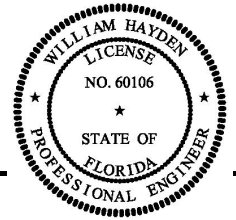


DEJONG & LEBET, NAVAL ARCHITECTS, INC.

SHIP'S ELECTRICAL PLANT LOAD ANALYSIS

DLI #18-1372

70.5' SOUND CLASS TUG



| | |
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| DATE | REV. |
| August 1, 2018 | 0 |

Switchboard

| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency S.F. | Emergency Loads |
|-----------|--|---------------------|-------------|--------------|-------------|--------------|----------------|-----------------|
| P201 | Pilot House Panel | 12.9 | | 6.4 | | 4.4 | | 0.4 |
| P202 | Engine Room Panel | 25.8 | | 11.8 | | 18.9 | | 8.8 |
| P203 | Engine Room Pumps Panel | 29.2 | | 14.1 | | 14.1 | | 4.2 |
| P204 | HVAC Panel | 7.6 | | 3.4 | | 0.8 | | 1.0 |
| P205 | Power and Lighting | 19.2 | | 10.7 | | 10.7 | | 2.2 |
| P206 | HVAC Condenser #1 (8.6 kW) | 8.6 | 0.2 | 1.7 | 0.8 | 6.9 | 0.0 | 0.0 |
| P207 | Water Heater | 20.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| P208 | Fire / Bilge Pump (20HP) | 18.2 | 1.0 | 18.2 | 1.0 | 1.0 | 1.0 | 18.2 |
| P209 | Bilge Pump (5HP) | 5.0 | 1.0 | 5.0 | 1.0 | 1.0 | 1.0 | 5.0 |
| P210 | Blank | | | | | | | |
| P211 | Blank | | | | | | | |
| P212 | Blank | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | TOTAL SWITCHBOARD kW | 146.5 | | 71.3 | | 57.7 | | 39.8 |
| | TOTAL AMPS @ GENERATOR 208 3 PH (.8 pf) | 508.4 | | 247.3 | | 200.2 | | 138.1 |
| | | | | | | | | |

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PANEL P201 PILOTHOUSE PANEL

| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency factor | Emergency Loads |
|-----------|------------------------------------|---------------------|-------------|--------------|-------------|--------------|------------------|-----------------|
| P201-1 | PILOT HOUSE 24VDC1 CHARGE/PANEL | 4.00 | 0.2 | 0.80 | 0.2 | 0.80 | 0.0 | 0.00 |
| P201-2 | FLIR CAMERA MD500 | 0.25 | 1.0 | 0.25 | 1.0 | 0.25 | 0.0 | 0.00 |
| P201-3 | SEARCH LIGHT #1 | 1.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P201-4 | PILOTHOUSE RECEPTACLES | 0.72 | 0.3 | 0.22 | 0.3 | 0.22 | 0.0 | 0.00 |
| P201-5 | SEARCH LIGHT #2 | 1.00 | 0.5 | 0.50 | 0.5 | 0.50 | 0.0 | 0.00 |
| P201-6 | FWD DOCKING FLOOD LIGHT | 0.50 | 0.6 | 0.30 | 0.6 | 0.30 | 0.0 | 0.00 |
| P201-7 | FIRE DETECTION SYSTEM | 0.40 | 1.0 | 0.40 | 1.0 | 0.40 | 1.0 | 0.40 |
| P201-8 | DOCKING FLOOD LIGHT AFT | 0.50 | 0.6 | 0.30 | 0.6 | 0.30 | 0.0 | 0.00 |
| P201-9 | PILOTHOUSE INTERIOR LIGHTS | 1.00 | 0.6 | 0.60 | 0.6 | 0.60 | 0.0 | 0.00 |
| P201-10 | NAV BRIDGE EXTERIOR DECK LIGHTS | 1.00 | 1.0 | 1.00 | 1.0 | 1.00 | 0.0 | 0.00 |
| P201-11 | SPARE | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 |
| P201-12 | WINDOW DEFROSTER | 0.50 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P201-13 | PILOTHOUSE HEATER 2000W | 2.00 | 1.0 | 2.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P201-14 | SPARE | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 | 0.0 | 0.00 |
| P201-15 | SPARE | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 | 0.0 | 0.00 |
| P201-16 | SPARE | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 | 0.0 | 0.00 |
| P201-17 | SPARE | 0.00 | 1.0 | 0.00 | 1.0 | 0.00 | 0.0 | 0.00 |
| | | | | | | | | |
| | TOTAL PANEL KW | 12.9 | | 6.4 | | 4.4 | | 0.4 |
| | TOTAL AMPS 208/120v 3 Phase | 44.7 | | 22.1 | | 15.1 | | 1.4 |
| | | | | | | | | |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.

