


GARDNER
LW
MARINE DIESEL ENGINES


Handwheel Control Unit and Rotation of Handwheel

The Handwheel Control Unit is identical for Port and Starboard engines of a twin screw installation. The "Ahead" rotation indicator engraved plate fitted, is available to suit either Clockwise or Anti-clockwise rotation of the hand-wheel for such engagement. The direction of rotation of the hand-wheel can be decided during installation to suit the requirements, and the appropriate rotation indicator engraved plate attached at that time.

When bolting the unit to a bulkhead or other structure, the surfaces in contact must be quite flat, and care exercised to avoid distortion of the unit due to irregular surfaces or undue tightening of the securing bolts.

Positioning of Pipes and Clips

The operating cylinder unit is hinged at point "D" and has a slight angular movement about this point when working, therefore, the two pipes connected to this unit must be arranged so that they are free to move with it. Whenever possible, the pipes should be installed as shown on the drawing, and the first clip fixed at some distance from the operating cylinder unit, as shown on Drawing No. 12553.

Any alternative run of pipes, whether copper or nylon, must provide for equivalent flexibility, and the first clip must not be nearer the unit than shown on the drawing. If possible, the pipes should rise gradually from the operating cylinder unit to the hand-wheel control unit, but this is not essential. It is also desirable that the length of pipes be kept to a minimum, consistent with reasonable facility of installation, and suitably clipped to avoid vibration.

Operating Cylinder Unit Stop Adjustment

For the "Ahead" engagement, the cylinder cover "X" provides the stop for the piston within the cylinder. For the "Astern" engagement the cover "X" provides the stop for the collar "Y".

In order to avoid excessive hydraulic pressure being applied to the stops within the reverse gear case, it is very important that the forked eye "Z" and the collar "Y" be so adjusted that the stops on the unit make contact just before the stops within the reverse gear.

Indicator Control

This control comprises a pull-push type flexible cable within a brass conduit and couples the unit on the reverse gear to the indicator which forms part of the hand-wheel control unit in the wheelhouse.

The brass conduit should be fitted first between these two points, using the water-tight fittings shown on Drawing No. 12553 where necessary. It must be carefully bent to the required shape, using a minimum number of bends. **No bend should be made to a smaller radius than 5 in. (8 in. is preferable) and no bend should exceed 90°.**

A length of cable inserted in the conduit before bending will assist in maintaining the bore of the conduit and at the same time ensuring that the conduit has not been damaged during transit to destination. The cable should be capable of being push-pulled through the conduit freely.

Having bent the conduit to shape, the ends must be sawn off square at the required length. Remove the screwed nipples from the bottom of the indicator body and from the unit at the reverse gear end and slide these on to the ends of the conduit. Finally, with the special drift provided, bellmouth each end of the conduit.

Should the length of indicator run exceed 10 ft., then two or more lengths of conduit will be necessary, and they must be coupled together with a greaser connector; exactly the same procedure is to be observed as for the extreme ends. The conduit should be clipped to the engine and elsewhere along the run with the special clips provided, upon completion of installation.

The length of the flexible cable can only be determined after the brass conduit has been installed. Its length must be approximately 16 in. longer than the fitted brass conduit. The cable should be pushed through the conduit, until one end is flush with the end of the conduit, the opposite end can then be cut to give the 16 in. projection.



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The cable can be readily cut with a fine hacksaw and the ends will not unravel. It is essential that the ends are dressed and any sharp edges removed, especially at the reverse gear end, otherwise damage may be caused to the inside of the unit casing when the cable gear quadrant is operating. Whilst the cable must be lubricated, this must be done sparingly since over-greasing can be responsible for creating undue friction and the locking of the cable within the conduit. Use only a thin anti-freeze grease when assembling.

Connect the bellmouthed end of the conduit to the reverse gear unit and screw home the nipple. The cable should temporarily be pushed up the conduit to make this connection.

Set the reverse gear lever in the "Neutral" position.

The $7\frac{1}{2}$ in. diameter cover of the unit on the reverse gear must be removed and also the three screws marked "E" on Drawing No. 12553. The removal of these screws disconnects the cable gear from its shaft.

