



8238-129th Street, Surrey, B.C. Canada V3W 0A6
Telephone 604-572-3935 Fax 604-590-8313
<http://www.kobel.com>

7173-KAS MANUAL

August 2010

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



MODEL 7173-KAS INSTRUCTION MANUAL

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“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, 7196 7197 and 7198 and coordinates the desired rudder position with our feedback unit Models 7168 or 7174. Fluid flow control Models 7144, 7145 and 7148 are 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

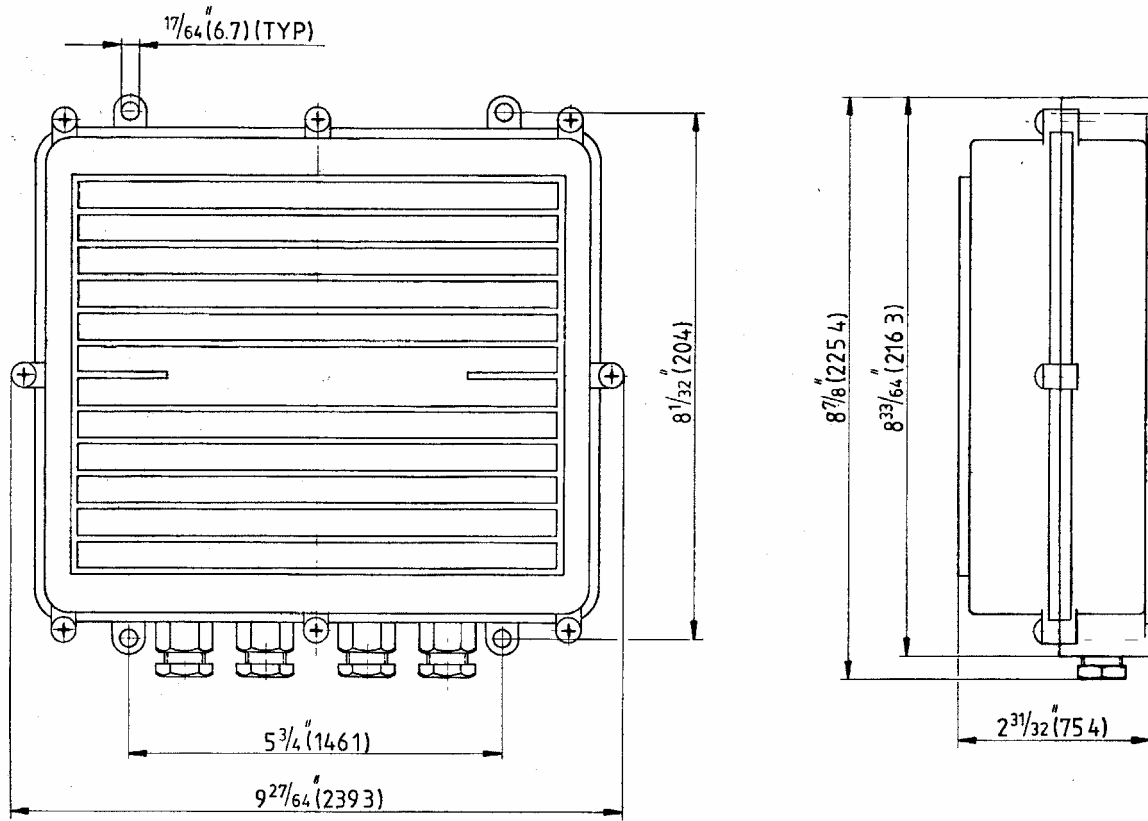
control or feedback potentiometer failure or wire break.

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

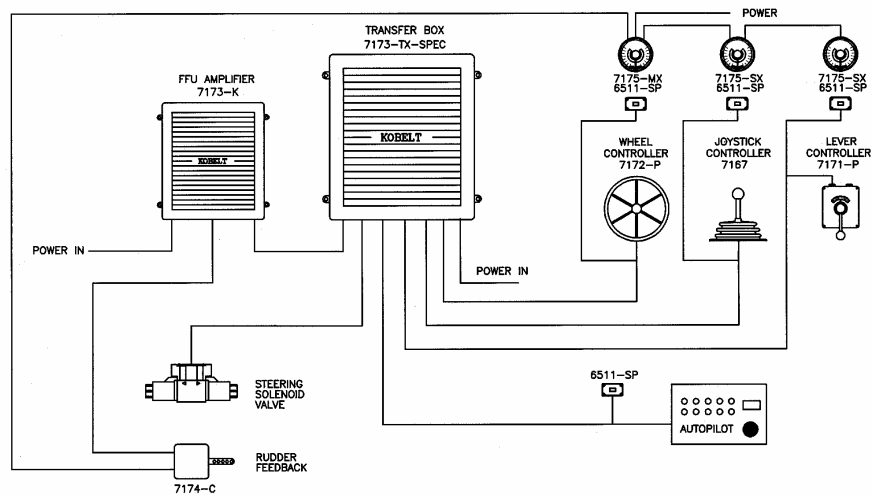
- Single speed steering system – see drawings 401706 sheets 1 & 2
- Dual speed steering system – see drawings 401706 sheets 3 & 4
- Single speed catamaran steering system (electronic tie bar) – see drawings 401706 sheets 5 & 6
- Two independent single speed steering system (steering/bucket) – see drawings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

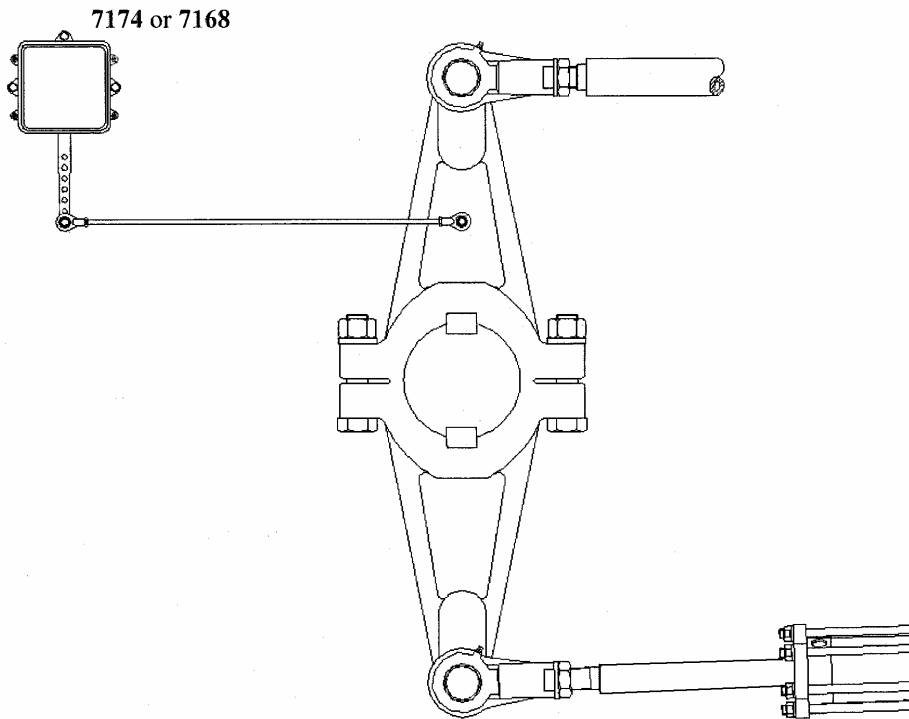
The following types of controllers are available:

- 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 7196 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 or 7168 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 wire.

