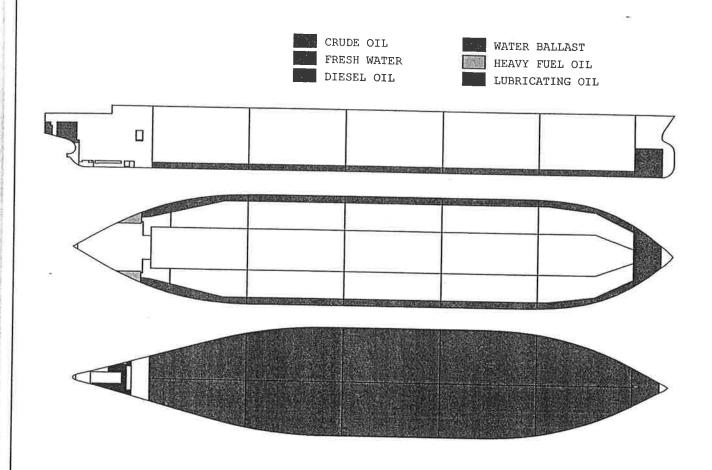
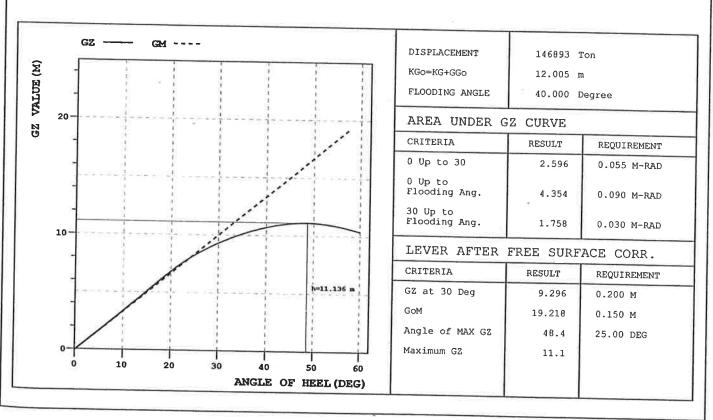
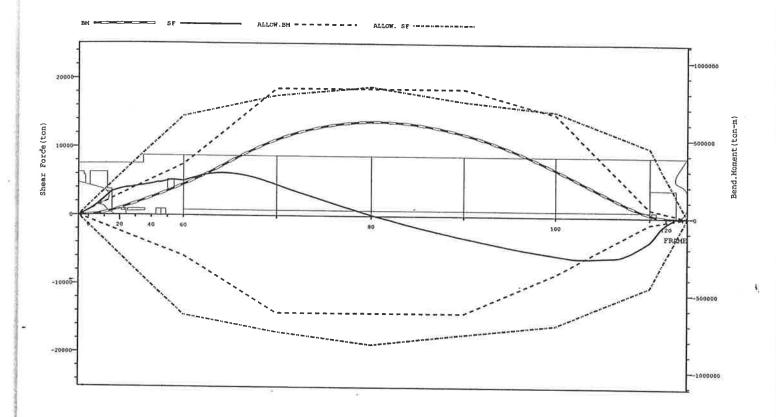
1. STEP 0 - BALLAST ARR.COND.





| WEICHM IMPAG | | | | | | | ========= | |
|--|---|---|--|--|--|--|---|---|
| WEIGHT ITEMS | ======= | FILL. (%) ======= | ~ | (MT) | /M) | (24) | | F.S.M (MT-M) |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(S) NO.4 W.B.TK(S) NO.5 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(S) F.P.TK A.P.TK | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 4173.3 | 279.870 279.870 229.326 229.326 178.500 127.896 127.896 75.928 75.805 312.027 | 11.198 11.198 9.652 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 -19.503 -0.001 | 0 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 102977.4 | 179.333 | 10.488 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 8.409 | 23.804 23.803 23.807 | -11.338 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING OIL | | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CONS | TANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 104293.1 42600.0 146893.1 | 177.675 152.000 170.229 | 15.425 | 0.069 0.029 0.058 | 5919 0 5919 |
| L.C.G. = L.C.B. = L.C.F. = | 11.630 8.865 2.765 146893.1 170.229 170.161 172.863 | M M M M MT M M M | ::::::::::::::::::::::::::::::::::::::: | M. T. K. V. UN GG CO PR BL | T.C. P.C P.C C.G. CORRECTED O RRECTED GI OPELLER IN IND DISTAN | GM 1(GOM) MER. NCE | = 2947.85 = 155.46 = 31.224 = 11.965 = 19.259 = 0.040 = 19.218 = 106.9 496.5 | MT-M MT/CM M M M M M M M M |
| | -0.058 | 1.623 3 | .327 5 | .000 20.00 | 00 30.000 | 40.000 10.712 | 50.000 60. 11.120 10. | 000 401 166 |

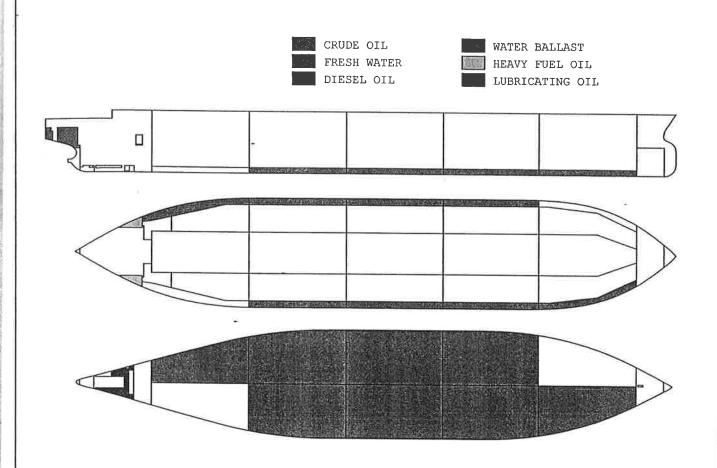
1. STEP 0 - BALLAST ARR.COND.

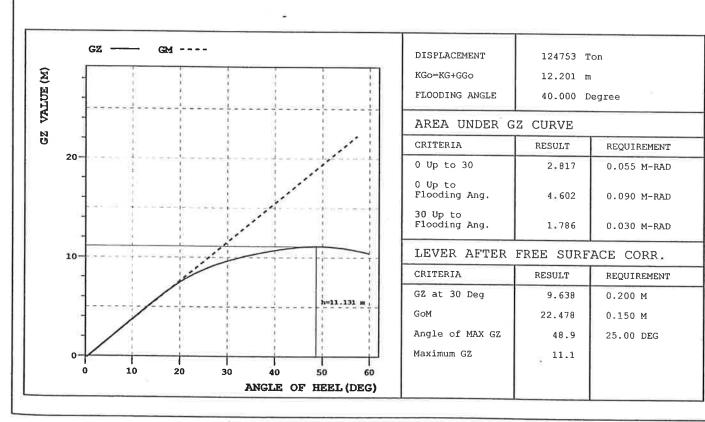


| FR. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT % | WEIGHT T/M | BOUY. T/M |
|---|--|---|--|--|--|---|--|
| -6 0 60 70 80 90 100 110 | -5.500 -0.000 51.000 102.000 153.000 204.000 255.000 306.000 326.500 | 0.0 693.1 5029.2 4515.8 162.9 -3150.3 -5622.1 -3481.9 0.0 | 49.10 34.68 25.80 0.87 18.21 35.36 34.14 | 0.0 1936.2 199074.1 490573.8 607695.6 529522.6 302992.1 20353.1 -0.0 | 6.03 60.33 59.83 74.11 64.58 45.98 37.69 | 93.9 168.6 324.9 499.8 534.9 529.2 496.0 421.5 20.2 | 0.0 18.8 341.0 594.4 611.6 585.2 537.3 232.7 0.2 |

| SHEAR FORCE (Negative) | | | POSITION: Fr103 + 0.87 m |
|------------------------|---|--------------------|------------------------------------|
| SHEAR FORCE (Positive) | | | |
| SAGGING MOMENT (Max.) | : | -143 T-m (1.1%) | POSITION: Fr125 + 0.50 m |
| HOGGING MOMENT (Max.) | : | 607924 T-m (74.1%) | POSITION: Fr $80 + 3.10 \text{ m}$ |

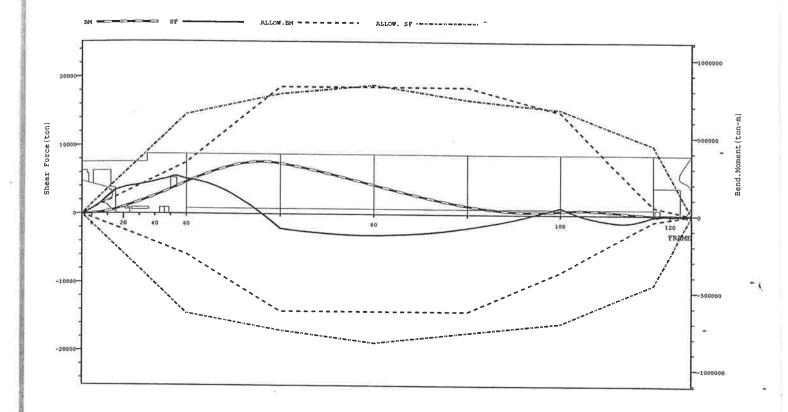
2. STEP 1 - BALLAST EXCHANGE





| WEIGHT ITEMS | | FILL. | S.G | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | T.C.G | F.S.M (MT-M) |
|---|--|--|--|--|--|--|--|--|
| NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(P) | * | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 2275.5 | 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.928 5.346 | 11.198 9.652 9.652 9.593 9.593 9.777 9.777 11.734 20.407 | -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 | 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 80837.5 | 173.303 | 10.374 | 0.221 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | | | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | | | | 768.4 | 41.Il1 | 18.414 | | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | -3.376 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | | 14.430 14.430 14.430 15.573 | | 24 24 12 3 3 |
| TOTAL LUBRICATING OIL | | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CONS | | | | 427.0 | 66.630 | 10.135 | | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | 24 | | 82153.3 42600.0 124753.3 | 171.294 152.000 164.706 | 10.456 15.425 12.153 | 0.316 0.029 0.218 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) = AFT. DRAFT(EXT) = FORE DRAFT(EXT) = TRIM = DISPLACEMENT = L.C.G. = L.C.B. | 8.698 11.367 6.455 4.912 124753.3 164.706 164.589 172.795 | M M M M MT M M M | | M. T. K. V. UN GG CC PF BI | T.C. P.C M.T. C.G. ICORRECTED SO DRRECTED G ROPELLER I JIND DISTA | GM GOM) MMER. NCE | = 2872.20 = 153.80 = 34.679 = 12.153 = 22.526 = 0.047 = 22.478 = 103.85 = 628.85 | MT-M MT/CM MM/CM MM M |
| GZ VALUE (M) | -0.219 - 0.000 | 1.746 0.067 | 3.728 0.305 | 5.720 7.4 0.718 1.2 | 194 9.638 297 2.815 | 10.725 | |).431 3.415 |

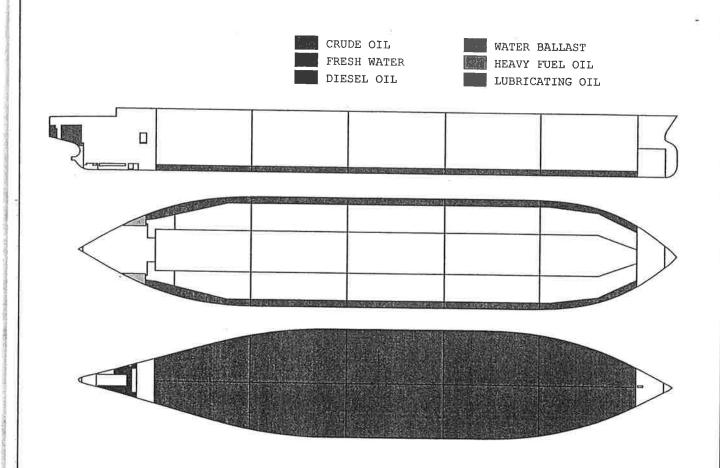
2. STEP 1 - BALLAST EXCHANGE

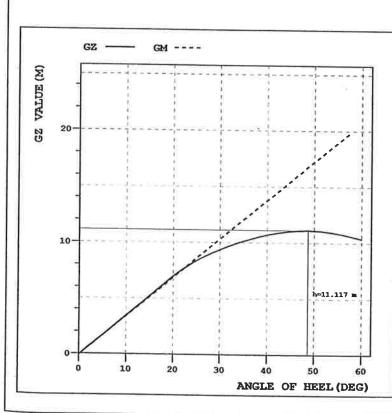


| FR. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT % | WEIGHT T/M | BOUY. |
|-----|---------------|------------|------------|---------------|-------------|---------------|-------|
| -6 | -5.500 | 0.0 | | 0.0 | | 93.9 | 0.0 |
| 0 | -0.000 | 694.3 | 49.19 | 1999.9 | 6.23 | 168.5 | 18.3 |
| 60 | 51.000 | 5077.1 | 35.01 | 204366.0 | 61.93 | 240.5 | 316.7 |
| 70 | 102.000 | -2109.2 | 12.41 | 326365.4 | 39.80 | 499.6 | 538.2 |
| 80 | 153.000 | -3069.4 | 16.33 | 188276.4 | 22.96 | 534.7 | 534.8 |
| 90 | 204.000 | -1950.9 | 11.28 | 54442.2 | 6.64 | 529.1 | 488.0 |
| 100 | 255.000 | 1043.2 | 6.82 | 24719.9 | 3.75 | 495.8 | 420.4 |
| 110 | 306.000 | -140.2 | 1.37 | 883.4 | 1.64 | 270.1 | 159.3 |
| 133 | 326.500 | 0.0 | **: | -0.0 | 1.04 | 20.2 | 0.0 |

| SHEAR FORCE (Negative) | * | -3069 Ton (16.3%) | DOCUMENTON . E DO . O DO |
|------------------------|---|---------------------|--------------------------------------|
| | | | POSITION: Fr $80 + 0.00 \text{ m}$ |
| SHEAR FORCE (Positive) | | 5468 Ton (41.5%) | POSITION: Fr $54 +-0.00 \text{ m}$ |
| SAGGING MOMENT (Max.) | | CO M - 1 0 001 | |
| | | -60 T-m (0.8%) | POSITION : Fr128 + 0.84 m |
| HOGGING MOMENT (Max.) | : | 336055 T-m (45.6%) | POSITION: Fr $68 + 1$ 62 m |