SHIP'S ELECTRICAL PLANT LOAD ANALYSIS

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70.5' SOUND CLASS TUG



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PANEL P202 ENGINE ROOM PANEL

| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency factor | Emergency Loads |
|-----------|------------------------------------|---------------------|-------------|--------------|-------------|--------------|------------------|-----------------|
| P202-1 | LAZARETTE / STEERING GEAR RM LTS | 0.04 | 0.6 | 0.02 | 0.6 | 0.02 | 0.0 | 0.00 |
| P202-2 | GENSET 12VDC 40A BATTERY CHARGER | 0.48 | 0.2 | 0.10 | 0.2 | 0.10 | 0.0 | 0.00 |
| P202-3 | ENGINE ROOM 120 VAC RECEPTACLES | 1.40 | 1.0 | 1.40 | 1.0 | 1.40 | 0.0 | 0.00 |
| P202-4 | ENGINE ROOM 120 VAC RECEPTACLES | 1.40 | 1.0 | 1.40 | 1.0 | 1.40 | 0.0 | 0.00 |
| P202-5 | CO2 SHUNT TRIP FEED | 0.05 | 1.0 | 0.05 | 1.0 | 0.05 | 1.0 | 0.05 |
| P202-6 | MAIN 24VAC 40 AMP BATTERY CHARGER | 0.96 | 0.2 | 0.19 | 0.2 | 0.19 | 0.0 | 0.00 |
| P202-7 | BELOW MAIN DECK EMERGENCY LIGHTS | 0.09 | 0.9 | 0.08 | 0.9 | 0.08 | 0.9 | 0.08 |
| P202-8 | ENGINE ROOM LIGHTS | 0.04 | 0.6 | 0.02 | 0.6 | 0.02 | 0.0 | 0.00 |
| P202-9 | AIR COMPRESSOR #1 31A@200VAC 3PH | 8.68 | 0.80 | 6.94 | 0.80 | 6.94 | 1.00 | 8.68 |
| P202-10 | AIR COMPRESSOR #2 31A@200VAC 3PH | 8.68 | 0.00 | 0.00 | 1.00 | 8.68 | 0.00 | 0.00 |
| P202-11 | ENGINE ROOM 2000W HEATER #1 | 2.00 | 0.40 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| P202-12 | ENGINE ROOM 2000W HEATER #2 | 2.00 | 0.40 | 0.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| | TOTAL PANEL kW | 25.8 | | 11.8 | | 18.9 | | 8.8 |
| | TOTAL AMPS 208/120v 3 Phase | 89.6 | | 41.0 | | 65.6 | | 30.6 |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.

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PANEL P203 ENGINE ROOM PUMPS PANEL