Rotate the cable gear on its shaft to a position which will permit entry of the flexible cable through the vertical hole in the unit casing. Push the cable down the conduit and engage the teeth of the cable gear with the spiral wire coil of the cable by rotating the cable gear. This engagement must allow about $1\frac{3}{4}$ in. of cable to project past the cable gear, as shown on Drawing No. 12553.

Reassemble the cover and screws "E". It is important that the cable gear and cable shall be in the position shown on the Drawing No. 12553 when the reverse gear lever is in "Neutral" position before the three screws are inserted in their tapped holes.

Remove the screwed plug at the base of the indicator unit and also the sliding split collar from inside the indicator bored hole. Connect the conduit to the screwed plug. The cable should project $3\frac{7}{16}$ in. beyond the screwed plug when in "Neutral" position. Fit the split collar to the cable allowing the end of the cable to stand out from the collar about $\frac{1}{2}$ in., and reassemble in the indicator bored hole. The conduit nipple must be temporarily screwed out of its tapped hole to permit screwing in the plug. The indicator button should be in line with the "Neutral" marking.

Check up after assembly to ensure that the run is free and that the button indicates correctly.

Operating Fluid.—The hydraulic medium is a mixture of two-thirds engine lubricating oil and one-third fuel oil.

29. **Single Lever Control.** The Gardner Single Lever Control is a device which enables the operation of the Reverse Gear and change of engine revolutions to be controlled by one lever.

This Single Lever, mounted on the engine is linked mechanically with the Governor Unit and also operates a Reverse Gear Hydraulic Selector Valve.

Remote operation is effected by a Gardner Remote Control Unit, located in the wheelhouse, which may be coupled to the Single Lever by either of the following methods:—

- (1) Roller chains and stainless steel wire ropes running over pulleys.
- (2) Roller chains, chainwheels and a simple arrangement of rods and levers supplied by customer.

A third alternative that may be used for remote operation is the Hydraulic Remote Control System. This comprises a Gardner Handwheel Hydraulic Pump Unit, located in the wheelhouse, which operates the Reverse Gear Valve and Single Lever by means of a Slave Unit mounted on the Reverse Gear.

With this system of remote control the Ahead, Neutral and Astern positions of the reverse gear are indicated by coloured lights on an indicator panel in the wheelhouse.

Methods (1) and (2) are recommended where "the run" from wheelhouse to engine room is short and does not include more than four changes in direction.

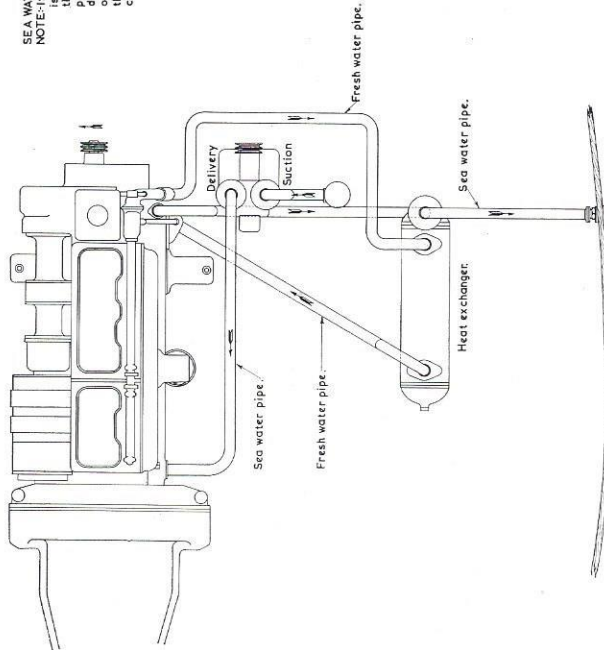
The Hydraulic Remote Control System is recommended where "the run" from wheelhouse to engine room is long and/or complicated, or when Dual Station Control is to be installed.

The advice and co-operation of our Technical Staff will be willingly offered upon receipt of any enquiry concerning installation details.

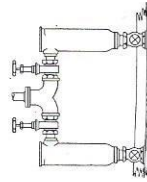
Full instructions covering the service and maintenance of the Single Lever Control System are contained in Instruction Book No. 64.

2 - 6 LW ENGINES.
 1 1/2" o.d. copper pipes.
 1" o.d. copper sea water pipes.
 6 LX ENGINES.
 1 1/2" o.d. copper fresh water pipes.

