

6-3. コスト予測

6-3-1. 運航費

(1) 燃料費

主機関については、セーリングスケジュールをもとに、巡航速度に対応する馬力及び運転合計時間から計算し、補機関については、平均1基85%連続運転として計算し、年間の所要量に現在価格を乗じて算出した。

(2) 港費

入出港毎に必要なとする費用で、その予測値は、現行の港費をベースに、入出港の回数増加を考慮に入れて算出した。

(3) 清水費

運航に伴なり清水消費量は、船員、キャビンクラス船客、ツーリストクラス船客の3つのグレードにわけ、船の年間稼働日数により算出し、単価は、Dar es Salaam 岸壁渡価格を乗じて計算した。

(4) その他

運航費のうち、上記以外の費用で、この予測値は、運航費計の約4%が通常であり、これにより算出した。この予測値はTCSLの従来の実績値と比較しても妥当なものである。

6-3-2. 船費

(1) 船員費

船員給与費のほか、諸手当、衣料費、食事費なども含むものである。予測値は現行TCSLの実績値をベースにした。

(2) 船用品費

船用品費は、平均として、建造船価の約0.7%とした。

(3) 潤滑油費

潤滑油は、燃料に対応するもので、その算出は、燃料費と同方法をとった。

(4) 保守、修理費

保守及び修理費は、入渠工事を含め、TCSLの実績値をベースにトン数を考慮して設定した。なお、4年毎に定期検査に伴なり修理費として、経常修理費の50%を加算した。

(5) 保険料費

保険料は、現在簿価の1.25%とした。

一般の慣例では、8年目以降は、船令上昇と共に保険料率がアップするので、8年目以降は同額とした。

6-3-3. 一般管理費その他

一般管理費、その他は人件費(役員、職員)、事務所費、厚生費、交通費、通信費、公租公課その他で、又少額の場合宣伝費も含めるのが普通である。これらの費用は、TUGSLの実績をもとに計上した。

6-4. 収支モデル

代替案1について、前記の新体系の旅客運賃の4種についての、収入及びコストの収支モデルを、Tab. 6-4 (a), (b), (c)及び(d)に示す。

これらの収支モデルは、何れも船の耐用命数を20年として、又、基礎計算であるので、収支共、経済変動はないものとしている。

船の耐用命数は、一概にこれを律することは出来ないが、客船又は貨客船の場合は、一般貨物船に比べて長いのが普通で、本プロジェクトの場合は、過去の多くの実例を参考とし、又、タンザニアにおける諸条件を恰わせ考慮して、20年乃至25年とするのが妥当となるが、本財務計算ではプロジェクトライフを、20年度と設定した。

6-5. F B R分析

本プロジェクトは、当初に投入資金があり、新造船の就航後は、プロジェクトの期間を通じて便益が生じ、同時に運航費その他のコストが支出となり、毎年その差が純利益となる。この純利益とプロジェクトの投入資金を比較して、その資金投入の価値の有無を判断する方法はいくつかあるが、最も普遍的な方法としてI B R法(Internal Rate of Return)で計算の上検討することとする。

即ち、

$$\sum_{i=1}^n \frac{B_i - O_i}{(1+d)^i} = 0$$

B_i : i 年目の収入

O_i : 投資金及び i 年目のコスト

d : 内部収益率

これによる計算結果は次のとおりである。

(1) 運賃改訂第1案	3.09%
(2) 運賃改訂第2案	3.97%
(3) 運賃改訂第3案	3.93%
(4) 運賃改訂第4案	5.38%
(参考) 現行運賃	-1.53%

6-6. 感度分析

前項の F B R を基準ケースとして、いくつかの感度要素を入れて、感度分析を行なった結果は次のとおりである。

(1) ケース1

収入、コスト共に毎年6%アップした場合

(2) ケース2

コストは毎年6%アップ、収入は4年毎20%アップの場合

(3) ケース3

収入が10%ダウンの場合

(4) ケース4

コストが10%アップの場合

(5) ケース5

燃料費が10%アップの場合

(6) ケース6

購入船価が5%アップの場合

(7) ケース7

購入船価が5%ダウンの場合

(8) ケース8

プロジェクトライフ15年の場合

(9) ケース9

プロジェクトライフ25年の場合

Tab 6-6 (a)

	改訂1案	改訂2案	改訂3案	改訂4案	現 行
基 準	3.09 %	3.97 %	3.93 %	5.38 %	- 1.53%
ケース1	8.57	9.44	9.31	10.75	3.22
ケース2	2.16	3.85	2.92	4.01	-18.34
ケース3	0.29	1.40	1.00	2.09	- 5.41
ケース4	1.23	2.27	2.03	3.33	- 4.51
ケース5	2.62	3.54	3.46	4.87	- 2.25
ケース6	2.76	3.64	3.56	4.93	- 1.81
ケース7	3.44	4.32	4.32	5.86	- 1.22
ケース8	-0.50	0.13	0.98	3.17	- 4.55
ケース9	4.87	6.36	5.35	6.50	0.14

6-7. 財務評価

本プロジェクトの基準ケースならびに、各ケースにおける感度分析の Financial Rate of Return の値は前記のとおりであるが、これらの結果より考えて、本プロジェクトは、長期の低利の資金を使用し、かつ、適当な旅客運賃値上げを実施するなら、企業としての収支は成り立たせることが出来るが、その収益性は、必ずしも高いものとは云えない。

本プロジェクトの実行は、潜在的に抑圧されていた旅客の輸送などが顕在化することによって、沿岸地域の経済活動が活発化し、それにより更に沿岸地域の所得水準や文化水準の向上、住民人心の安定、福祉の向上など種々な間接効果があり、単に企業の財務的な面のみでは表現できない十分な効果が予定される。

BALANCE MODEL (Proposal 1, 20 Years)

x 1000 mt

YEAR	x 1000 mt																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
REVENUE																					
Passenger fare	2181	2181	2181	2181	2593	2593	2593	2593	3112	3112	3112	3112	3735	3735	3735	3735	4381	4381	4381	4381	4181
Cargo freight	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	6181	6181	6181	6181	6703	6703	6703	6703	7223	7223	7223	7223	7846	7846	7846	7846	8392	8392	8392	8392	8192
SHIP EXPENSES																					
Operation exp.																					
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Crew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Laborant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	311	328	308	290	272	251	234	216	206	206	206	206	206	206	206	206	206	206	206	206
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900
Pre-Depreciation Profit	1281	1281	1281	1281	1703	1703	1703	1703	2303	2303	2303	2303	2921	2921	2921	2921	3506	3506	3506	3506	3000
Depreciation	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281
Interest	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Balance	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281	1281
Accumulated Acc.	1281	2562	3843	5124	6405	7686	8967	10248	11529	12810	14091	15372	16653	17934	19215	20496	21777	23058	24339	25620	26901

Tab. 6 - 4 (b)

BALANCE MODEL (Proposal 1 - 20 Years)

YEAR	x 1000 sh																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
REVENUE																					
Passenger fare	3,909	2,021	2,113	2,271	2,410	2,555	2,708	2,871	3,043	3,225	3,419	3,624	3,841	4,072	4,316	4,575	4,850	5,141	5,449	5,776	
Cargo freight	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020	1020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	6020	6135	6256	6383	6521	6666	6819	6982	7145	7316	7500	7705	7922	8153	8397	8655	8928	9215	9517	9834	10166
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Orew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	311	326	308	290	272	254	236	236	236	236	236	236	236	236	236	236	236	236	236	236
Others	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Over head & Misc. exp	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4,990	4,980	4,982	4,984	4,986	4,988	4,990	4,992	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972	4,972
Free Depreciation Profit	1021	1155	1291	1429	1565	1708	1829	1960	2100	2248	2401	2558	2718	2880	3045	3214	3387	3564	3745	3930	4119
Depreciation	1735	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1035	985	932	880	828	776	725	674	621	569	518	466	413	362	311	259	207	155	103	52	52
Balance	1740	1554	1364	1173	958	713	524	288	78	110	115	522	941	1324	1819	2480	3257	4180	5186	6286	7486
Accumulated Acc.	1739	3293	4657	5966	7167	8270	9191	9940	10532	11077	11577	12032	12453	12840	13193	13513	13800	14054	14276	14466	14624

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BALANCE MODEL (Proposal 1 - 20 Years)

Tab. 6 - 4 (c)

YEAR	x 1000 mb																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Revenue	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702
Passenger fare	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702	2702
Cargo freight	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813	6813
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Grew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Inhiberant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	341	326	308	290	272	251	236	226	216	206	196	186	176	166	156	146	136	126	116	106
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988	4988
Pre Depreciation Profit	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1063	983	903	823	743	663	583	503	423	343	263	183	103	23	153	73	23	153	73	23	153
Balance	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916	916
Accumulated Acc.	916	1832	2748	3664	4580	5496	6412	7328	8244	9160	10076	11000	11924	12848	13772	14696	15620	16544	17468	18392	19316

Tab. 6 - 4 (d)

BALANCE MODEL (Proposal 1 - 30 Years)

YEAR	x 1000 sh																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Passenger fare	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602	3602
Cargo freight	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020	4020
Sales	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Gross Revenue	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713	7713
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Crew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363	363
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900	4900
Pre-Depreciation Profit	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713	2713
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1045	983	921	859	797	735	673	611	549	487	425	363	301	239	177	115	53	1	1	1	1
Balance	18	91	183	274	365	456	547	638	729	820	911	1002	1093	1184	1275	1366	1457	1548	1639	1730	1821
Accumulated Acc.	10	21	31	41	51	61	71	81	91	101	111	121	131	141	151	161	171	181	191	201	211

Tab. 6 - 4 (e) Current BALANCE MODEL (Proposal 1, 20 Years) x 1000 \$

YEAR	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total	
REVENUE																						
Passenger fare	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801	1801
Cargo freight	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320	1320
Sales	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Gross Revenue	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219	6219
Operation exp.																						
Fuel oil	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280	1280
Port charges	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520	520
Fresh water	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Others	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Crew's exp.	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575	1575
Ship's stores	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
Lubricant	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
Repair & Maintenance	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300
Insurance	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343	343
Others	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Over head & Misc. exp.	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516	516
Gross Cost	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909	4909
Pre Depreciation Profit	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310
Depreciation	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725	1725
Interest	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625	1625
Balance	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310
Accumulated Acc.	1310	2620	3930	5240	6550	7860	9170	10480	11790	13100	14410	15720	17030	18340	19650	20960	22270	23580	24890	26200	27510	28820

7. 経済評価

7-1. 経済評価の方法

プロジェクトの経済評価の基本的な目的は、経済的費用と便益を、その国全体の観点から計かり、プロジェクトの純便益が、他の限界投資機会から得られるものと同様以上であるか否かを判定することである。

従って、経済的費用と便益は、プロジェクトを運営する企業体の費用と収入とは、必ずしも一致しない面がある。

経済評価における費用、および便益は、基本的には、シャドウプライスにもとづいて計算されるが、以下、その計算の考え方と方法について述べる。

7-1-1. 経済的費用

経済的費用のシャドウプライスを求めるための調整項目は、およそ次のとおりである。

(1) 外国為替

通常、開発途上国では公定為替レートは外国為替の実質価値を反映していない場合が多く、何らかの調整を必要とする。しかし本スタディにおいては、タンザニアにおける外国為替のシャドウレートが不明のため、一応公定レートをそのまま用いることとする。

(2) 税金

取引税等の間接税および関税などは、トランスファーの一形態であり、国全体に対する経済的費用とはならない。したがって税金は、すべて取除くべきであるが、本スタディの場合、新船の購入、燃料や船用品などの主要な費用項目は、すべて免税扱いとしており、その他の費用項目における税の比率も微少であるから、税の調整は特に必要としない。

(3) 賃金

失業率が高く不完全雇用が一般的な国においては、労働者のコストは実際に支払われている賃金よりも低い可能性がある。本スタディにおいては、TCSLの船員賃金がタンザニア国全体の船員賃金に比較して、それほどかけはなれたものでないので特に調整を必要としない。

7-1-2. 経済便益

交通プロジェクトの経済便益の計測は、経済的費用をはかるよりはるかにむづかしい面がある。その理由の第一は、快適性、便利性および時間短縮などの直接的効果は、いずれも市場価格がないので、貨幣単位にあらわすことがむづかしいからである。第二の理由は、投資の効果が長期に亘り多数の人におよぶため、長期の見とおしを必要とすることである。第3の理由は、経済的活動に対するインパクトのような間接的な便益が実現されるためには、輸送以外の分野での投資を必要とすることが、しばしばあるからである。

今回の分析では、次の点を考慮しつつ、輸送サービスのシャドウプライスを用いて、簡便に経済便益を算定することとした。

(1) 代替交通機関の実現困難

現状では、南部沿岸地域における大量輸送機関として、一般に利用可能なものは陸上のバスと船舶とがあるが、いずれも恒常的な供給能力不足の状態にあり、早急な改善がのぞまれている。但し、航空機には若干の余裕が認められるが、コスト的に見て、大衆の輸送機関とはなり得ない。又自家用自動車についても、国民所得の水準が低く、その普及には限りがある。

それに対して、バス輸送は、船舶輸送と比較可能な唯一の交通機関ではあるが、現状では道路状態が悪く、定常的なバス輸送を実現する為には、道路整備が先決条件となる。しかし、道路の整備には多大の費用と期間を必要とし、結局、現状としては、バス輸送も代替交通機関としては必ずしも妥当とは云えない。

従って、事実上の南部沿岸地域の旅客輸送の改善策として、当面可能性が高いと考えられるものは、船舶だけということになる。

(2) シャドウプライスの導入

シャドウプライスは、交通サービスに対して利用者が支払おうとする対価であり、理論的には、利用者の輸送サービスに対する需要関数によって測定できる。然し、実際には、需要関数を特定化することは困難であり、旅客運賃については、簡単にする為現状で最も競争的な関係と考えられるバス運賃が、シャドウプライスにほぼ等しいと考える。

そこで、次のようにまず、陸上のバス運賃を、DSMとMtwara

間の沿岸ルートと、DSM-Songea-Mtwara の内陸ルートの2つの経路についての平均を求め、次にバスに較べて船舶を利用する場合、港までのアクセスのコストが余分に必要となることを考慮して、その分として5%を割引いた値を、DSM-Mtwara 間の新船利用のシャドウプライスと考える。

DSM-Mtwara 間バス運賃

a) 沿岸経由	72 shs
b) Songea 経由	203 shs
平均	137.5 shs
シャドウプライス	130.6 shs

$$(137.5 \times 0.95 = 130.6)$$

また、貨物については、競合的と考えられるトラック運賃等が不明のため、現状のTCSLの運賃(200sh/PT)をもとにシャドウプライスを設定する。

(3) ケース分析

本プロジェクトを経済面で、前記のシャドウプライスを導入の上、分析評価することとし、手法として基準ケース(すべての便益およびコストが、想定どおりの場合)のほか、次の各ケースについて、経済収益率の計算を行なう。

- (ケース1) 基準ケース(ライフ20年)
- (ケース2) 便益が10%ダウンの場合
- (ケース3) コストが10%アップの場合
- (ケース4) 船のライフを15年の場合
- (ケース5) 船のライフを25年の場合

7-2. 経済収益率の計算結果

前記の各ケースについての内部経済収益率の計算結果は次のとおりである。

(1) 基準ケース	.....	12.33%
(2) ケース 2	.....	8.91%
(3) ケース 3	.....	10.57%
(4) ケース 4	.....	10.86%
(5) ケース 5	.....	12.96%

7 - 3. 経済分析の評価

経済評価の基準は、資本の Opportunity Cost（機会費用）をベースとするものであるが、ここでは12%と設定する。上記計算の結果は、基準ケースとしては、これを越えているので Acceptable と評価できる。

8. 勸告

本プロジェクトの運営主体、運航主体等は、前記のとおりであるが、これが実施にあたっては、NTC、TCSLだけでなく、タンザニア政府としても検討しなければならない点が少なからずある。プロジェクトが満足する形で実施するために、これらすべてにおいて十分配慮しなければならない。実施する上においての勸告事項は、本報告書の本文にそれぞれ記載してあるが、主な事項についてここに改めて列記する。

