

Reference A

SUMMARY

Fuel Oil Tanks - 98% Capacity

Comp't	Location	Gallons	Tons F.O. at 278.46 Gallons - 37.23 cu.ft.
No. 1 D.B.	Frs. 13-40 P.	13417	48.18
" 1 "	" 13-40 S.	13417	48.18
" 2 "	" 60-82 P.	29087	104.16
" 2 "	" 60-82 S.	29087	104.46
" 3 "	" 62-82 P.	20823	74.06
" 3 "	" 62-82 C.L.	44636	160.30
" 3 "	" 62-82 S.	20857	74.90
" 4 "	" 82-102 P.	25362	91.08
" 4 "	" 82-102 C.L.	44791	160.66
" 4 "	" 82-102 S.	29570	106.19
" 5 "	" 102-113 P.	25071	90.03
" 5 "	" 102-114 C.L.	25100	90.14
" 5 "	" 102-113 S.	22811	81.92
" 6 "	" 113-130 P.	19008	68.26
" 6 "	" 113-130 C.L.	25092	90.11
" 6 "	" 113-130 S.	18207	65.38
" 7 "	" 130-146 P.	21816	78.36
" 7 "	" 130-146 C.L.	34976	125.61
" 7 "	" 130-146 S.	24453	87.62
" 8 "	" 146-163 P.	16116	54.28
" 8 "	" 146-163 C.L.	43989	157.97
" 8 "	" 163-183 C.L.	31524	113.21
" 4 "	" 163-182 P.	28610	102.74
" 4 "	" 163-182 S.	28610	102.74
" 4 "	" 163-183 C.L.	34638	124.54
" 5 "	" 183-195	34630	124.54
" 6 "	" 193-210	32422	116.43
Total		786975	2836.14

Reference B

SUMMARY

Fuel Oil Settling Tanks - 95% Capacity

Comp't	Location	Gallons	Tons F.O. at 278.46 Gallons-37.23 cu.ft.
Settling Tank	Frs. 127-130 P. Outbd.	3527	30.62
" "	" 127-130 S. "	3819	30.95
" "	" 127-130 P. Inbd.	3814	35.24
" "	" 127-130 S. "	3641	31.03
Total		85601	127.84

Diesel Oil Tank - 95% Capacity

	Location	Gallons	Tons D.O. at 285.60 Gallons 38.23 cu.ft.
D.B. Tank	Frs. 102-104 S.	2381	7.99
No. 8 D.B.	" 146-163 S.	13382	55.61
Total		18163	63.60

Distilled Water Tank - Full Capacity

	Location	Gallons	Tons D.W. at 269.3 Gallons -36 cu.ft.
D.B. Tank	Frs. 115-118	6946	21.70

Reference C

SUMMARY

Fresh Water Tanks - Full Capacity

Comp't	Location	Gallons	Tons F.W. at 262.5
No. 1 D.B.	Frs. 118-122 F.	23846	91.84
" 1 "	" 118-119-122 S.	20240	77.13
" 2 "	" 122-123 F.	23827	91.82
" 2 "	" 122-123 S.	23827	91.82
Total		91739	340.51

F.W. Washing Water Tanks - Full Capacity

No. 3 D.B.	Frs. 143-166 F.	75003	282.73
" 5 "	" 143-166 C.L.	84430	318.70
" 3 "	" 143-166 S.	77478	287.59
Total		236911	889.02

Reference D

SUMMARY

Ballast Tanks - Full Capacity

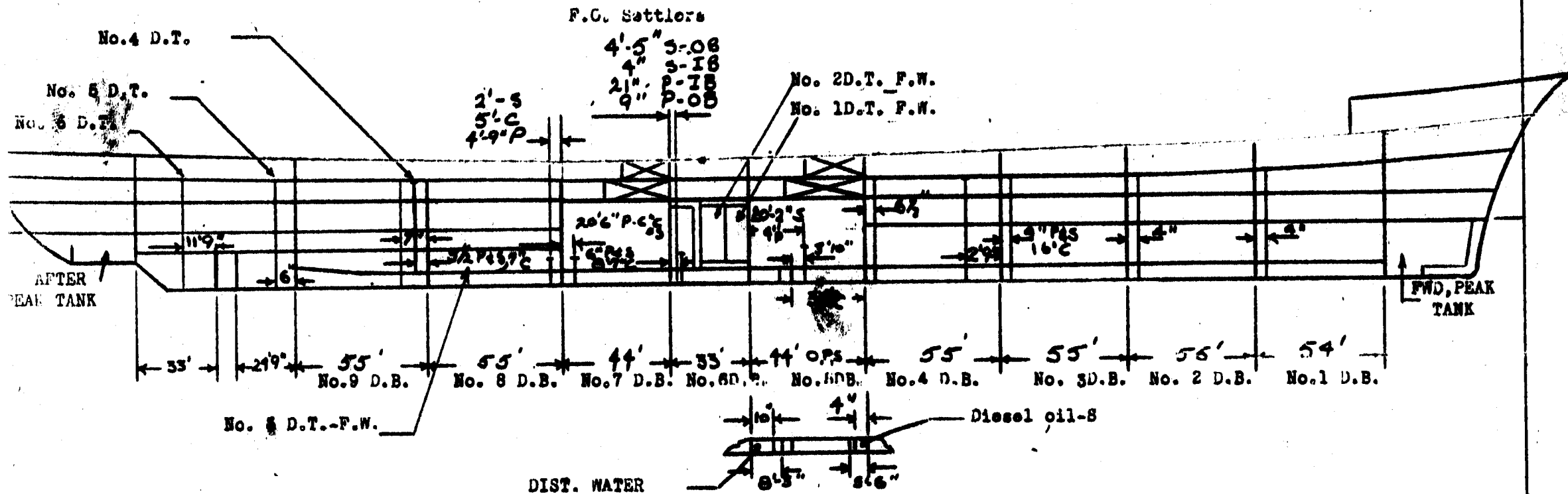
Tons Salt Water at 262.5 lbs. cu. ft.

Fore Peak	Stem - Fr. 16	40036	152.91
No. 1 D.B.	Frs. 22-40 P.	14123	53.94
No. 1 D.B.	" 22-40 S.	14123	53.94
No. 2 D.B.	" 40-62 P.	30618	116.94
No. 2 D.B.	" 40-62 S.	30618	116.94
No. 3 D.B.	" 62-82 P.	21708	82.91
No. 3 D.B.	" 62-82 C.L.	46985	179.46
No. 3 D.B.	" 62-82 S.	21975	83.86
No. 4 D.B.	" 82-102 P.	26698	101.97
No. 4 D.B.	" 82-102 C.L.	47142	180.09
No. 4 D.B.	" 82-102 S.	13125	50.89
No. 5 D.B.	" 102-118 P.	26391	100.80
No. 5 D.B.	" 102-114 C.L.	26421	100.91
No. 5 D.B.	" 102-118 S.	24081	91.71
No. 6 D.B.	" 118-130 F.	20010	76.43
No. 6 D.B.	" 118-130 C.L.	26418	100.89
No. 6 D.B.	" 118-130 S.	19166	73.20
No. 7 D.B.	" 130-146 P.	22965	87.71
No. 7 D.B.	" 130-146 C.L.	36819	140.63
No. 7 D.B.	" 130-146 S.	26740	98.31
No. 8 D.B.	" 146-166 P.	15911	60.77
No. 8 D.B.	" 146-166 C.L.	46304	175.86
No. 9 D.B.	" 166-186 C.L.	33123	126.74
No. 4 D.B.	" 186-192 P.	30116	115.03
No. 4 D.B.	" 186-192 S.	30116	115.03
No. 4 D.B.	" 186-186 C.L.	89093	340.31
No. 5 D.B.	" 186-195	36805	139.43
No. 6 D.B.	" 195-210	34128	130.88
After Peak	210-Stern	33041	126.20
Total		901472	3445.13

TANK (SEE NOTE BELOW)		CORRECTIONS (INCHES) FOR TRIM BY THE STERN									
		1 FT.	2 FT.	3 FT.	4 FT.	5 FT.	6 FT.	7 FT.	8 FT.	9 FT.	10 FT.
No. 1 & 2 D.T.	FRESH WATER-NO SOUNDING TUBES										
No. 3 D.T.	FRESH WATER-NO SOUNDING TUBES										
No. 4 D.T.-P.S.		+ 1/8	+ 7/8	+ 1 3/8	+ 1 3/4	+ 2 1/4	+ 2 3/4	+ 3 1/8	+ 3 5/8	- 4	+ 4 1/2
No. 4 D.T.-C.		+ 5/8	+ 1 1/8	+ 1 5/8	+ 2 1/4	+ 2 7/8	+ 3 3/8	+ 4	+ 4 1/2	+ 5 1/8	+ 5 5/8
No. 5 D.T.		+ 1/2	+ 1/2	+ 3/4	+ 1	+ 1 1/2	+ 1 1/2	+ 1 3/4	+ 2	+ 2 1/2	+ 2 1/2
No. 6 D.T.		+ 1/8	+ 1/4	+ 1/4	+ 3/8	+ 1/2	+ 5/8	+ 3/4	+ 3/4	+ 7/8	+ 1
P.O. SETTLER	P.-O.B.	- 1/8	- 1/8	- 1/4	- 1/4	- 3/8	- 3/8	- 1/2	- 5/8	- 5/8	- 3/4
	P.-T.B.	0	- 1/8	- 1/8	- 1/2	- 1/2	- 1/2	- 3/8	- 3/8	- 1/2	- 1/2
	S.-I.B.	- 1/8	- 1/8	- 1/2	- 3/8	- 3/8	- 1/2	- 1/2	- 5/8	- 3/4	- 3/4
	S.-D.B.	0	0	0	0	0	0	0	0	0	0
No. 1 D.B.		- 1/2	- 1 1/8	- 1 3/4	- 2 1/2	- 2 7/8	- 3 3/8	- 4	- 4 1/2	- 5 1/8	- 5 5/8
No. 2 D.B.		- 5/8	- 1 1/8	- 1 3/4	- 2 1/2	- 2 7/8	- 3 3/8	- 4	- 4 1/2	- 5 1/8	- 5 5/8
No. 3 D.B.		- 5/8	- 1 1/8	- 1 3/4	- 2 1/2	- 2 7/8	- 3 3/8	- 4	- 4 1/2	- 5 1/8	- 5 5/8
No. 4 D.B.-P & S		- 5/8	- 1 1/8	- 1 3/4	- 2 1/2	- 2 7/8	- 3 3/8	- 4	- 4 1/2	- 5 1/8	- 5 5/8
No. 4 D.B.-C.		+ 1/2	+ 1	+ 1 1/2	+ 2 1/8	+ 2 5/8	+ 3 1/8	+ 3 5/8	+ 4 1/8	+ 5/8	+ 1 1/8
DIESEL OIL		0	+ 1/8	+ 1/8	+ 1/4	+ 1/4	+ 1/4	+ 3/8	+ 3/8	+ 1/2	+ 1/2
No. 5 D.B.-S.		0	- 1/8	- 1/8	- 1/8	- 1/2	- 1/2	- 1/2	- 1/2	- 3/8	- 3/8
No. 5 D.B.-C.		- 1/4	- 1/2	- 3/4	- 1	- 1 3/8	- 1 5/8	- 1 7/8	- 2 1/8	- 2 3/8	- 2 5/8
No. 5 D.B.-P.		- 1/2	- 7/8	- 1 3/8	- 1 3/4	- 2 1/2	- 2 3/4	- 3 1/8	- 3 5/8	- 4 1/8	- 4 1/2
DISTILLED, W.		- 1/8	- 1/8	- 1/2	- 1/2	- 3/8	- 3/8	- 1/2	- 1/2	- 5/8	- 5/8
No. 6 D.B.-C.		- 1/8	- 3/8	- 1/2	- 5/8	- 7/8	- 1	- 1 1/8	- 1 3/8	- 1 1/2	- 1 5/8
No. 6 D.B.-P&S		- 3/8	- 5/8	- 1	- 1 3/8	- 1 5/8	- 2	- 2 3/8	- 2 5/8	- 3	- 3 3/8
No. 7 D.B.-P.		0	- 1/8	- 1/8	- 1/8	- 1/8	- 1/4	- 1/4	- 1/4	- 1/4	- 3/8
No. 7 D.B.-C&S.		- 1/2	- 7/8	- 1 3/8	- 1 3/4	- 2 1/2	- 2 3/4	- 3 1/8	- 3 5/8	- 4	- 4 1/2
No. 8 D.B.-S.		+ 1/2	+ 1 1/8	+ 1 5/8	+ 2 1/8	+ 2 5/8	+ 3 1/4	+ 3 3/4	+ 4 1/2	+ 4 3/4	+ 5 1/8
No. 8 D.B.-C&P.		+ 1/2	+ 1	+ 1 3/8	+ 1 7/8	+ 2 3/8	+ 2 7/8	+ 3 1/2	+ 3 3/4	+ 4 1/2	+ 4 3/4
No. 9 D.B.		+ 5/8	+ 1 1/8	+ 1 3/4	+ 2 1/2	+ 2 7/8	+ 3 3/8	+ 4	+ 4 1/2	- 5 1/8	+ 5 5/8

NOTE. THE CORRECTIONS ARE TO BE ADDED OR SUBTRACTED FROM THE ACTUAL SOUNDINGS TAKEN AND THE CORRECTED SOUNDINGS ARE TO BE USED IN THE TANK CAPACITY TABLES.

TANK CAPACITY DIAGRAM



Note: see correction for TRIM chart

Reference 1

CAPACITY TABLE NO. 1 D.B. TANK (FRS. 16-40) PORT (STBD. SIMILAR) FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
0'	988	1160	1320	1500	1680	1885	2090	2300	2510	2720	2930	3155
1'	3380	3607	3833	4060	4303	4548	4790	5037	5283	5530	5772	6013
2'	6255	6512	5770	7027	7285	7542	7800	8065	8330	8595	8860	9125
3'	9390	9682	9935	10207	10408	10762	11025	11303	11580	12136	11136	12413
4'	12691	12969	13247									
			13417	Tank is 95% full at 4'2-5/8"								
4'			13524	13802	14080							
			Tank is full at 4'5-1/8"			14123						

Lowest point of tank is at M.B.L.
Lowest point of sounding is 7-3/8" above M.B.L.

Reference 2

CAPACITY TABLE NO. 2 D.B. TANK (FRS. 40-62) PORT (STBD. SIMILAR). FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	125	300	525	760	1040	1347	1710	2100	2505	2950	3430	3911
1'	4450	4990	5450	5950	6400	6940	7480	8000	8500	9000	9500	10050
2'	10600	11090	11590	12130	12690	13250	13800	14320	14875	15440	15930	16525
3'	17100	17675	18230	18805	19360	19940	20500	21100	21660	22250	22830	23450
4'	24040	24640	25200	25820	26430	27000	27610	28210	28820			
	Tank is 95% full at 4'8-7/16"								29087			
4'										29400	30040	30618
									Tank is full at 4'11"			30618

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1" above M.B.L.

Reference 3

CAPACITY TABLE NO. 3 D.B. TANK (FRS. 62-82) PORT, FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

[illegible]

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 12-5/16" above M.B.L.

Reference 4

**CAPACITY TABLE NO. 3 D.B. TANK (FMS. 62-82) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING**

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	
0'	230	530	905	1405	2003	2710	3506	4326	5159	6000	6810	7709	
1'	8540	9370	10201	11032	11862	12693	13524	14353	15185	16018	16847	17677	
2'	18508	19339	20170	21000	21831	22662	23492	24323	25154	25984	26815	27646	
3'	28452	29257	30063	30869	31675	32481	33286	34092	34898	35704	36510	37316	
4'	38121	38927	39733	40539	41344	42150	42956	43762	44567				
			Tank is 95% full at 4'8-1/16"							44636			
										45373	46179	46985	
										Tank is full at 4'11"		46985	

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1" above M.B.L.

Reference 5

**CAPACITY TABLE NO. 3 D.B. TANK (FRS. 62-82) STBD. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING**

0'	600	900	1260	1550	1900	2230	2600	2983	3366	3750	4128	4503
1'	4880	5286	5693	6100	6528	6953	7380	7820	8260	8700	9153	9606
2'	10060	10530	11000	11470	11963	12456	12950	13446	13942	14439	14936	14433
3'	15930	16411	16952	17464	17976	18488	19000	19523	20046	20569		
				Tank is 95% full at 3'9-9/16"						20857		
3'											21092	21616
							Tank is full at 3'11-11/16"					21955

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 12-5/16" above M.B.L.

