DOG WATCHES MANUAL
11/11/24

Rolf Yngve

Update 11/11/24

Chapter 1 Dimensions Dog Watches, Albin 36 Express Trawler, 2001

LOA	37.5’
Beam	12’ 4”
Hull Length	36’
Waterline (measured)	32’ 6”’
Draft	3’ 6”
GRT	22 GRT
NRT	18 NRT
Displacement	16,000 lbs
Mast Height Above Water – Bridge Clearance:	20 ft
Lowered Mast to Waterline – Low Bridge Clearance	14.6 ft
Top of Mast to Keel	23.5 ft
Lowered Mast and Bimini to Keel (truck height)	16.5 ft
Waste Tank	30 gal
Fuel	385 gal
Water	120 gal
Anchor	Bow: 30ft stainless chain 250ft rode Spare: 30 ft galvanized Chain, 250 ft rode
Main Shaft	1 ¾ in

HIN	AUL33117A101
MMSI	338164832
USCG Document	1121630
EPIRB Beacon	2DCCB 19FB2 FFBFF

Normal Operating Specifications:

Engine Temp	158ºF - 194ºF
Engine Oil Pressure at 3000 RPM	48 psi – 78 psi
High RPM under load	3800
Continuous RPM under load	3600
Generator Temp	167ºF - 194ºF
Generator Oil Pressure	minimum 15 psi
DC Voltmeter	11-15 volts

Chapter 2 Equipment Serial Numbers and Models

Propulsion and Maneuver				
	Model	**Model #**	**Serial #**	**Parts Info**
Port Engine	Yanmar	6LP-STE	52534	
Stbd Engine	Yanmar	6LP-STE	52528	
Port Transmission	ZF Marine	HSW 800 V1 (ZF 80 IV)	02 13797	Gear Ratio 2.0
Stbd Transmission	ZF Marine	HSW 800 V1 (ZF 80 IV)	02 13796	Gear Ratio 2.0
Rudder piston	SeaStar	BA150-7TM		Part# HC 5318
Teleflex MT-3 Dual Engine Controls				2013
Shafts	Safe Seal			2019, replaced shafts and props, each main strut. Renewed shaft seals. 1 ¾ inch
Electrical				
Generator	Northern Lights 5-KW	M673M-5 Gen End TF-276M	67832-26012C Gen End K10787	5.5 kw, 1800 RPM, 60 Hertz, 120 VAC
Inverter	Victron MultiPlus-II 12/3000/120-50 120V	PMP122300 5120	HQ2212F KQ4U	April 2024 installation PN PMP122305110
Inverter control	Victron Digital Multi control GX Panel	200/200A GX	HQ2134Y C2FQ	April 2024 installation
Battery Monitor	Xantrex	Linkpro		
Battery Monitor	Victron-BMV 712 Smart		X0045C5 XZH	April 2024 installation
GPL-4DL Lifeline Batteries				replaced 2020- 4 on board
GPL-2400T Starter battery				Generator battery replaced 2024

Galvanic Isolator	Victron VDI16			April 2024 Installation

Deck				
	Model	**Model #**	**Serial #**	**Parts Info**
Windlass	Lofrans Project 1000	PJ10	PJ10 012725	Gypsy 08101 8mm Gypsy for 9/16 - 5/8 line and G4 chain, replaced 2016

Habitability				
	Model	**Model #**	**Serial #**	**Parts Info**
Stove	Force 10 Gourmet Galley Range	F63353	*F63353 E210907 423*	Replaced 2022
Refrigerator	Nova Cool	R5812 AC/DC	407708	Replaced 2019
A/C Raw Water Strainer				
Black water				2019 replaced macerator and moved valves – 2022 total rebuild including duck bill valves and toilet controls system
Stereo unit		Amp #MS-AM702, Speakers #010-01849		
Hot water heater				pressure relief valve replaced 2015
Water pump	JABSCO	#12884599	#82600-0092	replaced 2015
FW Pressure tank	GROCO	250357	#82600-0032	replaced 2015

Electronics				
	Model	Model #	Serial #	Parts Info
Radar	Raymarine 24# HD Color Digital Radome Scanner	RD424HD KW mfg# T70169	1202083	
Auto Pilot Control Head Upper	Raymarine P70R	RAY-E2217 mfg#E22167		2015
Raymarine ACU 200 Actuator Control Unit				2015
C-140 Widescreen MF Display	RAYMARINE C-140W DISPLAY	E62115-US	0313131	
TRANSDUCER	AIRMAR Cast TRIDUCER Multisensor	DST 810		2022
Upper VHF Standard Horizon	GX2150	30419348		
Lower VHF Standard Horizon	GX1800GPS	8N021155		FCC IS K6630643X3D IC511B-30643X3D

Chapter 3 Checklists

Start Checklist

BEFORE START			
MAIN ENGINE ROOM HATCH			
ENGINE SEACOCKS		BOTH OPEN	
FUEL LEVEL/QUANTITY		GAL	
INSPECT FUEL FILTERS			
OIL CHECKS			
AFTER ACCESS HATCH			
GENERATOR SEACOCK		OPEN	
GENERATOR OIL CHECK			
GENERATOR BREAKERS			
TRIM TAB HYDRAULIC FLUID			
BATTERY SWITCHES		ALL NORMAL RUN	
MAIN COOLANT			
CABIN HATCH			
FUEL TANK VALVE(S)	PORT	STBD	BOTH
BLACK WATER VALVE		CLOSED	
INVERTER		ON	
LOWER HATCH			
TRANSDUCER		INSTALLED	
A/C SUPPLY		OPEN	
FW FILTER		CLEAR	
RAW WATER SUPPLY		CLOSED	
SPARE INTAKE		CLOSED	
LOWER HELM PANEL			
TRIM TABS		ON – CHECK	
FUEL GUAGE		ON	
BLOWER		AS REQUIRED	
NAV EQUIPMENT		ON	
CIGARETTE LIGHTER		ON	
NAV LIGHTS		AS REQUIRED	
IPAD		INSTALLED	
VHF		ON	
DECK			
DINGHY AND MOTOR		SECURED	
DINGHY BATTERIES		PLUGGED IN	
CABIN PANEL			
DC MAIN		ON	
PANEL LIGHTS		ON	
CABIN LIGHTS		ON	
FRESHWATER PUMP		ON	
DC FRIDGE		ON	
ENG ROOM LIGHTS		ON	
CONTROLS (BOTH)		ON	
HEAD		ON	
OUTLETS		ON	
INVERT/CHARGE		ON	
BATTERY CHARGER		ON	
WATER HEATER		OFF	
WINDLASS BREAKER		CLOSED	
UPPER HELM PANEL			
DOME LIGHTS		ON	
TRIM TABS		ON	
NAV LIGHTS		(AS REQUIRED)	
NAV EQUIPMENT		ON	
NAV PLOT AND VHF		ON	

SUPPORT STUFF		
BINOCULARS		
INTERIOR CAMERA		
SECURE DINGHY		
SECURE SUP-BOARDS-ETC		

NAVIGATION		
“Remove” track on INavex		
Set new track		
Check NTM local		
Check Weather		
Ipad Setup		

HABITABILITY		
HEAD		ON
FREEZER SHIFT TO DC		
INTERIOR/BACKUP CAM		ON – check ipad
STOW STARLINK		
STOW TOPSIDE FOOD		
STOW RING CAMERA		
CHECK F/WATER LEVEL		

START SEQUENCE		
LOWER CABIN PANEL		
START GENERATOR		OIL PSI 40+
		VOLT 12
		CHECK EXHAUST
OPEN AC BREAKER		
CLOSE GENERATOR BREAKER		
SOURCE SWITCH TO GEN		
OPEN SHORE BREAKER AND REMOVE CABLE		
CHCK INVERTER REMOTE		
LOWER HELM		
TEST HELM AND THROTTLE FOR MOVEMENT		
TURN KEYS ON AND CHECK ALARM LIGHTS		
SHIFT THROTTLE TO UPPER		
DECK		
REMOVE SPRINGS		
CHECK FOR CLEARANCE		
UPPER HELM		
TEST HELM AND THROTTLE FOR MOVEMENT		
TURN KEYS ON AND CHECK FOR ALARM LIGHTS		
TEST THROTTLE LINKAGE		
BLOWER ON		
START ENGINES		OIL PRESSURE
		VOLTAGE
		EXHAUST

Shut Down Check List

SHUTDOWN		
UPPER HELM		
PRESS SHUT DOWN FOR ENGINES		Observe normal stop
TURN OFF KEYS BOTH UPPER AND LOWER		
ENGINE ROOMS		
BATTERY SWITCHES		
House		Normal Run
Engines		Off
Gen		As Required
BILGE INSPECTION		
FUEL LEVEL/QUANTITY		GAL
POWER		
ATTACH SHORE POWER CABLE		Leave shore breaker open
SOURCE SWITCH		"SHORE"
GEN BREAKER		OPEN/CLOSED
SHORE POWER BREAKER ON PANEL		CLOSE
BREAKER ASHORE		CLOSE -check for polarity at panel

HABITABILITY		
HEAD		ON
FREEZER SHIFT TO AC		
INTERIOR/BACKUP CAM		OFF
SET UP STARLINK		
BRING UP STOWED FOOD		
SET UP RING CAMERA		

SHUTDOWN – DISEMBARKING FOR LIFE ASHORE		
MAIN ENGINE ROOM AND AFTER HATCH		
ENGINE SEACOCKS		CLOSED
GENERATOR SEACOCK		CLOSED
BATTERY SWITCHES		
House		Normal Run
Engines		Off
Gen		As Required
BILGE INSPECTION		
CHECK OIL LEVELS		
UPPER HELM PANEL		
ALL 12 VOLT		OFF
NAV EQUIPMENT		OFF AND COVERED
VHF		OFF
KEYS OUT		
CLOSE DOWN COVER		
LOWER HATCH		
TRANSDUCER		REMOVED
A/C SUPPLY		CLOSED
FW FILTER		CLEAR
RAW WATER SUPPLY		CLOSED
SPARE INTAKE		CLOSED
LOWER HELM PANEL		
ALL DC		OFF
NAV LIGHTS		OFF – as required for anchorage
IPAD		REMOVED
VHF		OFF
CABIN PANEL		
DC MAIN		ON
PANEL LIGHTS		OFF
CABIN LIGHTS		ON
FRESHWATER PUMP		OFF
DC FRIDGE		ON
ENG ROOM LIGHTS		ON
CONTROLS (BOTH)		OFF
HEAD		OFF
OUTLETS		ON
INVERT/CHARGE		ON
BATTERY CHARGER		ON
WATER HEATER		AS REQUIRED
WINDLASS BREAKER		OPEN

Door Checklist

Canopy Windows
Electrical Panel Up
Ports and Windows
Electrical Panels Down
Dehumidifier
A/C
Refer
Ring
Main Breakers
Through Hulls
Shore Power
Mooring LIne s

Canopy Windows
Electrical Panel Up
Ports and Windows
Electrical Panels Down
Dehumidifier
A/C
Refer
Ring
Main Breakers
Through Hulls
Shore Power
Mooring LIne s

Chapter 4 Casualty Procedures

Single Shaft Operations

***Dog Watches* can be operated without restriction on a single shaft.**

- The HSW 800 V1 (ZF 80 IV) transmissions are designed to free spin without restriction.
- The SureSeal shaft seal system is cross connected to each engine. As long as one engine is running, water is supplied to both seals ensuring safe use without excessive wear.

Procedure:

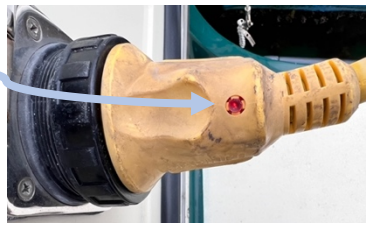
1. Place the idle engine transmission in neutral.
2. Open the idle engine breaker and turn off the idle engine keys to ensure no inadvertent start.
3. Close the idle engine fuel supply. (This is not written up in the literature but seems logical to ensure that there is no cross-over of fuel pressure.)
4. Close the idle engine raw water supply.

   Notes:
   There is no indication of a limiting RPM on the active engine.
   The limiting element will be the ability of the boat's rudders to steer a straight course on the single engine.

AC Power Outage – Shore Power

1. Check Connections and Breakers:

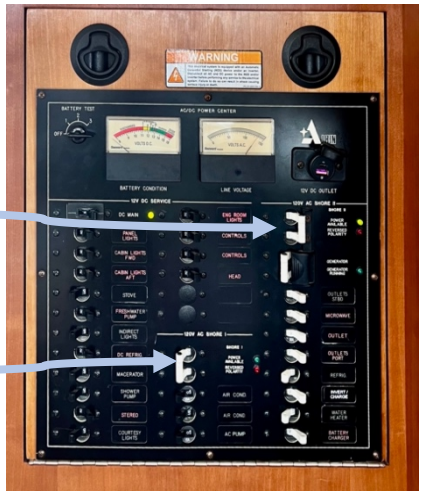
- Ensure main breaker on shore circuit is closed.
- Ensure power cable indicator is lit.



- There are two 120v circuit breakers on the main salon front panel.

Ensure the affected circuit is closed.
Examples are:

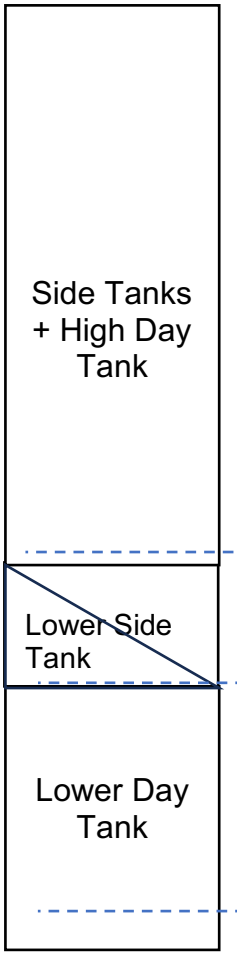
  - The Main Circuit (MC) closed
  - The Air Conditioning Circuit (AC) open



Chapter 5 Fuel Systems

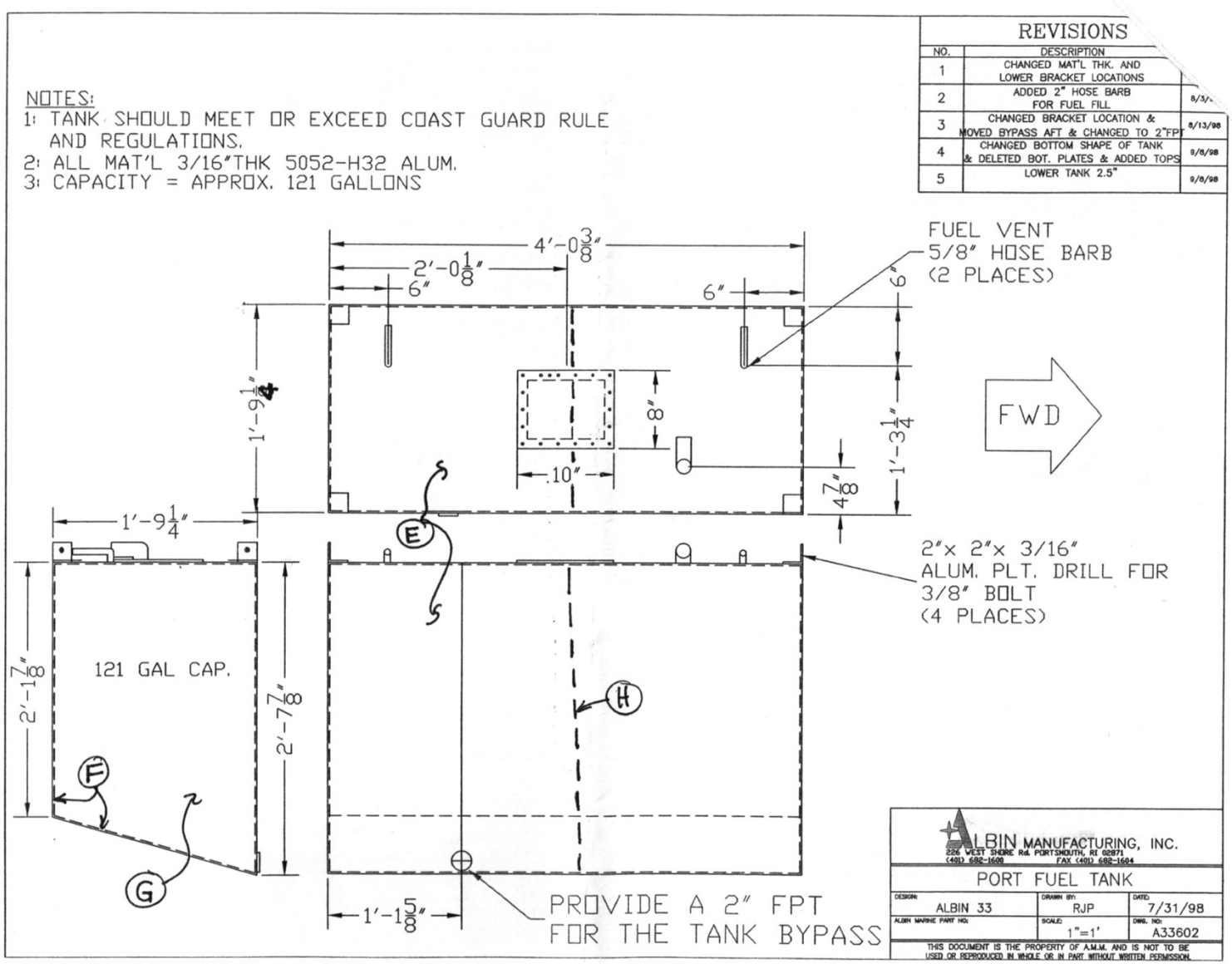
Tank Measurements: Advertised at 385 gal capacity, design drawings at 380 gal capacity, practical use (my standards) 370 gal capacity.