- 1) 本プロジェクトとして建造する船は、約1,000総トン型、乗客約400人、速力約13.5ノットのものを1隻とする。この船のOutline Specifications及びGeneral ArrangementはAppendixに示すとおりである。
- 2) 本プロジェクトの調達に必要とする投資金は、出来るだけ低利とし、又その償還期限は、20年以上とする。
- 3) 旅客運賃は、Financialの面と、国民経済ならびにバス運賃などを併わせ考慮して値上げを実施し、物価上昇などに合わせて、equitable adjustmentを実施する。
- 4) 新船の運航に関して、TCSLの他の部門の財務負担を、おわない形がのぞましい。
- 5) 本プロジェクトの船舶建造にあたっては、建造コンサルタントを指名し、建造、回航ならびに船員トレーニングについて相談し乍ら進めるのが、のぞましい。
- 6) 新船の運航は、確実な定期船として運航し、セーリングスケジュールを厳守する必要がある。又、各寄港地の岸壁の使用は、優先させることが必要である。
- 7) 旅客に対するサービスとして、ブッキング、チケッティングのシステムの合理化、公報の改善、待合所や乗下船システムの改良などを行なうことが、のぞましい。
- 8) 新船の乗組予定者のうち、士官および職長の大部分を、建造中、相当期間、造船所に派遣し、又そのあとタンザニアへの回航中も配乗させ、操船及び操機に関して必要最小限の技術訓練をうけることがのぞましい。
- 9) 各港の航路標識（なかんずく、ビーコン、灯浮標等）の消灯、毀損、位置移動などについて、至急整備を行なうことがのぞましく、又、レーダーレフレクターなども新設するのがのぞましい。
- 10) MafiaのKilindoniには簡易式コースウェイを新設し、又、浅喫水上陸艇の配備することがのぞましい。

THE PUBLIC CORPORATIONS ACT, 1969

(No. 17 OF 1969)

APPENDIX 1

ORDER

Made Under Sections 3, 5 and 11

THE NATIONAL TRANSPORT CORPORATION (ESTABLISHMENT)

ORDER, 1969

1. This Order may be cited as the National Transport Corporation (Establishment) Order, 1969.
2. In this Order, unless the context otherwise requires
"the Act" means the Public Corporations Act, 1969;
"Board" means the Board of Directors provided for in paragraph 5;
"the Corporation" means the National Transport Corporation established by paragraph 3;
"inland waterway" means any lake or river;
"Minister" means the Minister for the time being responsible for transport.
3. There is hereby established a public corporation to be known as the National Transport Corporation.
4. The functions of the Corporation shall be-
 - a) to provide the development of means of carrying goods and persons or both goods and persons by land, sea, inland waterway or air;
 - b) to conduct or engage in the business of carrying for hire or reward persons or goods, or both persons and goods, by land, sea, inland waterway or air;
 - c) to conduct or engage in any other business which, in the opinion of the Board, appertains to, or is expedient or convenient for enabling the Corporation to conduct or engage in, any of the businesses specified in sub-paragraph (b);

- d) to establish branches and to carry on business within the United Republic or elsewhere;
 - e) to acquire by agreement and hold interests in any business specified in this paragraph which is being conducted by any person or in which any person is engaged;
 - f) to manage the business and affairs pertaining to any business of any person which, or an interest in which, has been transferred to, or acquired by, the Corporation under the provisions of the Act or this Order;
 - g) to do all such acts and things as are, in the opinion of the Board, necessary, expedient or convenient to enable the Corporation to carry on any business specified in this paragraph according to good business practice, to uphold and support the credit of the Corporation, to obtain and justify public confidence, and to avert or minimize any loss to the Corporation;
 - h) to do any thing or enter into any transaction which, in the opinion of the Board, is calculated to facilitate the proper and efficient carrying on of the activities of the Corporation and the proper performance of its functions as specified in this paragraph.
5. (1) The management of the Corporation is hereby vested in a Board of Directors.
- (2) The Board shall consist of-
- (a) a Chairman who shall be appointed by the President;
 - (b) such other members being not less than five nor more than nine as the Minister may appoint, one of whom he shall nominate as its vice-chairman.
- (3) There shall be a general manager of the Corporation who shall be appointed by the President.
- (4) The Board may from time to time appoint on such terms and conditions as it thinks fit such officers and servants of the Corporation as may be necessary for conducting the business of the Corporation.

- (5) The Chairman and other members of the Board shall be entitled to such allowances and at such rates as the Minister may from time to time prescribe.
 - (6) The Minister may make regulations with respect to-
 - (a) the appointment of and the tenure and vacation of office by the members of the Board;
 - (b) the quorum, proceedings and meeting of the Board and determinations of the Board.
 - (7) Subject to the provisions of any regulation made under sub-paragraph (6) the Board shall have power to regulate their own procedure.
 - (6) All salaries, fees and other allowances whatsoever payable to the Chairman, a member of the Board, the General manager and other officers and servants of the Corporation, shall be paid out of the funds of the Corporation.
- 7.
- (1) The Seal of the Corporation shall be affixed by the Chairman, the Vice-Chairman or the general manager and witnessed by one other member of the Board.
 - (2) All contracts, guarantees, agreements, bonds, authorities, mortgages, charges, bills of exchange, promissory notes, bank drafts, letters of credit, securities and other instruments whatsoever to which the Corporation is a party, shall be executed on behalf of the Corporation-
 - (a) by the general manager and a member of the Board; or
 - (b) by such other person or persons as may be authorized by the Board in that behalf:

Provided that the general manager may, in writing, delegate his function under this sub-paragraph to any officer of the Corporation.

8. Subject to the provisions of any regulations relating to quorum made under sub-paragraph (6) of paragraph 5, the Board may act notwithstanding any vacancy in the membership thereof and no act or proceeding of the Board shall be invalid by reasons only of some defect in the appointment of a member or a person who purports to be a member, or, where such Regulations provide for the appointment of such alternate member or a person who purports to be such alternate member.

9. The Corporation may from time to time borrow such sums of money as it may require to meet any of its obligations or for the purposes of its business.
10. (1) The powers conferred on the President by section 6 of the Act are, in relation to the Board, hereby delegated to the Minister.
- (2) The Minister is hereby designated as the Minister for the purposes of the provisions of subsection (3) or section 7 of the Act which relates to the accounts of the Corporation.

Dar es Salaam,
19th September, 1969

J.K. NYERERE,
President

G. T. 1,000 TONS PASSENGER CUM CARGO VESSEL

OUTLINE SPECIFICATION

PART 1. HULL

1. GENERAL DESCRIPTION

The vessel shall be a twin-screw, diesel-propelled, passenger-cum-cargo boat intended for transportation of passengers and general cargo in regular service along the coast of Tanzania.

The vessel shall have a complete continuous freeboard deck, named "Main Deck", a short forecastle, a long poop, a deckhouse in two tiers on the poop deck, a raked stem and a cruiser stern. The passenger spaces shall be arranged on the poop deck forward for the cabin class, under the poop deck forward for the reclining seat tourist class and under the poop deck aft and under the main deck aft for the economy class, respectively, as shown on the General Arrangement plan. Two cargo holds shall be arranged under the main deck forward, each having a cargo hatch served by a derrick boom operated by three electro-hydraulic winches on the single swing-boom system.

The vessel shall be subdivided so that flooding into any one compartment may not cause submergence of the margin line, assuming that the permeabilities of flooded compartments be same as those prescribed in the International Convention for the Safety of Life at Sea, 1960.

The vessel shall be designed, constructed and fitted out under the special survey by and to the classification requirements of the Nippon Kaiji Kyokai for obtaining the class notations, NS* (Coasting service) and MNS* and also in compliance with the Japanese Law for the Safety of Ships and its related regulations.

2. PRINCIPAL DIMENSIONS

Length, overall	about	67.50 metres
Length between perpendiculars		61.00 metres
Breadth, moulded		11.00 metres
Depth, moulded		4.30 metres
Load draught, moulded, designed		3.00 metres
"Tween-deck heights :		
Main deck to forecastle deck		2.10 metres
Main deck to poop deck		2.40 metres

Poop deck to navigation bridge deck	2.40 metres
Navigation bridge deck to wheelhouse top	2.30 metres

3. TONNAGE & CAPACITY

Gross tonnage	about	1,000 tons
Deadweight	about	410 tons
Capacity :		
Cargo hold, bale	about	450 cubic metres
Fuel oil tanks	about	40 cubic metres
Fresh water tanks	about	65 cubic metres
Water ballast tanks	about	210 cubic metres

4. SPEED & ENDURANCE

Max. speed on trial, 1/4 load condition, clean bottom & calm sea, at max. continuous output of main engines	about	15 knots
Speed on service, full load condition, at 85% output of main engines, incl. 15% power margin	about	13.5 knots
Endurance, full load condition, at service speed defined above	about	1,300 nautical miles

5. SHIP'S COMPLEMENT & PASSENGERS

Ship's complement :

Officers	12
Petty officers	3
Subordinates	20
Sum	<u>35</u>

Passengers :

Cabin class	34
Tourist class (Reclining seats)	74
Economy class (Settees)	<u>302</u>
Sum	410
Grand total	445

6. DECK MACHINERY

Windlass	1 set
Hydraulic motor driven, horizontal type, with 2 sprocket wheels & 2 warping ends 5 t x 9 m/min	
Capstan	1 set
Electric motor driven, vertical type 3 t x 15 m/min x 11 KW	
Steering gear	1 set
Electro-hydraulic, twin-rudder parallel steering type, with 2 hydraulic pump units About 5 t-m x 2.2 KW	
Cargo hoisting winch	2 sets
Hydraulic motor driven, horizontal type 3 t x 30 m/min	
Boom luffing winch	2 sets
Hydraulic motor driven, horizontal type 3 t x 30 m/min	
Boom slewing winch	2 sets
Hydraulic motor driven, horizontal type 3 t x 30 m/min	
Boat winch	1 set
Electric motor driven, horizontal type 1 t x 15 m/min x 3.7 KW	
Electric hoist	2 sets
Electric motor driven, suspended type 500 kg x 20 m/min x 3.7 KW	
Lift	1 set
Electric motor driven, push-button control 60 kg x 30 m/min	

7. CREW'S ACCOMMODATION

Living rooms :

Captain	Single-berthed cabin, with private lavatory
Chief engineer	Single-berthed cabin, with private lavatory
Other officers	2-berthed cabin
Petty officers	3-berthed cabin
Subordinates	4- or 6-berthed cabin
Mess room	Officers' mess room seating 12 persons; Crew's mess room seating 12 persons
Sanitary spaces	Officers' lavatory with 1-WC & 1-shower; Crew's lavatory with 3-WC's & 3-showers; Laundry with electric washing machine

8. PASSENGERS' ACCOMMODATION

Cabin class, special	2-berthed cabin with private lavatory
Cabin class	4-berthed cabin with 2 double-tier sofa-beds (upper tier being foldable)
Tourist class	Common passenger space with reclining chairs, back of each chair having foldable table on its backside
Economy class	Common passenger spaces with upholstered settees with backs having foldable tables on backsides
Mess room	Separate mess room for cabin class passengers, seating 20 persons
Sanitary spaces	Cabin class passengers' lavatory (gents) incl. showers & WC's; Cabin class passengers' lavatory (ladies) incl. showers & WC's; Tourist & economy class passengers' WC rooms (gents); Tourist & economy class passengers' WC rooms (ladies)

9. COMMISSARY SPACES & KIOSK

Galley	1 - Common galley with electric cooking equip- ment capable of serving food for officers, crew, all cabin class passengers & 10% of tourist & economy class passengers
Pantry	1 - Pantry for cabin class passengers' mess room
Kiosk	1 - Kiosk, selling food for tourist & economy class passengers & other general articles

10. JOINER WORK & FURNITURE

Joiner work :

Steel wall lining	Marine plywood of 9 mm. with plastic overlay
Overhead ceiling	Marine plywood of 5.5 mm. with plastic overlay
Wooden partitions	Chip-board of 22 mm. with plastic overlay
Insulation	Glass wool insulation for steel walls & deck-heads exposed to weather & engine room

Deck covering :

Officers' cabins	Plastic tiling on latex deck composition
Crew's cabins	Latex deck composition
Officers' mess room	Plastic tiling on latex deck composition
Crew's mess room	Plastic tiling on latex deck composition
Cabin class passengers' cabins & mess room	Plastic tiling on latex deck composition
Tourist class passengers' space	Latex deck composition
Economy class passengers' spaces	Latex deck composition
Passageways	Latex deck composition
Wheelhouse	Plastic tiling on latex deck composition
Exposed portion of poop deck	Latex deck composition
Other exposed deck	Bare steel, coated with deck paint
Sanitary spaces	Mosaic tile on cement bed
Galley	Grooved tile on cement bed

Beds :

Officers & crew	Wooden bed
Cabin class, special	Wooden bed
Cabin class	Sofa-bed, double-tier, upper tier being folded down to form sofa back in the daytime

Tourist & economy class passengers' seats :

Tourist class	Reclining chair, reclining back having foldable table on its backside
Economy class	Settee, steel-framed, upholstered, back having foldable table on its backside

Upholstery :

Bed mattress	Cover of textile-fabric & stuffing of polyurethane foam for cabin class, special; Cover of vinyl-leather & stuffing of polyurethane foam for cabin class, officers & crew.
Sofa-bed	Cover of textile-fabric & stuffing of polyurethane foam.
Sofa	Cover of textile-fabric & stuffing of polyurethane foam for captain & chief engineer; Cover of vinyl-leather & stuffing of polyurethane foam for other officers.
Chair, seat & back	Wooden framed chair with seat & back covered with textile-fabric & stuffed with polyurethane foam for cabin class, special; Reclining chair with seat & back covered with vinyl-leather & stuffed with polyurethane foam for tourist class; Steel-framed settee with seat covered with vinyl-leather & stuffed with polyurethane foam & back of plywood for economy class; Steel revolving chair with seat & back covered with vinyl-leather & stuffed with polyurethane foam for officers & petty officers
Curtain	Synthetic fibre textile

11. CARGO HOLDS & CARGO GEAR

Cargo holds :

No. of compartments	2 compartments
Bottom ceiling	Close wooden ceiling
Side sparring	Open wooden sparring on shell sides

Cargo hatches :

No. of hatches	2
Hatch cover	Hinged folding steel hatch cover, operated by wire ropes from derrick boom

Derrick booms :

No. of booms	2 (one for each hatch)
Capacity of boom	5 tons
Type of cargo work	Double-topping, single swing-boom system

Winches :

Type	Hydraulic winch, horizontal type
Cargo hoisting winch	2 sets - 3 t x 30 m/min
Boom luffing winch	2 sets - 3 t x 30 m/min
Boom slewing winch	2 sets - 3 t x 30 m/min

12. VENTILATION & AIR - CONDITIONING

Classification :

Officers' cabins & mess room	Air-conditioning
Crew's cabins & mess room	Air-conditioning
Cabin class passengers' cabins & mess room	Air-conditioning
Tourist class passengers' space	Mechanical supply ventilation
Economy class passengers' spaces	Mechanical supply ventilation
Wheelhouse	Cooled air supply
Galley	Mechanical supply & exhaust ventilation
Sanitary spaces	Mechanical exhaust ventilation
Dry provision store	Mechanical exhaust ventilation
Engine room	Mechanical supply & exhaust ventilation
Steering gear room	Natural ventilation
Stores	Natural ventilation
Cargo holds	Natural ventilation

Air-conditioning system :

Design condition : -

	<u>Outside</u>	<u>Inside</u>
Air temperature	35°C	27°C
Relative humidity	80 %	50 %

Type of system Centralized air-conditioning system, electric motor driven, sea water cooled, automatically controlled.

Air ducting Insulated ducting of galvanized thin steel sheet, with air supply ports of diffuser or pankah-louvre type.