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

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 (R17 or R31) clockwise until the rudder begins to hunt back and forth (rudder may already be doing this).
10. Carefully adjust the R17 or R31 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 R17 or R31 counterclockwise to correct.

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.

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
L1 and L2 continuously ON	<ul style="list-style-type: none"> - U1 damaged 	<ul style="list-style-type: none"> - replace
L3 and L4 continuously ON	<ul style="list-style-type: none"> - U2 damaged 	<ul style="list-style-type: none"> - replace

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.

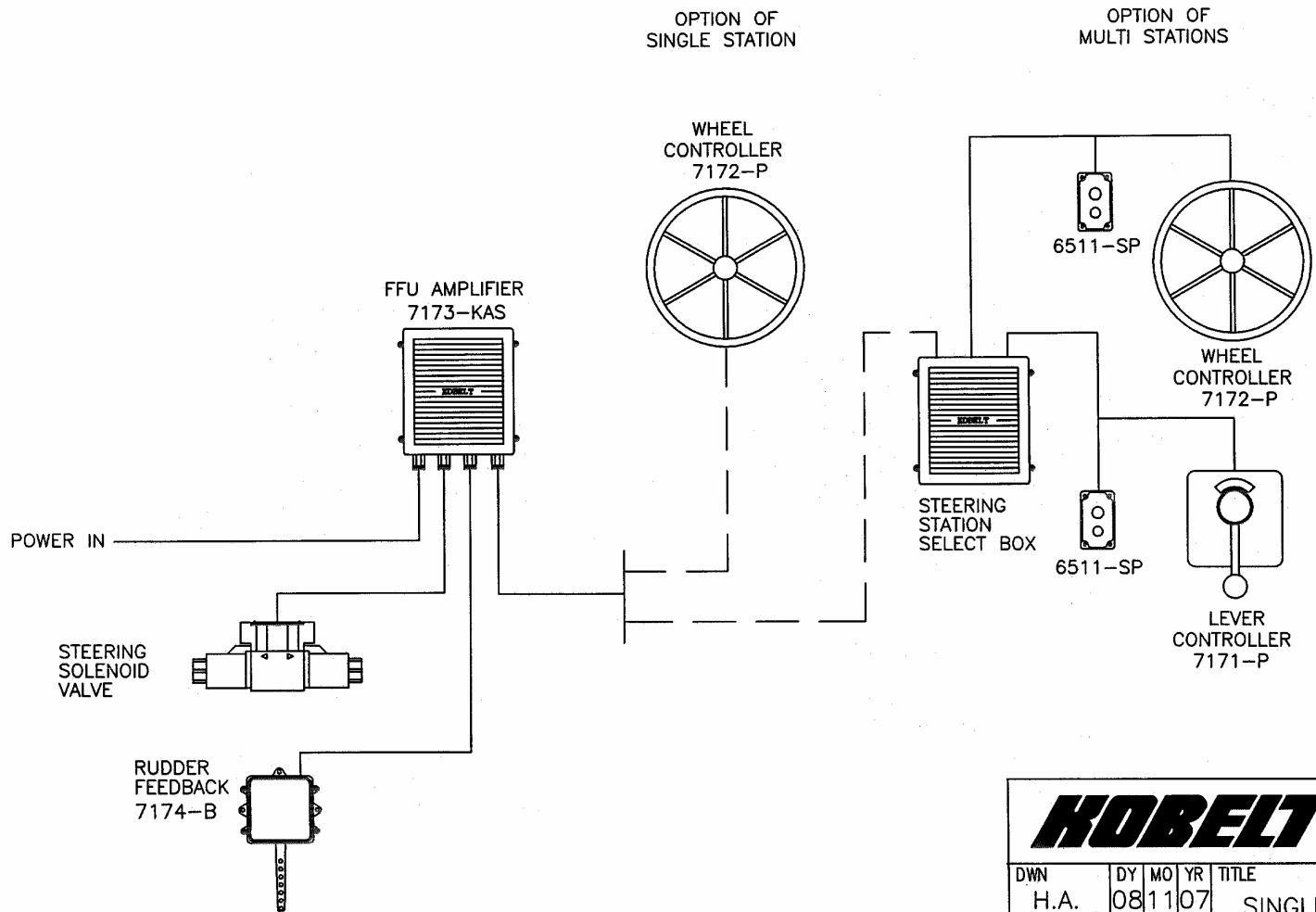
KOBELT MANUFACTURING COMPANY LTD.