Reference 6

CAPACITY TABLE NO. 4 D.B. TANK (FRS. 82-102) PORT FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	300	610	860	1165	1470	1815	2160	2555	2950	3375	3800	4220
1'	4640	5150	5680	6180	6700	7265	7830	8400	8970	9540	10100	10695
2'	11280	11890	12500	13107	13715	14322	14930	15558	16187	16815	17443	18072
3'	18700	19333	19966	20600	21233	21866	22500	23133	23767	24400	25033	25667
				Tank is 95% full at 3'10-1/2"							25363	
4'	26300											
	26698	Tank is full at 4'0-5/8"										

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 12-3/16" above M.B.L.

Reference 7

CAPACITY TABLE NO. 4 D.B. TANK (FRS. 82-102) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

GALLONS CORRESPONDING TO EACH INCH DRAIN PIPE												
0'	325	690	1180	1730	2460	3280	4120	4920	5800	6610	7480	8328
1'	9166	10004	10841	11679	12517	13355	14193	15031	15869	16707	17454	18383
2'	19221	20059	20897	21734	22572	23410	24248	25086	25924	26762	27600	28405
3'	29211	30016	30822	31627	32433	33238	34044	34849	35655	36460	37266	38071
4'	38877	39682	40488	41293	42099	42904	43710	44515				
		Tank is 95% full at 4'7-3/8"						44791				
4'									45321	46126	46932	
									Tank is full at 4'10-1/4"		47149	

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1-3/4" above M.B.L.

Reference 8

CAPACITY TABLE NO. 4 D.B. TANK (FRS. 82-102) STBD. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	380	580	880	1230	1610	1980	2400	2820	3260	3740	4230	4720
1'	5280	5860	6400	7020	7620	8240	8900	9540	10230	10910	11590	12270
2'	12950	15657	14364	15071	15778	16486	17193	17900	18607	19314	20021	20728
3'	21455	22143	22850	23582	24314	25045	25777	26509	27241	27973	28704	29436

Tank is 95% full at 3'11-3/16"

4' 30168 30900

31126 Tank is full at 4'1-3/8"

Lowest point of tank is 6-15/16" above M.B.L.

Lowest point of sounding is 10-5/8" above M.B.L.

Reference 9

CAPACITY TABLE NO. 5 D.B. TANK (FRSM 102-118) PORT FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH OF DEPTH SOUNDING

	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
0'	1097	1360	1680	2030	2380	2759	3140	3600	4030	4540	5040	5560
1'	6100	6650	7240	7840	8440	9050	9660	10270	10880	11490	12100	12690
2'	13280	13870	14460	15050	15640	16223	16806	17390	17973	18556	19140	19775
3'	20370	20985	21600	22215	22830	23442	24053	24665				

Tank is 95% full at 3'7-11/16"

25071

3'

25277 25888

3'

Tank is full at 3'9-13/16"

26391

Lowest point of tank is 6-15-16" above M.B.L.

Lowest point of sounding is 14-3/16" above M.B.L.

Reference 10

CAPACITY TABLE NO. 5 D.B. TANK (FRS. 102-114) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
0'	110	220	400	665	1040	1490	1945	2410	2865	3310	3770	4332
1'	4694	5155	5617	6079	6541	7003	7465	7927	8388	8850	9312	9774
2'	10236	10698	11159	11621	12083	12545	13007	13469	13930	14392	14854	15316
3'	15779	16241	16704	17167	17629	18092	18555	19018	19480	19443	20406	20868
4'	21331	21794	22256	22719	23182	23644	24107	24570	24570			

Tank is 95% full at 4'8-1/8"

25100

25495 25958 26421

Tank is full at 4'11"

26421

Lowest point of tank is at M.B.L.

Lowest point of sounding is 1" above M.B.L.

Reference 11

CAPACITY TABLE NO. 5 D.B. TANK (FRS. 102-118) STBD. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
0'	0	30	100	230	430	670	910	1180	1460	1780	2060	2400
1'	2750	3140	3510	4440	4800	5380	5900	6420	6930	7490	7490	8010
2'	8580	9140	9700	10208	11376	11932	12488	13044	13600	14150	14700	14700
3'	15250	15800	16350	16900	17461	18023	18584	19146	19708	20269	20831	21392
4'	21954	22515										

Tank is 95% full at 4'1-9/16"

4'

23077 23638

Tank is full at 4'3-3/4" 24012

Lowest point of tank is 6-15/16" above M.B.L.

Lowest point of sounding is 8-1/4" above M.B.L.

Reference 12

CAPACITY TABLE NO. 6 D.B. TANK (FRS. 118-130) PORT FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	30	80	130	260	410	610	840	1100	1330	1610	1900	2200
1'	2510	2860	3220	3610	3990	4360	4800	5200	5640	6060	6510	6966
2'	7422	7879	8335	8791	9247	9704	10106	10605	11051	11497	11942	12388
3'	12833	13279	13724	14170	14623	15077	15530	15983	16437	16890	17356	17821
4'	18287	18753	Tank is 95% full at 4'1-9/16"									
		19009		19218	19684	Tank is full at 4'3-3/4"						

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 8-1/4" above M.B.L.

Reference 13

CAPACITY TABLE NO. 6 D.B. TANK (FRS. 119-130) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	20	160	375	675	1060	1491	1950	2400	2890	3310	3800	4232
1'	4594	5155	5617	6079	6540	7002	7464	7226	8387	8849	9311	9772
2'	10234	10696	11158	11619	12081	12543	13004	13466	13928	14389	14851	15313
3'	15775	16238	16700	17163	17625	18088	18550	19013	19475	19938	20400	20863
4'	21325	21788	22250	22713	23175	23638	24100	24563	25025	Tank is 95% full at 4'8-1/8		
									25092	25488	25950	26413
4'	Tank is full at 4'11"										26413	

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1" above M.B.L.

Reference 14

CAPACITY TABLE NO. 6 D.B. TANK (FRS. 118-130) STBD. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	180	300	460	650	860	1000	1380	1675	1930	2240	2560	2900
1'	3300	3660	4020	4420	4810	5200	5650	6080	6937	6508	7366	7794
2'	8223	8651	9080	9487	9915	10332	10759	11167	11585	12002	12420	12846
3'	12272	13698	14124	14550	14988	15426	15864	16302	16740	17183	17626	18070
												18207
4'	18513	18956	Tank is 95% full at 4'1-3/8"									
		19165	Tank is full at 4'1-3/8"									

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 10-5/8" above M.B.L.

Reference 15

CAPACITY TABLE NO. 7 D.B. TANK (FRS. 130-146) PORT. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	30	70	150	260	440	700	900	1160	1440	1760	2030	2380
1'	2750	3110	3510	3940	4330	4780	5250	5710	6200	6700	7200	7717
2'	8233	8750	9266	9783	10300	10804	11308	11812	12317	12821	13325	13829
3'	14333	14837	15342	15846	16350	16900	17450	18000	18550	19100	19650	20225
4'	20800	21375	Tank is 95% full at 4'1-3/4"									
		21816		21950	22525	Tank is full at 4'3-3/4"						
					22965							

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 8-1/4" above M.B.L.

Reference 16

**CAPACITY TABLE NO. 7 D.B. TANK (FRS. 130-146) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING**

[illegible]

Reference 17

CAPACITY TABLE NO. 7 D.B. TANK (FRS. 130-148) STBD. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPT OF SOUNDING

0'	360	570	830	1110	1400	1750	2070	2420	2800	3200	3610	4040
1'	4500	5000	5410	6030	6550	7100	7640	8240	8800	9400	10000	10577
2'	11155	11732	12310	12885	13420	13975	14530	15085	15640	16170	16740	17312
3'	17885	18457	19030	19660	20240	20830	21450	22063	22676	23288	23901	24514
						Tank is 95% full at 3'10-7/8"					24453	
4'	25127	25740				Tank is full at 4'1"						

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 11" above M.B.L.

Reference 18

CAPACITY TABLE NO. 8 D.B. TANK (FRS. 146-166) PORT. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	60	100	150	200	300	400	500	650	800	950	1120	1330
1'	1530	1760	2000	2260	2500	2780	3040	3340	3660	3980	4300	4647
2'	4995	5342	5690	6000	6370	6740	7110	7500	7890	8280	8690	9100
3'	9510	9927	10343	10760	11183	11607	12030	12453	12877	13300	13733	14167
4'	14600	15028										
		15115	Tank is 95% full at 4'1-3/16"									
4'		15456	15884									
			15911	Tank is full at 4'3-1/16"								

Reference 19

CAPACITY TABLE NO. 8 D.B. TANK (FRS. 146-166) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	260	560	890	1260	1700	2197	2700	3300	3050	4170	5500	6337
1'	7163	7989	8815	9541	10467	11293	12110	12945	13771	14597	15423	16249
2'	17075	17901	18727	19553	20379	21205	22031	22857	23683	24509	25335	26161
3'	27000	27839	28679	29518	30357	31197	32036	32875	33715	34554	35393	36232
4'	37072	37911	38750	39580	40429	41268	42107	42947	43786			
	Tank is 95% full at 4'8-1/4"								43989			
4'										44625	45465	46304
	Tank is full at 4'11											46304
Lowest point of tank is at M.B.L.												
Lowest point of tank is 1" above M.B.L.												

Reference 20

CAPACITY TABLE NO. 8 DOUBLE BOTTOM TANK (FRS. 146-166) STBD. DIESEL OIL
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	20	80	120	220	330	430	560	700	890	1030	1240	1460
1'	1700	1900	2150	2400	2700	2980	3210	3560	3880	4200	4510	4875
2'	5240	5596	5953	6310	6690	7070	7450	7863	8277	8690	9110	9530
3'	9950	10387	10823	11260	11708	12156	12605	13053	13501	13950	14406	14863
4'	15320	15776	Tank is 95% full at 4'1-14"									
		15882	16233	16689	16718	Tank is full at 4'3-1/16"						

Lowest point of tank is 6-15/16" above M.B.L.
Lowest point of sounding is 8-15/16" above M.B.L.

Reference 21

CAPACITY TABLE NO. 9 D.B. TANK (FRS. 166-186) C.L. FUEL OIL OR BALLAST
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	660	850	1060	1300	1540	1810	2100	2400	2710	3020	3380	3740
1'	4110	4500	4880	5290	5710	6180	6600	7080	7580	8060	8550	9060
2'	9560	10100	10630	11200	11740	12310	12910	13520	14100	14700	15300	15910
3'	16580	17200	17860	18500	19120	19750	20450	21100	21730	22360	23030	23680
4'	24360	25010	25700	26300	27000	27660	28290	28980	29630	30220	30730	31140
5'	31480											
	31524	Tank is 95% full at 5'0-3/16"										
5'		31710	31960	32110	32280	32400	32480	32560	32660	32700	32750	32800
6'	32850	32900	32950	33000	33034	33068	33102	33136	33170			
		Tank is full at 6'8-3/8"								33183		

Lowest point of tank is at M.B.L.
Lowest point of sounding is 3-5/8" above M.B.L.

Reference 22

CAPACITY TABLE OF D.B. TANK (FRS. 102-104) STBD. DIESEL OIL
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	5	20	44	66	100	135	176	212	260	300	345	385
1'	427	469	511	553	595	637	679	721	753	805	847	889
2'	931	973	1015	1057	1099	1141	1183	1225	1267	1309	1351	1393
3'	1435	1477	1519	1561	1603	1645	1687	1729	1771	1813	1855	1897
4'	1939	1981	2023	2065	2107	2149	2191	2233	2275			
			Tank is 95% full at 4'8-1/8"							2281	2317	2359
4'											2401	2401
											Tank is full at 4'11"	

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1" above M.B.L.

Reference 23

CAPACITY TABLE DISTILLED WATER TANK (FRMS. 115-118)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	44	98	160	230	310	400	493	590	690	795	898	1005
1'	1106	1207	1307	1408	1509	1609	1710	1811	1912	2012	2113	2214
2'	2315	2416	2516	2718	2819	2917	2920	3021	3121	3222	3323	3424
3'	3525	3625	3726	3827	3928	4028	4129	4230	4330	4431	4532	4633
4'	4734	4834	4935	5036	5137	5238	5338	5439	5540	5641	5742	5843
											Tank is full at 4'11"	
												5843

Lowest point of tank is at M.B.L.
Lowest point of sounding is 1" above M.B.L.

Reference 24

CAPACITY TABLE NO. 1 DEEP TANK (FRS. 118-122) PORT. FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	0	85	169	253	338	423	508	591	675	760	844	928
1'	1013	1097	1182	1266	1351	1423	1519	1609	1773	1857	1857	1942
2'	2026	2110	2195	2280	2365	2450	2534	2619	2704	2789	2873	2958
3'	3043	3128	3212	3297	3382	3467	3351	3636	3721	3806	3890	3975
4'	4060	4145	4229	4314	4399	4484	4568	4653	4738	4823	4907	4922
5'	5077	5162	5246	5331	5416	5501	5585	5670	5755	5840	5924	6009
6'	6094	6179	6263	6348	6432	6517	6602	6687	6771	6856	6941	7025
7'	7110	7195	7279	7364	7449	7534	7618	7703	7788	7873	7957	8042
8'	8127	8212	8297	8381	8466	8551	8635	8720	8805	8890	8974	9059
9'	9144	9229	9313	9398	9483	9567	9652	9737	9822	9907	9991	10076
10'	10161	10246	10330	10415	10500	10585	10669	10754	10839	10924	11008	11093
11'	11178	11262	11347	11532	11517	11602	11686	11771	11856	11940	12025	12110
12'	12195	12280	12364	12449	12534	12619	12703	12788	12873	12958	13042	13127
13'	13212	13297	13381	13466	13551	13636	13720	13805	13890	13974	14059	14143
14'	14228	14312	14397	14482	14567	14652	14736	14821	14906	14990	15057	15160
15'	15245	15329	15414	15499	15584	16686	15753	16838	15923	16008	16092	16177
16'	16262	16347	16431	16516	16601	17703	16770	16855	16940	17023	17109	17194
17'	17279	17364	17448	17533	17618	18720	17787	17872	17957	18042	18126	18211
18'	18296	18381	18465	18550	18645	18720	18804	18889	18974	19059	19143	19228
19'	19313	19398	19482	19567	19652	19737	19821	19906	19991	20076	20160	20245
20'	20330	20415	20500	20584	20668	20754	20838	20923	21008	21093	21177	21262
21'	21347	21432	21506	21601	21686	21771	21855	21940	22025	22110	22195	22279
22'	22364	22449	22533	22618	22703	22788	22872	22957	23042	23147	23212	23296
23'	23381	23466	23550	23635	23720	23805						

Tank is full at 23'5-7/8" 23845

Lowest point of tank is 7'6-9/16" above M.B.L.
Lowest point of sounding is 7'6-9/16" above M.B.L.

Reference 25

CAPACITY TABLE NO. 1 DEEP TANK (FRS. 118-119-122) STBD. FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	0	72	143	215	287	359	430	502	574	646	717	789
1'	861	933	1004	1076	1148	1220	1291	1363	1435	1507	1578	1650
2'	1722	1794	1865	1937	2009	2081	2153	2225	2297	2369	2441	2513
3'	2585	2657	2729	2801	2873	2945	3016	3088	3160	3232	3304	3376
4'	3448	3520	3592	3664	3736	3807	3879	3951	4023	4095	4167	4239
5'	4311	4382	4455	4526	4598	4670	4742	4814	4886	4958	5030	5102
6'	5174	5245	5317	5389	5461	5535	5605	5677	5749	5821	5893	5965
7'	6036	6107	6180	6258	6324	6396	6467	6539	6611	6683	6755	6827
8'	6899	6971	7043	7115	7187	7258	7330	7402	7474	7546	7618	7690
9'	7762	7834	7906	7978	8050	8121	8193	8265	8337	8409	8481	8553
10'	8625	8697	8769	8841	8913	8985	9056	9128	9200	9272	9344	9416
11'	9488	9560	9632	9704	9776	9848	9919	9991	10063	10135	10217	10279
12'	10350	10422	10494	10566	10638	10709	10781	10853	10925	10997	11069	11141
13'	11213	11285	11357	11429	11501	11572	11644	11716	11788	11860	11932	12004
14'	12076	12148	12210	12292	12364	12435	12507	12579	12651	12723	12795	12867
15'	12939	13011	13083	13155	13227	13298	13370	13442	13514	13586	13658	13730
16'	13802	13874	13945	14018	14089	14161	14233	14305	14377	14449	14521	14539
17'	14664	14736	14808	14880	14952	15024	15096	15168	15240	15312	15384	15456
18'	15528	15600	15672	15744	15816	15888	15960	16032	16104	16176	16248	16320
19'	16392	16464	16536	16608	16752	16824	16896	16968	17040	16177	17112	17184
20'	17256	17328	17400	17472	17544	17616	17688	17760	17832	17904	17967	18048
21'	18120	18190	18260	18330	18401	18471	18541	18611	18682	18752	18822	18892
22'	18963	19036	19110	19183	19257	19330	19404	19477	19551	19624	19696	19771
23'	19845	19918	19992	20065	20139	20139	20212					

Tank is full at 23'5-7/16" 20240

Lowest point of tank is 7'6-9/16" above M.B.L.
Lowest point of sounding is 7'6-9/16" above M.B.L.

