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7173-KAS MANUAL

October 2023

“Leaders in Quality Marine Controls, Steering Gear, and Disc Brakes.”



MODEL 7173-KAS INSTRUCTION MANUAL

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DRAWINGS

- | | |
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| 401706-1 | - SINGLE SPEED STEERING SYSTEM BLOCK DIAGRAM |
| 401706-2 | - SINGLE SPEED STEERING SYSTEM WIRING DIAGRAM |
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| 401706-10 | - SINGLE STEERING SYSTEM WITH OPTIONAL JOG LEVER CONNECTION DIAGRAM |

“Leaders in Quality Marine Controls, Steering Gear, and Disc Brakes.”

SELECTING AND INSTALLING **ELECTRONIC REMOTE STEERING CONTROL**

When a full follow-up remote electronic control becomes integrated with either a manual steering system (helm pump) or a jog lever, the full follow-up control must be de-energized before putting the manual steering devices or jog levers into service.

If the full follow-up control system is not turned off when maneuvering with other methods, the steering will remain in the position as requested by the full follow-up system. For example, if a 2-speed steering system is installed whereby the full follow-up system would receive a smaller volume and the jog lever, via a separate solenoid, would receive a bigger volume of oil, the steering system would follow the jog lever until it is released. Then the follow-up control would put the rudder back to its original position.

We, however, highly recommend having a switch installed on the pump starting panel capable of turning off the 7173 and associated components. If more than one full follow-up control unit is used in a given system, a station transfer system is required since the 7173 can only use a command from any one station at any one time. Feeding two separate signals into the electronic control system would obviously create problems. If an autopilot is installed aboard a vessel, all full follow-up signals should be coordinated via a station transfer system. In other words, the autopilot must be considered as an extra station (but wired directly to the solenoid). If a vessel is equipped with two full follow-up electronic control stations and one autopilot, it is recommended to install a 3-station transfer system: two stations for the full follow-up and one for the autopilot and, of course, a switch as indicated on our electronic drawings alongside the electric breaker which is supplied by the shipyard. The switch also becomes shipyard supply and should be incorporated into the pump control panel for the hydraulic pumping unit.



MODEL 7173-KAS

Electronic Full Follow-Up Amplifier

This unit is designed to accept the command signal from our Models 6657, 7165, 7166, 7167, 7169, 7171, 7172, 7176, 7181, 7195, 7197 and 7198 and coordinates the desired rudder position with our feedback unit Models 7163, 7168, and 7174. Fluid flow control Models 7220 and 7248 is equipped with solenoid valves and when activated by the Model 7173-KAS, will disperse hydraulic fluid to the hydraulic steering system to maintain the desired position.

The device can be located anywhere aboard ship, even in the steering compartment, since its watertight and non-corrosive enclosure will protect the internal electronics from the effect of the environment.

The Model 7173-KAS is a multi-optional driver board working on 12- or 24-Volt DC. In the event of feedback potentiometer failure or wire break, the board will act in fail in mode. An LED light will be ON and the alarm output is active for monitoring

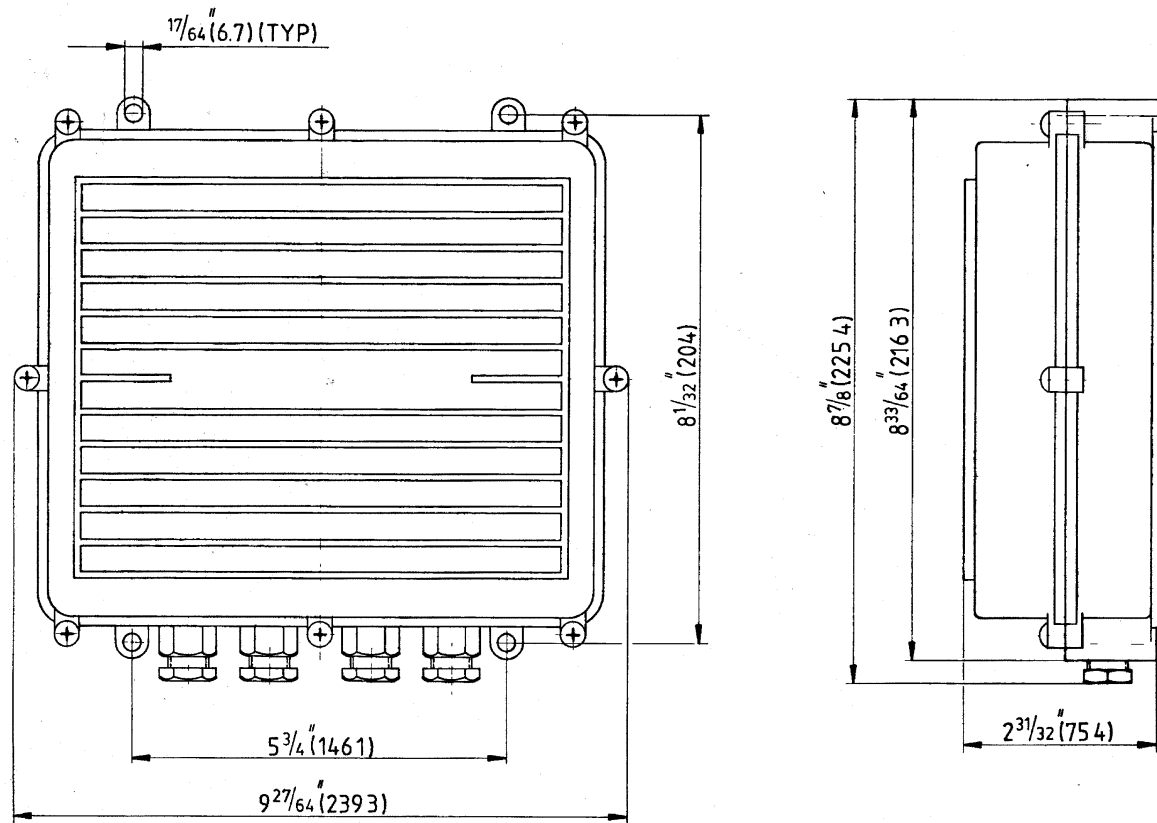
control or feedback potentiometer failure or wire break.