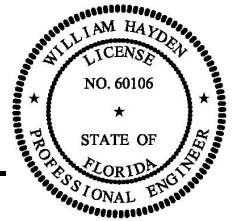
| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency factor | Emergency Loads |
|-----------|--|---------------------|-------------|--------------|-------------|--------------|------------------|-----------------|
| P203-1 | ENGINE ROOM SUPPLY FAN 3HP 3PH 208VAC | 3.10 | 0.9 | 2.79 | 0.9 | 2.79 | 0.4 | 1.24 |
| P203-2 | ENGINE ROOM SUPPLY FAN 3HP 3PH 208VAC | 3.10 | 0.9 | 2.79 | 0.9 | 2.79 | 0.4 | 1.24 |
| P203-3 | ENGINE ROOM EXHAUST FAN 1HP 1PH 120VAC | 1.80 | 0.9 | 1.62 | 0.9 | 1.62 | 0.4 | 0.72 |
| P203-4 | ENGINE ROOM EXHAUST FAN 1HP 1PH 120VAC | 1.80 | 0.9 | 1.62 | 0.9 | 1.62 | 0.4 | 0.72 |
| P203-5 | POTABLE WATER PRESS SET 1.5HP | 2.00 | 1.0 | 2.00 | 1.0 | 2.00 | 0.0 | 0.00 |
| P203-6 | SANITARY WATER PRESS SET 1.5HP | 2.00 | 0.5 | 1.00 | 0.5 | 1.00 | 0.0 | 0.00 |
| P203-7 | STEERING GEAR ROOM NO 1 VENT FAN 1.5HP | 0.70 | 0.9 | 0.63 | 0.9 | 0.63 | 0.4 | 0.28 |
| P203-8 | OILY WATER PUMP 2HP | 2.00 | 0.2 | 0.40 | 0.2 | 0.40 | 0.0 | 0.00 |
| P203-9 | WASTE OIL PUMP 2HP | 2.00 | 0.1 | 0.20 | 0.1 | 0.20 | 0.0 | 0.00 |
| P203-10 | SEWAGE PUMPOUT PUMP 2HP | 2.20 | 0.10 | 0.22 | 0.10 | 0.22 | 0.00 | 0.00 |
| P203-11 | FUEL TRANSFER PUMP 3HP | 3.10 | 0.10 | 0.31 | 0.10 | 0.31 | 0.00 | 0.00 |
| P203-12 | FUEL TRANSFER PUMP 3HP | 3.10 | 0.10 | 0.31 | 0.10 | 0.31 | 0.00 | 0.00 |
| P203-13 | SPARE | 0.00 | 0.10 | 0.00 | 0.10 | 0.00 | 0.00 | 0.00 |
| P203-14 | REDFOX MSD | 2.30 | 0.10 | 0.23 | 0.10 | 0.23 | 0.00 | 0.00 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | TOTAL PANEL kW | 29.2 | | 14.1 | | 14.1 | | 4.2 |
| | TOTAL AMPS 208/120v 3 Phase | 101.3 | | 49.0 | | 49.0 | | 14.6 |
| | | | | | | | | |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.

SHIP'S ELECTRICAL PLANT LOAD ANALYSIS

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PANEL P204 HVAC

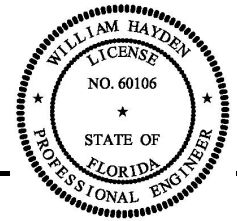
| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency factor | Emergency Loads |
|-----------|------------------------------------|---------------------|-------------|--------------|-------------|--------------|------------------|-----------------|
| P204-1 | PILOT HOUSE AIR HANDLER | 0.03 | 0.7 | 0.02 | 0.7 | 0.02 | 0.4 | 0.01 |
| P204-2 | STAIRTOWER EXHAUST FAN | 0.19 | 0.7 | 0.13 | 0.7 | 0.13 | 0.4 | 0.08 |
| P204-3 | CREW LOUNGE AIR HANDLER | 0.06 | 0.7 | 0.04 | 0.7 | 0.04 | 0.4 | 0.03 |
| P204-4 | CAPTAIN QUARTERS AIR HANDLER | 0.03 | 0.7 | 0.02 | 0.7 | 0.02 | 0.4 | 0.01 |
| P204-5 | SHOWER AIR HANDLER | 0.20 | 0.7 | 0.14 | 0.7 | 0.14 | 0.4 | 0.08 |
| P204-6 | MAIN DECK HEAD AIR HANDLER | 0.20 | 0.7 | 0.14 | 0.7 | 0.14 | 0.4 | 0.08 |
| P204-7 | 2ND DECK HEAD AIR HANDLER | 0.20 | 0.7 | 0.14 | 0.7 | 0.14 | 0.4 | 0.08 |
| P204-8 | CREW QUARTERS AIR HANDLER | 0.03 | 0.7 | 0.02 | 0.7 | 0.02 | 0.4 | 0.01 |
| P204-9 | 2ND DECK PASSEGEWAY AIR HANDLER | 0.06 | 0.7 | 0.04 | 0.7 | 0.04 | 0.4 | 0.03 |
| P204-10 | MAIN DECK OFFICE AIR HANDLER | 0.03 | 0.7 | 0.02 | 0.7 | 0.02 | 0.4 | 0.01 |
| P204-11 | 2ND DECK HEAD 1500W HEATER | 1.50 | 0.4 | 0.60 | 0.0 | 0.00 | 0.4 | 0.60 |
| P204-12 | HVAC CENTRAL CONTROL UNIT | 0.04 | 0.7 | 0.03 | 0.7 | 0.03 | 0.0 | 0.00 |
| P204-13 | MAIN DECK HEAD 1500W HEATER | 1.50 | 0.4 | 0.60 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-14 | 2ND DECK SHOWER 1500W HEATER | 1.50 | 0.4 | 0.60 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-15 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-16 | GALLEY 2000W HEATER | 2.00 | 0.4 | 0.80 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-17 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-18 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-19 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| | | | | | | | | |
| | | | | | | | | |
| | TOTAL PANEL kW | 7.6 | | 3.4 | | 0.8 | | 1.0 |
| | TOTAL AMPS 208/120v 3 Phase | 26.3 | | 11.6 | | 2.6 | | 3.5 |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.