CAPACITY TABLE NO. 2 DEEP TANK (FRS. 122-126) PORT FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	0	84	169	253	337	422	506	590	674	759	844	928
1'	1011	1095	1179	1264	1348	1433	1517	1601	1685	1770	1855	1939
2'	2022	2106	2191	2276	2361	2446	2530	2613	2700	2785	2869	2954
3'	3039	3124	3208	3293	3278	3463	3547	3632	3717	3802	3886	3971
4'	4056	4141	4225	4310	4395	4480	4564	4649	4734	4819	4903	4988
5'	5072	5157	5241	5326	5411	5495	5580	5665	5750	5835	5920	6004
6'	6089	6174	6258	6343	6428	6513	6597	6682	6767	6852	6936	7021
7'	7106	7191	7275	7360	7445	7530	7614	7699	7784	7869	7954	8038
8'	8122	8206	8291	8376	8461	8546	8630	8715	8800	8885	8970	9054
9'	9139	9224	9308	9393	9478	9563	9647	9732	9817	9902	9986	10007
10'	10156	10240	10325	10410	10495	10580	10665	10749	10834	10919	11003	11088
11'	11172	11256	11341	11426	11511	11596	11680	11765	11850	11935	12020	12104
12'	12189	12273	12358	12443	12528	12512	12697	12782	12867	12952	13036	13121
13'	13206	13291	13375	13460	13454	13630	13714	13799	13884	13969	14053	14138
14'	14222	14307	14391	14476	14561	14646	14730	14815	14900	14985	15069	15154
15'	15239	15324	15408	14593	15578	15663	15747	15832	15917	16002	16086	16171
16'	16256	16341	16425	16510	16595	16680	16764	16849	16934	17018	17103	17188
17'	17270	17355	17439	17524	17608	17693	17777	17862	17946	18031	18116	18200
18'	18252	18370	18454	18539	18623	18708	18792	18877	18962	19046	19131	19215
19'	19300	19385	19469	19554	19638	19723	19807	19892	19977	20061	20145	20230
20'	20315	20400	20494	20569	20653	20738	20822	20907	20992	21076	21160	21245
21'	21330	21414	21499	21584	21668	21753	21837	21922	22007	22091	22176	22260
22'	22345	22430	22514	22599	22683	22768	22852	22937	23022	23106	23191	23275
23'	23360	23444	23529	23614	23698	23783						
Tank is full at 23'5-7/16"							23827					

Lowest point of tank is 7'6-9/16" above M.B.L.
Lowest point of sounding is 7'6-9/16" above M.B.L.

CAPACITY TABLE NO. 2 DEEP TANK (FRS. 122-126) STBD. FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	0	83	167	250	333	417	500	584	667	750	834	917
1'	1000	1083	1167	1250	1333	1417	1500	1584	1667	1750	1834	1917
2'	2001	2086	2171	2256	2341	2426	2510	2595	2680	2765	2850	2935
3'	3020	3105	3190	3275	3360	3445	3529	3614	3699	3784	3869	3954
4'	4039	4124	4209	4294	4379	4463	4548	4633	4718	4803	4888	4973
5'	5058	5143	5228	5313	5398	5482	5567	5652	5737	5822	5907	5992
6'	6077	6162	6246	6332	6417	6502	6586	6671	6756	6841	6926	7011
7'	7096	7180	7265	7351	7436	7520	7605	7690	7775	7860	7945	8030
8'	8115	8200	8285	8370	8455	8540	8625	8710	8795	8880	8965	9050
9'	9135	9220	9305	9490	9475	9560	9644	9729	9814	9899	9984	10069
10'	10154	10239	10324	10409	10494	10579	10579	10663	10748	10833	10918	11088
11'	11173	11257	11343	11427	11514	11597	11682	11767	11852	11937	12022	12107
12'	12192	12277	12362	12447	12532	12616	12702	12786	12871	12956	13041	13126
13'	13211	13295	13381	13466	13551	13636	13720	13805	13890	13975	14060	14145
14'	14230	14314	14399	14485	14569	14615	14759	14824	14909	14994	15079	15164
15'	15249	15334	15419	15504	15589	15674	15758	15843	15928	16013	16098	16185
16'	16268	16353	16438	16523	16607	16692	16777	16862	16947	17032	17117	17202
17'	17287	17372	17457	17543	17627	17712	17796	17881	17966	18051	18136	18221
18'	18306	18391	18476	18561	18646	18731	18816	18901	18986	19071	19156	19241
19'	19326	19411	19496	19581	19667	19751	19836	19920	20005	20090	20175	20260
20'	20345	20430	20515	20600	20685	20770	20854	20939	21024	21109	21194	21279
21'	21364	21449	21534	21619	21704	21788	21873	21958	22043	22128	22203	22298
22'	22383	22467	22553	22638	22723	22807	22892	22977	23062	23147	23233	23308
23'	23403	23488	23573	23658	23743	23827						
Tank is full at 23'5-7/16"							23869					

Lowest point of tank is 7'6-9/16" above M.B.L.
Lowest point of sounding is 7'6-9/16" above M.B.L.

Reference 28

CAPACITY TABLE NO. 3 DEEP TANK (FRS. 146-166) PORT FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	950	1350	1755	2160	2570	2980	3400	3825	4250	4680	5110	5550
1'	6000	6450	6900	7350	7800	8250	8700	9160	9620	10090	10560	11030
2'	11500	11980	12460	12940	13420	13910	14400	14900	15410	15930	16450	16975
3'	17500	18025	18550	19080	19620	20160	20700	21240	21780	22330	22880	23430
4'	23980	24530	25080	25630	26180	26740	27300	27860	28430	29000	29580	20160
5'	30740	31330	31920	32510	33100	33700	34300	34900	35510	36120	36730	37340
6'	37950	38560	39170	39780	40390	41000	41610	42220	42830	43440	44060	44680
7'	45300	45920	46540	47160	47790	48420	49050	49680	50310	50940	51570	52210
8'	52850	53490	54130	54770	55410	56050	56690	57330	57930	58610	29250	29890
9'	60530	61170	61810	62450	63100	63750	64400	65050	65700	66350	67000	67650
10'	68300	68950	69600	70250	70900	71550	72200	72850	73500	74150	74800	75450
Tank is full at 10'11-7/16"												75606

Lowest point of tank is 3'9" above M.B.L.
Lowest point of sounding is 5'0-9/16" above M.B.L.

Reference 29

CAPACITY TABLE NO. 3 DEEP TANK (FRS. 148-166) CENTER. FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	0	644	1288	1931	2575	3219	3863	4506	5150	5794	6437	7081
1'	7725	8369	9012	9656	10300	10944	11587	12231	12875	13519	14162	14806
2'	15450	16094	16737	17381	18025	18669	19312	19956	20600	21244	21887	22531
3'	23175	23819	24462	25106	25740	26394	27037	27681	28325	28969	29612	30256
4'	30900	31544	32187	32831	33475	34119	34762	35406	36050	36694	37337	37981
5'	38625	39269	39912	40556	41200	41844	42487	43131	43775	44419	45062	45706
6'	46350	46994	47637	48281	48925	49569	50212	50856	51500	52144	52787	53431
7'	54075	54719	55362	56006	56650	57294	57937	58581	29225	29869	60512	61156
8'	61800	62444	63087	63731	64375	65019	65662	66306	66950	27954	68237	68881
9'	69525	70169	70812	71456	72100	72744	73387	74031	74675	73319	75962	76606
10'	77249	77881	78514	79146	79778	80410	81042	81674	82307	82399	83571	84480
Tank is full at 10'11-7/16"												84480

Lowest point of tank is 5'0-9/16" above M.B.L.
Lowest point of sounding is 5-0-9/16" above M.B.L.

Reference 30

CAPACITY TABLE NO. 3 DEEPTANK (FRS. 146-166) STBD. FRESH WATER
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

0'	950	1360	1780	2210	2640	3070	3500	3940	4380	4820	5270	5720
1'	6170	6630	7090	7560	8040	8520	9000	9480	9960	10440	10920	11410
2'	11900	12400	12900	13400	13910	14420	14930	15450	15980	16510	17040	17570
3'	18100	18630	19160	19690	20230	20770	21310	21860	22420	22990	23560	24130
4'	24700	25275	25850	26450	27000	27575	28150	28725	29300	29880	30460	31050
5'	31640	32240	32850	33460	34070	34685	35300	35915	36530	37145	37760	38380
6'	39000	39620	40240	40865	41490	42120	42750	43390	44030	44670	45310	45955
7'	46600	47245	47890	48535	49180	49825	50470	51115	51760	52405	53050	53695
8'	54340	54985	55630	56275	56920	57656	58210	58855	59500	60150	60800	61450
9'	62100	62750	63400	64055	64710	65365	66020	66675	67330	67985	68640	69295
10'	69950	70605	71260	71915	72570	73230	73890	74550	75870	77870	76530	77190
Tank is full at 10'11-7/16"												77476

Lowest point of tank is 3'9" above M.B.L.
Lowest point of sounding is 5'0-9/16" above M.B.L.

Reference 31

CAPACITY TABLE FOR FUEL OIL DEEP TANKS NO. 4 PORT AND NO. 4 STBD. (FRS. 182-166)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
	5	8	12	17	23	30	38	46	55	64	75	87
0'												
1'	99	112	125	140	158	180	202	225	250	280	315	350
2'	390	430	475	525	578	633	688	743	798	855	915	975
3'	1040	1110	1185	1260	1335	1415	1500	1590	1690	1790	1895	2000
4'	2110	2225	2340	2460	2590	2723	2858	2995	3135	3280	2435	3580
5'	3740	3905	4075	4250	4425	4600	4780	4965	5160	5360	5560	5760
6'	5970	6185	6410	6620	6840	7063	7293	7525	7760	8000	8240	8485
7'	8730	8975	9225	9480	9735	9995	10260	10575	10810	11085	11360	11635
8'	11910	12120	12470	12750	13030	13320	13615	13920	14225	14530	14840	14150
9'	15460	15780	16100	16420	16740	17060	17380	17705	18030	18365	18700	19035
10'	19370	19710	20055	20400	20745	21190	21440	21790	22140	22490	22840	23240
11'	23590	23940	24290	24640	24990	25340	25690	26060	26430	26800	27170	27540
12'	27910	28278										
		28610	Tank is 95% full at 12'1-7/8"									
12'		28616	29040	29382	29750	30016						
		Tank is full at 12'6"					30016					

Lowest point of tank is at 3'1-3/8" above M.B.L.

Lowest point of sounding is at 3'6" above M.B.L.

Reference 32

CAPACITY TABLE FOR FUEL OIL DEEP TANK NO. 4 CENTER (FRS. 166-B6)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	420	850	1300	1760	2230	2710	3210	3730	4250	4770	5300	5840
0'												
1'	6400	6970	7550	8150	8770	9400	10030	10660	11300	11940	12580	13237
2'	13930	14637	15344	16051	16758	17465	18172	18879	19586	20293	21000	21707
3'	22414	23121	23838	24535	25242	25949	26656	27363	28070	28777	29484	30191
4'	30989	31605	32312	33019	33726	34433	35140	35847	36554	37261	37968	38675
5'	39372	40089	40976	41503	42210	42917	43624	44331	45038	45745	46452	47159
6'	47866	48573	49280	49987	50694	51401	52108	52815	53522	54229	54936	55643
7'	56350	57057	57764	58471	59178	59885	60592	61299	62006	62713	63420	64127
8'	64483	65541	66248	66955	67662	68369	69076	69783	70490	71197	71904	72511
9'	73318	74025	74732	75439	76146	76853	77560	78267	78974	79681	80388	81095
10'	81802	82499	83893	84590								
				84638	Tank is 95% full at 10'4-1/16"							
					85287	85984	86681	87378	88075	88872		
10'					Tank is full at 10'10-15/32"						89093	

Lowest point of tank is at 5'0-17/32" above M.B.L.

Lowest point of sounding is at 5'1-17/32" above M.B.L.

Reference 33

CAPACITY TABLE FOR FUEL OIL DEEP TANK NO. 5 (FRS. 186-195)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	65	132	199	266	334	402	470	540	610	680	755	830
0'												
1'	905	980	1060	1140	1220	1305	1390	1480	1570	1660	1750	1840
2'	1930	2025	2120	2220	2320	2425	2530	2640	2750	2860	2970	3080
3'	3200	3330	3460	3595	3730	3865	4000	4135	4270	4410	4550	4690
4'	4830	4980	5130	5280	5440	5600	5760	5920	6090	6260	6430	6600
5'	6770	6945	7120	7295	7470	7650	7830	8010	8190	8375	8560	8745
6'	8930	9115	9300	9490	9680	9870	10060	10220	10500	10720	10940	11160
7'	11330	11601	11822	12044	12265	12486	12707	12929	13150	13371	13592	13814
8'	14035	14267	14499	14731	14963	15195	15427	15660	15891	16123	16356	16588
9'	16820	17052	17284	17516	17748	17980	18213	18445	18677	18909	19141	19373
10'	19605	19837	20070	20302	20534	20766	20998	21230	21462	21695	21926	22158
11'	22390	22622	22855	23086	23319	23551	23783	24015	24247	24479	24712	24944
12'	25176	25408	25604	25872	26104	26336	26568	26800	27032	27265	27497	27729
13'	27961	28193	28425	28657	28889	29121	29354	29586	29818	30050	30282	30514
14'	30746	30978	31210	31442	31675	31907	32139	32371	32603	32875	33067	33269
15'	33531	33763	33996	34288	34460							
				34680	Tank is 95% full at 15'4-15/16"							
15'					34682	24924	35156	35388	35620	35852	36084	
16'	36315											
	36505	Tank is full at 16'0-13/16"										

Lowest point of tank is at M.B.L.

Lowest point of sound is at 1" above M.B.L.

Reference 34

CAPACITY TABLE FOR FUEL OIL DEEP TANK NO. 6 (FRS. 193-210)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	
0'	30	60	90	120	150	180	210	240	270	300	330	360	
1'	391	422	453	484	515	546	577	608	639	670	701	732	
2'	763	794	827	860	893	926	959	992	1025	1058	1092	1126	
3'	1160	1195	1230	1266	1302	1338	1374	1410	1446	1482	1519	1556	
4'	1593	1630	1667	1704	1744	1784	1830	1876	1922	1969	2016	2063	
5'	2110	2158	2206	2254	2302	2351	2400	2452	2504	2556	2609	2652	
6'	2715	2770	2830	2890	2950	3010	3070	3135	3200	3270	3340	3410	
7'	3480	3560	3640	3720	3800	3880	3960	4040	4120	4205	4290	4375	
8'	4460	4545	4630	4720	4810	4900	4990	5090	5200	5310	5420	5530	
9'	5640	5750	5860	5980	6100	6220	6340	6460	6580	6800	6925	7050	
10'	7130	7330	7480	7630	7780	7930	8080	8230	8380	8540	8730	8930	
11'	9130	9330	9530	9730	9930	10130	10330	10540	10750	10960	11170	11380	
12'	11540	11810	12030	12250	12480	12710	12940	13180	13420	13660	13900	14140	
13'	14390	14640	14900	15160	15420	15685	15950	16220	16499	16770	17050	17340	
14'	17630	17930	18240	18550	18860	19170	19490	19820	20160	20510	20870	21240	
15'	21620	22010	22410	22810	23230	23655	24080	24510	24950	25400	25850	26310	
16'	26730	27250	27720	28190	28670	29150	29640	30130	30620	31110	31600	32100	
	Tank is full at 16'11-1/8"(95%)											32422	
17'	32620	33150	33690										
			34128	Tank is full at 17'2-13/16"									

Lowest point of tank is at M.B.L.

Lowest point of sounding is 1" above M.B.L.

