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ADJUSTMENT INSTRUCTIONS

FOR

CONSTANT AND VARIABLE TIMING

CONTROL PANELS

FOR

HYDRAULIC GEARS

"LEADERS IN QUALITY MARINE CONTROLS, STEERING GEAR AND DISC BRAKES"

KOBELT MANUFACTURING COMPANY LIMITED

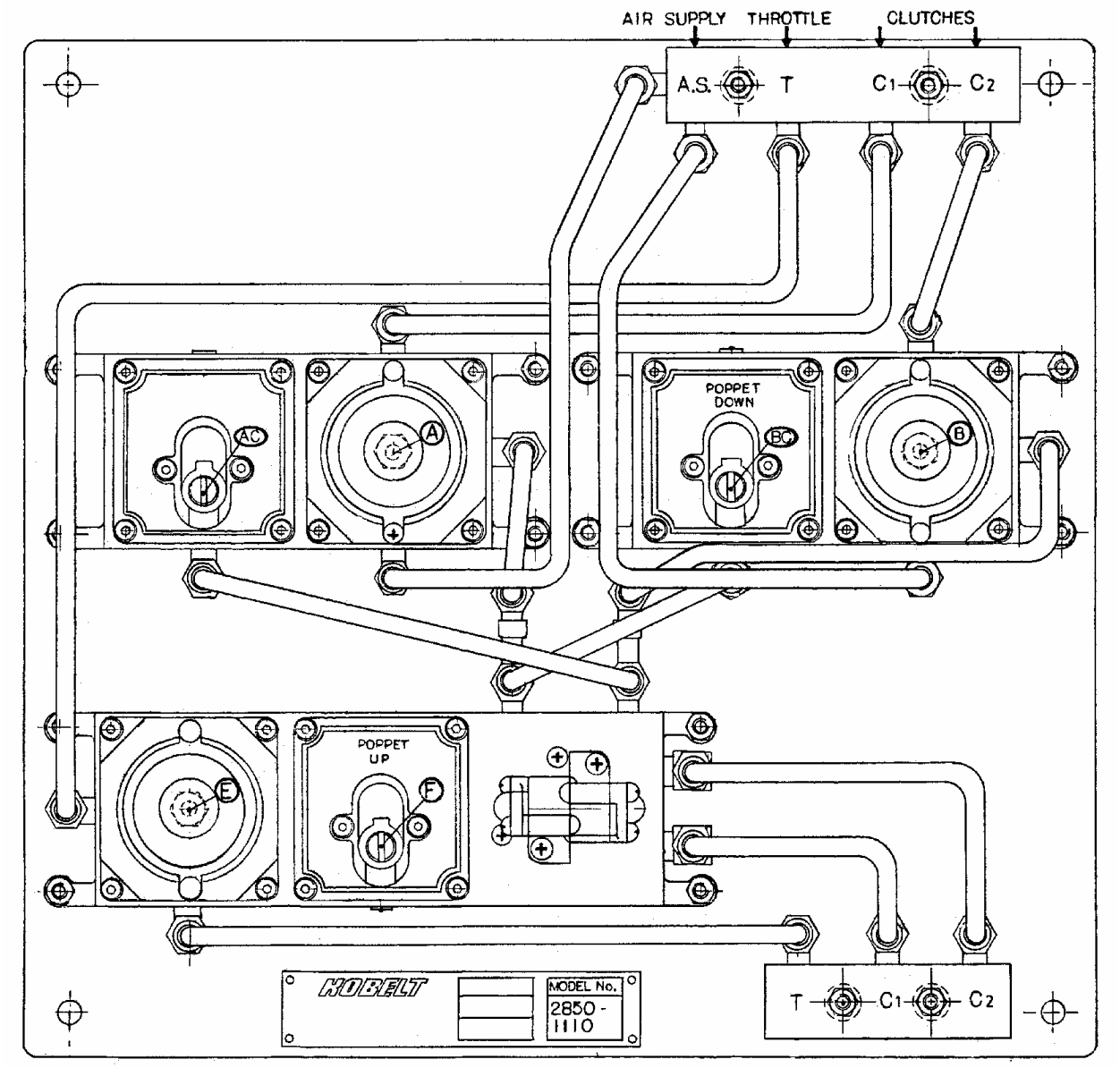
ADJUSTMENT INSTRUCTIONS FOR

CONSTANT TIMING CONTROL PANELS FOR HYDRAULIC GEARS

The remote control signal entering the clutch circuit via ports **C1** and **C2** will trip either relay valve **A** or **B** into an open position. The engine room air supply (**AS**) will then energize the interlock valves and clutch actuator. The adjustments on relay valves **A** and **B** should be set at approximately 30 psi. If the clutch relay **A** is energized, the output from this relay is permitted to enter into the accumulator tank **BC** immediately, therefore, locking out relay valve **B**. When a reverse maneuver is made, the clutch valve **B** is energized and the accumulated air pressure in the accumulator tank **BC** must exit via needle valve **BC** before clutch engagement can take place in the opposite direction. Closing needle valves (clockwise) prolongs the delay in the clutch neutral position. Opening the needle valves (counterclockwise) will increase the volume of air exiting through the needle valves and therefore reduces the neutral time delay. This allows for separate time delay settings for the forward and reverse clutches.

ILLUSTRATION EXAMPLE 1: 2850-1110

Constant Timing, Single Engine, Throttle Delay



CONTROL ADJUSTMENTS FOR

VARIABLE TIMING CONTROL PANELS FOR HYDRAULIC GEARS (2850-3xxx)