3. STEP 2 - BALLAST EXCHANGE

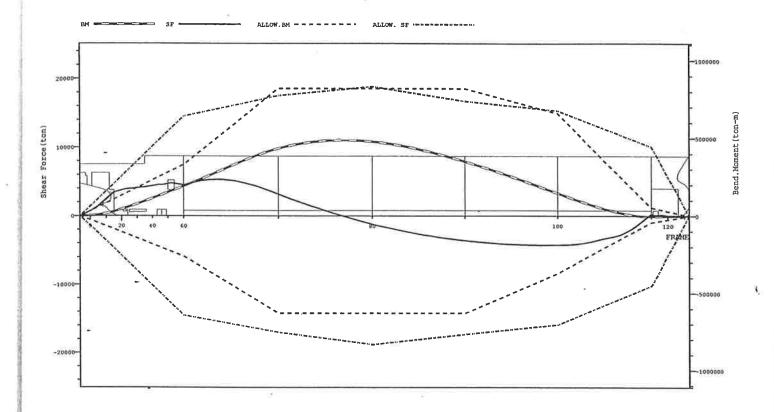




| DISPLACEMENT | 142720 I | 'on |
|------------------------|----------------|-------------|
| KGo≖KG+GGo | 12.110 m | ı |
| FLOODING ANGLE | 40.000 D | egree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.651 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.415 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.764 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.373 | 0.200 M |
| GoM | 19.843 | 0.150 M |
| | CHOCKMONTO CO. | |
| Angle of MAX GZ | 48.4 | 25.00 DEG |

| WEIGHT ITEMS | | FILL (%) | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | | F.S.M (MT-M) |
|---|--|---|--|--|---|--|---|---|
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(P) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 2275.5 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.652 9.593 9.593 9.777 9.777 11.734 11.752 20.407 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 -19.503 -0.025 | 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 98804.1 | 173.728 | 10.575 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | * | 10.0 10.0 10.0 | | 20.6 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 98.0 | | 129.9 235.5 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | | | | 768.4 | 41.111 | 18.414 | | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 16.7 3.2 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | - 104 305 305 305 305 305 | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 | 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING OIL | | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CONSTA | ANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 42600.0 142719.9 | | 15.425 12.069 | 0.029 0.059 | 5919 0 5919 |
| EQUIV. DRAFT (EXT) = AFT. DRAFT (EXT) = FORE DRAFT (EXT) = TRIM = DISPLACEMENT = 1 L.C.G. = L.C.B. | 9.862 N 12.417 N 7.697 N 4.720 N 142719.9 N 166.082 N 165.980 N 172.070 N | 1 1 1 1 1 1 1 1 | : | M. T. V. UN GC CC PF BI | T.C. P.C. M.T. C.G. CORRECTED CORRECTED CORRECTED CORRECTED COPELLER I | O GM GM (GOM) MMER. NCE | = 2936.7° = 155.22 = 31.953 = 12.063 = 19.883 = 0.041 = 19.843 = 114.6 = 592.6 | 2 MT/CM 3 M 9 M 5 M 1 M 3 M 6 % |
| HEEL ANGLES (DEG.) = GZ VALUE (M) = GZ AREA (M*RAD.) = | -0.060 0.000 | 1.675 0.070 | 3.430 | 5.000 20.0 5.219 6.9 0.670 1.2 | 000 30.000 969 9.373 203 2.651 | 10.709 | 11.101 10 | 0.000 0.374 3.221 |

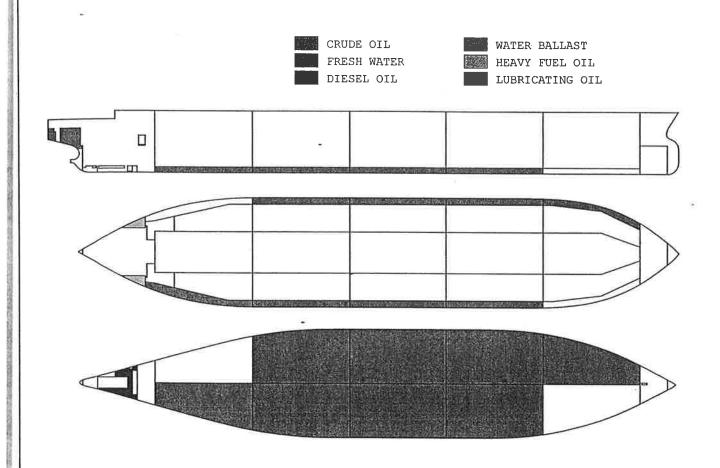
3. STEP 2 - BALLAST EXCHANGE

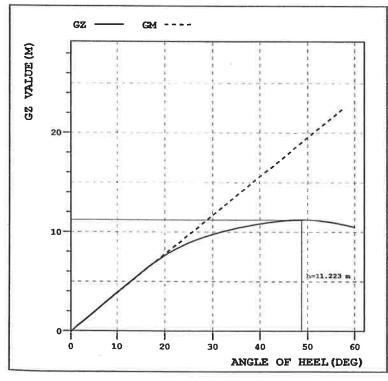


| FR. | DISTANCE | SHEAR | FORCE | BENDING | MOMENT | WEIGHT | BOUY. |
|-----|----------|---------|------------------|----------|--------|--------|-------|
| NO. | М | T | 윰 | TM | 8 | T/M | T/M |
| -6 | -5.500 | 0.0 | | 0.0 | | 93.9 | 0.0 |
| 0 | -0.000 | 688.4 | 48.77 | 1984.7 | 6.18 | 168.6 | 20.2 |
| 60 | 51.000 | 4521.1 | 31.18 | 191749.5 | 58.11 | 324.9 | 360.3 |
| 70 | 102.000 | 3172.5 | 18.13 | 434341.9 | 52.97 | 499.7 | 604.0 |
| 80 | 153.000 | -1203.4 | 6.40 | 478910.2 | 58.40 | 534.9 | 602.8 |
| 90 | 204.000 | -3595.4 | 20.78 | 351083.3 | 42.82 | 529.2 | 557.8 |
| 100 | 255.000 | -4202.8 | 26.43 | 145959.1 | 22.15 | 496.0 | 491.7 |
| 110 | 306.000 | 279.6 | 2.77 | -2034.8 | 4.84 | 421.5 | 197.9 |
| 133 | 326.500 | 0.0 | 20 01 | -0.0 | - | 20.2 | 0.1 |

SHEAR FORCE (Negative): -4241 Ton (26.2%) POSITION: Fr 98 + 0.59 m SHEAR FORCE (Positive): 5323 Ton (34.3%) POSITION: Fr 63 + 1.70 m SAGGING MOMENT (Max.): -2242 T-m (4.2%) POSITION: Fr109 + 3.30 m HOGGING MOMENT (Max.): 488327 T-m (59.6%) POSITION: Fr 76 + 4.60 m

4. STEP 3 - BALLAST EXCHANGE

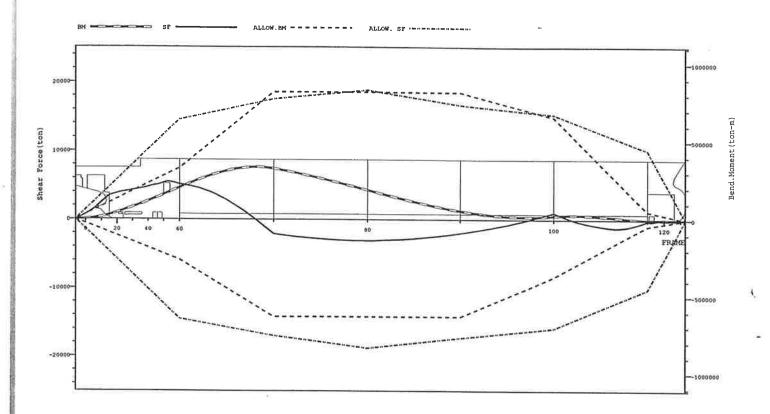




| DISPLACEMENT | 124793 T | on |
|------------------------|-----------|-------------|
| KGo=KG+GGo | 12.202 m | ı |
| FLOODING ANGLE | 40.000 D | egree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.887 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.692 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.806 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.759 | 0.200 M |
| GoM | 22.472 | 0.150 M |
| Angle of MAX GZ | 48.7 | 25.00 DEG |
| Maximum GZ | 11.2 | |
| | | 76 |
| | | |

| ======================================= | | | | ======= | ======= | | | ====== |
|---|--|---|--|--|--|---|--|---|
| WEIGHT ITEMS | | FILL. (%) | | WEIGHT (MT) | L.C.G (M) | (M) | | F.S.M (MT-M) |
| NO.1 W.B.TK(P) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(S) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9176.6 | 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.805 5.346 | 11.198 9.652 9.652 9.593 9.777 9.777 11.752 20.407 | 18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 -19.503 | 0 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | 7 | | | | 173.241 | 10.377 | -0.233 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | * *** *** *** *** *** *** *** *** *** | 100 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | -11.338 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | -14.598 14.679 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OI | L | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | -3.376 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | 3) | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | -4.095 0.000 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O |)IL | - | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CO | NSTANT | | | 427.0 | 66.630 | 10,135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | | 171.234 152.000 164.668 | 10.459 15.425 12.154 | -0.131 0.029 -0.076 | 5919 0 |
| EQUIV. DRAFT (EXT) AFT. DRAFT (EXT) FORE DRAFT (EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. | = 8.700 M = 11.380 M = 6.450 M = 4.930 M = 124793.1 M = 164.668 M = 164.551 M = 172.786 M | I I I I I I | : : : : : : | M. T. K. V. UN GG CO PR BL | T.C. P.C M.T. C.G. CORRECTED O RRECTED G OPELLER II IND DISTA | GM M(GOM) MMER. NCE | = 2872.41 = 153.81 = 34.674 = 12.154 = 22.519 = 0.047 = 22.472 = 103.9 = 629.4 | MT/CM M M M M M M M |
| HEEL ANGLES (DEG.) GZ VALUE (M) | = 0.000 $= -0.075$ $= 0.000$ | 5.000 1 1.888 0.079 | 0.000 15 3.868 5 0.330 0 | .000 20.0 .856 7.6 | 00 30.000 27 9.759 46 2 886 | 40.000 10.833 | 50.000 60 11.213 10 | .000 .500 |

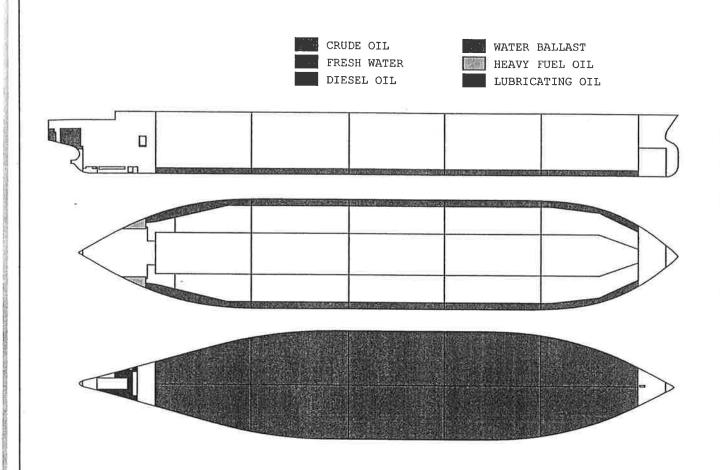
4. STEP 3 - BALLAST EXCHANGE

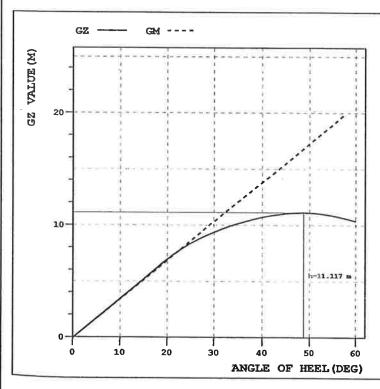


| FR. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT | WEIGHT T/M | BOUY. T/M |
|-----|---------------|------------|-------|---------------|--------|---------------|--------------|
| | | | | | | 1/1 | 1/11 |
| -6 | -5.500 | 0.0 | - | 0.0 | = | 93.9 | 0.0 |
| 0 | -0.000 | 694.2 | 49.18 | 2023.3 | 6.30 | 168.5 | 18.3 |
| 60 | 51.000 | 5108.1 | 35.23 | 204615.6 | 62.00 | 240.5 | 317.1 |
| 70 | 102.000 | -2100.1 | 12.35 | 327858.8 | 39.98 | 499.6 | 538.6 |
| 80 | 153.000 | -3077.5 | 16.37 | 189976.9 | 23.17 | 534.7 | 535.0 |
| 90 | 204.000 - | -1967.6 | 11.37 | 55691.6 | 6.79 | 529.1 | 488.1 |
| 100 | 255.000 | 1026.2 | 6.71 | 25292.4 | 3.84 | 495.8 | 420.3 |
| 110 | 306.000 | -150.5 | 1.48 | 969.4 | 1.80 | 270.1 | 159.2 |
| 133 | 326.500 | 0.0 | - | 0.0 | | 20.2 | 0.0 |

| SHEAR FORCE (Negative) : | -3078 Ton (16.4%) | POSITION: Fr 80 + 0.00 m |
|--------------------------|---------------------|---------------------------|
| SHEAR FORCE (Positive) : | 5461 Ton (41.4%) | POSITION: Fr 54 + 0.00 m |
| SAGGING MOMENT (Max.) : | -60 T-m (0.8%) | POSITION: Fr128 + 0.84 m |
| HOGGING MOMENT (Max.) : | 337419 T-m (45.7%) | POSITION : Fr 68 + 1.62 m |