Green is measured during fill from empty.



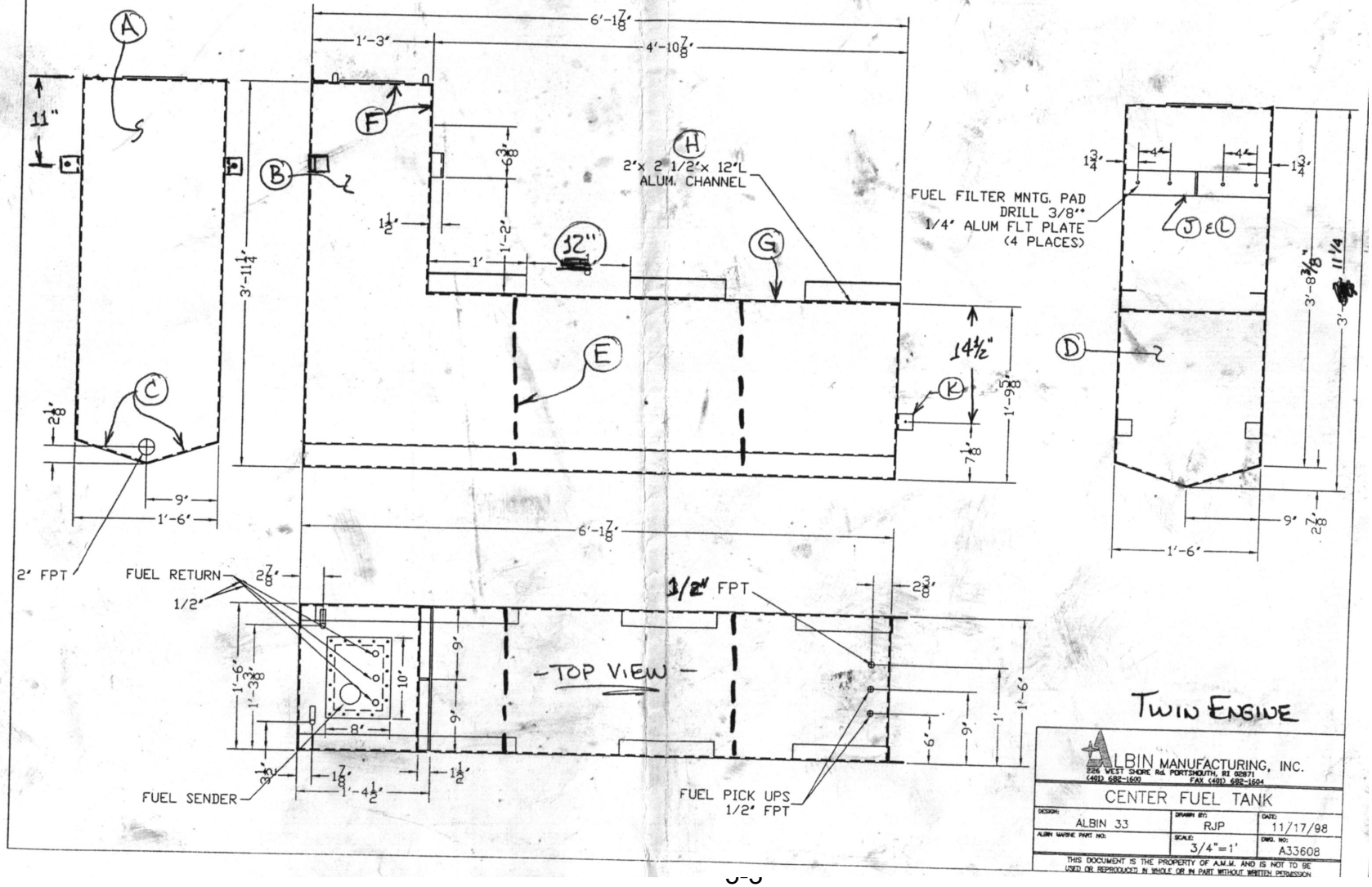
Mark	Gal Both - Side		G/In
45	370 – 250	Full	10 - 5 gal/in
44	360 – 245		
42	340 – 235		
40	320 – 225		
38	300 - 215		
36	280 – 205	3/4	
33	250 – 190		
30	220 – 175		
28	200 – 165		
26	180 – 155	1/2	
24	160 – 165		
23	150 – 140		
22	143 – 136.5		7.14 gal/in
20	129 – 122		
18	114 – 106		
16	100 – 100		
14	85	1/4 = 92	
12	71		
9	50		
6	27.7		5.5 gal/in
3	11.2		
2.125	5.7		

Fuel Tank Drawings



NOTES:
1: TANK SHOULD MEET OR EXCEED COAST GUARD RULE AND REGULATIONS.
2: ALL MAT'L 3/16"THK 5052-H32 ALUM.
3: CAPACITY = APPROX. 139 GALLONS
4: ENG P 1/2" I.D.
R 1/2" I.D.

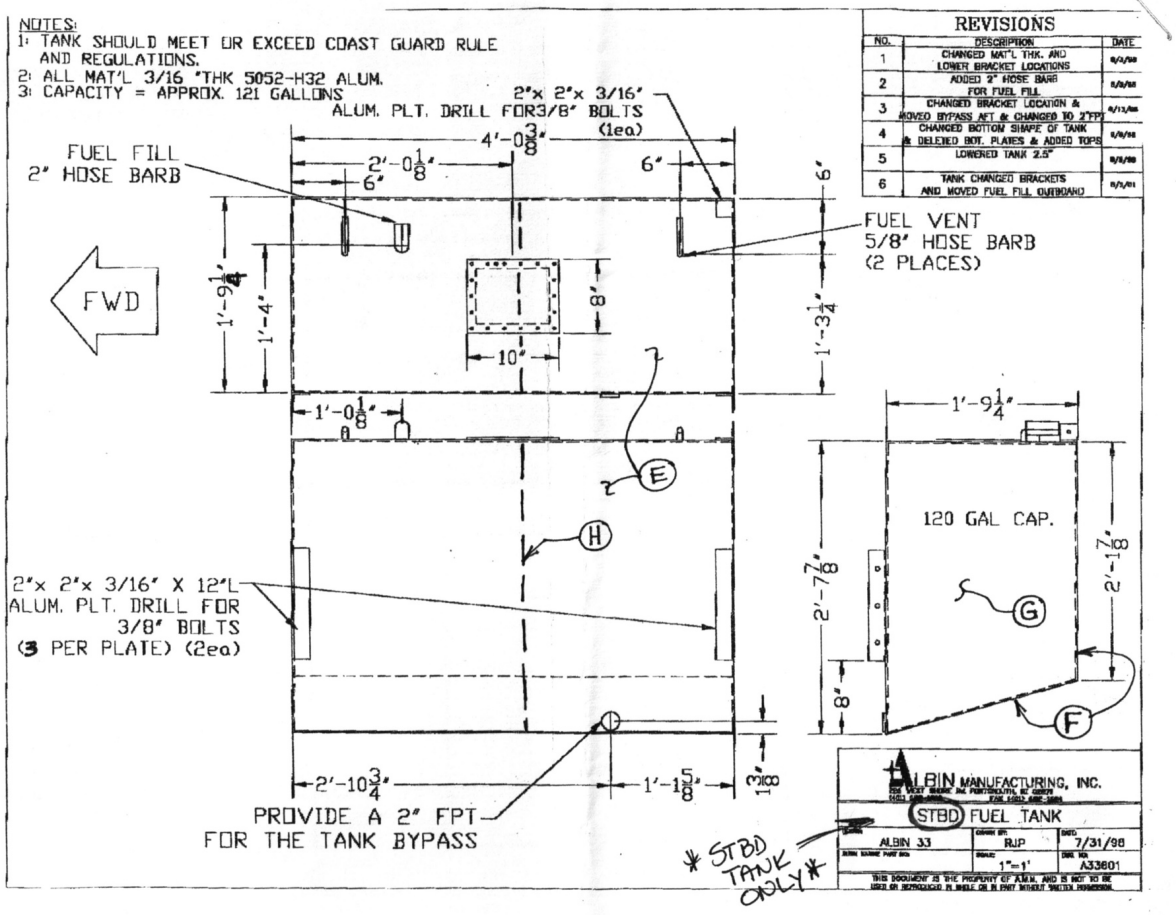
REVISIONS		
NO.	DESCRIPTION	DATE
1	POINT OF THE TANK ADDED 3" TO THE HIGHEST	12/14/9
2	2" FPT MOVED VENT AND DELETED 1ea	12/14/9
3	AND SHORTENED BY 3.5" RAISED TANK UP 3" & F.F. MNTG BRKT	12/14/9
4	MOVED, & CLIPS ALL & RETURNS (Ye)	



ALBIN MANUFACTURING, INC.
226 WEST SHORE Rd. PORTSMOUTH, RI 02871
(401) 682-1600 FAX (401) 682-1604

CENTER FUEL TANK

DESIGN:	DRAWN BY:	DATE:
ALBIN 33	RJP	11/17/98
ALBIN MARINE PART NO:	SCALE: 3/4"=1'	DWG. NO: A33608



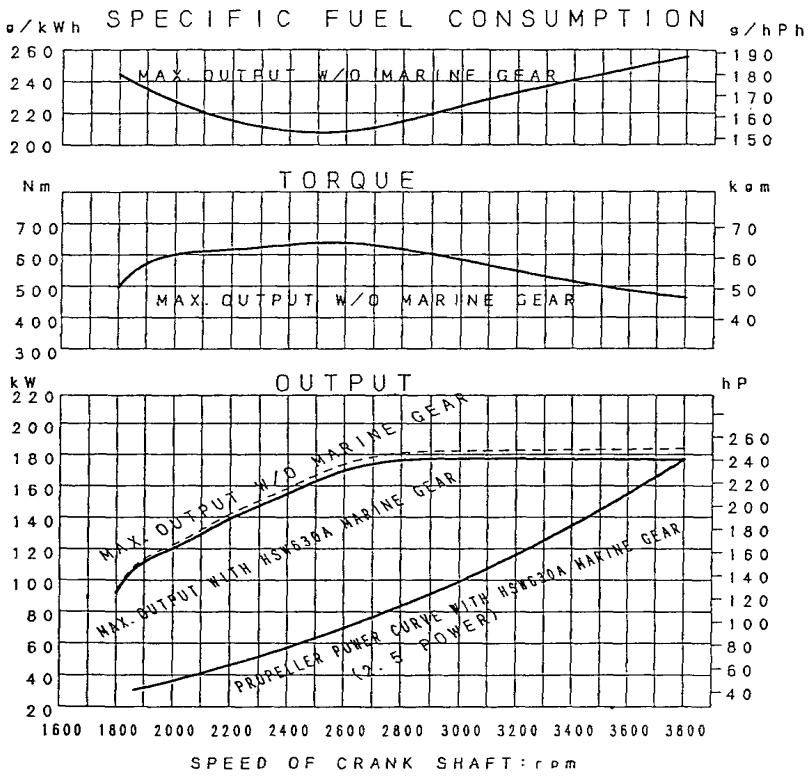
Fuel Curves and Estimated Range

Fuel Curves from SLP Service Manual 2001

RPM	g/hPh	HP	L/H	G/h	2 E	SpD	G/nm	rng 340 gal
1800	175	45	9.16	2.42	4.83	7.60	0.64	550.17
2200	156	60	10.88	2.87	5.75	9.00	0.64	548.15
2600	155	100	18.02	4.76	9.52	9.80	0.97	360.43
2800	155	115	20.73	5.47	10.94	10.50	1.04	335.81
3000	165	137	26.28	6.94	13.88	11.30	1.23	284.97
3100	168	180	35.16	9.28	18.57	12.70	1.46	239.42
3200	170	198	39.14	10.33	20.67	15.20	1.36	257.43
3400	182	230	48.67	12.85	25.70	15.70	1.64	213.81

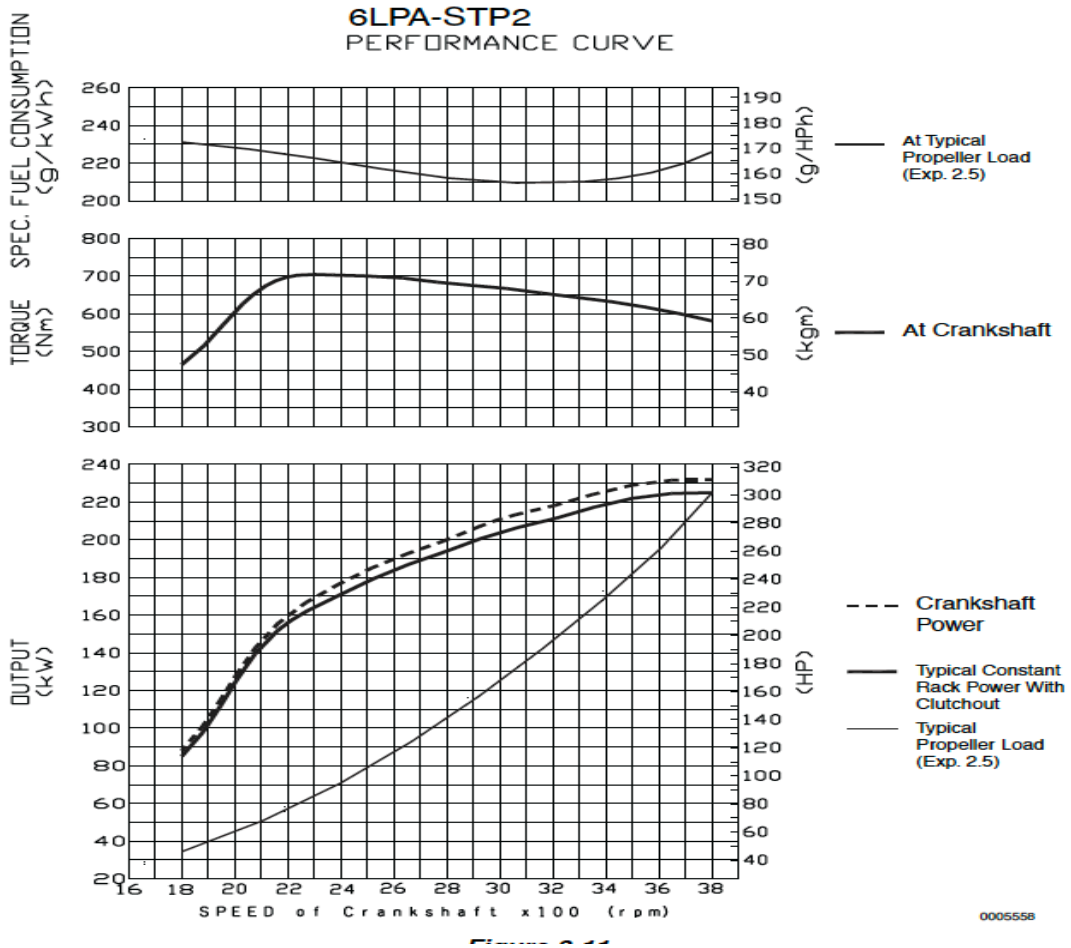
https://buildingclub.info/calculator/perevesti-g-l-s-ch-v-l-ch/

