

# **YANMAR**

# ***SERVICE MANUAL***

***MARINE DIESEL ENGINE***

**MODEL**

**2QM20(H)**

**3QM30(H)**

# Model **2QM20(H)·3QM30(H)**

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# CHAPTER 1

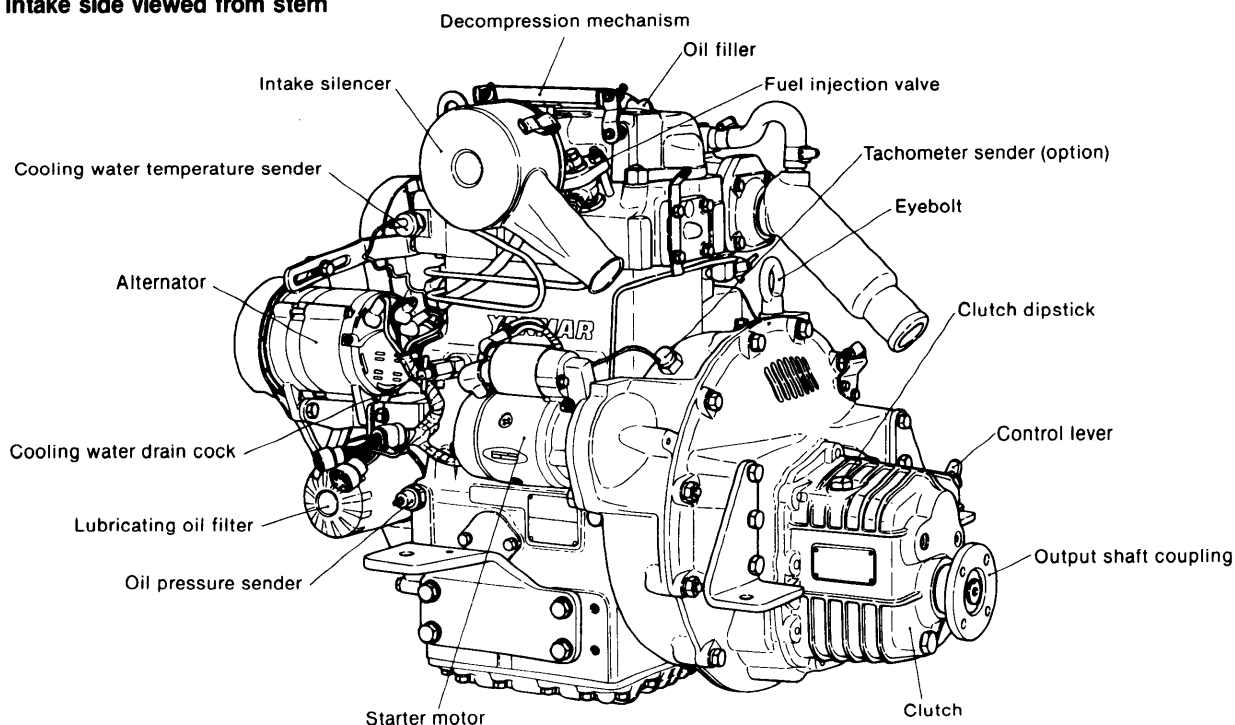
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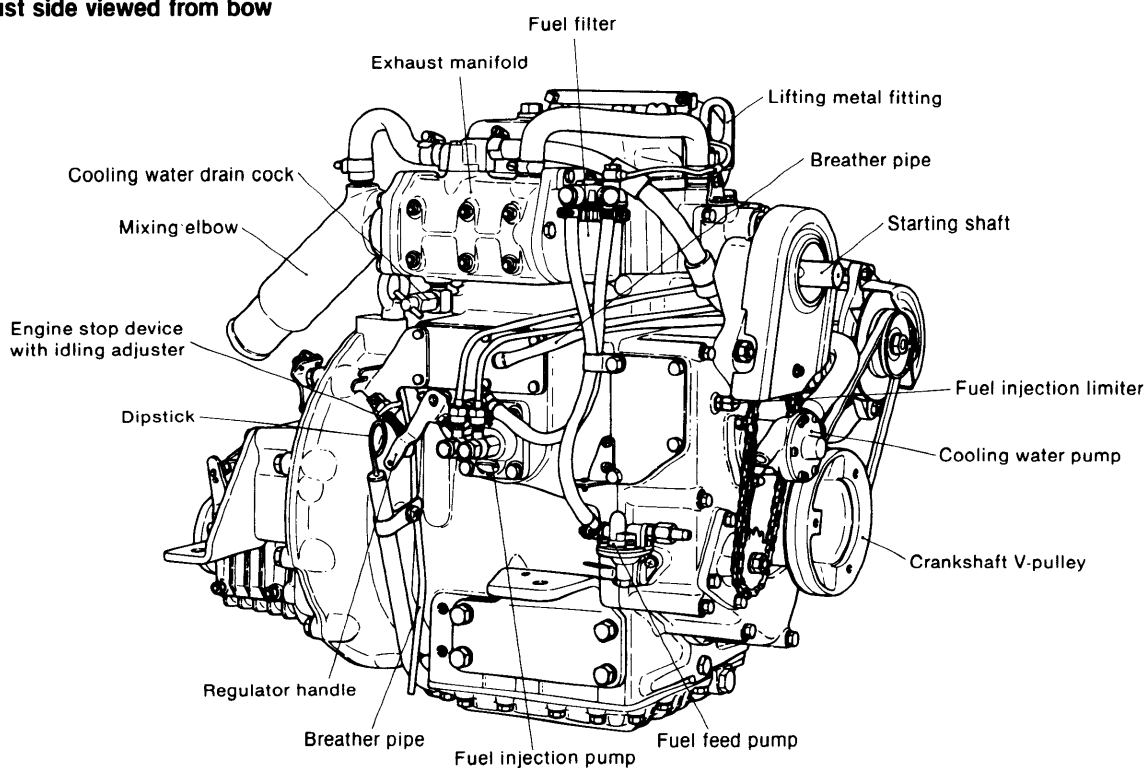
# 1. Exterior Views