5. STEP 4 - BALLAST EXCHANGE

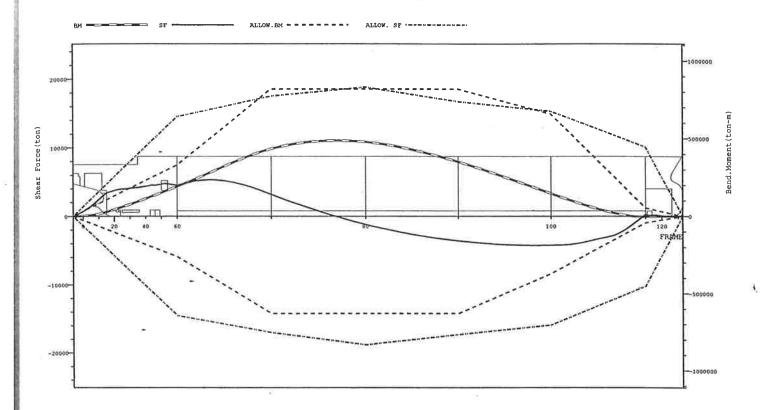




| DISPLACEMENT | 142720 T | on |
|--------------------------|-----------|-------------|
| KGo=KG+GGo | 12.110 m | L |
| FLOODING ANGLE | 40.000 D | egree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2,651 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.415 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1,764 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.373 | 0.200 M |
| GoM | 19.843 | 0.150 M |
| Angle of MAX GZ | 48.4 | 25.00 DEG |
| Maximum GZ | 11.1 | |
| | | |
| | | |

| WEIGHT ITEMS | | FILL. (%) | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | T.C.G (M) | |
|---|--|--|--|--|---|--|--|--|
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(S) NO.5 W.B.TK(P) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 2275.5 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.652 9.593 9.593 9.777 9.777 11.734 11.752 20.407 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 -19.503 -0.025 | 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 98804.1 | 173.728 | 10.575 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING OIL | | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CONST | TANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 100119.8 42600.0 142719.9 | 172.074 152.000 166.082 | 10.640 15.425 12.069 | 0.072 0.029 0.059 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) = AFT. DRAFT(EXT) = FORE DRAFT(EXT) = TRIM = | 9.862 12.417 7.697 4.720 142719.9 166.082 165.980 172.070 | M M M M MT M M | : | M T V Ui GC CC PI BI | T.C. P.C M.T. C.G. NCORRECTED ORRECTED G ROPELLER I | O GM GM(GOM) MMER. NCE | = 2936.77 = 155.22 = 31.953 = 12.069 = 19.883 = 0.042 = 19.843 = 114.6 = 592.0 | 7 MT-M 2 MT/CM 3 M 9 M 6 M 6 M 8 M 8 M 6 % |
| HEEL ANGLES (DEG.) = GZ VALUE (M) = GZ AREA (M*RAD.) = | 0.000 -0.060 0.000 | 5.000 1.675 0.070 | 10.000 1: 3.430 0.293 | 5.000 20.0 5.219 6.9 0.670 1.2 | 000 30.000 969 9.373 203 2.651 | 40.000 10.709 4.415 | 50.000 60 11.101 10 6.334 8 | 0.000 0.374 3.221 |

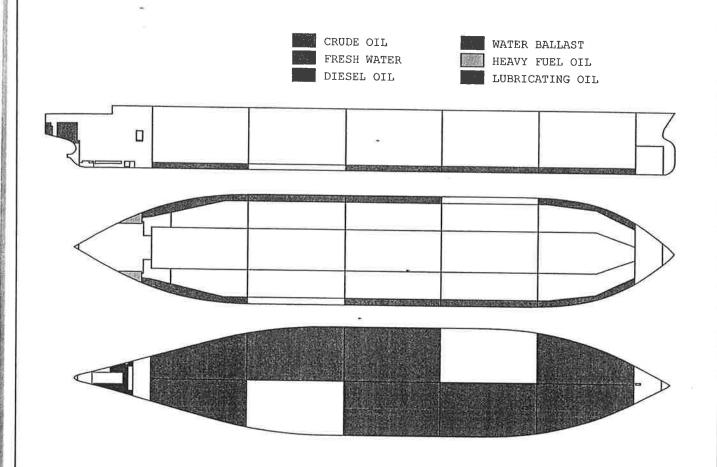
5. STEP 4 - BALLAST EXCHANGE

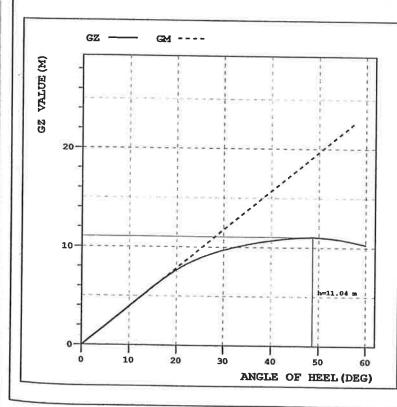


| FR. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT | WEIGHT T/M | BOUY. T/M |
|---|--|---|---|--|---|---|--|
| -6 0 60 70 80 90 100 110 | -5.500 -0.000 51.000 102.000 153.000 204.000 255.000 306.000 326.500 | 0.0 688.4 4521.1 3172.5 -1203.4 -3595.4 -4202.8 279.6 0.0 | 48.77 31.18 18.13 6.40 20.78 26.43 2.77 | 0.0 1984.7 191749.5 434341.9 478910.2 351083.3 145959.1 -2034.8 -0.0 | 6.18 58.11 52.97 58.40 42.82 22.15 4.84 | 93.9 168.6 324.9 499.7 534.9 529.2 496.0 421.5 20.2 | 0.0 20.2 360.3 604.0 602.8 557.8 491.7 197.9 0.1 |

| SHEAR FORCE (Negative) | : | -4241 Ton (26.2%) | POSITION: Fr 98 + 0.59 m |
|------------------------|---|--------------------|---------------------------|
| SHEAR FORCE (Positive) | | 5323 Ton (34.3%) | POSITION: Fr 63 + 1.70 m |
| SAGGING MOMENT (Max.) | : | -2242 T-m (4.2%) | POSITION : Fr109 + 3.30 m |
| HOGGING MOMENT (Max.) | : | 488327 T-m (59.6%) | POSITION : Fr 76 + 4.60 m |

6. STEP 5 - BALLAST EXCHANGE





| FLOODING ANGLE | 40.000 Degree | | | | | | | | |
|--------------------------------|-----------------------------|-------------|--|--|--|--|--|--|--|
| AREA UNDER GZ CURVE | | | | | | | | | |
| CRITERIA | RESULT | REQUIREMENT | | | | | | | |
| 0 Up to 30 | 2.902 | 0.055 M-RAD | | | | | | | |
| 0 Up to Flooding Ang. | 4.691 | 0.090 M-RAD | | | | | | | |
| 30 Up to Flooding Ang. | 1.789 | 0.030 M-RAD | | | | | | | |
| LEVER AFTER FREE SURFACE CORR. | | | | | | | | | |
| CRITERIA | CRITERIA RESULT REQUIREMENT | | | | | | | | |
| GZ at 30 Deg | 9.703 | 0.200 M | | | | | | | |

22.582

48.4

11.0

0.150 M

25.00 DEG

122620 Ton

12.503 m

DISPLACEMENT

KGo=KG+GGo

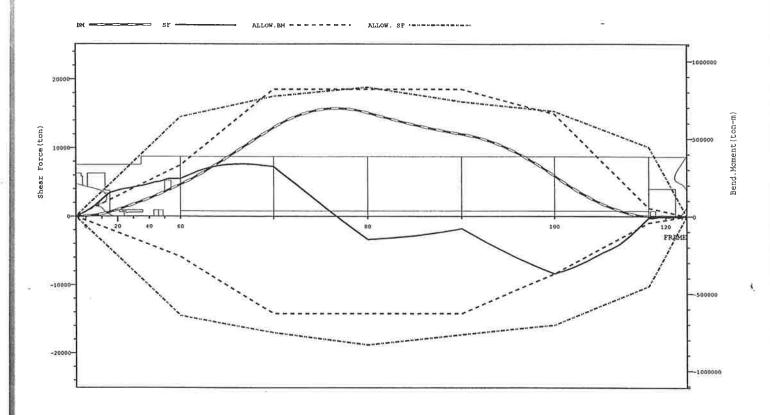
GoM

Angle of MAX GZ

Maximum GZ

| WEIGHT ITEMS | == | ======= | | | | ==== | ====== | | | | |
|--|-----|---|-----------------------------|---|--|--------------------------------------|--|---|--|--|---|
| WEIGHT TIEMS | | | | FILL (%) | | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | (M) | F.S.M (MT-M) |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.5 W.B.TK(P) NO.5 W.B.TK(S) A.P.TK | | | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 0 10 0 10 0 10 0 10 0 10 | 8790.0 8790.0 0126.4 0218.2 0218.2 9973.0 9136.8 9176.6 2275.5 | 279.870 279.870 229.326 178.500 178.500 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.593 9.593 9.777 11.734 11.752 20.407 | 18.224 -18.224 -21.363 21.421 -21.421 21.274 19.496 -19.503 | 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | | | 78 | 3704.6 | 172.382 | 10.795 | -0.064 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | | | 10.0 10.0 10.0 | 1.0000 | 0 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | -11.338 | 424 312 45 |
| TOTAL FRESH WATER | | | | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | | | 4.5 4.5 98.0 98.0 | 1.0000 | 0 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | -14.598 14.679 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OI | L | | | | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 |)) | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | -3.376 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) |) | Đ | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 |)) | 7.4 7.4 5.9 1.4 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O | IL | | | | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CO | nsi | TANT | | | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | | | 42 | 0020.4 2600.0 2620.4 | 170.335 152.000 163.965 | 10.873 15.425 12.455 | 0.038 0.029 0.035 | 5919 0 5919 |
| EQUIV. DRAFT (EXT) AFT. DRAFT (EXT) FORE DRAFT (EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. HEEL ANGLES (DEG.) | = = | 6.200 5.169 122620.4 163.965 163.837 172.734 | M M M MT M M | | | | T. K. V. UN GG CO PR BL | RRECTED G OPELLER I IND DISTA | M(GOM) MMER. NCE | = 2865.29 = 153.65 = 35.084 = 12.453 = 22.630 = 0.048 = 22.582 = 103.8 = 646.3 | MT-M MT/CM M M M M M M |
| GZ VALUE (M) GZ AREA (M*RAD.) | = | -0.036 0.000 | 0 | .937 .083 | 3.925 0.339 | 5.91 | .6 7.6 SB 1.3 | 55 9.703 | 10.698 | 50.000 60 11.024 10 6.599 8 | .281 |

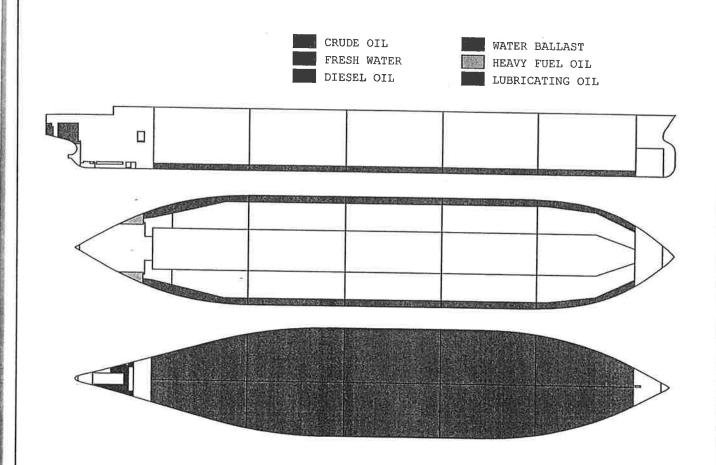
6. STEP 5 - BALLAST EXCHANGE

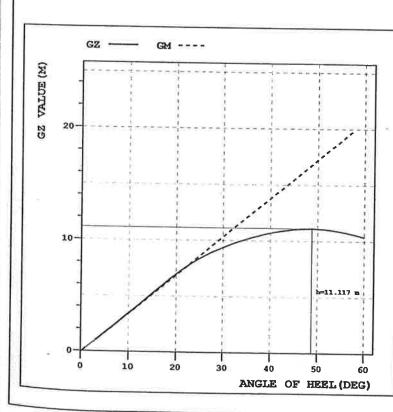


| FR. | DISTANCE M | SHEAR | FORCE | | BENDING TM | MOMENT | WEIGHT T/M | BOUY. |
|------|---------------|---------|-------------|---|---------------|--------|---------------|-------|
| 110. | 11 | 1 | 70 | | 111 | 70 | 1/14 | 1/1. |
| -6 | -5.500 | 0.0 | | | 0.0 | := | 93.9 | 0.0 |
| 0 | -0.000 | 694.5 | 49.20 | | 1958.7 | 6.10 | 168.6 | 18.3 |
| 60 | 51.000 | 5497.0 | 37.91 | | 205258.4 | 62.20 | 324.9 | 315.1 |
| 70 | 102.000 | 7263.3 | 41.50 | | 571277.3 | 69.67 | 320.2 | 533.4 |
| 80 | 153.000 | -3355.8 | 17.85 | | 667950.5 | 81.46 | 334.4 | 527.5 |
| 90 | 204.000 | -1797.9 | 10.39 | 4 | 529802.9 | 64.61 | 529.2 | 478.3 |
| 100 | 255.000 | -8367.7 | 52.63 | | 261265.4 | 39.65 | 308.1 | 408.4 |
| 110 | 306.000 | -224.7 | 2.20 | | 1652.1 | 3.06 | 421.5 | 151.8 |
| 133 | 326.500 | 0.0 | ₩2 | | 0.0 | - | 20.2 | 0.0 |

| SHEAR FORCE (Negative) | : | -8368 Ton | (| 52.6%) | POSITION | : | Fr100 + 0.00 m |
|------------------------|---|------------|---|--------|----------|---|----------------|
| SHEAR FORCE (Positive) | | 7652 Ton | (| 46.5%) | POSITION | : | Fr 66 + 2.55 m |
| SAGGING MOMENT (Max.) | : | -28 T-m | (| 0.4%) | POSITION | : | Fr128 + 0.84 m |
| HOGGING MOMENT (Max.) | : | 695810 T-m | (| 84.9%) | POSITION | : | Fr 76 + 4.60 m |

7. STEP 6 - BALLAST EXCHANGE





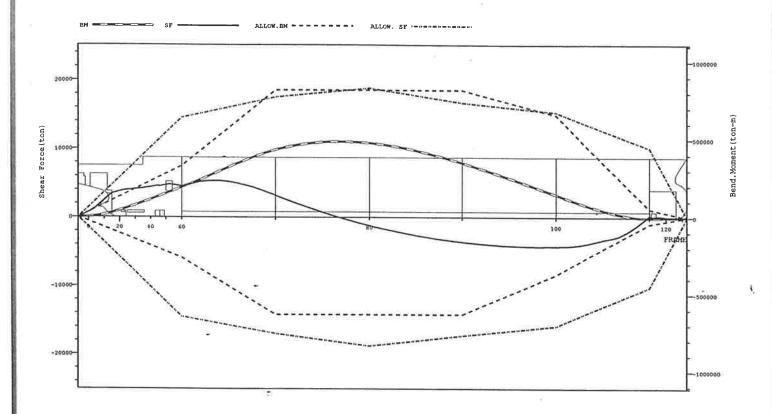
| l . | 1 | |
|--------------------------|-----------|-------------|
| KGo=KG+GGo | 12.110 π | 1 |
| FLOODING ANGLE | 40.000 p | egree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.651 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.415 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.764 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.373 | 0.200 M |
| GoM | 19.843 | 0.150 M |
| Angle of MAX GZ | 48.4 | 25.00 DEG |
| Maximum GZ | 11.1 | 1 |
| | | |