Reference 35

CAPACITY TABLE FOR FUEL OIL SETTLING TANK PORT-OUTBOARD (FRS. 121-30)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	43	86	129	172	215	258	301	344	387	430	473	516
1'	559	602	645	688	731	774	817	860	903	946	989	1032
2'	1075	1118	1161	1204	1247	1290	1333	1376	1419	1462	1505	1548
3'	1591	1634	1677	1720	1763	1806	1849	1892	1935	1978	2021	2064
4'	2107	2150	2193	2236	2279	2322	2365	2408	2451	2494	2537	2580
5'	2623	2666	2709	2752	2795	2838	2881	2924	2967	3010	3053	3096
6'	3139	3182	3225	3268	3311	3354	3397	3440	3483	3526	3569	3612
7'	3655	3698	3741	3784	3827	3870	3913	3956	3999	4042	4085	4128
8'	4171	4214	4257	4300	4343	4386	4429	4472	4515	4558	4604	4644
9'	4687	4730	4773	4816	4859	4902	4945	4988	5031	5074	5117	5150
10'	5203	5246	5289	5332	5375	5418	5461	5504	5547	5590	5633	5666
11'	5709	5752	5795	5838	5880	5923	5966	6009	6051	6094	6137	6180
12'	6222	6265	6308	6350	6393	6436	6479	6522	6565	6608	6651	6695
13'	6737	6779	6822	6865	6907	6950	6993	7036	7079	7122	7165	7208
14'	7250	7293	7336	7379	7421	7464	7507	7550	7593	7636	7679	7722
15'	7764	7807	7850	7893	7935	7978	8021	8064	8107	8150	8193	8236
16'	8278	8321	8363	8406	8449	8492	Tank is 95% full at 16'5-13/16"					
16'							8527	8570	8613	8656	8707	8750
17'	8792	8834	8876	8918	8960	Tank is full at 17'4-3/8"						
17'							8976					

Lowest point of tank is at 5'0-5/8" above M.B.L.

Lowest point of sounding is at 5'1-5/8" above M.B.L.

CAPACITY TABLE FOR FUEL OIL SETTLING TANK, STBD OUTBOARD (FRS. 127-130)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

Lowest point of tank is at 5'0-5/8" above M.B.L.
Lowest point of sounding is 5'1-5/8" above M.B.L.

CAPACITY TABLE FOR FUEL OIL SETTLING TANK, PORT-INBOARD (FRS. 127-130)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

Lowest point of tank is at 5'0-5/8" above M.B.L.
Lowest point of sounding is at 5'1-5/8" above M.B.L.

CAPACITY TABLE FOR FUEL OIL SETTLING TANK, STBD. INBOARD (FRS. 127-30)
GALLONS CORRESPONDING TO EACH INCH DEPTH OF SOUNDING

	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
0'	29	58	87	116	145	174	203	232	261	290	319	348
1'	377	406	436	465	494	523	552	581	611	640	669	699
2'	727	757	786	815	844	874	903	933	962	991	1020	1050
3'	1079	1108	1137	1166	1196	1225	1254	1283	1313	1342	1371	1400
4'	1429	1459	1488	1517	1546	1576	1605	1634	1663	1692	1722	1751
5'	1780	1809	1839	1868	1897	1926	1956	1985	2014	2043	2073	2102
6'	2131	2160	2189	2219	2248	2277	2306	2335	2365	2394	2423	2453
7'	2481	2511	2540	2569	2599	2628	2657	2686	2715	2745	2774	2803
8'	2332	2862	2891	2920	2949	2979	3008	3037	3066	3096	3124	3154
9'	3183	3212	3242	3271	3300	3329	3358	3388	3417	3446	3476	3505
10'	3435	3563	3592	3622	3651	3680	3709	3738	3768	3797	3826	3866
11'	3884	3914	3943	3972	4001	4031	4060	4089	4119	4148	4177	4206
12'	4235	4265	4294	4323	4352	4382	4411	4440	4469	4499	4528	4557
13'	4586	4616	4645	4674	4703	4732	4762	4791	4820	4849	4879	4908
14'	4937	4966	4995	5025	5054	5083	5112	5142	5171	5200	5229	5259
15'	5288	5317	5346	5375	5405	5434	5463	5492	5522	5551	5580	5609
16'	5639	5667	5697	5726	5755	5785	5814	5843	5872	5902	5931	5960
17'	5989	6018	6048	6077	6106	6135	6165	6154	6223	6252	6282	6311
18'	6340	6369	6399	6428	6457	6486	6515	6545	6574	6603	6632	6662
19'	6691	6720	6749	6778	6808	6837	6866	6895	6925	6954	6983	7012
20'	7042	7071	7100	7129	7158	7188	7217	7246	7275	7305	7334	7363
21'	7392	7422	7451	7480	7509	7538	7568	7597	7626	7655	7684	7714
22'	7743	7772	7802	7831	7860	7889	7919	7948	7977	8006	8035	8065
23'	8094	8123	8152	8182	8211	8240	8269	8328	8357	8386	8390	8415
24'	8445	8474	8503	8532	8562	8591	8620					
	Tank is 95% full at 24'6-3/4"						8641					
24'								8649	8678	8708	8737	8766
25'	8795	8824	8853	8882	8911	8940	8969	8998	9027	9056	9085	
				Tank is full at 25'10-3/8"							9096	

Lowest point of tank is at 5'6-5/8" above M.B.L.
Lowest point of sounding is at 5'1-5/8" above M.B.L.

SK. 26977 - 18010 - 1 WIRE ROPE & W.R. SOCKETS

WIRE ROPE (for one ship)

Item No.	USED FOR	No Of Pcs Req.	length of piece	SIZE	MATERIAL	Plain or Gal	TYPE	CATALOGUE PAGE NO.
4	10 Ton Vang Pendants	1	610'0"	7/8" D	Improved pl st	Galv	6x19	18
5	10 Ton Topp. Lift. Tackle & whips	1	8300'0"	3/4"	"	Galv.	"	18
6	Stack Guys	1	700'0"	1"	Std CCS	Galv	"	59
8	Shrouds	1	550'0"	2"	ImpPlStl	"	"	18
9	Forestay	1	160'0"	1 1/4"	Std CCS	"	"	59
10	Topmast Forestay & side stays	1	240'0"	3/4"	"	"	"	59
12	Wireless Downhaul	1	300'0"	1/2"	"	"	"	59
13	Sounding Boom Pendant	1	25'0"	7/16"	"	"	"	59
A14	Telescopic Topmast (Hulls 26871 only)	1	338'0"	5/8"	Flow Stl	"	"	17
15	Paravane Preventers	1	220'0"	1"	"	"	"	17
16	Boat Boom Ladders	1	280'0"	9/16"	Std CCS	"	6 x 12	61
17	Boat Boom Pendants	1	115'0"	5/8"	ImpPlStl	"	6 x 19	18
18	Boat Boom Pendants	1	85'0"	3/4"	"	"	"	18
19	Triatic Stay	1	135'0"	5/8"	Std CCs	"	"	59
A20	Paravane Pendant	For Hulls	15'0"	5/8"	ImpPlStl	"	6 x 37	30
A21	Paravane Topp. Pendant	2727 only	13'0"	1 1/4"	Std CCS	"	6 x 19	59

ALTERATIONS: (A) Item 14 cancelled for hulls 2727 & items 20 & 21 added for hulls 2727 only.

WIRE ROPE SOCKETS (For one ship)					
Item	USED FOR	No. Req.	SIZE	TYPE	REMARKS
1	Shrouds	16	2"	closed	Drop forged steel
2	Forestay	1	1 1/4"	closed	Galv similar to
3	Forestay	1	1 1/4"	open	T. Laughlin
6	Paravane Preventers	4	1"	open	Sk. 92E. for open
7	Stack Guys	32	1"	closed	Sockets closed
5	10 ton Vang Pendant	32	7/8"	closed	T. Laughlin Std.
					sockets

THIS SKETCH SUPERSEDES SK #26877-18010-1 FOR HULLS #269-77.

SK. 26977-18010-2 SISAL ROPE

SISAL ROPE (for one ship)

Item No	USED FOR	No of Coils Req	Length or weight coil	SIZE	TYPE	MATERIAL
1	10 Ton vang tackle and accom. ladder falls		750 fath.	4" circ	3 strand	sisal
2	Fuel oil hose and boat boom		195 fath.	3 1/4"	3 "	"
3	Lyle Gun		250 fath	3"	3 "	"
B4	Stores tackle, accom. ladder guys & Paravane Gear	Hulls 26871 2727	100 fath 127 fath	2 1/8"	3 "	"
A5	Gantlines, Boat Booms and forward anchor		34 fath	1 3/4"	3 "	"
6	Paravane Gear		34 fath	1 3/4"	3 "	"
7	Paravane Gear, sounding boom, ice cabinet tackle and accomodation ladder lashings		115 fath	1 1/2"	3 "	"
8	Misc. lashings		34 fath	1 1/8"	12 thread	tarred hemp
9	Signal, truck, & gaff halyards		350 fath	1"	9 thread	braided cotton
10	Houseline for serving		40 lbs.	-	-	-
11	Paravane Gear		60 fath	6" circ	3 strand	sisal
B12	Paravane crane vangs (Hull 2727 only)		120 fath	2 3/4"	3 strand	sisal

ALTERATIONS (A) Item #5 increased from 106 to 117 fathoms to include ford
 (B) Item #4 quantity changed for hulls 2727 for paravane gear, Item 12 added.

THIS SKETCH SUPERSEDES SK. #26877-18010-2 FOR HULLS #269-77.

ACCESS - ELEVATORS

Two Westinghouse elevators are provided within the ship. Details concerning each are as follows:

One is located on the Center line at frame 82 to 84 $\frac{1}{2}$, operating from the refrigerating flat to the 3rd deck. Machinery and controls are located directly above on the 2nd deck.

Capacity - 2000#, 13 people, (adjusted for 800 lbs. ave. load.)
Weight of car - 2200 lbs.
Speed - 100 feet per minute.
Cables - No. 4, $\frac{1}{2}$ " diameter, ultimate strength 58000 lbs.
Car, inside dimensions - 7'-5" x 4'-8" x 4'-2".
Door, dimensions - 7'-0" x 3'-1" (Manually opened)
Drive - Motor, Westinghouse, 7 $\frac{1}{2}$ HP, 230-volt, 32.8 Amps., 1150 RPM,
Direct current, compound wound, worm gear speed reducer. Shoe
type solenoid brake between motor and reducer.
Telephone service is provided between the car and the elevating machinery room.

Movement of the car is controlled by a hand lever which has two positions for two speeds. Push button stations are located on each deck connected to a call bell and indicator panel in the car. Elevator position dials with pointers are located just above the doors on each deck and show the position of the car. Emergency door unlocking keys are provided on each deck, housed behind a glass panel located on the bulkhead beside the elevator doors.

Inside the car, push buttons are provided for emergency stop, overhead fan, lights, and a button for clearing the call bell indicator panel. Provided also is a push button type lock with keys for locking the controls of the car to prevent movement in any direction.

The second elevator is located on the port side at frame 128-130, operating from the fourth deck to the Main deck. Machinery and controls are located directly above on the upper deck. With the following exceptions, this elevator is identical with the one described above:

Car, inside dimensions, 7'-5" x 3'-10" x 4'-2".
Door, dimensions - 7'-0" x 2'-4 $\frac{1}{2}$ " (automatically opens)

Within the car, push buttons are provided for each deck level, the car moving automatically to the deck corresponding to the button pushed.

WINCHES AND CAPSTANS

CAPSTANS:

The Capstan is of a very rugged construction and is built to stand whatever load the motor is able to produce. It is, however, good practice after a standstill to permit the capstan to idle a few seconds before submitting it to a full hawser pull. This is recommended for the benefit of the motor and also because it insures proper lubrication of the worm drive, resulting in maximum efficiency. Pulling slack in the hawser may of course, be considered as idling.

Aside from the proper lubrication the capstan needs comparatively little attention. The main things are to see that all bolts, nuts, and screws are kept tight at all times. Do not permit dirt to enter any bearing or oil chamber. As soon as the tapered roller bearings on the vertical shaft indicate excessive play, proper tightness is obtained by removing shims provided for this purpose.

Careful attention must be given to the lubrication of all bearings and moving parts, to insure efficient and continued operation.

There are two pressure grease fittings, one on the capstan base and one on top of the worm gear case cover. These should be lubricated regularly with Navy Dept. Specification 14Glg Grade 2. The oil-tight spur gear case should be filled to the level gauge (bibb cock) with SAE 40 engine oil.

The worm gear case and the vertical shaft coupling should be filled to the proper levels, with SAE 160 engine oil. Both are equipped with bibb cocks as the oil level.

It will be noted that the worm gear case has two drain pipes, one at the center and one slightly off center. By draining through the off center pipe first and then through the center pipe it is possible to prevent the courser sediments from passing through the tapered roller bearing.

RULES FOR ORDERING REPAIR PARTS: Whenever it is found necessary to order parts for repair the following procedure will be insure that the proper part will be furnished:

Identify the part by description and part number as given in list on drawing 5WW.1112-F, attached to Clyde Instruction Book.

Specify serial no. of the capstan as given in the Clyde Instruction book. The same serial number will be found on a metal plate on the capstan.

Supplies:

Clyde Iron Works, Inc., Duluth Minnesota.

Motor - Westinghouse 35 HP 600 RPM, 230-volt, 181 Amp, compound wound, direct current.

See sketch for further details.

Reference: Clyde Iron Works Drawing 5WW1112F.

CARGO WINCHES:

American Hoist and Derrick Company, St. Paul, Minnesota.

8 single speed, motor driven, single drum, single niggerhead 16" x 20".

Motor - Westinghouse, 50 HP, 600 RPM, 181 Amps, 230 volt, compound wound, direct.

Reference: American Hoist and Derrick Company drawing 55408. See sketch for further details.

The following instructions for "Brake Adjustment" are given by the manufacturer -

"The foot operated brake should be kept properly adjusted. This adjustment is done in the following manner:

"The dead end of the brake band is pin-connected to a Tee Bolt. This Tee bolt is threaded and screws into a nut welded to the bed frame. To take up the wear of the brake lining, it is necessary to remove the pin connecting the band end to the Tee Bolt. Then rotate the Tee Bolt as required to take up the wear on the lining. Assemble the disconnected parts and check for clearance between the brake lining and the brake drum. This clearance should be kept to a minimum, just sufficient to prevent dragging on the brake drum when the brake is in the released position and should be kept as uniform as possible around the brake surface."

BOAT WINCHES:

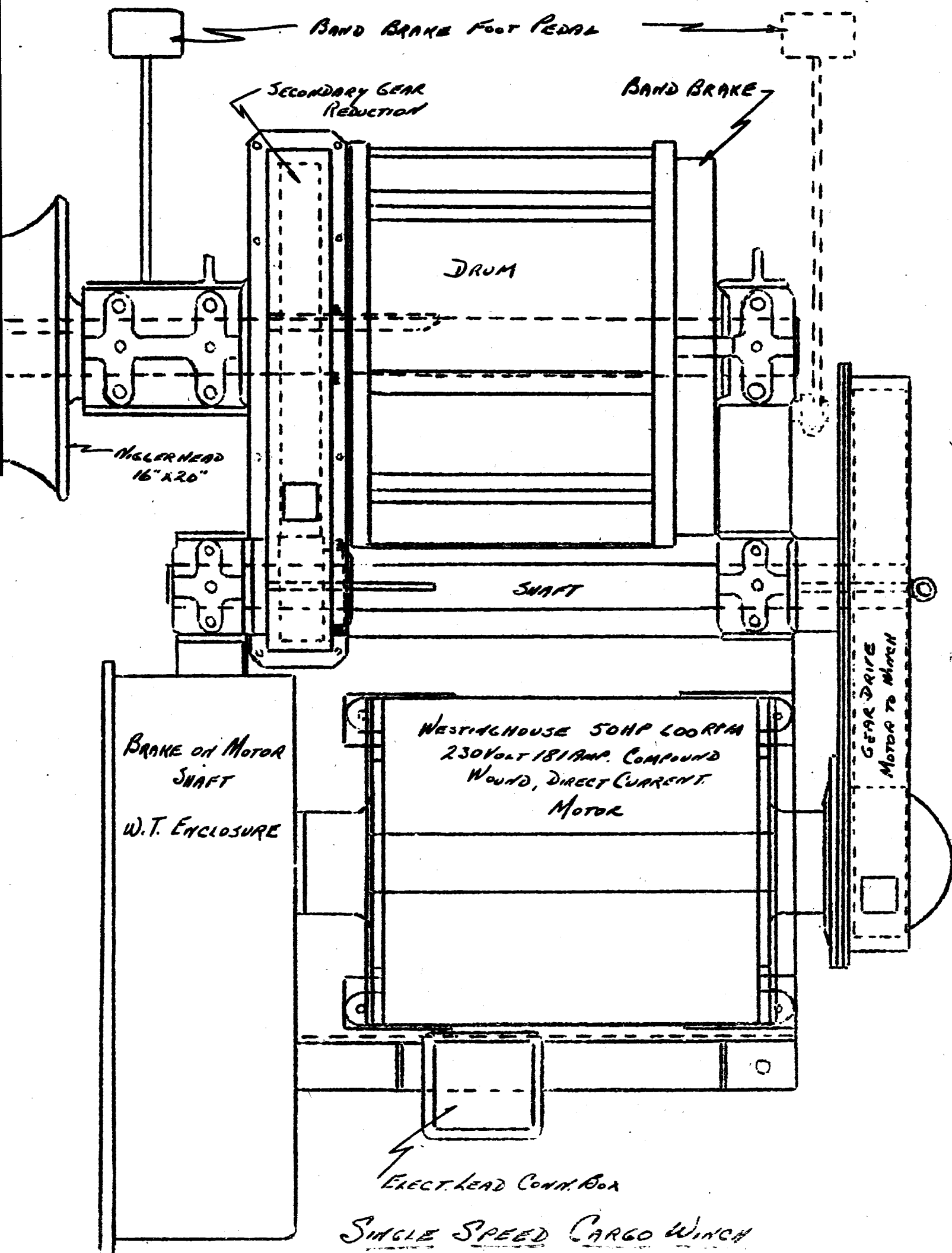
The ship is equipped with twelve (12) "Welin" electric boat winches, or one for each nest of boats. In each case the winch is driven by an electric motor driving through a double worm gear reduction unit to the cable drums. Each winch has two (2) cable drums with a manually operated level winding attachment. Winches are equipped with counter weighted brake bands which function automatically to hold the load in case of power failure, and which are used to lower-away by lifting up on the counter weighted brake lever. Hand cranks are provided for manual operation. A push button station is located on the winch or near by for "lifting" or stopping the motor.