## 1-1 2QM20H

### 1-1.1 Intake side viewed from stern

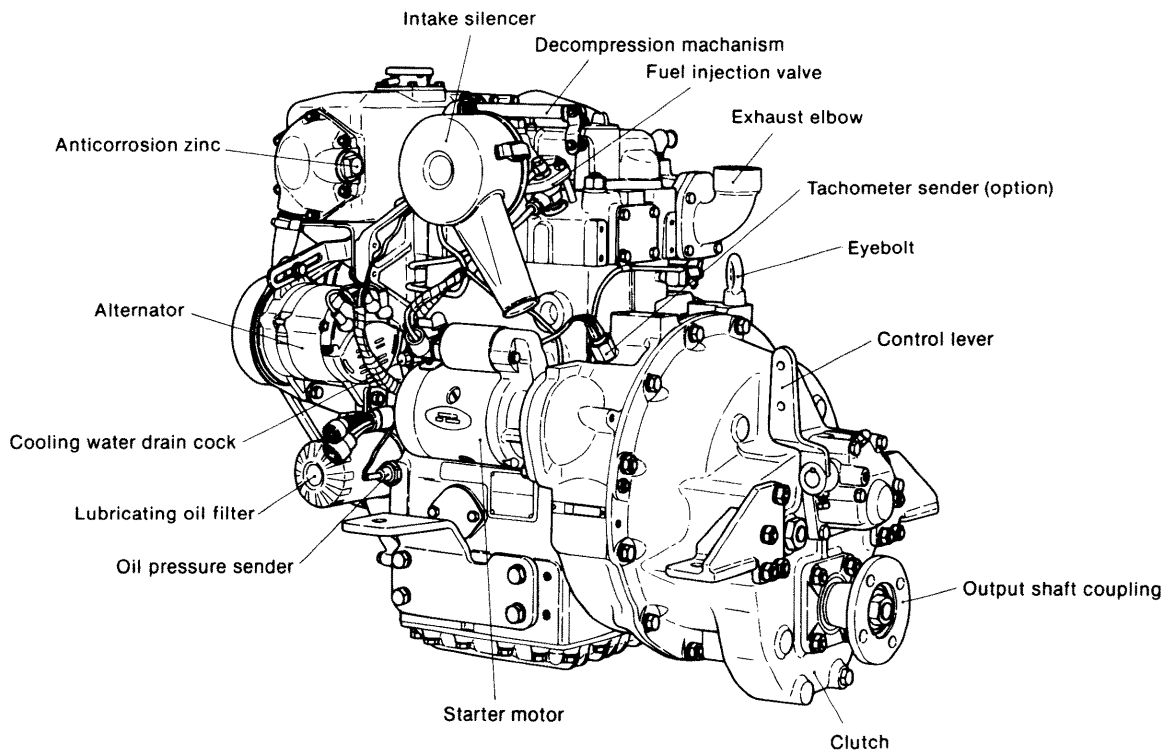


### 1-1.2 Exhaust side viewed from bow

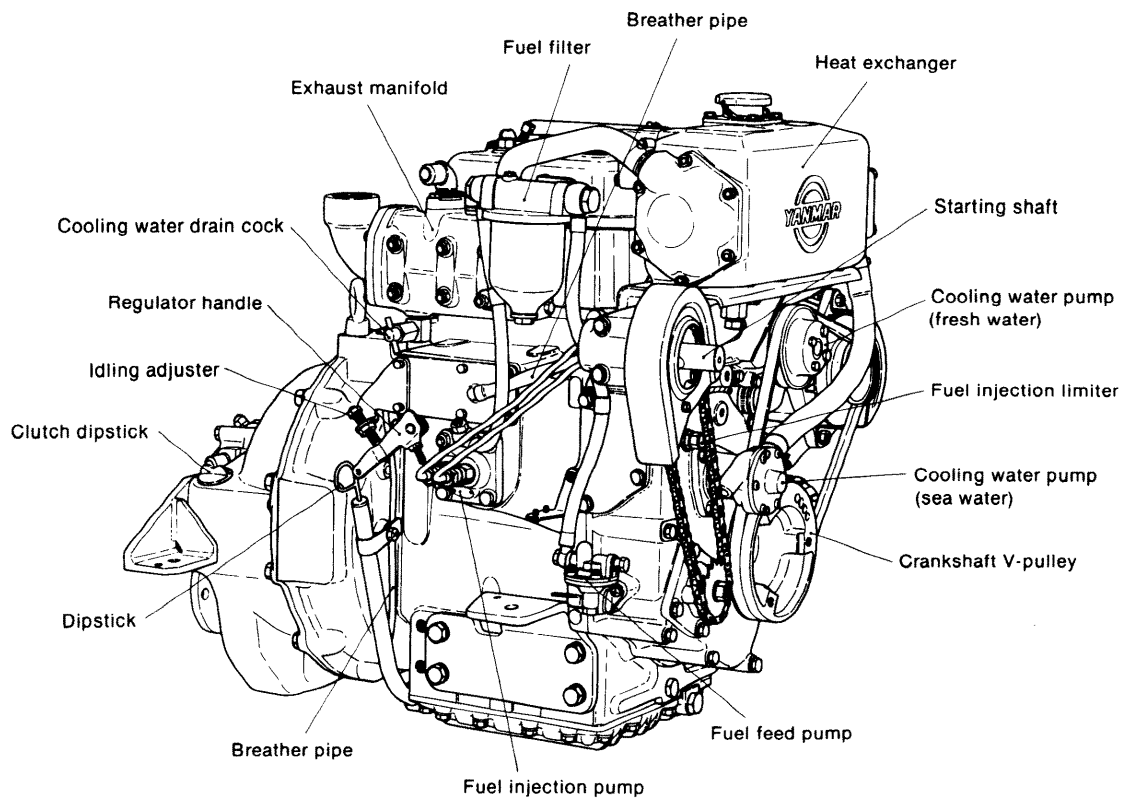


1-2 2QM20Y

1-2.1 Intake side viewed from stern

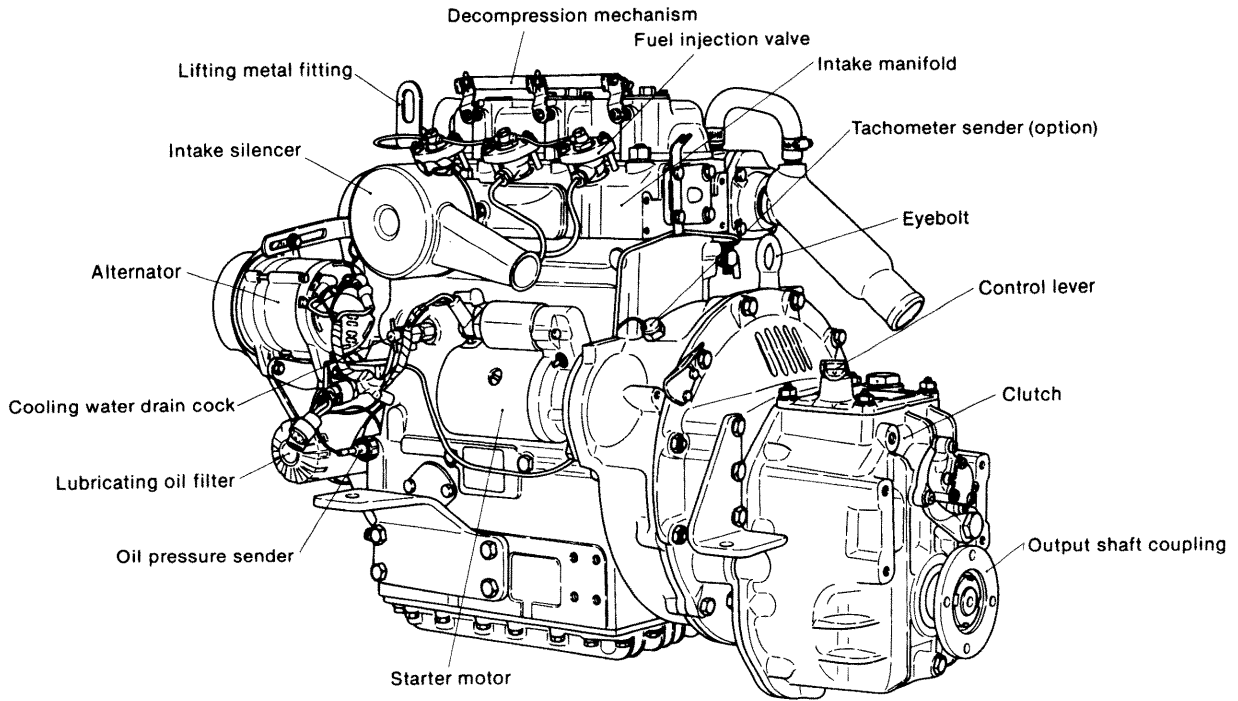


1-2.2 Exhaust side viewed from bow

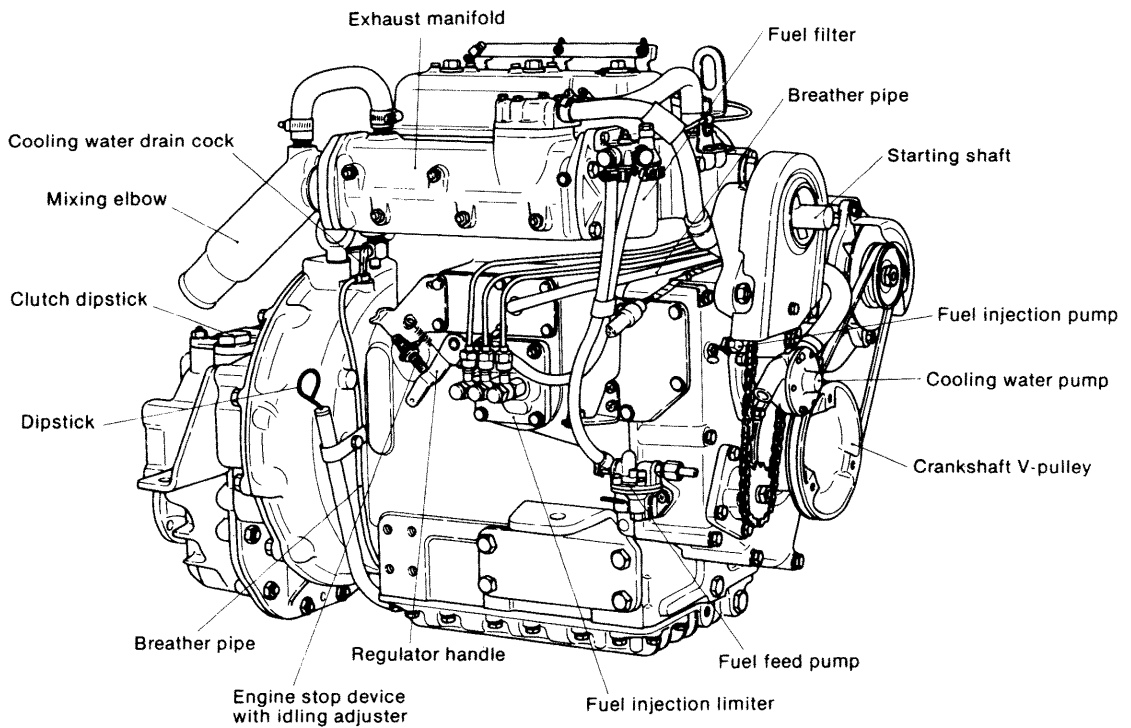


1-3 3QM30H

1-3.1 Intake side viewed from stern

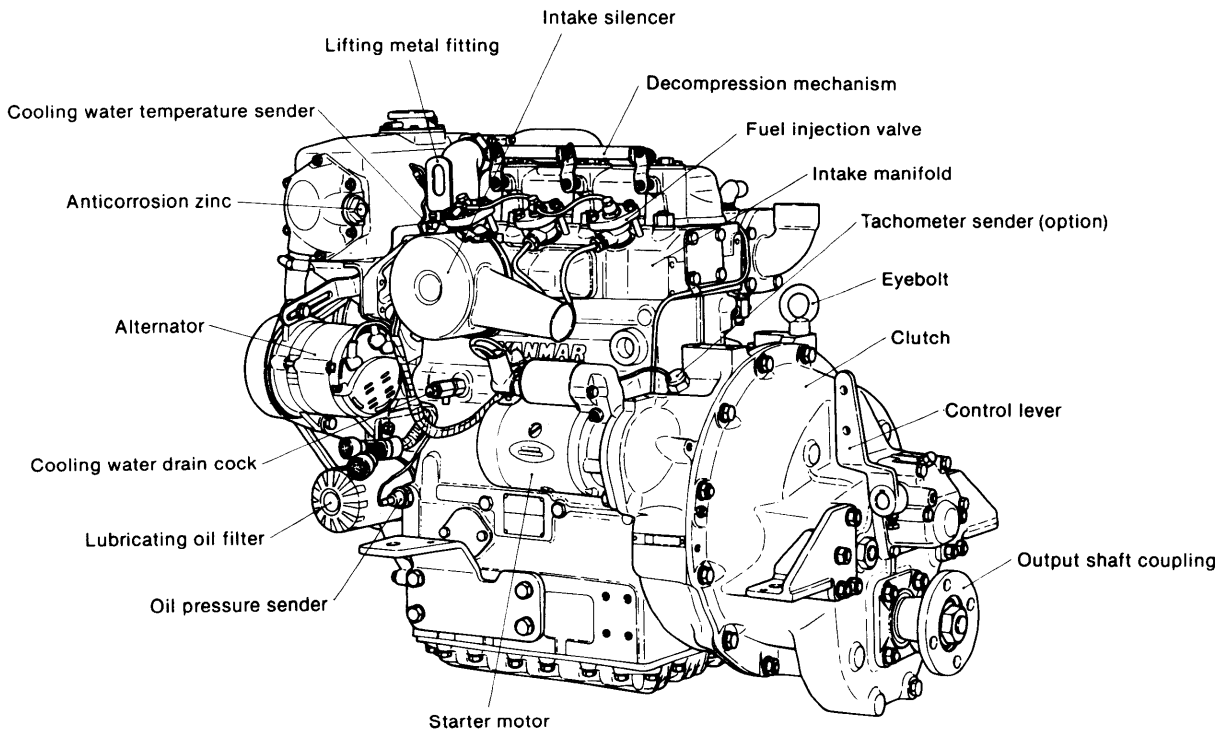


1-3.2 Exhaust side viewed from bow

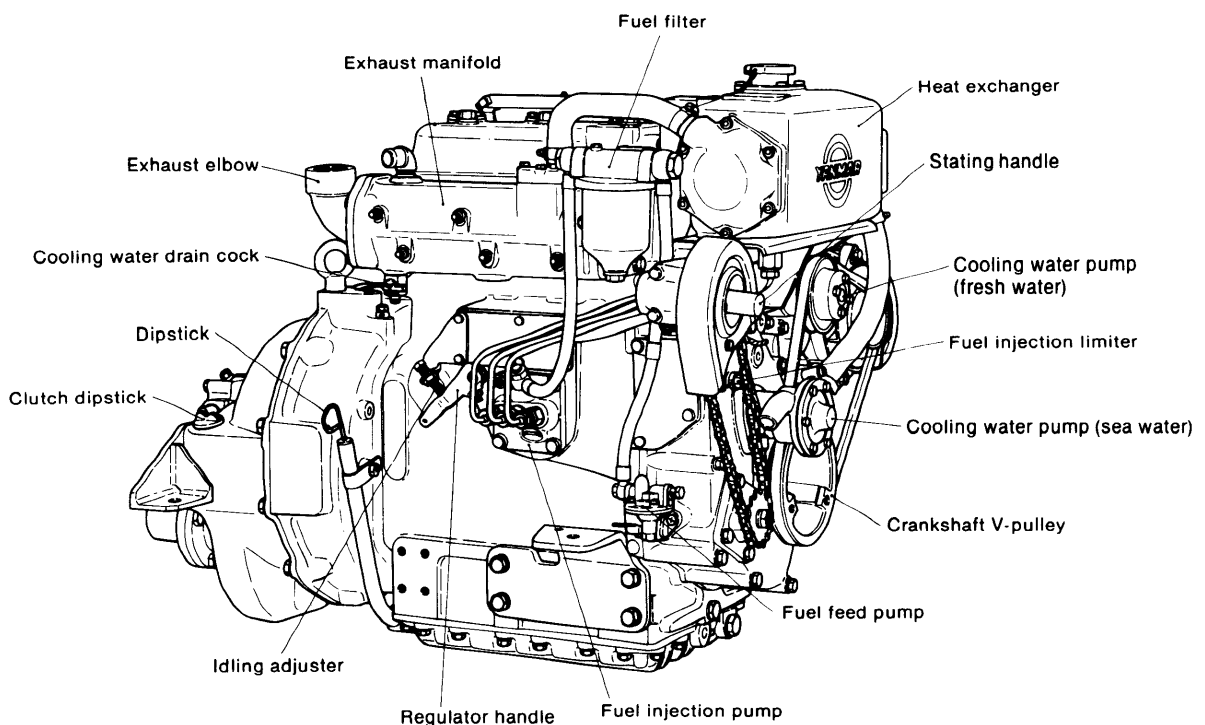


1-4 3QM30Y

1-4.1 Intake side viewed from stern



1-4.2 Exhaust side viewed from bow



## 2. Specifications

| Model                               |                               |                    | 2QM20[2QM20B]                               |      | 2QM20H                         |      | 2QM20Y                          |      | 2QM20F                         |      |  |
|-------------------------------------|-------------------------------|--------------------|---|------|--------------------------------|------|---------------------------------|------|--------------------------------|------|--|
| Type                                |                               |                    | Vertical 4-cycle water cooled diesel engine |      |                                |      |                                 |      |                                |      |  |
| Combustion chamber                  |                               |                    | Swirl pre-combustion chamber                |      |                                |      |                                 |      |                                |      |  |
| Number of cylinders                 |                               |                    | 2   |      |                                |      |                                 |      |                                |      |  |
| Bore × stroke                       |                               | mm                 | 88 × 90                                     |      |                                |      |                                 |      |                                |      |  |
| Displacement                        |                               | cc                 | 1094  |      |                                |      |                                 |      |                                |      |  |
| Continuous rating output (DIN6270A) | Output/Crankshaft speed       | HP/rpm             | 20/2600                                     |      |                                |      |                                 |      |                                |      |  |
|                                     | Brake mean effective pressure | kg/cm <sup>2</sup> | 6.33  |      |                                |      |                                 |      |                                |      |  |
|                                     | Piston speed                  | m/sec.             | 7.80  |      |                                |      |                                 |      |                                |      |  |
|                                     | Propeller speed (Ahead)       | rpm                | 1182  | 810  | 1215                           | 919  | 1182                            | 810  | 1215                           | 919  |  |
| One hour rating output (DIN6270B)   | Output/crankshaft speed       | HP/rpm             | 22/2800                                     |      |                                |      |                                 |      |                                |      |  |
|                                     | Brake mean effective pressure | kg/cm <sup>2</sup> | 6.46  |      |                                |      |                                 |      |                                |      |  |
|                                     | Piston speed                  | m/sec.             | 8.40  |      |                                |      |                                 |      |                                |      |  |
|                                     | Propeller speed (Ahead)       | rpm                | 1273  | 872  | 1308                           | 989  | 1273                            | 872  | 1308                           | 989  |  |
| Compression ratio                   |                               |                    | 20:1  |      |                                |      |                                 |      |                                |      |  |
| Fuel injection timing               |                               | degree             | bTDC 25                                     |      |                                |      |                                 |      |                                |      |  |
| Fuel injection pressure             |                               | kg/cm <sup>2</sup> | 160±10                                      |      |                                |      |                                 |      |                                |      |  |
| Engine weight (dry)                 |                               | kg                 | 220   |      | 190                            |      | 260                             |      | 230                            |      |  |
| Main power take off                 |                               |                    | at Flywheel side                            |      |                                |      |                                 |      |                                |      |  |
| Front power take off                |                               |                    | at Crankshaft V-pulley side                 |      |                                |      |                                 |      |                                |      |  |
| Direction of rotation               | Crankshaft                    |                    | Counter-clockwise viewed from stern         |      |                                |      |                                 |      |                                |      |  |
|                                     | Propeller shaft               |                    | Clockwise viewed from stern                 |      |                                |      |                                 |      |                                |      |  |
| Cooling system                      |                               |                    | Direct sea water cooling                    |      |                                |      | Fresh water cooling             |      |                                |      |  |
| Lubrication system                  |                               |                    | Complete enclosed forced lubrication        |      |                                |      |                                 |      |                                |      |  |
| Starting system                     |                               |                    | Electric and/or manual                      |      |                                |      |                                 |      |                                |      |  |
| Reduction gear system               |                               |                    | Constant-mesh spur gear                     |      | Constant-mesh helical gear     |      | Constant-mesh spur gear         |      | Constant-mesh helical gear     |      |  |
| Clutch                              | Type of clutch                |                    | Mechanical wet type single disc             |      | Mechanical wet type multi disc |      | Mechanical wet type single disc |      | Mechanical wet type multi disc |      |  |
|                                     | Model                         |                    | YP-7M[YP-10M]                               |      | KBW10A                         |      | YP-10M                          |      | KBW10A                         |      |  |
| Reduction ratio                     | Ahead                         |                    | 2.20  | 3.21 | 2.14                           | 2.83 | 2.20                            | 3.21 | 2.14                           | 2.83 |  |
|                                     | Astern                        |                    | 2.30  | 3.46 | 2.50                           |      | 2.30                            | 3.46 | 2.50                           |      |  |
| Dimensions                          | Overall length                | mm                 | 825 [810]                                   |      | 821.5                          |      | 810                             |      | 821.5                          |      |  |
|                                     | Overall height                | mm                 | 675 [673]                                   |      | 665                            |      | 714                             |      | 706                            |      |  |
|                                     | Overall width                 | mm                 | 501   |      | 501                            |      | 562                             |      | 562                            |      |  |
| Lubricating oil capacity            | Total                         | ℓ                  | 5.1   |      |                                |      |                                 |      |                                |      |  |
|                                     | Effective                     | ℓ                  | 3.3   |      |                                |      |                                 |      |                                |      |  |
|                                     | Clutch                        | ℓ                  | 0.8 [1.2]                                   |      | *0.6                           |      | 1.2                             |      | *0.6                           |      |  |

Model YP-7M clutch equipped on 2QM20 will be changed to model YP-10M, which is a standard clutch for 3QM30. Please notice that YP-10M clutch is equipped on "2QM20B".  
The engine output of model "2QM20B" is the same output as model 2QM20.



Chapter 1 General  
2. Specifications

SM/2QM20(H)·3QM30(H)

| Model                               |                               |                    | 3QM30                                       |      | 3QM30H                         |      | 3QM30Y                          |      | 3QM30F                         |      |
|-------------------------------------|-------------------------------|--------------------|---|------|--------------------------------|------|---------------------------------|------|--------------------------------|------|
| Type                                |                               |                    | Vertical 4-cycle water cooled diesel engine |      |                                |      |                                 |      |                                |      |
| Combustion chamber                  |                               |                    | Swirl pre-combustion chamber                |      |                                |      |                                 |      |                                |      |
| Number of cylinders                 |                               |                    | 3   |      |                                |      |                                 |      |                                |      |
| Bore × stroke                       |                               | mm                 | 88 × 90                                     |      |                                |      |                                 |      |                                |      |
| Displacement                        |                               | cc                 | 1642  |      |                                |      |                                 |      |                                |      |
| Continuous rating output (DIN6270A) | Output/Crankshaft speed       | HP/rpm             | 30/2600                                     |      |                                |      |                                 |      |                                |      |
|                                     | Brake mean effective pressure | kg/cm <sup>2</sup> | 6.32  |      |                                |      |                                 |      |                                |      |
|                                     | Piston speed                  | m/sec.             | 7.80  |      |                                |      |                                 |      |                                |      |
|                                     | Propeller speed (Ahead)       | rpm                | 1182  | 810  | 1281                           | 867  | 1182                            | 810  | 1281                           | 867  |
| One hour rating output (DIN6270B)   | Output/crankshaft speed       | HP/rpm             | 33/2800                                     |      |                                |      |                                 |      |                                |      |
|                                     | Brake mean effective pressure | kg/cm <sup>2</sup> | 6.46  |      |                                |      |                                 |      |                                |      |
|                                     | Piston speed                  | m/sec.             | 8.40  |      |                                |      |                                 |      |                                |      |
|                                     | Propeller speed (Ahead)       | rpm                | 1273  | 872  | 1379                           | 933  | 1273                            | 872  | 1379                           | 933  |
| Compression ratio                   |                               |                    | 20:1  |      |                                |      |                                 |      |                                |      |
| Fuel injection timing               |                               | degree             | bTDC 28                                     |      |                                |      |                                 |      |                                |      |
| Fuel injection pressure             |                               | kg/cm <sup>2</sup> | 160±10                                      |      |                                |      |                                 |      |                                |      |
| Engine weight (dry)                 |                               | kg                 | 280   |      | 260                            |      | 310                             |      | 290                            |      |
| Main power take off                 |                               |                    | at Flywheel side                            |      |                                |      |                                 |      |                                |      |
| Front power take off                |                               |                    | at Crankshaft V-pulley side                 |      |                                |      |                                 |      |                                |      |
| Direction of rotation               | Crankshaft                    |                    | Counter-clockwise viewed from stern         |      |                                |      |                                 |      |                                |      |
|                                     | Propeller shaft               |                    | Clockwise viewed from stern                 |      |                                |      |                                 |      |                                |      |
| Cooling system                      |                               |                    | Direct sea water cooling                    |      |                                |      | Fresh water cooling             |      |                                |      |
| Lubrication system                  |                               |                    | Complete enclosed forced lubrication        |      |                                |      |                                 |      |                                |      |
| Starting system                     |                               |                    | Electric and/or manual                      |      |                                |      |                                 |      |                                |      |
| Reduction gear system               |                               |                    | Constant-mesh spur gear                     |      | Constant-mesh helical gear     |      | Constant-mesh spur gear         |      | Constant-mesh helical gear     |      |
| Clutch                              | Type of clutch                |                    | Mechanical wet type single disc             |      | Mechanical wet type multi disc |      | Mechanical wet type single disc |      | Mechanical wet type multi disc |      |
|                                     | Model                         |                    | YP-10M                                      |      | KH18                           |      | YP-10M                          |      | KH18                           |      |
| Reduction ratio                     | Ahead                         |                    | 2.20  | 3.21 | 2.13                           | 3.00 | 2.20                            | 3.21 | 2.13                           | 3.00 |
|                                     | Astern                        |                    | 2.30  | 3.46 | 1.96                           | 3.06 | 2.30                            | 3.46 | 1.96                           | 3.06 |
| Dimensions                          | Overall length                | mm                 | 924   |      | 952.5                          |      | 924                             |      | 966.5                          |      |
|                                     | Overall height                | mm                 | 673   |      | 692                            |      | 714                             |      | 733                            |      |
|                                     | Overall width                 | mm                 | 501   |      | 501                            |      | 562                             |      | 562                            |      |
| Lubricating oil capacity            | Total                         | ℓ                  | 6.5   |      |                                |      |                                 |      |                                |      |
|                                     | Effective                     | ℓ                  | 2.2   |      |                                |      |                                 |      |                                |      |
|                                     | Clutch                        | ℓ                  | 1.2   |      | *1.7                           |      | 1.2                             |      | *1.7                           |      |