142720 Ton

DISPLACEMENT

| WEIGHE IMPAG | | | | | ======= | | | ====== |
|---|--|--|--|--|--|---|--|---|
| WEIGHT ITEMS | | FILL. (%) | S.G | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | T.C.G (M) | |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(P) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 2275.5 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.652 9.593 9.777 9.777 11.734 11.752 20.407 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 -19.503 | 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 98804.1 | 173.728 | 10.575 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OI | L | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | 110 | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P M/E SYS.O.STOR.TK(S M/E SYS.O.SETT.TK(C G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) |) | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O | IL | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CON | NSTANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | c | | | 142719.9 | 172.074 152.000 166.082 | 12.069 | 0.059 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) AFT. DRAFT(EXT) FORE DRAFT(EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. | = 9.862 M = 12.417 M = 7.697 M = 4.720 M = 142719.9 M = 166.082 M = 165.980 M = 172.070 M | r | : : : : : : : | M. T. V. UN GG CO PR BL | T.C. P.C M.T. C.G. CORRECTED O PRECTED G OPELLER I IND DISTA | M (GOM) MMER. NCE | = 2936.77 = 155.22 = 31.953 = 12.069 = 19.885 = 0.041 = 19.843 = 114.6 = 592.0 | MT/CM M M M M M M M M M M M M M M M M M M |
| HEEL ANGLES (DEG.) GZ VALUE (M) GZ AREA (M*RAD.) | = -0.060 $=$ 0.000 | 1.675 0.070 | 3.430 5 0.293 0 | .219 6.9 | 69 9.373 03 2 651 | 10.709 | 50.000 60 11.101 10 6.334 8 | .374 |

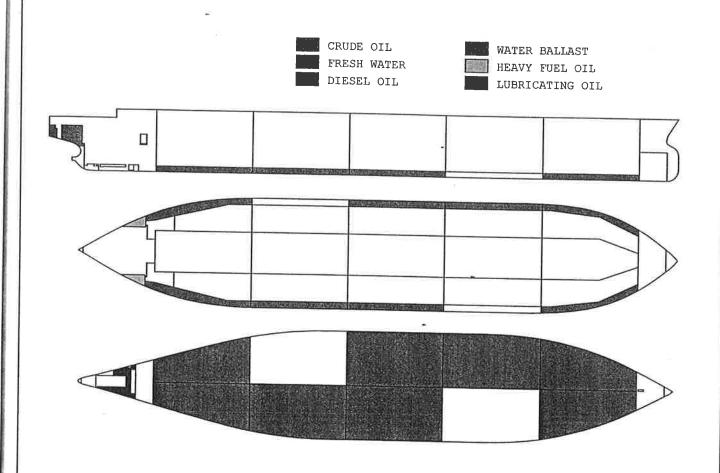
7. STEP 6 - BALLAST EXCHANGE

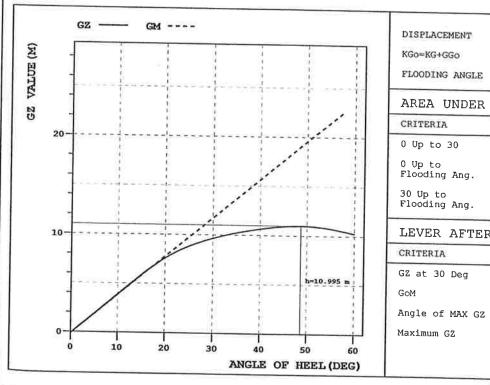


| FR. NO. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT | WEIGHT T/M | BOUY. |
|------------|---------------|------------|-------|---------------|--------|---------------|-------|
| | | | | | | 1714 | 1/14 |
| -6 | -5.500 | 0.0 | - | 0.0 | = | 93.9 | 0.0 |
| 0 | -0.000 | 688.4 | 48.77 | 1984.7 | 6.18 | 168.6 | 20.2 |
| 60 | 51.000 | 4521.1 | 31.18 | 191749.5 | 58.11 | 324.9 | 360.3 |
| 70 | 102.000 | 3172.5 | 18.13 | 434341.9 | 52.97 | 499.7 | 604.0 |
| 80 | 153.000 | -1203.4 | 6.40 | 478910.2 | 58.40 | 534.9 | 602.8 |
| 90 | 204.000 | -3595.4 | 20.78 | 351083.3 | 42.82 | 529.2 | 557.8 |
| 100 | 255.000 | -4202.8 | 26.43 | 145959.1 | 22.15 | 496.0 | 491.7 |
| 110 | 306.000 | 279.6 | 2.77 | -2034.8 | 4.84 | 421.5 | 197.9 |
| 133 | 326.500 | 0.0 | 122 | -0.0 | _ | 20.2 | 0.1 |

| SHEAR FORCE (Negative) | : | -4241 7 | ron | (| 26.2%) | POSITION : Fr | 98 + | 0.59 m |
|------------------------|---|---------|-----|---|--------|----------------|------|--------|
| SHEAR FORCE (Positive) | | | Ton | (| 34.3%) | POSITION : Fr | 63 + | 1.70 m |
| SAGGING MOMENT (Max.) | | | | | | POSITION : Fr1 | 09 + | 3.30 m |
| HOGGING MOMENT (Max.) | : | 488327 | r-m | (| 59.6%) | POSITION : Fr | 76 + | 4.60 m |

8. STEP 7 - BALLAST EXCHANGE



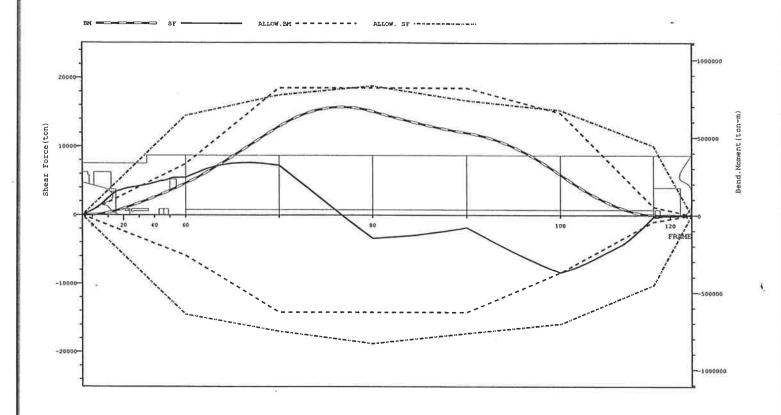


| KGo=KG+GGo FLOODING ANGLE | 12.503 m | |
|------------------------------|------------|-------------|
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.868 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.647 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.779 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF. | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.645 | 0.200 M |
| GoM | 22.582 | 0.150 M |
| Angle of MAX GZ | 48.5 | 25.00 DEG |
| Maximum GZ | 11.0 | |
| | | |
| | | |

122620 Ton

| WEIGHT ITEMS | FILL. | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | | F.S.M (MT-M) |
|--|--|--|---|---|--|--|---|
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(P) | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10218.2 10218.2 9973.0 9136.8 9176.6 2275.5 | 279.870 279.870 229.326 178.500 178.500 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.593 9.593 9.777 11.734 11.752 20.407 | 18.224 -18.224 21.363 21.421 -21.421 -21.274 19.496 -19.503 -0.025 | 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | 78704.6 | | 10.795 | 0.042 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | - 424 312 45 |
| TOTAL FRESH WATER | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | 4.5 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | 500 per 600 pe | | 768.4 | 41.111 | 18.414 | 10.716 | 457Ō |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | No. 200 Sep | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | 10.0 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 - 24 12 3 3 |
| TOTAL LUBRICATING OIL | | | 23.4 | 41.547 | 14.562 | | 65 |
| TOTAL DEADWEIGHT CONSTANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0_ |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | 80020.4 42600.0 122620.4 | 170.335 152.000 163.965 | 10.873 15.425 12.455 | 0.142 0.029 0.103 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) = 8.5 AFT. DRAFT(EXT) = 11.3 FORE DRAFT(EXT) = 6.2 TRIM = 5.1 DISPLACEMENT = 122620 L.C.G. = 163.9 L.C.B. = 163.8 L.C.F. = 172.7 | 59 M 68 M 00 M 68 M .4 MT 65 M 37 M 34 M | | T. K. V. UN GO CC PR BI | T.C. P.C M.T. C.G. NCORRECTED SO DRRECTED ROPELLER I | GM GM(GOM) MMER. NCE | = 2865.28 = 153.64 = 35.084 = 12.455 = 22.630 = 0.048 = 22.582 = 103.8 = 646.3 | MT-M MT/CM MMT/CM M M M M M M M M M M M M M M M M M M |
| GZ VALUE (M) = -0.1 | 00 0.077 | 3.858 5 0.327 6 | 5.850 7.5 0.751 1.3 | 591 9.645 340 2.868 | 10.646 | 10.980 10 6.547 8 |).247 3.413 |

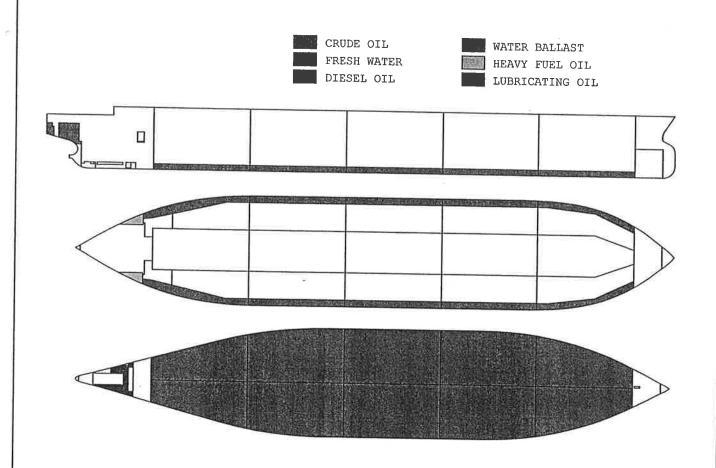
8. STEP 7 - BALLAST EXCHANGE

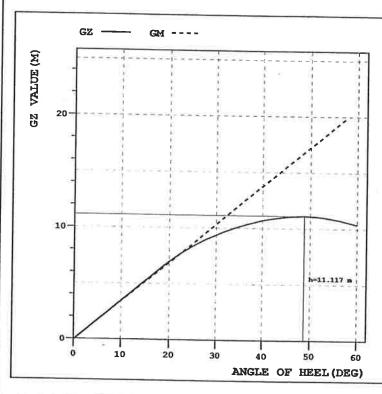


| FR. NO. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT % | WEIGHT T/M | BOUY. T/M |
|------------|---------------|------------|-------|---------------|-------------|---------------|--------------|
| -6 | -5.500 | 0.0 | | 0.0 | (= | 93.9 | 0.0 |
| 0 | -0.000 | 694.5 | 49.20 | 1979.3 | 6.16 | 168.6 | 18.3 |
| 60 | 51.000 | 5496.6 | 37.91 | 205463.8 | 62.26 | 324.9 | 315.2 |
| 70 | 102.000 | 7261.4 | 41.49 | 571618.4 | 69.71 | 320.2 | 533.4 |
| 80 | 153.000 | -3359.4 | 17.87 | 668343.3 | 81.51 | 334.4 | 527.5 |
| 90 | 204.000 | -1803.1 | 10.42 | 530161.5 | 64.65 | 529.2 | 478.3 |
| 100 | 255.000 | -8374.4 | 52.67 | 261511.1 | 39.68 | 308.1 | 408.4 |
| 110 | 306.000 | -232.3 | 2.28 | 1719.9 | 3.19 | 421.5 | 151.8 |
| 133 | 326.500 | 0.0 | | 0.0 | 199 | 20.2 | 0.0 |

| SHEAR FORCE (Negative) | : | -8374 Ton (| 52.7%) | POSITION | : | Fr100 + 0.00 m |
|------------------------|---|--------------|--------|----------|---|----------------|
| SHEAR FORCE (Positive) | : | 7651 Ton (| 46.5%) | POSITION | : | Fr 66 + 2.55 m |
| SAGGING MOMENT (Max.) | : | -28 T-m (| 0.4%) | POSITION | : | Fr128 + 0.84 m |
| HOGGING MOMENT (Max.) | | 696196 T-m (| 84.9%) | POSTTION | | Fr 76 + 4.60 m |

9. STEP 8 - BALLAST EXCHANGE

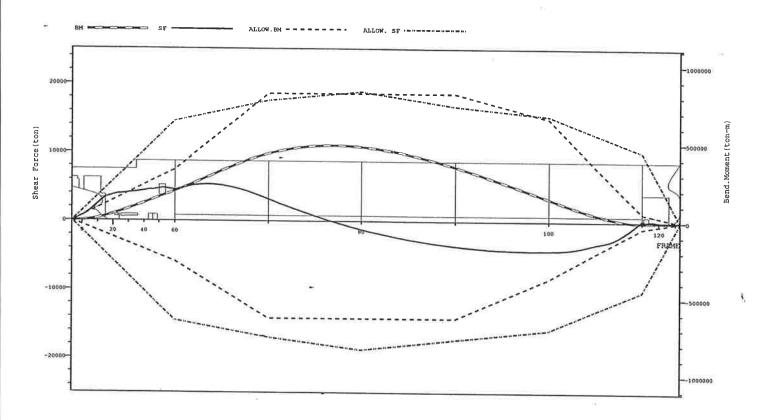




| DISPLACEMENT | 142720 1 | Con |
|--------------------------|-----------|-------------|
| KGo=KG+GGo | 12.110 m | n |
| FLOODING ANGLE | 40.000 E | Degree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.651 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.415 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.764 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.373 | 0.200 M |
| GoM | 19.843 | 0.150 M |
| Angle of MAX GZ | 48.4 | 25.00 DEG |
| Maximum GZ | 11.1 | |
| | | |
| | | |

| | ======================================= | === | -====== | -==: | ====: | ====== | | ====== | | | | | | |
|---|--|-----|--|----------------------------------|--|--|--|--|--|---|--|------|---|---|
| | WEIGHT ITEMS | | | | FIL: (%) |) | .G | (1) | (TP | L.C.G (M) | V.C.(M) | | T.C.G (M) | (MT-M) |
| | NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(S) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(P) NO.5 W.B.TK(S) | | | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 0 1.02 0 1.02 0 1.02 0 1.02 0 1.02 0 1.02 0 1.02 0 1.02 0 1.02 | 50 50 50 50 50 50 50 50 | 8790 8790 10126 10126 10218 10218 9973 9176 2275 | 0.0 0.0 6.4 6.4 6.2 3.2 3.0 6.5 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.652 9.593 9.777 9.777 11.734 11.752 20.407 | - | 18.224 ·18.224 ·21.363 ·21.421 ·21.421 ·21.274 ·21.274 ·19.503 -0.025 | 0 0 0 0 0 0 0 0 0 |
| • | TOTAL WATER BALLAST | 1 | | | | | | 98804 | | 173.728 | 10.575 | | -0.009 | 0 |
| | F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | | | 10.0 | 1.00 1.00 1.00 | 00 | 20 | 3.9 0.6 3.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | - | 10.705 11.338 -9.100 | 424 312 45 |
| | TOTAL FRESH WATER | | | | | | | 57 | 7.8 | 9.161 | 23.804 | | 0.004 | 782 |
| | NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | | | 4.5 98.0 | 1.000 1.000 1.000 | 00 00 | 110 129 235 292 | 9.9 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | - | 14.507 14.598 14.679 17.332 | 2048 2048 78 396 |
| | TOTAL HEAVY FUEL OI | L | r | | | | | 768 | 3.4 | 41.111 | 18.414 | | 10.716 | 4570 |
| | D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | | | 10.0 | 0.850 0.850 0.850 0.850 | 00 | 16 3 | 2.8 5.7 5.2 5.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | _ | 3.255 -3.376 13.571 13.571 | 214 271 6 11 |
| | TOTAL DIESEL OIL | | | | | â | | 39 | .1 | 37.308 | 5.610 | | - - -3.678 | 503 |
| | M/E CYL.O.STOR.TK(P M/E SYS.O.STOR.TK(S M/E SYS.O.SETT.TK(C G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) |) | | | 10.0 10.0 10.0 | 0.900 0.900 0.900 0.900 | 00 00 00 | 7 5 1 | . 4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| | TOTAL LUBRICATING O | IL | | | | | | 23 | . 4 | 41.547 | 14.562 | | 0.828 | 65 |
| | TOTAL DEADWEIGHT CO | NST | ANT | | | | | 427 | .0 | 66.630 | 10.135 | | 0.000 | 0 |
| | TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | === | | | | | | 100119 42600 142719 | .0 | 172.074 152.000 166.082 | 15.425 | ===: | 0.072 0.029 0.059 | 5919 0 5919 |
| | EQUIV. DRAFT(EXT) AFT. DRAFT(EXT) FORE DRAFT(EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. | | 9.862 12.417 7.697 4.720 142719.9 166.082 165.980 172.070 | M M M M MT M M | ===== | | -==: | | T.E K.M V.C UNC GGC COF PRC BLI | 4.T. C.G. CORRECTED RRECTED GN PPELLER IN | M(GOM) MMER. NCE | | 2936.77 155.22 31.953 12.069 19.885 0.041 19.843 114.6 592.0 | MT/CM M M M M M M M |
| | GZ VALUE (M) | = | 0.000 | 0 | .675 | 0.293 | 0 | .219 .670 | 6.96 1.20 | 00 30.000 59 9.373 03 2.651 | 10.709 | 11. | .101 10 | .374 |