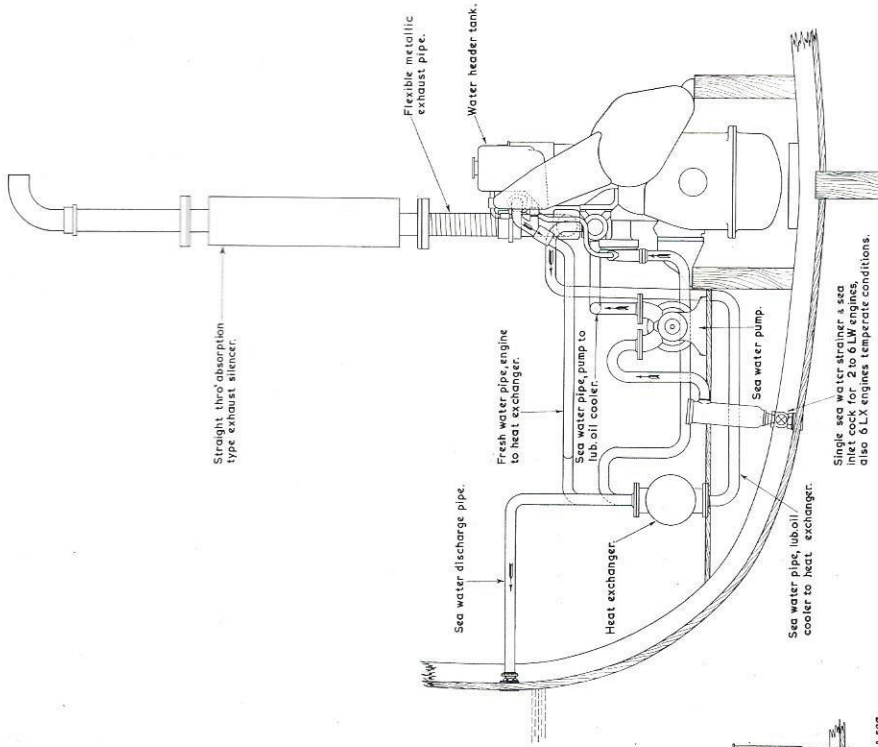
NB This drawing shows only a diagrammatic arrangement in actual practice the run pipes to the engine room should be made direct to suit the engine room.



SEA WATER CIRCULATING PUMP
 NOTE:-If the rotation of the engine is opposite to that shown, then the sea water circulating pump should be driven from the opposite end of the pump. This will reverse the suction & delivery connections.



Twin sea water strainers & sea inlet cocks for 6 LX engines tropical conditions.



R.D. 385.

DWG. N°
14704.

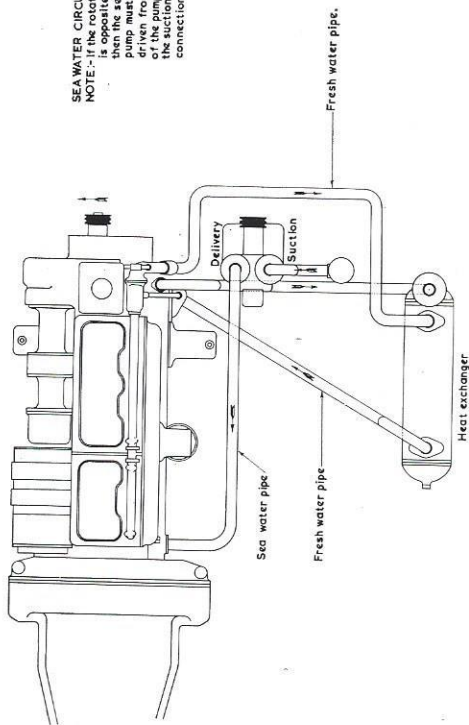
L. GARDNER & SONS, Ltd.
 PATRICROFT,
 N° MANCHESTER.