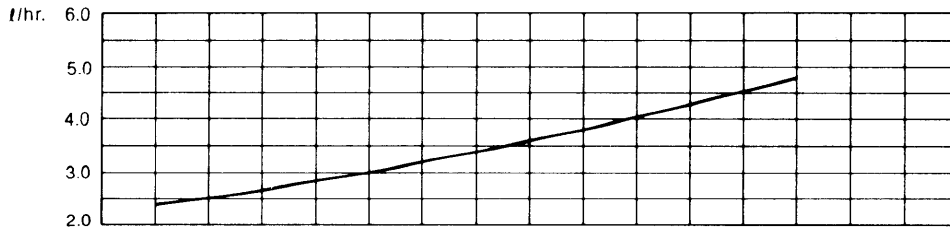
# 3. Principal Construction

| Group  | Part                      | Construction                                      | 2QM20<br>2QM20B | 2QM20H | 2QM20Y | 2QM20F | 3QM30 | 3QM30H | 3QM30Y | 3QM30F |
|--|---------------------------|---|-----------------|--------|--------|--------|-------|--------|--------|--------|
|  | Cylinder block            | Integrally-cast water jacket and crankcase        | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Engine block                                   | Cylinder liner            | Wet type coated with anticorrosion point          | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Main bearing              | Bearing housing type without intermediate bearing | ○               | ○      | ○      | ○      |       |        |        |        |
|  |                           | Bearing housing type with intermediate bearing    |                 |        |        |        | ○     | ○      | ○      | ○      |
|  | Oil sump                  | Bottom cover (Oil pan)                            | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Intake and exhaust systems and valve mechanism | Cylinder head             | Integrated two-cylinder                           | ○               | ○      | ○      | ○      |       |        |        |        |
|  |                           | Integrated three-cylinder                         |                 |        |        |        | ○     | ○      | ○      | ○      |
|  | Intake and exhaust valves | Poppet type, seat angle 90°                       | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Exhaust manifold          | Integral water-cooled type                        | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Exhaust silencer          | Water-cooled mixing elbow                         | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Valve mechanism           | Overhead valve push rod, rocker arm system        | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Intake silencer           | Polyurethane filter, sound absorbing type         | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Main moving elements                           | Crankshaft                | Stamped forging                                   | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Flywheel                  | Cast iron with ring gear                          | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Piston                    | Oval type   | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Piston pin                | Full floating type                                | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Piston rings              | 3-compression rings, 1-oil ring                   | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Lubrication system                             | Oil pump                  | Trochoid pump                                     | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Oil filter                | Full-flow, spin-on cartridge type                 | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Oil level gauge           | Dipstick  | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Cooling system                                 | Water pump                | Rubber impeller type                              | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Thermostat                | Wax pellet type                                   | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Fresh water cooling       | Heat exchanger                                    |                 |        | ○      | ○      |       |        | ○      | ○      |
| Bilge system                                   | Bilge pump                | Rubber impeller combined with cooling water pump  | ○               | ○      | ○      | ○      | ○     | ○      | ○      |        |
| Fuel system                                    | Fuel injection pump       | Integral 2-cylinder type                          | ○               | ○      | ○      | ○      |       |        |        |        |
|  |                           | Integral 3-cylinder type                          |                 |        |        |        | ○     | ○      | ○      | ○      |
|  | Fuel injection valve      | Throttle type                                     | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Fuel strainer             | Paper element type                                | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Fuel feed pump            | Mechanical camshaft driven                        | ○               | ○      | ○      | ○      | ○     | ○      | ○      |        |
| Governor                                       | Governor                  | Centrifugal all speed mechanical type             | ○               | ○      | ○      | ○      | ○     | ○      | ○      |        |
| Starting system                                | Electric                  | Pinion shift type starter motor                   | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Manual                    | Cranking handle with chain sprocket               | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
| Electrical system                              | Charger                   | Alternator with built-in IC regulator             | ○               | ○      | ○      | ○      | ○     | ○      | ○      |        |
| Reduction reversing                            | Reduction gear            | Constant mesh spur gear                           | ○               |        | ○      |        | ○     |        | ○      |        |
|  |                           | Constant mesh helical gear                        |                 | ○      |        | ○      |       | ○      |        | ○      |
| Clutch system                                  | Clutch                    | Wet type single disc, mechanical                  | ○               |        | ○      |        | ○     |        | ○      |        |
|  |                           | Wet type multi disc, mechanical                   |                 | ○      |        | ○      |       | ○      |        | ○      |
| Remote control                                 | Decompression             | Boden wire  | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | Engine stop               | Boden wire  | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |
|  | One-handle remote control | Speed and Clutch control                          |                 | ○      |        | ○      |       | ○      |        | ○      |
|  |                           | Speed control                                     | ○               |        | ○      |        | ○     |        | ○      |        |
|  | Two-handle remote control | Clutch control                                    | ○               |        | ○      |        | ○     |        | ○      |        |
| Electric wiring                                |                           | Extension wireharness                             | ○               | ○      | ○      | ○      | ○     | ○      | ○      | ○      |

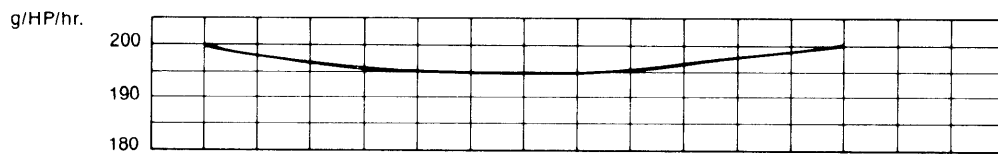
# 4. Performance Curves

## 4-1 2QM20(H)

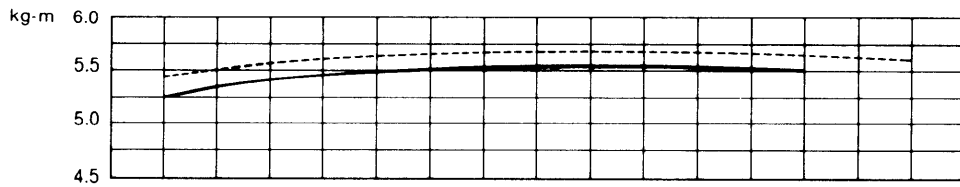
Fuel consumption



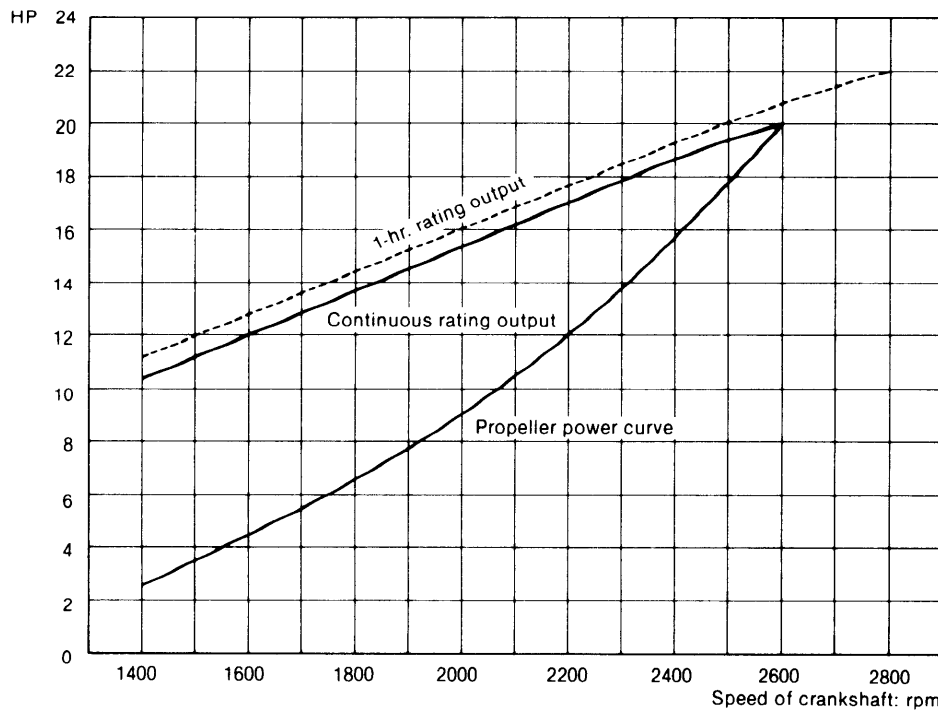
Specific fuel consumption



Torque

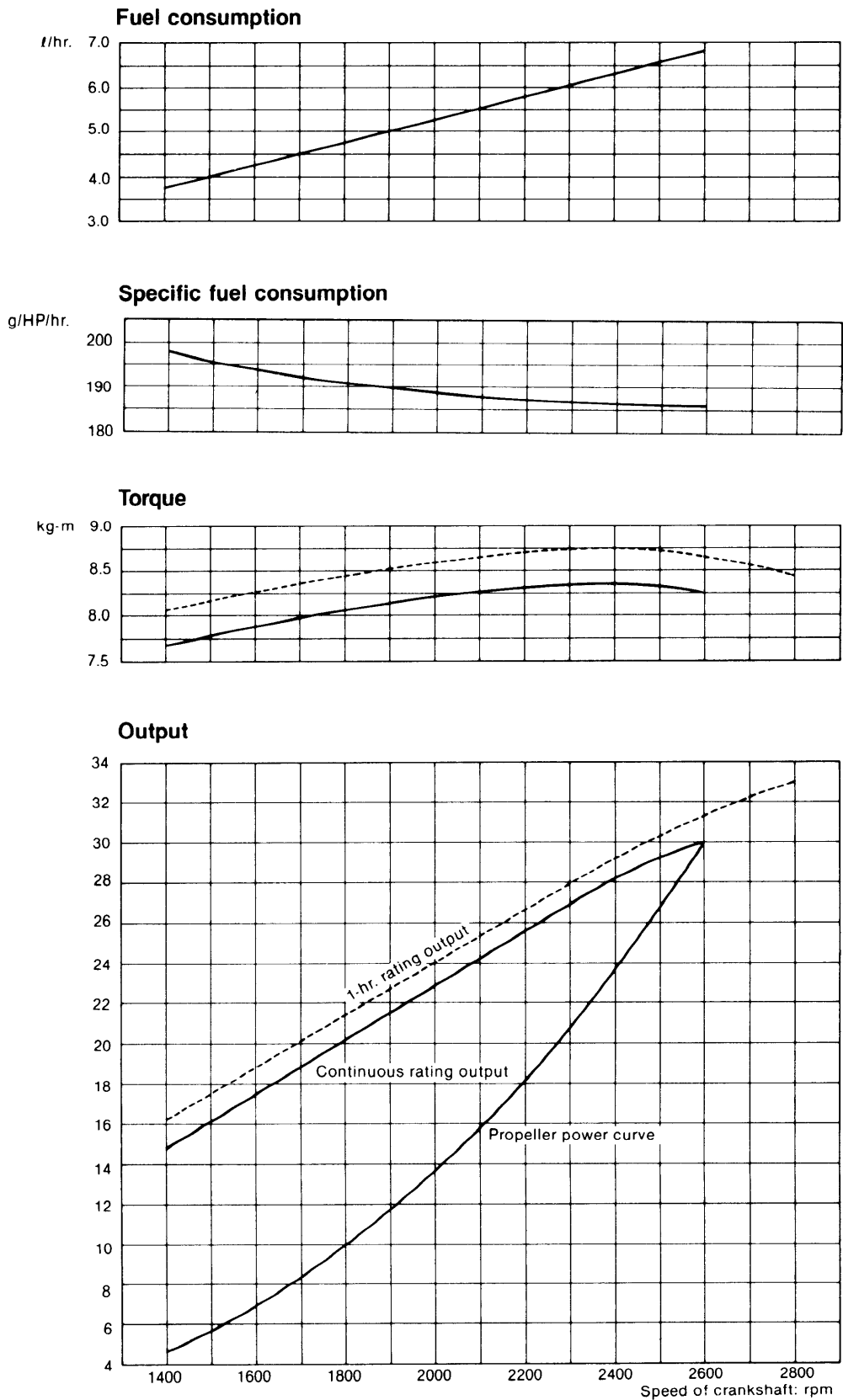


Output



Note: These curves show the average performance of respective engines in test operation at our plant.

4-2 3QM30(H)



Note: These curves show the average performance of respective engines in test operation at our plant.

## 5. Features

### 1. Superior combustion performance

The unique Yanmar swirl precombustion chamber combustion system and new cooling system display superior combustion performance in all types of operation. Low-speed, low-load combustion performance, especially demanded for marine applications, is also superb, and stable performance is maintained over a wide range of speeds. Since starting characteristics are also excellent and warm-up is fast, full engine performance can be obtained within a short time.

### 2. Low operating costs

Excellent combustion and low friction reduce fuel costs, while the optimized piston shape and ring configuration and improved cooling system reduce oil consumption. Continuous operating time has been extended and operating costs reduced through improved durability.

### 3. Compact, lightweight

The cylinder head is the integrally-cast type, and the crankshaft is the housing type. Minimum weight has been pursued for each engine part, and a reduction reversing gear employing a special new mechanism has been incorporated to obtain revolutionary engine lightness.

### 4. Long term continuous operation

Improved durability has been achieved by adopting special construction and materials for main moving parts and the valve mechanism, which are the areas most subject to trouble in high-speed engines. Moreover, a bypass system with a thermostat maintains the cooling water at a stable high temperature, resulting in reduced cylinder liner and piston ring wear, reduced thermal load around the combustion chamber, and substantially improved durability. Long-term continuous operation is possible by correct operation and proper attention to fuel and lubricating oil.

### 5. Low vibration

Vibration has been reduced by minimizing the weights of the pistons, connecting rods, and other sources of vibration, stringent weight management at assembly, and balancing of the flywheel, V-pulley, etc. Vibration has also been suppressed through the adoption of a special cylinder block rib construction and improved rigidity. Rubber shock mounts are available when the engine is to be used under conditions which may lead to severe vibration.

### 6. Quiet operation

Intake and exhaust noises have been lowered by adopting an intake silencer, water-cooled exhaust manifold and water mixing elbow type exhaust system.

The precombustion chamber system and semi-throttle type injection valve suppress combustion noise substantially.

Moreover, gear noise has been reduced by the use of helical gears around the gear train and clutch gear, and by the buffering effect of a damper disc.

In addition, noise prevention measures have also been taken at the control valve mechanism and other parts.