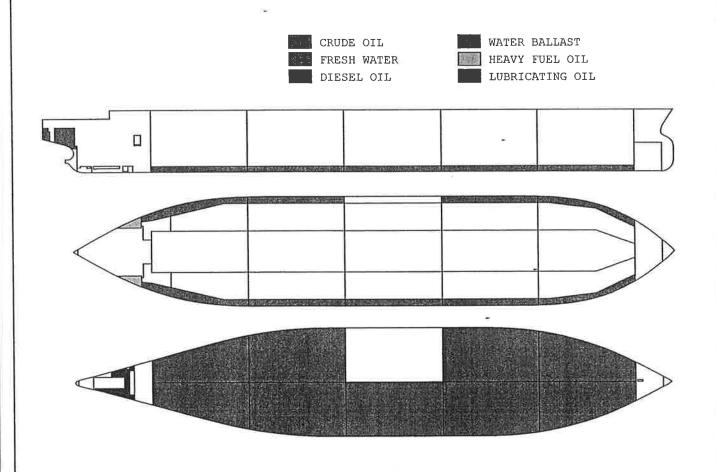
9. STEP 8 - BALLAST EXCHANGE

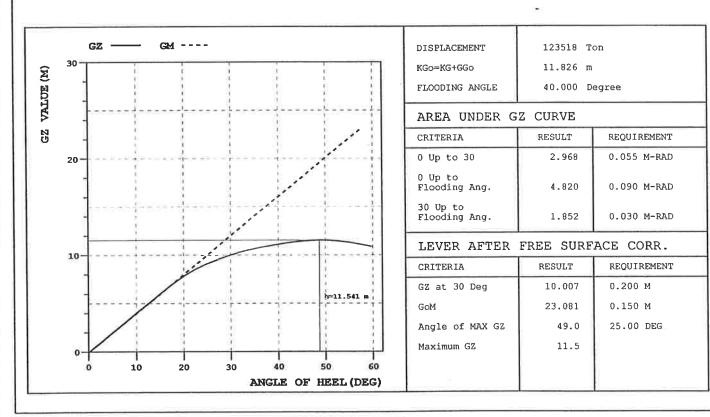


| FR. NO. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT & | WEIGHT T/M | BOUY. T/M |
|---|--|---|---|--|---|---|---|
| -6 0 60 70 80 90 100 110 | -5.500 -0.000 51.000 102.000 153.000 204.000 255.000 306.000 326.500 | 0.0 688.4 4521.1 3172.5 -1203.4 -3595.4 -4202.8 279.6 0.0 | 48.77 31.18 18.13 6.40 20.78 26.43 2.77 | 0.0 1984.7 191749.5 434341.9 478910.2 351083.3 145959.1 -2034.8 -0.0 | 6.18 58.11 52.97 58.40 42.82 22.15 4.84 | 93.9 168.6 324.9 499.7 534.9 529.2 496.0 421.5 20.2 | 0.0 20.2 360.3 604.0 602.8 557.8 491.7 197.9 |

| SHEAR FORCE (Negative) | | | |
|------------------------|---|---------------------|------------------------------------|
| SHEAR FORCE (Positive) | | | POSITION: Fr $63 + 1.70 \text{ m}$ |
| SAGGING MOMENT (Max.) | : | -2242 T-m (4.2%) | POSITION: $Fr109 + 3.30 m$ |
| HOGGING MOMENT (Max.) | : | 488327 T-m (59.6%) | POSITION: Fr $76 + 4.60 \text{ m}$ |

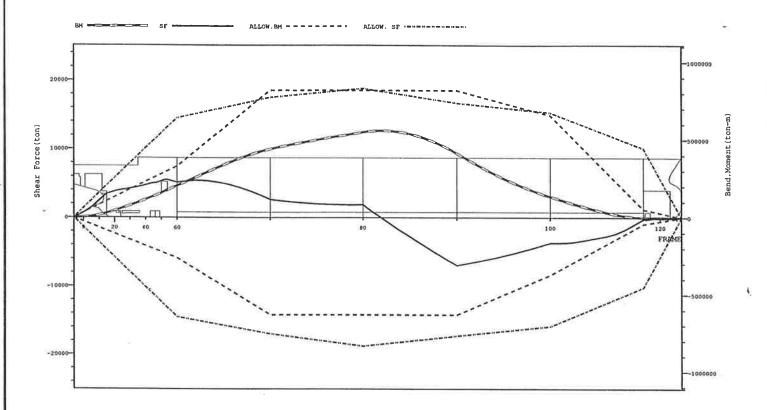
10. STEP 9 - BALLAST EXCHANGE





| | | | | | | | | - | ======= | | | ==== | |
|--------------------------|--------|----------|-------------|----------|-------|---------|------------------|-----|-----------------|---------------|---------------|------|------------------|
| WEIGHT ITEMS | | | FIL (% |) | S.(| | WEIGHT (MT) | | L.C.G (M) | V.C.G (M) | (| M) | F.S.M (MT-M) |
| NO.1 W.B.TK(P) | | | 100. | 0 | 1.025 | 0 | 8790.0 |) 2 | 79.870 | 11.198 | 18.2 | 24 | 0 |
| NO.1 W.B.TK(S) | | | 50. | | 1.025 | | 4395.0 | | 78.199 | | -13.5 | | 5327 |
| NO.2 W.B.TK(P) | | | 100. | | 1.025 | | 10126.4 | | 29.326 | 9.652 | 21.3 | | 0 |
| NO.2 W.B.TK(S) | | | 100. | | 1.025 | | 10126.4 | | 29.326 | 9.652 | -21.3 | | 0 |
| NO.3 W.B.TK(S) | | | 100. | | 1.025 | | 10218.2 | | .78.500 | 9.593 | -21.4 | | 0 |
| NO.4 W.B.TK(P) | | | 100. | | 1.025 | | 9973.0 | | .27.896 | 9.777 | 21.2 | | 0 |
| NO.4 W.B.TK(S) | | | 100. | | 1.025 | 0 | 9973.0 | | .27.896 | 9.777 | -21.2 | | 0 |
| NO.5 W.B.TK(P) | | | 100. | | 1.025 | | 9136.8 | | | 11.734 | 19.4 -13.5 | | 3 380 |
| NO.5 W.B.TK(S) A.P.TK | | | 50. 100. | | 1.025 | | 4588.3 2275.5 | | 78.083 5.346 | | -0.0 | | 3300 |
| TOTAL WATER BALLAST | | | | | | | | | 72.939 | | | | 8707 |
| | | | 1.0 | ^ | 1 000 | ^ | | | | | | | |
| F.W.TK(P) | | | 10. | | 1.000 | | 28.9 | | 9.157 8.409 | 23.804 | 10.7 | | 424 312 |
| F.W.TK(S) | | | 10. 10. | | 1.000 | | 20.6 8.3 | | 11.050 | 23.803 23.807 | -11.3 -9.1 | | 45 |
| DIST.W.TK(S) | | | .01 | · | 1.000 | | 0.3 | | 11.050 | | | | 40 |
| TOTAL FRESH WATER | | | | | | | 57.8 | 3 | 9.161 | 23.804 | 0.0 | 04 | 782 |
| NO.1 H.F.O.TK(P) | | | 4. | 5 | 1.000 | 0 | 110.6 | 5 | 41.999 | 11.394 | 14.5 | 07 | 2048 |
| NO.1 H.F.O.TK(S) | | | 4. | 5 | 1.000 | 0 | 129.9 | | 41.789 | 11.647 | -14.5 | 98 | 2048 |
| H.F.O.SETT.TK(P) | | | 98. | - | 1.000 | | 235.5 | | | 17.685 | 14.6 | | 78 |
| H.F.O.SERV.TK(P) | | | 98. | 0 | 1.000 | 0 | 292.3 | 3 | 41.650 | 24.663 | 17.3 | 32 | 396 |
| TOTAL HEAVY FUEL OI | L | | | | | | 768.4 | 4 | 41.111 | 18.414 | 10.7 | 16 | 4570 |
| D.O.STOR.TK(P) | | | 10. | n | 0.850 | 0 | 12.8 | 3 | 36.265 | 0.386 | 3.2 | 55 | 214 |
| D.O.STOR.TK(S) | | | 10. | | 0.850 | | 16.7 | | 35.642 | 0.451 | -3.3 | | 271 |
| D.O.SETT.TK(S) | | | 10. | | 0.850 | | 3.2 | | 43.350 | 21.748 | -13.5 | | 6 |
| D.O.SERV.TK(S) | | | 10. | | 0.850 | | 6.3 | | 40.800 | 21.748 | -13.5 | | 11 |
| TOTAL DIESEL OIL | | | | | | | 39.1 | 1 | 37.308 | 5.610 | -3.6 | 78 | 503 |
| M/E CYL.O.STOR.TK(P | ١ | 27 | 10. | Ω | 0.900 | 10 | 7.4 | 1 | 44.200 | 14.430 | 4.0 | 195 | 24 |
| M/E SYS.O.STOR.TK(S | | | 10. | | 0.900 | | 7.4 | | 44.200 | 14.430 | -4.0 | | 24 |
| M/E SYS.O.SETT.TK(C | | | 10. | | 0.900 | | 5.9 | | 44.200 | 14.430 | 0.0 | | 12 |
| G/E L.O.STOR.TK(P) | ′ | | 10. | | 0.900 | | 1.4 | | 22.100 | 15.573 | 7.1 | | 3 |
| G/E L.O.SETT.TK(P) | | | 10. | | 0.900 | | 1.4 | | 20.400 | 15.573 | 7.1 | | 3 |
| TOTAL LUBRICATING O | IL | | | | | | 23.4 | 4 | 41.547 | 14.562 | 0.8 | 328 | 65 |
| TOTAL DEADWEIGHT CO | NST | 'ANT | | | | | 427.0 | 0 | 66.630 | 10.135 | 0.0 | 000 | 0 |
| | | | | | | | | | | | | | |
| TOTAL DEADWEIGHT | | | | | | | 80918.4 | 4 | 170.905 | 9.750 | 0.0 | 72 | 14625 |
| LIGHT SHIP | | | | | | | 42600.0 | | 152.000 | 15.425 | 0.0 | | 0 |
| TOTAL DISPLACEMENT | | | | | | | 123518.4 | | 164.385 | 11.707 | |)57 | |
| EQUIV. DRAFT(EXT) | | 8.617 | | | : | | | м.т | | | = 2868 | | ====== В МТ-М |
| AFT. DRAFT(EXT) | = | 11.342 | | | : | | | T.P | | | | | MT/CM |
| FORE DRAFT (EXT) | = | 6.330 | | | | | | K.M | | | | 907 | • |
| TRIM | = | 5.012 | | | | | | v.c | | | | 707 | |
| DISPLACEMENT | | 123518.4 | | | | | | | ORRECTED | GM | | 200 | |
| L.C.G. | = | 164.385 | | | | | | GGO | | | | .118 | |
| L.C.B. | = | 164.273 | | | | | | | RECTED G | M (GOM) | | .081 | |
| L.C.F. | = | 172.789 | | | : | | 1 | PRO | PELLER I | MMER. | | 03.5 | |
| | | | | T-10 EUT | | 1111000 | | | ND DISTA | | | 35.9 | |
| HEEL ANGLES (DEG.) | === | 0.000 | | | | | | | 0 30.000 | | | | |
| GZ VALUE (M) | = | -0.058 | 1.959 | | 3.992 | | | | 1 10.007 | | | | |
| GZ AREA (M*RAD.) | = | 0.000 | 0.083 | | 0.342 | | | | 8 2.968 | | | | |
| *************** | - | | | | | | | | | | | | |