The remote control clutch signals enter the variable timing panels via ports **C1** and **C2** into relay valves **AA** and **BB**. The remote control signals trip either one of these valves into an open position. Engine room air supply (**AS**) is permitted to charge the interlock valves and clutch actuator. The adjustments on relay valve **AA** and **BB** should be set at approximately 50 psi. The out-signal from the primary relay is allowed to enter into the primary variable timing manifold which consists of two relay valves (Item **A** and Item **B**), two accumulator tanks (Item **AC** and Item **BC**) and a flow control valve (mounted on Item **AC**). With the control in a neutral position, selecting a clutch direction, the air is allowed to pass through either relay valves and energize the clutch immediately. If the gear was previously in an engaged position and at half throttle, the throttle pressure will accumulate in both accumulator tanks via the flow control **D** and **AC**. Since the throttle pressure is in relation to the engine rpm and the speed of the ship, the throttle pressure venting is controlled by the discharge through need valve **AC**.

Clutch reversal is not made possible until the accumulated air has drained through needle valve **AC**. This demonstrates that the forward and reverse timing will vary according to engine speed. Needle valve **D** regulates the charge rate of the tanks. If a boat accelerates very quickly, the tanks should be fully charged in approximately 10 seconds. If a boat accelerates slowly, the accumulator tanks should be charged in 20 – 25 seconds. Gear reversal, without engine speed, will take place almost instantly. At full engine rpm, gear reversal will consequently take longer since a major amount of accumulated throttle air must exit through flow control valve **AC**. Adjusting flow control valve **AC**, turning clockwise, will prolong the neutral time delay. Turning flow control valve **AC** counterclockwise will shorten the neutral time delay. Adjustments for **A** and **B**, secondary regulating valves, shall be set at 30 psi.