Periodic General Inspection Notes

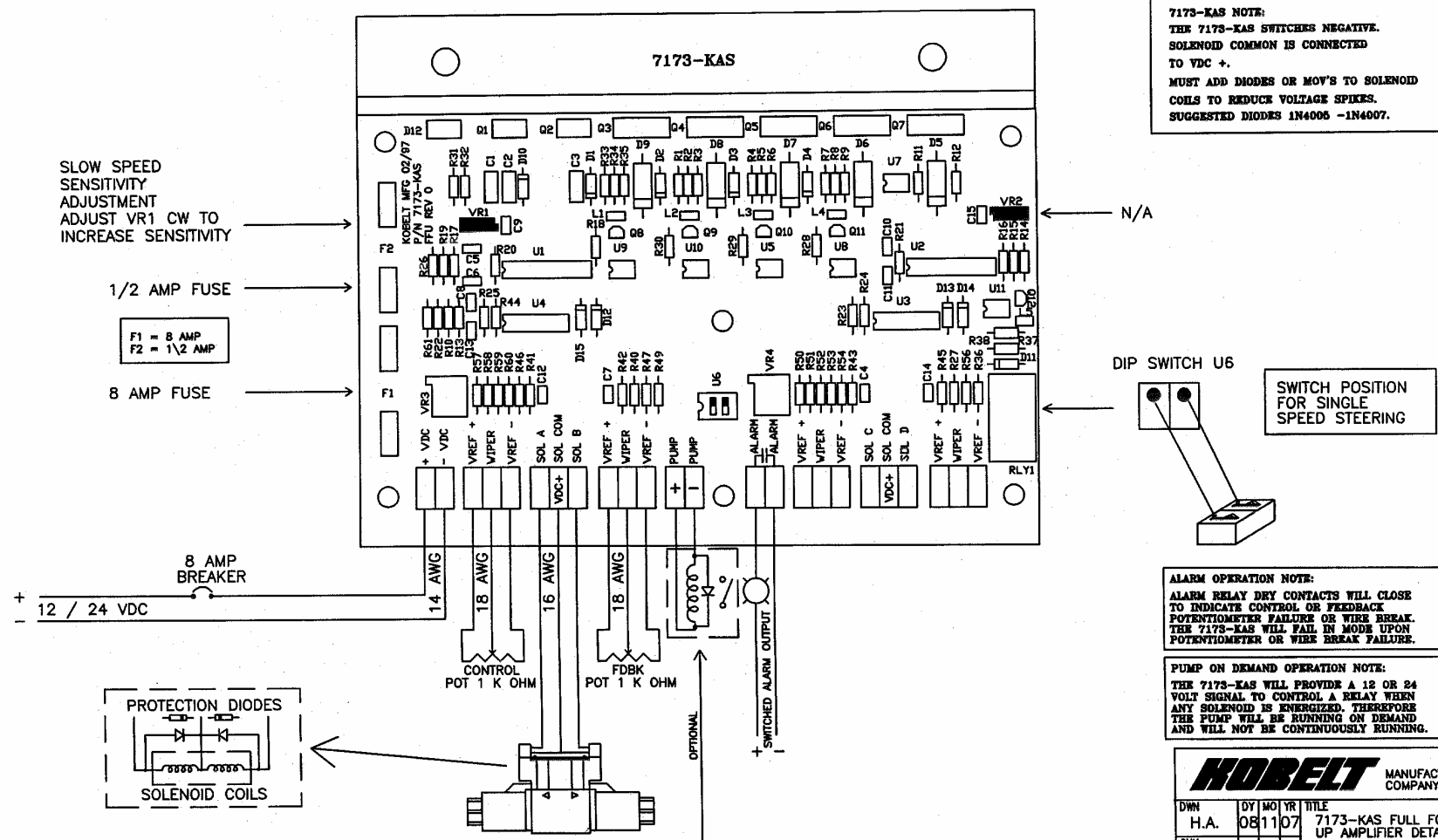
All mechanical and electronic components should be inspected at regular intervals, at least once every 6 - 12 months is recommended depending on the operating environment and frequency of use. Some Kobelt components are equipped with inspection covers which can be removed for examination of internal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

The followings serve 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 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 parts that could cause problem in normal operation.
4. Apply lubricating oil / grease to mechanical parts at all available greasing points. For gears and rotating shafts, use of a 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 and dust.
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 for details.



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



7173-KAS NOTE:
 THE 7173-KAS SWITCHES NEGATIVE.
 SOLENOID COMMON IS CONNECTED
 TO VDC +.
 MUST ADD DIODES OR MOV'S TO SOLENOID
 COILS TO REDUCE VOLTAGE SPIKES.
 SUGGESTED DIODES 1N4005 -1N4007.

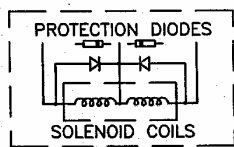
SLOW SPEED
 SENSITIVITY
 ADJUSTMENT
 ADJUST VR1 CW TO
 INCREASE SENSITIVITY

1/2 AMP FUSE

F1 = 8 AMP
 F2 = 1 1/2 AMP

8 AMP FUSE

8 AMP
 BREAKER
 + 12 / 24 VDC



TO LIMIT THE TRAVEL OF THE RUDDER
 ADJUST THE STROKE OF THE FEEDBACK UNIT.

RELAY CONTACTS MUST BE ABLE
 TO HANDLE PUMPSET CURRENT.
 RELAY IS CUSTOMER SUPPLIED.