- **6LP-DT(Z)E/-DTZE1 (Max. output : 184 kW/3800 rpm)**



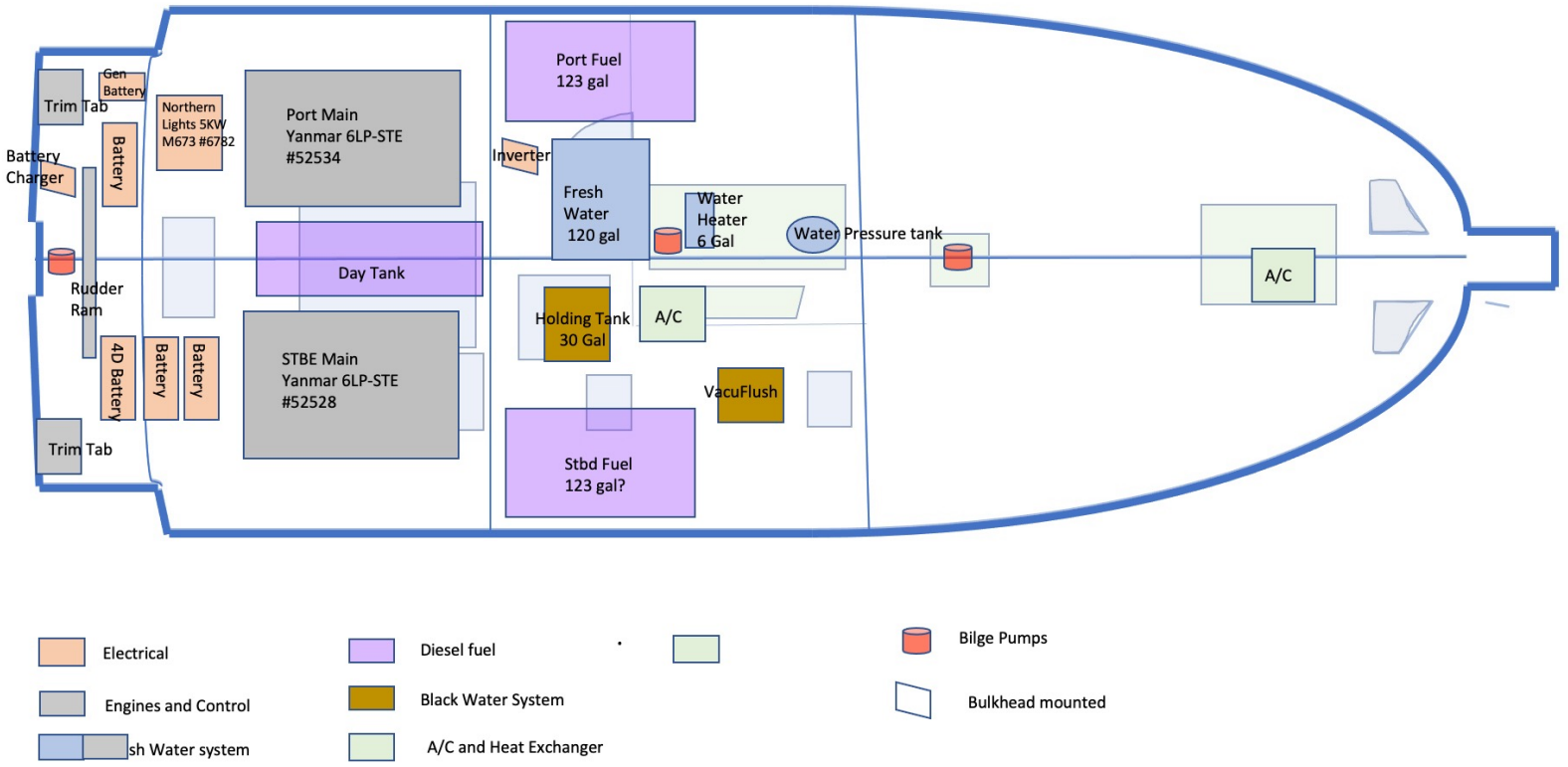
Fuel Curves from SLPA Service Manual 2007 With Prop

RPM	g/hPh	HP	L/H	G/h	Two Engines	Speed	G/nm	Range for 350 Gal
1800	173	50		2.68	5.20	7.60	0.68	511.54
2200	168	78		4.06	7.80	9.00	0.87	403.85
2400	164	92		4.68	11.60	9.40	1.23	283.62
2600	160	120		5.95	11.60	9.80	1.18	295.69
2800	156	140		6.77	16.20	10.50	1.54	226.85
3000	156	170		8.22	16.20	11.30	1.43	244.14
3100	157	185		9.00	17.80	12.70	1.40	249.72
3200	157	195		9.49	19.20	13.60	1.41	247.92
3400	157	230		11.19	22.39	15.30	1.46	239.19

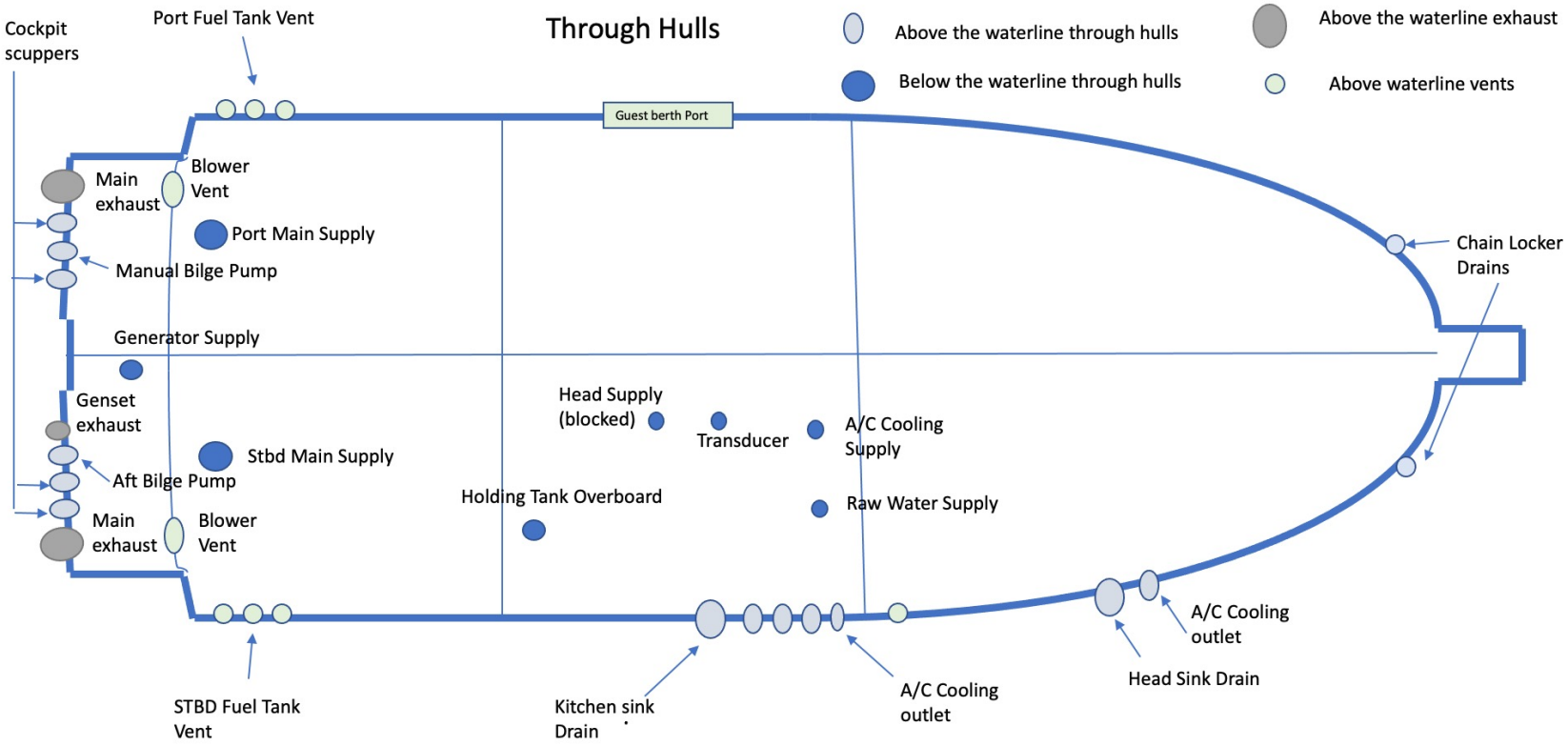


Chapter 6 Drawings

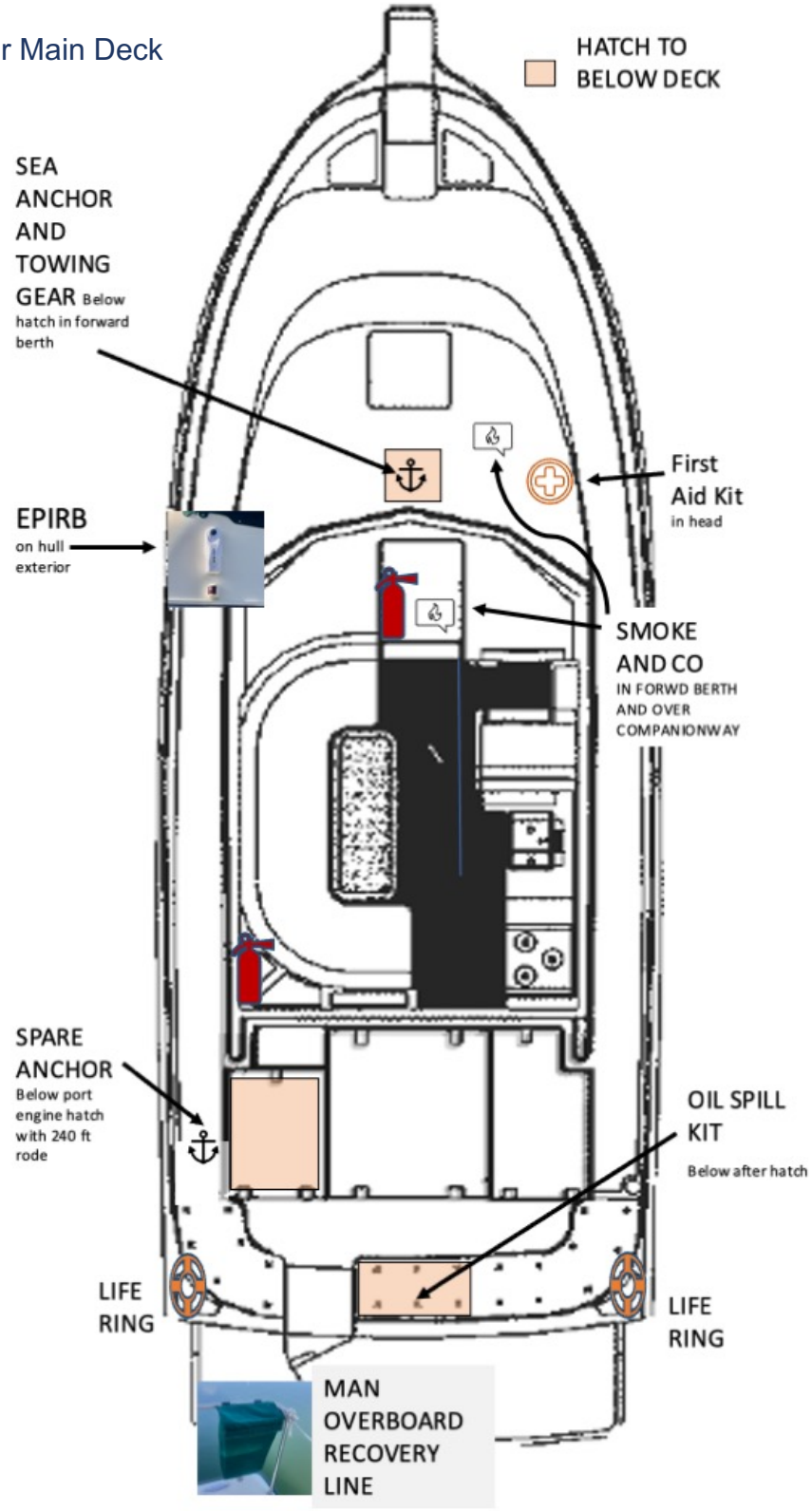
Major Equipment



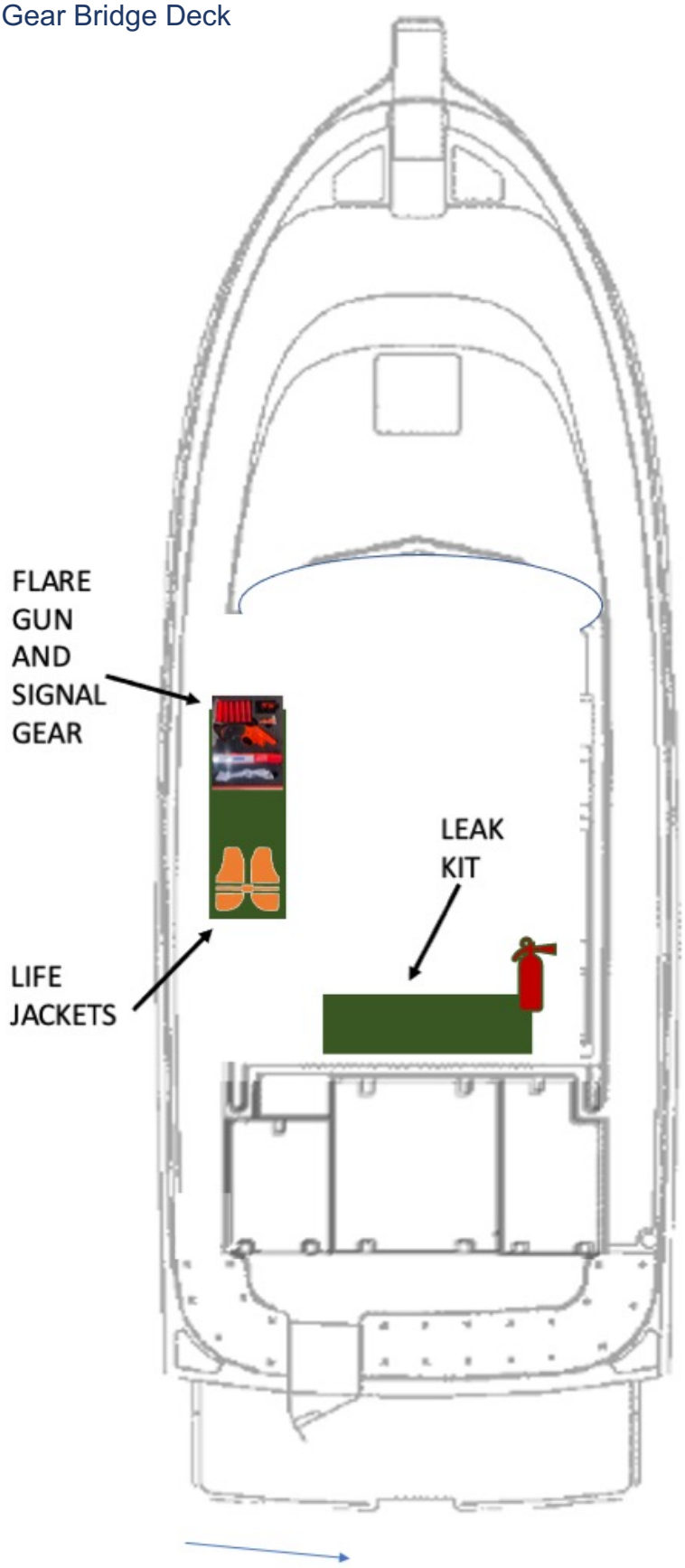
Through Hulls



Safety Gear Main Deck



Safety Gear Bridge Deck



Chapter 7 Maintenance and Repair Records

Repair Record

Maintenance in Green

Date	System	Notes
11/15/21	Interior	Refinished cabin flooring. Repaired and refinished drawers
12/10/21	Compass	Overhauled and reinstalled magnetic compass
12/15/21	Lighting	Repaired overhead light in v-berth
12/15/21	Lighting	Replaced spotlight in crew berth. Replaced all burnt out lights with leds
12/27/21	Nav Lights	Replaced port and stbd running light lenses
1/15/22	Lights	Repaired all engine room lights
1/22/22	Vents	Relaced broken air vents to engine room stbd
1/26/22	1200 hour engine maintenance	Changed oils, filters, and coolant on engines and generator. Replaced all cooling and exhaust equipment. Rebuilt raw water pumps to engines, replaced timing belts, all belts, all hoses. Replaced corroded drain valves on coolers. Port and stbd. Replaced transmission oil coolers. Rebuilt sea strainers. Replaced start relays stbd engine.
1/26/22	Generator	Replaced generator cooling and exhaust
2/15/22	Salt water washdown	Replaced SW wash valve and handle
2/17/22	Generator insulation installation	Moved sea water strainer mount, painted and reset generator platform
2/18/22	Grill	Installed new Magma grill
2/22/22	Sound insulation	Installed on battery hatch aft
2/23/22	FW filter	Cleaned white gravel-like stuff from filter
3/12/22	Lighting	Replaced aft overhead lights with red and white leds.
3/14/22	Scuppers	Repaired open scupper from stbd aft boat seats
3/21/22	Steering rebuilt	SeaTech Invoice 42898
3/21/22	Swim Ladder	Removed. Filled holes
3/22/22	Refinished bottom	Safe Harbor Work order 50199

Date	System	Notes
3/22/22	Port engine through hull	Replaced. Morton Marine
3/22/22	Depth sounder transducer	Replaced. Shelter Island Electronics invoice 18685
3/28/22	Generator Battery	Replaced with Groupe 24 AGM starting battery
4/8/22	Stbd oil cooler	Oil leak in stbd oil cooler tightened by Pacwest.
4/14/22	Galley drawer	Reglued and repaired galley drawer.
4/20/22	Bridge and Salon 12v	Installed 12v USB in salon and bridge. Had to take down curtains in salon which resulted in broken slides. Reordered.
4/20/22	Salon	Installed Samsung TV monitor.
4/26/22	Engine Room	Replaced and repaired yoke for port engine exhaust. Repaired all engine room lights.
5/9/22	Aft Bilge pump	Rebuilt bilge pump stand and reinstalled. Painted after engine room.
5/12/22	Engine room	Cleaned and reinstalled engine space deck plate
5/29/22	Generator	Installed feet and support for soft enclosure. Tied down generator port, stbd, fore, aft.
6/10/22-6/15/22	Stanchion	Installed stanchion and plate on fantail overhead to cover holes and make the overhead sturdier.
6/12/22	Dinghy	Installed Davits
6/12/22	Upper deck	Installed support stanchion for upper deck. Installed plate over holes on former ensign spot on upper deck.
6/27/22	Stbd Engine	Minor fuel leak from supply hose. Tightened clamps and it stopped.
7/1/22	Generator	Installed soft generator sound shield. 57.4 dB down to 54.7 23% decrease in sound.
7/1/22	Windlass	Overhauled windlass. Replaced spring on windlass finger to fix slippage
7/10/22	Drawer	Repaired broken drawer pull and wood facing with glue and clamps. Rebuilt cherry galley drawer front, replaced with teak, cherry too brittle.