TYPE 2 to 6 LW & 6 LX ENGINES.
 DESCRIPTION DIAGRAMMATIC ARRANGEMENT OF ENGINE, FRESH WATER COOLED OIL COOLER, SEA WATER COOLED & DRY EXHAUST SYSTEM ALSO ENGINE MOUNTED HEADER TANK.
 SCALE 2" = 1' FOOT.

| | | | |
|-------------------|--|---------------|--|
| MATERIAL | | SUPERSEDED BY | |
| DRAWN BY J.P.S. | | DATE 5-2-03 | |
| TRACED BY J.P.S. | | INDEXED 72 | |
| CHECKED BY J.P.S. | | DATE 7/99 | |

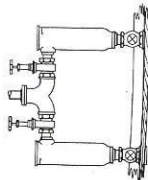
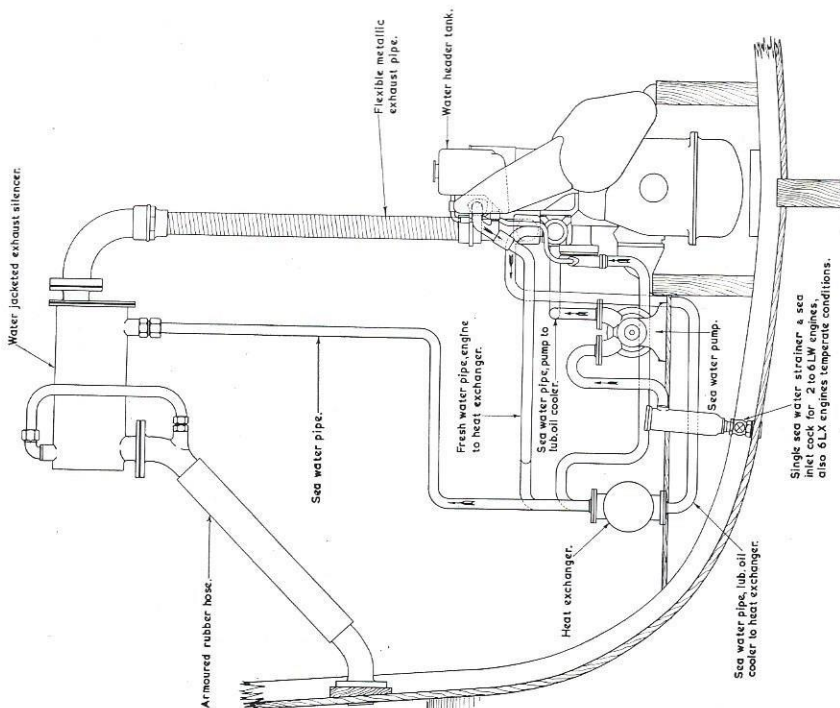
DWG. N°
14704.

2-6 LW ENGINES. { 1 1/2" o.d. copper pipes.
 6 LX ENGINES. { 1 1/2" o.d. copper sea water pipes,
 1 1/2" o.d. copper fresh water pipes.



SEA WATER CIRCULATING PUMP
NOTE:—If the rotation of the engine is opposite to that shown, then the sea water circulating pump must be turned 180° & the suction & delivery connections.