### 7. Superior matching to the hull

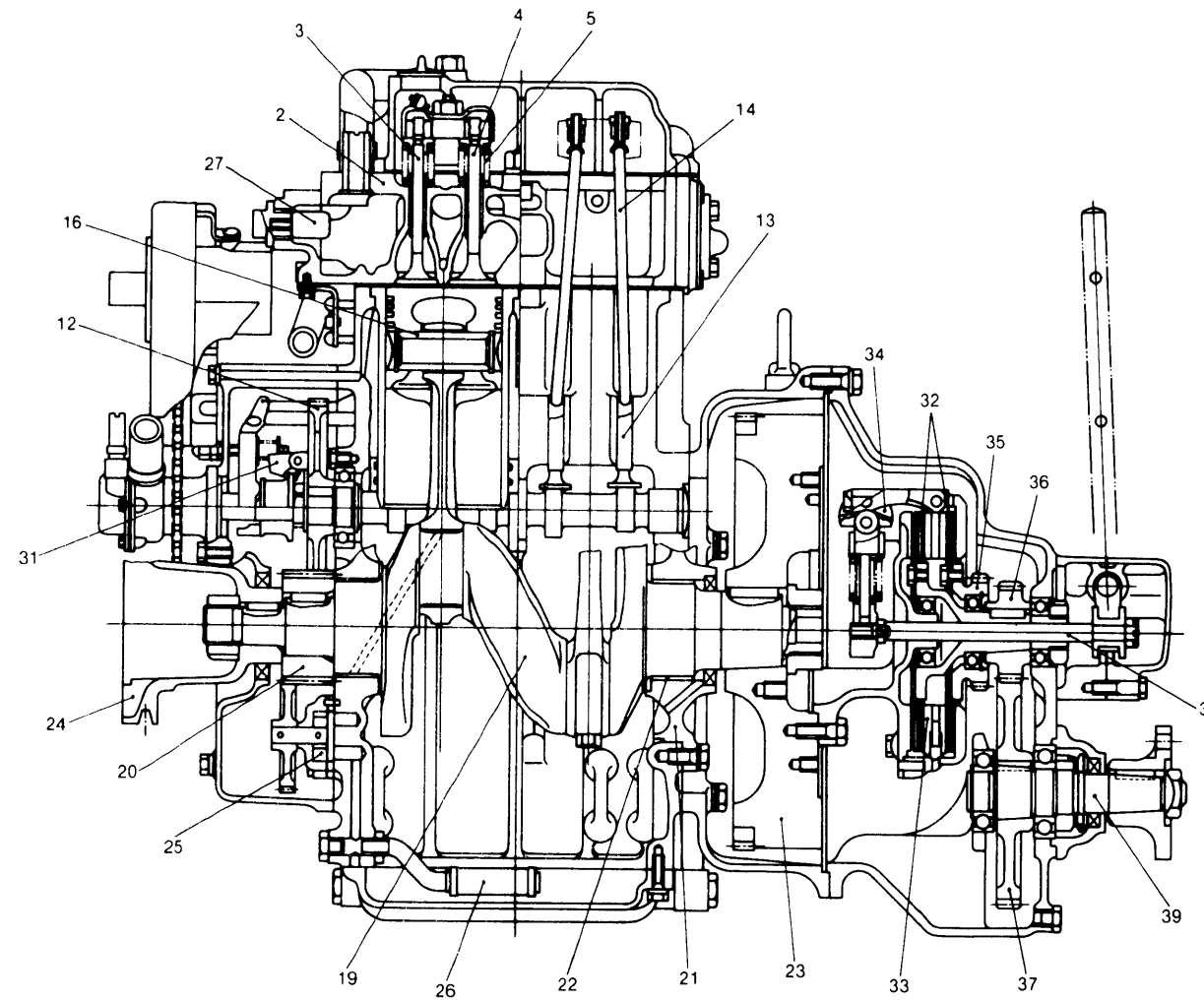
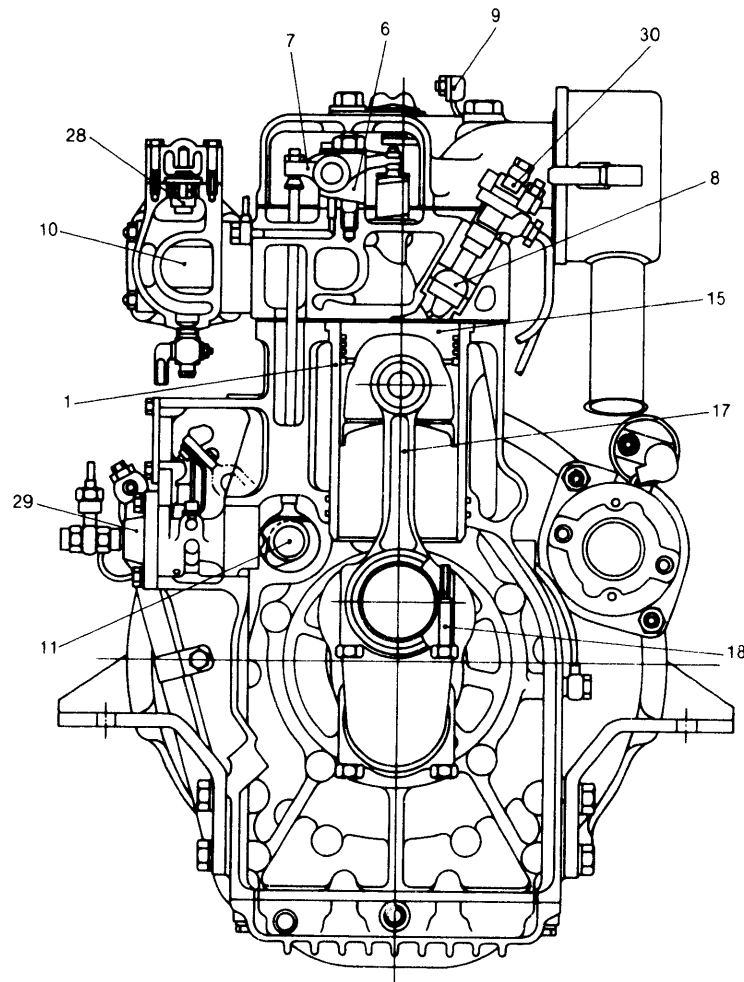
- (1) Four-point support engine installation feet make installation easy.
- (2) Mist intake system prevents contamination of the engine room.
- (3) Since the fuel pump is mounted on the engine, the fuel tank can be installed anywhere.
- (4) Water-cooled manifold prevents a rise in the engine room temperature.
- (5) Independent type instrument panel can be installed wherever it is easiest to see.
- (6) Speed, clutch forward and reverse, decompression and engine stop can all be remotely controlled.
- (7) The use of rubber and vinyl hoses for ship interior piping not only facilitates piping work, but also eliminates brazing faults caused by vibration.
- (8) Tandem type cooling water/bilge pump is available as an option.

### 8. Easy to operate

- (1) Cooling water temperature switch and lubricating oil pressure switch are provided, and alarm lamps and buzzer are mounted on the instrument panel.
- (2) Threaded hole in the V-pulley permits front power take-off.
- (3) Manual starting handle permits manual starting.
- (4) Positive clutch engagement and disengagement; propeller shaft does not rotate when clutch is placed in neutral position.

## 6. Engine Cross-Section

### 6-1 2QM20



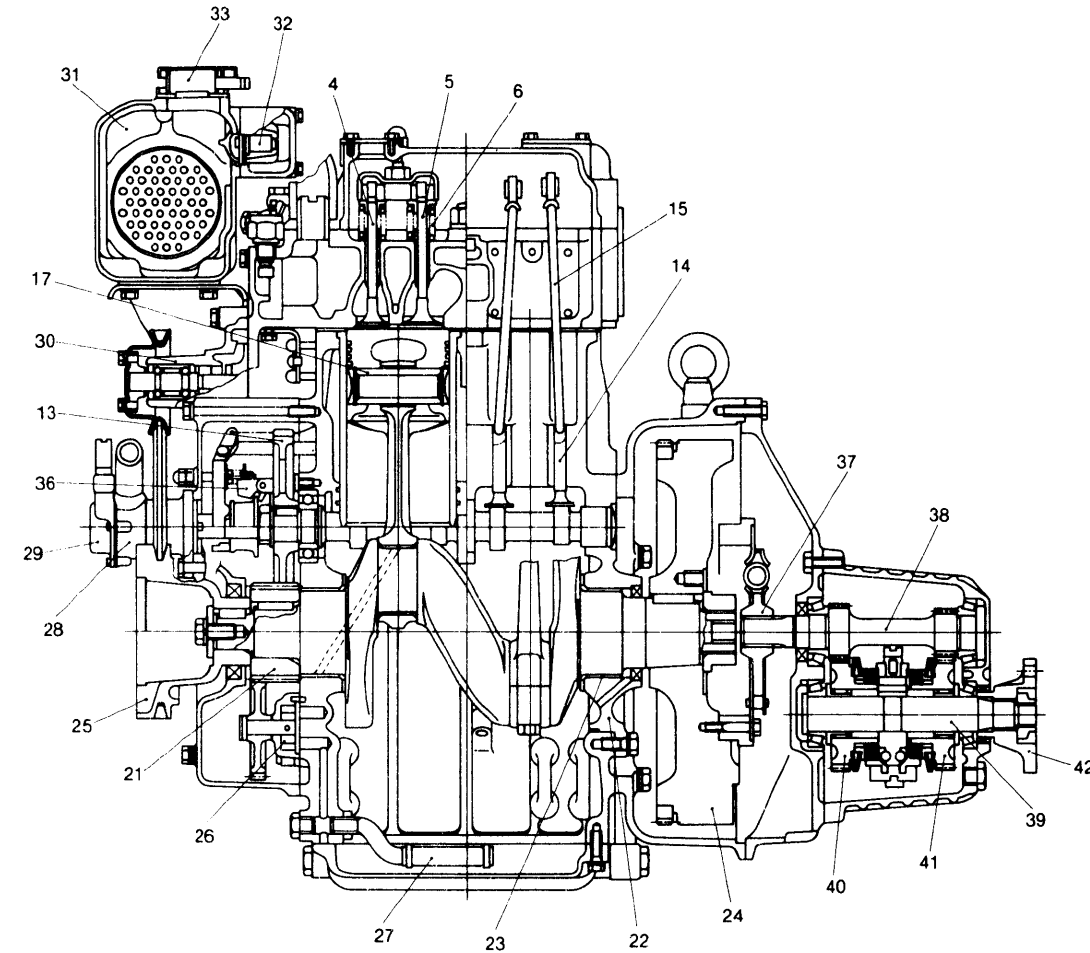
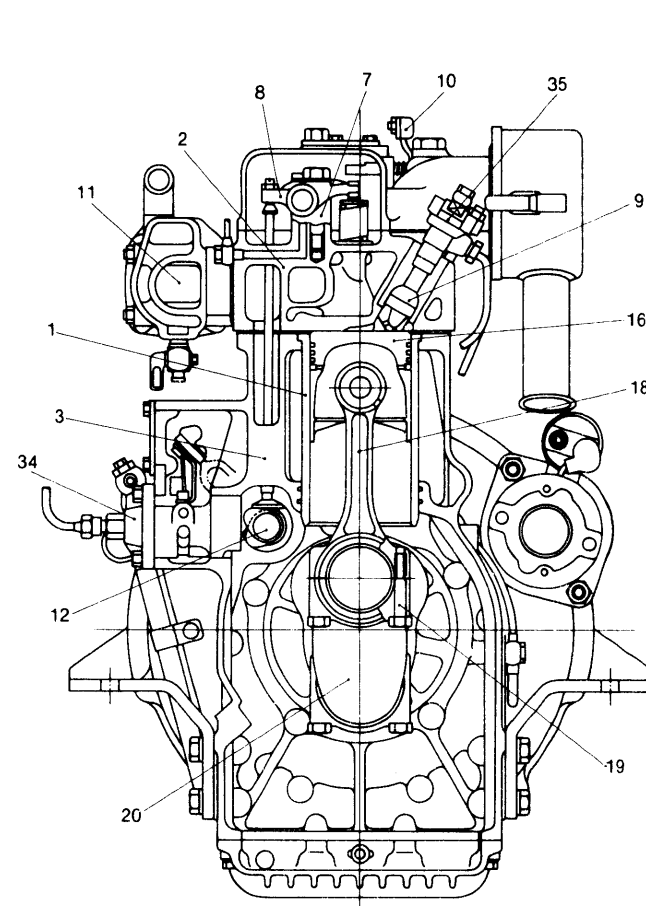
- 1. Cylinder liner
- 2. Cylinder head
- 3. Exhaust valve
- 4. Intake valve
- 5. Valve spring
- 6. Valve rocker arm support
- 7. Valve rocker arm
- 8. Precombustion chamber
- 9. Decompression lever
- 10. Exhaust manifold

- 11. Camshaft
- 12. Camshaft gear
- 13. Tappet
- 14. Push rod
- 15. Piston
- 16. Piston pin
- 17. Connecting rod
- 18. Connecting rod bolt
- 19. Crankshaft
- 20. Crankshaft gear

- 21. Main bearing housing
- 22. Main bearing
- 23. Flywheel
- 24. Crankshaft V-pulley
- 25. Lubricating oil pump
- 26. Lubricating oil inlet pipe
- 27. Anticorrosion zinc
- 28. Thermostat
- 29. Fuel injection pump
- 30. Fuel injection valve

- 31. Governor weight
- 32. Friction disc
- 33. Steel disc plate
- 34. V-lever
- 35. Reversing shaft gear
- 36. Forward small gear
- 37. Forward large gear
- 38. Shifting shaft
- 39. Output shaft

6-2 2QM20F



- 1. Cylinder liner
- 2. Cylinder head
- 3. Cylinder block
- 4. Exhaust valve
- 5. Intake valve
- 6. Valve spring
- 7. Valve rocker arm support
- 8. Valve rocker arm
- 9. Precombustion chamber
- 10. Decompression lever

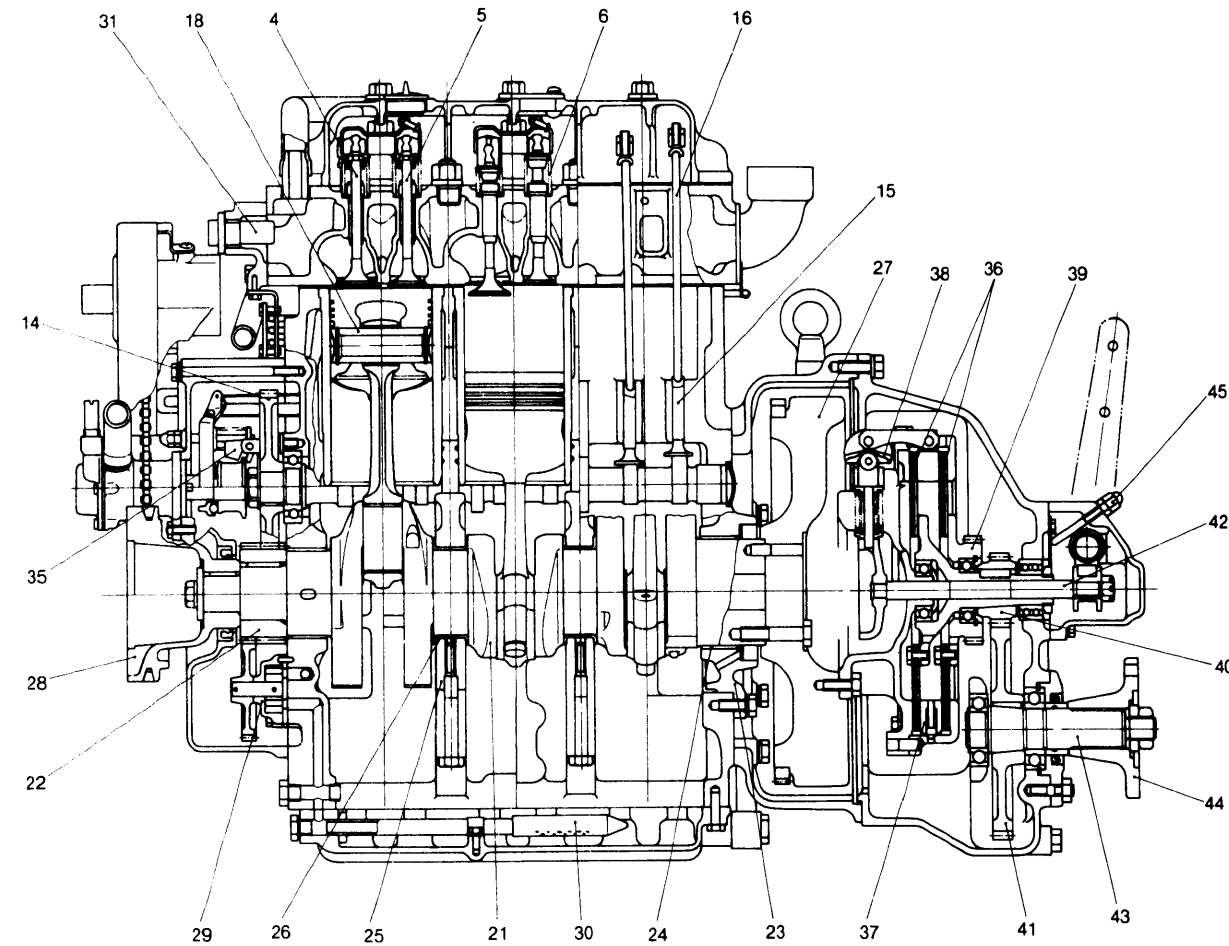
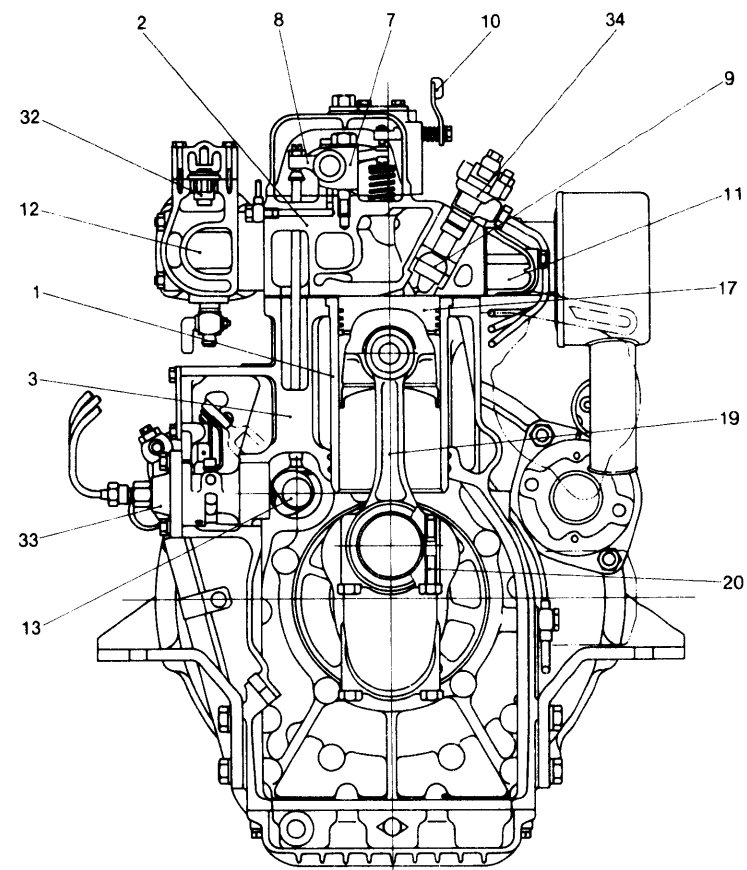
- 11. Exhaust manifold
- 12. Camshaft
- 13. Camshaft gear
- 14. Tappet
- 15. Push rod
- 16. Piston
- 17. Piston pin
- 18. Connecting rod
- 19. Connecting rod bolt
- 20. Crankshaft