Also the 7173-KAS provides a pump on demand pilot signal (12 or 24 VDC) that can control a relay/contacter to energize the pump whenever any directional solenoid is activated; therefore, the pump is not continuously running.

Several options can be provided for

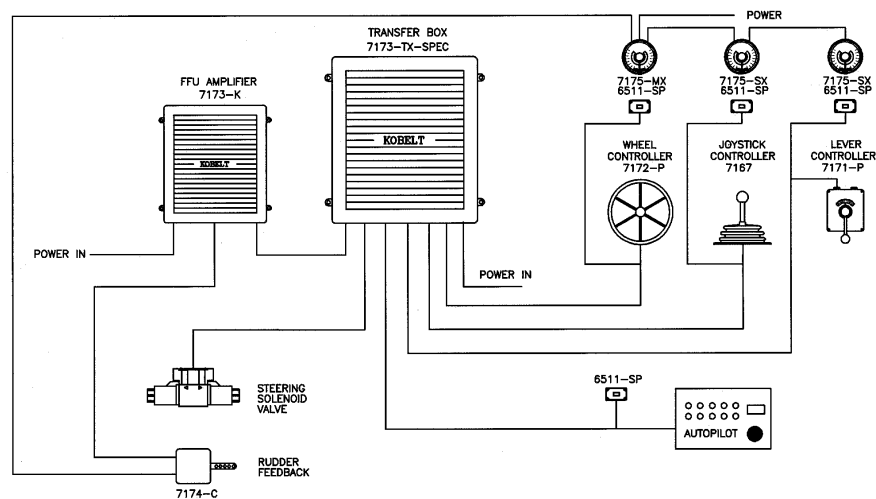
- Single speed steering system – see drawings 401706 sheets 1 & 2
- Dual speed steering system – see drawings 401706 sheets 3 & 4
- Single speed catamaran steering system (electronic tie bar) – see drawings 401706 sheets 5 & 6
- Two independent single speed steering system (steering/bucket) – see drawings 401706 sheets 7 & 8.

MODEL 7173-KAS



Dimensions are in inches (mm)

TYPICAL MULTIPLE STATION ARRANGEMENT



MODEL 7173-KAS ELECTRONIC FULL FOLLOW-UP STEERING SYSTEM

The KOBELT 7173-KAS System consists of the following components:

1. Electronic FFU Amplifier
2. Controller (Wheel Controller, FFU Lever or Joystick)
3. Follow-up (Rudder Feedback) Unit
4. Solenoid Interface Valve

The Model 7173-KAS System is used to set the position (or the angle) to which the Rudder goes. The Amplifier Unit compares the respective command and feedback signals from the Controller and Follow-Up Unit. If the signals are not equal, the Amplifier Unit applies directional control to the hydraulic pressure to move the rudder in the appropriate direction. When the Controller and Follow-Up signals are equal, the Amplifier shuts off directional control and the rudder stops.

Mounting the Model 7173-KAS Amplifier Unit

The Model 7173-KAS Amplifier Unit is mounted inside a waterproof housing. The housing should be mounted in a convenient, easily serviced location. Allow enough space to permit opening of the housing cover (see Model 7173-KAS data sheet).

Mounting the FFU Controller Unit

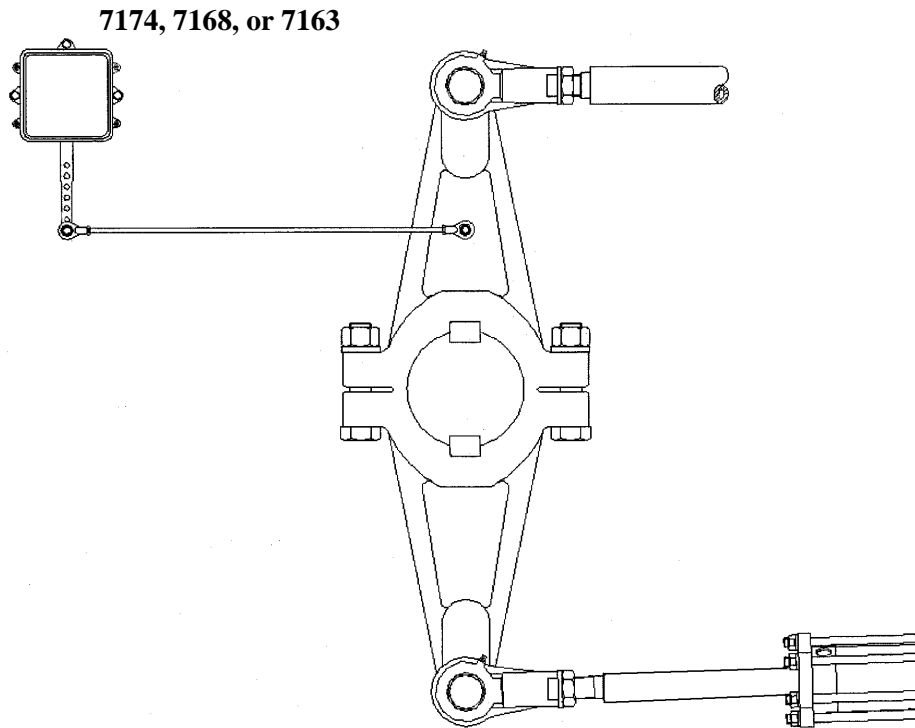
The following types of controllers are available:

- Model 6655 Steering and Engine Controller
- Model 6657 Steering / Engine Controller
- Model 7165 Joystick Controller
- Model 7166 Wheel Controller
- Model 7167 2-Axis Joystick Controller
- Model 7169 Joystick Controller
- Model 7171 Lever Controller
- Model 7172 Wheel Controller
- Model 7176 Walk-about Controller
- Model 7181 Wheel Controller
- Model 7195 Lever Controller
- Model 7197 Lever Controller
- Model 7198 Dual Lever Controller

The Model 7172 Wheel Controller is normally bulkhead mounted. A steering wheel with a 1" bore should be attached to this Controller (see Model 7172 data sheet). The Model 7171 FFU Lever Controller is waterproof and is normally mounted on a flat surface (see Model 7171 data sheet). The Model 7169 Joystick Controller should also be mounted on a flat surface.