N/A

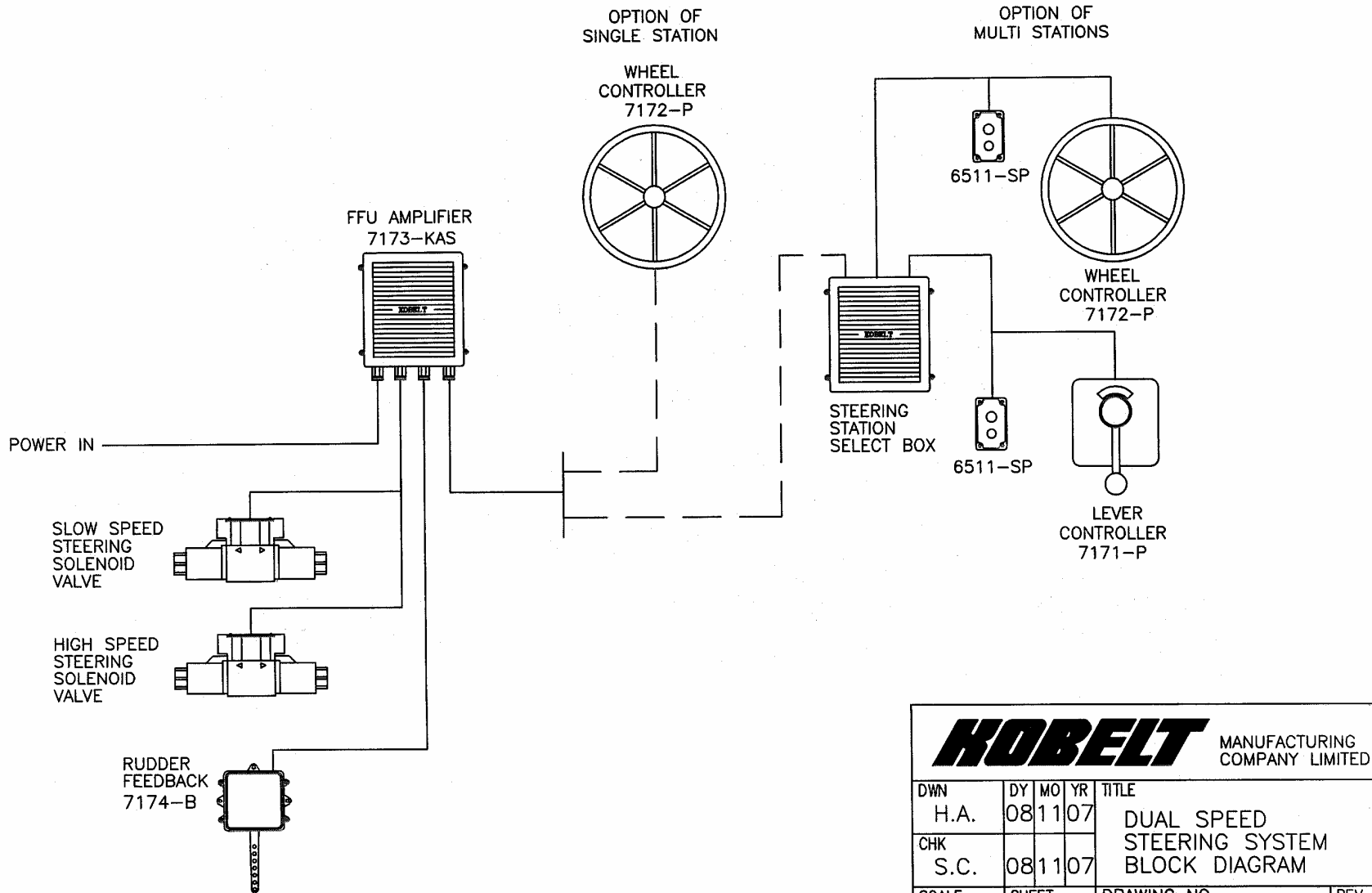
DIP SWITCH U6

SWITCH POSITION
 FOR SINGLE
 SPEED STEERING

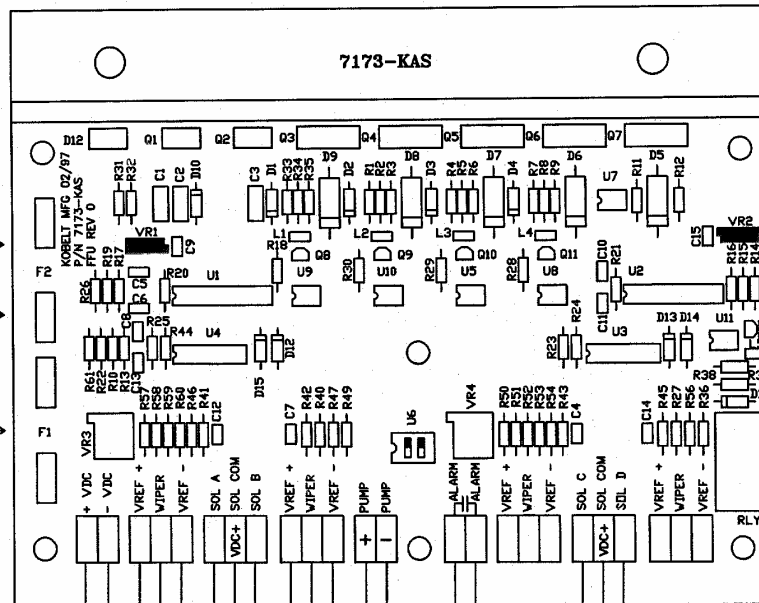
ALARM OPERATION NOTE:
 ALARM RELAY DRY CONTACTS WILL CLOSE
 TO INDICATE CONTROL OR FEEDBACK
 POTENTIOMETER FAILURE OR WIRE BREAK.
 THE 7173-KAS WILL FAIL IN MODE UPON
 POTENTIOMETER OR WIRE BREAK FAILURE.

PUMP ON DEMAND OPERATION NOTE:
 THE 7173-KAS WILL PROVIDE A 12 OR 24
 VOLT SIGNAL TO CONTROL A RELAY WHEN
 ANY SOLENOID IS ENERGIZED. THEREFORE
 THE PUMP WILL BE RUNNING ON DEMAND
 AND WILL NOT BE CONTINUOUSLY RUNNING.

KOBELT		MANUFACTURING COMPANY LIMITED	
DWN	07	MO	11
H.A.	08	11	07
CHK			
S.C.	08	11	07
SCALE	SHEET	DRAWING NO	REV
N/A	2/10	B-401706	A



KOBELT				MANUFACTURING COMPANY LIMITED
DWN	DY	MO	YR	TITLE
H.A.	08	11	07	DUAL SPEED STEERING SYSTEM BLOCK DIAGRAM
CHK	S.C.	08	11	07
SCALE	SHEET	DRAWING NO		REV
N/A	3/10	A-401706		A



7173-KAS NOTE:
 THE 7173-KAS SWITCHES NEGATIVE.
 SOLENOID COMMON IS CONNECTED
 TO VDC +.
 MUST ADD DIODES OR MOV'S TO SOLENOID
 COILS TO REDUCE VOLTAGE SPIKES.
 SUGGESTED DIODES 1N4005 -1N4007.

SLOW SPEED
 SENSITIVITY
 ADJUSTMENT
 ADJUST VR1 CW TO
 INCREASE SENSITIVITY

HIGH SPEED
 SENSITIVITY
 ADJUSTMENT
 ADJUST VR2 CW TO
 INCREASE SENSITIVITY

1/2 AMP FUSE

F1 = 8 AMP
 F2 = 1/2 AMP

8 AMP FUSE

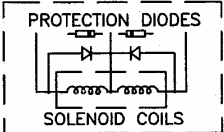
DIP SWITCH U6

SWITCH POSITION FOR
 DUAL
 SPEED STEERING

8 AMP BREAKER
 + 12 / 24 VDC

ALARM OPERATION NOTE:
 ALARM RELAY DRY CONTACTS WILL CLOSE
 TO INDICATE CONTROL OR FEEDBACK
 POTENTIOMETER FAILURE OR WIRE BREAK.
 THE 7173-KAS WILL FAIL IN MODE UPON
 POTENTIOMETER OR WIRE BREAK FAILURE.