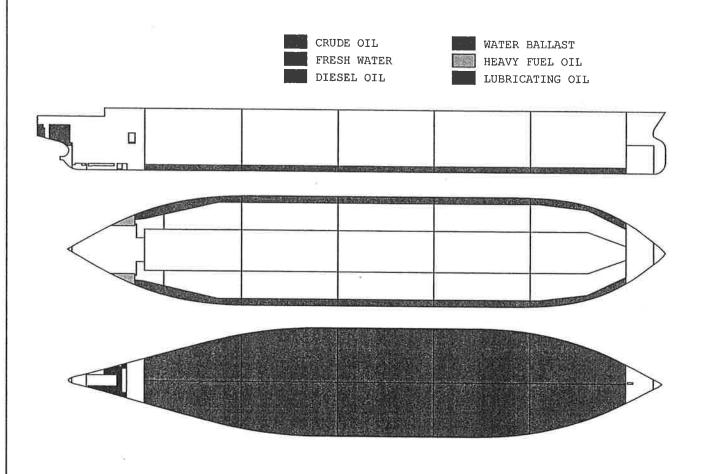
10. STEP 9 - BALLAST EXCHANGE

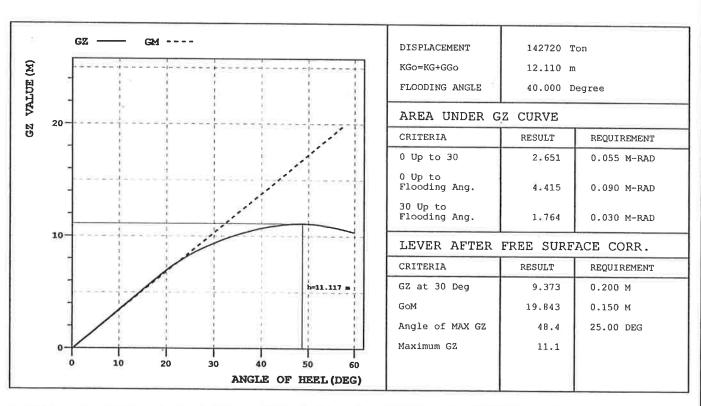


| FR. NO. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT % | WEIGHT T/M | BOUY. T/M |
|------------|---------------|------------|------------|----------------------|-------------|---------------|--------------|
| -6 | -5.500 | 0.0 | 724 | 0.0 | | 93.9 | 0.0 |
| 0 | -0.000 | 694.5 | 49.20 | 1973.8 | 6.14 | 168.6 | 18.3 |
| 60 | 51.000 | 5126.6 | 35.36 | 204574.1 | 61.99 | 244.8 | 315.1 |
| 70 | 102.000 | 2644.1 | 15.11 | 441629.3 | 53.86 | 499.7 | 534.8 |
| 80 | 153.000 | 1883.5 | 10.02 | 550595.2 | 67.15 | 534.8 | 530.4 |
| 90 | 204.000 | -6972.3 | 40.30 | 414563.3 | 50.56 | 328.7 | 482.7 |
| 100 | 255.000 | -3682.3 | 23.16 | 135851.0 | 20.61 | 495.9 | 414.2 |
| 110 | 306.000 | -191.0 | 1.87 | 1456.0 | 2.70 | 325.6 | 155.6 |
| 133 | 326.500 | 0.0 | | -0.0 | 9-0 | 20.2 | 0.0 |

| SHEAR FORCE (Negative) | : | -6972 Ton (| 40.3%) | POSITION | : | Fr 90 + 0.00 m |
|------------------------|---|--------------|--------|----------|---|----------------|
| SHEAR FORCE (Positive) | : | 5493 Ton (4 | 41.6%) | POSITION | : | Fr 54 +-0.00 m |
| SAGGING MOMENT (Max.) | : | -25 T-m (| 0.4%) | POSITION | : | Fr128 + 0.84 m |
| HOGGING MOMENT (Max.) | : | 560247 T-m (| 68.3%) | POSITION | : | Fr 81 + 4.00 m |

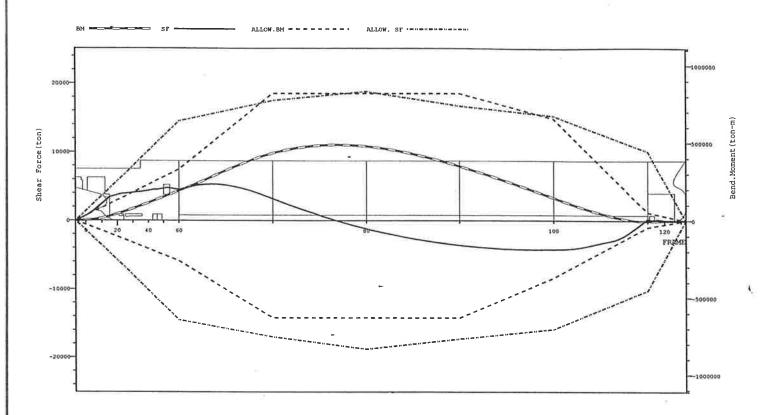
11. STEP 10 - BALLAST EXCHANGE





| WEIGHT ITEMS | | FILL. | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | (M) | F.S.M (MT-M) |
|--|--|--|--|--|--|---|--|---|
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(P) NO.5 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(S) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 75.928 75.805 5.346 | 11.198 11.198 9.652 9.652 9.593 9.777 9.777 11.734 11.752 20.407 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 -19.503 -0.025 | 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 98804.1 | 173.728 | 10.575 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 129.9 235.5 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 16.7 3.2 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | - | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING OIL | _ | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CONSTA | ANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 100119.8 42600.0 142719.9 | 172.074 152.000 166.082 | 10.640 15.425 12.069 | 0.072 0.029 0.059 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) = AFT. DRAFT(EXT) = FORE DRAFT(EXT) = TRIM = | 9.862 12.417 7.697 4.720 142719.9 166.082 165.980 172.070 | M M M M MT M M | : : | M T K V U G C P B | T.CP.C .M.TC.G. NCORRECTEL GO ORRECTED CROPELLER LIND DISTA | O GM GM(GOM) MMER. NCE | = 2936.77 = 155.22 = 31.953 = 12.069 = 19.889 = 0.043 = 19.843 = 114.0 = 592.0 | 7 MT-M 2 MT/CM 3 M 9 M 5 M 1 M 3 M 6 % |
| HEEL ANGLES (DEG.) = GZ VALUE (M) = GZ AREA (M*RAD.) = | 0.000 -0.060 0.000 | 5.000 1.675 0.070 | 10.000 1 3.430 0.293 | 5.000 20. 5.219 6. 0.670 1. | 000 30.000 969 9.373 203 2.651 | 40.000 3 10.709 4.415 | 50.000 60 11.101 10 6.334 | 0.000 0.374 8.221 |

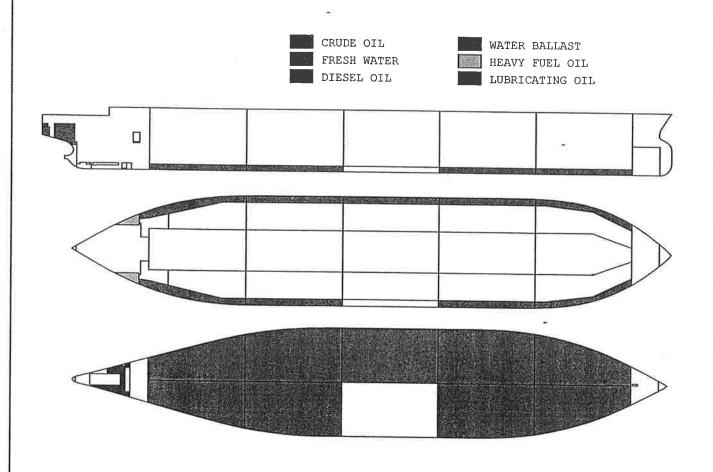
11. STEP 10 - BALLAST EXCHANGE

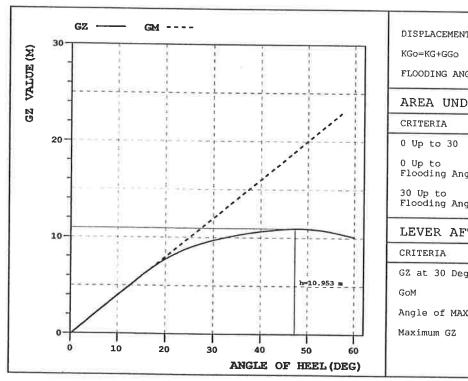


| FR. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT % | WEIGHT T/M | BOUY. T/M |
|-----|---------------|------------|---------|---------------|-------------|---------------|--------------|
| -6 | -5.500 | 0.0 | * | 0.0 | - | 93.9 | 0.0 |
| 0 | -0.000 | 688.4 | 48.77 | 1984.7 | 6.18 | 168.6 | 20.2 |
| 60 | 51.000 | 4521.1 | 31.18 | 191749.5 | 58.11 | 324.9 | 360.3 |
| 70 | 102.000 | 3172.5 | 18.13 | 434341.9 | 52.97 | 499.7 | 604.0 |
| 80 | 153.000 | -1203.4 | 6.40 | 478910.2 | 58.40 | 534.9 | 602.8 |
| 90 | 204.000 | -3595.4 | 20.78 | 351083.3 | 42.82 | 529.2 | 557.8 |
| 100 | 255.000 | -4202.8 | 26.43 | 145959.1 | 22.15 | 496.0 | 491.7 |
| 110 | 306.000 | 279.6 | 2.77 | -2034.8 | 4.84 | 421.5 | 197.9 |
| 133 | 326.500 | 0.0 | -22 | -0.0 | - | 20.2 | 0.1 |

| SHEAR FORCE (Negative) : | -4241 Ton (26.2%) | POSITION : Fr 98 + 0.59 m |
|--------------------------|--------------------|---------------------------|
| SHEAR FORCE (Positive) : | 5323 Ton (34.3%) | POSITION : Fr 63 + 1.70 m |
| SAGGING MOMENT (Max.) : | -2242 T-m (4.2%) | POSITION : Fr109 + 3.30 m |
| HOGGING MOMENT (Max.) : | 488327 T-m (59.6%) | POSITION : Fr 76 + 4.60 m |

12. STEP 11 - BALLAST EXCHANGE





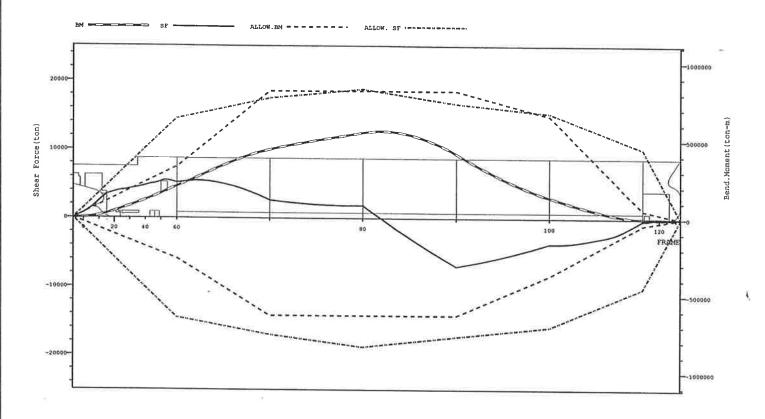
| 123538 | Ton |
|--------|----------------------------|
| 11.828 | \mathfrak{m} |
| 40.000 | Degree |
| | 123538 11.828 40.000 |

| AREA UNDER G | Z CURVE | |
|---------------------------|---------|-------------|
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.920 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.706 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.786 | 0.030 M-RAD |
| | | |

| LEVER AFTER | FREE SURF | ACE CORR. | - 1 |
|-----------------|-----------|-------------|-----|
| CRITERIA | RESULT | REQUIREMENT | ٦ |
| GZ at 30 Deg | 9.714 | 0.200 M | ٦ |
| GoM | 23.077 | 0,150 M | |
| Angle of MAX GZ | 47.9 | 25.00 DEG | 1 |
| Maximum GZ | 11.0 | | |
| | | | |
| | | | 1 |

| | | | | | | A service of the Original Park | | |
|--|--|--|--|---|--|---|---|---|
| WEIGHT ITEMS | | FILL. | | WEIGHT (MT) | L.C.G | V.C.G | (M) | F.S.M |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(S) | | 50.0 100.0 100.0 100.0 100.0 100.0 50.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 4395.0 8790.0 10126.4 10126.4 10218.2 9973.0 9973.0 4568.4 9176.6 2275.5 | 278.199 279.870 229.326 229.326 178.500 127.896 127.896 78.100 75.805 5.346 | 2.826 11-198 9.652 9.652 9.593 9.777 9.777 3.364 11.752 20.407 | 13.541 -18.224 21.363 -21.363 21.421 21.274 -21.274 13.516 -19.503 | 5327 0 0 0 0 0 0 0 0 0 0 3427 0 |
| TOTAL WATER BALLAST | | | | 79622.5 | 172.901 | 9.658 | 0.012 | 8754 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 | 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OI | L | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SETV.TK(S) | | 10.0 10.0 10.0 10.0 | | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) |) | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O | IL | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CO | | | | 427.0 | 66.630 | 10.135 | | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 80938.3 42600.0 123538.3 | 170.868 152.000 164.362 | 9.753 15.425 11.709 | 0.112 0.029 0.083 | 14672 0 14672 |
| EQUIV. DRAFT (EXT) AFT. DRAFT (EXT) FORE DRAFT (EXT) TRIM DISPLACEMENT | = 8.619 M = 11.349 M = 6.327 M = 5.022 M = 123538.3 M = 164.362 M = 164.249 M = 172.782 M | 1 1 1 1 1 1 1 1 | : | M. T. K. V. UN GG CC PF BI | T.C. P.C M.T. C.G. GORRECTED GO RRECTED GI ROPELLER II | GM M(GOM) MMER. NCE | = 2868.17 = 153.71 = 34.905 = 11.709 = 23.195 = 0.119 = 23.077 = 103.6 | MT-M MT/CM MM M |
| HEEL ANGLES (DEG.) GZ VALUE (M) GZ AREA (M*RAD.) | = 0.000 $= -0.084$ $= 0.000$ | 5.000 1 1.932 0.081 | 10.000 15 3.960 5 0.338 0 | 5.000 20.0 5.984 7.7 5.772 1.3 | 000 30.000 228 9.714 374 2.919 | 40.000 10.657 4.706 | 50.000 60 10.926 10 6.602 8 | 0.000 0.098 1.451 |