MOUNTING THE MODEL 7174 RUDDER FEEDBACK UNIT

The Model 7174, 7168, or 7163 Follow-Up (Rudder Feedback Unit) must be mounted near the steering gear as shown in the diagram below. The output signals will then be calibrated with the tiller in place.



IMPORTANT: Hydraulic steering gears using a hydraulic Full Follow-Up System (often referred to as “Telemotor” or “Accumotor”) must drive the Feedback Unit from the Servo Cylinder, not the Rudder stock. In such a case, the Model 7174 Follow-Up should be mounted approximately two feet from the end of the Servo Cylinder. This is done to ensure proper linear motion. The cable for the Models 7174 or 7168 Feedback Unit should be a 3-conductor #18-gauge cable.

WIRING THE SYSTEM

All cables should be weatherproof marine type and be free of joints or splices. If it is necessary to join wires, a proper waterproof junction box should be used.

The input power to the Model *7173-KAS* Amplifier Unit is 11 VDC to 28 VDC. The power cable (2-conductor, #14-gauge) should be run from the switchboard through a customer-supplied on/off switch via a circuit breaker or fuse (8 amp).

The cable to the pumpset solenoid/relay should be 3-conductor #16 gauge .

A 3-conductor, #18 gauge cable should be used for the Controller. If more than one controller is used, a “Station Select” switch must be connected between the controller and the Model *7173-KAS*. The “Station Select” switch is optionally supplied. A mechanical selector switch requires a single pole, multi-position switch. Consult the factory for electronic station selector systems (Model *7173-T*).

The Model *7170* NFU Controller can also be connected to the Model *7173-KAS* System (see Model *7170* data sheet). Activating the Model *7170* Jog switch will temporarily override the FFU System. FFU Control will be returned automatically as soon as the Jog switch is deactivated. If the rudder moves in the wrong direction, reverse the black and white wires.

TESTING THE SYSTEM

The Hydraulic system must be fully operation, bled from air and adjusted for proper hard over to hard over timing before attempting to calibrate the 7173-KAS amplifier unit.

1. Check that the supply voltage is connected to the correct amplifier terminals. The circuit board has built-in polarity protection to prevent circuit damage, but the system will not initialize until polarity is correct.
2. Centre the rudder and ensure that the rudder follow-up unit is mechanically centered. Centre all FFU controllers.
3. Turn on power to the Model 7173-KAS Amplifier Unit.
4. Turn on the hydraulic pumpset or, in the case of an engine driven pumpset, start the engine.
5. The rudder should stay at midship and may hunt back and forth (see steps #9 and #10) at the midship position. If the rudder moves to a hardover position, shut off power to the amplifier and reverse the wires going to the solenoid or the black and white wires coming from the feedback unit (see applicable drawing) on the Model 7173-KAS circuit board. Re-apply power to the Model 7173-KAS Amplifier Unit.
6. Move the FFU controller to the 20° port. The rudder should move in the port direction. If the rudder moves to starboard, reverse the black and white wires coming from the controller.
7. Repeat step #6 for any additional controllers wired via a station selector.
8. Move the FFU controller to a hardover position and adjust the internal FFU controller trim pot until the rudder stops just before the hardover position. Also, rudder limit adjustment can be achieved by adjusting rudder limit trim pots on 7173-KAS board or by adjusting the stroke on the feedback unit.

NOTE: You must not allow the cylinder to continually push against the mechanical stops (hardover position).

9. Move the FFU controller to the centre position and adjust the deadband adjustment trim pot (VR1/VR2) clockwise until the rudder begins to hunt back and forth (rudder may already be doing this). SEE APPLICABLE DRAWINGS
10. Carefully adjust the VR1/VR2 deadband control counterclockwise until the hunting effect stops. This setting will be the maximum useable gain for your system. Check the adjustment several times by moving the controller to various positions. If hunting starts, re-adjust VR1/VR2 counterclockwise to correct. SEE APPLICABLE DRAWINGS

CAUTION: In order to avoid overheating/damaging the solenoid coils or the 7173-KAS amplifier, power to the amplifier should be disconnected if hydraulic power is not available. For dual speed operation the high speed sensitivity adjustment VR2 must be set for few degrees of deadband for proper operation.

TROUBLESHOOTING

| <u>SYMPTOM</u> | <u>POSSIBLE CAUSE</u> | <u>REMEDY</u> |
|--|--|--|
| System dead | <ul style="list-style-type: none"> - power off - fuse blown - DC power input polarity reversed | <ul style="list-style-type: none"> - turn on power - replace fuse - reverse connection |
| Erratic operation | <ul style="list-style-type: none"> - follow-up pot of FFU or controller potentiometer defective | <ul style="list-style-type: none"> - check follow-up and controller potentiometer - meter output voltage, replace if necessary |
| Rudder hunts back and forth | <ul style="list-style-type: none"> - deadband control in Model 7173-KAS Amplifier incorrectly adjusted | <ul style="list-style-type: none"> - reduce gain by turning counter-clockwise |
| Rudder goes to a hardover position | <ul style="list-style-type: none"> - defective potentiometer - damaged cable - sticky solenoid valve or relay - loose follow-up linkages - solenoid wires reversed - feedback wires reversed | <ul style="list-style-type: none"> - replace - repair - repair or replace - repair - reverse wires - reverse wires |
| Rudder does not travel same number of degrees hardover to hardover | <ul style="list-style-type: none"> - control potentiometer not centered - feedback unit or potentiometer not centered | <ul style="list-style-type: none"> - meter output voltage or resistance - meter output voltage or resistance |

LED Lights and Output Indicator Information

If “L1” LED light is ON, then Solenoid “A” output is active.

If “L2” LED light is ON, then Solenoid “B” output is active.

If “L3” LED light is ON, then Solenoid “C” output is active.

If “L4” LED light is ON, then Solenoid “D” output is active.