Date	System	Notes
7/13/22	Shore power repair	Marine Electrical Services Newport Beach, 8122 Brush Drive, Huntington Beach CA 82647 MESHBLLC@gmail.com rewired grounds for Magnum Inverter to allow hookup to newer shore power breakers.
7/13/22	Vacuflush	NEWPORT BEACH YACHT SERVICES INC, 3419 VIA LIDO #216, NB, CA 92663D 949-631-3763 replaced ball valve, seals, shaft and valve on toilet after it stuck in place open
7/23/22	curtains	Reinstalled curtains from work on 12v supply on Stbd side over helm
7/29/22 - 8/4/22	Stbd Transmission Cooler hose	Stbd Transmission cooler hose came off barbed fitting and relieved transmission fluid over the engine room. Cleaned all. Secured all transmission hoses on both engines with hose clamps. Refilled transmission and checked. System sat
8/4/22	Engine revolutions	Bought handheld tachometer and checked engine revolutions. All matched will with Tachs except stbd engine lower tack. May be wrong gearing setting.
8/22/22	Vacuflush	Lost vacuum. Replaced 3 of 4 Duckbill valves, system restored
8/22/22	Stbd Transmission cooler hose, output.	Follow up on hose failure. Hose installed was a heater hose with yellow barbs loosely fitted on to fool the observer. The barbs would not hold the hose as it loosened with exposure to ATF. Installed a swaged hydraulic hose. This is over engineered but certainly bulletproof.
9/3/22	A/C	Cleaned A/C raw water filter, installed new basket
9/3/22	Head shower sump	Shower sump pump not responding to level indications. Test showed very little to no flow at overboard. Float switch and pump need replacement. Ordered.
9/3/22	Overboard hoses	Head and shower sump overboard hoses seem clogged. Ordered skinny brush on 60□ flex to clean out hoses.
9/5/22	Shower Sump	Replaced shower pump cartridge and float switch. Cleaned all.
9/12/22	Vacuflush	Cleaned
9/12/22	Interior Seat Cushions	Recovered rips

Date	System	Notes
9/19/22	Doors, shelves	Door bumpers replaced. Refinished manual shelf
10/3/22	Fuel	Made new fuel stick reflecting computed tank values
10/4/22	Documentation	Set up Document and Travel books
10/5/22	Ground tackle - trim	Moved spare anchor to aft port side
10/5/22	Lighting	Replaced forward berth lights with LEDs with phone charger
10/5/22	Fuel Gauge	Based upon David Blue recommendation ordered new sender
10/9/22	Wipers	Repaired port wiper motor connection. Rebuilt all wipers.
10/10/22	Engine Room	Removed supports for hatches and delivered to powder coat. Rebuilt hatch supports
10/13/22	trim	Added 100lb ballast to port side
10/13/22	Wipers	Reinstalled wipers
10/20/22	Engine room	Installed refurbished hatch U-beams
10/21/22	Galley	Fabricated and installed trim on stove
10/25/22	Stbd Engine	Low Raw Water Flow alarm □ trouble shot to be sensor, no high temp, good indications of water flow
10/25/22 -11/10/22	Boat taken to Baja Navale	Haul out and painting window and door frames, and bottom
11/10/22	Bottom Paint	Refinished bottom.
11/21/22	Engines	Replaced zincs each engine □ lowered zinc check to every 100 hours
11/21/22	Stbd Engine	Replaced Low Raw Water Flow switch.
12/2/22	Returned boat from Ensenada	Sea Test Sat, Low Raw Water Flow good
12/14/22	Boat	Set up Xmas lights and entertained in CCYC Boat parade. Stbd Throttle stuck in idle at 1100 rpm.
2/10/23	Stbd Engine	Primed beneath oil pan.
2/10/23	Steering and trim tabs	Topped off fluids in both.
2/10/23	Stbd Engine	Repaired stuck throttle by greasing elements and wiggling throttle after linkage removed and greased.

Date	System	Notes
2/15/23	Port engine	Broke fitting for zinc on fuel oil cooler. Ordered new cooler, removed old cooler and hoses. Primed and painted fittings. (Note, previous owner replaced starboard fuel oil cooler in 2020.)
2/15/23	Generator	Replaced primary and secondary fuel filter. Repaired slow leak with by replacing bowl on primary fuel filter. Generator db with sound enclosure removed and main hatch open: 72.6 db. With enclosure on main hatch open 64.4db. With main hatch closed 60.9db
2/16/23	Ground tackle	Opened pulpit from below. Removed chain stopper and repaired. Reinstalled on HDPE board. Ground heads of nuts down to fit inside the stopper fitting. The stopper was installed backwards.
2/19/23	Stbd Engine	Removed coolant overflow mount to reinstall. Primed and painted it.
2/21/23	Port Engine	Reinstalled fuel oil cooler, primed and painted. Engine test sat.
3/2/23	Bullnose	Delivered bullnose cover to Stewart Fabrication 619-726-8894 to build a stainless version.
3/4/23	Stbd Engine	Reinstalled coolant overflow element. New mount, tank is now level.
3/6/23	Drains	Found leaks in starboard drains, main T aft and seat drains starboard. Need new drain line material. Reset the seat drain fitting.
3/6/23	Mast	Removed coax and mount for tv antenna. Broke open bolts and lowered mast. Disconnected radar. All in preps for refinishing.
3/9/23	Engines	Oil and oil filter change
3/9/23	Port engine Cooling	Replaced cooling supply hose to overflow tank with fuel quality hose.
3/9/23	mast	Removed mast and plate. Delivered to Chavez Painting at Safe Harbor to refinish. Removed old GPA antenna, tested GPS for function. All good.
3/10/23	Anchor	Installed new anchor and 30 ft stainless chain. Anchor needs better fit for securing.
4/15/23	Anchor	Installed new swivel, u-bolt and links to anchor, tensioner cleat and made tensioner line

Date	System	Notes
4/16/23	Mast	Reinstalled mast without wiring or top. Reinstalled cleats with fiber washers and pulleys. Filled holes for removed items.
4/20/23	Mast	Re-installed mast wiring and top. Replaced cracked Satdome top plate with new. Lights and radar test good
4/20/23	Deck Drain	Replaced stbd aft deck drain fitting and hose connection.
4/21/23	Hull	Hull zincs replaced
4/21/23	Exterior	Boat washed, detailed and waxed.
4/26/23	Engine compartment	Cleaned and soundproofed edges on aft hatches. Readjusted hydraulic lift for center hatch.
4/26/23	Engines	Tightened alternator belts both engines.
5/3/23	Hull/engine room	Sound proofing loose. Found rotted boards behind it. These are facing boards and not associated with the hull proper.
5/3/23	cabling	Hung vent hoses on stbd bulkhead.
5/3/23	Port and Stbd Engines	Replaced transmission oils and filter. Removed rust and repainted filter covers.
5/15/23	Engines	Changed fuel filters, engine test. Primed with SeaFoam
5/23/23	Sound proofing Engine Room	Removed sound insulation and water rotted boards from stbd side of engine room. Hull inspection sat.
5/27-30/23	Sound Proofing Engine Room	Bleached bulkheads, installed new sound proofing on stbd side, moved cable runs to hang from overhead, repaired and reinstalled exhaust stanchion, installed sound proofing on overhead, replaced deck drain.
6/2/23	Boat	Wax and detail.
6/6/23	Stbd Engine	Replaced safety tags. Painted Bilge.
6/7/23	Generator	Changed oil and filters
6/8/23	Tach Tests	Confirmed stbd salon tachometer is out of calibration Engine speed tests: no load WOT: 3600 RPM Engine throttle no load WOT: 4180 RPM (stbd engine test) WOT loaded 3400 RPM – 14.6 SOG Research - max sustained RPM 3600 WOT - 3800
6/12/23	Ports	Repaired cracked ventilation porthole glass port side.
6/20/23	Engines	Changed Pencil Zincs

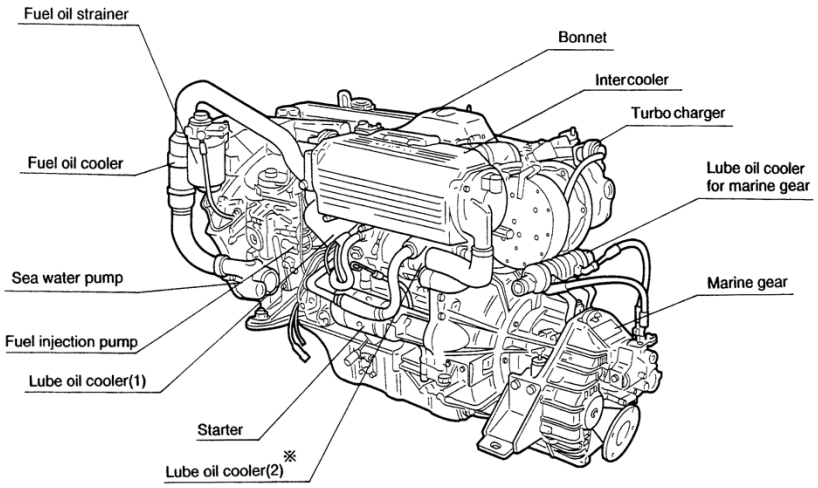
Date	System	Notes
6/24/23	Bullnose	Installed steel plate to replace plastic plate under bullnose
6/25/23	Fuel tank	Opened access to fuel tank sender and installed “Yanmar” plate to seal it until needed.
7/13/23	Fuel Tanks	Emptied, cleaned, and polished all tanks. Refilled to 300 gal and measured fill to correct stick notations.
7/20/23	Generator	Replaced corroded ventilation cover.
8/1/23	Engine Room	cleaned and painted port engine area on hull side
8/2/23	Electrical	Replaced cables and y-fitting
8/2/23	Port Engine	cleaned off rust and installed new safety labels
8/3/23	Engines	Fresh water flush and fill (note: built freshwater attachment for raw water filters.)
8/5/23	Stanchion	Repaired stanchion stbd side entry
9/11/23	Fuel Tank	Replaced fuel sender and installed new fuel gauge.
11/2/23	Engines	Finished change of oil filters, replaced zincs.
10/15/23	Swim Step	Installed new swim step.
10/20/23	Stbd Engine	Removed flywheel and cover plates, removed rust and refinished.
11/8/23	Stbd Engine	PACWEST Replaced front crankshaft oil seal. I refinished front engine component cover parts and flywheel.
11/15/23	Engines	Fresh water flush
12/10/23	Port Transmission	changed filter port transmission and refinished cap
12/13/23	Communications	installed mount for StarLink router and cable in lower berth.
12/29/23	Boat	2 hr bay run to check all systems. 20 minute WOT. All propulsion, habitability, electrical, deck, fluids tested sat. Fresh water flush of raw water systems on engines.
01/31/24	Boat	Systems Check, engines and generator run. A/C. All water, all bilge pumps, cycled all through-hulls, FW flush and fill raw water intakes for engines.
03/15/24	Boat	Systems Check, engines and generator run. A/C. All water, all bilge pumps, cycled all through-hulls. FW flush and fill for raw water.
04/10/24	Electrical	Replaced Inverter and controls, realigned A/C electrical system. Installed galvanic isolator

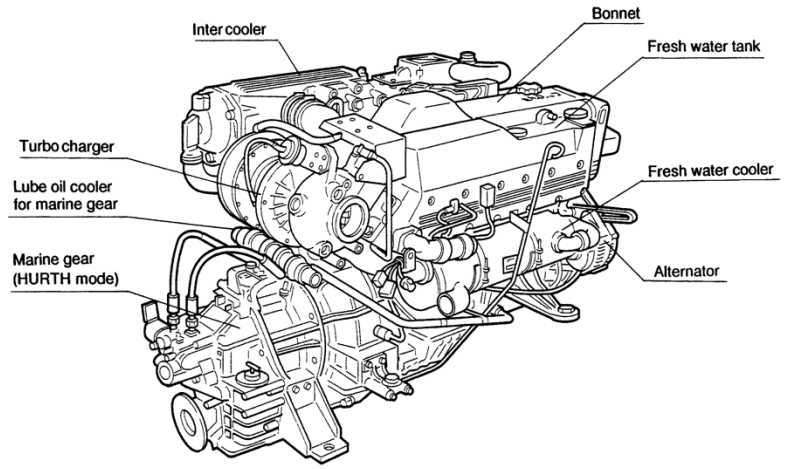
Date	System	Notes
05/01/24	Boat	Wax and detail.
05/11/24	Transmissions	Changed ATF, replaced filters.
5/15/24	Generator	Installed Noco trickle charger for generator batteries. Tightened all the fittings for the generator enclosure. Inspected and checked oil.
5/16/24	Boat	Systems Check, engines and generator run. A/C. All water, all bilge pumps, cycled all through-hulls, checked steering and trim tabs, checked shore power cable for leakage. Reading: .02mA.
5/16/24	Fresh Water	Performed complete freshwater flush and clean.
5/25/24	Electrical	Replaced shorted AC outlet in flying bridge. Checked continuity and polarity on all outlets serviced by “outlet” breaker on electrical panel.
6/25/24	Star Link	Installed Star Link exterior mount for antennae.
7/17/24	Generator	Installed new generator battery, repositioned and installed new starter cable.
7/21/24	Generator	Changed generator oil and filter. Oil test sat. Change primary fuel filter for generator and tightened fittings.
7/29/24	Interior	Washed and reinstalled curtains.
8/27/24	Port Engine	Replaced aft end cover on the raw water lube oil cooler due to raw water leak. Tested and reinstalled forward cover. Inspected covers on stbd engine. Sat.
8/27/24	Port Engine	Changed zincs, lube oil and oil and fuel filters. Oil test sat. Fresh water flush and fill.
9/6/24	Stbd Engine	Changed zincs, lube oil, and oil and fuel filters Oil test sat. --- F/W flush and fill.
9/20/24		Altered throttle arms to allow shortened throw to bring engines up to rated WOT rpm. Note: **New replacement throttle arms are included in spares.** Tested to 3800 rpm. F/W flush and fill.
10/15/24	Exterior	Filled and finished old screw holes.
10/30/24	Salon Windows	Repaired screens on salon windows, reinstalled seals.

Date	System	Notes
11/1/24	Hydraulics	Tightened couplings for trim tab hydraulics
11/5/24	Controls	Replaced audible alarms in Salon and Flying bridge.

2.2 External Views

- **6LP-DTE/-STE, 6LPA-DTP/-STP**





Note: **6LP-DTE** has almost same external shape as **6LP-STE** but it does not include a lube oil cooler(2). (※ mark) The above illustrations show the **6LP-STE** attaching the HURTH marine gear. The external shape of the **6LPA-DTP/-STP** is identical with that of **6LP-DTE/-STE**.