SHIP'S ELECTRICAL PLANT LOAD ANALYSIS

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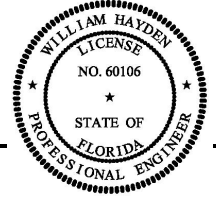


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| DATE | REV. |
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PANEL P205 POWER&LIGHTING

| CIRCUIT # | DESCRIPTION | ATTACHED LOADS (KW) | Winter S.F. | Winter Loads | Summer S.F. | Summer Loads | Emergency factor | Emergency Loads |
|-----------|--------------------------------------|---------------------|-------------|--------------|-------------|--------------|------------------|-----------------|
| P204-1 | MAIN DECK STAIR LIGHTS | 2.00 | 0.6 | 1.20 | 0.6 | 1.20 | 0.0 | 0.00 |
| P204-2 | MAIN DECK MACHINERY ROOM LIGHTS/RECT | 1.44 | 0.9 | 1.30 | 0.9 | 1.30 | 0.9 | 1.30 |
| P204-3 | MAIN DECK OFFIC LIGHTS/ RECT | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.0 | 0.00 |
| P204-4 | GALLEY STOVE RECT | 5.00 | 0.4 | 2.00 | 0.4 | 2.00 | 0.0 | 0.00 |
| P204-5 | MAIN DECK HEAD LIGHTS/ RECT/ FAN | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.0 | 0.00 |
| P204-6 | GALLEY COUNTER GFCI RECT | 1.44 | 0.2 | 0.29 | 0.2 | 0.29 | 0.0 | 0.00 |
| P204-7 | REFRIGERATOR RECT | 0.72 | 1.0 | 0.72 | 1.0 | 0.72 | 0.0 | 0.00 |
| P204-9 | 2ND DECK HEAD LIGHTS/FAN/RECT | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.0 | 0.00 |
| P204-10 | CAPTAIN QUARTERS LIGHTS/ RECT | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.0 | 0.00 |
| P204-11 | 2ND DECK SHOWER LIGHTS/FAN/RECT | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.0 | 0.00 |
| P204-12 | CREW QUARTERS LIGHTS/ RECT | 1.44 | 0.6 | 0.86 | 0.6 | 0.86 | 0.6 | 0.86 |
| P204-15 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-16 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-17 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-18 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| P204-19 | SPARE | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 | 0.0 | 0.00 |
| | | | | | | | | |
| | | | | | | | | |
| | TOTAL PANEL KW | 19.2 | | 10.7 | | 10.7 | | 2.2 |
| | TOTAL AMPS 208/120v 3 Phase | 66.8 | | 37.1 | | 37.1 | | 7.5 |
| | | | | | | | | |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.
 SHIP'S ELECTRICAL PLANT LOAD ANALYSIS
 DLI #18-1372
 70.5' SOUND CLASS TUG