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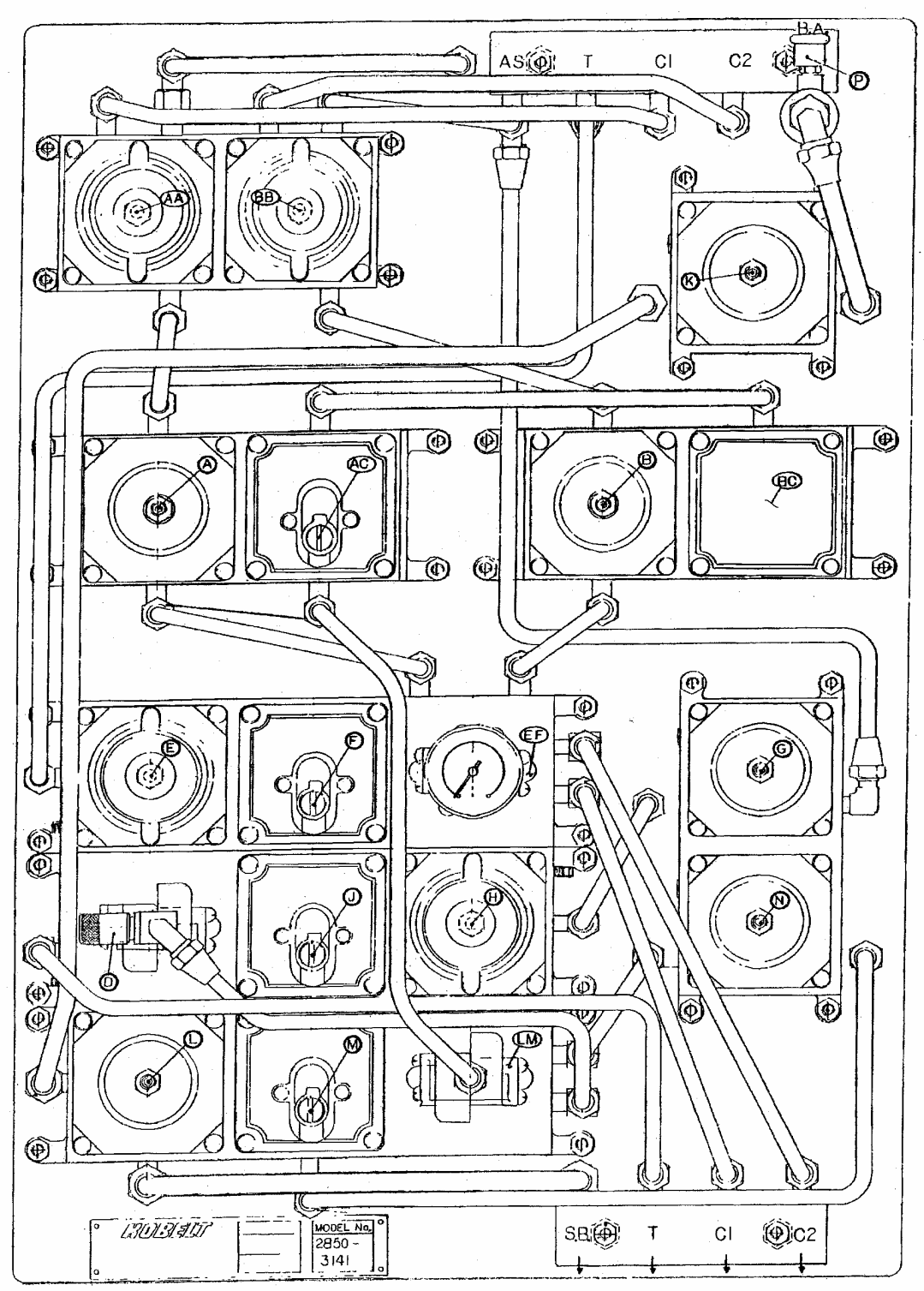
ILLUSTRATION EXAMPLE 2: 2850-3141

Variable Timing, Single Engine, Throttle Delay, Throttle Boost, Minimum Timing, Shaft Brake



THROTTLE BOOST

The throttle boost consists of three adjustments:

(1) Starting point of boost

(2) Stopping point of boost

(3) Amount of boost

Adjusting the pressure regulator (**G**) will control the output pressure. It is recommended that this regulator be set at approximately 25 psi. Adjustment **H** governs the starting point of the boost. It is recommended that the pressure setting be maintained at 25 psi. The flow control valve **J** regulates the cut-off point of the boost. If the boost comes in too late, adjustment **H** must be set lower. If the boost comes off too soon, needle valve J must be turned in clockwise. If the boost stays on too long, adjustment **H** must be turned out counterclockwise. If the boost is too low, adjustment **G** should be turned in clockwise.

THROTTLE DELAY

The shuttle valve **EF** give a pilot signal in either a forward or reverse running position, into the accumulator tank **F**. The air enters this tank via needle valve **F**. Turning the needle valve out, or counterclockwise, will allow the air to accumulate at a more rapid rate and therefore opens the relay valve Item **E** faster. Closing the needle valve Item **F** by turning clockwise, will prolong the accumulation of air into the tank and delay the opening of relay valve **E**. This in turn will delay the opening of the throttle which avoids engine acceleration during gear engagement. Relay valve **E** should be set at approximately 70 psi. These instructions apply to all timing panels. Any additional timing functions, such as throttle boost and shaft brake, do not affect the primary settings as given.

MINIMUM TIMING FOR HYDRAULIC GEARS

Minimum time in conjunction with variable timing will give a control minimum neutral time delay. The throttle pressure passing through flow control valve **D** is fed into shuttle valve **LM** and passes via its regulator outing into the variable timing accumulator tanks, **AC** and **BC**. The pressure regulator, with adjustment **N**, is fed off the clutch pilot line. Whenever gear engagement occurs, this regulator is charged with clutch pressure. Turning adjustment **N** in or clockwise, will prolong minimum timing. Conversely, turning adjustment **N** out or counterclockwise, will decrease the pressure setting and shorten the neutral time delay.