L1 and L2 continuously ON - U1 damaged - replace

L3 and L4 continuously ON – U2 damaged - replace

If “L5” LED light is ON, then the “Alarm Output” will be active to indicate control or feedback potentiometer failure or wire break. The 7173-KAS will fail in mode upon potentiometer or wire break failure.

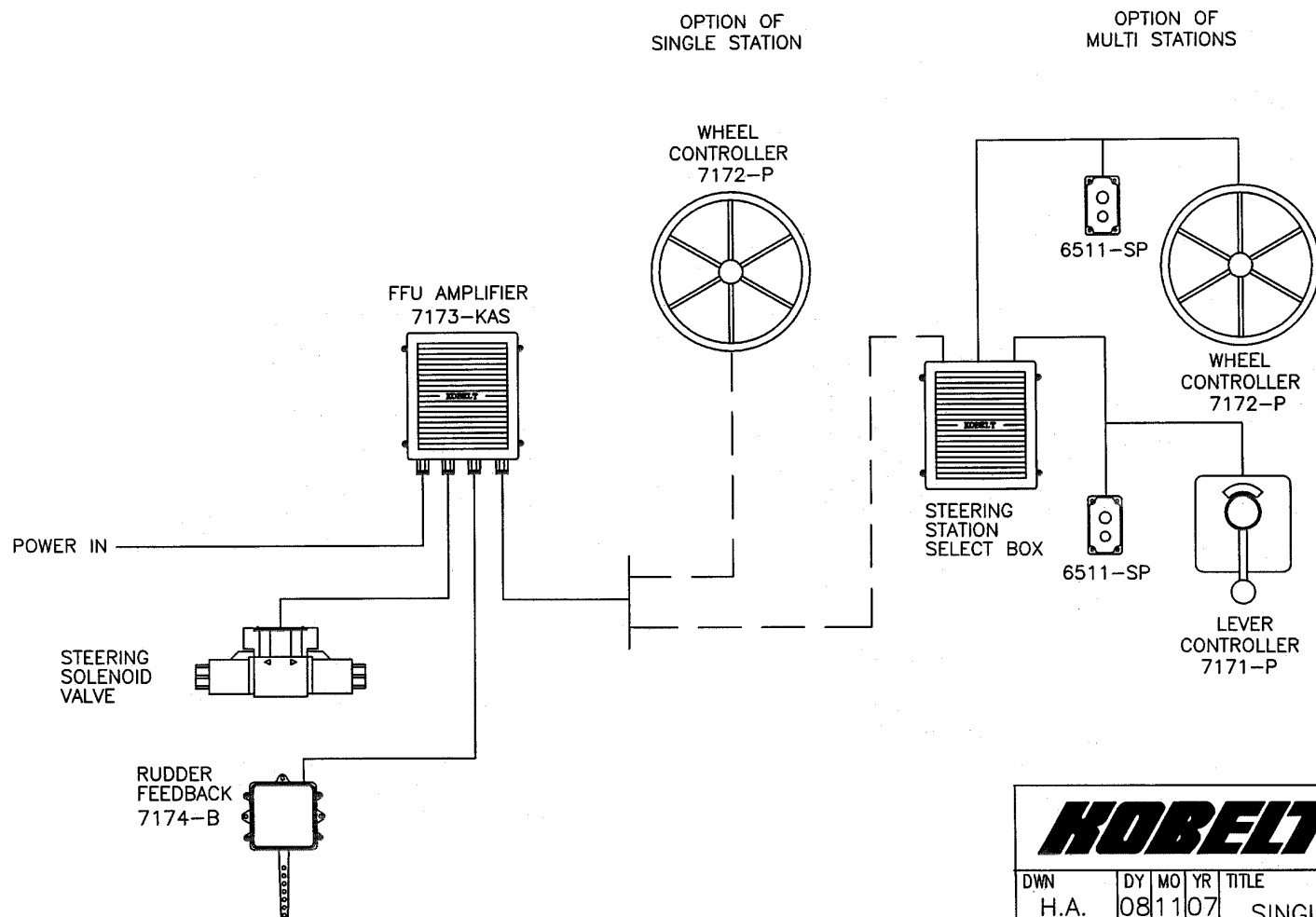
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Periodic Inspection Notes