- 21. Crankshaft gear
- 22. Main bearing housing
- 23. Main bearing
- 24. Flywheel
- 25. Crankshaft V-pulley
- 26. Lubricating oil pump
- 27. Lubricating oil inlet pipe
- 28. Cooling water pump (sea water)
- 29. Bilge pump (option)
- 30. Cooling water pump (fresh water)

- 31. Heat exchanger
- 32. Thermostat
- 33. Filler cap (with pressure valve)
- 34. Fuel injection pump
- 35. Fuel injection valve
- 36. Governor weight
- 37. Damper disc
- 38. Input shaft
- 39. Output shaft
- 40. Forward large gear

- 41. Reverse large gear
- 42. Output shaft coupling

6-3 3QM30



- 1. Cylinder liner
- 2. Cylinder head
- 3. Cylinder block
- 4. Intake valve
- 5. Exhaust valve
- 6. Valve spring
- 7. Valve rocker arm support
- 8. Valve rocker arm
- 9. Precombustion chamber
- 10. Decompression lever

- 11. Intake manifold
- 12. Exhaust manifold
- 13. Camshaft
- 14. Camshaft gear
- 15. Tappet
- 16. Push rod
- 17. Piston
- 18. Piston pin
- 19. Connecting rod
- 20. Connecting rod bolt

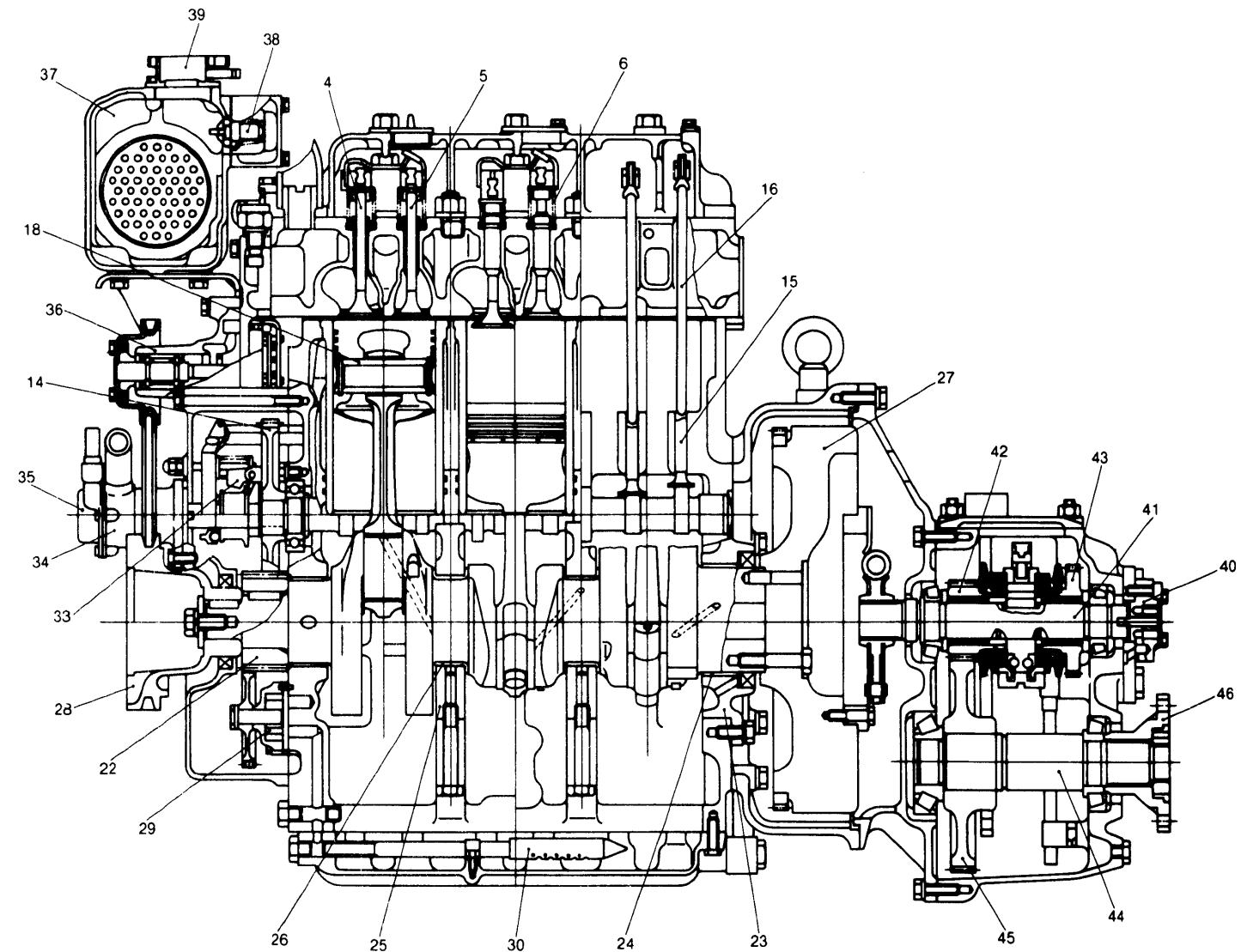
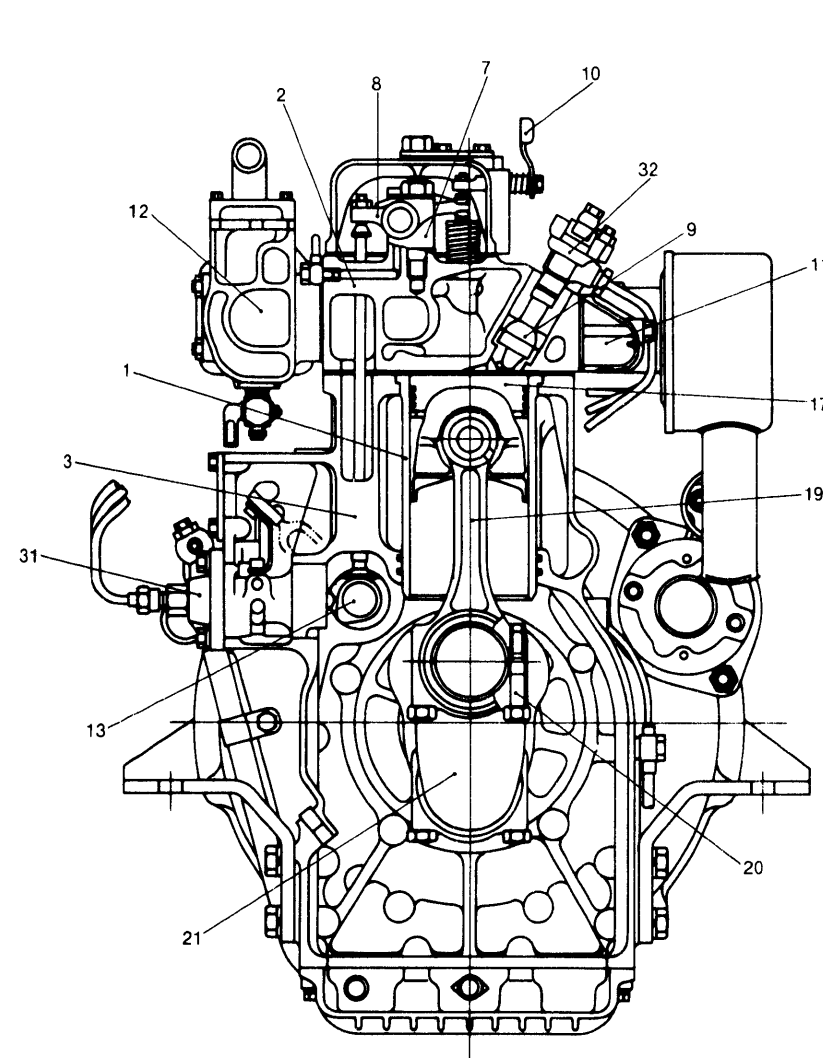
- 21. Crankshaft
- 22. Crankshaft gear
- 23. Main bearing housing
- 24. Main bearing
- 25. Intermediate main bearing housing
- 26. Intermediate main bearing
- 27. Flywheel
- 28. Crankshaft V-pulley
- 29. Lubricating oil pump
- 30. Lubricating oil inlet pipe

- 31. Anticorrosion zinc
- 32. Thermostat
- 33. Fuel injection pump
- 34. Fuel injection valve
- 35. Governor weight
- 36. Friction disc
- 37. Steel disc plate
- 38. V-lever
- 39. Reversing shaft gear
- 40. Forward small gear

- 41. Forward large gear
- 42. Shifting shaft
- 43. Output shaft
- 44. Output shaft coupling
- 45. Neutral point set claw



6-4 3QM30F

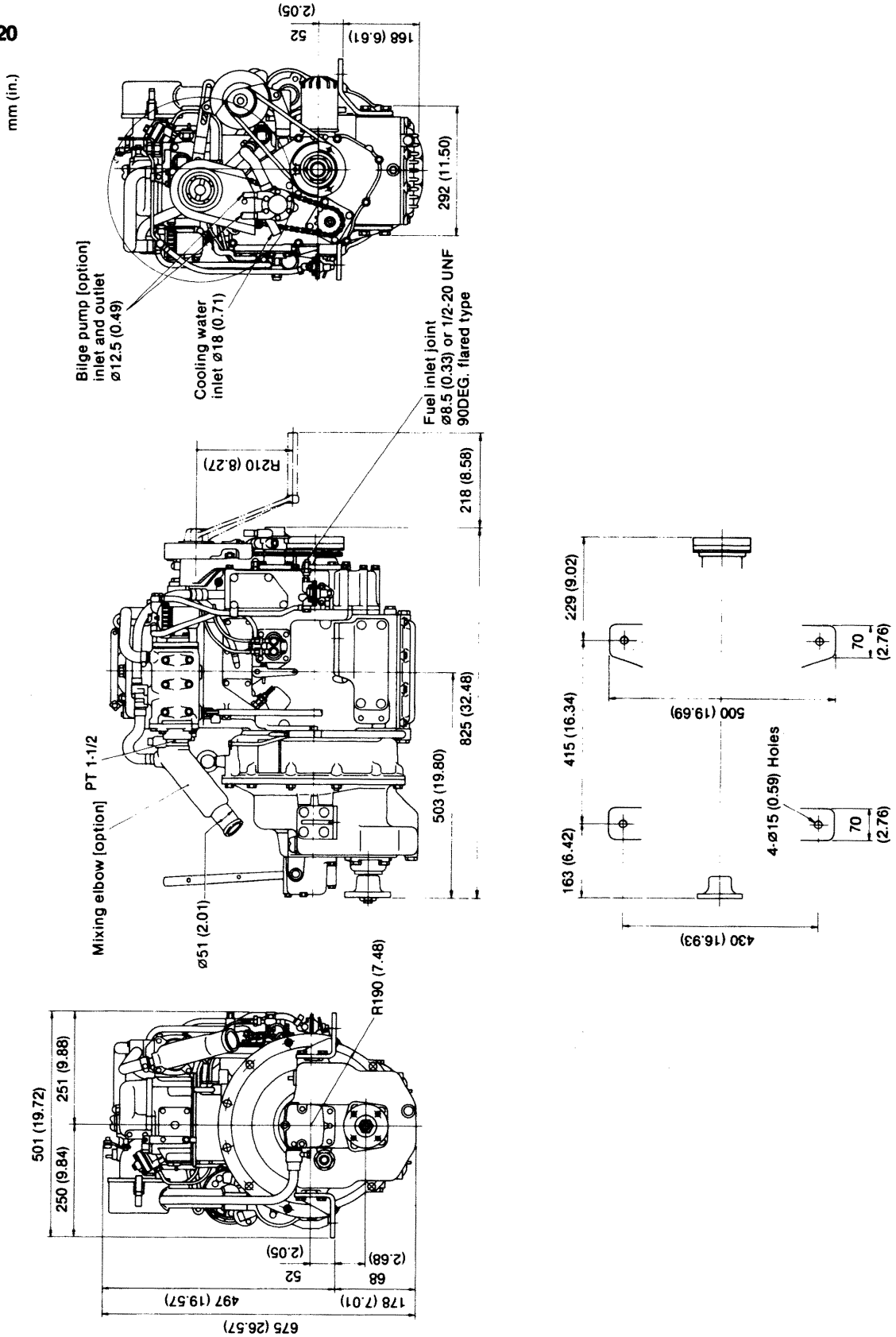


- |                             |                         |                                       |   |
|-----------------------------|-------------------------|---------------------------------------|---|
| 1. Cylinder liner           | 11. Intake manifold     | 21. Crankshaft                        | 31. Fuel injection pump                     |
| 2. Cylinder head            | 12. Exhaust manifold    | 22. Crankshaft gear                   | 32. Fuel injection valve                    |
| 3. Cylinder block           | 13. Camshaft            | 23. Main bearing housing              | 33. Governor weight                         |
| 4. Intake valve             | 14. Camshaft gear       | 24. Main bearing                      | 34. Cooling water pump (sea water)          |
| 5. Exhaust valve            | 15. Tappet              | 25. Intermediate main bearing housing | 35. Bilge pump (option)                     |
| 6. Valve spring             | 16. Push rod            | 26. Intermediate main bearing         | 36. Cooling water pump (fresh water)        |
| 7. Valve rocker arm support | 17. Piston              | 27. Flywheel                          | 37. Heat exchanger                          |
| 8. Valve rocker arm         | 18. Piston pin          | 28. Crankshaft V-pulley               | 38. Thermostat                              |
| 9. Precombustion chamber    | 19. Connecting rod      | 29. Lubricating oil pump              | 39. Filler cap (with pressure relief valve) |
| 10. Decompression lever     | 20. Connecting rod bolt | 30. Lubricating oil inlet pipe        | 40. Lubricating oil pump (clutch)           |

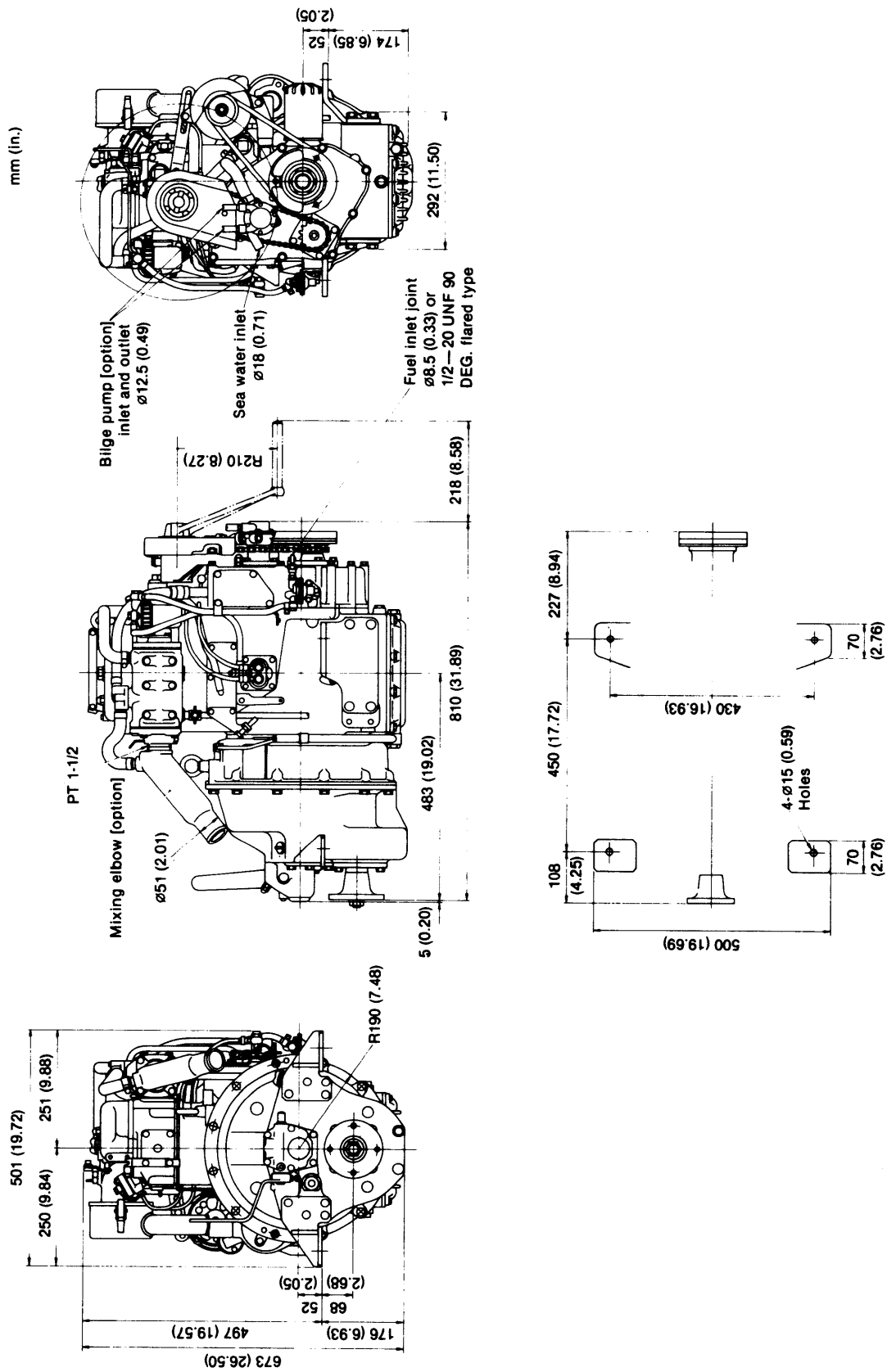
- |                             |
|-----------------------------|
| 41. Input shaft             |
| 42. Forward small gear      |
| 43. Reverse small gear      |
| 44. Output shaft            |
| 45. Output shaft large gear |
| 46. Output shaft coupling   |