PROPELLER SHAFT BRAKE

The relay valve K provides the amount of air pressure required to stop the propeller via Kobelt disc brakes. Item **L** is a normally open relay valve in a neutral gear position. When clutch pressure enters the accumulator tank via shuttle valve **EF**, the relay valve will trip into a closed and exhaust position, releasing the brakes. A quick release valve should be installed near the brakes to allow a fast dump of the air in the brake actuators. Adjustment **K** should be set between 70 and 100 psi. This adjustment regulates the amount of output pressure to the brake. If the brake torque is not sufficient, the air pressure should be raised. If the brake comes on too severe, the pressure must be lowered. Turning adjustment **K** out or counterclockwise will lower the pressure. Adjustment **L** on the brake relay governs the releasing point of the brake. If the brake releases too late, adjustment **L** must be turned out or counter-clockwise. If the brake applies too soon, needle valve **M** must be turned in or clockwise. If the brake comes on too late, the needle valve must be turned out or counter-clockwise.

When setting the propeller shaft time during sea trial, it is extremely important to set the brake so that no overlapping in clutch timing or brake timing takes place. It is also important to set the brake to prevent propeller shaft rollback between clutch engagement and brake release. After all adjustments are made, it is important to secure all needle valves with the locking screws and also to lock setting screws on all relay valves and regulators with the appropriate locknuts.

OVERRRIDING and INTERLOCKED THROTTLE (REF. DRAWING #2850-1112)

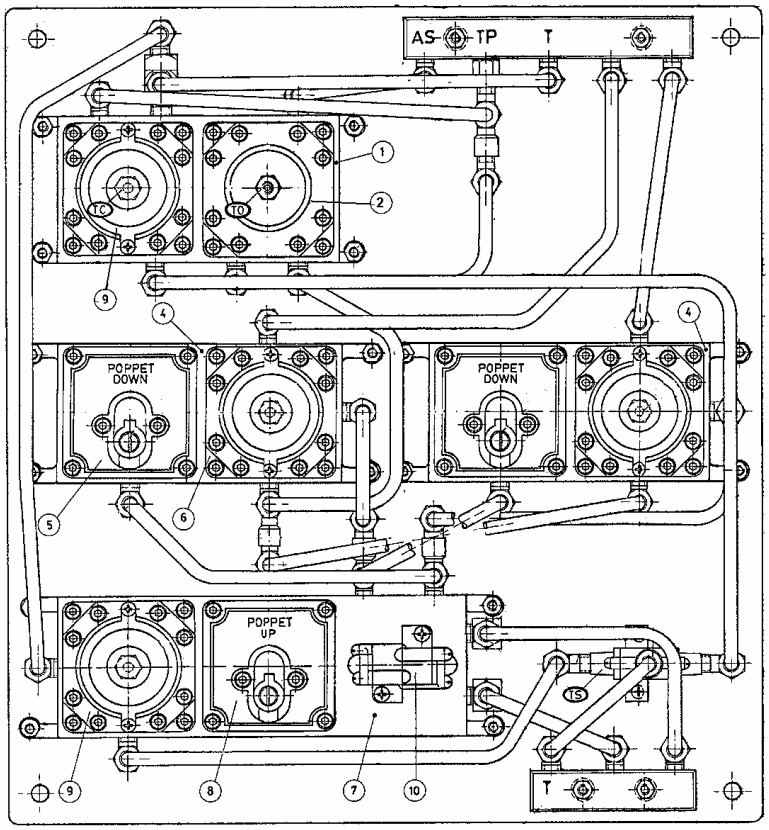
The purpose of an over-riding throttle is to allow engine acceleration in a neutral gear position since it is not possible to get a throttle signal past the interlocks in normal operation.

It is necessary to employ two relay valves to divert the throttle signal past the regular timing units. At the station where an over-riding throttle is desired, a 3-way valve for each engine, Model *3514* or Model *3516* is employed. The regular air supply to these 3-way valves must be from the same source as the control head itself.

If the 3-way valve is in the closed position, no pressure signal enters the port **TP** on the timing panel. Therefore, the normally open relay **TO** is in its open position allowing the air supply to go to the regular interlocking relays. The relay valve **TC** which is normally closed, remains in the closed position not allowing any throttle signal to bypass the regular timing units. The 3-way valve, being in the closed position in the normal operating mode, does not allow over-riding throttle. If the 3-way valve is in an open position, a pilot signal enters port **TP**. This signal will, in fact, close relay valve **TO** and will, therefore, make the clutch inoperative (remains in neutral). It is not possible to engage the gear in this mode. The throttle signal entering the panel is now permitted to pass through relay valve **TC** and shuttle valve **TS**, exiting through port **T** to the engine speed control device.