Rates of air-change in mechanically ventilated spaces :

Tourist class passengers' space	30 times per hour
Economy class passengers' spaces	40 times per hour
Galley	Supply : 30 times per hour Exhaust : 45 times per hour
Sanitary spaces	20 times per hour
Dry provision store	5 times per hour

13. REFRIGERATING SYSTEM

Refrigerating plant	Electric motor driven, R-12 direct expansion type, automatically controlled, with a stand-by compressor
Temperature	Lobby + 5°C Vegetable store + 3°C Meat store -10°C

14. BOAT & LIFE SAVING APPLIANCES

Boat	1 - FRP motor dinghy, 6.5 metres in length
Boat davit	1 - Radial davit, with electric motor driven boat winch
Inflatable liferaft	18 - Inflatable liferaft in container, 25 persons each
Lifebuoy	8 - Lifebuoy
Lifejacket	445 - Lifejacket for adult 45 - Lifejacket for infant

15. FIRE DETECTING & EXTINGUISHING SYSTEMS & APPLIANCES

Fire detecting system	Smoke tube fire detector for officers' living quarter, crew's living quarter, passengers' spaces, galley, cargo holds & engine room.
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Fire-extinguishing systems & appliances :

Officers' & crew's living quarter	Hydrants & portable fire extinguishers
Passengers' spaces	Hydrants & portable fire extinguishers
Cargo holds	Carbon dioxide fire smothering system
Engine room	Carbon dioxide fire smothering system, hydrants & portable fire extinguishers
Store spaces	Hydrants & portable fire extinguishers

16. DECK & OUTBOARD FITTINGS

Accommodation ladder	2 - Light alloy made, feathering type, about 2.5 metres in length & 600 mm in width
Awning	1 - Removable vinylon canvas awning over poop deck aft

Windows	Light alloy framed, fixed or hinged-up rectangular windows for wheelhouse; Light alloy framed, side-hinged rectangular windows for cabin class passengers' cabins; Light alloy framed side scuttles for officers' cabins & mess room, tourist & economy class passengers' spaces, sanitary spaces, etc. above main deck level.
Fendering	Hollow half-round steel fender along main deck side line on each side

17. ANCHORS, CHAIN CABLES & ROPES

Bower anchor, stockless, 1,020 kg	3
Bower anchor cable, welded stud link chain cable, NK Grade 2, 28 mm dia. x 192.5 m & 165 m in length	2 lines
Towline, flexible steel wire rope (6 x 24), 22.4 mm dia. x 130 m in length	1 line
Mooring line, vinylon rope 34 mm dia. x 140 m in length	3 lines

PART 2. MACHINERY

1. MAIN ENGINES

No. of sets	2 sets
Type	Vertical, four stroke cycle, single acting, airless injection, trunk piston, supercharged, uni-directional, marine diesel engine with reverse/reduction gear
Max. continuous output	1,000 PS at 800 - 1,100 RPM (engine revolution)
Cooling system	Indirect cooling by fresh water
Starting system	Compressed air starting
Control system	Remote control from wheelhouse for engine speed & ahead/astern, Direct manual control for starting & stopping
Attachments	Cooling fresh water pump 1 set Lubricating oil pump (engine) 1 set Fuel oil supply pump 1 set Reverse/reduction gear with pump 1 set Exhaust turbo-supercharger 1 set Intermediate air cooler 1 set
Fuel oil	Diesel oil

2. SHAFTING & PROPELLERS

No. of shaft lines	2 lines
Intermediate shaft	Solid shaft of forged steel
Propeller shaft	Solid shaft of forged steel with bronze sleeves & rubber covering between sleeves
Stern tube	Cast iron or fabricated steel stern tube with rubber bearings
Propeller	4- or 3-bladed solid propeller of manganese bronze

3. DIESEL GENERATOR SETS

No. of sets	2 sets
Diesel engine prime mover :	
Type	Vertical, four stroke cycle, single acting, airless injection, trunk piston, supercharged, diesel engine
Max. continuous output	330 PS at 1,000 RPM
Cooling system	Indirect fresh water cooling
Starting system	Compressed air starting

Generator :

Type	Drip-proof, self-ventilated, self-excited, marine A.C. generator
Phase & frequency	3-phase, 50 Hz
Voltage	405 V
Rated output	275 KVA (220 KW), continuous
Insulation	Class B

4. AUXILIARY MACHINERY & EQUIPMENT IN ENGINE ROOM

- Main air compressor 1 set
Electric motor driven, vertical, double stage, sea water cooled, reciprocating air compressor, automatically started & stopped
18 m³/h (piston displacement) x 30 kg/cm² x 3.7 KW x 1,000 RPM
- Auxiliary air compressor 1 set
Diesel driven, vertical, double stage, sea water cooled, reciprocating air compressor, hand started
10 m³/h x 30 kg/cm² x 3.5 PS
- Cooling sea water pump 2 sets
Electric motor driven, vertical or horizontal, centrifugal pump
Capacity as per engine maker's standard specification, each pump serving for two main engines simultaneously
- Auxiliary cooling fresh water pump 1 set
Electric motor driven, horizontal, centrifugal pump
Capacity as per engine maker's standard specification
- Auxiliary lubricating oil pump (main engine) 1 set
Electric motor driven, horizontal, gear pump
Capacity as per engine maker's standard specification
- Auxiliary fuel oil supply pump 1 set
Electric motor driven, horizontal, gear pump
Capacity as per engine maker's standard specification
- Auxiliary lubricating oil pump (reverse/reduction gear) 1 set
Electric motor driven, horizontal, gear pump
Capacity as per gear maker's standard specification
- Cooling sea water for auxiliary machinery 1 set
Electric motor driven, horizontal, centrifugal pump
75 m³/h x 30 m x 15 KW x 1,500 RPM

Main fuel oil transfer pump 1 set
 Electric motor driven, horizontal, gear pump, automatically started & stopped
 5 m³/h x 2.5 kg/cm² x 1.5 KW x 1,000 RPM

Auxiliary fuel oil transfer pump 1 set
 Electric motor driven, horizontal, gear pump, automatically started & stopped
 2 m³/h x 2.5 kg/cm² x 0.75 KW x 1,500 RPM

Wire, general service & auxiliary cooling sea water pump for auxiliary machinery 1 set
 Electric motor driven, horizontal, self-priming, centrifugal pump
 80/40 m³/h x 30/55 m x 15 KW x 1,500 RPM

Wire, bilge & ballast pump 1 set
 Electric motor driven, horizontal, self-priming, centrifugal pump
 60/30 m³/h x 30/55 m x 11 KW x 1,500 RPM

Bilge pump 1 set
 Electric motor driven, vertical, piston pump
 1 m³/h x 20 m x 0.4 KW x 1,000 RPM

Fresh water pump 2 sets
 Electric motor driven, horizontal, centrifugal or Wesco pump, automatically started & stopped
 5 m³/h x 25 m x 1.5 KW x 3,000 RPM

Sanitary/refrigerator cooling sea water pump 1 set
 Electric motor driven, horizontal, centrifugal pump
 30 m³/h x 25 m x 5.5 KW x 1,500 RPM

Fuel oil purifier 1 set
 Electric motor driven, centrifugal separator, with suction & discharge pumps
 700 ltr/h x 1.5 KW x 1,500 RPM

Lubricating oil purifier 1 set
 Electric motor driven, centrifugal separator, with suction & discharge pumps
 700 ltr/h x 1.5 KW x 1,500 RPM

Engine room ventilating fan 2 sets
 Electric motor driven, vertical, axial-flow, reversible fan
 180 m³/min x 25 mm aq x 2.2 KW x 1,500 RPM

Oily bilge water separator 1 set
 1 m³/h, oil content of 100 ppm

Lubricating oil filter for generator engine 2 sets
 By-pass filtering, oil filter with renewable elements

Main air reservoir 2 sets
 Welded, cylindrical type
 Capacity as per engine maker's standard specification for twin-engines

Auxiliary air reservoir 1 set
 Welded, cylindrical type
 About 60 - 80 ltr x 30 kg/cm²

5. CONTROL & ALARM SYSTEMS

Main engine control Local manual control for starting & stopping,
 Remote control for engine speed & ahead-astern

Alarms :

Main engines	Cooling fresh water high temperature Lubricating oil low pressure
Reverse/reduction gear	Lubricating oil low pressure
Generator engines	Cooling fresh water high temperature Lubricating oil low pressure Overspeed (emergency stop)
Main air reservoirs	Low pressure
Engine room tanks	Low level alarms as necessary

PART 3. ELECTRICAL INSTALLATIONS

1. PRIMARY ELECTRIC POWER SOURCES

Main generator 2 sets
Diesel driven, drip-proof, self-ventilated, self-excited, marine
A.C. generator
275 KVA x 405 V x 3-phase x 50 Hz x 1,000 RPM

Shore connection box 1 set
Wall-mounted, drip-proof type, with phase sequence indicator
A.C. 400 V x 120 A x 3-phase x 50 Hz

2. SECONDARY ELECTRIC POWER SOURCES

Transformer 4 sets
Drip-proof, self-cooled, dry, marine type
25 KVA x 400/235 V x single-phase x 50 Hz

Storage battery for general use 2 sets
Lead-acid, marine storage battery
400 AH x 24 V

Storage battery for radio use 1 set
Lead-acid, marine storage battery
200 AH x 24 V

Rectifier 1 set
Silicon rectifier, with transformer
AC 400 V / DC 32 V x 60 ampere

3. SWITCHBOARDS

Main switchboard 1 set
Self-supported, drip-proof, dead-front type

Battery charging & discharging switchboard 1 set
Self-supported, drip-proof, dead-front type

4. ELECTRIC LIGHTING

Officers' cabins	Fluorescent lamps with globes
Crew's cabins	Fluorescent lamps with globes
Officers' & crew's mess rooms	Fluorescent lamps with globes
Cabin class passengers' cabins & mess room	Fluorescent lamps with globes
Tourist class passengers' space	Fluorescent lamps with globes
Economy class passengers' spaces	Fluorescent lamps with globes
Interior passageways	Fluorescent lamps with or without globes
Galley	Incandescent lamps with globes
Sanitary spaces	Fluorescent or incandescent lamps with globes
Stores	Incandescent lamps with protective globes
Engine room	Fluorescent & incandescent lamps with globes
Weather deck passageways	Incandescent lamps with protective globes
Cargo lamps	4 - 500 W fixed incandescent flood lamps 8 - 200 W portable incandescent lamps
Flood-light projector	6 - 500 W incandescent lamps 4 - 400 W mercurial lamps
Searchlight	1 - 3 KW directional searchlight
Funnel mark projector	2 - 500 W fixed incandescent flood lamps
Gangway lamps	4 - 300 W incandescent flood lamps

5. INBOARD COMMUNICATION SYSTEMS & APPLIANCES

Public address system	1 set
50 W output, incorporating talk-backs from bow & stern, radio broadcasting receiver & record or cassette tape player	
Automatic exchanging telephone	1 set
10-point telephone set	
Battery telephone, direct call	2 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Signal bell with reply	3 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Engine room to fuel filling stations	

Call buzzer system	3 sets
Officers' use,	
Cabin class passengers' use	
Call from engine room to chief engineer	

Alarm systems :

General alarm system	1 set
Refrigerated chamber alarm system	1 set
Steering gear alarm system	1 set
Engineer's alarm system	1 set
Smoke tube fire detector system	1 set
Manually operated fire alarm system	1 set

Remote indication systems :

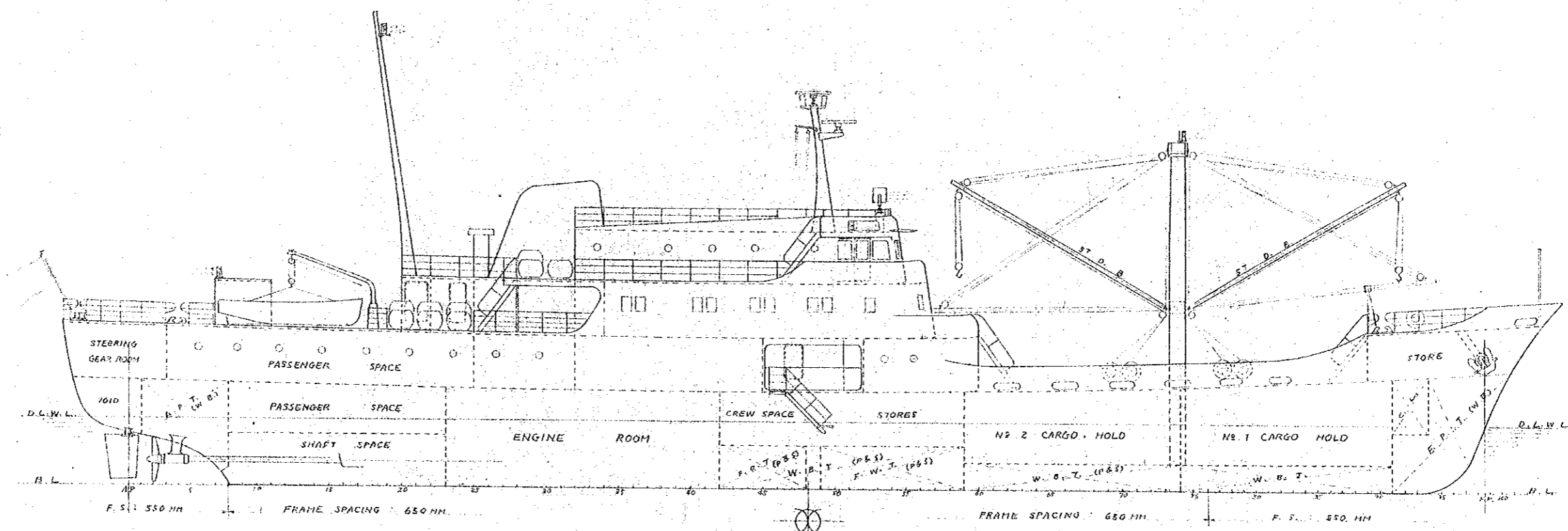
Main engine revolution indicator system	1 set
Helm angle indicator system	1 set

6. NAVIGATION AIDES

Gyroscopic compass & auto-pilot system	1 set
Marine radar, 40-mile range 10" screen	2 sets
Echo sounder	1 set
Electro-magnetic log or Doppler log	1 set
Anemometer & anemoscope	1 set
Electric clear-view screen, 30 cm dia.	2 sets
Time controller for air horn & motor siren	1 set
Motor siren	1 set

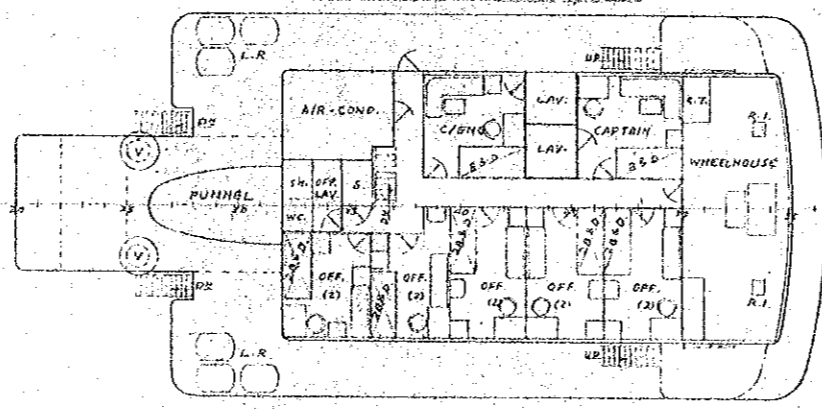
7. RADIO COMMUNICATION EQUIPMENT

SSB radio-telephone transceiver, 100 W output	1 set
VHF radio-telephone transceiver, 20 W outout	1 set

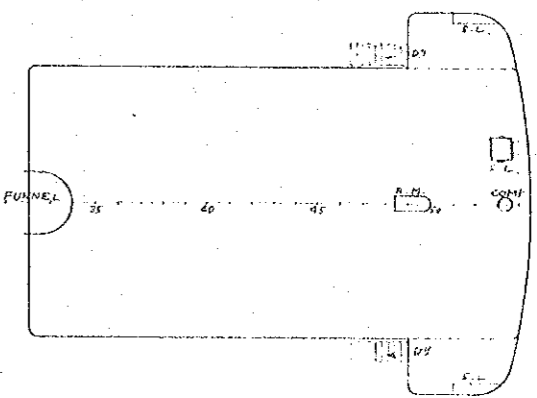


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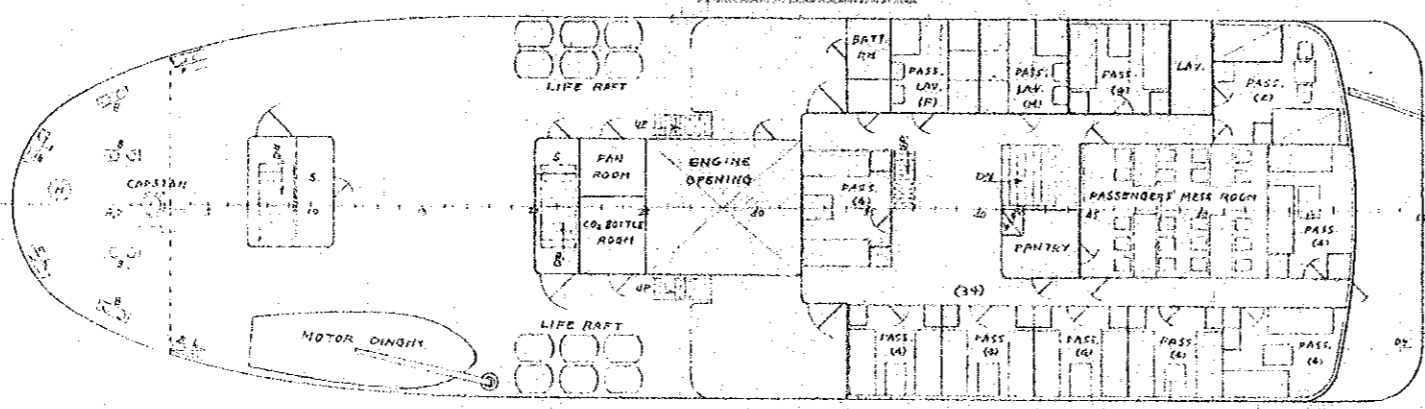
NAV. BRIDGE DECK