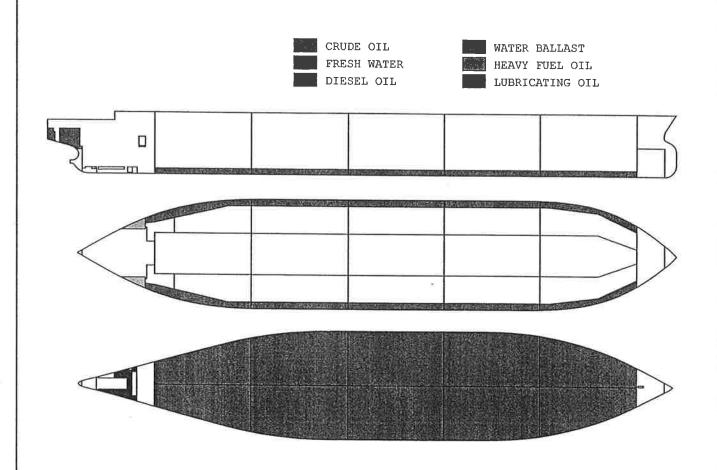
12. STEP 11 - BALLAST EXCHANGE

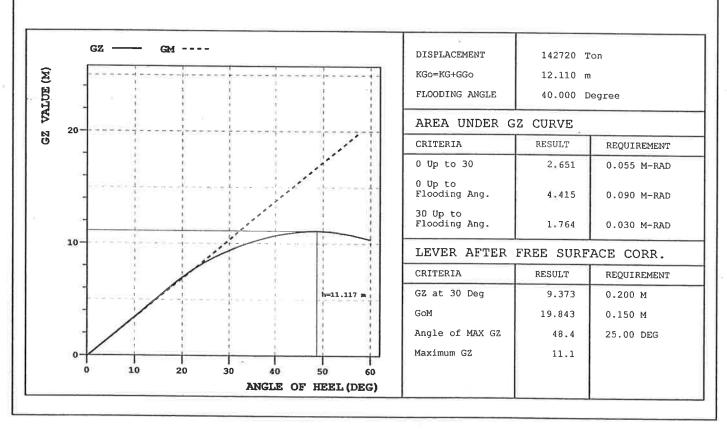


| FR. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT | WEIGHT T/M | BOUY. T/M |
|-----|---------------|------------|------------|---------------|--------|---------------|--------------|
| -6 | -5.500 | 0.0 | _ | 0.0 | | 93.9 | 0.0 |
| 0 | -0.000 | 694.5 | 49.20 | 1971.8 | 6.14 | 168.6 | 18.3 |
| 60 | 51.000 | 5160.6 | 35.59 | 204620.7 | 62.01 | 244.5 | 315.3 |
| 70 | 102.000 | 2647.7 | 15.13 | 442606.5 | 53.98 | 499.7 | 535.0 |
| 80 | 153.000 | 1879.0 | 9.99 | 551510.8 | 67.26 | 534.8 | 530.5 |
| 90 | 204.000 | -6980.0 | 40.35 | 415127.1 | 50.63 | 328.7 | 482.7 |
| 100 | 255.000 | -3688.2 | 23.20 | 136029.8 | 20.64 | 495.9 | 414.1 |
| 110 | 306.000 | -191.4 | 1.88 | 1457.6 | 2.70 | 325.6 | 155.5 |
| 133 | 326.500 | 0.0 | _ | -0.0 | == | 20.2 | 0.0 |

| SHEAR FORCE (Negative) | : | -6980 Ton (40. | 3%) POSITION: Fr 90 + 0.00 m |
|------------------------|---|------------------|--|
| SHEAR FORCE (Positive) | | | |
| SAGGING MOMENT (Max.) | | | 48) POSITION: $Fr128 + 0.84 \text{ m}$ |
| HOGGING MOMENT (Max.) | : | 561113 T-m (68. | 4%) POSITION: Fr 81 + 4.00 m |

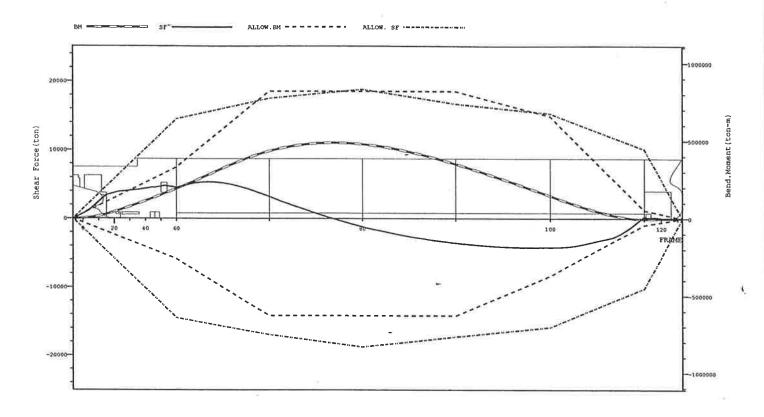
13. STEP 12 - BALLAST EXCHANGE





| | | | | ===== | | | | |
|--|---------------------------|-------------------------|----------------------------|-----------------------------|-------------------------------|---------------------------|-----------------------------|-----------|
| WEIGHT ITEMS | | FILL. | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | (M) | |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) | | 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 | 279.870 279.870 279.326 | 11.198 11.198 9.652 | 18.224 -18.224 21.363 | 0 0 |
| NO.2 W.B.TK(S) | | 100.0 | 1.0250 | 10126.4 | 229.326 | 9.652 | -21.363 | Ō |
| NO.3 W.B.TK(P) | | 100.0 | 1.0250 | 10218.2 | 178.500 | 9.593 | 21.421 | 0 |
| NO.3 W.B.TK(S) NO.4 W.B.TK(P) | | 100.0 | 1.0250 1.0250 | 10218.2 9973.0 | 178.500 127.896 | 9.593 9.777 | -21.421 21.274 | 0 |
| NO.4 W.B.TK(S) | | 100.0 | 1.0250 | 9973.0 | 127.896 | 9.777 | -21.274 | 0 |
| NO.5 W.B.TK(P) | | 100.0 | 1.0250 | 9136.8 | 75.928 | 11.734 | 19.496 | Ő |
| NO.5 W.B.TK(S) A.P.TK | | 100.0 | 1.0250 | 9176.6 | 75.805 | 11.752 | -19.503 | 0 |
| | | 100.0 | 1.0250 | 2275.5 | 5.346 | 20.407 | -0.025 | 0 |
| TOTAL WATER BALLAST | | | | 98804.1 | 173.728 | 10.575 | -0.009 | 0 |
| F.W.TK(P) | | 10.0 | 1.0000 | 28.9 | 9.157 | 23.804 | 10.705 | 424 |
| F.W.TK(S) DIST.W.TK(S) | | 10.0 | 1.0000 | 20.6 | 8.409 | 23.803 | -11.338 | 312 |
| | | 10.0 | 1.0000 | | 11.050 | 23.807 | -9.100 | 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) | | 4.5 | 1.0000 | 110.6 | 41.999 | 11.394 | 14.507 | 2048 |
| NO.1 H.F.O.TK(S) | | 4.5 | 1.0000 | 129.9 | 41.789 | 11.647 | -14.598 | 2048 |
| H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | a t s | 98.0 98.0 | 1.0000 | 235.5 292.3 | 39.651 41.650 | 17.685 24.663 | 14.679 17.332 | 78 |
| TOTAL HEAVY FUEL OII | | | | | | | | |
| | _ | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) | | 10.0 | 0.8500 | 12.8 | 36.265 | 0.386 | 3.255 | 214 |
| D.O.STOR.TK(S) D.O.SETT.TK(S) | | 10.0 10.0 | 0.8500 0.8500 | 16.7 3.2 | 35.642 43.350 | 0.451 21.748 | -3.376 -13.571 | 271 |
| D.O.SERV.TK(S) | | 10.0 | 0.8500 | 6.3 | 40.800 | 21.748 | -13.571 -13.571 | 6 11 |
| TOTAL DIESEL OIL | | | | 39.1 | 37.308 | 5.610 | | |
| | | 10.0 | | | - | | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) | | 10.0 10.0 | 0.9000 | 7.4 7.4 | 44.200 44.200 | 14.430 | 4.095 | 24 |
| M/E SYS.O.SETT.TK(C) | | 10.0 | 0.9000 | 5.9 | 44.200 | 14.430 14.430 | -4.095 0.000 | 24 12 |
| G/E L.O.STOR.TK(P) | | 10.0 | 0.9000 | 1.4 | 22.100 | 15.573 | 7.162 | 3 |
| G/E L.O.SETT.TK(P) | | 10.0 | 0.9000 | 1.4 | 20.400 | 15.573 | 7.162 | 3 |
| TOTAL LUBRICATING O | [L | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CON | ISTANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| ###################################### | | | | | | | | |
| TOTAL DEADWEIGHT LIGHT SHIP | | | | 100119.8 | 172.074 | 10.640 | 0.072 | 5919 |
| TOTAL DISPLACEMENT | | | | 42600.0 142719.9 | 152.000 166.082 | 15.425 12.069 | 0.029 | 0 5919 |
| EQUIV. DRAFT(EXT) | = 9.862 | | | | T.C. | | = 2936.77 | |
| AFT. DRAFT(EXT) | = 12.417 | | | | P.C | | = 155.22 | |
| FORE DRAFT (EXT) | = 7.697 | | 2 | K. | M.T. | | = 31.953 | |
| TRIM DISPLACEMENT | = 4.720 1 $=$ 142719.9 1 | M | • | | C.G. | | = 12.069 | |
| L.C.G. | = 142/19.91 = 166.0821 | | | UN GG | CORRECTED | GM | = 19.885 = 0.041 | |
| L.C.B. | = 165.980 | M | : | | RRECTED G | M (GOM) | = 19.843 | |
| L.C.F. | = 172.070 | M | : | PR | OPELLER I | MMER. | = 114.6 | |
| | | | | BL | IND DISTA | NCE | = 592.0 | M |
| HEEL ANGLES (DEG.) | = 0.000 | 5.000 1 | 0.000 15 | | | | 50.000 60 | |
| GZ VALUE (M) | | 1.675 | 3.430 | .219 6.9 | 9.373 | 10.709 | 11.101 10 | |
| GZ AREA (M*RAD.) | = 0.000 | | | 0.670 1.2 | 03 2.651 | 4.415 | 6.334 8 | .221 |
| | | | | | | = | | _==== |

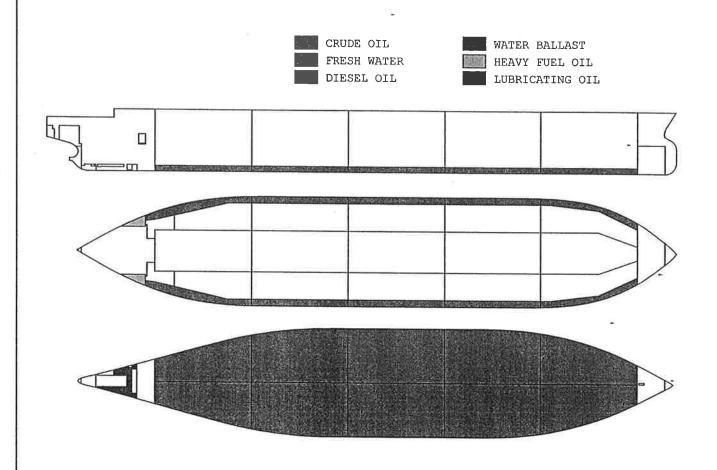
13. STEP 12 - BALLAST EXCHANGE

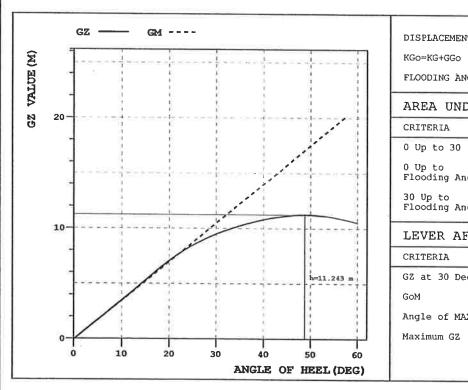


| FR. | DISTANCE M | SHEAR | FORCE % | BENDING TM | MOMENT | WEIGHT T/M | BOUY. |
|-----|---------------|---------|---------|---------------|--------|---------------|-------|
| | | | | | | 1713 | 1715 |
| -6 | -5.500 | 0.0 | ~= | 0.0 | - | 93.9 | 0.0 |
| 0 | -0.000 | 688.4 | 48.77 | 1984.7 | 6.18 | 168.6 | 20.2 |
| 60 | 51.000 | 4521.1 | 31.18 | 191749.5 | 58.11 | 324.9 | 360.3 |
| 70 | 102.000 | 3172.5 | 18.13 | 434341.9 | 52.97 | 499.7 | 604.0 |
| 80 | 153.000 | -1203.4 | 6.40 | 478910.2 | 58.40 | 534.9 | 602.8 |
| 90 | 204.000 | -3595.4 | 20.78 | 351083.3 | 42.82 | 529.2 | 557.8 |
| 100 | 255.000 | -4202.8 | 26.43 | 145959.1 | 22.15 | 496.0 | 491.7 |
| 110 | 306.000 | 279.6 | 2.77 | -2034.8 | 4.84 | 421.5 | 197.9 |
| 133 | 326.500 | 0.0 | - | -0.0 | 100 | 20.2 | 0.1 |

| SHEAR FORCE (Negative) | : | -4241 Ton (| 26.2%) | POSITION | : | Fr 98 + 0.59 m |
|------------------------|---|--------------|--------|----------|---|----------------|
| SHEAR FORCE (Positive) | : | 5323 Ton (| 34.3%) | POSITION | : | Fr 63 + 1.70 m |
| SAGGING MOMENT (Max.) | : | -2242 T-m (| 4.2%) | POSITION | : | Fr109 + 3.30 m |
| HOGGING MOMENT (Max.) | : | 488327 T-m (| 59.6%) | POSITION | : | Fr 76 + 4.60 m |

14. STEP 13 - BALLAST EXCHANGE

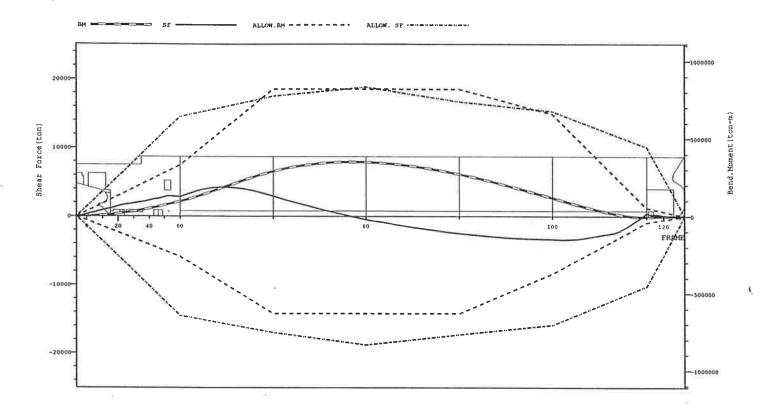




| DISPLACEMENT | 140444 T | on |
|------------------------|-----------|-------------|
| KGo=KG+GGo | 11.976 m | ı |
| FLOODING ANGLE | 40.000 D | egree |
| AREA UNDER G | Z CURVE | |
| CRITERIA | RESULT | REQUIREMENT |
| 0 Up to 30 | 2.687 | 0.055 M-RAD |
| 0 Up to Flooding Ang. | 4.468 | 0.090 M-RAD |
| 30 Up to Flooding Ang. | 1.781 | 0.030 M-RAD |
| LEVER AFTER | FREE SURF | ACE CORR. |
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.473 | 0.200 M |
| GoM | 20.145 | 0.150 M |
| Angle of MAX GZ | 48.7 | 25.00 DEG |
| Maximum GZ | 11.2 | |
| | | |
| | | |

| WEIGHT ITEMS | | | | | | | | ====== |
|--|--|---|--|--|--|---|---|--|
| WEIGHT TIEMS | | FILL. (%) | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | T.C.G (M) | F.S.M (MT-M) |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(S) | | 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 10218.2 9973.0 9973.0 9136.8 9176.6 | 279.870 279.870 229.326 229.326 178.500 178.500 127.896 127.896 75.928 75.805 | 11.198 11.198 9.652 9.652 9.593 9.777 9.777 11.734 11.752 | 18.224 -18.224 21.363 -21.363 21.421 -21.421 21.274 -21.274 19.496 -19.503 | 0 0 0 0 0 0 0 0 |
| TOTAL WATER BALLAST | | | | 96528.6 | 177.697 | 10.344 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OIL | L | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SERV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | -3.376 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | . | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P) M/E SYS.O.STOR.TK(S) M/E SYS.O.SETT.TK(C) G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) | | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O | ſL | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CON | NSTANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | | | | 97844.3 42600.0 140444.3 | 175.952 152.000 168.687 | 10.413 15.425 11.933 | 0.074 0.029 0.061 | 5919 0 5919 |
| EQUIV. DRAFT (EXT) AFT. DRAFT (EXT) FORE DRAFT (EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. | = 9.715 = 11.581 = 8.142 = 3.439 = 140444.3 = 168.687 = 168.613 = 172.870 | M M M M MT M M M | : | M. T. K. V. UN GG CC PR BI | T.C. P.C M.T. C.G. CORRECTED CORRECTED COPELLER I | GM M(GOM) MMER. NCE | = 2925.43 = 154.98 = 32.121 = 11.933 = 20.187 = 0.042 | 3 MT-M 3 MT/CM 4 M 5 M 7 M 2 M 5 M 8 % 8 % |
| HEEL ANGLES (DEG.) GZ VALUE (M) | = 0.000 $=$ -0.061 $=$ 0.000 | 5.000 1 1.700 0.072 | 0.000 15 3.482 5 0.297 0 | 5.000 20.0 5.300 7.0 0.680 1.2 | 00 30.000 71 9.473 21 2.687 | 40.000 10.803 4.468 | 50.000 60 11.232 10 6.407 8 | 0.000 0.519 |