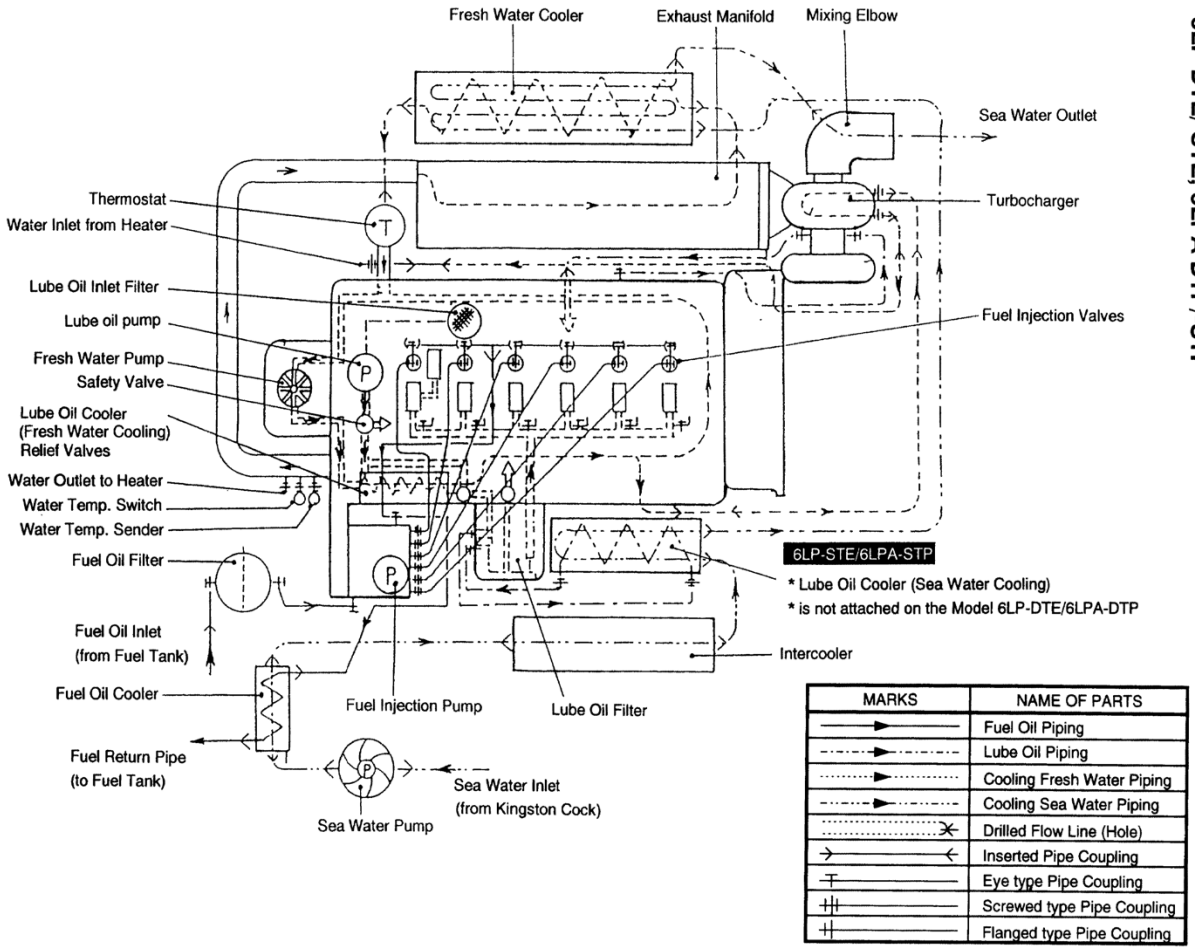


Figure 3-7

1 – Freshwater Level Switch
2 – Seawater Flow Switch
3 – Freshwater Temperature Switch
4 – Freshwater Temperature Sender
5 – Fuel Filter Switch
6 – Tachometer Sender
7 – Engine Oil Pressure Switch
8 – Engine Oil Pressure Sender
9 – Boost Sender
10 – Boost Switch

Engine Service Records

Main Engine Service Record

Stbd Engine Every 250 hours (1 yr) (upper tach)											
											DUE
Change Transmission Lube Oil	1/23/22 1035	8/2/22 1112.2	05/03/23 1194.0	5/8/24 1282							5/25 1532
Change Transmission Filter	Same	8/2/22 1112.2	05/03/23 1194.0	5/8/24 1282							5/25 1532
Replace Engine Fuel Filter Element	Same		05/15/23 1195.0	9/6/24 1349.2							5925 1599
Replace Coolant (3 yr)	Same										1/25
Every 100 hours (1 Year)											
Change Lube Oil	1/22 1035	9/22 1135.1	3/23 1193.2		11/10/23 1278.5	9/6/24 1349.2					11/24 1450
Change Filter	1/22 1035	9/22 1135.1	3/23 1193.2		11/10/23 1278.5	9/6/24 1349.2					11/24 1450
Zincs	Changed 1/22	Changed 11/22	Checked 3/23	Changed 6/20/23 1205.1	Changed 11/10/23 1278.5	Changed 9/6/24 1349.2					09/25 1450

Port Engine Every 250 hours (1 yr) (upper tach)											
											DUE
Change Transmission Lube Oil	1/22 1049	4/30/23 1196	5/5/24 1282								11/24 1382
Change Transmission Filter	Same	4/30/23 1196	5/5/24 1282								11/24 1382
Replace Engine Fuel Filter	Same	5/15/23 1220				09/03/24					5/24 1450
Replace Coolant	Same										5/24 1450
Every 100 hours (1 Yr)											
Change Lube Oil	1/22 1049	9/22 1147.5	3/23 1195.4		11/10/23 1278	09/03/24 1338					9/25 1438
Change Filter	1/22 1049	9/22 1147.5	3/23 1195.4		11/10/23 1278	08/27/24 1338					8/25 1438
Zincs	Changed 1/22	Changed 11/22	Checked 3/23	Changed 6/20/23 1206	Changed 11/10/23 1278	Changed 08/27/24 1338					8/25 1436

Every 500 hours (1 year)											
Replace Racor Primary Filters (500 hours or 1 yr)	10/21	9/22	**11/23**								**11/24**

Generator Service Record

Operation	Hours/Date						
150 Hours – 1 yr							
Change Lube oil	643 5/10/22	6/7/23 695	7/20/24 729				
Change Oil Filter	643 5/10/22	6/7/23 695	7/20/24 729				
Change Fuel Filter	643 5/12/22	651 2/15/23 (fixed leak in primary filter)	7/20/24 729				
Due	**7/25**						

Maintenance Parts
Parts for 250hr 1 year service

	Generator	Engines
Oil 15W-40 Rotella	3.3 qts	11 qts each total $100.00
Oil filter	NL-24-08001 WIX 57145	Yanmar 119770-90620 – 2 x $60
Fuel filter	Luger 24-52020	Yanmar 119773-55710 2 x $45
Coolant	ACDelco 10-101 DEX-COOL Extended Life Coolant	ACDelco 10-101 DEX-COOL Extended Life Coolant - 1 Gallon
Transmission fluid		Castrol Transmax Dex III Multivehicle
Transmission Filter		ZF OEM Marine Oil Filter, Part# 3312199031
Primary Fuel Filter		Racor 900 MA

Spare Parts List

Main Engines	Part #	# required	# on hand	to buy
Turbo air filter foam	Yanmar 11593-18880	1	1	0
Secondary Fuel Filter	Yanmar 119773-55710	2	2	0
Oil Filter	Yanmar 119770-90620	2	1	1
Zincs	Yanmar 119574-44150	2 kits	2 kits	0
Sea Water Impeller	Yanmar 119779-42600	2	2	
Thermostat	Yanmar 119773-49550	1	2	0
Thermostat Gasket	Yanmar 119773-49570	1	0	1
Alternator Belt	Yanmar 119773-77260	2	2	0
Transmission filter	ZF OEM Marine Oil Filter, Part# 3312199031	2	1	0
Racor 900 MA Filter	2040PM-QR or 2040N-30	2	4	
Fresh Water Pump		1	1	
Throttle Arm		2	2	

Gen Set	Part #	# required	# on hand	to buy
Oil Filter	NL24-08001	1	1	
Secondary Fuel Filter	Northern Lights 24-52020	1	1	
Impeller	Northern Lights 25-12009	1	1	
Primary fuel filter	R12T	~~1~~	~~1~~	
Thermostat	Northern Lights 145206062	1	1	
Water Pump Cover O ring	Northern Lights 25-12031	1	0	1
Drive Belt	Gates XL 7280, Northern Lights 40-02002	1	1	0
Impeller		1	1	0

Tachometer Comparison 7/28/22

	Port			Stbd		SOG
Hand Measure	Bridge	Salon	Hand Measure	Bridge	Salon	
800	800	900	721	800	800?	
1085	1000	1100	945	1000	700	
2263	2200	2300	2167	2200	1500	9
2653	2600	2700	2512	2600	1700	10
2760	2800	2900	2750	2800	1800	10.5
3052	3000	3050	2966	3000	2000	11.5
3356			3215			wot
	Stbd Salon tach reads .67 of 2/3 of true value					

Chapter 8 Electrical Systems Operations

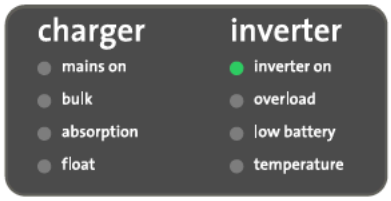
Inverter/Charger LED Indications

3.4. LED Indications

LEDs off

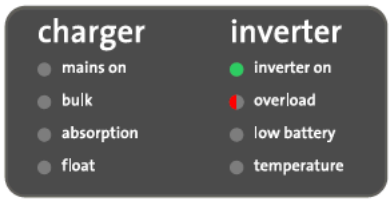
LEDs blinking

LEDs illuminated



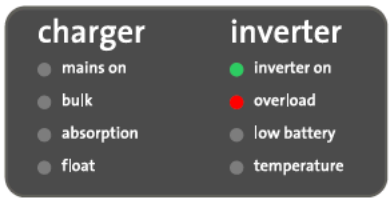
Inverting

The inverter is on. Inverter power is supplied to the load. The "inverter" LED is on.



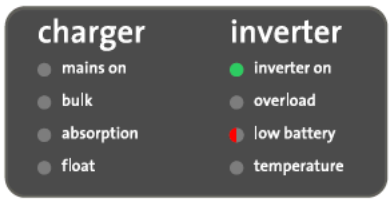
Overload pre-alarm

The nominal output of the inverter is exceeded. The "overload" LED is blinking



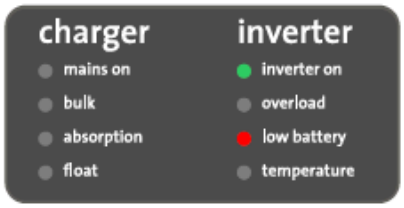
Overload alarm

The inverter is switched off due to overload or short circuit. The "overload" LED is on.



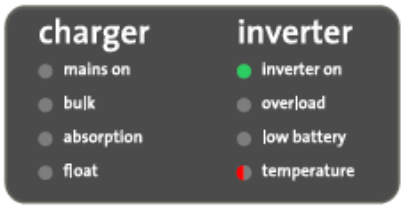
Low battery pre-alarm

The battery voltage is getting low. The battery is almost fully exhausted. The "low battery"LED is blinking.



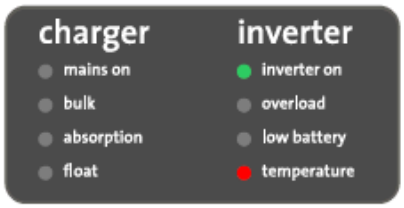
Low battery alarm

The inverter has switched off due to low battery voltage. The "low battery" LED is blinking.



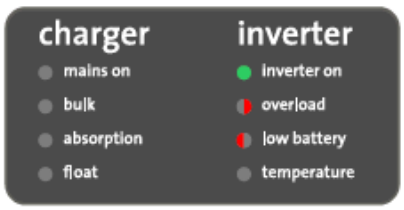
Temperature pre-alarm

The internal temperature is reaching a critical level. The "temperature" LED is blinking.



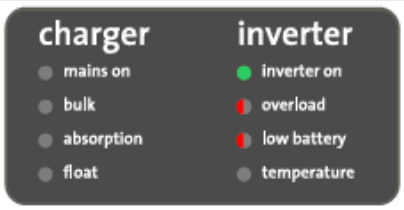
Temperature alarm

The inverter has switched off due it's internal temperature being too high. The "temperature" LED is on.



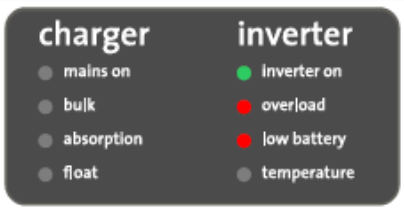
Overload pre-alarm and low battery pre-alarm

The battery is nearly exhausted and the nominal output of the inverter is exceeded. The "overload" and "low battery" LEDs are both blinking alternately.



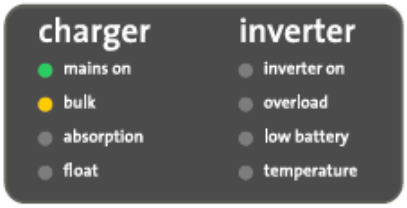
Ripple pre-alarm

The ripple voltage on the battery terminals is too high. The "overload" and "low battery" LEDs are both blinking simultaneously.



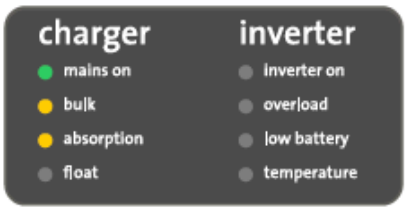
Ripple alarm

The inverter has switched off due to excess ripple voltage on the battery terminals. The "overload" and "low battery" LEDs are both on.



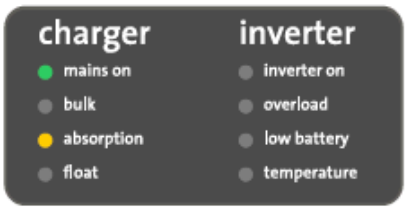
Bulk charging

The AC input voltage is switched through and the charger operates in bulk mode. The "bulk" LED is on.



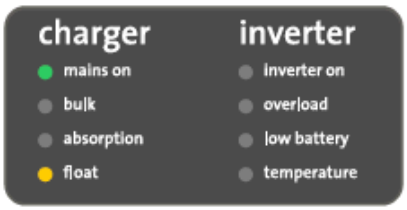
BatterySafe

The mains voltage is switched through and the charger is on. However, the set absorption voltage has not yet been reached. The "bulk" and "absorption" LEDs are both on.



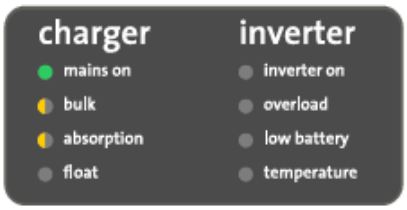
Absorption charging

The mains voltage is switched through and the charger operates in absorption mode. The "absorption" LED is on.



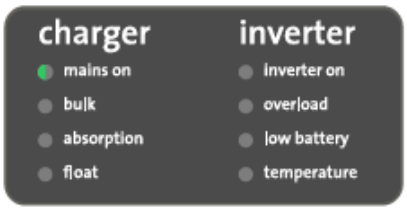
Float charging

The mains voltage is switched through and the charger operates in float mode. The "float" LED is on.



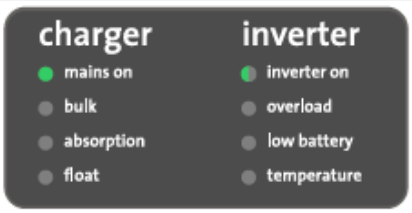
Equalize charging

The mains voltage is switched through and the charger operates in equalize mode. The "bulk" and "absorption" LED are both blinking.



PowerControl

The AC input is switched through. The AC output current is equal to the preset maximum input current. The charge current is reduced to 0A. The "mains on" LED is blinking.



PowerAssist

The AC input is switched through, but the load requires more current than the preset maximum input current. The inverter is switched on to supply the required additional current. The "mains on" LED is on and the "inverter" LED is blinking.