# 7. Dimensions

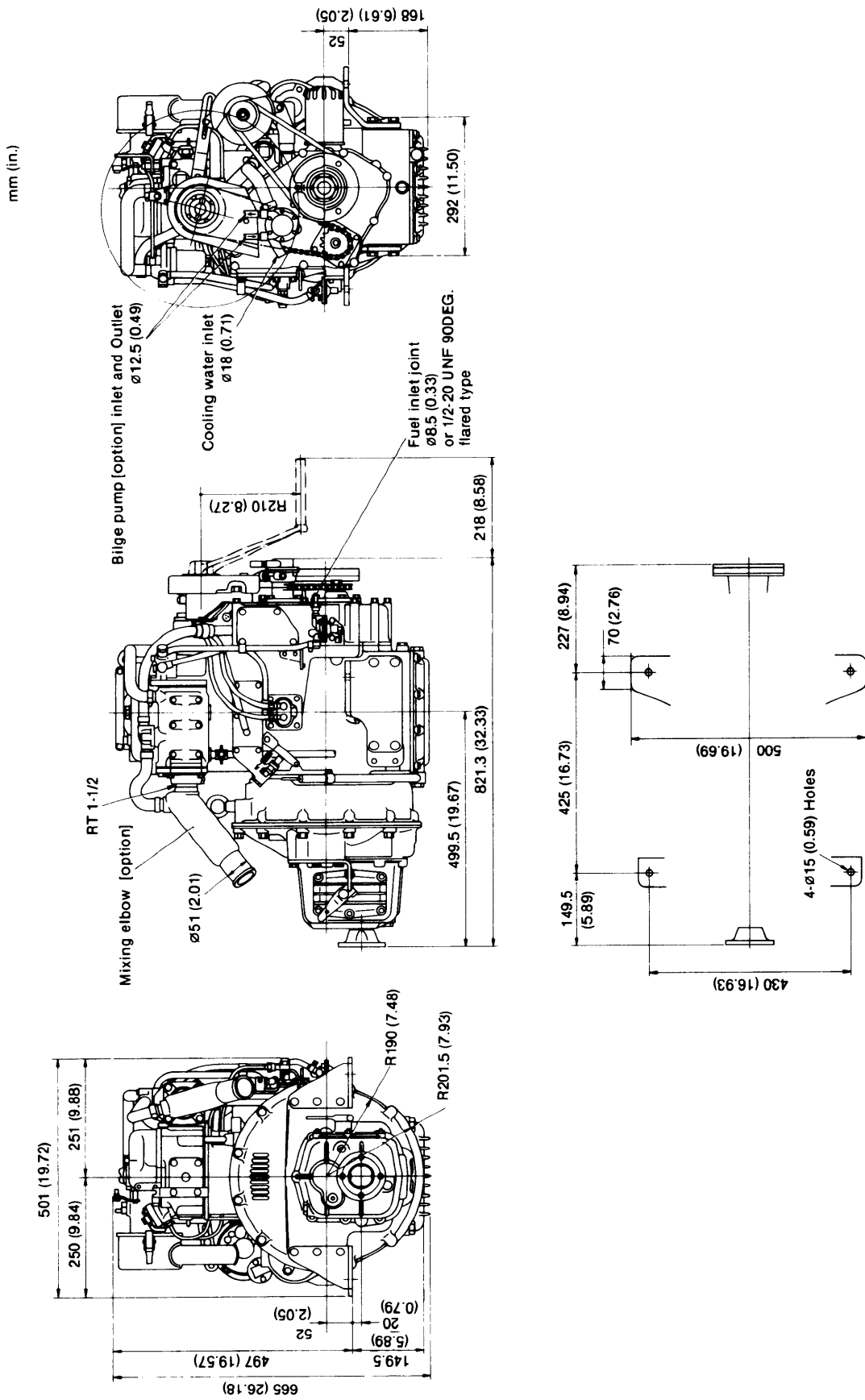
## 7-1 2QM20



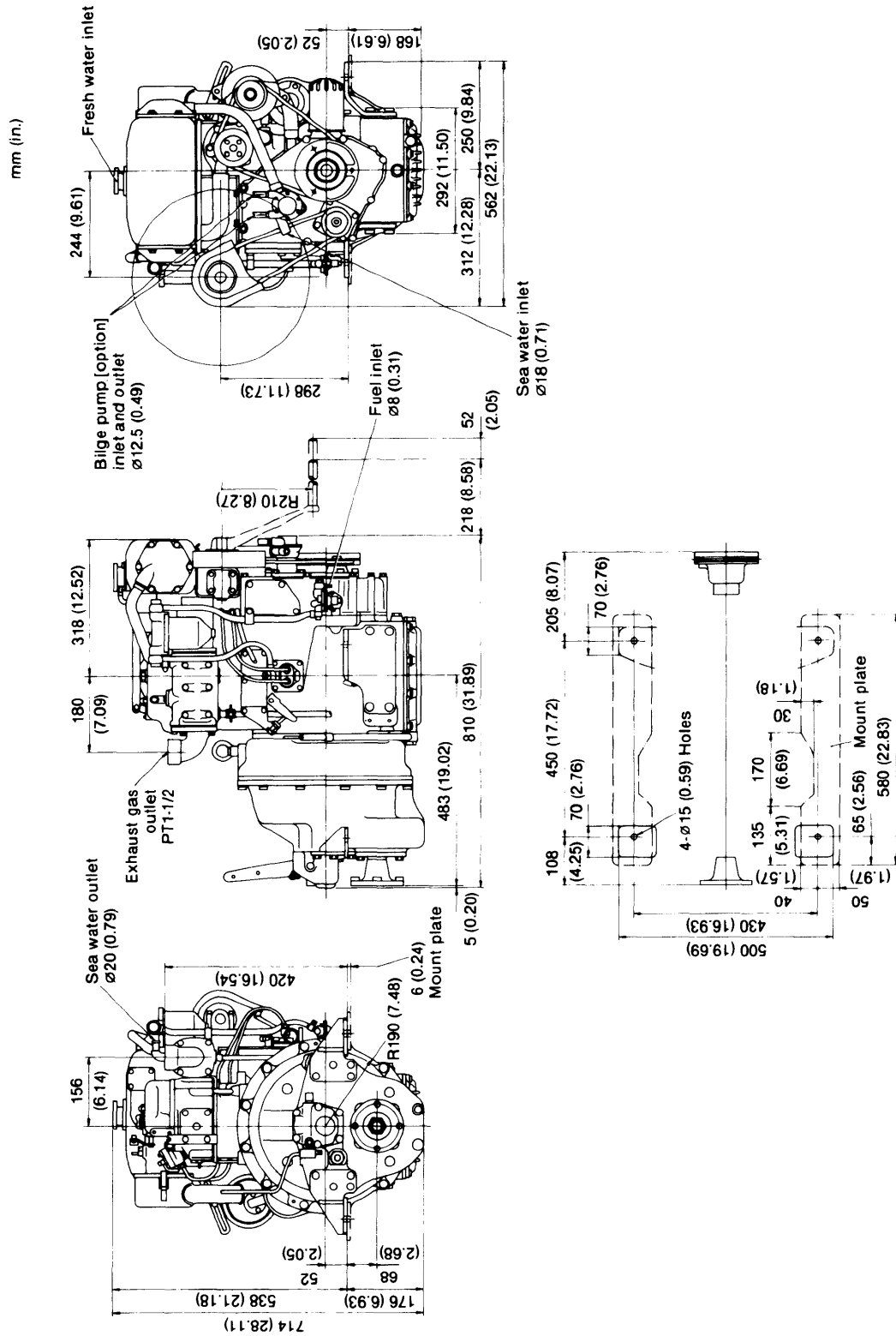
7-2 2QM20B



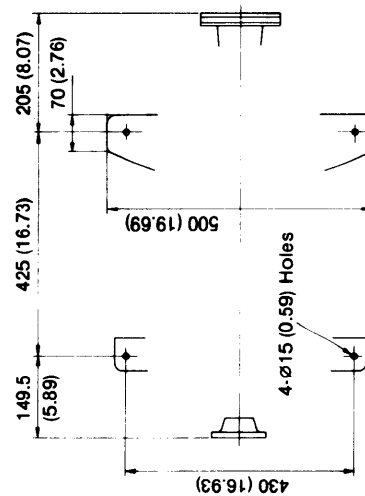
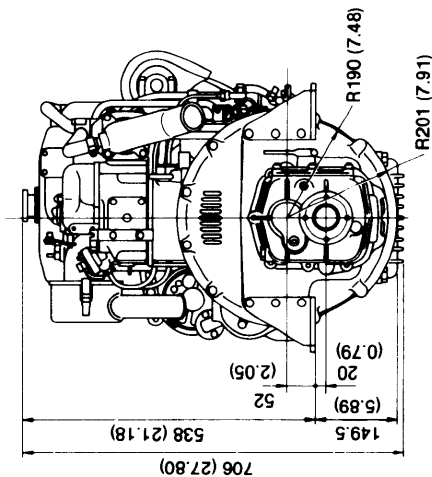
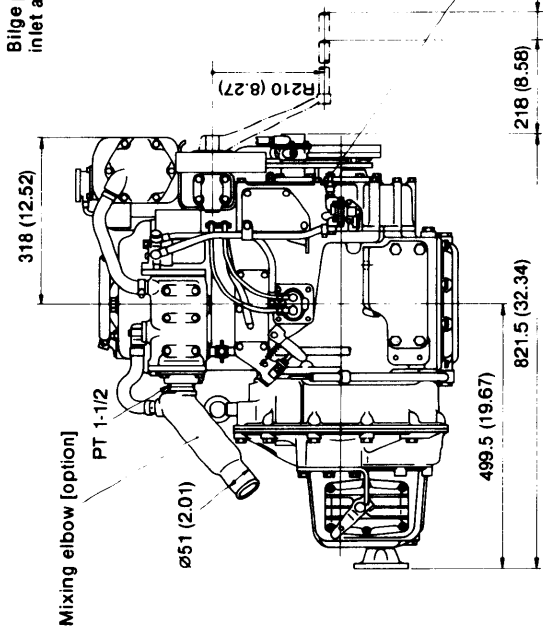
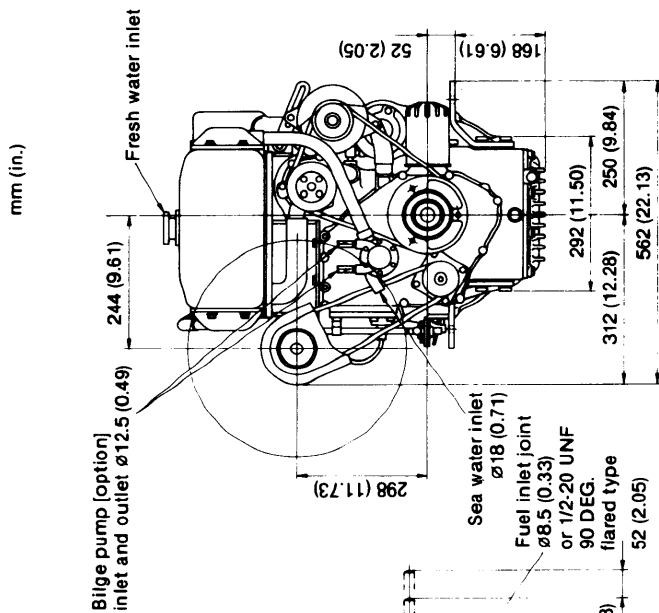
7-3 2QM20H