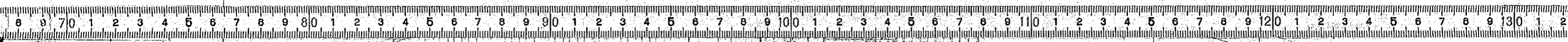
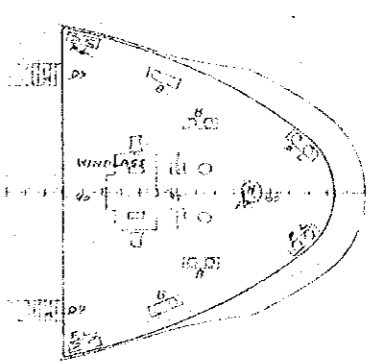
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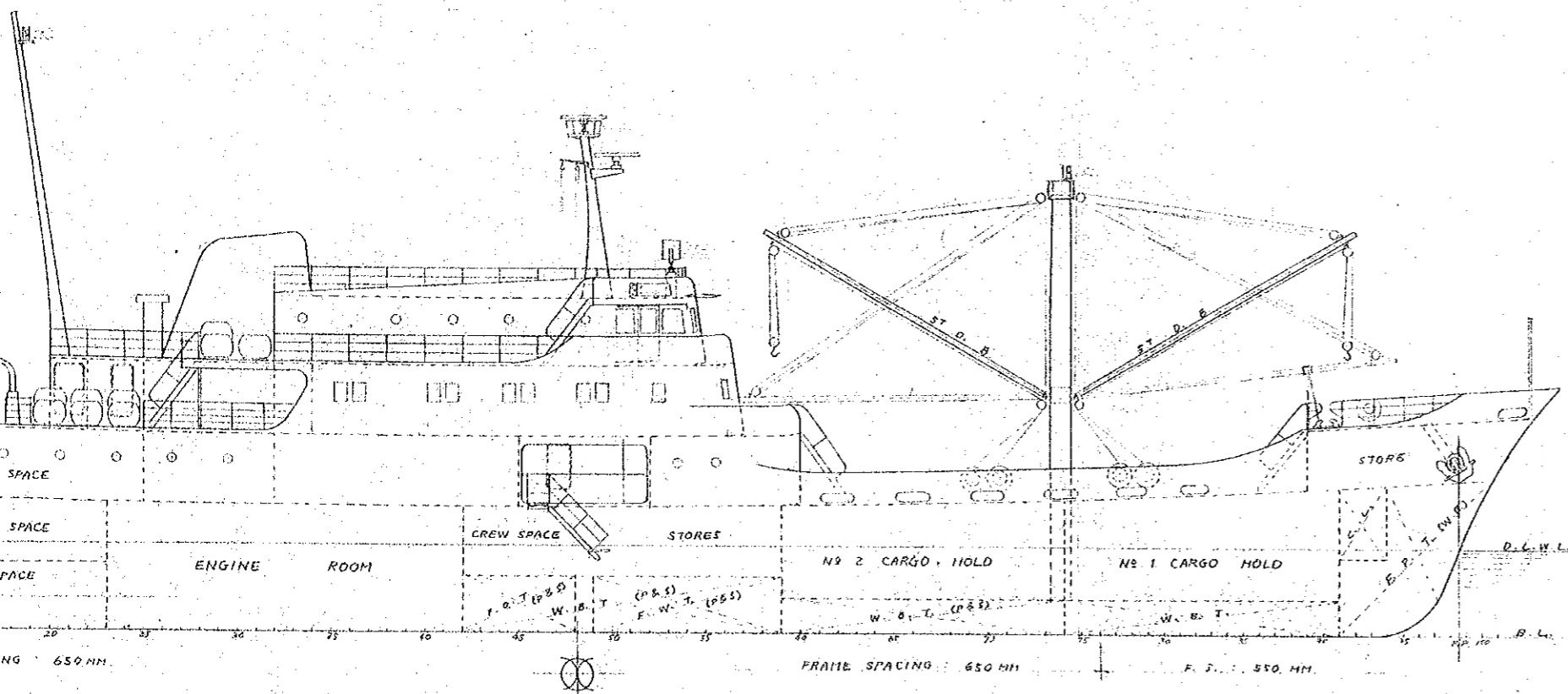


POOP DECK



FORECASTLE DECK

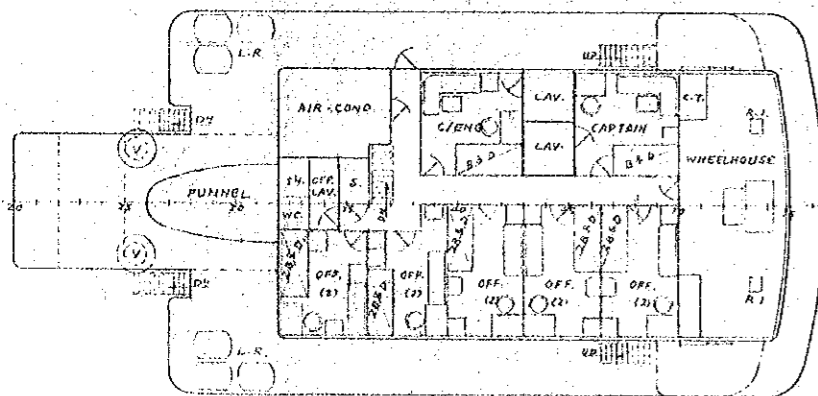




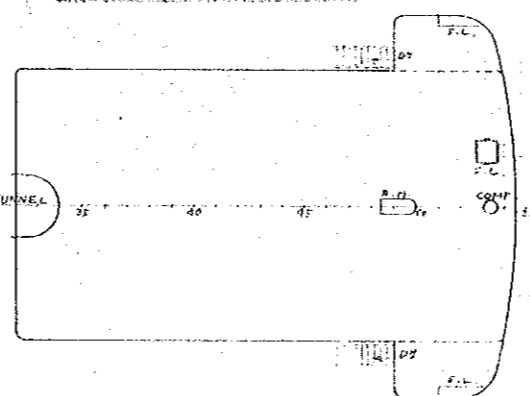
PRINCIPAL PARTICULARS

LENGTH O.A.	ABT.	67'50
LENGTH B.P.		61'00
BREADTH M _W		11'00
DEPTH M _W		4'30
LOAD DRAUGHT M _W DESIGNED		3'00
GROSS TONNAGE	ABT.	1,000 ^T
DEADWEIGHT	ABT.	410 ^T
MAIN ENGINES		1,000 ^{PS} x 2 SETS
TRIAL SPEED	ABT.	15 KNOTS
SERVICE SPEED	ABT.	13.5 KNOTS
CREW		35
PASSENGERS	CABIN CLASS	34
	TOURIST CLASS	74
	ECONOMY CLASS	302
	TOTAL	410

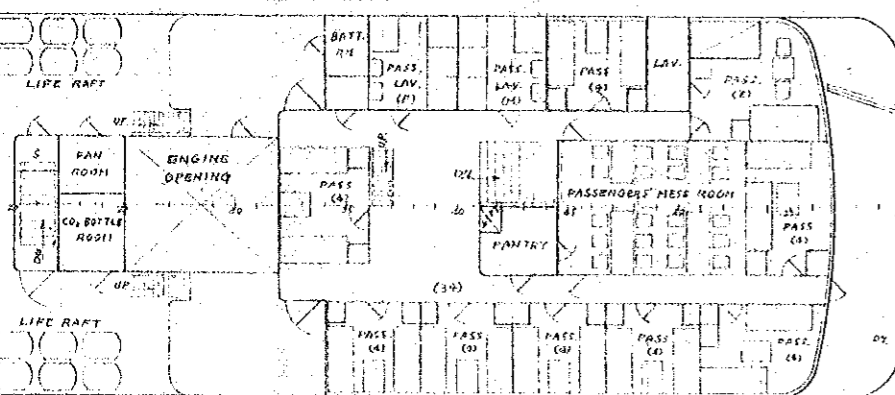
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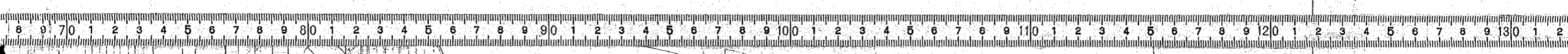
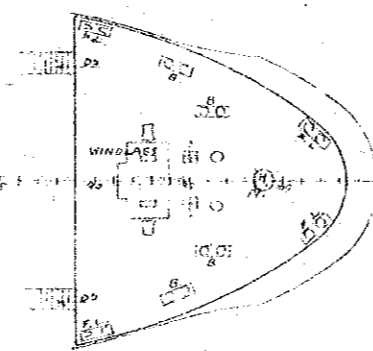
WHEELHOUSE TOP

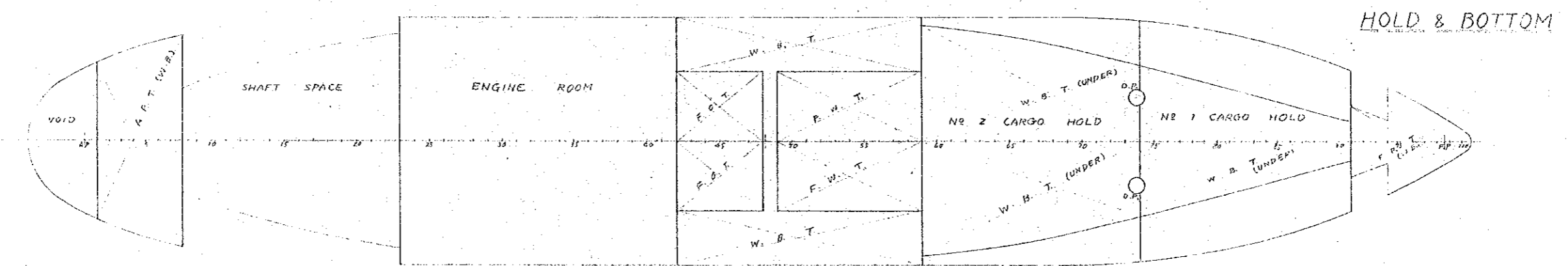
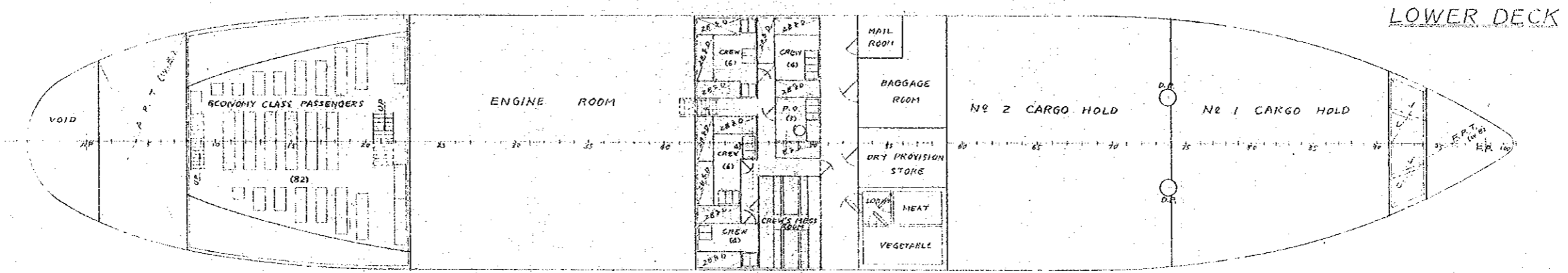
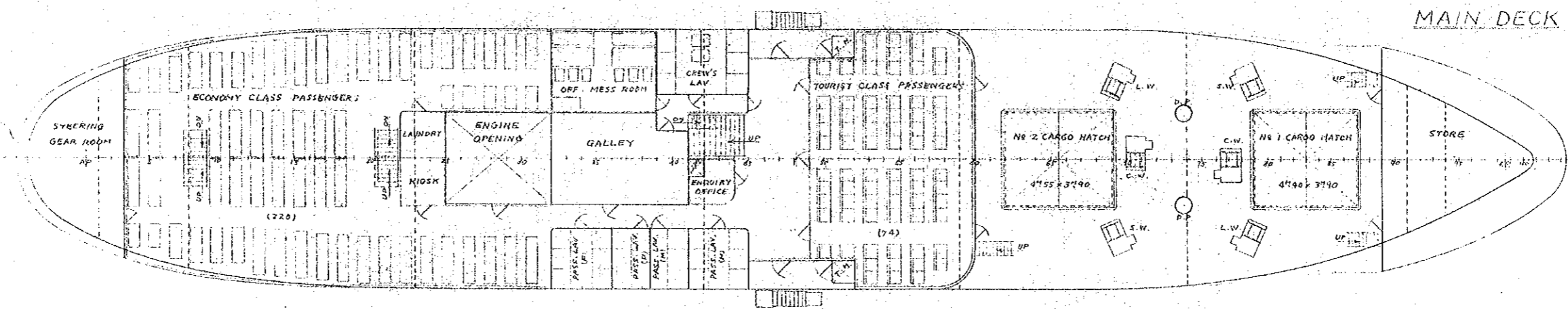
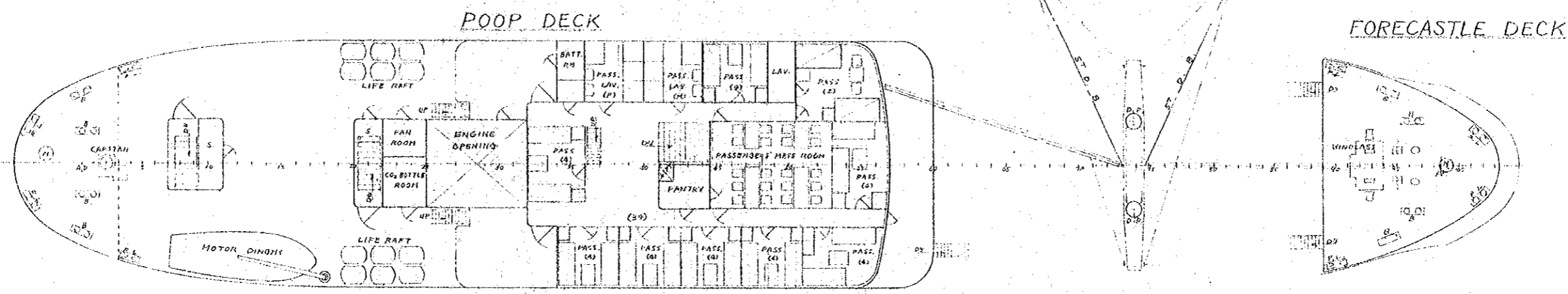