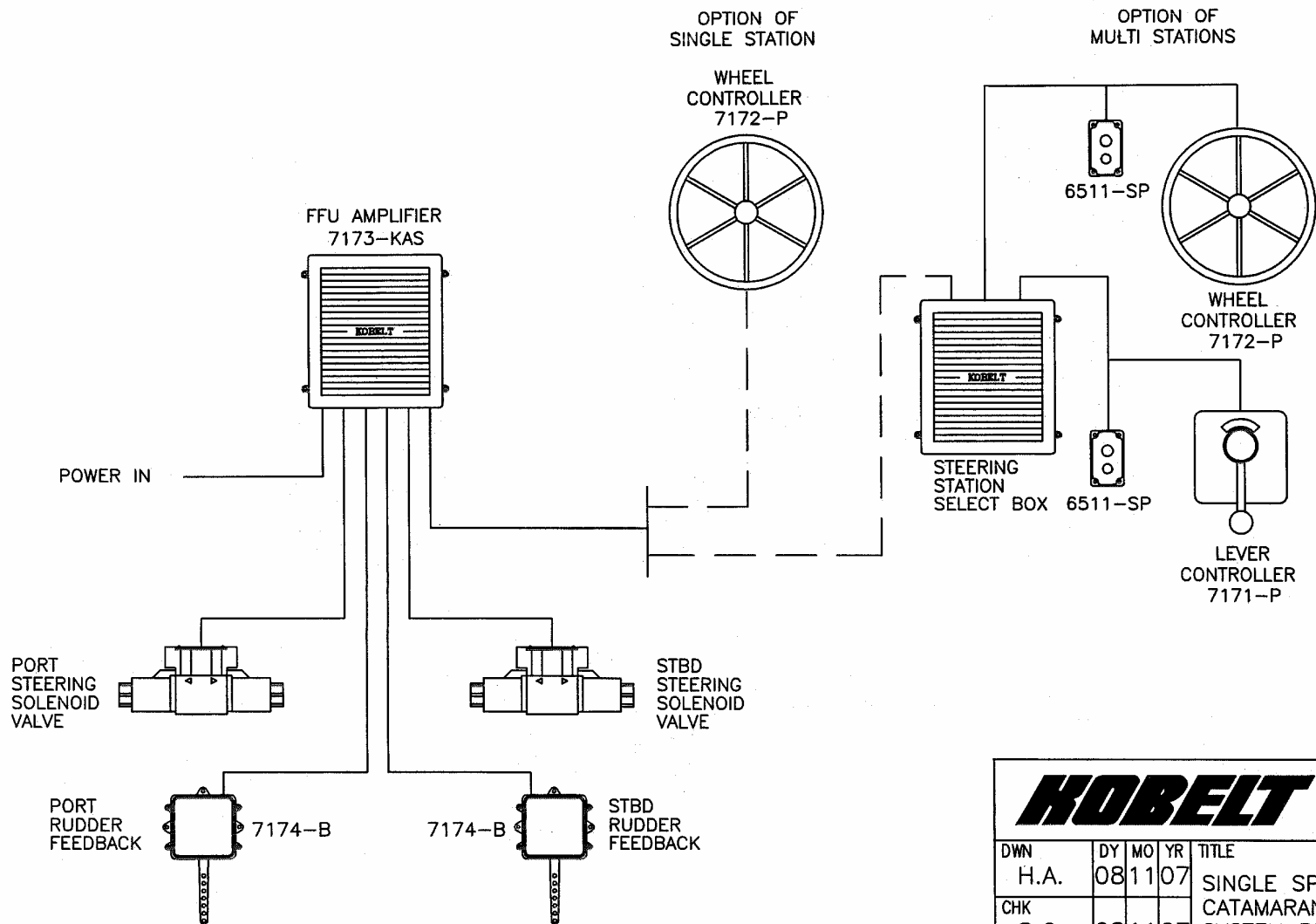
PUMP ON DEMAND OPERATION NOTE:
 THE 7173-KAS WILL PROVIDE A 12 OR 24
 VOLT SIGNAL TO CONTROL A RELAY WHEN
 ANY SOLENOID IS ENERGIZED. THEREFORE
 THE PUMP WILL BE RUNNING ON DEMAND
 AND WILL NOT BE CONTINUOUSLY RUNNING.



TO LIMIT THE TRAVEL OF THE RUDDER
 ADJUST THE STROKE OF THE FEEDBACK UNIT.

RELAY CONTACTS MUST BE ABLE
 TO HANDLE PUMPSET CURRENT.
 RELAY IS CUSTOMER SUPPLIED.

CONTRACT N/A	KOBELT MANUFACTURING COMPANY LIMITED			
CUSTOMER N/A	DWN H.A.	DY 08	MO 11	YR 07
VESSEL N/A	CHK S.C.	08	11	07
SCALE N/A	SHEET 4/10	DRAWING NO B-401706	REV A	



KOBELT				MANUFACTURING COMPANY LIMITED
DWN	DY	MO	YR	TITLE
H.A.	08	11	07	SINGLE SPEED CATAMARAN STEERING SYSTEM BLOCK DIAGRAM
CHK	S.C.	08	11	07
SCALE	SHEET	DRAWING NO		REV
N/A	5/10	A-401706		A

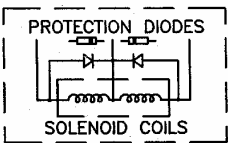
PORT RUDDER SENSITIVITY ADJUSTMENT
ADJUST VR1 CW TO INCREASE SENSITIVITY

1/2 AMP FUSE

F1 = 8 AMP
F2 = 1/2 AMP

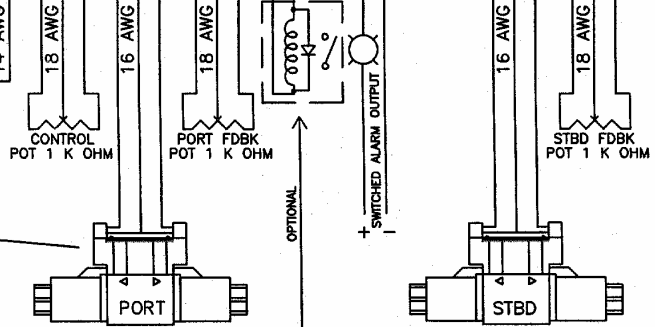
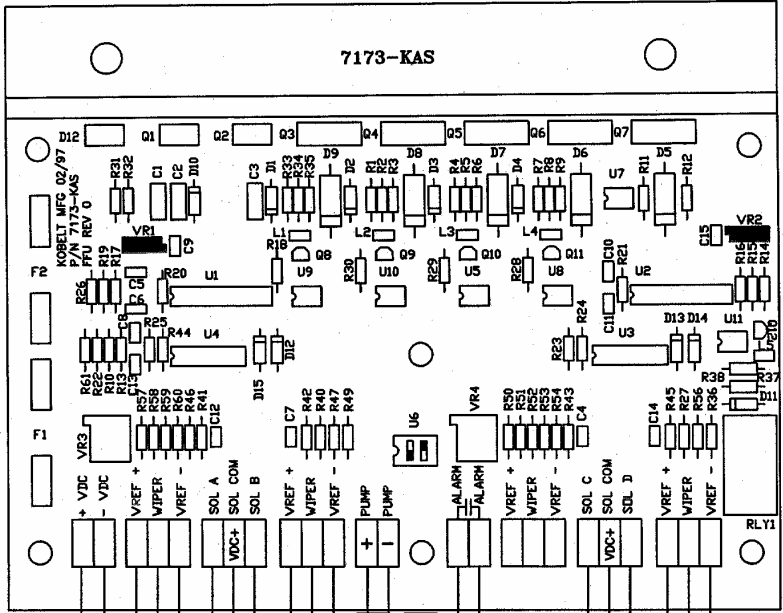
8 AMP FUSE

8 AMP BREAKER



TO LIMIT THE TRAVEL OF THE RUDDER
ADJUST THE STROKE OF THE FEEDBACK UNIT.