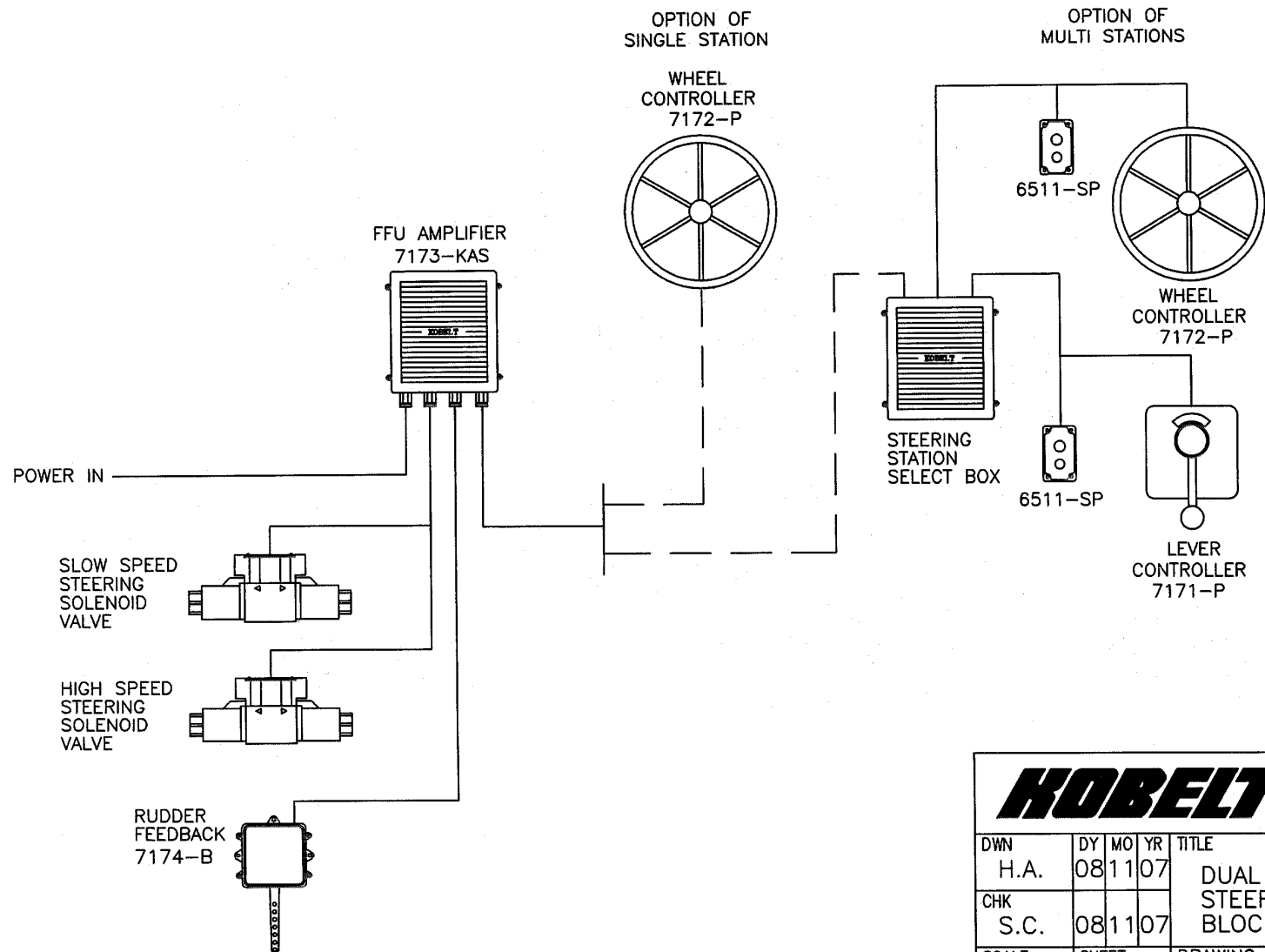
All mechanical and electronic components should be inspected at regular intervals, once every 6 – 12 months is recommended depending on the operating environment and frequency of use. Some Kobelt components are equipped with inspection covers which can be removed for examination of internal parts.

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. Check for corrosion and excessive wear at all moving parts that could cause problem in normal operation.
3. 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.
4. 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.
5. Check seals and holding screws on housings for damage and tightness.
6. Verify that primary and secondary power sources are at normal values.
7. Inspect system wiring for insulation breakdown, loose connections or potential for short-circuit failure.
8. Check limit switches and potentiometers for corrosion, smooth operation and correct positioning. It is recommended that these components be replaced at least every five years or more frequently when working in hot and humid environment.
9. With the engine stopped, perform functional test for each system – refer to individual component operating and test procedures.



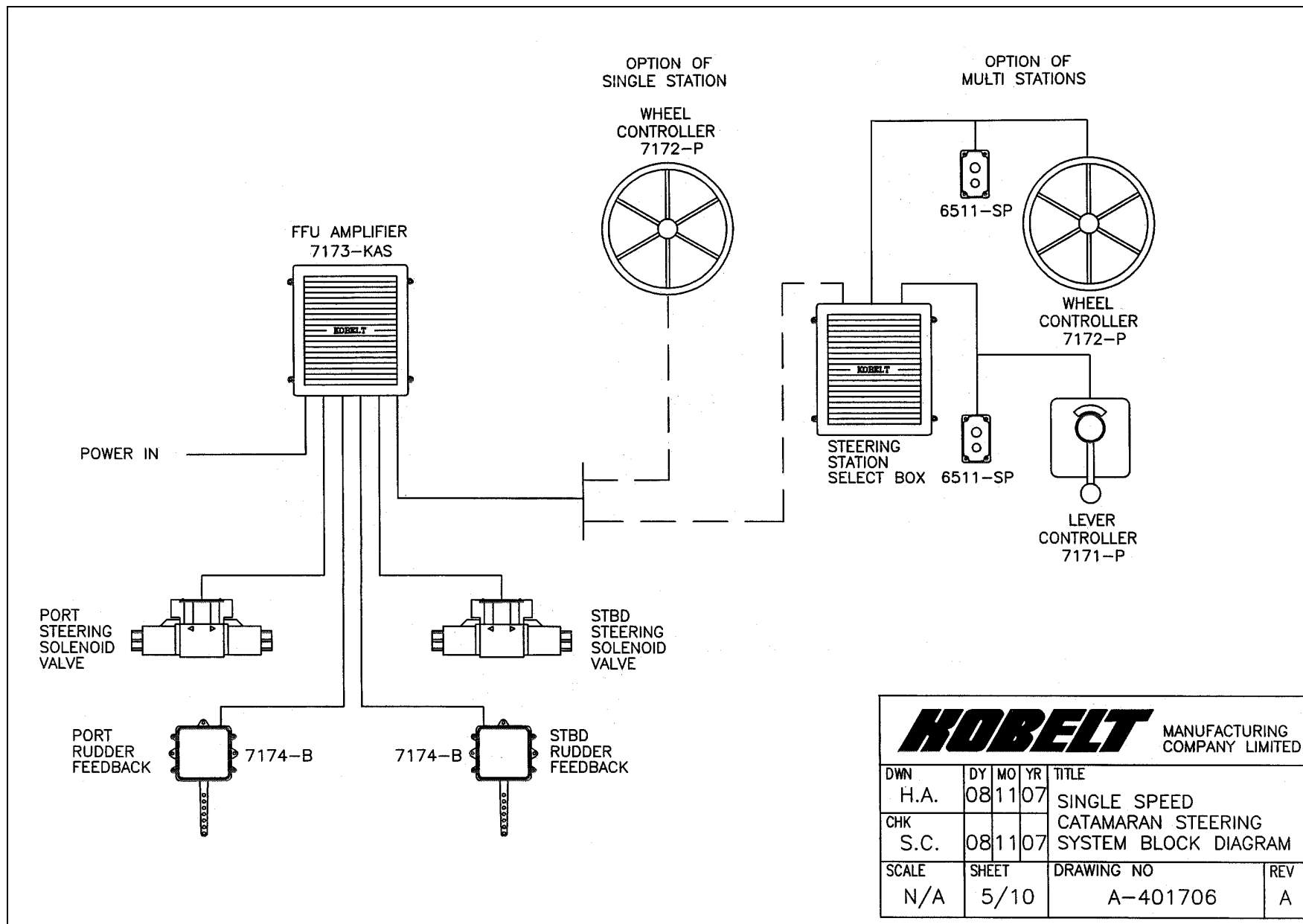
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|---------------|------|---------------|----|------------------------|---|----------|
| DWN | H.A. | DY | MO | YR | TITLE SINGLE SPEED STEERING SYSTEM BLOCK DIAGRAM | |
| CHK | S.C. | 08 | 11 | 07 | | |
| SCALE | N/A | SHEET 1/10 | | DRAWING NO A-401706 | | REV A |