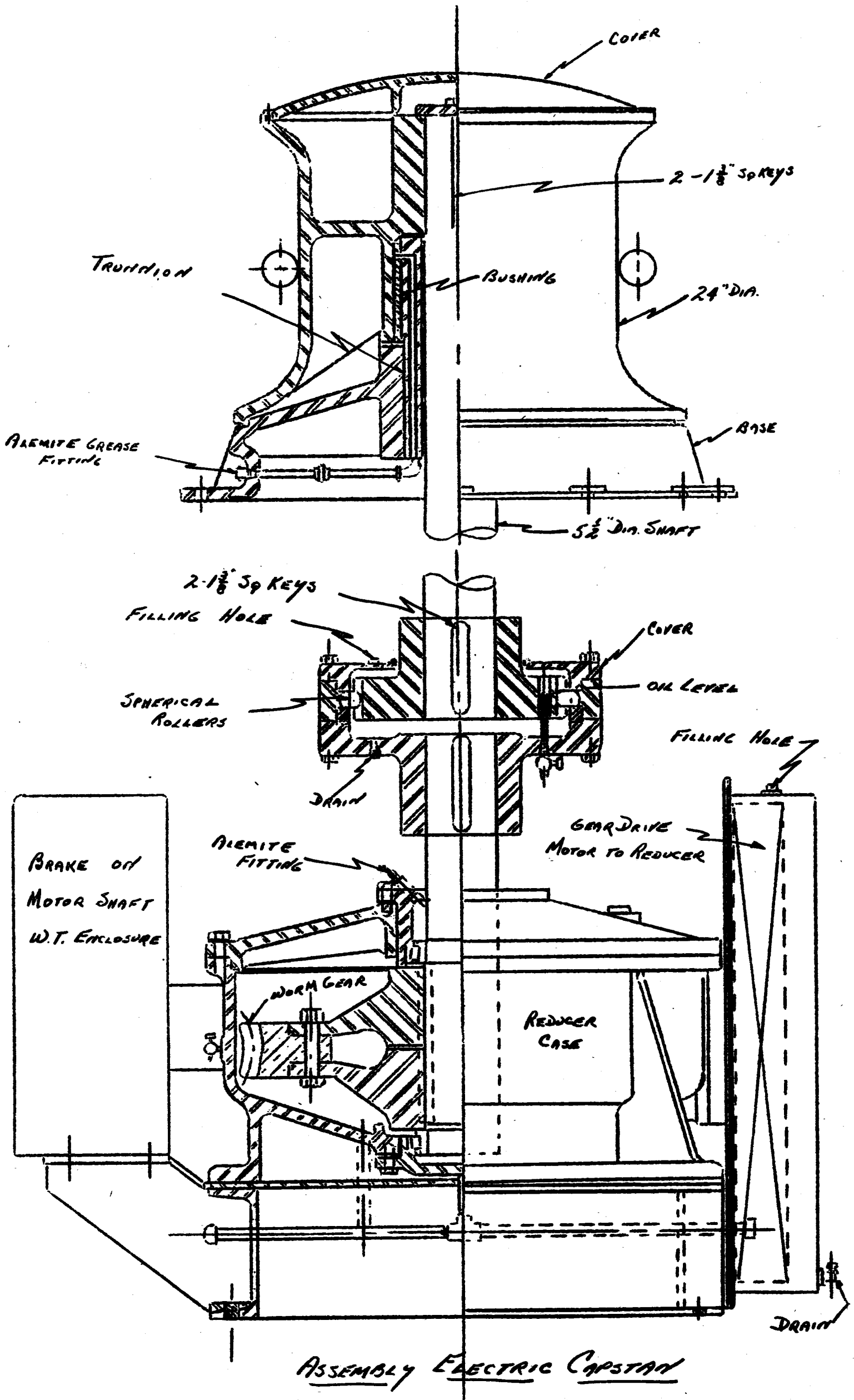
Winches #1 and #2, for the 26' motor wharf boats forward, are:

type CWB contract #7065.
Motor - General Electric type CDM
1250 RPM, $12\frac{1}{2}$ HP, 230 volts, 47 amps.
frame #75, model 31A1918, compound wound, direct current.

Winches #3 thru #12, for remaining boats are -

type BWB contract #7665,
Motor - General Electric, type CDM
1750 RPM, 25 HP, 230 volt, 90 amp.
frame #77 model 55a655, compound wound, direct current.





SHIP CONTROL SECTION-S24

SHIP CONTROL EQUIPMENT

CONTENTS:

Description - Anchor Windlass.
Description - Gyro-Compass System.
Description - Sounding Machine.

REFERENCES:

Windlass Operating Instruction Book - Lidgerwood Manufacturing Company.
Gyro-Compass, Mark 14 Mod 1, Inst. 17-1400-C; Sperry Gyroscope Company.

ELECTRIC WINDLASS

The electric windlass self contained on deck handles 2-5/8" stud link chain and 15575 pounds anchors.

The windlass capacity is such that it can hoist both anchors simultaneously from a depth of 30 fathoms at a rate of not less than 30 feet per minute. Also the windlass can hoist one anchor and 120 fathoms of chain.

Each warping head, ~~not~~ not simultaneously, can handle a load of 20,000 lbs. at not less than 30 feet per minute, and a light line load at approximately 75 feet per minute.

Dual electric controls are provided, one for anchor handling and one for warping. Selection of control is automatic by means of operating the locking keys, which in turn operates a switch. Engaging the locking head and keys with the wildcat places the control on anchor handling and disengaging the locking head and keys from the wildcat places the control on warping service.

The electric brake is to be set so that the load on the warping head cannot exceed 30,000 lbs.

DESCRIPTION

The windlass consists of two independent cast steel wildcats bronze bushed to the slow speed shaft. Outboard of each wildcat are cast steel locking heads keyed to the slow speed shaft, and mounted on each locking head is a bronze locking ring, and supported on the same shaft projection on each ring are two forged steel black keys, slidable into suitable pockets in the wildcat. In each ring are slots and by means of a bar inserted into any of the slots the ring can be revolved thru 60 degree which will either insert the black keys into the wildcat pockets and thus lock the wildcat to the slow speed shaft or disengage the wildcat from the shaft. By this arrangement either or both wildcats may be used. On the locking ring is a spring loaded locking pin for locking the locking ring to the locking head, when the latter is engaged to or is disengaged from the wildcat.

The low speed shaft is supported by three bronze bushed cast steel pedestals. Outboard of each outer pedestal and keyed to the slow speed shaft are the cast steel warping heads 22" diameter by 23-1/2" long over flanges. The warping heads are located so that the hawsers will clear all other portions of the windlass.

The slow speed shaft is driven by a triple set of spur gear reductions by A Westinghouse 100 HP motor, type ME, frame 16, 230 volt, variable speed motor. At 100 H the motor runs at 600 RPM. Attached to the motor is a Westinghouse type 104P electric brake. All gears are cast steel, and pinions are forged steel having cut teeth. All shafts run in bronze bushings mounted on cast steel pedestals. All gearing except the high speed gearing have protective guards while the high speed gearing is encased in an oil tight housing.

The outboard end of each wildcat forms the brake drum for the asbestos composition lined brake bands. As shown the brake band is in two parts secured together by a hinged joint. Attached to this hinge pin is a spring loaded brake support to prevent brake band from dragging. The "dead" end of the brake band is secured by a pin to the brake wheel stand, while the "live" end of the brake

is secured to one end of the brake lever through a threaded (brake lining wear adjustment) clevis, while the other end of the brake lever is operated by the brake wheel through a loaded screw. The arrangement is such that five turns of the brake will move the brake from full-off to full-on.

UNDER NO CIRCUMSTANCES SHOULD ADDITIONAL LEVERAGE BE APPLIED TO THE BRAKE WHEEL, OR MORE THAN 75 POUNDS BE APPLIED TO THE BRAKE WHEEL RIM.

All pedestals, motor and brake, are mounted on a cast steel bedplate.

LUBRICATION

Parts such as bearings, brake mechanism, etc., requiring pressure greasing are fitted for alomite lubrication. The high speed gear runs in oil, and for this purpose, two quarts of SAE 30W oils should be kept in the high speed reduction gear casing. All other gearing should be greased by hand.

Inasmuch as water often breaks over the windlass, all parts of the windlass must be kept well lubricated, but no oil or grease must be allowed to get on the brake bands.

Care must be taken in painting the windlass, that the openings in the alomite fittings and all parts requiring lubrication, are kept free from paint.

OPERATION

When the wildcat is not in operation, the chains and anchors must be held by the chain stoppers, with the wildcat brakes either entirely off or partially on. Do not put the brakes full on and attempt to hold the anchors by the brakes instead of the chain stoppers, as in so doing will greatly shorten the life of the wildcat bushings.

To use either or both wildcats insert block keys into wildcats, set brakes and release chain stoppers. Care should be taken that the locking pin is locked to the locking head by the spring loaded lock pin.

When warping, disengage wildcats from wildcat shaft, holding the anchors and chains by the chain stoppers, and brake partially on.

When lowering by gravity, the wildcat brakes should be used.

When operating by power, and power fails, the electric brake will operate and automatically stop the windlass. If this occurs when warping, the hawser should immediately be secured to a bitt or other suitable fastening.

GYRO COMPASS SYSTEM

If the basic principles of the Compass are understood and the rules laid down for operation, care and maintenance are carefully followed, the instrument should give satisfactory service for many years. Normal replacements, due to wear will be necessary from time to time. Most of these replacements may be made by the Compass operator, following the instructions contained in the instruction book. But the operator should not attempt to make any repairs or adjustments other than those noted in the text, otherwise he may seriously effect the adjustments and balances of the compass. It will be found more economical to have a Gyro-compass semiengineer make any major adjustments, overhauls, etc. The Sperry Gyro-compass company, Inc. maintains a staff of experts ready to render quick and efficient service in any port in the United States.

Basically the Compass is much like the very popular Mk. VI and VIII compasses, of which over 1000 have been placed in service on ships representing almost every maritime nation in the world. Many improvements in design are present in the new compass but since they are too numerous to mention here, only a few outstanding changes will be mentioned.

The Mercury ballistic is cast in one piece so as not to be subject to distortion.

The binnacle is designed to support the Compass in such a manner that the entire unit is shock-proofed. The doors are large, permitting free access for oiling and cleaning. The binnacle may be readily disassembled to permit it to be carried through a small door on board ship.

The follow up system for the compass is the A-C amplifier type. The great advantage of the amplifier unit over the trolleys and contactors, formerly used is that it permits much smoother and more accurate transmission of the master compass readings to the repeater compasses. Its use also eliminates any rolling or sliding contact between the sensitive and phantom elements. This serves to lessen friction about the vertical axis of the sensitive element and assists in improving the accuracy of the compass. Furthermore, maintenance requirements are minimized.

In order to secure constancy of balance, all parts are made to have the utmost rigidity. Balances once made are thus permanent and the settling position of the compass is practically invariable.

Special attention has been devoted to ruggedness, simplicity, and accessibility of construction. This is considered specially important for the proper maintenance of a compass equipment aboard ship.

The Mark XIV Gyro-compass Equipment consists of the following groups of units:

- (a) Master compass, by which the true north reading is gyroscopically discovered and maintained.
- (b) Repeater compasses, which receive and indicate the true heading transmitted electrically from the Master compass.
- (c) Course recorder, which also received the true heading electrically from the master compass, and makes a continuous record of the heading on a moving strip of paper.
- (d) Control panel, for governing the electrical operation of the system and for ascertaining the running condition by means of a suitable meter.
- (e) Voltage regulator, to maintain constant the ship's supply to the motor generator.
- (f) Alarm unit, for indicating failure of the ship's supply.
- (g) Amplifier panel, for controlling the follow-up system.
- (h) Motor-generator, which converts the ship's D-C supply to A-C for energizing the compass equipment.

OPERATION

PREPARING TO START

1. Preparations should be begun preferably at least 4 hours before the compass is required for service.
2. Make certain that all supply switches are open.
3. Unlock binnacle top cover, open one door and make sure that vertical ring and rotor case locks are applied.
4. Take hold of both sides of phantom and vertical rings and turn them slowly until compass card indicates approximate heading of ship. The compass should never be turned in azimuth, with the power off, by pressure on compensator weights or mercury ballistic.
5. Check height of oil on oil well windows. Make sure that oil level is just even with center of dot on window and that oil level is the same on both sides of compass.
6. Test alarm by throwing switch on alarm unit for a second or so, to make sure relay functions.

- (7) Adjust speed and latitude and auxiliary latitude correctors to proper setting. (See paragraphs 25 and 27)
- (8) Pull out circuit breaker plunger on control panel, to energize motor generator. Hold plunger out by hand until motor generator speeds up (in about 5 seconds).
- (9) If compass rotor does not start with motor generator, rock compass in plane of its rotor until it starts.
- (10) When starting alongside a deck, wait until rotor is up to speed (in approximately 10 minutes), then turn on follow up switch on amplifier panel. (When starting up at sea, release the rotor case and vertical ring locking latches immediately and steady the rotor case by hand until rotor is up to speed.)
- (11) Wait one minute for rectifier tube filaments to heat up.
- (12) Release rotor case and vertical ring locking latches.
- (13) Turn ON azimuth motor switch at amplifier panel.
- (14) Close all repeater switches.
- (15) Turn switch at alarm unit so as to silence alarm.
- (16) Reset Compass on ship's heading by pressing down on one or the other of the rotor case bearing housings, and if necessary level the rotor by pressing against the vertical ring until bubble is on normal settled position. Check repeaters, and synchronize if necessary.
- (17) After Compass is up to speed and operating normally, precess compass by pressing on top of either rotor case bearing housing until zero on compass card points true north, at which time the card will indicate the true heading of the ship. Then level the case by bringing bubble to normal settled position and allow compass one hour to settle.
- (18) Level the case; approximately 21 minutes later level it again; approximately 21 minutes later, level it a third time. The compass will then indicate approximately the true meridian. When the bubble remains at at its normal operating position, the Compass has settled on the true meridian.
- (19) Level the case and observe rate of travel of rotor case level bubbles, in minutes of arc for any convenient period of time (say 3 minutes) Also note direction of movement.
- (20) Divide number of minutes of arc through which bubble traveled by number of minutes of time allowed for the test. Multiply this quotient by the constant 5. The product will give the approximate number of degrees deflection from meridian.
- (21) If the bubble travels to the south, compass should be precessed to the East, and if bubble travels to north, compass should be precessed to the West. Amount of precession should be equal to number of degrees obtained in preceding paragraph. Thus if the bubble moves to the south at a rate of 6 minutes of arc in 2 minutes of time, when compass heading was 125° , then north end of the compass is pointing approximately $6/2 \times 5$ equals 15° West of the meridian and it should be precessed this number of degrees to the east, or to $125^{\circ} - 15$ equals 110° .
- (22) Level the case, again observe bubble movement and make a finer correction if and when necessary. When bubble movement has become less than one minute of arc in 5 minutes of time, compass should be within one degree of the meridian. The foregoing rule is approximately accurate for deflections up to about 50° in latitudes between 0° and 60°

- (23) Care should be taken that compass is not started exactly 180° off the meridian, as bubble will travel very slowly when compass is heading in such a direction.
- (24) The settling position of the gyro axle relative to the meridian is reached when the bubble finally occupies its normal settled position in the level. In case the normal settled position in the level is not central, when compass is settled on the meridian, its normal settled position should be recorded and used in making the above setting.
- (25) When the compass is in operation, the corrector should be set for the approximate speed and latitude of the ship. These settings need not be changed for small variations in speed and latitude, but should be kept within 3 knots and 30° respectively.
- (26) To set corrector, turn knob 57 (figure 1) until the scale line corresponding to the ship's latitude on the movable latitude bar intersects the curve representing the ship speed on the speed plate across which the latitude bar is movable.
- (27) To set the auxiliary corrector, turn knob 58 until the line engraved on lubber ring coincides with approximate local latitude marked on adjustable block of corrector.
- (28) A momentary failure of the supply current will cause buzzer to sound until the supply is restored, and in such case the accuracy of the compass will not be affected. It is well, however, to check repeaters with Master Compass after any momentary failure of the supply.
- (29) If the alarm continues to sound, the current failure evidently is more than temporary. Turn switch OFF to silence buzzer. Examine control panel immediately. The circuit breaker is adjusted to open approximately 5 seconds after the ship's supply fails. If, on examination, the circuit breaker is found open, repeat instructions for starting compass at sea. Check Master compass and repeaters.
- (30) Open repeater switches.
- (31) Turn alarm switch to silence buzzer.
- (32) Turn OFF azimuth motor switch.
- (33) Turn OFF the follow up switch.
- (34) Depress push button on control panel until circuit breaker snaps open, whence the voltmeter pointer will return to 0.
- (35) If stopping the compass at sea, during heavy weather when considerable motion is imparted to the compass, steady rotor by hand until it stops then lock it with locking latches. If stopping at deck, there is no need of supporting rotor by hand; it may be locked immediately.
- (36) Inspect equipment and clean same, if convenient. The equipment can best be cleaned while it is still warm.
- (37) Under normal operation, the rotor case is uncomfortably hot to the bare hand. This should occasion no alarm, as the normal operating temperature is approximately 45°C higher than room temperature. Keep oil level even with center of dot in oil well windows at each end of the rotor case.
- (38) Keep binnacle doors closed and cover locked whenever the compass is left unattended. Allow no unauthorized person to tamper with it at any time.
- (38a) With ships having 220 volt D-C supply, the operating instructions are somewhat different from the preceding. Refer to separate instruction pamphlet provided with 220 volt control panel.