POOP DECK



FORECASTLE DECK



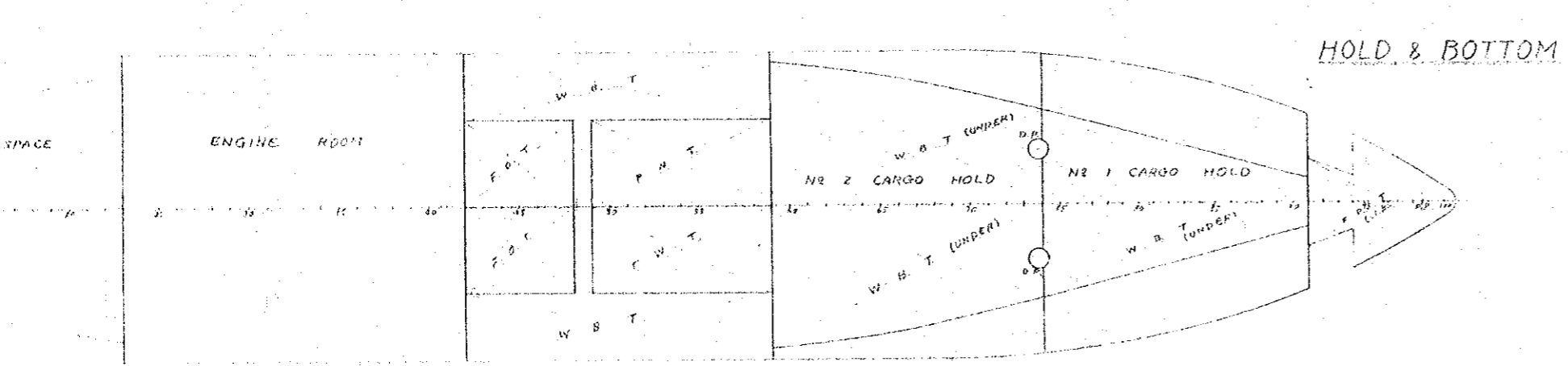
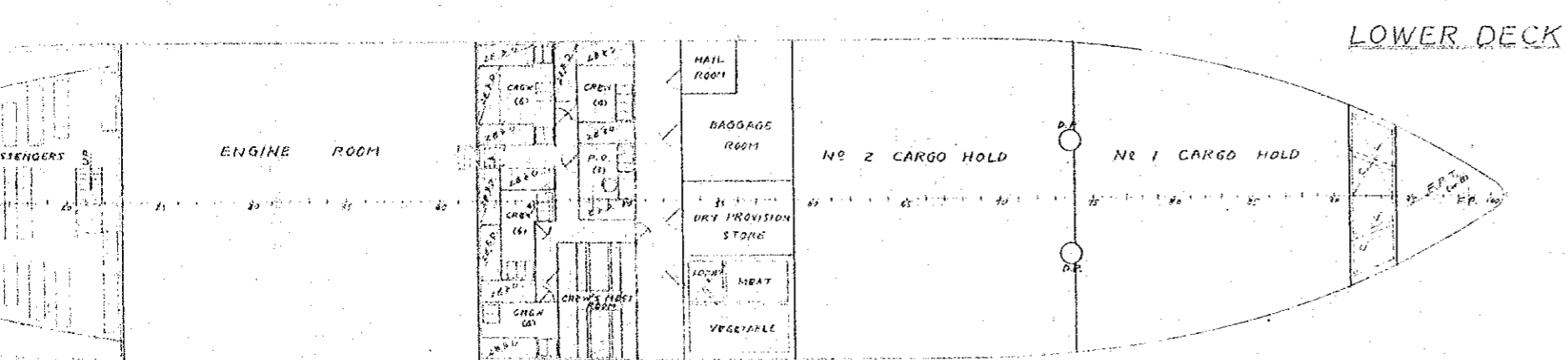
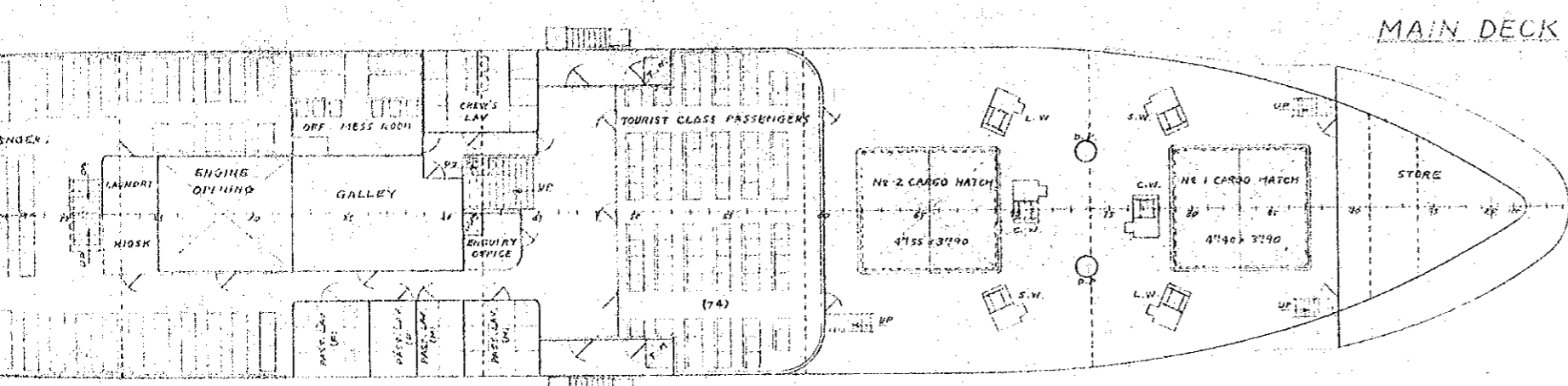
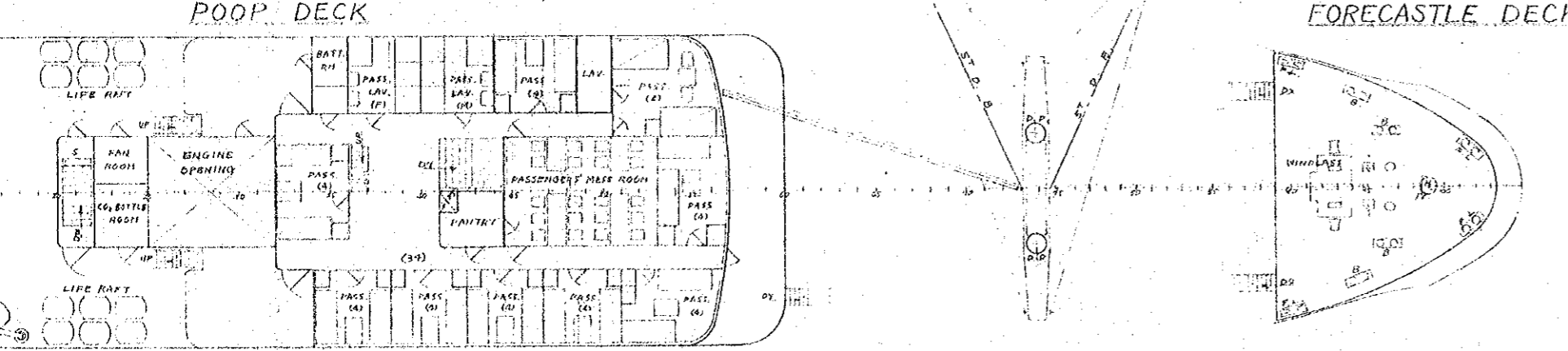


G.T. 1,000 T.

GENERAL

SCALE





G.T. 1,000 T. PASSENGER CUM CARGO BOAT

GENERAL ARRANGEMENT

SCALE 1/150



G. T. 700 TONS PASSENGER & CARGO VESSEL

OUTLINE SPECIFICATION

PART 1. HULL

1. GENERAL DESCRIPTION

The vessel shall be a high speed, triple-screw, passenger and cargo boat intended for transportation of passengers and minor quantity of general cargo along the coast of Tanzania.

The main hull structure shall be constructed of steel, while the astern portion of the cabin deck and the deckhouses above this deck shall be constructed of sea water resisting light alloy. High tensile steel shall be used for shall plating and other structural members as may be considered necessary.

The vessel shall be designed, constructed and fitted out under the special survey by and to the classification requirements of internationally recognized ship classification society to obtain its highest class for the coasting service.

2. PRINCIPAL DIMENSIONS

Length, overall	about	60.00 metres
Length between perpendiculars		55.00 metres
Breadth, moulded		9.00 metres
Depth, moulded		4.00 metres
Load draught, moulded, designed		2.50 metres
'Tween-deck heights:		
Main deck to cabin deck		2.25 metres
Cabin deck to navigation bridge deck		2.25 metres
Navigation bridge deck to wheelhouse top		2.20 metres

3. TONNAGE & CAPACITY

Gross tonnage	about	700 tons
Deadweight	about	130 tons
Capacity:		
Cargo hold	about	35 cubic metres
Fuel oil tanks	about	58 cubic metres
Fresh water tank	about	28 cubic metres

4. SPEED & ENDURANCE

Max. speed on trial, 1/4 load condition, clean bottom & calm sea, at max. continuous output of main engines	about	knots
Speed on service, full load condition, at 85% output of main engines, Incl. 15% power margin	about	22 knots
Endurance, full load condition, at service speed defined above	about	700 nautical miles

5. SHIP'S COMPLEMENT & PASSENGERS

Ship's complement :

Officers	10
Petty officers	3
Subordinates	18
Sum	31

Passengers :

Cabin class A	4
Cabin class B	16
Cabin class C	28
Tourist class A	186
Tourist class B	84
Sum	318
Grand total	349

6. DECK MACHINERY

Windlass	1 set
Electric motor driven, horizontal type, with 2 sprocket wheels & 2 warping ends 4 t x 9 m/min x 11 KW	
Capstan	1 set
Electric motor driven, vertical type 3 t x 15 m/min x 11 KW	
Steering gear	1 set
Electro-hydraulic, twin-rudder parallel steering type, with 2 hydraulic pump units 7.5 t-m x 3.7 KW	
Boat/cargo winch	1 set
Electric motor driven, horizontal type 1 t x 18 m/min x 5.5 KW	

Electric hoist 1 set
 Electric motor driven, suspended type
 500 kg x 20 m/min x 3.7 KW

7. CREW'S ACCOMMODATION

Living rooms :

Captain	Single-berthed cabin
Chief engineer	Single-berthed cabin
Other officers	2-berthed cabin
Petty officer	3-berthed cabin
Subordinates	Dormitories, 10-berthed & 8-berthed

Mess rooms	Officers' mess room seating 10 persons Crew's mess room seating 21 persons
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Sanitary spaces	Officers' lavatory with 1-WC & 1-shower Crew's lavatory with 2-WCs & 2-showers
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8. PASSENGERS' ACCOMMODATION

Cabin class A	2-berthed cabin with private lavatory comprising washbasin, WC & shower
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Cabin class B	4-berthed cabin with 2-double tier sofa-bed (upper tier being foldable), 1 table & 2 chairs
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Cabin class C	14-berthed cabin with 7 double-tier sofa-bed (upper tier being foldable)
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Tourist class A	Common passenger spaces with reclining chairs, back of each chair having foldable table on its backside
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Tourist class B	Common passenger space with upholstered settees with backs having foldable tables on backsides
-----------------	--

Mess room	Separate mess room for cabin class passengers, seating 24 persons
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Sanitary spaces	Cabin class passengers' lavatory (gents) incl. shower & WCs, Cabin class passengers' lavatory (ladies) incl. shower & WCs, Tourist class passengers' WC rooms (gents), Tourist class passengers' WC rooms (ladies)
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9. COMMISSARY SPACES & KIOSK

Galley	1 - Common galley with electric cooking equipment capable of serving food for officers, crew, all cabin class passengers & 10% of tourist class passengers
Pantry	1 - Pantry for cabin class passengers' mess room
Kiosk	1 - Kiosk, selling food for tourist class passengers & other general articles

10. JOINER WORK & FURNITURE

Joiner work :

Steel wall lining	Marine plywood of 5.5 mm, with plastic overlay
Overhead ceiling	Marine plywood of 3 mm, with plastic overlay
Wooden partitions	Marine plywood of 19 mm, with plastic overlay
Insulation	Glass wool insulation for metallic walls & deckheads exposed to weather & engine room

Deck covering :

Officers' cabins	Latex deck composition
Crew's cabins	Latex deck composition
Cabin class passengers' cabins & mess room	Plastic tiling on latex deck composition
Tourist class passengers' spaces	Latex deck composition
Passages	Latex deck composition
Sanitary spaces	Mosaic tile on cement bed
Galley	Grooved tile on cement bed

Beds :

Officers	Wooden bed
Crew	Sofa-bed, double-tier, upper tier being folded down to form sofa back in the daytime
Cabin class A	Wooden bed, single-tier
Cabin class B & C	Sofa-bed, double-tier, upper tier being folded down to form sofa back in the daytime

Tourist class passengers' chairs & settees :

Chairs (A-class spaces)	Reclining chair, with seat & back covered with vinyl-leather & stuffed with polyurethane foam, reclining back having foldable table on its back
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Settees
(B-class spaces)

Frames of steel pipe & seat & back covered with vinyl-leather & stuffed with polyurethane foam, back having foldable tables on its backside

Upholstery :

Bed mattress

Cover of moquette & stuffing of polyurethane foam for Cabin class A,

Cover of vinyl-leather & stuffing of polyurethane foam for Cabin class B & C, officers & crew.

Sofa-bed

Cover of vinyl-leather & stuffing of polyurethane foam.

Sofa

Cover of vinyl-leather & stuffing of polyurethane foam.

Chair seat & back

Cover of moquette & stuffing of polyurethane foam for Cabin class A,

Cover of vinyl-leather & stuffing of polyurethane foam for Cabin class B, Tourist classes, officers & crew.

Curtain

Synthetic fibre textile.

11. CARGO HOLD & CARGO GEAR

Cargo hold :

No. of compartment
Bottom ceiling
Side sparring

1 compartment
Close wooden ceiling
None

Cargo hatch :

No. of hatch
Hatch cover

1
Light alloy hatch cover of pontoon type, with 2 sheets of vinylon canvas tarpaulin

Cargo/boat davit :

Type
No. of davit

Radial davit with electric winch, 0.9 ton
1 set

12. VENTILATION & AIR - CONDITIONING

Classification :

Officers' cabins
& mess room

Air-conditioning

Crew's dormitories
& mess room

Air-conditioning

Cabin class passengers' cabins & mess room

Air-conditioning

Tourist class passengers' spaces	Mechanical supply ventilation
Wheelhouse	Cooled air supply
Galley	Mechanical supply & exhaust ventilation
Sanitary spaces	Mechanical exhaust ventilation
Dry provision store	Mechanical exhaust ventilation
Engine room	Mechanical supply & exhaust ventilation

Air-conditioning system:

Design conditions:-

	<u>Outside</u>	<u>Inside</u>
Air temperature	35° C	27° C
Relative humidity	80%	50%
Type of system	Centralized air-conditioning system, electric motor driven, sea water cooled, automatically controlled.	
Air ducting	Insulated ducting of galvanized thin steel sheet, with air supply ports of diffuser or pankah-louvre type.	

Rates of air-change in mechanically ventilated spaces:

Tourist class passengers' spaces	30 times per hour
Galley	Supply : 30 times per hour Exhaust : 45 times per hour
Sanitary spaces	20 times per hour
Dry provision store	5 times per hour

13. BOAT & LIFE SAVING APPLIANCES

Boat	1 - FRP motor dinghy, 6.5 metre in length 1 - FRP hydro jet boat, 20 passengers
Boat davit	1 - Radial davit, with electrically driven winch, commonly used for cargoing
Inflatable liferaft	14 - Inflatable liferaft in container, 25 persons, each
Lifebuoy	8 - Lifebuoy
Lifejacket	349 - Lifejacket for adult 32 - Lifejacket for infant

14. FIRE - EXTINGUISHING SYSTEMS & APPLIANCES

Fire detecting system Smoke tube fire detector for officers' living quarter, crew's living quarter, passengers' spaces, galley, cargo hold & engine room.