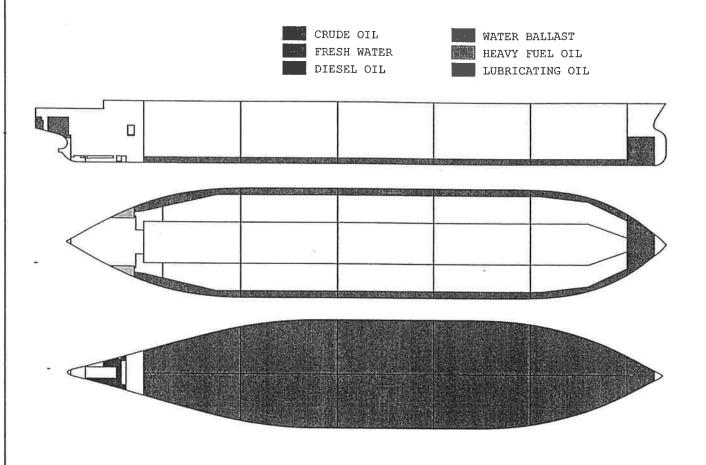
14. STEP 13 - BALLAST EXCHANGE

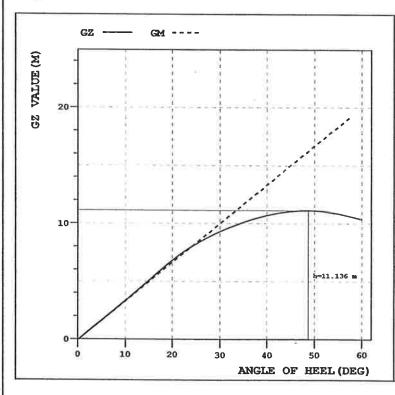


| FR. | DISTANCE M | SHEAR T | FORCE | BENDING TM | MOMENT & | WEIGHT T/M | BOUY. |
|-----|---------------|------------|-------|---------------|----------|---------------|-------|
| | | | | | | | |
| -6 | -5.500 | 0.0 | _ | 0.0 | | 35.5 | 0.0 |
| 0 | -0.000 | 289.0 | 20.47 | 894.8 | 2.79 | 86.5 | 18.7 |
| 60 | 51.000 | 2863.7 | 19.75 | 96604.1 | 29.27 | 324.9 | 334.6 |
| 70 | 102.000 | 2929.1 | 16.74 | 290531.3 | 35.43 | 499.8 | 578.7 |
| 80 | 153.000 | -459.2 | 2.44 | 350086.7 | 42.69 | 534.9 | 589.5 |
| 90 | 204.000 | -2483.4 | 14.35 | 271820.5 | 33.15 | 529.2 | 556.7 |
| 100 | 255.000 | -3342.9 | 21.02 | 119200.3 | 18.09 | 496.0 | 502.7 |
| 110 | 306.000 | 428.1 | 4.24 | -3003.1 | 7.15 | 421.5 | 210.4 |
| 133 | 326.500 | 0.0 | - | -0.0 | | 20.2 | 0.1 |

| SHEAR FORCE (Negative) | : | -3402 Ton | 22.8%) | POSITION | • | Fr101 + 3.40 m | |
|------------------------|---|------------|--------|----------|---|----------------|--|
| SHEAR FORCE (Positive) | | 4239 Ton | | | | Fr 64 + 5.02 m | |
| SAGGING MOMENT (Max.) | | -3484 T-m | 6.5%) | | | Fr109 + 3.30 m | |
| HOGGING MOMENT (Max.) | | 351721 T-m | 42.9%) | POSITION | : | Fr 78 + 2.58 m | |

15. STEP 14 - BALLAST ARR.COND.





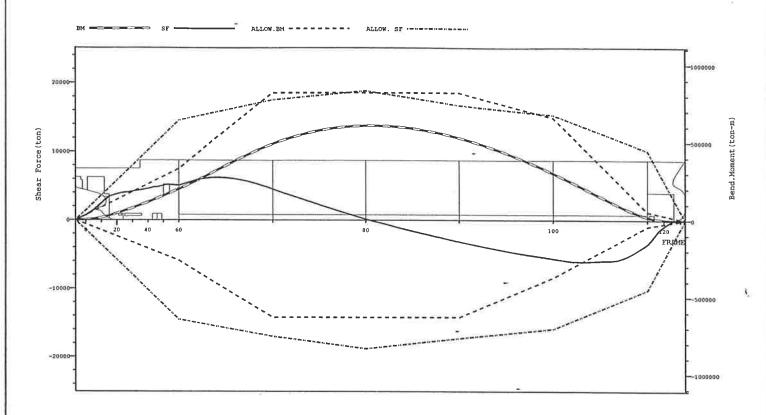
| DISPLACEMENT | 146893 | Ton |
|----------------|---------|--------|
| KGo=KG+GGo | 12.005 | m |
| FLOODING ANGLE | 40.000 | Degree |
| | | |
| AREA UNDER G | Z CURVE | |

| AREA UNDER GZ CURVE | | | | | | | | |
|---------------------------|--------|-------------|--|--|--|--|--|--|
| CRITERIA | RESULT | REQUIREMENT | | | | | | |
| 0 Up to 30 | 2.596 | 0.055 M-RAD | | | | | | |
| 0 Up to Flooding Ang. | 4.354 | 0.090 M-RAD | | | | | | |
| 30 Up to Flooding Ang. | 1.758 | 0.030 M-RAD | | | | | | |

| LEVER AFTER | FREE SURF | ACE CORR. |
|-----------------|-----------|-------------|
| CRITERIA | RESULT | REQUIREMENT |
| GZ at 30 Deg | 9.296 | 0.200 M |
| GoM | 19.218 | 0.150 M |
| Angle of MAX GZ | 48.4 | 25.00 DEG |
| Maximum GZ | 11.1 | 1 |
| | | |
| | | |

| | ========= | ====== | | | ======== | | ======== | ====== |
|---|---|---|--|---|--|--|---|--|
| WEIGHT ITEMS | ======================================= | FILL. (%) | | WEIGHT (MT) | L.C.G (M) | V.C.G (M) | (M) | F.S.M (MT-M) |
| NO.1 W.B.TK(P) NO.1 W.B.TK(S) NO.2 W.B.TK(P) NO.2 W.B.TK(S) NO.3 W.B.TK(P) NO.3 W.B.TK(S) | | 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 | 8790.0 8790.0 10126.4 10126.4 10218.2 | 279.870 279.870 229.326 229.326 178.500 | 11.198 11.198 9.652 9.652 9.593 | 18.224 -18.224 21.363 -21.363 21.421 | 0 0 0 0 0 |
| NO.4 W.B.TK(P) NO.4 W.B.TK(S) NO.5 W.B.TK(P) NO.5 W.B.TK(S) F.P.TK | | 100.0 100.0 100.0 100.0 100.0 | 1.0250 1.0250 1.0250 1.0250 1.0250 1.0250 | 10218.2 9973.0 9973.0 9136.8 9176.6 4173.3 | 178.500 127.896 127.896 75.928 75.805 312.027 | 9.593 9.777 9.777 11.734 11.752 8.426 | -21.421 21.274 -21.274 19.496 -19.503 -0.001 | 0 0 0 0 0 |
| A.P.TK | | 100.0 | 1.0250 | 2275.5 | 5.346 | 20.407 | -0.025 | 0 |
| TOTAL WATER BALLAST | | | | 102977.4 | 179.333 | 10.488 | -0.009 | 0 |
| F.W.TK(P) F.W.TK(S) DIST.W.TK(S) | | 10.0 10.0 10.0 | 1.0000 1.0000 1.0000 | 28.9 20.6 8.3 | 9.157 8.409 11.050 | 23.804 23.803 23.807 | 10.705 -11.338 -9.100 | 424 312 45 |
| TOTAL FRESH WATER | | | | 57.8 | 9.161 | 23.804 | 0.004 | 782 |
| NO.1 H.F.O.TK(P) NO.1 H.F.O.TK(S) H.F.O.SETT.TK(P) H.F.O.SERV.TK(P) | - | 4.5 4.5 98.0 98.0 | 1.0000 1.0000 1.0000 1.0000 | 110.6 129.9 235.5 292.3 | 41.999 41.789 39.651 41.650 | 11.394 11.647 17.685 24.663 | 14.507 -14.598 14.679 17.332 | 2048 2048 78 396 |
| TOTAL HEAVY FUEL OI | L | | | 768.4 | 41.111 | 18.414 | 10.716 | 4570 |
| D.O.STOR.TK(P) D.O.STOR.TK(S) D.O.SETT.TK(S) D.O.SETV.TK(S) | | 10.0 10.0 10.0 10.0 | 0.8500 0.8500 0.8500 0.8500 | 12.8 16.7 3.2 6.3 | 36.265 35.642 43.350 40.800 | 0.386 0.451 21.748 21.748 | 3.255 -3.376 -13.571 -13.571 | 214 271 6 11 |
| TOTAL DIESEL OIL | | | ~ | 39.1 | 37.308 | 5.610 | -3.678 | 503 |
| M/E CYL.O.STOR.TK(P M/E SYS.O.STOR.TK(S M/E SYS.O.SETT.TK(C G/E L.O.STOR.TK(P) G/E L.O.SETT.TK(P) |) | 10.0 10.0 10.0 10.0 | 0.9000 0.9000 0.9000 0.9000 | 7.4 7.4 5.9 1.4 | 44.200 44.200 44.200 22.100 20.400 | 14.430 14.430 14.430 15.573 15.573 | 4.095 -4.095 0.000 7.162 7.162 | 24 24 12 3 3 |
| TOTAL LUBRICATING O | IL | | | 23.4 | 41.547 | 14.562 | 0.828 | 65 |
| TOTAL DEADWEIGHT CO | NSTANT | | | 427.0 | 66.630 | 10.135 | 0.000 | 0 |
| TOTAL DEADWEIGHT LIGHT SHIP TOTAL DISPLACEMENT | 2 | | | 104293.1 42600.0 146893.1 | 177.675 152.000 170.229 | 10.552 15.425 11.965 | 0.069 0.029 0.058 | 5919 0 5919 |
| EQUIV. DRAFT(EXT) AFT. DRAFT(EXT) FORE DRAFT(EXT) TRIM DISPLACEMENT L.C.G. L.C.B. L.C.F. | = 10.131 M = 11.630 M = 8.865 M = 2.765 M = 146893.1 M = 170.229 M = 170.161 M = 172.863 M | т | : | M. T. V. UN GG CO PR BI | T.C. P.C M.T. C.G. CORRECTED O RRECTED G OPELLER I | M(GOM) MMER. NCE | = 2947.85 = 155.46 = 31.224 = 11.965 = 19.255 = 0.046 = 19.218 = 496.5 | 5 MT/CM 1 M 5 M 9 M 9 M 9 M 9 M 9 M |
| HEEL ANGLES (DEG.) GZ VALUE (M) GZ AREA (M*RAD.) | = 0.000 = -0.058 = 0.000 | 5.000 1 1.623 0.068 | 0.000 15 3.327 5 | 5.000 20.0 5.071 6.8 | 00 30.000 | 40.000 10.712 | 50.000 60 11.120 10 6.276 8 | 0.000 0.401 |

15. STEP 14 - BALLAST ARR.COND.



| FR. NO. | DISTANCE M | SHEAR T | FORCE % | BENDING TM | MOMENT & | WEIGHT T/M | BOUY. T/M |
|------------|---------------|------------|------------|---------------|----------|---------------|--------------|
| -6 | -5.500 | 0.0 | | 0.0 | = | 93.9 | 0.0 |
| 0 | -0.000 | 693.1 | 49.10 | 1938.6 | 6.03 | 168.6 | 18.8 |
| 60 | 51.000 | 5029.2 | 34.68 | 199099.2 | 60.33 | 324.9 | 341.0 |
| 70 | 102.000 | 4515.8 | 25.80 | 490620.1 | 59.83 | 499.8 | 594.4 |
| 80 | 153.000 | 162.6 | 0.86 | 607755.5 | 74.12 | 534.9 | 611.6 |
| 90 | 204.000 | -3150.9 | 18.21 | 529584.2 | 64.58 | 529.2 | 585.2 |
| 100 | 255.000 | -5623.0 | 35.36 | 303039.8 | 45.98 | 496.0 | 537.3 |
| 110 | 306.000 | -3483.1 | 34.15 | 20367.9 | 37.72 | 421.5 | 232.7 |
| 133 | 326.500 | 0.0 | - | -0.0 | - | 20.2 | 0.2 |

| SHEAR FORCE (Negative) | ž | -6062 Ton (43.0%) | POSITION: Fr103 + 0.87 m |
|------------------------|---|---------------------|------------------------------------|
| SHEAR FORCE (Positive) | | 6212 Ton (39.3%) | POSITION: Fr 64 + 1.70 m |
| SAGGING MOMENT (Max.) | | -140 T-m (1.1%) | POSITION: Fr125 + 0.50 m |
| HOGGING MOMENT (Max.) | : | 607984 T-m (74.1%) | POSITION: Fr $80 + 3.10 \text{ m}$ |