DESCRIPTION - CONTROL PANEL

The control panel provides electrical control for the Master Gyro-compass, the motor generator and the repeater compasses, and indicates through a D-C voltmeter the regulated voltage to the Gyro-compass equipment.

In the following paragraphs the units which appear on the panel front, and inside the panel box are described in this order.

PANEL FRONT

The following units appear on the front of the panel. See Fig. 1.

- (a) Voltmeter (range 0-100), for indicating the D-C voltage supplies to the repeaters, the alarm unit, and the motor end of the motor generator.
- (b) Circuit breaker for connecting the ship's D-C supply to the units just mentioned. The circuit breaker plunger is pulled out to connect the ship's supply.
- (c) Push button, located in the upper right corner of the panel, used to shut down the equipment. Its function is to disconnect the circuit breaker coil, thereby releasing the contacts and disconnecting the ship's supply.
- (d) Repeater switch, located below the voltmeter in the middle of the panel, used for connecting the repeater compasses to the transmitter on the Master compass.
- (e) Fuses, plug type. There are 3 fuses, 2 in the ship's supply circuit and 1 in the repeater switch circuit.

THE ALARM UNIT

Since the compass equipment is dependent on the ship's supply and its accuracy may be seriously affected by a failure or an interruption of the current, it is essential that adequate warning be given in case the supply does fail, so that steps may be taken to remedy the difficulty at once. For this reason an alarm unit, arranged to sound an alarm in the wheelhouse in case the 70 volt D-C supply is interrupted, is supplied with the equipment.

The alarm unit, comprises a weatherproof case containing a voltage relay, a buzzer, a set of dry cells, which supply current for operating the buzzer, and a toggle switch mounted on the front of the case. The relay is connected across the 70 volt repeater supply, preferably at the bridge. When the compass supply is normal, the relay armature is held in place by the energized magnet coil. The circuit to the buzzer is controlled by the toggle switch which ordinarily is turned so as to silence the alarm.

Failure or reduction of the compass supply voltage causes the relay armature to drop, closing the buzzer circuit and sounding the alarm until the switch is turned off to silence it. To prevent the switch from being left in the OFF position when the supply has been restored and the relay armature returned to its normal operating position, the circuit is so arranged that the buzzer is again sounded when the armature is in the normal position. The switch is then turned ON which silences the buzzer during normal operation.

COURSE RECORDER

The course recorder is a device which is operated electrically from the Master Compass and traces on a moving strip of paper a record of the lateral work of the ship's head. Since the paper bears time marks and is driven by clockwork, the exact time is automatically recorded for each change of course. Thus a graphic check on the course is had, from the moment the vessel leaves the dock. At the end of the voyage, the chart can be removed and entered as a part of the ship's log where it will always be available for reference as a valuable navigational aid.

The course recorder is a complete unit operating on the repeater circuit from the master compass. It comprises a repeater motor which drives the controlling mechanism for an indicator dial and a pair of ink pins. A clock

controlled drive roller feeds a paper chart under the pens at the proper rate, and a spring driven re-wind roller winds up the paper and keeps it taut. The action of the re-wind roller is similar to that of an ordinary window shade, except that an automatic lock is provided on the spring drive to guard against excessive speed.

The repeater motor shaft extends in both directions, each shaft end carrying a worm drives a cam cylinder. The cylinder has a groove which causes a trolley carrying the course pen, to travel horizontally so that the course pen matches, on the paper chart, the position of the indicator dial. The dial periphery constitutes a cam which causes the zone pen to shift from one zone to another, on the paper chart, according to the dial position.

The clock mechanism is enclosed in a metal casing from which the necessary winding stems and control knobs protrude, at the left.

The recorder chart is a specially printed sheet of paper 90 feet long, sufficient for a continuous record of 30 days.

A window is provided in the front cover to enable an observer to examine several hours of record without opening the instrument. An auxiliary indicator of the ship's heading is also provided, when the cover is closed, by an azimuth scale concentric to the motor driven indicator dial within.

A lamp, controlled by a switch on the upper right corner of the front cover, provides illumination for reading the chart at night.

OPERATION

To start the recorder, wind clock springs and re-wind roller spring in direction indicated by arrows.

If needed, insert a new chart-roll.

Fill pens with special red ink, using glass dropper provided. Inkwells should be removed from their holders for filling. To remove, grasp inkwell between thumb and fore-finger and slide it downward. Fill the well $\frac{3}{4}$ full and replace in holder. Start a flow of ink through pens by means of the pen primer, also provided. To do this, compress primer bulb, then insert pen point in primer hole and slowly release bulb, drawing ink up from the well through the pen. Remove primer and allow pen to bear on chart. When both pens have been thus primed, move chart up and down under pens to insure that ink flows properly. Once started, the ink will continue to be fed by capillary action.

Start clock by moving clock control arm forward.

To set the recorder with Master compass, turn motor shaft by means of the knurled synchronizing stem until ZONE PEN (left hand pen) enters quadrant in which ship's head lies. Continue turning until COURSE PEN (right hand pen) reaches the proper degree line as indicated by the horizontal row of numbers which corresponds to quadrant in which ZONE PEN rests. Recorder may be set with circuit closed without damage, but it is easier to first set it to the approximate heading with the current off.

When making a final check of the Master compass and repeaters, the course recorder may be synchronized exactly with the master by turning the motor shaft as described above.

CAUTION:- Do not attempt to synchronize the pens in any other manner than that described. Any attempt to set the instrument by applying force to the cam drum or to the indicator dial is likely to result in damage to the repeater movement.

If clock fails to start when clock control arm is turned in the proper direction, raise glass window and start escapement wheel by moving it very carefully with a piece of paper. DO NOT TRY TO START ESCAPEMENT WHEEL BY MOVING IT WITH THE FINGERS.

Close and lock the recorder cover.

TO STOP THE RECORDER

When the compass equipment circuits are opened, the recorder motor is stopped.

Stop recorder clock by moving clock arm backward .

Place a piece of paper underneath pens to keep the chart clean. Close and lock the cover.

SOUNDING MACHINE

A Navy standard sounding machine is provided, located on the starboard side of the upper deck at about frame 82. The boom is suitably located at the rail to serve the machine. The sounding machine consists of a stand carrying drum, driven by cranks on each side. A mechanized brake controls the speed at which the wire runs out. The drum capacity is 300 fathoms of wire. A dial on the machine indicates the amount of wire out and must be set at zero before sounding is taken.

To the end of the wire is attached a brass cylinder which carries and protects the glass sounding tubes. Beyond the cylinder end connected to it is the lead.

Two types of glass tubes are used:

1. "Chemically" coated tubes are coated on the inside with chloride of silver, a substance which changes color on contact with salt water.
2. "Ground Glass" tubes are ground on the inside so that they show clear glass when wet, this being a peculiarity of ground glass.

LAUNDRY SECTION S35

LAUNDRY WASHER

Maintenance and Operation Instructions

Name: HOFFMAN SILVERCREST MONEL WASHER, 42" X 64".
Maker: U.S. Hoffman Machinery Corp., 105 Fourth Ave., New York City.
Refer: HOFFMAN INSTRUCTION BOOK, Laundry Equipment pp. 1-33.

ELECTRICAL WORK: The washer is furnished with an automatic motor reversing control to be mounted on the wall adjacent to the machine. The necessary control pushbutton station and limit switches are mounted on the washer. The control wires from these stations are run in conduit to a junction box mounted on the rear of the washer (See wiring diagram No. 1189 of reference).

The conduit carrying wiring to the motor must be fitted with a flexible section to permit motor adjustment for chain take-up.

It is suggested that the following checks on electrical work be made:

(1) Does the machine reverse smoothly and pick up speed without jolting? If not a readjustment of the timing device on the control panel is necessary. For method of adjustment see Dwg. No. 1126 of reference.

(2) Does the pushbutton station operate properly? The washer should start when the toggle switch is in the "ON" position and by pushing the "START" button. The washer can be stopped by pushing either "STOP" button or opening the shell door. The cylinder can be inched when shell door is open and the "START" button and either "INCH" button are held down.

(3) Be sure that the motor brake functions only when the shell door is open. When properly connected this brake holds the cylinder against rotation only when motor current is interrupted provided the shell door is open. The brake should never be applied when the motor current is interrupted during the normal reversal of the cylinder with the shell door in the closed position.

STEAM, WATER AND

DRAIN PIPING : An adequate supply of steam and both hot and cold water should be available. Live steam at a pressure of 85 to 100 lbs. is preferable. The water lines should be the same size as the water inlet valves mounted on the washer. The hot water supply washer should be as near 180°F as is possible.

The drain pipe should run from the outlet valve on the washer to a waste receiver or drain line. A 4-inch companion flange is furnished on the discharge side of the outlet valve for this connection.

OPERATION OF WATER

AND STEAM LINES: Either hot or cold water may be admitted to the shell by means of quick opening valves mounted on the right hand end of the washer. The level of water in the shell is indicated by the dial water gage located on the left hand end of the washer. Temperature of the incoming water is regulated by the degree of opening of the hot and cold water valves.

Steam may be admitted through steam inlet on the bottom of the washer shell in the drain valve body. This permits the water to be heated to the correct temperature. The steam valve is operated from control handle located next to pushbutton station and gear guard. This steam inlet circulates water assuring uniform distribution and no live steam striking the load.

ADMITTING

CHEMICALS: Chemicals such as soap, bleach, sour and blue are admitted to the washer by opening the supply door lid on the washer shell door. This must be done while the machine is running so that the chemical will be thoroughly mixed with the water in the washer.

DUMPING: The washer is drained by opening the poppet type of dump valve connected to the bottom of the shell. This valve is operated by a foot lever located at the front of the washer. To conserve water be sure that this valve is tightly closed before refilling the shell.

STARTING AND
STOPPING :

The washer cannot be started until the shell door is closed and the safety switch on pushbutton station pushed to "ON". Pushing the "START" button will then start the washer reversing automatically. The washer may be stopped by opening the shell door or pushing either "STOP" button.

"INCHING" can be accomplished when the shell door is open by pushing either inch button (According to the direction of rotation desired) and then holding in the "START" button. The cylinder will continue to rotate in the selected direction as long as the start button is held in.

The brake on the motor will hold the cylinder against rotation as soon as the start button is relieved.

MAINTENANCE

REFERENCE TO
PARTS :

If referring to or ordering parts for this washer always give the following information: Part Number, Part Name, Quantity Desired; Model, Type and Serial Number shown on Name Plate of machine. If correspondence or order has reference to motor or controls, the serial number shown on the Name Plate of these items should also be given.

LUBRICATION: Lubricate the machine regularly as indicated by Dwg. No. 1187 of reference.

TIGHTENING

PACKING : As with all stuffing boxes, it becomes necessary to take up the packing. This operation can be accomplished by removing sheet from gear guard. Then with an open end wrench, turn jam nuts on gland stud to the right. Be sure to take the same number of turns on each nut, taking up evenly on all four.

After the washer has been in service some time, the shaft trunnion packing needs replacing. The work should proceed as follows: (See Dwg. No. 1102 of reference) Be sure power lines are disconnected so no one can operate the washer. Remove the sheet attached to the gear guard. Then remove jam nuts on gland stud and push back gland. Remove old packing, clean out packing box. Then put in new packing one ring at a time, and reassemble parts.

ADJUSTMENT OF
CYLINDER DOOR

LOCKS : It is most important that the cylinder door latches be kept as tight as possible. Looseness hastens wear of the cylinder door, slides and latch parts.

The cylinder door latches are of the tapered self-adjusting type and automatically compensate for wear within a reasonable degree. If the wear exceeds the range of automatic take up the latch keeper must be readjusted. The readjustment is made by loosening the nuts on the keeper screws and adjusting the keeper downwardly a sufficient amount to reduce the engagement of the tapered latch surfaces by about 1/8".

The wear of the latches takes place on only one side of the tapered surfaces. The effect of new parts can be obtained by merely interchanging the latches between right and left positions.

MOTOR SPECIFICATIONS FOR HOFFMAN LAUNDRY WASHER

1. Identification:

- | | |
|------------------------------------|----------------------------------|
| (a) Manufacturer | The Louis Allis Company |
| (b) Navy Contract or Shipbuilder's | Order No. F.S.& D.D.Co. #268-403 |
| (c) For Driving | 42x64" Laundry Washing Machine |
| (d) Mfr. of Driven Auxiliary | U.S. Hoffman Mach. Corp. |
| (e) Number of Motors Involved | One per washer |

2. Motor Ratings:

- | | | | |
|---------------------|------|---------------------------|---------------|
| (a) Volts | 230 | (f) Method of temperature | |
| (b) Horsepower | 3 | Measurement | - Thermometer |
| (c) Amperes | 12 | (g) Temperature Rise | 50°C. |
| (d) R.P.M. | 1150 | | |
| (e) Horsepower Req. | 3 | | |

3. Motor Classification:

- | | | | |
|-------------------------|------------|------------------------------|------------|
| (a) Degree of Enclosure | Drip-Proof | (e) Ambient Temperature | - 40°C. |
| (b) Method of Cooling | Natural | (f) Mfr's. type and class | - |
| (c) Speed | Constant | Type GNA, Frame 254, Class E | |
| (d) Type of Winding | Compound | (g) Mounting | Horizontal |

4. Weights:

- | | |
|--|----------|
| (a) Motor Complete | 240 Lbs. |
| (b) Spare Armature, Complete | 52 Lbs. |
| (c) All spares boxed, including control spares | 120 Lbs. |

5. Efficiency:

- | | Efficiency | Amperes |
|-----------------------|------------|---------|
| (a) At Rated Load 4/4 | 79 % | 12.5 |
| (b) At 3/4 Load | 78 % | 9.5 |
| (c) At 1/2 Load | 75 % | 6.5 |
| (d) At 1/4 Load | --- | --- |

6. Main Poles:

- | | |
|-----------------------|-------|
| (a) Number | 4 |
| (b) Air Gap (Nominal) | .034" |

7. Shaft Material:

- (a) Hot rolled steel

8. Commutating Poles:

- | | |
|-----------------------|-------|
| (a) Number | 2 |
| (b) Air Gap (Nominal) | .048" |

9. Bearings:

- | | | | |
|--|-----------------------------|-------------|----------|
| (a) Type | A | Class A & B | Grade 11 |
| M.R.C. #207 S or M on front and M.R.C. #307 or M on back or Fafnir #207 K or W on front and Fafnir K or W on back. The bearings shown are approved by the Harlin Rockwell Corp., and signed by L.A. Cummings, C.E. per A.W.W. By Fafnir Bearing Co. and signed by E.H. Carter, C.E. per C.W.K. | | | |
| (b) Lubrication | Grease, Navy 14L3b, Grade B | | |

10. Shunt Field Windings:

- | | |
|------------------|---|
| (a) Winding Data | 2000 Turns of #26 Wire, Enamel Covered. |
| (b) " " | Developed Length in Ft. Per Coil = 2260 Feet. |
| (c) " " | Weighing 9-1/2 Lbs. Resistance Per Coil at 250C = 94. |
| (d) Insulation | Enamel |
| (e) Impregnation | Complete coils are dipped in G.E. #458 varnished and baked 6 hours. Final spray with air drying varnish |

11. Series Field Windings:

- (a) Winding Data - 38 Turns of #12 Wire, SCE conductor insulation.
Developed length = 53 ft., weighing 5-1/8 lbs.
Resistance per coil at 25°C = 1085
- (b) Insulation - SCE
- (c) Impregnation - Completed coils are dipped in G.E. #458 varnish and
bake 6 hours. Final spray with air drying varnish.