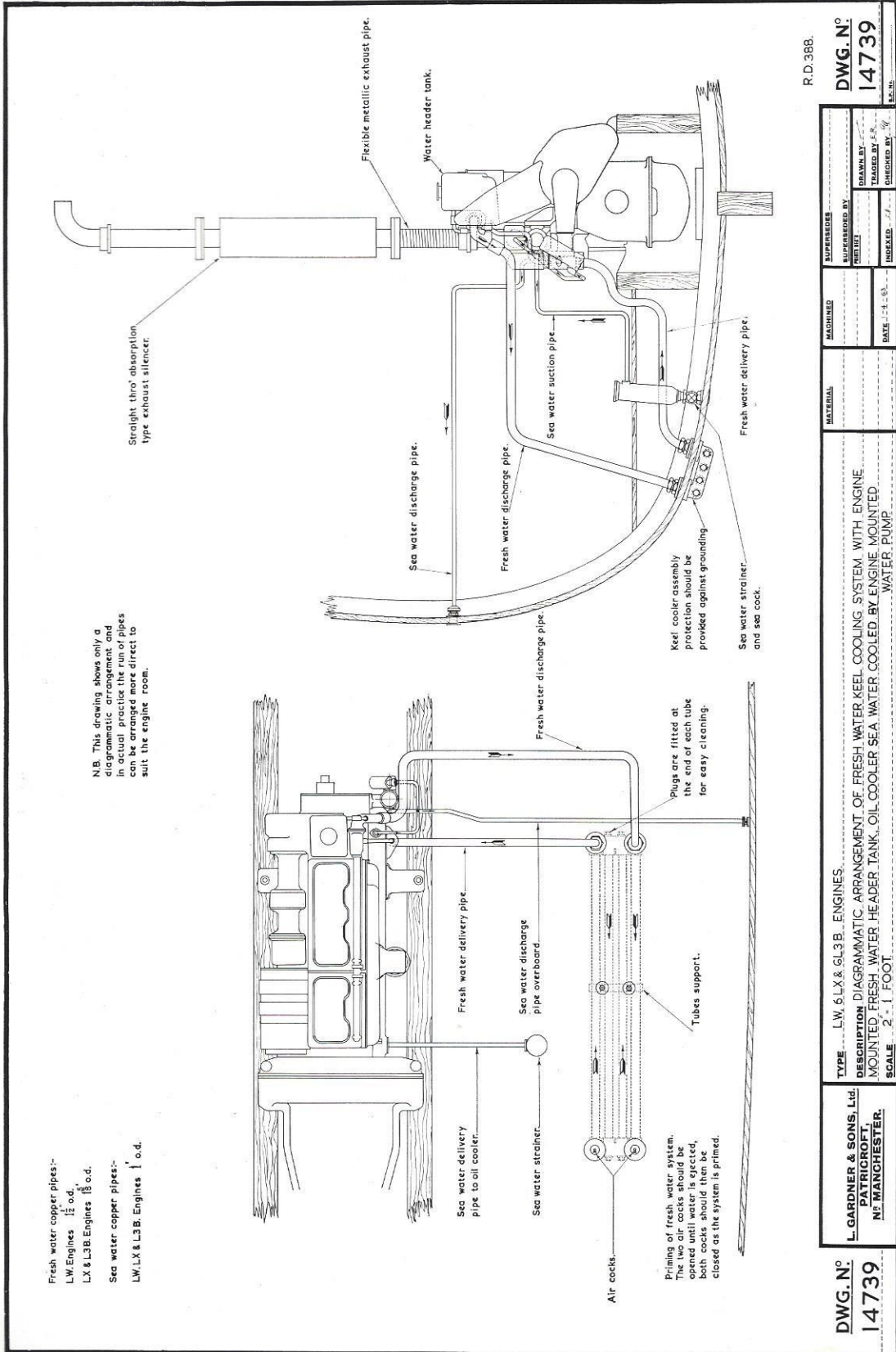
N.B. This drawing shows only a diagrammatic arrangement & in actual practice the run of pipes can be arranged more direct to suit the engine room.



Twin sea water strainers & sea inlet cocks for 6 LX engines tropical conditions.

R.D. 386.

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|--------------------------------|---|---|------------------------|--------------------------------|
| DWG. N° 14705 | L. GARDNER & SONS, Ltd. PATRICROFT, N° MANCHESTER. | TYPE 2 TO 6 LW & 6 LX ENGINES | SUPERSEDED BY | DWG. N° 14705 |
| | | DESCRIPTION DIAGRAMMATIC ARRANGEMENT OF ENGINE FRESH WATER COOLED, OIL COOLER SEA-WATER COOLED & WET EXHAUST SYSTEM, ALSO ENGINE MOUNTED HEADER TANK | MATERIAL | DRAWN BY S.H. |
| | | SCALE 2" = 1 FOOT | DATE 4.2.53 | TRACED BY S.H. |
| | | | CHECKED BY G.P. | |



R.D. 388.

DWG. N.
14739

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| SUPERSEDES | ISSUED BY |
| DATE | BY |
| INDEXED | CHECKED BY |

| | |
|----------|--------|
| MATERIAL | DATE |
| | 1-1-63 |

| | |
|-------|-------------|
| SCALE | 2" = 1 FOOT |
|-------|-------------|

TYPE L.W. 6LX & 6L3B. ENGINES.
DESCRIPTION DIAGRAMMATIC ARRANGEMENT OF FRESH WATER KEEL COOLING SYSTEM WITH ENGINE MOUNTED FRESH WATER HEADER TANK, OIL COOLER SEA WATER COOLED BY ENGINE MOUNTED WATER PUMP.

L. GARDNER & SONS, Ltd.
PATRICROFT,
N^o MANCHESTER.

DWG. N.
14739