The pressure setting adjustment on relay valve **TO** should be approximately 30 psi. To raise the pressure setting, loosen jam nut and turn setscrew clockwise. To lower the pressure setting, loosen jam nut and turn setscrew counter-clockwise. The pressure setting on relay valve **TC** should be set at approximately 70 psi. Remove cap and loosen jam nut (two wrenches are required). To increase pressure setting, turn the nut nearest to the spring washer clockwise or turn it counter-clockwise if you want to lower the setting.

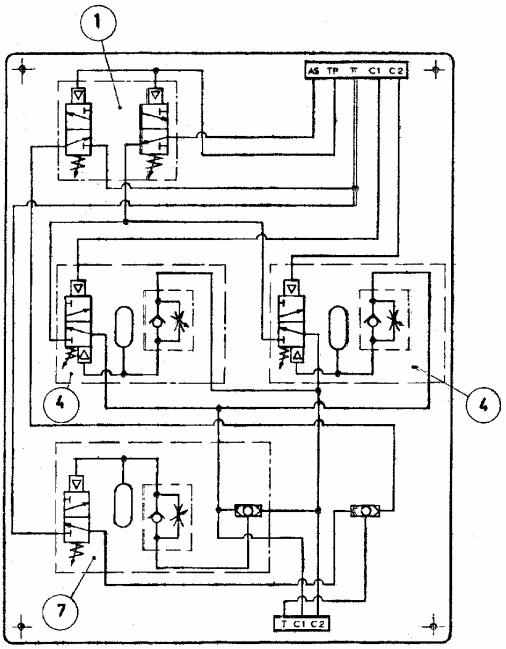
The above system allows operation of a single lever control, eliminating the clutch function and maintaining control over the engine speed in the speed range.



Item

1 Double manifold unit
2 N/O Adjustable Relay Valve 2825
4 Constant Timing Manifold 2802
5 Accumulator 4806-ANCD
6 N/C Adjustable Relay Valve 2827
7 Throttle Delay Manifold 2803
8 Accumulator 4806
9 N/C Adjustable Relay Valve 2826
10 Shuttle Valve 3008

Drawing 2850-1112



Schematic Diagram

Notes::

1) Header bar ports are ¼" NPT

2) All lines shall be 5/16" OD copper tubing

3) Keep all lines and fittings free of dirt during installation

4) Use pipe sealant on all pipe fittings to prevent leakage [Teflon tape not recommended]

5) Height of assembled panel is approx. 7¼" [185 mm]. Clear this height to allow for valve adjustment

6) Air supply "AS" for control heads and air supply panel must be from common source

7) If gauge is desired to read outgoing clutch pressure, shuttle valve 3008 (item 10) must be replaced with shuttle valve 3011 (with gauge port and pressure gauge).

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Periodic Inspection Notes

All mechanical and electronic components should be inspected at regular intervals, once every 6 – 12 months is recommended depending on the operating environment and frequency of use. Some Kobelt components are equipped with inspection covers which can be removed for examination of internal parts.

The following serves as a general inspection guideline for Kobelt engine control and steering control system components. All deficiencies have to be fixed and defective parts be replaced by a certified technician to ensure a reliable and safe operation.

1. Inspect all mechanical linkages for proper movement and the bolts and nuts are tight for their functions.

2. Inspect all push / pull cable connections for free movement, adjust if necessary.

3. Check for corrosion and excessive wear at all moving parts that could cause problem in normal operation.

4. Apply lubricating oil / grease to mechanical parts at all available greasing points. Make sure that no oil or grease will come into contact with any electronic parts. For gears and rotating shafts, use of graphite-base grease is recommended.

5. Check for signs of moisture ingress or condensation that could cause short-circuit or corrosion problem to electrical / electronic components. Surfaces of all electronic parts should be free from moisture, dust or foreign particles.

6. Check seals and holding screws on housings for damage and tightness.

7. Verify that primary and secondary power sources are at normal values.

8. Inspect system wiring for insulation breakdown, loose connections or potential for short-circuit failure.

9. Check limit switches for corrosion, smooth operation and correct positioning.

10. With the engine not running, perform functional test for each system – refer to individual component operating and test procedures.