12. Commutating Field Windings:

- (a) Winding Data - 114 Turns of #13 wire SCE conductor insulation.
Developed length 89 ft., weighing 2-3/4 lbs.
Resistance per coil at 25°C = .18.
- (b) Insulation - SCE
- (c) Impregnation - Coil is dipped in G.E. #458 varnish and baked for
6 hours. Final spray with air drying varnish.

13. Armature:

- (a) Diameter 6.473"
- (b) Core Length 3.500"
- (c) Winding Data:
 - No. of slots 31
 - No. Comm. segments 93
 - No. Single coils 93
 - Conductor Copper (2 coils - #16)
(1 coil - #17)
 - Conductor Insulation SCE
 - Turns in series per coil 6
 - Developed length per coil 10 feet
 - Weight of copper 7-3/4/lbs.
 - Resistance at 25°C. .94

The shunt wound on red paper cell. Several layers of friction tape and three layers of varnished cambric wound shunt before winding series. Two layers varnished cambric around corners of completed shunt and series winding. .020" pressboard cell on sides and inside of coil. One (1) layer of half lapped cotton tape to complete coil.

Insulation Material

- | | |
|---------------------------|---------------------|
| Slot Cell | .022" Composite |
| Top Wedge | .062" Fibre |
| Center Wedge | .062" Fibre |
| 2 - Coil Layer Insulation | .010" Varn. Cambric |
- (d) Impregnation - Preheat armature four (4) hours at 230°F. Dip in G.E. #458 varnish and bake 6 hours.

14. Commutator:

- (a) Diameter 3-15/16"
- (b) Wearing Depth 3/8"
- (c) Length 1-5/8"
- (d) Flush or Undercut - Undercut
- (e) Insulation between bars - Mica
- (f) Insulation to Ground shaft - Mica

15. Brushes:

- (a) No. of Studs 4
- (b) No. of Brushes per Stud 1
- (c) Size of Brush
 - Length 1-1/4"
 - Width 3/4"
 - Thickness 1/4"
- (d) Navy Grade A
- (e) Manufacturer Speer Carbon Co.

16. Brake Data: (none)

17. Clutch Data: (none)

CONTROLLER SPECIFICATIONS

FOR

WASHER DRIVE MOTOR

"HOFFMAN 42X64" SILVERCREST MONEL WASHER

1. IDENTIFICATION:

- (A) Submitted by Cutler-Hammer Inc.
- (B) Navy Contract or Shipbuilder's Order No. F.S.&D.D.CO. P.O.No.268-403.
- (C) For use on MCC Hulls 668-677
- (d) For use with 42X64" Hoffman Silvercrest washer.
- (E) Driving Motor Manufactured by Louis Allis Co
- (F) Driven Auxiliary Manufactured by U.S. Hoffman Machinery Corp.
- (G) Number of Controllers One per Washer

2. REFERENCE DRAWINGS:

The following drawings showing the various construction details, as required by the specifications under "Plans", form A part of this description:

<u>TITLE OF DRAWING</u>	<u>MANUFACTURERS NO.</u>	<u>BUREAU NO.</u>
Drip Proof D.C. Reversing Magnetic Controller	Navy-X-1117A, 1126,1160,1189, 1243,1279,1283,1286.	
D.C.Disc Type Solenoid Brake	Navy-X-1239	

3. CONTROLLER CLASSIFICATION AND RATING:

- (A) Volts.....230
- (B) Horsepower..... 3
- (C) Degree of Enclosure..... Drip Proof, Protected
- (D) Type of Construction..... Magnetic
- (E) Duty Rating..... Stg. & Rev.
- (F) Operation of Control Circuit..... Semi-Automatic
- (G) Master Switch..... Push button
- (H) Resistor Classification..... Heavy Starting
- (I) Low Voltage..... Protection
- (J) No. of Resistor Starting Steps..... Two
- (K) Speed Control..... None
- (L) Type of Braking..... Shunt Type

4. MANUFACTURERS IDENTIFICATION:

- (A) Manufacturers Type Designation Bulletin 6106
3 HP, 230 Volt, D.C. Serial #B942188
B942252

5. DESCRIPTION OF OPERATION: (SEE DRAWING NAVY X-1189)

WASHER CYLINDER MOTOR

To start motor, Press "ON" Button first and then the "start" Button. This energizes the Main Contactor "CR" which releases the brake and starts the timer motor. When the "Start" Button is released, the motor is started thru the reversing contactors and the armature resistor is in series with the motor which is shorted out in two steps by the accelerators "1A" and "2A" to bring the motor up to full speed. Reversing is accomplished by means of the timer three times per minute. Acceleration is the same in Both Directions. To "Inch" Both "Start-Inch" and either "Stop Inch" or "Stop Inch-Down" Buttons must be depressed at the same time.

Stopping is accomplished with either "Stop Inch-Up" or "Stop Inch-Down" Buttons or opening the shell door.

5. DESCRIPTION OF OPERATION: (CONT.)

WASHER CYLINDER MOTOR

The operation of the controller is subjected to the overload relay at all times. Tripping of the overload relay stops the motor, so that the "start-Inch" Button must be depressed to resume operation. Relay must be reset by Button in cover of controller enclosure before pressing "Start-Inch" button.

When a Low-Voltage occurs the motor stops and must be started again by depressing the "Start-Inch" Button. After relay has been reset by button in cover of controller enclosure.

6. MASTER SWITCH:

- | | |
|------------------------------------|---|
| (A) Manufacturers Type Designation | Bulletin #6960 |
| (B) Description | Two Button, two N.O. & N.C. Elements marked "Stop", "Inch Up" and "Stop", "Inch Down", Three Button-One Element N.O. & N.C. Marked "Start-Inch" and Snap Switch marked "On" "Safe". |
| (C) Operation | See section #5 of this specification |
| (D) Material | Phenolic |
| (E) Enclosure | Waterproof |
| (F) Insulation | Phenolic |
| (G) Weight | 2 Button Station 3- $\frac{1}{2}$ lbs.
3 Button Station 5 lbs. |

7. OVERLOAD DEVICE:

- | | |
|------------------------------------|--|
| (A) Manufacturers type designation | #307 Overload Relay |
| (B) Description | - This is a solder pot type of relay. Melting of the thermal metal releases the contacts. |
| (C) Operation | - Device functions automatically in connection with control Panel. Overload causes thermal metal to melt after metal has congealed and set, pushbutton in door is depressed to reset device. |

8. LOW-VOLTAGE DEVICE:

- | | |
|------------------------------------|--|
| (A) Manufacturers Type Designation | Part of Contactor |
| (B) Description of equipment | - This is a magnetic contactor which has dropout voltage of 10 volts, operates in conjunction with the overload device and will not re-start on return of voltage. |

9. BRAKE DATA:

- (a) Description and method of control -

The brake is Cutler-Hammer, #512, 5" disc type alternating current Solenoid brake. The brake is controlled by a relay located on the reversing controller panel. The Hold-in coil of relay is operated by the Master Switch Located on the washer. The brake is applied when the Solenoid is deenergized and its plunger is pulled out of Solenoid so that the brake linings, #21, which are attached to the motor shaft by means of the lining disc, #22, are compressed between friction plate, #20, and support, #28. The pressure is applied by spring, #19, and is transmitted to plate #20. through lever plate, #14, Against which the spring bears and which carries the pressure plate, #2, and its pins.

The brake is released when the solenoid is energized and its plunger is pulled into the solenoid. The mechanism is arranged so that the lever plate, #14, is moved against the pressure of spring, #19. The lever plate carries the friction plate, #20, to free the lining and allow the motor shaft to rotate.

The brake can be released manually by means of the Hand Release Lever, which extends through the cover. The hand release is constructed so that the brake will not stay in the release position when the operator releases the Handle.

9. BRAKE DATA: (CONT.)

ADJUSTMENT:

1. Remove the cover screws and cover, #27, and adjust nut, #1, until the links, #15, are loose when the solenoid plunger, #9, is 1" out from its sealed position.
2. Then move the plunger by hand to the sealed position. The friction plate, #20, should then be free to move side ways as far as permitted by the fit of the guide pins in the holes. Determine whether the plate is free by trying to move it. If the plate is not free, release the nut, #1, until the plate is entirely free.
3. Operate the motor and apply the brake to determine whether the rate of stop is correct. If the stopping is unsatisfactory, adjust the Torque Spring, #19, to suit.
4. For the full Torque Rating of 15#LB-FT. The dimension between the top of the spring, #19, and the surface of the lever plate, #14, should be 1-19/32". After the proper rate of stop has been obtained, Re-check fittings as discussed in paragraph 1 and 2.

READJUSTMENT:

The brake will lose its torque when the lining wear is sufficient to allow the plate, #20, to be loose with the plunger, #9, in the down position. The brake should be readjusted before this condition occurs.

TO RENEW THE SOLENOID COIL:

Remove the three cover screws and cover, #27. Disconnect the coil leads and remove the screws which hold the solenoid to the support, #28. Lift the linkage, #16 and #17 and draw the solenoid away from the support. Remove the screws which hold the plunger guides to the frame and center the coil in the frame. Lift out are not held in place by screws. Place the new coil in the frame. Slide the coil springs into place. Replace the plunger guides and hold them in position with their screws. Slide the plunger into the frame. Lift out linkage and insert plunger link, #7, and slide solenoid into place. Fasten the solenoid into place. Reconnect the leads to the terminals. Replace the cover and fasten with its screws.

TO RENEW BRAKE LINING:

Remove the cover and solenoid as discussed in the previous paragraph. Remove spring gland, #18, and spring, #19. The linkage can be removed and allow the whole assembly consisting of lever plate, #14, and pressure plate, #2, to be lifted out of the support. The lining disc, #22, with the lining attached can be slid off the hub. Renew the lining on the disc and slide the new assembly back on to the hub. Reassemble the brake by putting the friction plate, #20, into place on its guide pins. Slip the plate assembly, #14, back into place on its support. Reassemble the linkage, #16 and #17, and the spring and spring gland, #18, and #19, into place. Reassemble the solenoid and secure to the support by means of screws. Replace brake cover after reconnecting the coil leads.

- | | | |
|------------------------------------|---|--------------------------|
| (A) Full load torque (Ft.Lb.) | 15 | |
| (c) No. of coils | 1 | Pull of each (Ft.Lb.) 15 |
| (D) Size and number of brake discs | - 1-5" Spring actuated disc with 2
circular rings of brake lining riveted thereto. | |
| (E) Brake lining | - 2 - 5" discs of asbestos. Disc of best commercial Manufacture.
Riveted to either side of disc #22. | |
| (F) Degree of Enclosure | - Drip-proof | |
| (G) Ambient Temperature (°C.) | 50°C. | |
| (H) Volts | -230 volt | |

10. LIST OF SPARE PARTS: Spare parts are listed on sheets 3,4,5
Drawing 1163-C on pages 31, 32, 33

TERMINAL OVERLOAD RELAY

DESCRIPTION

Under normal conditions the contacts of the relay are closed. The spring is under compression and tends to open the contacts. This is prevented by the outer part of the solder tube holding the ratchet mechanism. When the current to the heater coil is such value as to melt the solder film holding the outer part of the tube, the tube rotates and releases the ratchet mechanism to open the control contacts. The opening of these contacts breaks the circuit to the coil of the contactor and opens the power circuit. At the time the power circuit is opened the solder film cools and hardens, after which the relay can be reset with the reset button in cover of enclosure.

HOW TO INSTALL THE HEATER COIL

1. Remove the instruction plate from the overload relay.
2. Remove the cover of the overload relay by sliding it to the extreme upper position and pulling outward.
3. Remove the terminal nuts at the side of the relay.
4. Insert the heater coil in the overload relay base, with the asbestos tube surrounding the coil. Be sure that the heater coil eyes fit over the terminal studs.
5. Fasten the celluloid calibration plate, which forms a part of the heater coil package, to the front of the overload relay base, using the screw provided for this purpose. The celluloid plate bears a symbol marking which should agree with that on the heater coils.
6. Replace the relay cover so that it encloses all of the coiled portion of the heater.
7. Replace the terminal nuts.

HOW TO SET THE OVERLOAD RELAY

This relay is adjustable. The pointer on the instruction plate should be set opposite the current marked on the calibration plate, at which it is desired to have the overload relay trip. This can be done by loosening the two screws which hold the instruction plate and the cover of the relay, #3, and sliding the entire cover until the pointer on the plate is in the proper position.

LIST OF SPARE PARTS AND TOOLS

For 42X64" Silvercrest Washer	Appliance Washer
Reproduced from MPG DR.NO. 1152	Bu. Dr. No.
Shipbuilders Dr. No.	Shipbuilders P.O.NO. 268-403
Manufacturer U.S. Hoffman Machinery Corp.	

Vessels name and Number

Item No.	No. of Units per ship	Measure of Units	quantity per Unit	Name of part or tool	Manufacturers Date	Catalog Serial	Box Pc No.	DWG No.	Bu. Dr. No.	PC. NO.
1	1	PC	1	Motor Pinion 1-1/4" Bore. 1/4x1/8 Keyway.		078145	2	1152		

Manufacturer, The Louis Allis Co. Appliance 3 HP Reversing Motor
Bu. Dr. No. Shipbuilders P.O.No. 268-403

1	1	PC	1	Front Ball B.	#207	50	1173-A
2	1	PC	1	Back Ball B.	#307	30	1173-A
3	1	PC	1	Grease Pipel/8"		25	1173-A
4	1	SET	2	" " 1/8"		1	1173-A
5	1	SET	2	" Cup #00FEM		2	1173-A
6	1	PC	1	" Cap 1/8"		46	1173-A
7	6	Set	4	Carbon Brush		44	1173-A
8	1	PC	1	Brushholder complete with 3 extra springs		42	1173-A
9	1	SET	4	Brush Rigging Insulation Washings.		10	1173-A
10	1	SET	4	brush Rigging Insulation Washers		11	1173-A
11	1	SET	2	Main Field Coils		65-	1173A
12	1	SET	2	Interpole Field Coils on Pole Pieces		73	1173-A
13	3	SET	2	Bearing Lubricant Seal	SK12360-13	26	1173-A
14	3	PC	1	" " "	SK-12360-17	48	1173-A
15	3	PC	1	" " "	SK-12360-19	31	1173-A

TOOLS

16 1 PC 1 Bearing Removal Tool

Manufacturer, Cutler Hammer, Inc Appliance 5" Disc Type D Brake
Bu. Dr. No.
Shipbuilders P.O. No. 268-403

1	2	PC	1 15# Torque Spring	69-503
2	2	PC	2 Disengaging "	69-131
3	1	PC	1 Lined Disc Assem.	16-738
5	1	PC	1 Contact Board Asem.	81-2325-2
6	1	PC	1 " Lever "	24-1446-2
7	2	PC	1 " Spring	69-447
8	1	PC	1 Coil	9-627-4

Manufacturer, Cutler Hammer, Inc Appliance 3 HP Reversing Controller
Bu. Dr, No.
Shipbuilders P.O.NO. 268-403

		#225 Contactor (F-R)					
1	1	SET	4	Contact Tip	1323-1484	16	1242
2	1	SET	4	Contact Finger	940-963AZ7	19	1242
3	1	SET	4	Contact Spring	969-548	20	1242
4	1	SET	2	Tail Spring	969-279	2	1242
5	1	SET	4	Magnet Coil Spring	69-195	-	1242
6	1	SET	4	N.O. STAT. INT. Contact	21-174-4	53	1242
7	1	SET	2	" MOV. " "	4221-4	60	1242
8	1	SET	2	" " " Spring	969-633	59	1242
9	1	PC	1	Shunt Coil	9-91-13	11	1242

LIST OF SPARE PARTS AND TOOLS

For 42X64" Silvercrest Washer Appliance 3 HP Reversing Controller
 Reproduced from Mfg. Cr. No. 1117A, 1279 BU. DR. NO.
 1283. Shipbuilders Dr. No. SHIPBUILDERS P.O. NO. 268-403
 Manufacturer Cutler-Hammer, Inc.