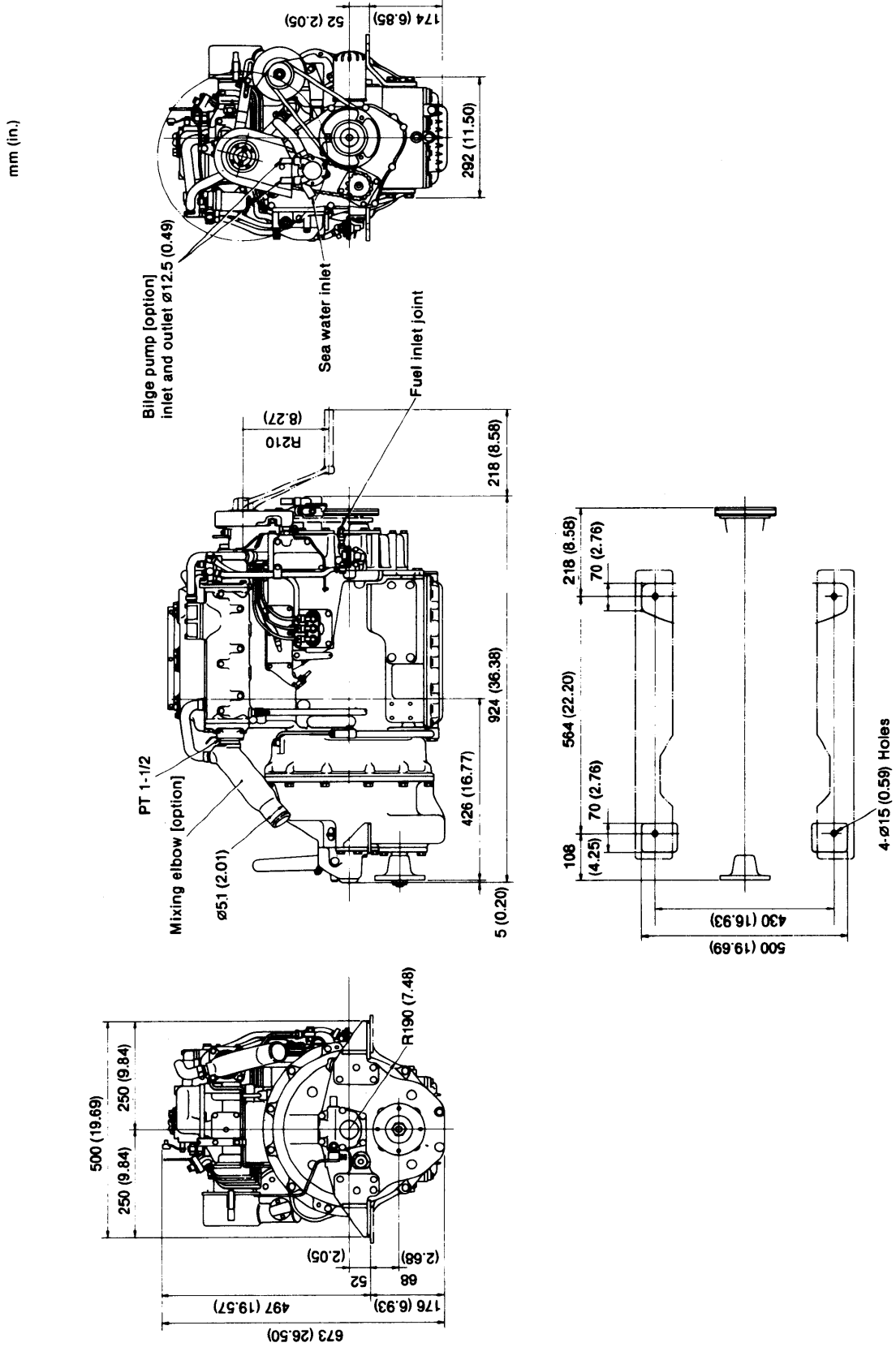
7-4 2QM20Y



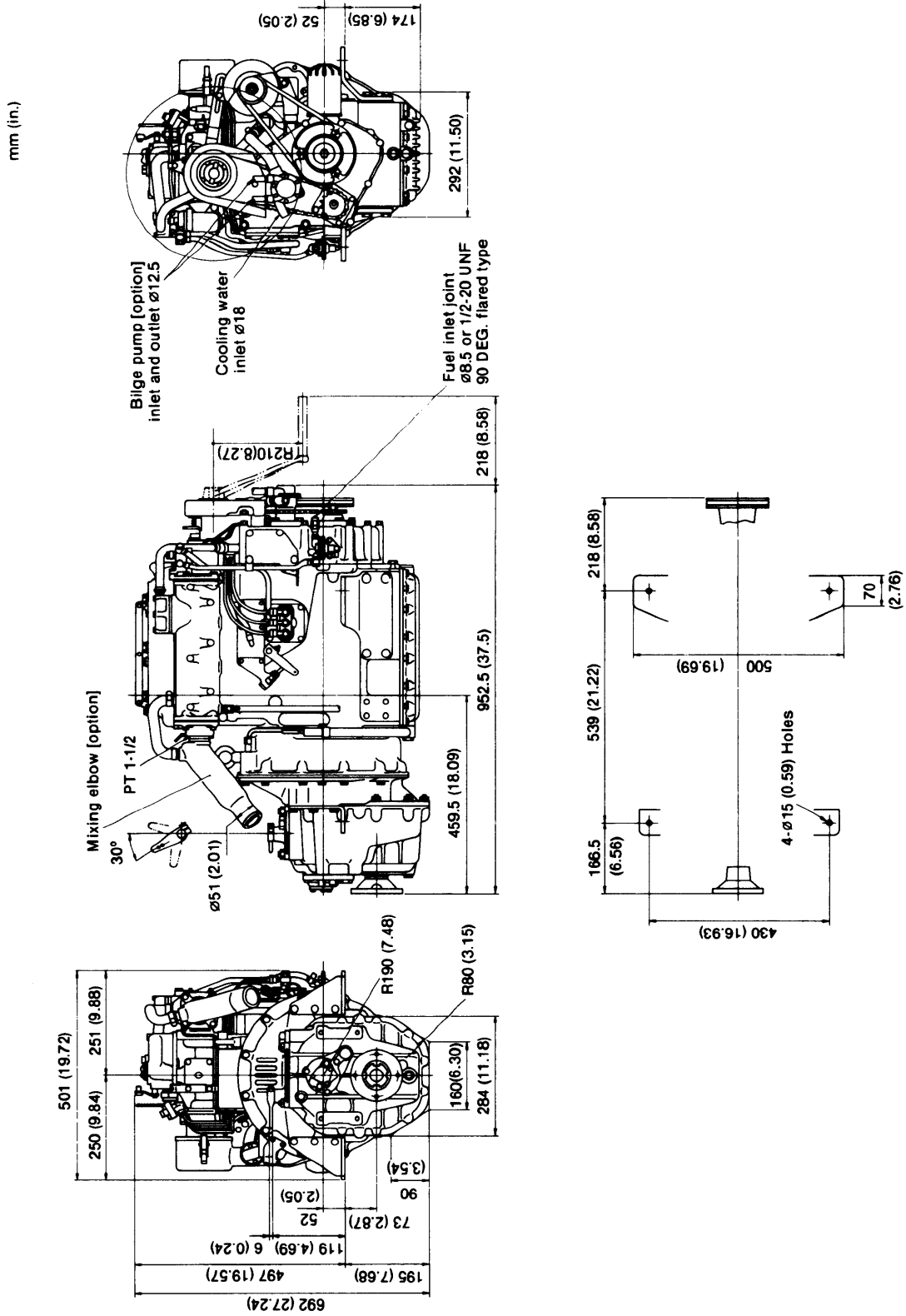
7-5 2QM20F



7-6 3QM30

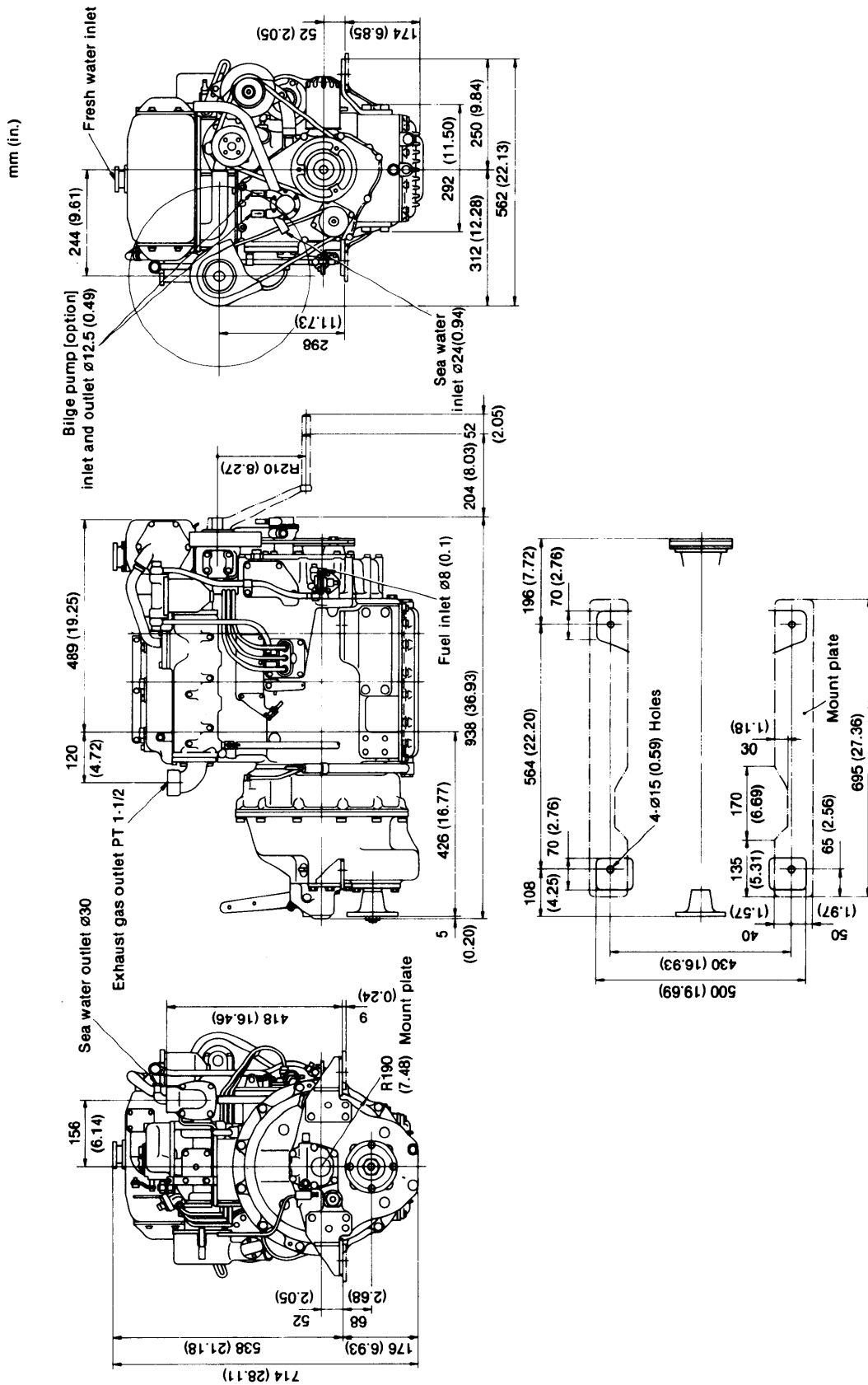


7-7 3QM30H

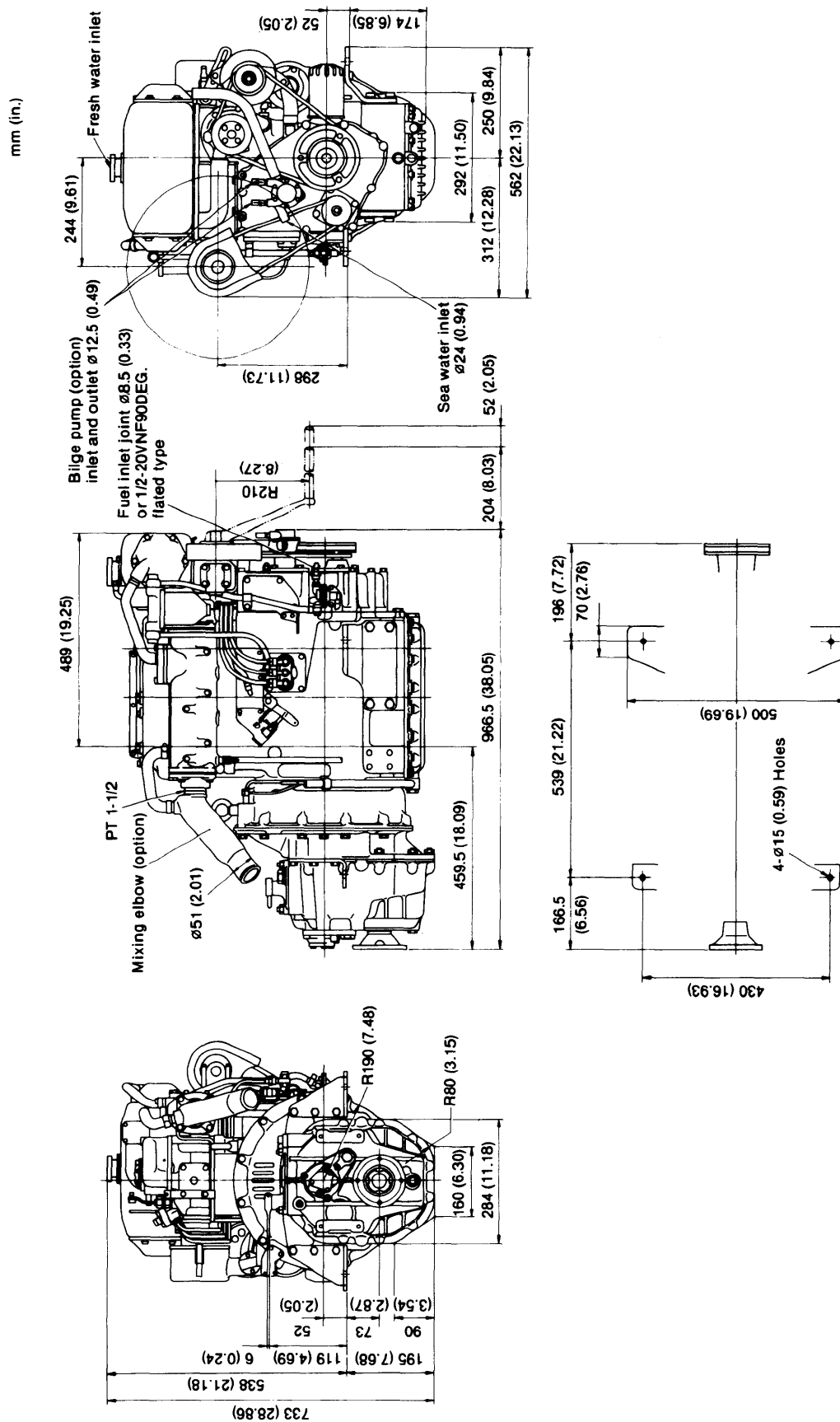




7-8 3QM30Y



7-9 3QM30F

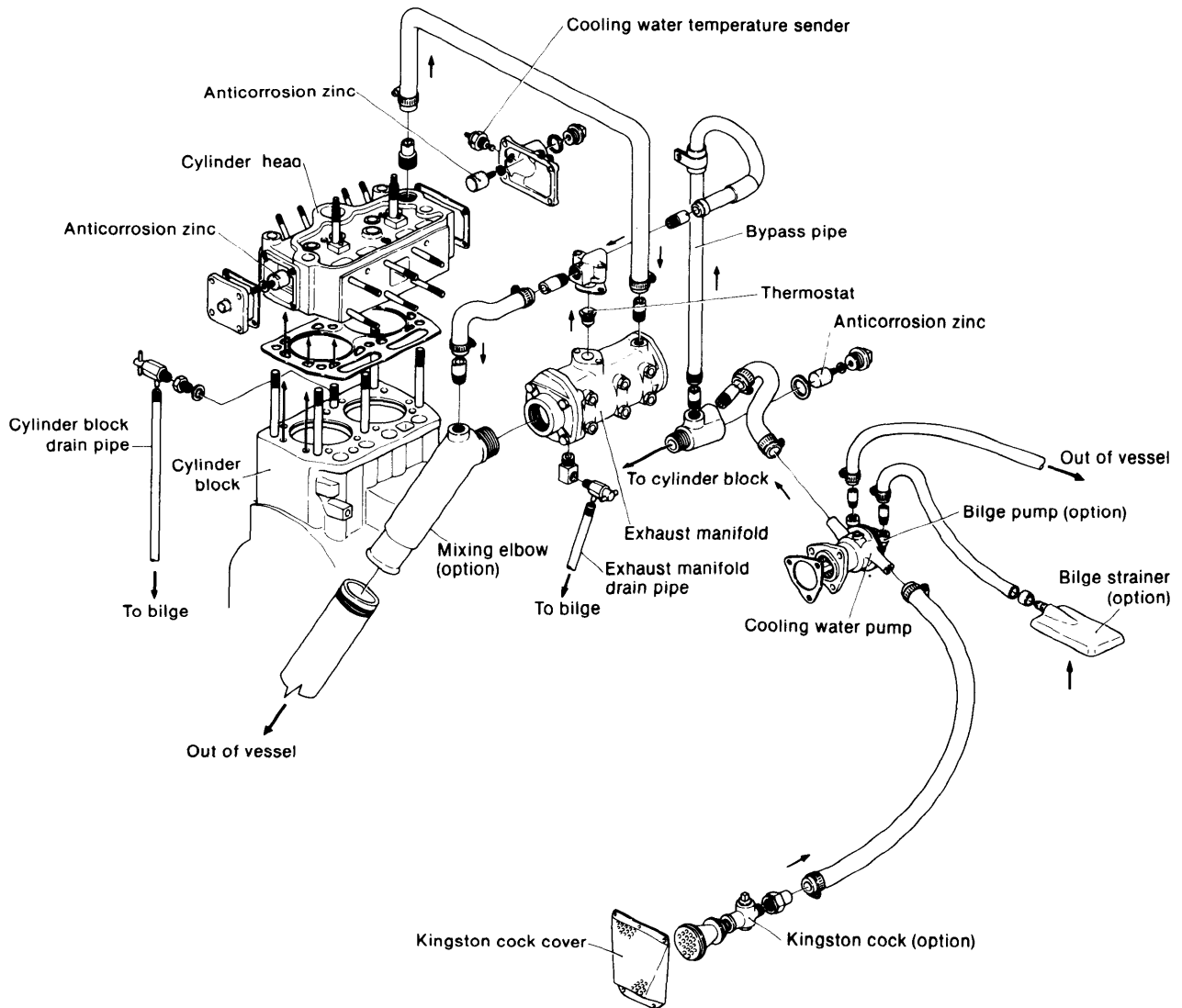


# 8. System Diagrams

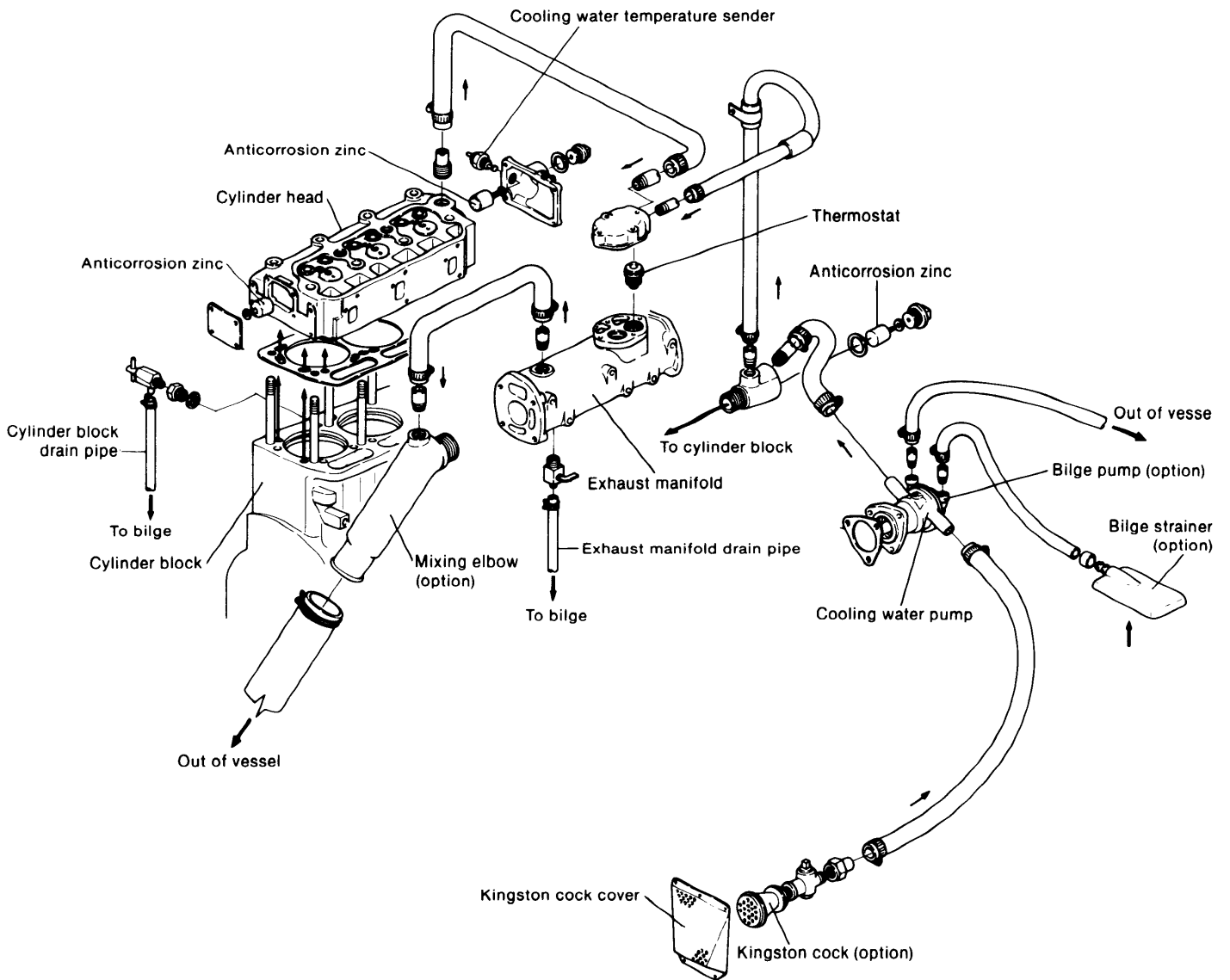