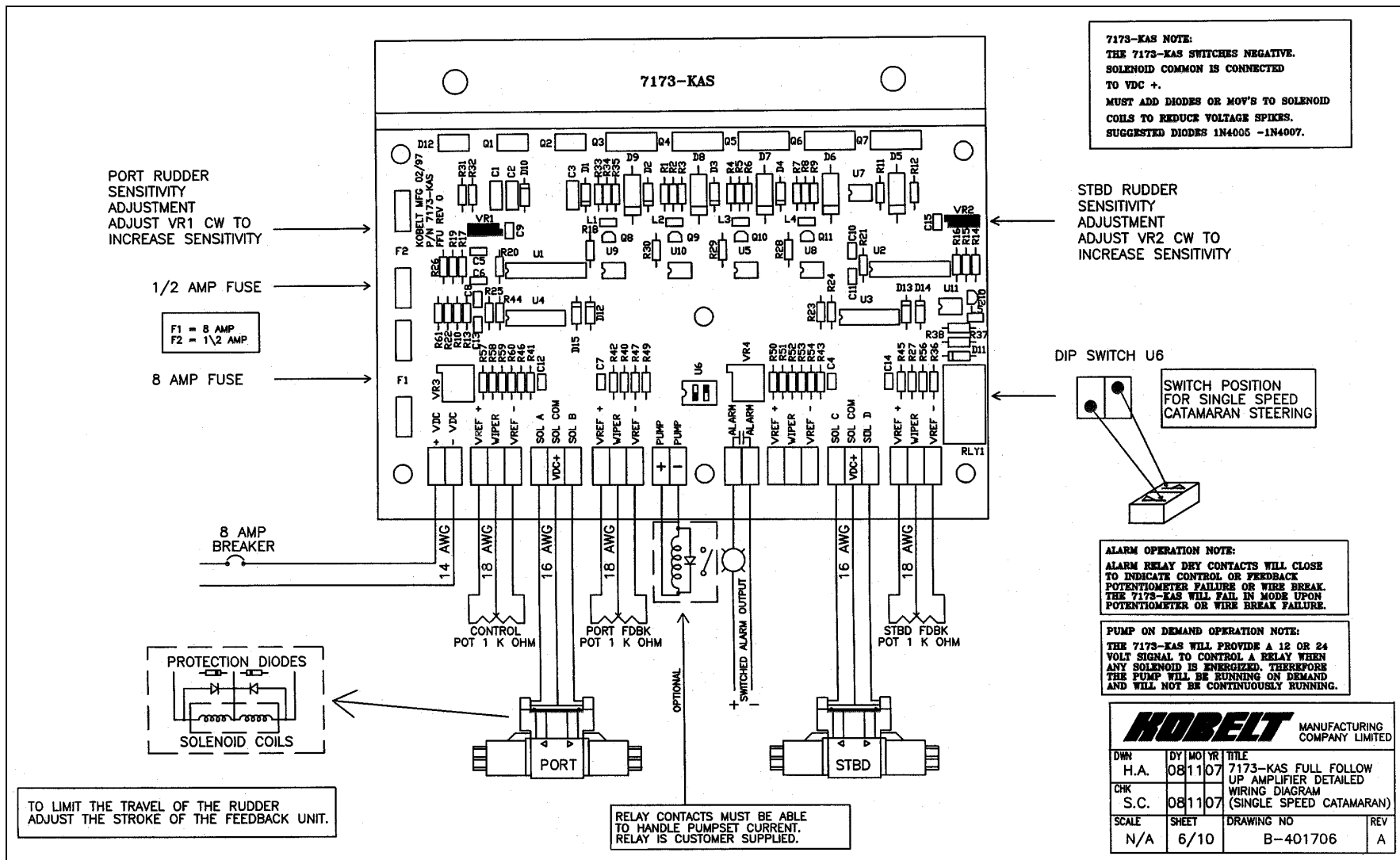


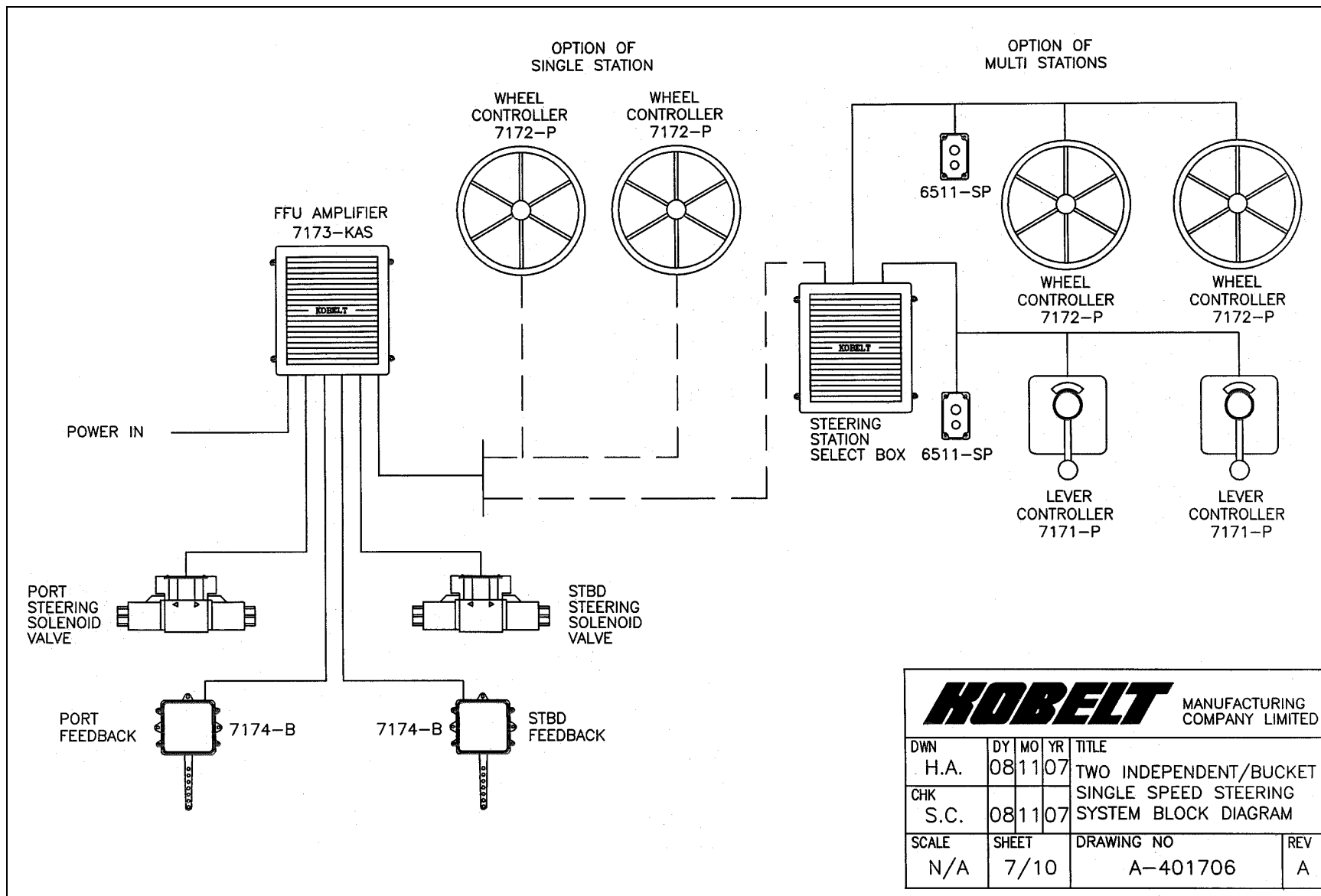
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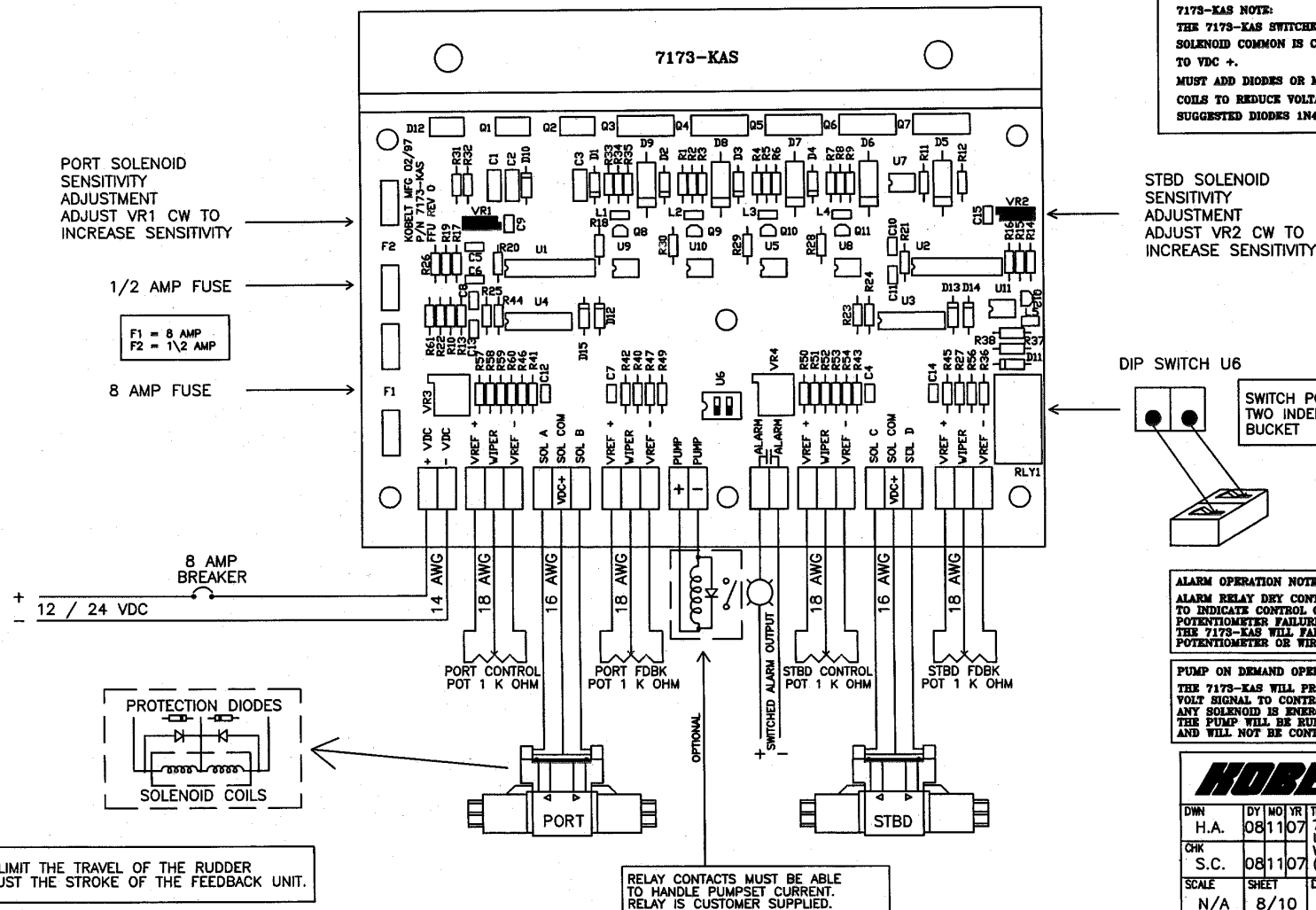
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|-------|-------|------------|----|------------|--|
| DWN | DY | MO | YR | TITLE | |
| H.A. | 08 | 11 | 07 | | |
| CHK | S.C. | 08 | 11 | DRAWING NO | |
| | | | | | |
| SCALE | SHEET | DRAWING NO | | REV | |
| N/A | 3/10 | A-401706 | | A | |