Fire fighting systems & appliances :

Officers' & crew's quarters	Hydrants & portable fire extinguishers
Passengers' spaces	Hydrants & portable fire extinguishers
Cargo hold	Hydrants
Store spaces	Hydrants & portable fire extinguishers
Engine room	Hydrants & portable fire extinguishers

15. ANCHORS, CHAIN CABLES & ROPES

Bower anchor, stockless, 900 kg	3
Bower anchor cable, welded stud link chain cable, NK Grade 2, 26 mm. dia. x 192.5 m. & 165 m. in length	2 lines
Towline, flexible wire rope (6 x 24), 20 mm. dia. x 180 m. in length	1 line
Mooring line, vinylon rope, 34 mm. dia. x 140 m. in length	3 lines

PART 2. MACHINERY

1. MAIN ENGINES

No. of sets	3 sets
Type	Vee-type, four stroke cycle, single acting, airless injection, trunk piston, supercharged, marine diesel engine with reverse/reduction gear
Max. continuous output	3,290 PS at 1,200 - 1,500 RPM
Cooling system	Indirect fresh water cooling
Starting system	Compressed air starting
Control system	Remote control from wheelhouse for engine speed & ahead/astern, Direct manual control for starting & stopping
Attachments	Cooling sea water pump 1 set Cooling fresh water pump 1 set Lubricating oil pump 1 set Fuel oil supply pump 1 set Exhaust turbo-supercharger 2 sets Intermediate air cooler 2 sets Reverse/reduction gear with L.O. pump & cooler 1 set

2. SHAFTING & PROPELLERS

No. of shaft lines	3 lines
Intermediate shaft	Solid shaft of forged steel
Propeller shaft	Solid shaft of forged steel with bronze sleeves & rubber covering between sleeves
Stern tube	Fabricated steel stern tube with rubber bearing
Shaft bracket	Cast and/or fabricated steel shaft bracket with rubber bearing
Propeller	Four-bladed solid propeller of manganese bronze

3. DIESEL GENERATOR SETS

No. of sets	2 sets
Diesel engine prime mover :	
Type	Vertical, four stroke cycle, single acting, airless injection, trunk piston, diesel engine
Max. cont. output	300 PS at 1,500 RPM
Cooling system	Indirect fresh water cooling
Starting system	Compressed air starting

Generator :

Type	Drip-proof, self-ventilated, self-excited, marine A.C. generator
Phase & frequency	3-phase, 50 Hz
Voltage	405 V
Rated output	250 KVA (200 KW), continuous
Insulation	Class B

4. AUXILIARY MACHINERY & EQUIPMENT IN ENGINE ROOM

Main air compressor	1 set
Electric motor driven, vertical, double stage, sea water cooled, reciprocating air compressor, automatically started & stopped 18 m ³ /h (piston displacement) x 30 kg/cm ² x 3.7 KW x 1,000 RPM	
Auxiliary air compressor	1 set
Diesel driven, vertical, double stage, sea water cooled, reciprocating air compressor, manually started 10 m ³ /h x 30 kg/cm ² x 3.5 PS	
Auxiliary lubricating oil pump	1 set
Electric motor driven, vertical, gear pump Capacity as per engine maker's standard specification	
Auxiliary fuel oil supply pump	1 set
Electric motor driven, horizontal, gear pump Capacity as per engine maker's standard specification	
Auxiliary lubricating oil pump for reverse/reduction gear	1 set
Electric motor driven, horizontal, gear pump Capacity as per gear maker's standard specification	
Cooling sea water pump for auxiliary machinery	1 set
Electric motor driven, horizontal, centrifugal pump 75 m ³ /h x 30 m x 15 KW x 1,500 RPM	
Fuel oil transfer pump	1 set
Electric motor driven, horizontal, gear pump, automatically started & stopped 5 m ³ /h x 2.5 kg/cm ² x 1.5 KW x 1,000 RPM	
Fire, general service & auxiliary cooling sea water pump	1 set
Electric motor driven, vertical, self-priming, centrifugal pump 105 m ³ /h x 30 m x 19 KW x 1,500 RPM	
Fire, bilge, ballast & auxiliary cooling fresh water pump	1 set
Electric motor driven, vertical, self-priming, centrifugal pump 90 m ³ /h x 40 m x 19 KW x 1,500 RPM	

Bilge pump	1 set
Electric motor driven, vertical, piston pump 1 m ³ /h x 20 m x 0.4 KW x 1,000 RPM	
Fresh water pump	2 sets
Electric motor driven, horizontal, centrifugal or Wesco pump, automatically started & stopped 5 m ³ /h x 25 m x 1.5 KW x 3,000 RPM	
Fuel oil purifier	2 sets
Electric motor driven, centrifugal separator, with suction & discharge pumps, automatic sludge discharge control 3,000 ltr/h x 5.5 KW x 1,500 RPM	
Lubricating oil purifier	1 set
Electric motor driven, centrifugal separator, with suction & discharge pumps, automatic sludge discharge control 2,000 ltr/h x 3.7 KW x 1,500 RPM	
Engine room ventilating fan	4 sets
Electric motor driven, vertical, axial-flow, reversible fan 300 m ³ /min x 25 mm sq x 3.7 KW x 1,500 RPM	
Oily bilge water separator	1 set
1 m ³ /h, as per IMCO standards	
Lubricating oil filter for auxiliary engine	1 set
Forced circulated, oil filter with renewable elements	
Main air reservoir	2 sets
Welded, cylindrical type Capacity as per engine maker's standard specification	
Auxiliary air reservoir	1 set
Welded, cylindrical type About 100 ltr x 30 kg/cm ²	

5. CONTROL & ALARM SYSTEMS

Main engine control	Local manual control for starting & stopping Remote control for engine speed & ahead/astern
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Alarms :

Main engines	Cooling fresh water high temperature lubricating oil low pressure
Reverse/reduction gear	Lubricating oil low pressure
Generator engines	Cooling fresh water high temperature lubricating oil low pressure
Main air reservoirs	Low pressure
Engine room tanks	Low level alarms as necessary

PART 3. ELECTRICAL INSTALLATIONS

1. PRIMARY ELECTRIC POWER SOURCES

Main generator 2 sets
Diesel driven, drip-proof, self-ventilated, self-excited, marine
A.C. generator
250 KVA x 405 V x 3-phase x 50 Hz

Shore connection box 1 set
Wall-mounted, drip-proof type, with phase sequence indicator
A.C. 400 V x 120 A x 3-phase x 50 Hz

2. SECONDARY ELECTRIC POWER SOURCES

Transformer 4 sets
Drip-proof, self-cooled, dry, marine type
20 KVA x 400/235 V x single-phase x 50 Hz

Storage battery for general use 2 sets
Lead-acid, marine storage battery
300 AH x 24 V

Storage battery for radio use 1 set
Lead-acid, marine storage battery
200 AH x 24 V

Rectifier 1 set
Silicon rectifier, with transformer
AC 400 V / DC 32 V x 50 Ampere

3. SWITCHBOARDS

Main switchboard 1 set
Self-supported, drip-proof, dead-front type

Battery charging & discharging switchboard 1 set
Self-supported, drip-proof, dead-front type

4. ELECTRIC LIGHTING

Officers' cabins	Fluorescent lamps with globes
Crew's dormitories	Fluorescent lamps with globes
Officers' & crew's mess rooms	Fluorescent lamps with globes
Cabin class passengers' cabins	Fluorescent lamps with globes
Tourist class passengers' spaces	Fluorescent lamps with globes
Cabin class passengers' mess room	Fluorescent lamps with globes
Inboard passageways	Fluorescent lamps with or without globes
Galley	Incandescent lamps with globes
Sanitary spaces	Fluorescent or incandescent lamps with globes
Stores	Incandescent lamps with protective globes
Engine room	Fluorescent & incandescent lamps with globes
Weather deck lamps	Incandescent lamps with protective globes
Flood light projectors	6 - 500 W incandescent lamps 4 - 400 W mercurial lamps
Searchlight	1 - 3 KW directional searchlight
Gangway lamps	4 - 300 W incandescent flood lamps

5. INBOARD COMMUNICATION SYSTEMS & APPLIANCES

Public address system	1 set
30 W output, incorporating talk-backs from bow & stern, radio broadcasting receiver & record or cassette tape player	
Automatic exchanging telephone	1 set
12-point telephone set	
Battery telephone, direct call	2 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Signal bell with reply	3 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Engine room to fuel filling stations	
Call buzzer system	3 sets
Officers' use,	
Cabin class passengers' use,	
Call from engine room to chief engineer	

Alarm systems :

General alarm system	1 set
Refrigerating chamber alarm system	1 set
Steering gear alarm system	1 set
Engineer's alarm system	1 set
Smoke tube fire detecting system	1 set

Remote indication systems :

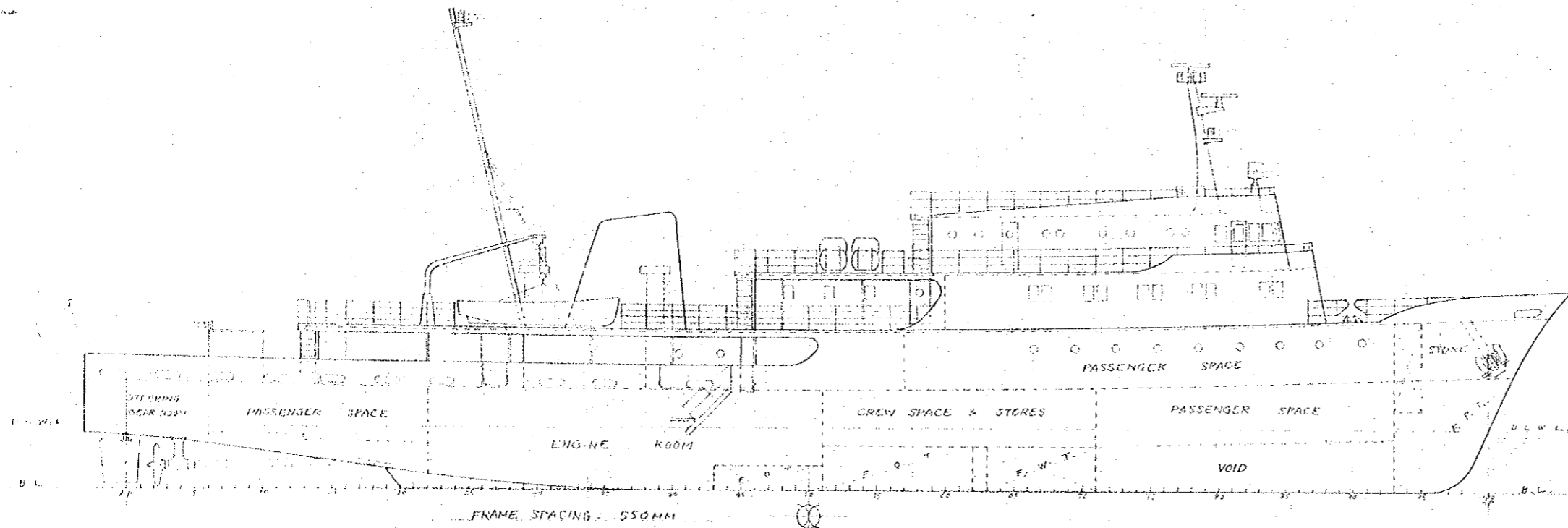
Engine revolution indicator system	2 sets
Helm angle indicator system	1 set

6. NAVIGATION AIDS

Gyroscopic compass & auto-pilot system	1 set
Marine radar, 40 miles range, 10" screen	2 sets
Echo sounder	1 set
Electro-magnetic log or Doppler log	1 set
Anemometer	1 set
Electric clear-view screen, 30 cm. dia.	2 sets

7. RADIO COMMUNICATION EQUIPMENT

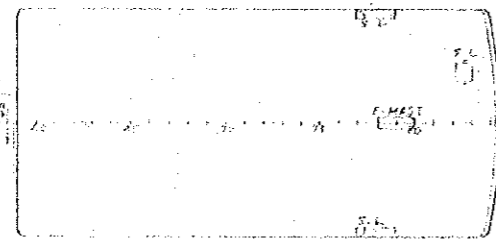
SSB radio-telephone transceiver, 100 W output	1 set
VHF radio-telephone transceiver, 20 W output	1 set



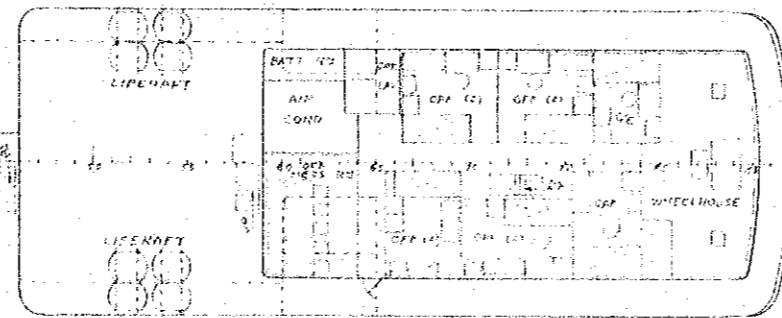
PRINCIPAL PARTICULARS

LENGTH, O.A.	ABT.	60'00
LENGTH, B.P.		55'00
BREADTH, M _W		9'00
DEPTH, M _W		4'00
LOAD DRAUGHT, M _W , DESIGNED		2'50
GROSS TONNAGE	ABT.	100 ^T
MAIN ENGINES		3,290 ^{PS} x 3 ^{SETS}
TRIAL SPEED	ABT.	25 KNOTS
SERVICE SPEED	ABT.	22 KNOTS
CREW		31
PASSENGERS:	CABIN CLASS A	4
	B	16
	C	28
TOURIST CLASS	A	186
	B	84
TOTAL		318

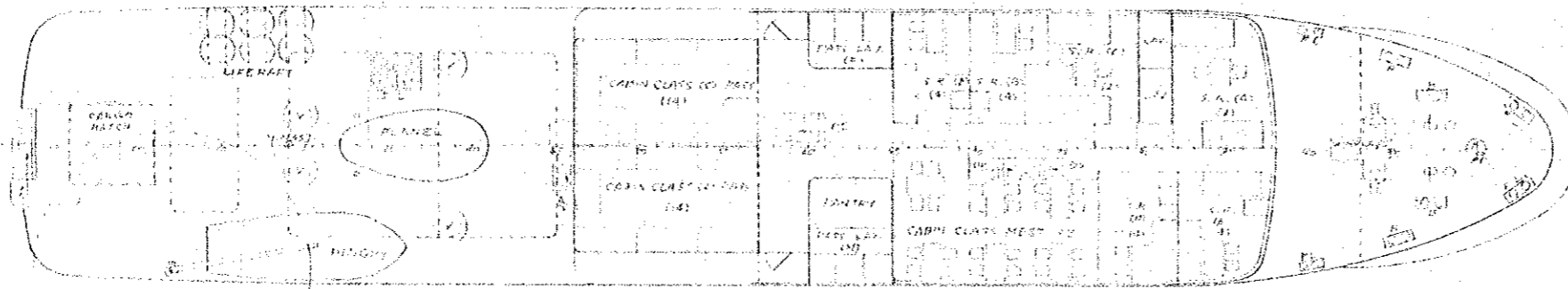
WHEELHOUSE TOP



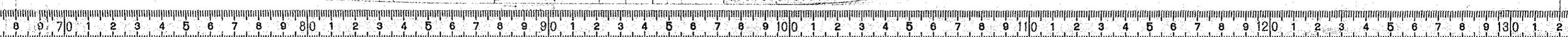
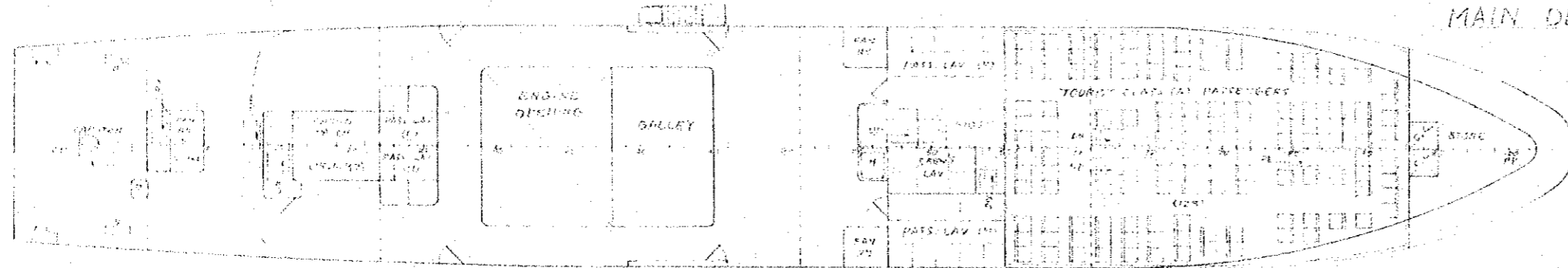
NAVIGATION BRIDGE DECK