Problem	Cause	Solution
No output voltage on AC-out-2.	MultiPlus-II in inverter mode	
MultiPlus-II will not switch over to generator or mains operation.	Circuit breaker or fuse in the AC-in input is open as a result of overload.	Remove overload or short circuit on AC-out-1 or AC-out2, and reset fuse/breaker.
Inverter operation not initiated when switched on	The battery voltage is excessively high or too low. No voltage on DC connection.	Ensure that the battery voltage is within the correct range.
'Low battery' LED flashes	The battery voltage is low.	Charge the battery or check the battery connections.
Low battery' LED lights.	The converter switches off because the battery voltage is too low.	Charge the battery or check the battery connections.
'Overload' LED flashes.	The converter load is higher than the nominal load.	Reduce the load.
'Overload' LED lights	The converter is switched off due to excessively high load.	Reduce the load.
'Temperature' LED flashes or lights.	The environmental temperature is high, or the load is too high.	Install the converter in cool and well-ventilated environment, or reduce the load.
'Low battery' and 'overload' LEDs flash intermittently.	Low battery voltage and excessively high load.	Charge the batteries, disconnect or reduce the load, or install higher capacity batteries. Fit shorter and/or thicker battery cables.
'Low battery' and 'overload' LEDs flash simultaneously.	Ripple voltage on the DC connection exceeds 1.5 Vrms.	Check the battery cables and battery connections. Check whether battery capacity is sufficiently high, and increase this if necessary.
'Low battery' and 'overload' LEDs light.	The inverter is switched off due to an excessively high ripple voltage on the input.	Install batteries with a larger capacity. Fit shorter and/or thicker battery cables, and reset the inverter (switch off, and then on again).
One alarm LED lights and the second flashes.	The inverter is switched off due to alarm activation by the lighted LED. The flashing LED indicates that the inverter was about to switch off due to the related alarm.	Check this table for appropriate measures in regard to this alarm state.
The charger does not operate.	The AC input voltage or frequency is not within the range set.	Ensure that the AC input is between 97 VAC and 140 VAC, and that the frequency is within the range set (default setting 45-65 Hz).
	Circuit breaker or fuse in the AC-in input is open as a result of overload.	Remove overload or short circuit on AC-out-1 or AC-out-2, and reset fuse/breaker.
	The battery fuse has blown.	Replace the battery fuse.
	The distortion or the AC input voltage is too large (generally generator supply).	Turn the settings WeakAC and dynamic current limiter on.

Problem	Cause	Solution
The charger does not operate. 'Bulk' LED flashes and 'Mains on' LED illuminates	MultiPlus-II is in 'Bulk protection' mode thus, the maximum bulk charging time of 10 hours is exceeded. Such a long charging time could indicate a system error (e.g. a battery cell short-circuit).	Check your batteries.  You can reset the error mode by switching off and back on the MultiPlus-II. The standard MultiPlus-II factory setting of the 'Bulk protection' mode is switched on. The 'Bulk protection' mode can be switched off with help of VEConfigure only.
The battery is not completely charged.	Charging current excessively high, causing premature absorption phase.	Set the charging current to a level between 0.1 and 0.2 times the battery capacity.
	Poor battery connection.	Check the battery connections.
	The absorption voltage has been set to an incorrect level (too low).	Set the absorption voltage to the correct level.
	The float voltage has been set to an incorrect level (too low).	Set the float voltage to the correct level.
	The available charging time is too short to fully charge the battery.	Select a longer charging time or higher charging current.
	The absorption time is too short. For adaptive charging this can be caused by an extremely high charging current with respect to battery capacity, so that bulk time is insufficient.	Reduce the charging current or select the 'fixed' charging characteristics.
The battery is overcharged.	The absorption voltage is set to an incorrect level (too high).	Set the absorption voltage to the correct level.
	The float voltage is set to an incorrect level (too high).	Set the float voltage to the correct level.
	Poor battery condition.	Replace the battery.
	The battery temperature is too high (due to poor ventilation, excessively high environmental temperature, or excessively high charging current).	Improve ventilation, install batteries in a cooler environment, reduce the charging current, **and connect the temperature sensor.**
The charging current drops to 0 as soon as the absorption phase initiates.	The battery is over-heated (>50°C)	• Install the battery in a cooler environment • Reduce the charging current • Check whether one of the battery cells has an internal short circuit
	Defective battery temperature sensor	Disconnect the temperature sensor plug in the MultiPlus-II. If charging functions correctly after approximately 1 minute, the temperature sensor should be replaced.

Chapter 9 Maintenance Procedures

Torques and Tightening Fasteners

Use the correct amount of torque when tightening the fasteners. Applying excessive torque may damage the fastener or component and not enough torque may cause a leak or component failure.

NOTICE: The tightening torque in the Standard Torque Chart should be applied only to the bolts with a "7" head (JIS strength classification: 7T). Apply 60% torque to bolts that are not listed. Apply 80% torque when tightened to aluminum alloy.

Tightening Torque for Standard Bolts and Nuts

	Bolt diameter x pitch (mm)					
	M6 X 1.0	**M8 X 1.25**	**M10 X 1.5**	**M12 X 1.75**	**M14 X 1.5**	**M16 X 1.5**
N·m	11.0 ± 1.0	26.0 ± 3.0	50.0 ± 5.0	90.0 ± 10.0	140.0 ± 10.0	230.0 ± 10.0
kgf·m	1.1 ± 0.1	2.7 ± 0.3	5.1 ± 0.5	9.2 ± 1.0	14.3 ± 1.0	23.5 ± 1.0
lb-ft	-	19.0 ± 2.1	37 ± 3.6	66.0 ± 7.2	103 ± 7.2	170 ± 7.2
lb-in.	96 ± 9.0	-	-	-	-	-

Component		Specification
Fuel injection pump x Timing gear case		185 kgf/cm², 18.14 N·m (13.6 lb-ft)
Fuel injection pump x Fuel injection pump stay		700 kgf/cm², 68.65 N·m (50.6 lb-ft)
Fuel injection pump drive gear x Fuel injection pump		1000 kgf/cm², 98.07 N·m (72.3 lb-ft)
Fuel injection pump stay x Cylinder block		700 kgf/cm², 68.65 N·m (50.6 lb-ft)
Fuel injection nozzle mounting bolt x Cylinder head		255 kgf/cm², 25.01 N·m (18.4 lb-ft)
No. 1 Camshaft timing pulley x Camshaft		1000 kgf/cm², 98.07 N·m (72.3 lb-ft)
No. 2 Camshaft timing pulley x Fuel injection pump drive gear		315 kgf/cm², 30.89 N·m (22.8 lb-ft)
Idler pulley x Timing gear cover		350 kgf/cm², 34.32 N·m (25.3 lb-ft)
Timing belt tensioner x Timing gear cover		130 kgf/cm², 12.75 N·m (9.4 lb-ft)
Idler gear x Cylinder block		694 kgf/cm², 68.06 N·m (50.2 lb-ft)
Timing gear cover, Cylinder block x Timing gear case		200 kgf/cm², 19.61 N·m (14.5 lb-ft)
Camshaft bearing cap x Cylinder head		250 kgf/cm², 24.52 N·m (18.08 lb-ft)
Camshaft oil seal retainer x Cylinder head		200 kgf/cm², 19.61 N·m (14.5 lb-ft)
Main bearing cap x Cylinder block	(12 pointed head)*	1050 kgf/cm², 102.97 N·m (75.9 lb-ft) (90° Retightening)
	(6 pointed head)	185 kgf/cm², 18.14 N·m (13.38 lb-ft)
Crankshaft pulley x Crankshaft		4400 kgf/cm², 431.50 N·m (318.3 lb-ft)
Flywheel x Crankshaft		1300 kgf/cm², 127.50 N·m (94 lb-ft)
Viscous damper x Crankshaft pulley		380 kgf/cm², 37.27 N·m (27.5 lb-ft)
Input shaft joint (rubber block) x Flywheel		400 kgf/cm², 39.23 N·m (28.9 lb-ft)
* Connecting rod cap x Connecting rod		375 kgf/cm², 36.77N·m (27.1 lb-ft) (90° Retightening)
* Cylinder head x Cylinder block		700 kgf/cm², 68.65 N·m (50.6 lb-ft) (90° Retightening)
Rocker cover x Cylinder head		65 kgf/cm², 6.37 N·m (56.4 lb-in.)
Intake manifold x Cylinder head		200 kgf/cm², 19.61 N·m (14.5 lb-ft)
Alternator bracket x Cylinder block		700 kgf/cm², 68.65 N·m (50.6 lb-ft)
Rear end plate x Cylinder block		185 kgf/cm², 18.14 N·m (13.4 lb-ft)
Engine mounting bracket x Cylinder block		700 kgf/cm², 68.65 N·m (50.6 lb-ft)
Rear oil seal case x Cylinder block		65 kgf/cm², 6.37 N·m (56.4 lb-in.)

* Apply oil to threads and seat before tightening.

UNIT CONVERSIONS

Unit Prefixes

Prefix	Symbol	Power
mega	M	x 1,000,000
kilo	k	x 1,000
centi	c	x 0.01
milli	m	x 0.001
micro	µ	x 0.000001

Units of Length

mile	x	1.6090	= km
ft	x	0.3050	= m
in.	x	2.5400	= cm
in.	x	25.4000	= mm
km	x	0.6210	= mile
m	x	3.2810	= ft
cm	x	0.3940	= in.
mm	x	0.0394	= in.

Units of Volume

gal (U.S.)	x	3.78540	= L
qt (U.S.)	x	0.94635	= L
cu in.	x	0.01639	= L
cu in.	x	16.38700	= mL
fl oz (U.S.)	x	0.02957	= L
fl oz (U.S.)	x	29.57000	= mL
cm^3	x	1.00000	= mL
cm^3	x	0.03382	= fl oz (U.S.)

Units of Mass

lb	x	0.45360	= kg
oz	x	28.35000	= g
kg	x	2.20500	= lb
g	x	0.03527	= oz

Units of Force

lbf	x	4.4480	= N
lbf	x	0.4536	= kgf
N	x	0.2248	= lbf
N	x	0.1020	= kgf
kgf	x	2.2050	= lbf
kgf	x	9.8070	= N

Units of Torque

ft-lb	x	0.1383	= kgf/m
in.-lb	x	0.0115	= kgf/m
lb-ft	x	1.3558	= N·m
lb-ft	x	0.1383	= kgf/m
lb-in.	x	0.1130	= N·m
lb-in.	x	0.0115	= kgf/m
kgf/m	x	7.2330	= ft-lb
kgf/m	x	86.8000	= in.-lb
kgf/m	x	9.8070	= N·m
N·m	x	0.7376	= ft-lb
N·m	x	8.8510	= in.-lb
N·m	x	0.1020	= kgf/m

Units of Pressure

psi	x	0.0689	= bar
psi	x	6.8950	= kPa
psi	x	0.0703	= kg/cm^2
bar	x	14.5030	= psi
bar	x	100.0000	= kPa
bar	x	29.5300	= inHg (60°F)
kPa	x	0.1450	= psi
kPa	x	0.0100	= bar
kPa	x	0.0102	= kg/cm^2
kg/cm^2	x	98.0700	= psi
kg/cm^2	x	0.9807	= bar
kg/cm^2	x	14.2200	= kPa
in.Hg (60°)	x	0.0333	= bar
in.Hg (60°)	x	3.3770	= kPa
in.Hg (60°)	x	0.0344	= kg/cm^2
mmAq	x	0.0394	= in.Aq

Units of Power

hp (metric or PS)	x	0.9863201	= hp SAE
hp (metric or PS)	x	0.7354988	= kW
hp SAE	x	1.0138697	= hp (metric or PS)
hp SAE	x	0.7456999	= kW
kW	x	1.3596216	= hp (metric or PS)
kW	x	1.3410221	= hp SAE

Units of Temperature

°F = (1.8 x °C) + 32
°C = 0.556 x (°F - 32)

3.23.1.1 Inspect the drive belt

(1) Visually check for cracks, oiliness and wear. Also, check that the belt does not contact the bottom of the pulley groove. If needed, replace the drive belt as a set.

(2) Press down the belt at the position shown in the illustration, with a 10 kgf (98 N) force, and check the deflection of the drive belt.

Deflection of drive belt

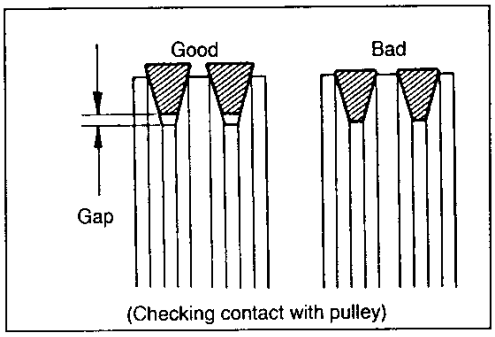
New belt: 6 to 8 mm

Used belt: 8 to 11 mm

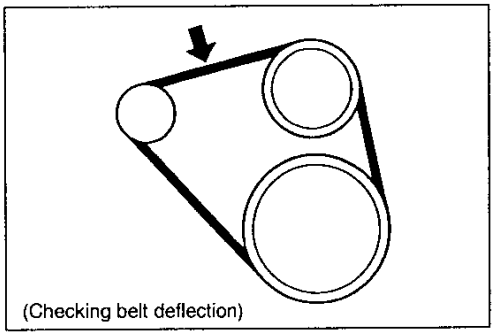
Adjust the drive belt deflection as needed.

Note:

- A new belt is that used for less than 5 minutes on the running engine.
- Used belt is that used for over 5 minutes on the running engine.
- Install a new belt, operate the engine for 5 minutes and then check the deflection again.



(Checking contact with pulley)


(Checking belt deflection)

Draining the Freshwater and Seawater Cooling System

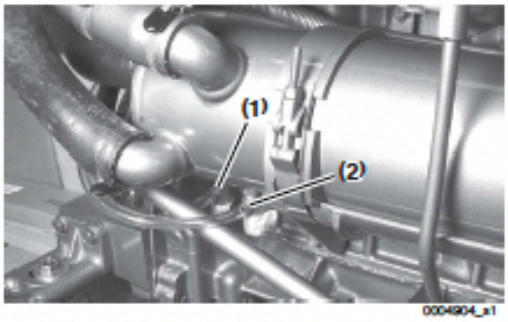


Figure 3-26

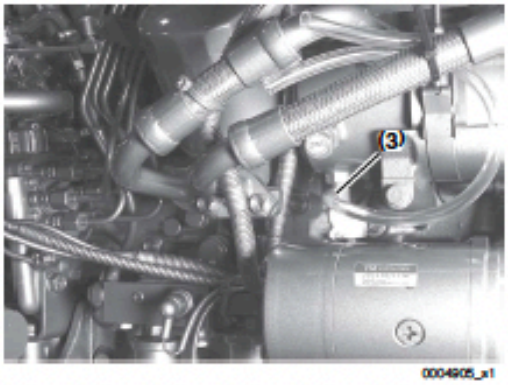


Figure 3-27

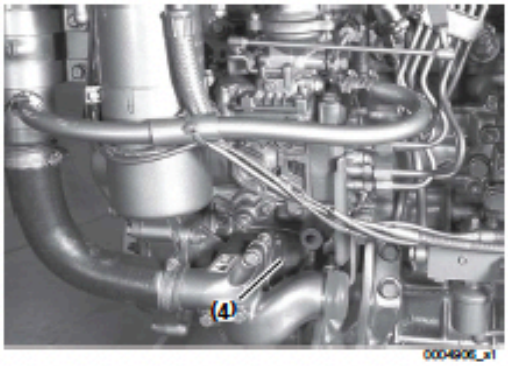


Figure 3-28

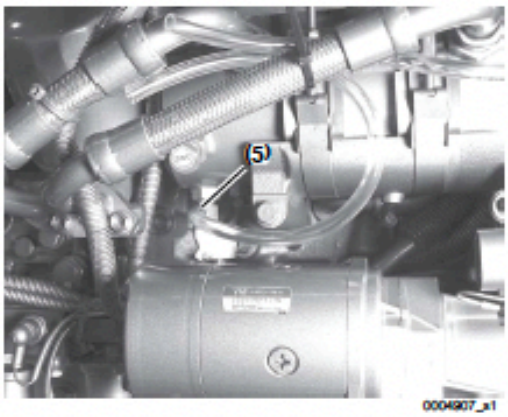


Figure 3-29

1 – Seawater Drain Cock
2 – Freshwater Drain Cock
3 – Freshwater Drain Cock
4 – Seawater Pump Cover
5 – Seawater Drain Cock

Draining the Freshwater Cooling System

1. Open the freshwater drain cocks and drain the fresh water into an appropriate container.
2. Close the drain cocks after draining the water.
3. Dispose of waste properly

Draining Seawater Cooling System

NOTICE: If seawater is left inside, it may freeze and damage parts of the cooling system (freshwater cooler, seawater pump, etc.) when ambient temperature is below 0°C (32°F).

1. Close the seacock.
2. Open the seawater drain cocks and drain off the seawater.
3. Remove the four bolts attaching the seawater pump cover. Remove the cover and drain the seawater.
4. Install cover and tighten bolts.
5. Close all the drain cocks.