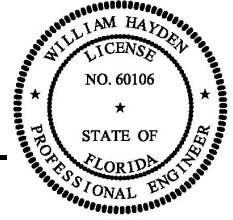
DATE
 August 1, 2018

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Pilot House 12vDC1
 DC Load Analysis

| CIRCUIT # | A | AMPERES | CIRCUIT # | B | AMPERES |
|-----------|---|--|-----------|---|---------|
| 1 | VHF 1 | 5.50 | 4 | VHF 2 | 5.50 |
| 2 | RAI 1 | 1.25 | 5 | Radar & Remote display #2 | 16.60 |
| 5 | PH Console Illumination | 2.08 | 6 | Propulsion Controls Alt Supply | 8.30 |
| 6 | Navigation Lights | 4.00 | 7 | AIS/GPS/Chartplotter #2 | 5.00 |
| 7 | Air Horn (whistle) | 4.16 | | | |
| 8 | Bridge Deck Emergency Lighting | 5.00 | | | |
| 10 | PA/Ga System | 8.30 | | | |
| 11 | Bilge Alarms | 5.00 | | | |
| 12 | Tank Level Indicators/Alarms | 5.00 | | | |
| 13 | AIS/GPS/Chartplotter #1 | 5.00 | | | |
| 16 | Radar & Remote Display #1 | 16.60 | | | |
| | TOTAL COLUMN A | 61.89 | | TOTAL COLUMN B | 35.40 |
| | | | | 10% COLUMN B | 3.54 |
| | | | | LARGEST ITEM COLUMN B | 16.60 |
| | TOTAL DC LOAD COLUMN A + LARGEST COLUMN B | 78.49 | | Ships Service Battery Selection | |
| | Peukerts $T=0.0292 \times I^{1.225} \times 60$ | 309.28 | | 89.74 x 3hrs=268 Ah, 2x 101 Ah battery | |
| | T=battery reserve in minutes | | | connected series=101Ah Rating @ | |
| | I=Total Current of Column A in Amperes | | | 20Ah rating=(.5 x 101=50.5 useable | |
| | Battery Bank Amp Hours(Reserve capacity) | 101 Ah (Res Cap 198) | | Ah), therefore increase size of Battery | |
| | *2x 12V Norstar 92FT HT connected in Series! (2*12v=24v)per bank (198 Res Cap) | 380>198 therefore unacceptable reserve capacity. Use vessel has backup generator rule. | | Bank or chargers. | |

DEJONG & LEBET, NAVAL ARCHITECTS, INC.
 SHIP'S ELECTRICAL PLANT LOAD ANALYSIS
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DATE
 August 1, 2018

REV.
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Engine Room 12vDC2
 DC Load Analysis

| CIRCUIT # | A | AMPERES | CIRCUIT # | B | AMPERES |
|-----------|---|----------------------|-----------|---------------------------------------|---------|
| 1 | Integrated Alarm System | 5.00 | 1 | Genset #2 Control | 2.50 |
| 2 | ME #1 Control | 4.00 | | | |
| 3 | Genset #1 Control | 2.50 | | | |
| 4 | Steering Control #1 Power | 1.50 | | | |
| 5 | Steering Control #2 Power | 1.50 | | | |
| 6 | Shaft Tachometers | 2.50 | | | |
| 7 | Propulsion Gear Control | 8.30 | | | |
| 8 | ME #2 Control | 4.00 | | | |
| 9 | Fire Damper Main Deck | 0.30 | | | |
| 10 | Fire Damper Engine Room | 0.60 | | | |
| | | | | | |
| | | | | | |
| | TOTAL COLUMN A | 30.20 | | TOTAL COLUMN B | 2.50 |
| | | | | 10% COLUMN B | 0.25 |
| | | | | LARGEST ITEM COLUMN B | 2.50 |
| | | | | | |
| | | | | Ships Service Battery Selection | |
| | TOTAL DC LOAD COLUMN A + LARGEST COLUMN B | 32.70 | | 44.20 x 3hrs=132Ah, 2x 101 AH battery | |
| | | | | connected Series=101 Ah Rating @ | |
| | Peukerts $T=0.0292 \times I^{1.225} \times 60$ | 128.42 | | 20ah rating=(.5 x 101=50.5 useable | |
| | T=battery reserve in minutes | | | Ah), therefore use Res Cap method for | |
| | I=Total Current of Column A in Amperes | | | sizing Battery Bank | |
| | Battery Bank Amp Hours(Reserve capacity) | 101 Ah (Res Cap 198) | | | |
| | *2x 12V Northstar 92FT HT Red connected in series | 150<198 therefore | | | |
| | (2*12v=24v)per bank (198 Res Cap) | acceptable reserve | | | |
| | | | | | |
| | | | | | |