7173-KAS

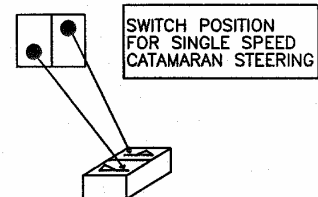


RELAY CONTACTS MUST BE ABLE TO HANDLE PUMPSET CURRENT.
RELAY IS CUSTOMER SUPPLIED.

7173-KAS NOTE:
THE 7173-KAS SWITCHES NEGATIVE.
SOLENOID COMMON IS CONNECTED TO VDC +.
MUST ADD DIODES OR MOV'S TO SOLENOID COILS TO REDUCE VOLTAGE SPIKES.
SUGGESTED DIODES 1N4005 -1N4007.

STBD RUDDER SENSITIVITY ADJUSTMENT
ADJUST VR2 CW TO INCREASE SENSITIVITY

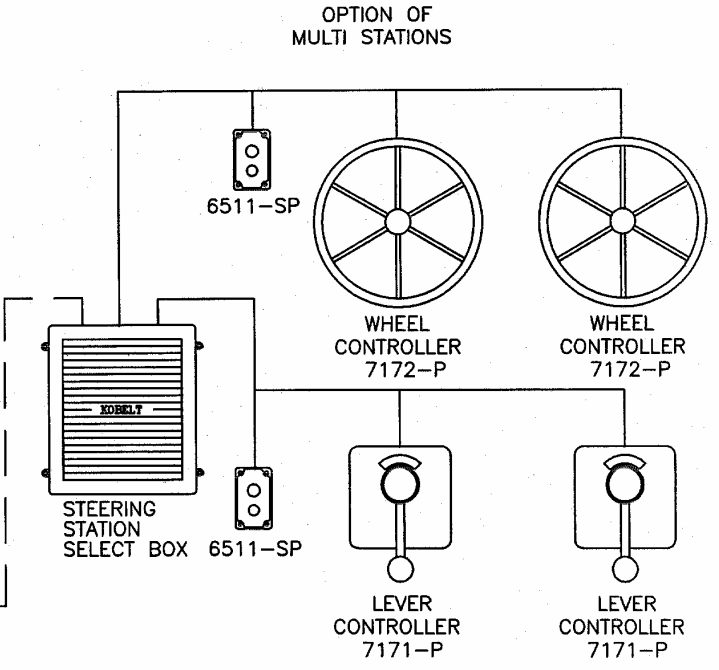
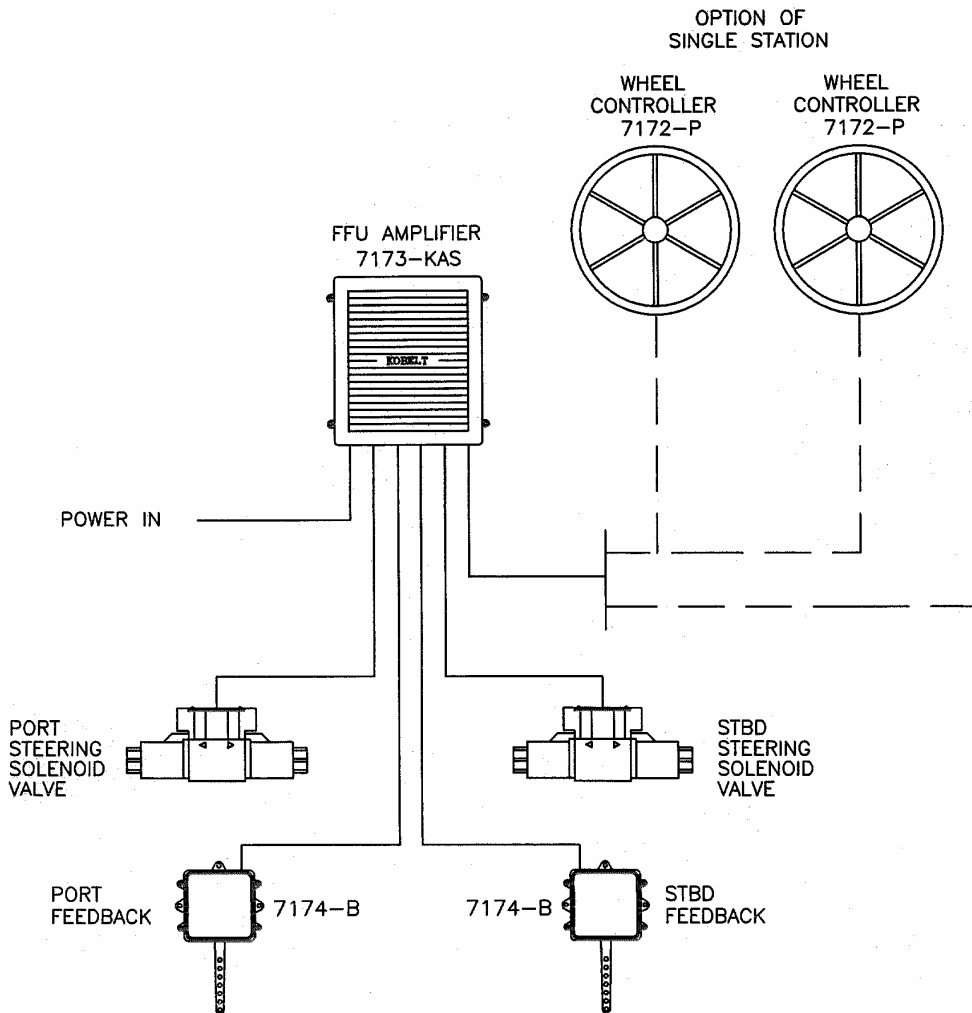
DIP SWITCH U6