VESSELS NAME AND NUMBER

Item No.	No. Of Units Per Ship	Measure of Units	Quantity Per Unit	Name of part or tool	Manufacturers Data			
					Catalog serial or stock no.	Box No.	PC No.	DWG No.
				<u>#307 Overload Relay</u>	Ordering data			
10	1	PC	1	Contact Lever	34985-if3		11	1286
11	1	PC	1	Contact Lever Spring	69-264		12	1286
12	1	SET	2	Stat. Contact Finger	640-217		8	1286
13	1	PC	1	Reset Button Spring	969-452		-	1286
				<u>#313 RELAY (CR)</u>				
14	1	PC	1	Contact Button	11-150			
15	1	PC	1	Contact Finger	624-658			
16	1	PC	1	Contact Spring	969-505			
17	1	PC	1	Armature Lever Spring	769-53			
18	1	PC	1	Shunt Coil	9-565-2			
				<u>#369 CONTACTOR (1A-2A)</u>				
19	1	SET	2	Contact Tip	1321-61		10	1243
20	1	SET	2	Contact Finger	640-246		12	1243
21	1	SET	2	Contact Spring	69-95		14	1243
22	1	SET	2	Mx Tail Spring	69-179		18	1243
23	1	SET	2	Magnet Coil Spring	969-566		--	1243
24	1	PC	1	Shunt Coil	9-483-7		6	1243
				<u>TIMER DEVICE</u>				
25	1	SET	2	Outer Contact Finger	40-211		1	1126
26	1	PC	1	Inner LH Contact Finger	40-218		2	1126
27	1	PC	1	" RH " "	40-212		3	1126
28	1	SET	4	Contact Finger Spring	969-507		11	1126
				<u>230 VOLT TIMER MOTOR</u>				
29	1	PC	1	230 Volt motor with Special Reduction	42-129-2 42-128-4			
				<u>RESISTORS</u>				
30	1	pc	1	F-D 1,000 Ohms RA Unit	11003H54A22			
31	1	SET	3	R1-R3 .5 Ohm L Units	57-23-17			
				Total 16.5 Ohms				
				<u>PUSH BUTTON MASTER</u>				
32	1	PC	1	Snap SW Element	90-389		9	1283
33	1	PC	1	N.O. & N.C. Element	631-164		10	1283
33	1	SET	2	" " " "	631-164		9	1279
				<u>BUL 10316H5A Limit Switch</u>				
34	1	PC	1	N.C. Element	9007W51			
				<u>BUL. 10316H10B Limit Switch</u>				
35	1	SET	4	Stationary Contact	54451xIF7			
36	1	SET	2	Mov. Contact Finger	40-42.			
37	1	PC	1	Contact Finger Spring	969-563			
38	1	PC	1	Plunger	69-744			

LAUNDRY EXTRACTOR

Maintenance and Operation Instructions

Name: 30" HOFFMAN EXTRACTOR

Maker: U.S. Hoffman Machinery Corp., 105 Fourth Ave., New York City.

Refer: HOFFMAN INSTRUCTION BOOK, Laundry Equipment pp 34-57.

SETTING MACHINE

IN PLACE : The uncrated extractor should be handled on the skids until lowered into position. Mounting saddles must be provided to give a rigid foundation as level as possible and insure that the base of the extractor is flush with the finished floor level. Extractor must be bolted to the mounting saddle in such a manner as to insure that the natural vibration of the machine will not tend to loosen the hold down bolts.

ELECTRICAL WORK: The extractor is furnished with a magnetic across-the-line starter for remote control. The starter must be placed on the wall adjacent to the extractor but not mounted directly on the extractor. Wiring of control and power lines from motor to starter must be run in a conduit provided with a flexible section to permit of adjustment of the motor for belt take up.

It is suggested that the following checks on electrical work be made:

- (1) Does basket run in direction as indicated by arrow on curb top?
- (2) Does the machine come up to speed smoothly?
- (3) Does the starter pushbutton station operate properly? The switch lever should operate the "OFF" button when the handle is moved toward the position which permits opening of the safety cover.

PIPING: A pipe line is run from tapped flange on the bottom of the curb to a waste receiver or drain line.

LOADING: For efficient extraction the basket should be loaded as evenly as possible. This gives faster acceleration, eliminates false starts and prevents the spindle shaft striking against the bumper block. A cover cloth should always be spread over the clothes and tucked under the basket top after the basket has been loaded.

STARTING AND

STOPPING: See Drawing no. 1052 of reference. Before starting the brake should be in the released position. To start the extractor the safety cover must be closed and the lever in the forward right hand position. The "ON" button of the pushbutton station is held in long enough to engage the magnetic starter. The extractor may be stopped by pushing the "OFF" button and is brought to a full stop by depressing the brake pedal. The safety cover can be raised only when the extractor is at a full stop and the lever is in the rear left hand position.

REFERENCE TO

PARTS: In referring to or ordering parts for this extractor, always give the following information: Part number, part name, quantity desired; model, type and serial number shown on name plate of machine. If correspondence or order has reference to motor or controls, the serial number shown on the name plate of these items should also be given.

TIGHTENING BELT: When belt adjustment becomes necessary, tighten the belt an amount sufficient to properly drive the loading basket without belt slippage. Do not overtighten as this practice will tend to overload the motor bearings and shorten the belt life.

To tighten the belt loosen cap screws in the feet of the motor, loosen lock nuts and turn adjusting screws to the left an equal number of turns. When proper belt tension is obtained tighten adjusting screw lock nuts and cap screws in motor feet.

REPLACING PRESSURE RUBBERS

After an extractor has been in service for two or three years, it becomes necessary to replace the pressure rubbers. This work should proceed as follows: (See DWG. No. 1054) Disconnect all connections between the bracket on the curb top and safety device parts. Take out the screws which hold the curb top to the curb and remove this assembly. Then remove the pressure nut lock key and turn the pressure nut No. 11 counter clockwise until the threads of the pressure nut are free from engagement in the toe box. Next wedge a Pinch bar between pulley and toe box, at the same time rocking the basket back and forth and lifting with the pinch bar. This will free rubber from the sides of the toe box. Now the basket and the basket drive mechanism can be removed by pulling it upwards. Next remove the old rubber from the toe box and put in the new one. Then cut the old rubber from the ~~extractor~~ basket drive assembly which was removed from the extractor. The new rubber should be cut straight through with a Jack-Knife or hacksaw. This will permit spreading the rubber so that it can be put around the main bearing sleeve (Be sure to keep the steel washer above the rubber) Now the basket and basket drive assembly can be reassembled into the extractor. Use care to see that the rubbers enter the toe box properly. After this assembly is back into place, screw the pressure nut down with the aid of the spanner wrench. Do not tighten too tight as this will damage the new rubbers. Align one of the slots in the pressure nut with the slot in the toe box and replace the key. Turn the extractor basket by hand to see that it turns freely. Now reassemble the curb top to the curb. (Fill the outer groove with putty or equivalent) Then connect the safety device parts to the bracket on the curb top.

MOTOR SPECIFICATIONS

FOR

HOFFMAN 30" UNDERDRIVEN EXTRACTOR

1. IDENTIFICATION:

- | | |
|---|------------------------------|
| (A) Manufacturer | The Louis Allis Company |
| (B) Navy Contract or Shipbuilders order No. | F.S. & D.D. Co. #268-403 |
| (C) For | MCC Hulls 668-677 |
| (D) For Driving | 30" Laundry Extractor |
| (E) Manufacturer of Driven Auxiliary | U.S. Hoffman Machinery Corp. |
| (F) Number of Motors involved | One Per Extractor |

2. REFERENCE DRAWINGS:

The following plans are submitted herewith to show the various construction details and which cannot be suitably covered in the manufacturers specifications.

<u>TITLE OF DRAWING</u>	<u>MANUFACTURERS NUMBER</u>	<u>BU. SHIPS NUMBER</u>
Motor Assembly	Navy X-10820	
Drip Proof		

3. MOTORS RATING:

- | | | | |
|----------------------|--------|---------------------------------------|-------------|
| (A) Volts | 230 | (B) Amperes | 14 |
| (C) Horsepower | 3 1/2 | (D) R.P.M. | 1750 |
| (E) Duty | 2 Hour | (F) Method of temperature measurement | Thermometer |
| (G) | | | |
| (H) Temperature Rise | 50°C. | | |

4. MOTOR CLASSIFICATION:

- | | | | |
|-------------------------|------------|----------------------------------|-------------------------------|
| (A) Degree of enclosure | Drip-Proof | (D) Type of Winding | Compound |
| (B) Method of cooling | Natural | (E) Ambient Temperature | 40°C. |
| (C) Speed | Constant | (F) Manufacturers Type and Class | Type Gna, Frame 225z, class J |
| | | (G) Mounting Wall | Vertical |

MOTOR SPECIFICATIONS (CONT.)

5. WEIGHTS:

- (A) Motor Complete 135 LBS
- (B) Spare Armature, Complete 35 LBS
- (c) All spares boxed, including control spares. 104 LBS

6. EFFICIENCY:

		EFFICIENCY	AMPERES
(A) At Rated Load	4/4	77%	14.8
(B) At 3/4 Load		76%	11.2
(C) At 1/2 Load		74%	7.7
(D) At 1/4 Load		----	----

7. MAIN FLIES:

- (A) Number 4
- (B) Air Gap (Normal) .034"
(Norminal)

8. SHAFT MATERIAL:

- (A) Hot Rolled Steel

9. COMMUTATING POLES:

- (A) Number 2
- (B) Air Gap (Norminal) .048"

10. BEARINGS:

- (A) Type A Class B Grade 11
Fafnir #308 K or W, or MRC #308 S or M used on back; Fafnir #206 K or W or MRC #206 S or M on front. The bearings shown are approved by Fafnir Bearing Co. and signed by C.W. Kramlich, Engineer; Approved by Marlin Rockwell Corp. and signed by L.A. Cummings, C.E. per A.W.W.
- (B) Lubrication Grease, Navy #14L3B, Grade B.

11. SHUNT FIELD WINDINGS:

- (A) Winding Data 900 Turns of #25 Wire, Enamel covered, developed length in FT. - 910 Feet, Weighing 1 1/8 LBS.
900 turns of #26 wire, enamel covered, developed length in Ft, - 1050 Feet, Weighing 1 1/8 LBS.
Resistance per coil at 25° C. - 73
- (B) Insulation Enamel
- (C) Impregnation Completed coils are dipped in G.E. #458 Varnish and baked 6 hours. Final spray with air drying varnish.

12. SERIES FIELD WINDINGS:

- (A) Winding Data 50 turns of #12 wire, SCE conductor insulation. Developed length - 68 Ft. Weighing 2 1/4 LBS.
Resistance per coil at 25° C. - .11
- (B) Insulation S.C.E.
- (C) Impregnation Completed coils are dipped in G.E. #458 Varnish and Bake 6 Hours. Final spray with air drying Varnish.

13. COMMUTATING FIELD WINDINGS:

- (A) Winding Data 102 Turns of #12 wire, SCE conductor insulation developed length - 81 Ft., Weighing 2 5/8 LBS.
Resistance per coil at 25° C. - .130.
- (B) Insulation S.C.E.
- (C) Impregnation Coil is dipped in G.E. #458 Varnish and Baked for 6 hours. Final spray with air drying Varnish.

14. ARMATURE:

- (A) Diameter 5.510"
 (B) Core length 3.5"
 (C) Winding Data:

No. of Slots	31
No. of Comm. Segments	93
No. of Single Coils	93
Conductor Insulation	SCE
Conductor Copper	#16
Turns in Series per coil	5
Developed length per coil	7 Ft.
Weight of Copper	6 $\frac{1}{2}$ LBS
Resistance at 25°C.	0.64

The shunt wound on Red paper cell. Several layers of friction tape and three layers of varnished cambric wound on shunt before winding series. Two layers varnished cambric around corners of completed shunt and series winding. .020" pressboard cell on sides and inside of coil. One (1) layer of half lapped cotton tape to complete coil.

INSULATION MATERIAL

Slot Cell	-	.002" Composite Cell
Center Wedge	-	.062" Fibre
Top wedge	-	.062" Fibre
2 - Coil Layer-	-	.010" Varn. Cambric insulation

- (D) Impregnation Preheat Armature four (4) Hours at 230°F. Dip in G.E. #458 varnish and bake 6 Hours.

15. COMMUTATOR:

- (A) Diameter 3" (B) Length 1 1/8"
 (C) Wearing Depth 3/8" (D) Flush or undercut undercut
 (E) Insulation between bars.Mica (F) Insulation to ground shaft- Mica.

16. BRUSHES:

- (A) No. of Studs 4 (B) No. of brushes per stud 1
 (C) Size of Brush
 Length 1 1/4" Width 3/4" Thickness 1/4"
 (D) Navy Grade A
 (E) Manufacturer Speed Carbon Co.

17. BRAKE DATA: (NONE)

18. SPARE PARTS:

- (A) See spare parts list page 55.
 (B) Special Tools - See spare parts list page 55.

CONTROLLER SPECIFICATIONS

FOR

HOFFMAN 30" UNDERDRIVEN LAUNDRY EXTRACTOR

DRIVE MOTOR

1. IDENTIFICATION:

- (A) Submitted by Cutler-Hammer, Inc.
 (B) Navy contract or shipbuilders order No. F.S. & D.D. CO. #268-403
 (C) For use on MCC HULLS 668 - 677
 (D) For use with 30" Underdriven Laundry Extractor
 (E) Driving Motor Manufacturer by Louis Allis Co.
 (F) Driven Auxiliary Manufacturer by U.S. Hoffman Machinery Corp.
 (G) Number of controllers One per extractor.

CONTROLLER SPECIFICATIONS (CONT.)

FOR

HOFFMAN 30" UNDERDRIVEN LAUNDRY EXTRACTOR

DRIVE MOTOR

2. REFERENCE DRAWINGS:

THE FOLLOWING DRAWINGS SHOWING THE VARIOUS CONSTRUCTION DETAILS, AS REQUIRED BY THE SPECIFICATIONS UNDER "PLANS" FORM A PART OF THIS DESCRIPTION:

TITLE OF DWG.	MANUFACTURERS NO.	BUREAU NO.
Drip-Proof D.C. Magnetic Controller	Navy-X-1056, 10693, 1243. 1286, 2013, 2014.	

3. CONTROLLER CLASSIFICATION AND RATING:

(A) Volts.	230
(B) Horsepower.	3 1/2
(C) Degree of Enclosure.	Drip Proof, protected
(D) Type of Construction.	Magnetic
(E) Duty Rating.	Starting
(F) Operation of control circuit.	Semi-Automatic
(G) Master Switch.	Pushbutton
(H) Resistor Classification.	Heavy Starting
(I) Low Voltage.	Protection
(J) No. of Resistor Starting Steps.	Two
(K) Speed Control.	None
(L) Type of Braking.	None

4. MANUFACTURERS IDENTIFICATION:

(A) Manufacturers Type Designation	Bulletin #6842 3 1/2 HP, 230 Volt, D.C. Serial #B942188 B942252
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5. DESCRIPTION OF OPERATION:

To start the motor, close the line knife switch which energizes relay CT and closes shorting-out resistor E-B and charging condenser C. Then press the "START" button which closes the "M" contactor and start the motor with the Armature resistor in series. The "M" contactor maintains itself thru auxiliary contacts. When closed, it breaks the circuit to relay CT. which times itself open by discharging its coil circuit thru resistors AB & CD and condenser C. When CT has opened, a normally closed contact closes the circuit for the accelerator 1A coil which then closes and shorts out the armature, resistor, putting the motor across the line and bringing it up to full speed.

Stopping is accomplished by pressing the "STOP" button, by tripping of the overload relay, or by low voltage. When the overload relay trips, it must be reset by pressing the reset button before the motor can be restarted. After the motor has been stopped, it is necessary to press the "START" button to restart.

6. MASTER SWITCH:

(A) Manufacturers Type Designation	Hoffman #58957
(B) Description	= Two button, one N.O. Element Marked "ON" and one N.C. Element marked OFF.
(C) Operation	= See Section #6 of this specification
(D) Material	= C.I.
(E) Enclosure	= Drip Proof
(F) Insulation	= Phenolic
(G) Weight	= 3 1/2 LBS.

7. OVERLOAD DEVICE:

(A) Manufacturers type designation	#307 Overload Relay
(b) Description	= This is a solder pot type of relay. Melting of the thermal metal releases the contacts.
(C) Operation	= Device functions automatically in connection with control panel.