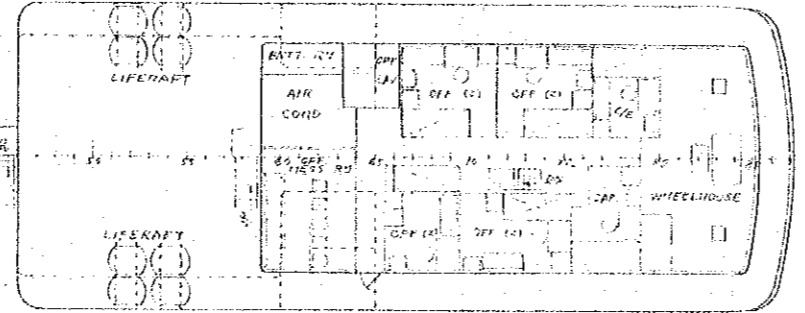
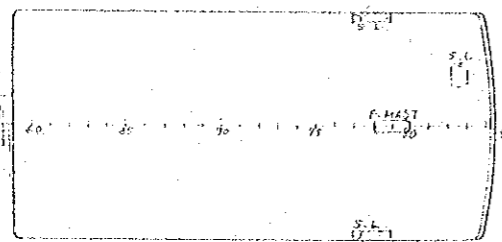


CABIN DECK

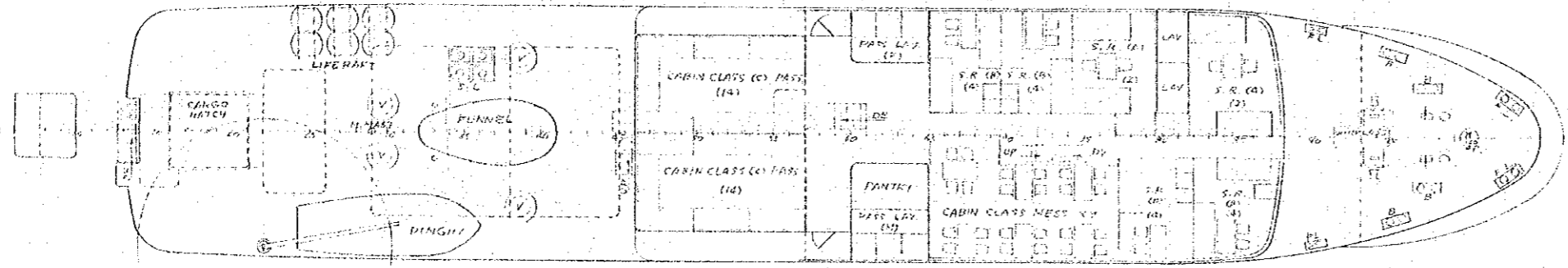


MAIN DECK

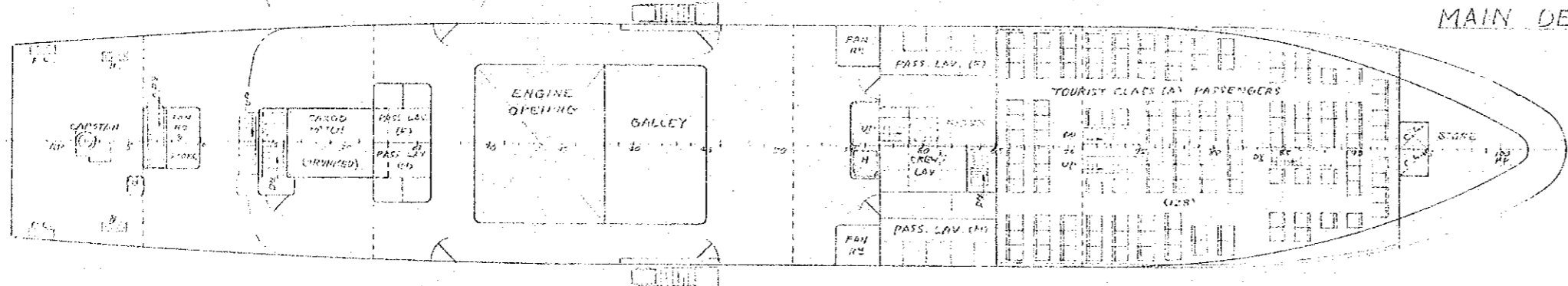




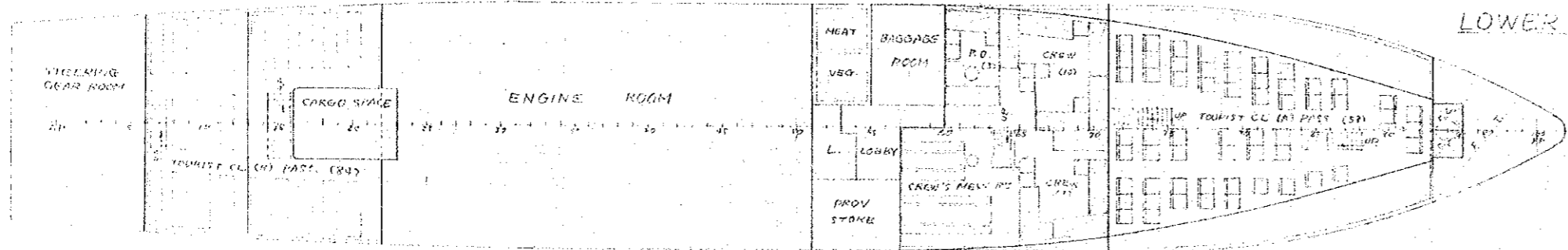
CABIN DECK



MAIN DECK



LOWER DECK



BOTTOM

G.T. 700T. PASSENGER & CARGO BOAT

GENERAL ARRANGEMENT

1/150



G. T. 580 TONS PASSENGER & CARGO VESSEL

O U T L I N E S P E C I F I C A T I O N

PART 1. H U L L

1. GENERAL DESCRIPTIONS

The vessel shall be a twin-screw, passenger and cargo boat intended for transportation of passengers and general cargo along the coast of Tanzania.

The vessel shall be designed, constructed and fitted out under the special survey by and to the classification requirements of internationally recognized ship classification society to obtain its highest class for the coasting service.

2. PRINCIPAL DIMENSIONS

Length, overall	about	49.90 metres
Length between perpendiculars		45.50 metres
Breadth, moulded		9.00 metres
Depth, moulded		3.50 metres
Load draught, moulded, designed		2.50 metres
Tween-deck heights:		
Main deck to cabin deck		2.25 metres
Cabin deck to navigation bridge deck		2.25 metres
Navigation bridge deck to wheelhouse top		2.20 metres

3. TONNAGE & CAPACITY

Gross tonnage	about	580 tons
Deadweight	about	145 tons
Capacity:		
Cargo hold	about	75 cubic metres
Fuel oil tanks	about	21 cubic metres
Fresh water tanks	about	48 cubic metres
Water ballast tanks	about	24 cubic metres

4. SPEED & ENDURANCE

Max. speed on trial, 1/4 load condition, clean bottom & calm sea, at max. continuous output of main engines	about	13.5 knots
Speed on service, full load condition, at 85% output of main engines, incl. 15% power margin	about	12.3 knots
Endurance, full load condition, at service speed defined above	about	1,300 nautical miles

5. SHIP'S COMPLEMENT & PASSENGERS

Ship's complement :

Officers	8
Petty officers	3
Subordinates	14
Sum	25

Passengers :

Cabin class	A	2
Cabin class	B	16
Cabin class	C	22
Tourist class	A	198
Tourist class	B	74
Sum		312
Grand total		337

6. DECK MACHINERY

Winchlass	1 set
Electric motor driven, horizontal type, with 2 sprocket wheels & 2 warping ends 3 t x 9 m/min x 11 KW	
Capstan	1 set
Electric motor driven, vertical type 2 t x 15 m/min x 7.5 KW	
Steering gear	1 set
Electro-hydraulic, twin-rudder parallel steering type, with 2 hydraulic pump units 3 t-m x 1.5 KW	
Cargo winch	2 sets
Electric motor driven, horizontal type 2 t x 25 m/min x 15 KW	

Boat winch	1 set
Electric motor driven, horizontal type 1 t x 15 m/min	
Electric hoist	1 set
Electric motor driven, suspended type 500 kg x 20 m/min x 3.7 KW	

7. CREW'S ACCOMMODATION

Living rooms :

Captain	Single-berthed cabin
Chief engineer	Single-berthed cabin
Other officers	2-berthed cabin
Petty officers	3-berthed cabin
Subordinates	Dormitory with mess tables
Mess rooms	Officers' mess room seating 8 persons
Sanitary spaces	Officers' lavatory with 1-WC & 1-shower Crew's lavatory with 2-WCs & 1-shower

8. PASSENGERS' ACCOMMODATION

Cabin class A	2-berthed cabin with private lavatory comprising washbasin, WC & shower
Cabin class B	4-berthed cabin with 2 double-tier sofa-bed (upper tier being foldable), 1 table & 2 chairs
Cabin class C	10- or 12-berthed cabin with 5 or 6 double-tier sofa-bed (upper tier being foldable)
Tourist class A	Common passenger space with reclining chairs, back of each chair having foldable table on its backside
Tourist class B	Common passenger spaces with upholstered settees with backs having foldable tables on backsides
Mess room	Separate mess room for cabin class passengers, seating 20 persons
Sanitary spaces	Cabin class passengers' lavatory (gents) incl. showers & WCs, Cabin class passengers' lavatory (ladies) incl. showers & WCs, Tourist class passengers' WC room (gents), Tourist class passengers' WC room (ladies)

9. COMMISSARY SPACES & KIOSK

Galley	1 - Common galley with electric cooking equipment, capable of serving food for officers, crew, all cabin class passengers & 10% of tourist class passengers
Pantry	1 - Pantry for cabin class passengers' mess room
Kiosk	1 - Kiosk, selling food for tourist class passengers & other general articles

10. JOINER WORK & FURNITURE

Joiner work :

Steel wall lining	Marine plywood of 9 mm. with plastic overlay
Overhead ceiling	Marine plywood of 5.5 mm. with plastic overlay
Wooden partitions	Marine plywood of 10 mm. with plastic overlay
Insulation	Glass wool insulation for steel walls & deck-heads exposed to weather & engine room

Deck covering :

Officers' cabins	Plastic tiling on latex deck composition
Crew's cabins	Latex deck composition
Cabin class passengers' cabins & mess room	Plastic tiling on latex deck composition
Tourist class passengers' spaces	Latex deck composition
Passages	Latex deck composition
Sanitary spaces	Mosaic tile on cement bed
Galley	Grooved tile on cement bed

Beds :

Officers & crew	Wooden bed
Cabin class A	Wooden bed, single-tier
Cabin class B & C	Sofa-bed, double-tier, upper tier being folded down to form sofa back in the daytime

Tourist class passengers' chairs & settees :

Chairs (A-class spaces)	Reclining chair, with seat & back covered with vinyl-leather & stuffed with polyurethane foam, reclining back having foldable table on its backside
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Settees (B-class spaces) Frames of steel pipe & seat & back covered with vinyl-leather & stuffed with polyurethane foam, back having foldable tables on its backside

Upholstery :

Bed mattress	Cover of moquette & stuffing of polyurethane foam for Cabin class A, Cover of vinyl-leather & stuffing of polyurethane foam for Cabin class B & C, officers & crew
Sofa-bed	Cover of vinyl-leather & stuffing of polyurethane foam
Sofa	Cover of vinyl-leather & stuffing of polyurethane foam
Chair seat & back	Cover of moquette & stuffing of polyurethane foam for Cabin class A, Cover of vinyl-leather & stuffing of polyurethane foam for Cabin class B, Tourist classes, officers & crew
Curtain	Synthetic fibre textile

11. CARGO HOLD & CARGO GEAR

Cargo hold :

No. of compartment	1 compartment
Bottom ceiling	Close wooden ceiling
Side sparring	Open wooden sparring on shell sides

Cargo hatch :

No. of hatch	1
Hatch cover	Hinged folding steel hatch cover, operated by wire ropes from derrick boom

Derrick booms :

No. of booms	2
Capacity of boom	3 tons
Type of cargo work	Married-fall system for cargo up to 2 tons, Swing-boom sy stem for cargo up to 3 tons

Cargo winches :

No. of winches	2 sets
Type	Electric motor driven, horizontal type, with 1 wire drum & 1 warping end
Capacity	2 t x 25 m/min x 15 KW

12. VENTILATION & AIR - CONDITIONING

Classification :

Officers' cabins & mess room	Air-conditioning
Crew's cabins & mess room	Air-conditioning
Cabin class passengers' cabins & mess room	Air-conditioning
Tourist class passengers' spaces	Mechanical supply ventilation
Wheelhouse	Cooled air supply
Galley	Mechanical supply & exhaust ventilation
Sanitary spaces	Mechanical exhaust ventilation
Dry provision store	Mechanical exhaust ventilation
Cargo hold	Natural ventilation
Engine room	Mechanical supply & exhaust ventilation

Air-conditioning system :

Design conditions : -

	<u>Outside</u>	<u>Inside</u>
Air temperature	35°C	27°C
Relative humidity	80 %	50 %

Type of system : Centralized air-conditioning system, electric motor driven, sea water cooled, automatically controlled.

Air ducting : Insulated ducting of galvanized thin steel sheet, with air supply ports of diffuser or pankah-louvre type.

Rates of air-change in mechanically ventilated spaces :

Tourist class passenger spaces	30 times per hour
Galley	Supply : 30 times per hour Exhaust : 45 times per hour
Sanitary spaces	20 times per hour
Dry provision store	5 times per hour

13. BOAT & LIFE SAVING APPLIANCES

Boat	1 - FRP motor dinghy, 6.5 metres in length
	1 - FRP Tydro jet boat, 20 passengers
Boat david	1 - Radial davit, with electrically boat winch
Inflatable liferaft	14 - Inflatable liferaft in container, 25 persons, each
Lifebuoy	8 - Lifebuoy
Lifejacket	337 - Lifejacket for adult 32 - Lifejacket for infant

14. FIRE - EXTINGUISHING SYSTEMS & APPLIANCES

Fire detecting system	Smoke tube fire detector for officers' living quarter, crew's living quarter, passengers' spaces, galley, cargo hold & engine room.
Fire fighting systems & appliances:	
Officers' & crew's living quarters	Hydrants & portable fire extinguishers
Passenger's spaces	Hydrants & portable fire extinguishers
Cargo hold	Hydrants
Store spaces	Hydrants & portable fire extinguishers
Engine room	Hydrants & portable fire extinguishers

15. ANCHORS, CHAIN CABLES & ROPES

Bower anchor, stockless, 660 kg	3
Bower anchor cable, welded stud link chain cable, NK Grage 2, 22 mm. dia x 165 m & 137.5 m in length	2 lines
Towline, flexible steel wire rope (6 x 24), 18 mm. dia. x 180 m	1 line
Mooring line, vinylon rope, 32 mm. dia. x 120 m in length	lines

PART 2. M A C H I N E R Y

1. MAIN ENGINES

No. of sets.	2 sets
Type	Vertical, four stroke cycle, single acting, airless injection, trunk piston, supercharged, uni-directional, marine diesel engine with reverse/reduction gear
Max. continuous output	400 PS at 750 - 1,200 RPM
Cooling system	Indirect fresh water cooling
Starting system	Compressed air starting
Control system	Remote control from wheelhouse for ahead/astern & speed control Direct manual control for starting & stopping
Attachments	Cooling fresh water pump 1 set Lubricating oil pump 1 set Fuel oil supply pump 1 set Exhaust turbo-supercharger 1 set Intermediate air cooler 1 set Reverse/reduction gear 1 set

2. SHAFTING & PROPELLERS

No. of shaft lines	2 lines
Intermediate shaft	Hollow shaft of forged steel
Propeller shaft	Hollow shaft of forged steel with bronze sleeves & rubber covering between sleeves
Stern tube	Cast iron or fabricated steel stern tube with rubber bearings
Propeller	Three or four bladed solid propeller of manganese bronze

3. DIESEL GENERATOR SETS

No. of sets	2 sets
Diesel engine prime mover:	
Type	Vertical, four stroke cycle, single acting, airless injection, trunk piston, diesel engine
Max. continuous output	180 PS at 1,500 RPM

Cooling system	Indirect fresh water cooling
Starting system	Compressed air starting

Generator :

Type	Drip-proof, self-ventilated, self-excited, marine A.C. generator
Phase & frequency	3-phase, 50 Hz
Voltage	405 V
Rated output	150 KVA (120 KW), continuous
Insulation	Class B