Checking or Replacing Zinc Anodes

Inspect and replace the zinc anodes periodically. *NOTICE: If zinc anodes are not replaced periodically, corrosion and engine damage will result.*

1. Close the seacock.
2. Drain the seawater cooling system. *See Draining Seawater Cooling System on page 3-26.*

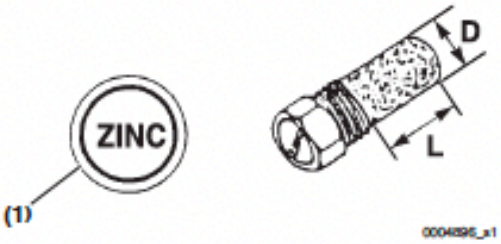


Figure 4-7

3. Remove all the plugs labeled ZINC (**Figure 4-7, (1)**).
   - Fuel Cooler (**Figure 4-8, (1)**)
   - Freshwater Cooler (**Figure 4-9, (4)**)
   - Intercooler (**Figure 4-11, (2)**) and (**Figure 4-12, (2)**)
   - Engine Oil Cooler (**Figure 4-11, (3)**)
4. Measure the remaining zinc in the plug. Replace the zinc anode when it is less than one-half its original size. See chart for sizes.

Location	Part Number	Qty.	Dimensions D X L
Fuel Cooler	119574-44150	1	12.7 x 25.4 mm (0.5 x 1.0 in.)
Engine Oil Cooler		2	
Freshwater Cooler		2	
Intercooler	119574-18790	1	

Note: Some marine drives have additional zinc anodes. Check the manufacturer's documentation for location and other information.

5. Install a new zinc in a new plug. *NOTICE: NEVER use sealing tape to install the zinc anode. The anode must make metal-to-metal contact.*
6. Install plug.
7. Open the seacock and check for leaks.

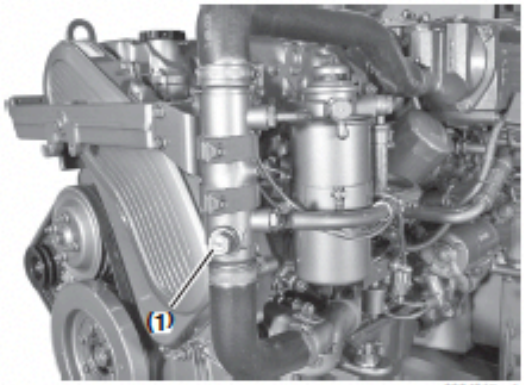


Figure 4-8

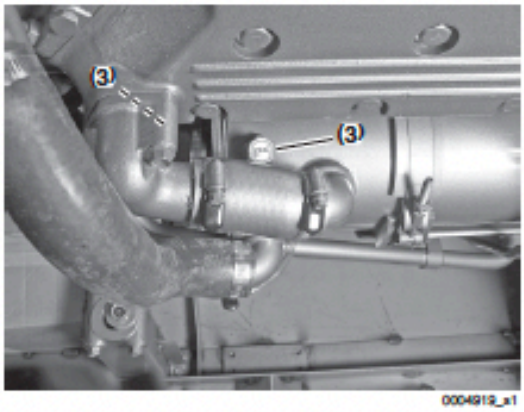


Figure 4-9

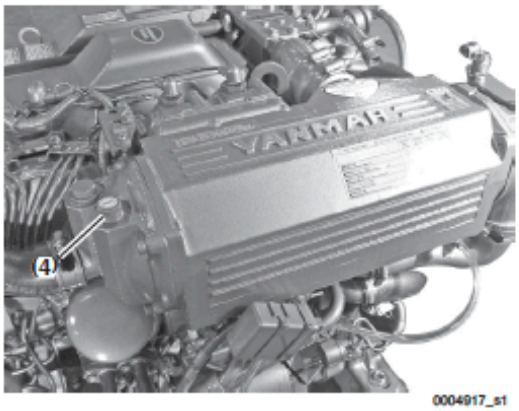


Figure 4-10

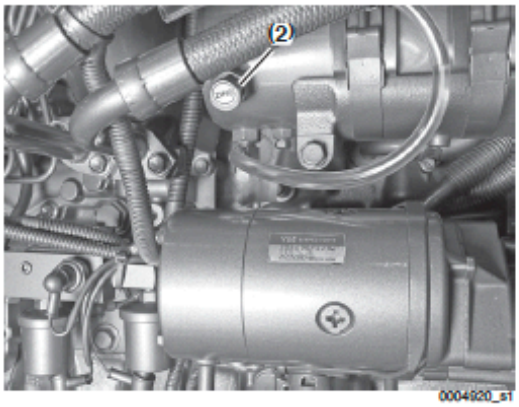


Figure 4-11

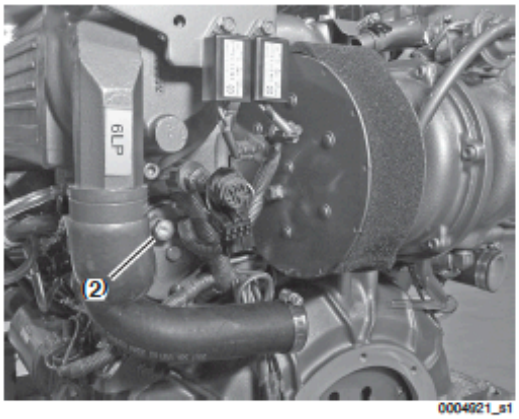


Figure 4-12

4.7 FLUID FILTER

4.7.1 Mounting the fluid filter

- Wet O-rings (item 1 and 2, Fig. 7-1) with some ATF fluid and mount them.
- Install filter element (item 3, Fig. 7-1) into the transmission.
- Lock cover (item 4 Fig. 7-1) to the transmission using an allen wrench. Tightening torque: min. 5 Nm - max 8 Nm (min. 4 ft.lb. - max 6 ft.lb.)

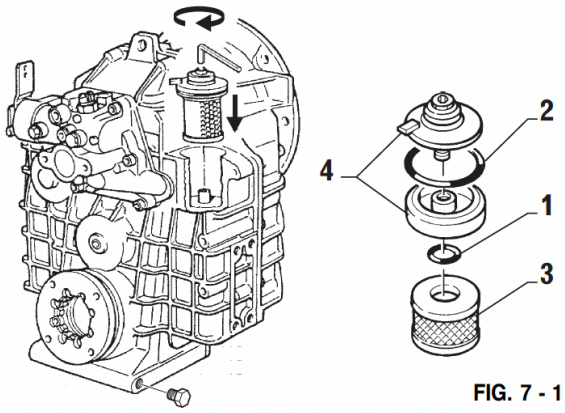


FIG. 7 - 1

3.9 Fuel Filter Replacement

3.9.1 Removal of Fuel Filter

3.9.1.1 Disconnect the connector of the water alarm switch of the fuel filter

3.9.1.2 Drain fuel from the fuel filter

(1) Close the cocks of fuel tank, etc.
(2) Connect a vinyl hose to the filter drain cock and the other end of the hose to an oil container.
(3) Loosen the drain plug to drain the fuel.

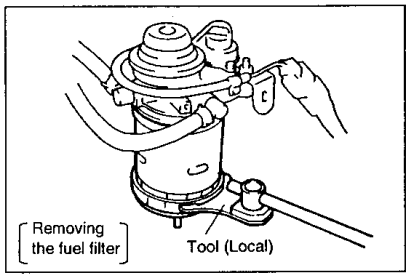
3.9.1.3 Fuel filter removal

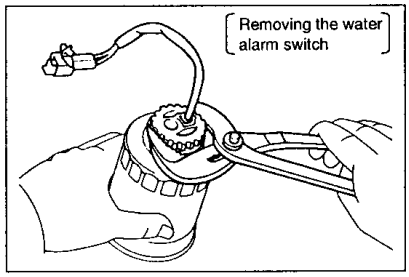
Remove the fuel filter.

3.9.1.4 Remove the water alarm switch from the fuel filter

Remove the alarm switch and O-ring using pliers.

Note: Pay attention so as not to damage the alarm switch.





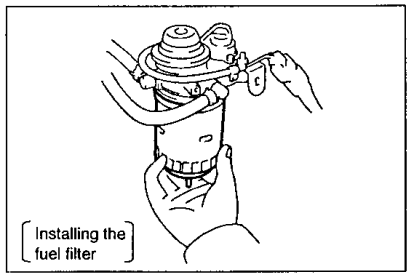
3.9.2 Installation of Fuel Filter

3.9.2.1 Install the water alarm switch to the new fuel filter

(1) Install a new O-ring to the alarm switch.
(2) Apply fuel to the O-ring of the alarm switch.
(3) Manually install the alarm switch to the new fuel filter.

3.9.2.2 Install the new fuel filter

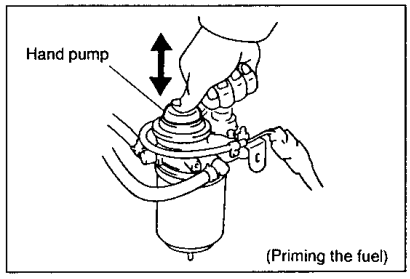
(1) Check and clean the fuel filter mounting surface.
(2) Apply fuel to the gasket of the new fuel filter.
(3) Lightly screw in the fuel filter in position and tighten it until the gasket comes into contact with the seat.
(4) Manually retighten the filter by a 3/4 turn.
Tightening torque:
150 to 200 kgf·cm (14.71 to 19.61 N·m)



3.9.2.3 Install the water alarm switch connector of the fuel filter

3.9.2.4 Fill fuel to the fuel filter

(1) Open the fuel tank cock and operate the hand pump to add fuel.
(2) Operate the hand pump until further operation is felt heavy.



3.9.2.5 Start the engine to check for fuel leakage

Bleeding the Main Engine Fuel System

Bleeding must be done if any fuel system maintenance has been performed (replacement of fuel filter, etc.) or if the engine does not start after several attempts.

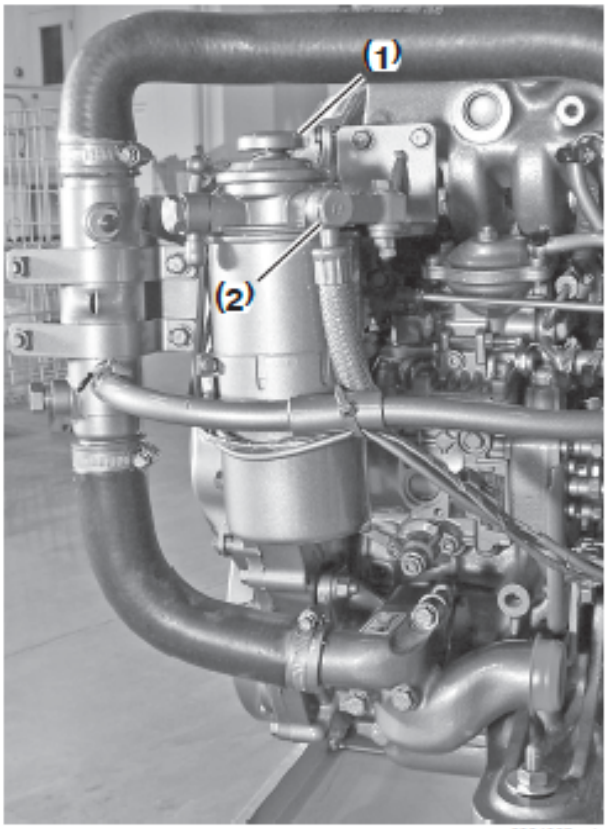


Figure 3-20

1. Check the fuel level in the fuel tank. Refill if necessary.
2. Open the fuel cock of the fuel tank. **WARNING!** ***ALWAYS wear safety glasses when bleeding the fuel system.***
3. Loosen the air bleed screw **(Figure 3-20, (2))** 2 to 3 turns.
4. Push up and down on the priming pump **(Figure 3-20, (1))** to release air out of the air bleed screw. **WARNING!** ***Ensure no fuel is leaking from the seals of the air bleed screw while pushing on the priming pump.***
5. Continue pumping until a solid stream of fuel with no air bubbles begins to flow.
6. Tighten the air bleed screw.

Chapter 10 Habitability – Head – Galley

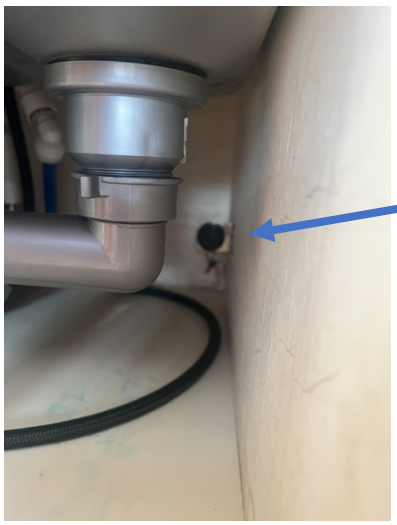
Stove

Start

- Open propane tank valve
- Close stove breaker on main panel
- Switch gas control panel to “on”

Shut down

- Switch gas control panel to “off”
- Open stove breaker on main panel
- Close propane tank valve



NOTE: The stove AA cell battery to power the ignition spark is under the sink instead of at the back of the stove. It was moved there to ensure accessibility.

Head

NOTICE: Keep through-hull to sea valve closed at all times except when using macerator to pump to sea outside 3 NM from land.

Key to Waste (Black Water) Valves

1. Macerator
2. "Direction Out" valve

   To pump out or to macerator and

   sea
3. Direction in valve

   To tank or to macerator and sea
4. Through-hull to sea

   Note: this is a valve to the fuel tank.

Procedure to empty tank to pump out station in port.

1. Turn off FW Pump
2. Turn off Head
3. Turn off Water Heater
4. Align Direction Out Valve to "Deck Pump Out"
5. Open "waste" access on stbd side, main deck
6. Engage pump out per instructions

When empty

1. Close "waste" access and rinse deck.
2. Turn on FW pump and run faucet in galley to let out air.

3. Turn on Head
4. Turn on Water Heater if needed.
5. Check alignment of Waste (Black Water) valves.
    a. Direction Out valve to “Deck Pump Out”
    b. Direction In valve to “Tank”
    c. Through-hull closed

Procedure to empty tank to sea outside three mile limit.

1. Turn off F/F pump.
2. Turn off head.
3. Use flashlight to check level
4. Align Direction Out Valve to “Macerator”
5. Align tank valve to “Overboard”
6. Open through hull to sea.
7. Switch macerator on main panel to “on”
8. When sound changes to higher whine, turn macerator switch off and check level with flashlight.
    a. When less than 1 inch remains, tank is empty.

When Empty:

1. Close through hull to sea.
2. Align Direction Out Valve to “Deck”
3. Align Tank Valve to “Tank”
4. Turn on FW pump breaker.
5. Turn on Head breaker.

Breaker Alignment

Main Panel: in Port, Shore Power 120V AC

When leaving boat connected to shore power, leave on:

DC Main

- Shower Pump (it empties sump to A/C drains and other.)
- Cabin Lights
- DC Refrigerator
- Panel Lights

AC Main

- AC outlets in use
- Invert/Charger

Leave Off:

- A/C water heater unless using hot water
- Battery Charger unless putting charge on engine starte batteries.
- Fresh water and head unless using fresh water and head.

Boat Colors –

- Hull (Freeboard) -AWLGRIP Jade Mist Green (H4094) mixed with AWLGRIP Superjet Black (G2091) 12:1 mix ratio
- Window Frames and Mast AWLGRIP Cream H8002
- Cushions, Sunbrella Color Heather Beige
- Deck and superstructure color: Sherwin Williams Classical White. SW 2829

Habitability Dimensions

Port screen size 14x7 with 1 ¼ radius man ship part # LS-0714-sn

Air Conditioning Systems

The A/C units work off either shore power or the generator.

These are pictures of the lineup for the generator.

Note that the label on the main panel says “Shore I” over Generator A/C Breaker.
that is not accurate. This breaker works for both shore power and generator.

The source is controlled by this switch located on the side of the main electrical panel.

IMPORTANT: WHEN SHIFTING SOURCE FOR THE A/C FROM SHORE POWER TO GENERATOR, OR GENERATOR TO SHORE, TURN OFF THE A/C SYSTEMS AND OPEN A/C THE BREAKER.

If you do not do this, the breakers open on the main control panel and will not reset until you turn off all power to the A/C (that means “off” on the shore/off/gen switch and open all the A/C breakers) then wait for about fifteen minutes.

The sequence for energizing the A/C off the generator is this:

- Turn off the A/C at the local panels.
- Open all the breakers to the A/C on the main panel.
- Turn the shore/off/gen switch to "OFF". The green light next to the main breakers will go dark.
- Start the generator if not already running.
- Turn the shore/off/gen switch to “GEN”
- Close all the A/C breakers on the main panel from the top down.