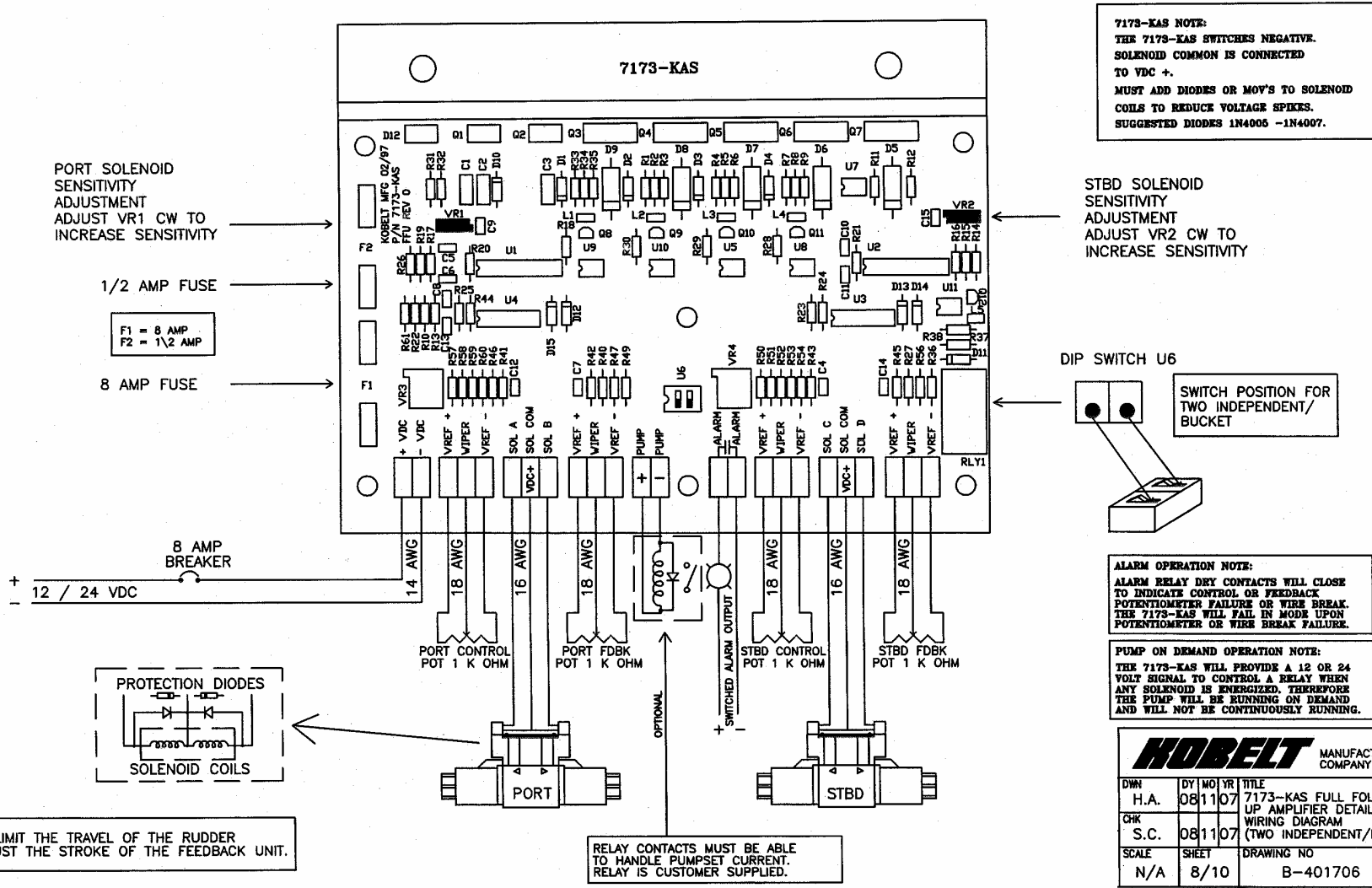
ALARM OPERATION NOTE:
ALARM RELAY DRY CONTACTS WILL CLOSE TO INDICATE CONTROL OR FEEDBACK POTENTIOMETER FAILURE OR WIRE BREAK. THE 7173-KAS WILL FAIL IN MODE UPON POTENTIOMETER OR WIRE BREAK FAILURE.

PUMP ON DEMAND OPERATION NOTE:
THE 7173-KAS WILL PROVIDE A 12 OR 24 VOLT SIGNAL TO CONTROL A RELAY WHEN ANY SOLENOID IS ENERGIZED. THEREFORE THE PUMP WILL BE RUNNING ON DEMAND AND WILL NOT BE CONTINUOUSLY RUNNING.

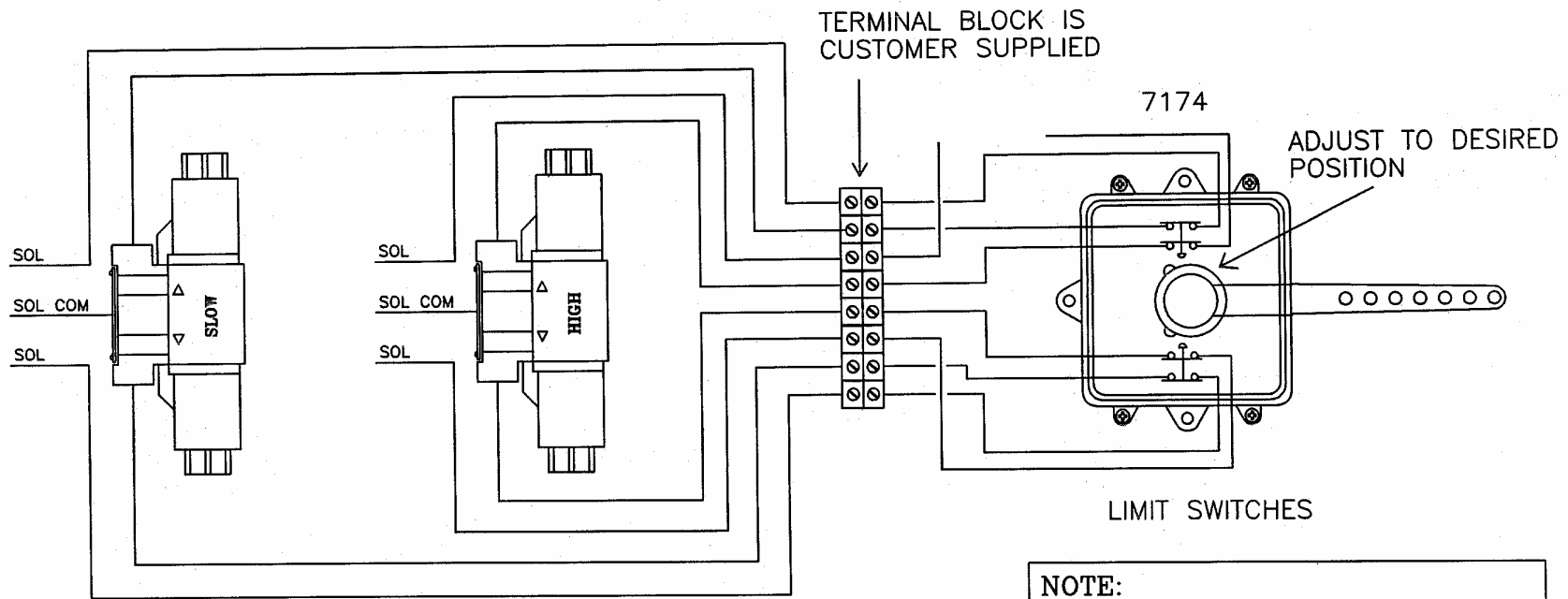
KOBELT		MANUFACTURING COMPANY LIMITED	
DWN	BY	MO	YR
H.A.	08	11	07
CHK	7173-KAS FULL FOLLOW UP AMPLIFIER DETAILED WIRING DIAGRAM (SINGLE SPEED CATAMARAN)		
S.C.	08	11	07
SCALE	SHEET	DRAWING NO	REV
N/A	6/10	B-401706	A