## 8-1 Cooling system

### 8-1.1 Sea water cooling

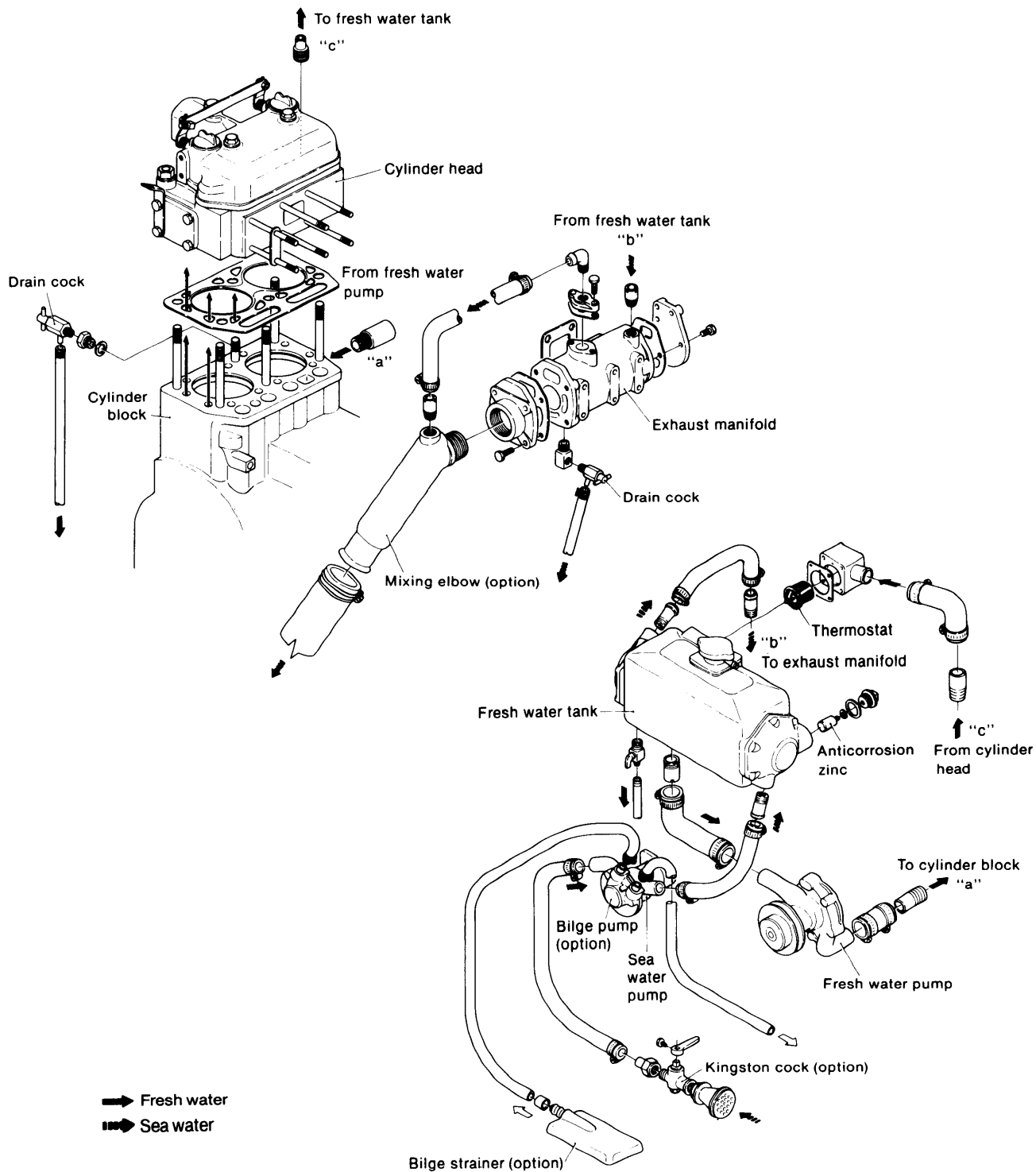
(1) 2QM20(H)



(2) 3QM30(H)

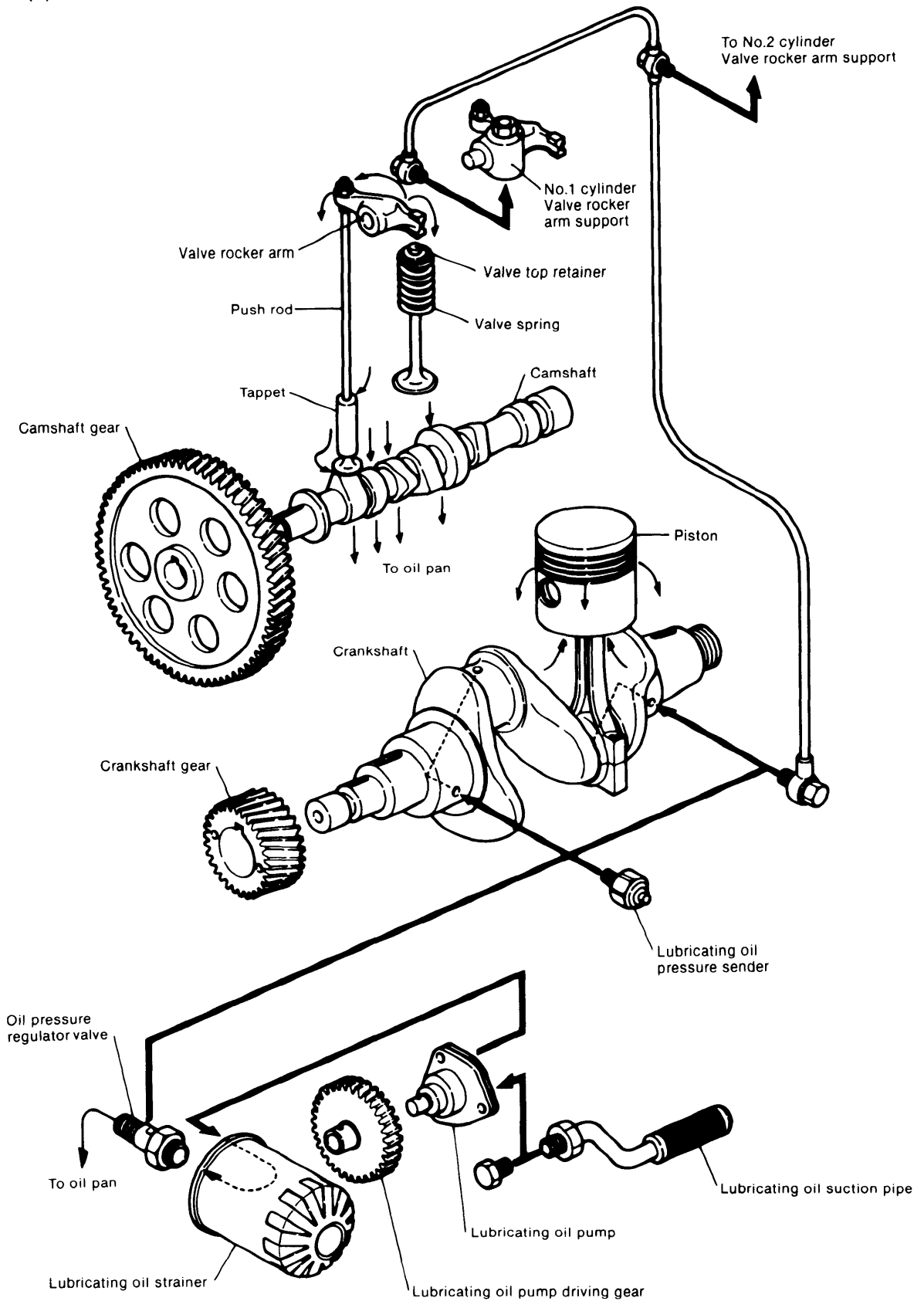


8-1.2 Fresh water cooling

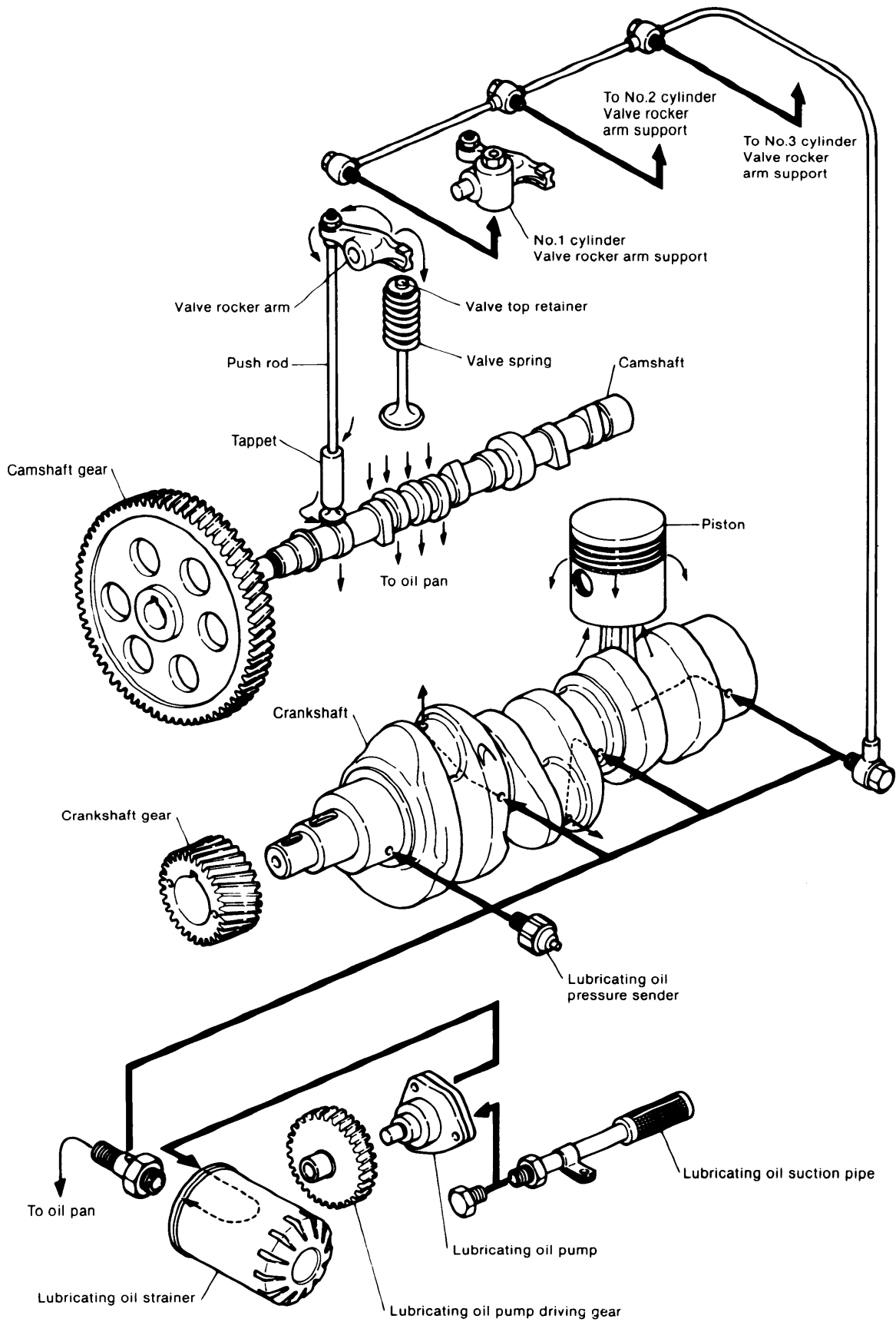


8-2 Lubrication system

8-2.1 2QM20(H)

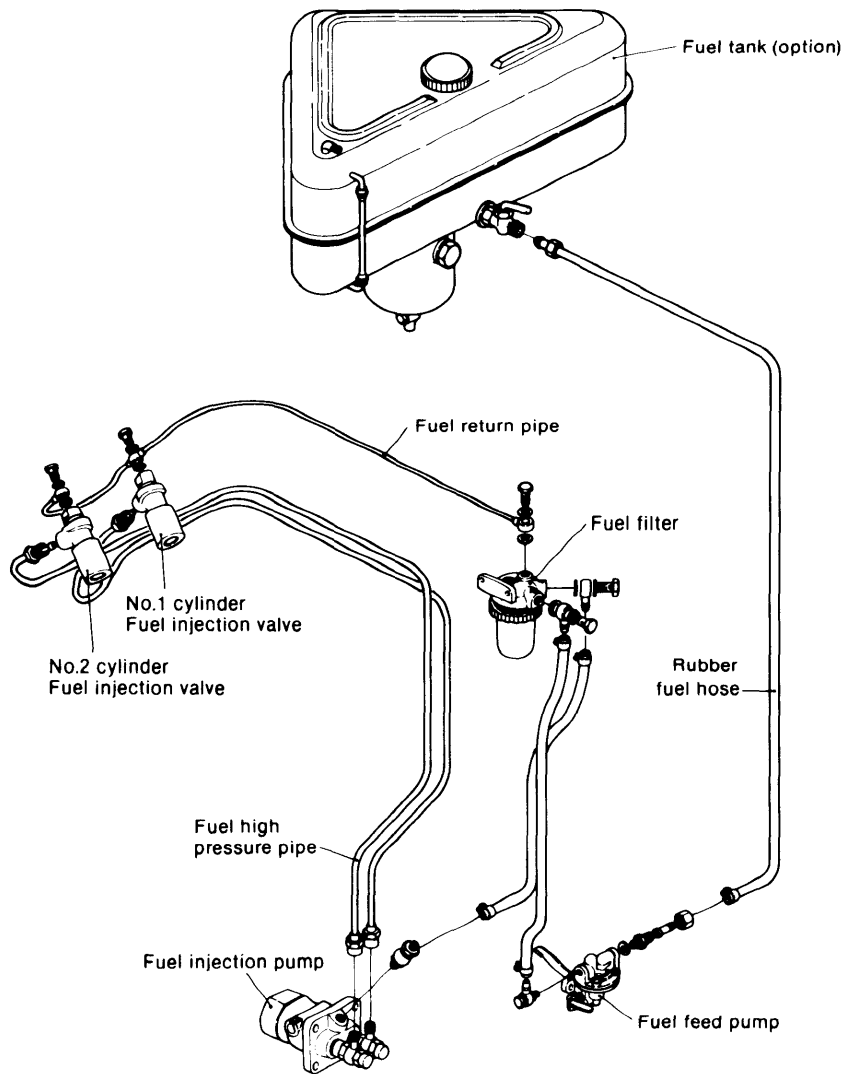


8-2.2 3QM30(H)



8-3 Fuel system

8-3.1 2QM20(H)







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