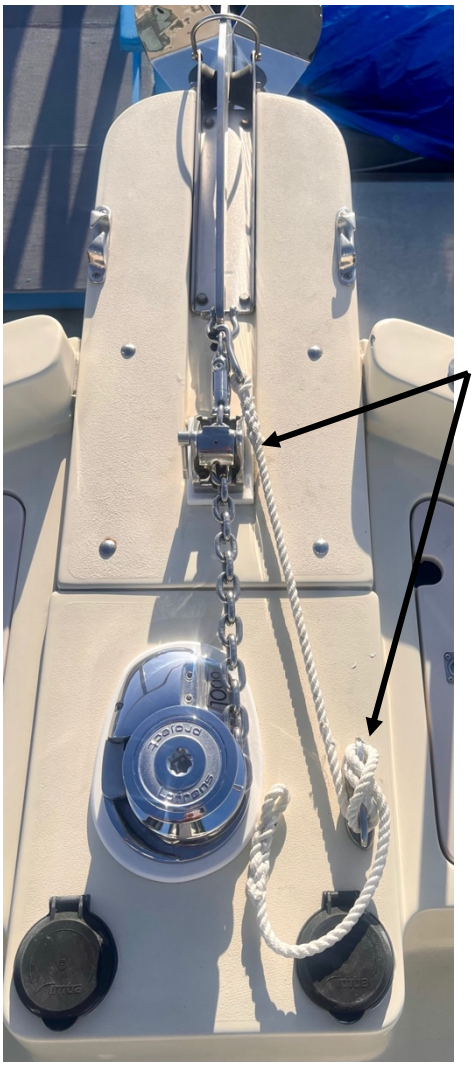
- Turn and observe the indication “888” on the local control panel near the salon steering station.

The sequence for energizing the A/C off shore power is this:

- Turn off the A/C at the local panels.
- Open all the breakers to the A/C on the main panel.
- Turn the shore/off/gen switch to "OFF". The green light next to the main breakers will go dark.
- Connect the shore power if it is not connected.
- Turn the shore/off/gen switch to “Shore”
- Close all the A/C breakers on the main panel from the top down.
- Turn and observe the indication “888” on the local control panel near the salon steering station.

If the local panel fails to indicate “888”, that means a power fluctuation, or some other event (unknown to me) has caused some sort of breaker to open. Shut off all power to the A/C, Turn the shore/off/gen switch to "OFF" and make sure the green light next to the main breakers is dark. Open all the breakers on the A/C panel and wait 15 minutes then try again.

Chapter 11 Windlass and Anchor



Windlass: Lofrens Project 1000

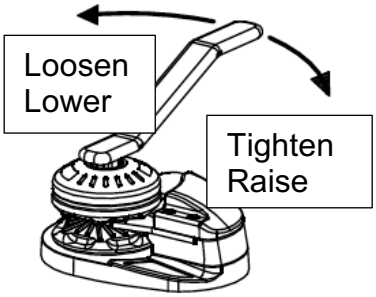
Supports G4 Chain 5/16 HT and 5/16 BBB – accepts 9/16 or 5/8 three strand line

Lowering the anchor electrically

1. Tighten clutch.
2. Disengage chain stopper and chain tensioner.
3. Close the breaker in the cabin.
4. Press the DOWN button.
5. Set the anchor deactivate the safety switch.
6. Cleat the rode.
7. Open the breaker.

Lowering the anchor by gravity

1. Tighten clutch.
2. Disengage the clutch gradually.
3. Always the check speed through the hawse.
4. Cleat the rode.



Weighing Anchor by Power

1. Close the breaker in the cabin.
2. Attach hose to saltwater wash system.
3. Open chain locker hatch to observe lie fo rode and chain. and
4. Attach winch handle to gypsy head, tighten clutch and remove winch handle.
   Note: the winch handle is kept in the main cabin shelf above the TV.
5. Uncleat the rode and feed loose end into chain locker opening until the rode is engaged on the wildcat.

6. Press the UP button from the control.
   Ensure rode is falling into chain locker.
7. Raise anchor until weighed, tell helmsman anchor is weighed.
8. Retrieve anchor until it is clear of water and rinse.
9. Tell helmsman to activate saltwater wash.
10. Clean anchor
11. Retrieve until set into hawse.
12. Set chain stopper and chain tensioner.

Weighing Anchor Manually

Note: this is a casualty procedure when power is not available to weigh anchor.

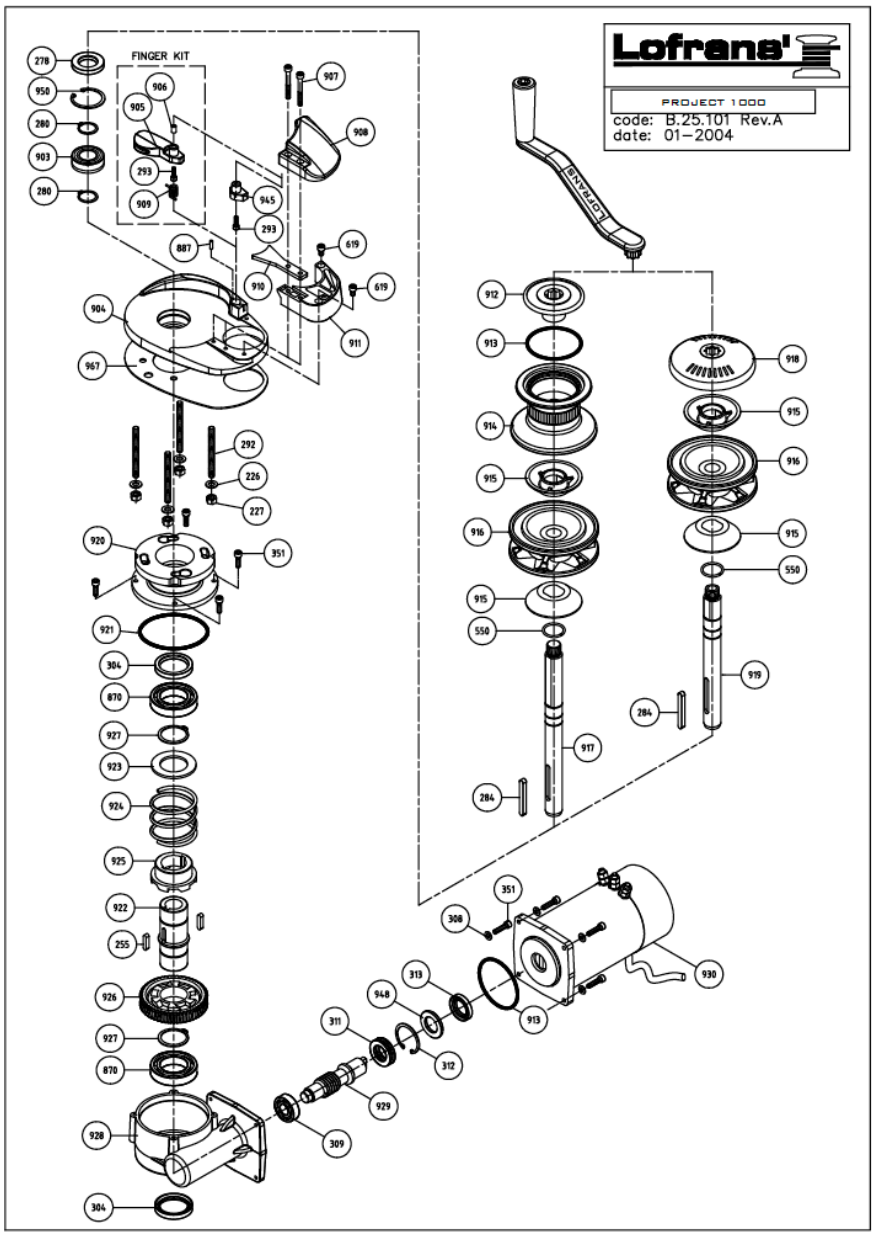
1. Uncleat the rode and feed loose end into the chain locker until the rode is engaged on the wildcat.
2. Open chain locker hatch to observe lie of rode and chain.
3. Insert the winch handle into the hand-wheel and turn clockwise by overcoming the strength of the spring contained in the reducer
4. In deep water, the effort will turn out to be significant.
   Ensure rode is falling into chain locker.
5. Raise anchor until weighed, tell helmsman anchor is weighed.
6. Retrieve anchor until it is clear of water and rinse.
7. Tell helmsman to activate saltwater wash.
8. Clean anchor
9. Retrieve until set into hawse.
10. Set chain stopper and chain tensioner.

Windlass Drawings

PROJECT 1000

Item	Description	Kit	Q.ty
226	Washer for M8 screw	Kit B	4
227	Nut M8	Kit B	4
255	Key 6x6x25	Kit C	2
272	Handle		1
278	Seal 25-47-7	Kit A	1
280	Circlip 25 Din 471	Kit D	2
284	Key 8x7x60	Kit C	1
292a	Stud M8x75		4
293	Hd cap screw M5x16	Kit F	1
304	Seal 40-55-7	Kit A	2
308	Washer for M6 screw	Kit B	4
309	Bearing 6203		1
311	Thrust bearing 51105		1
312	Circlip 43 Din 472	Kit D	1
313	Seal 25-43-8	Kit A	1
351	Hd cap screw M6x20	Kit B	8
550	Ring		1
619	Hd cap screw M6x10	Kit B	1
870	Bearing 6008		2
903	Stainless steel bearing 6005 2RS		1
904a	Base		1
905a	Finger	Kit F	1
905b	Stainless steel finger (option)	Kit F	1
906	Spacer	Kit F	1
907	Hd cap screw M6x50	Kit B	2
908a	Cover		1
909	Spring	Kit F	1
910	Stripper		1
911	Support		1
912	Clutch nut		1
913	O Ring 3287	Kit A	2
914a	Drum		1
915	Cone clutch		2
916a	Gipsy chain 06101		1
916b	Gipsy chain 08101		1
916c	Gipsy chain 10101		1
916d	Gipsy chain 10102		1
917a	Std main shaft		1
918a	Gipsy cap		1
919a	LP main shaft		1
920	Gearcase - upper		1
921	O Ring 4375	Kit A	1
922	Sleeve		1
923	Washer		1
924	Spring		1
925	Dog clutch		1
926	Wormwheel		1
927	Circlip 40 Din 471	Kit D	2
928	Gearcase - lower		1
929	Worm		1
930a	Electric motor 1000W 12V		1
930b	Electric motor 1000W 24V		1
945	Cap	Kit F	1
948	Bush		1
950	Circlip 47 Din 472	Kit D	1
967	Gasket		1
1008	Pivot 7x14	Kit F	1
1011	Hd cap screw M6x40	Kit B	1
1026	Cap		1

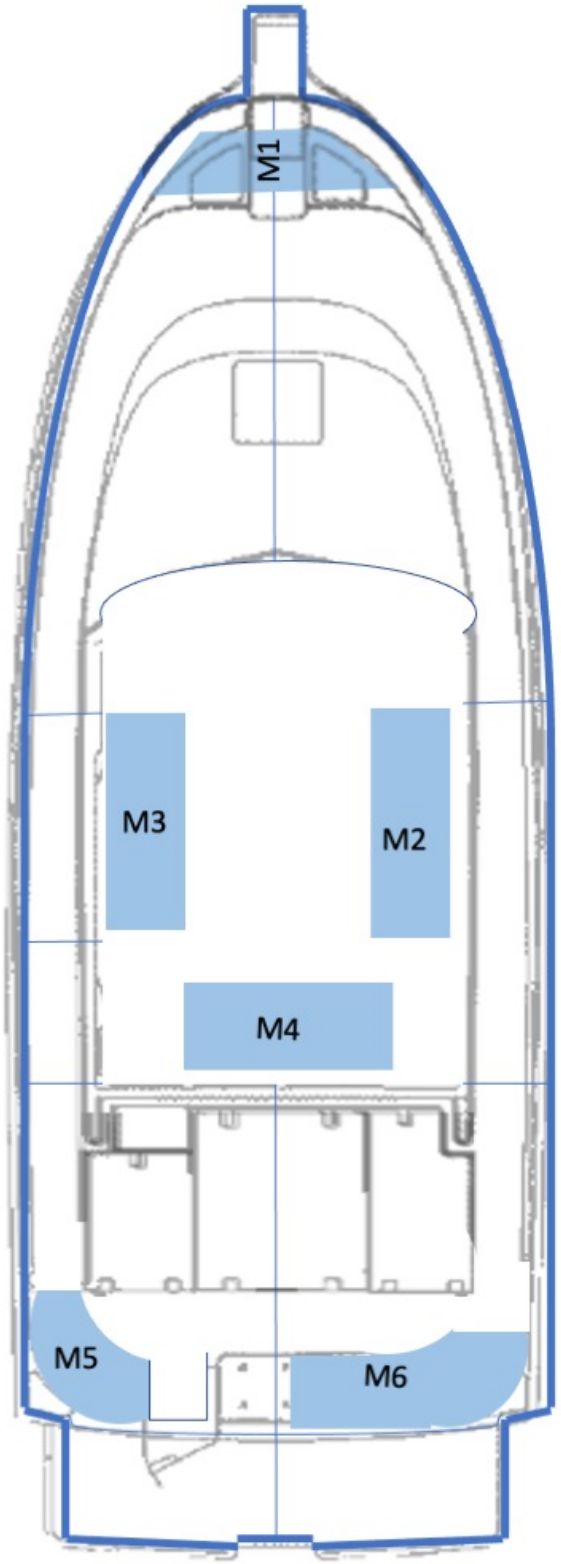
Item	Description	Kit	Q.ty
KA25101	Kit A - Seals		1
KB25101	Kit B - Screw&Nuts		1
KC25101	Kit C - Keys		1
KD25101	Kit D - Circlips		1
KF25101	Kit F - Finger		1
KF25102	Kit F - S/S Finger (option)		1



Chapter 12 Stowage Plan

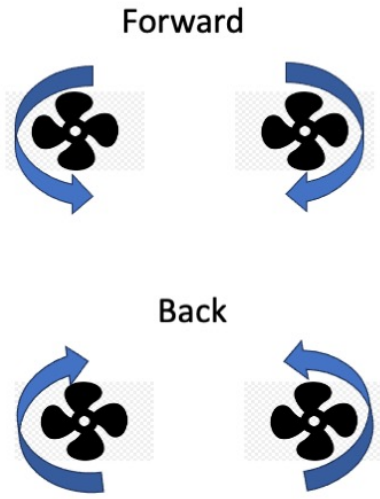
Hatch Number	Equipment	Notes
1	FWD AC	
2	SEA ANCHOR	
2	PAPER MANUALS	
2	FILES	
3	ACCESS TO BILGEPUMP	
5	(GPS ANTENNA)	
5	CLEANING GEAR	
5	TOILET PAPER /PAPER TOWELS	
5	SIGNAL FLAG	
5	COMPUTER ELECTRONICS	
6		
8	HOSE REPAIR	
8	SPARE PARTS	
8	OIL SAMPLE KIT	
8	ENGINE SPARE FILTERS/PARTS	
8	VACUFLUSH SPARES	
10	ACCESS TO FRESH WATER SYSTEM	
11		
9		
7	CLEANING GEAR	
12		
13	TORQEEDO COVER	
13		
14	SPARE ANCHOR	
14	OIL (SMALL) FUNNELS	
15	OIL EXTRACTOR	
16	OIL PADS	
17	TOOL BOX	Electrical repair. Inspection scope. Glue. Screws. Wire.
17		
17	LIGHT OIL, WD40 KIT	
17	SPARE OIL behind tool box	
17	SPARE HYDRAULICS behind tool box	

Access and Storage Plan Main Deck and Flying Bridge



M1	HOSE	
M1	ANCHOR RODE	
M3	LIFE JACKETS	
M3		
M3	LIFE JACKETS, DOG	
M3	FLARES	
M3	EMERGENCY SIGNAL KIT	
M3		
M2	DINGHY MOTOR STUFF	
M2	DINGHY BATTERIES	
M2	GLOVES	
M2	EXTENSION CORD	
M4	AIR PUMPS	
M4	TOOL ROLL	
M2	DRILL	
M2	PAINT	
M2	PATCH KIT	
M4	LARGE FIRE EXTINGUISHER	
M4	FISHING GEAR	
M5	PROPANE FOR STOVE	
M5	PROPANE FOR GRILL	
M6	SPARE LINE	
M6	SEWING KIT	
M6	STRAPS FOR BOAT	
M6	MOORING LINES	
M6	GRILL TOOLS	
M6	CLEANING GEAR	

Chapter 13 Maneuvering Notes



Dog Watches' propellers are counter-rotating

The starboard propeller is right handed
The port propellor is left handed.

When view from the stern, they turn as illustrated

Twisting

Dog Watches will twist in her own length.