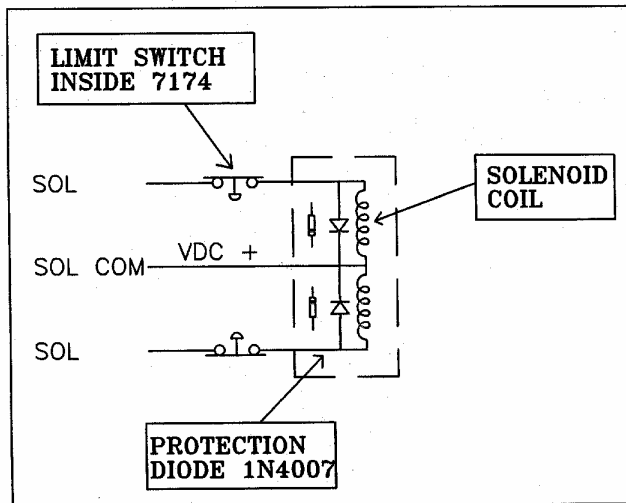
KOBELT				MANUFACTURING COMPANY LIMITED
DWN	DY	MO	YR	TITLE
H.A.	08	11	07	TWO INDEPENDENT/BUCKET SINGLE SPEED STEERING SYSTEM BLOCK DIAGRAM
CHK	S.C.	08	11	07
SCALE	SHEET	DRAWING NO		REV
N/A	7/10	A-401706		A



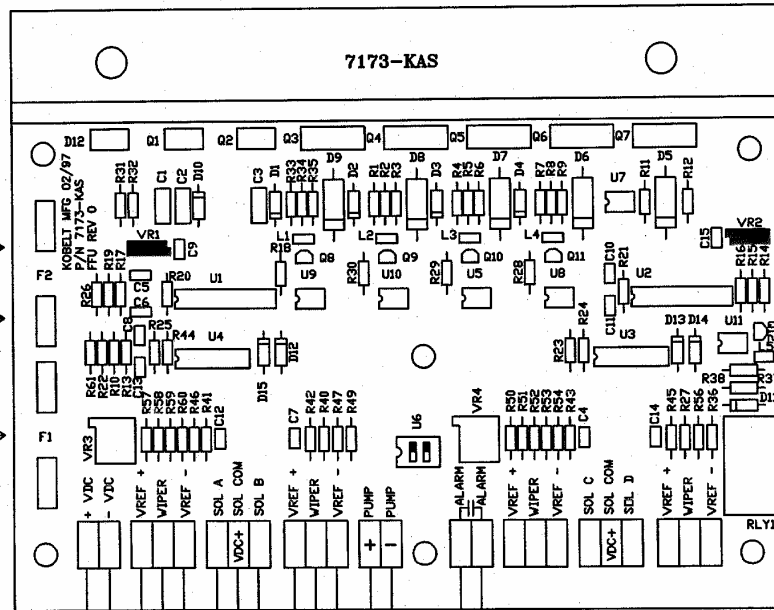
HOBELT		MANUFACTURING COMPANY LIMITED	
DWN	DY	MO	YR
H.A.	08	11	07
CHK	S.C.	08	11
		07	
SCALE	SHEET	DRAWING NO	REV
N/A	8/10	B-401706	A



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.



KOBELT				MANUFACTURING COMPANY LIMITED
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



7173-KAS NOTE:
 THE 7173-KAS SWITCHES NEGATIVE.
 SOLENOID COMMON IS CONNECTED
 TO VDC +.
 MUST ADD DIODES OR MOV'S TO SOLENOID
 COILS TO REDUCE VOLTAGE SPIKES.
 SUGGESTED DIODES 1N4005 -1N4007.

SLOW SPEED
 SENSITIVITY
 ADJUSTMENT
 ADJUST VR1 CW TO
 INCREASE SENSITIVITY

1/2 AMP FUSE

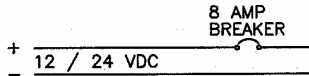
F1 = 8 AMP
 F2 = 1/2 AMP

8 AMP FUSE

N/A

DIP SWITCH U6

SWITCH POSITION
 FOR SINGLE
 SPEED STEERING



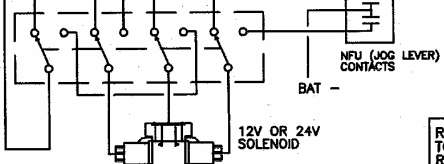
TO LIMIT THE TRAVEL OF THE RUDDER
 ADJUST THE STROKE OF THE FEEDBACK UNIT.

ALARM OPERATION NOTE:
 ALARM RELAY DRY CONTACTS WILL CLOSE
 TO INDICATE CONTROL OR FEEDBACK
 POTENTIOMETER FAILURE OR WIRE BREAK.
 THE 7173-KAS WILL FAIL IN MODE UPON
 POTENTIOMETER OR WIRE BREAK FAILURE.

PUMP ON DEMAND OPERATION NOTE:
 THE 7173-KAS WILL PROVIDE A 12 OR 24
 VOLT SIGNAL TO CONTROL A RELAY WHEN
 ANY SOLENOID IS ENERGIZED. THEREFORE
 THE PUMP WILL BE RUNNING ON DEMAND
 AND WILL NOT BE CONTINUOUSLY RUNNING.

NOTE:
 SWITCH OR RELAY MUST BE
 ABLE TO HANDLE SYSTEM CURRENT.
 SWITCH OR RELAY IS
 CUSTOMER SUPPLIED.

4 POLES SPDT
 SWITCH OR RELAY



RELAY CONTACTS MUST BE ABLE
 TO HANDLE PUMPSET CURRENT.
 RELAY IS CUSTOMER SUPPLIED.

HOBELT		MANUFACTURING COMPANY LIMITED			
				DWN	BY
H.A.	09	11	07	7173-KAS FULL FOLLOW UP AMPLIFIER DETAILED WIRING DIAGRAM (SINGLE SPEED STEERING WITH OPTIONAL NFO JOG LEVER)	
CHK	S.C.	09	11	07	
SCALE	N/A	SHEET	10/10	DRAWING NO	REV
				B-401706	A