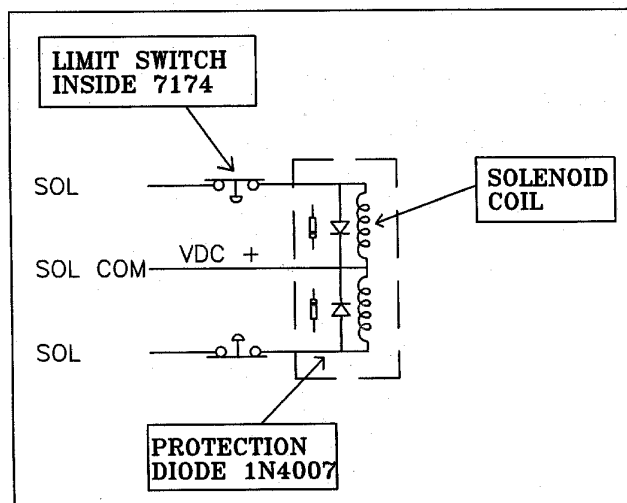
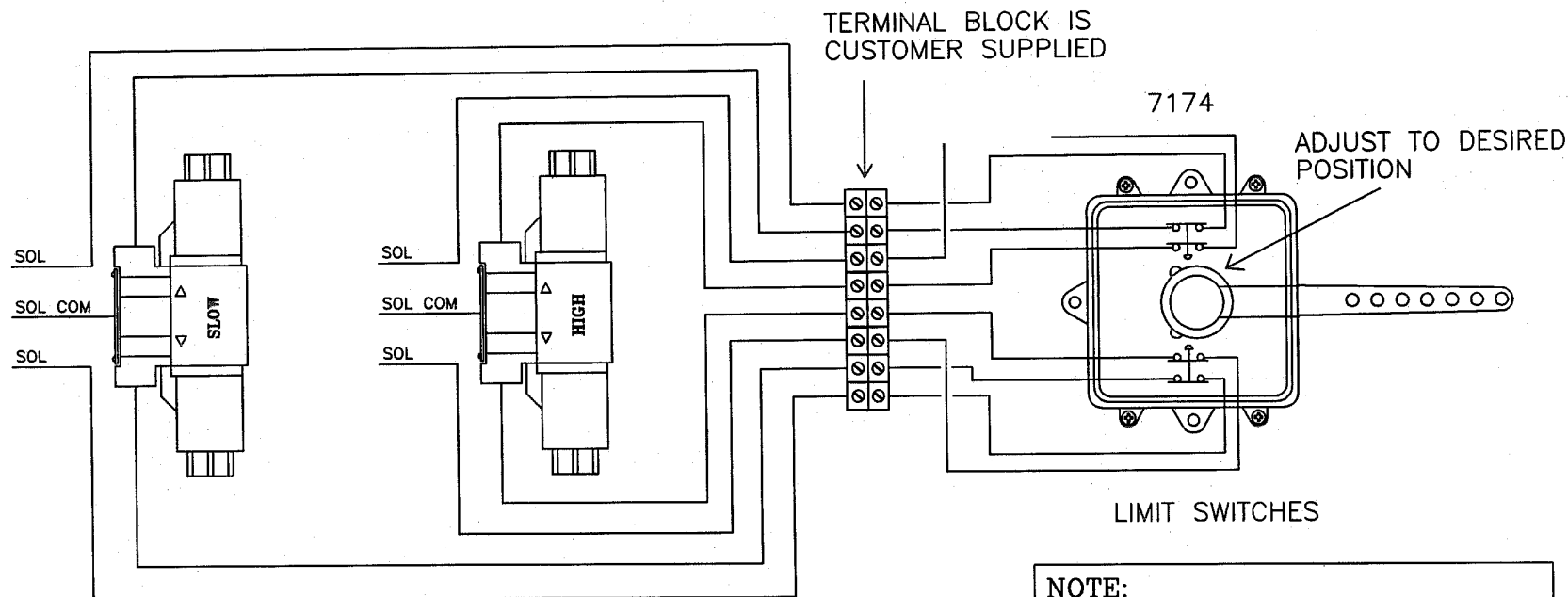








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|--------------------------------------|-------|------------|-----|
| DWN | DY | MO | YR |
| H.A. | 08 | 11 | 07 |
| CHK | S.C. | 08 | 11 |
| SCALE | SHEET | DRAWING NO | REV |
| N/A | 8/10 | B-401706 | A |



NOTE:
 DWG SHOWN FOR DUAL SPEED
 STEERING SYSTEM.
 MUST ADD PROTECTION DIODES
 TO SOLENOID COILS TO REDUCE
 VOLTAGE SPIKES.
 7173-KAS AMPLIFIER SWITCHES
 NEGATIVE, MUST SET AUTOPILOT
 TO SWITCH NEGATIVE.

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| | | | | | |
|-------|-------|----|----|-------------------------|-----|
| DWN | DY | MO | YR | TITLE | |
| H.A. | 08 | 11 | 07 | 7174 FEEDBACK UNIT | |
| CHK | | | | LIMIT SWITCHES DETAILED | |
| S.C. | 08 | 11 | 07 | WIRING DIAGRAM | |
| SCALE | SHEET | | | DRAWING NO | REV |
| N/A | 9/10 | | | A-401706 | A |