4. AUXILIARY MACHINERY & EQUIPMENT IN ENGINE ROOM

Main air compressor	1 set
Electric motor driven, vertical, double stage, sea water cooled, reciprocating air compressor, automatically started & stopped 18 m ³ /h (piston displacement) x 30 kg/cm ² x 3.7 KW x 1,000 RPM	
Auxiliary air compressor	1 set
Diesel driven, vertical, double stage, sea water cooled, reciprocating air compressor, manually started 10 m ³ /h x 30 kg/cm ² x 3.5 PS	
Cooling sea water pump	2 sets
Electric motor driven, horizontal, centrifugal pump Capacity as per engine maker's standard specification, each pump serving for two main engines simultaneously	
Auxiliary lubricating oil pump	1 set
Electric motor driven, horizontal, gear pump Capacity as per engine maker's standard specification	
Auxiliary fuel oil supply pump	1 set
Electric motor driven, horizontal, gear pump Capacity as per engine maker's standard specification	
Auxiliary lubricating oil pump for reverse/reduction gear	1 set
Electric motor driven, horizontal, gear pump Capacity as per engine maker's standard specification	
Cooling sea water pump for auxiliary machinery	1 set
Electric motor driven, horizontal, centrifugal pump 50 m ³ /h x 29 m x 7.5 KW x 1,500 RPM	

Fuel oil transfer pump 1 set
 electric motor driven, horizontal, gear pump, automatically started & stopped
 3 m³/h x 2,5 kg/cm² x 0.75 KW x 1,000 RPM

Fire, general service & auxiliary cooling sea water pump for auxiliaries 1 set
 electric motor driven, horizontal, self-priming, centrifugal pump
 50 m³/h x 30 m x 7.5 KW x 1,500 RPM

Fire, bilge, ballast & auxiliary cooling fresh water pump 1 set
 electric motor driven, horizontal, self-priming, centrifugal pump
 25 m³/h x 30 m x 5.5 KW x 1,500 RPM

Bilge pump 1 set
 electric motor driven, vertical, piston pump
 1 m³/h x 20 m x 0.4 KW x 1,000 RPM

Fresh water pump 2 sets
 electric motor driven, horizontal, centrifugal or Wesco pump, automatically started & stopped
 3 m³/h x 25 m x 0.75 KW x 3,000 RPM

Fuel oil purifier 1 set
 electric motor driven, centrifugal separator, with suction & discharge pumps, automatic sludge discharge control
 700 ltr/h x 1.5 KW x 1,500 RPM

Engine room ventilating fan 2 sets
 electric motor driven, vertical, axial-flow, reversible fan
 120 m³/min x 25 mm dia x 1.5 KW x 1,500 RPM

Oily bilge water separator 1 set
 1 m³/h, as per INOC standards

Lubricating oil filter for main engine 2 sets
 forced circulated, oil filter with renewable elements

Lubricating oil filter for auxiliary engine 2 sets
 forced circulated, oil filter with renewable elements

Air reservoir 2 sets
 welded, cylindrical type
 Capacity as per engine maker's standard specification

5. CONTROL & ALRM SYSTEMS

Main engine control	Local manual control for starting & stopping Remote control for engine speed & ahead/astern
Alarm:	
Main engines	Cooling fresh water high temperature Lubricating oil low pressure
Reverse/reduction gear	Lubricating oil low pressure
Generator engines	Cooling fresh water high temperature Lubricating oil low pressure Overspeed (emergency stop)
Air reservoirs	Low pressure
Engine room tanks	Low level alarms as necessary

PART 3. ELECTRICAL INSTALLATIONS

1. PRIMARY ELECTRIC POWER SOURCES

Main generator 2 sets
Diesel driven, drip-proof, self-ventilated, self-excited, marine
A.C. generator
150 KVA x 405 V x 3-phase x 50 Hz

Shore connection box 1 set
Wall-mounted, drip-proof type, with phase sequence indicator
A.C. 400 V x 60 A x 3-phase x 50 Hz

2. SECONDARY ELECTRIC POWER SOURCES

Transformer 4 sets
Drip-proof, self-cooled, dry, marine type
20 KVA x 400/235 V x single-phase x 50 Hz

Storage battery for general use 2 sets
Lead-acid, marine storage battery
300 AH x 24 V

Storage battery for radio use 1 set
Lead-acid, marine storage battery
200 AH x 24 V

Rectifier 1 set
Silicon rectifier, with transformer
AC 400 V / DC 32 V x 50 Ampere

3. SWITCHBOARDS

Main switchboard 1 set
Self-supported, drip-proof, dead-front type

Battery charging & discharging switchboard 1 set
Self-supported, drip-proof, dead-front type

4. ELECTRIC LIGHTING

Officers' cabins	Fluorescent lamps with globes
Crew's dormitory	Fluorescent lamps with globes
Officers' mess room	Fluorescent lamps with globes
Cabin class passengers' cabins	Fluorescent lamps with globes
Tourist class passengers' spaces	Fluorescent lamps with globes
Cabin class passengers' mess room	Fluorescent lamps with globes
Inboard passageways	Fluorescent lamps with or without globes
Galley	Incandescent lamps with globes
Sanitary spaces	Fluorescent or incandescent lamps with globes
Stores	Incandescent lamps with protective globes
Engine room	Fluorescent & incandescent lamps with globes
Weather deck lamps	Incandescent lamps with protective globes
Cargo lamps	2 - 500 W fixed incandescent flood lamps 4 - 200 W portable incandescent lamps
Flood-lamp projectors	4 - 500 W incandescent lamps 2 - 300 W incandescent lamps
Searchlight	1 - 2 KW directional searchlight
Gangway lamps	2 - 300 W incandescent flood lamps

5. INBOARD COMMUNICATION SYSTEMS & APPLIANCES

Public address system	1 set
30 W output, incorporating talk-backs from bow & stern, radio broadcasting receiver & record or cassette tape player	
Battery telephone, direct call	4 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Wheelhouse to captain's cabin	
Engine room to chief engineer's cabin	
Signal bell with reply	3 sets
Wheelhouse to engine room	
Wheelhouse to steering gear room	
Engine room to fuel filling stations	
Call buzzer system	2 sets
Officers' use,	
Cabin class passengers' use	

Alarm systems :

General alarm system	1 set
Steering gear alarm system	1 set
Engineer's alarm system	1 set
Smoke tube fire detecting system	1 set

Remote indication systems :

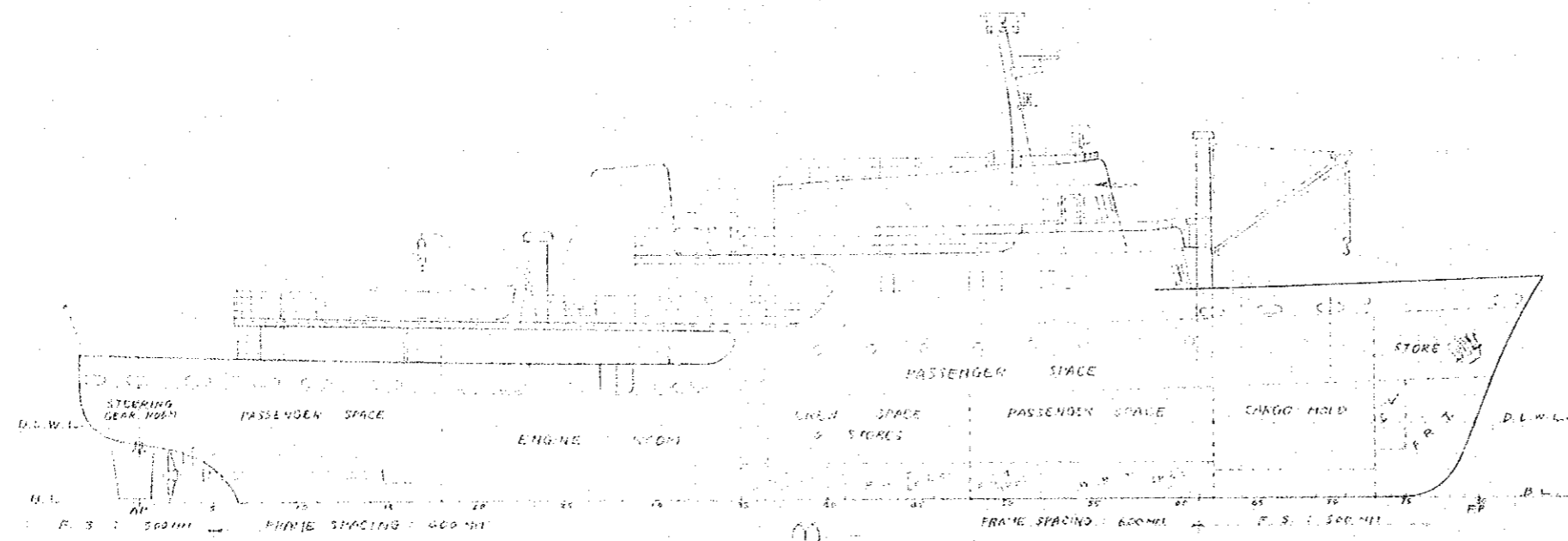
Engine revolution indicator system	2 sets
Helm angle indicator system	1 set

6. NAVIGATION AIDS

Gyroscopic compass & auto-pilot system	1 set
Marine radar, 40 miles range, 7" screen	2 sets
Echo sounder	1 set
Electro-magnetic log or Doppler log	1 set
Anemometer	1 set
Electric clear-view screen, 30 cm. dia.	2 sets

7. RADIO COMMUNICATION EQUIPMENT

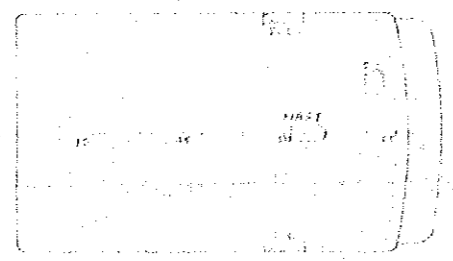
SSB radio-telephone transceiver, 100 W output	1 set
VHF radio-telephone transceiver, 20 W output	1 set



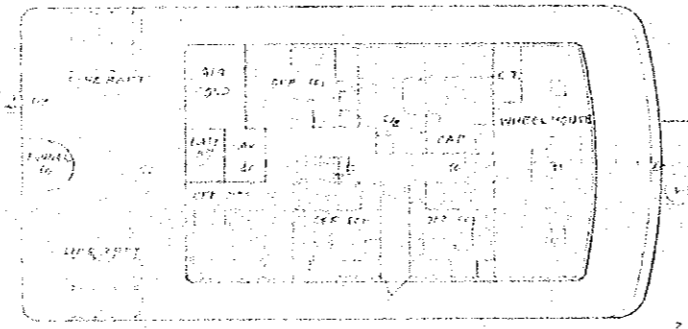
PRINCIPAL PARTICULARS

LENGTH, O.A.	ABT.	49 ^m 90
LENGTH, B.P.		45 ^m 50
BREADTH, M ^d		9 ^m 00
DEPTH, M ^d		3 ^m 50
LOAD DRAUGHT, M ^d DESIGNED		2 ^m 50
GROSS TONNAGE	ABT.	580 ^T
MAIN ENGINES		400 ^{PS} 2 ^{SETS}
TRIAL SPEED	ABT.	13.5 ^{KNOTS}
SERVICE SPEED	ABT.	12.3 ^{KNOTS}
CREW		25
PASSENGERS:	CABIN CLASS A	2
	" " B	16
	" " C	22
	TOURIST CLASS A	198
	" " B	74
TOTAL		312

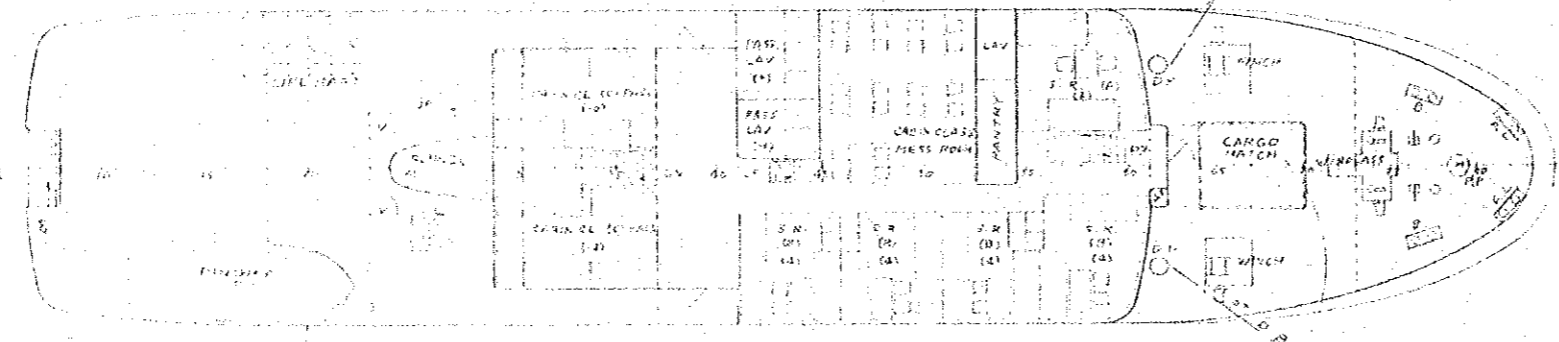
WHEELHOUSE TOP



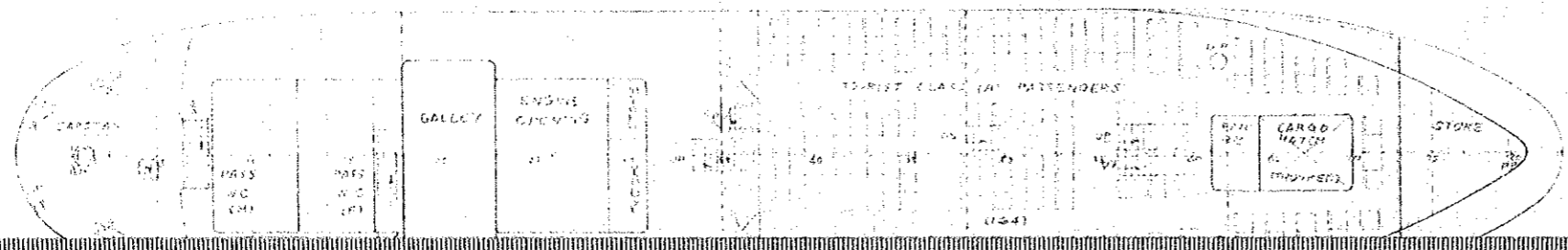
NAVIGATION BRIDGE DECK

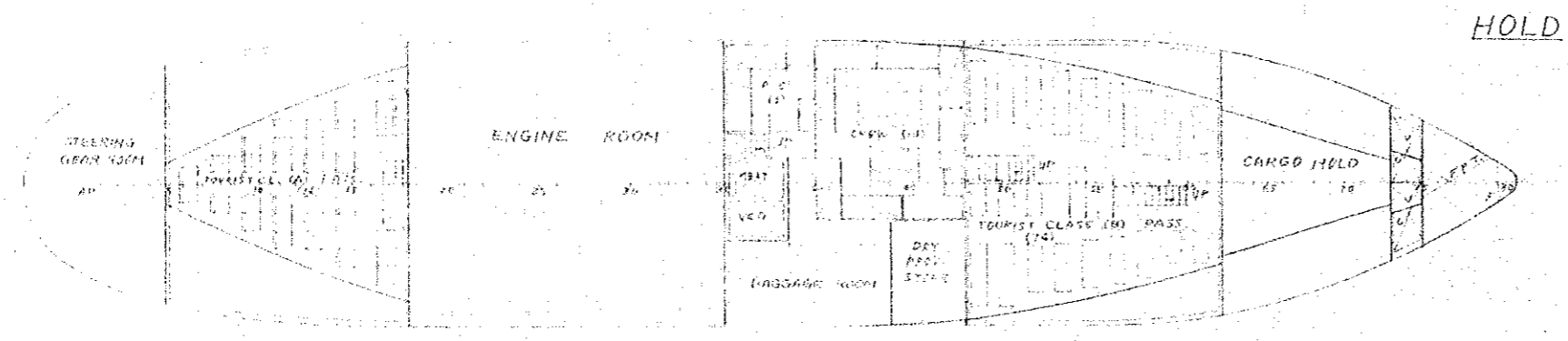
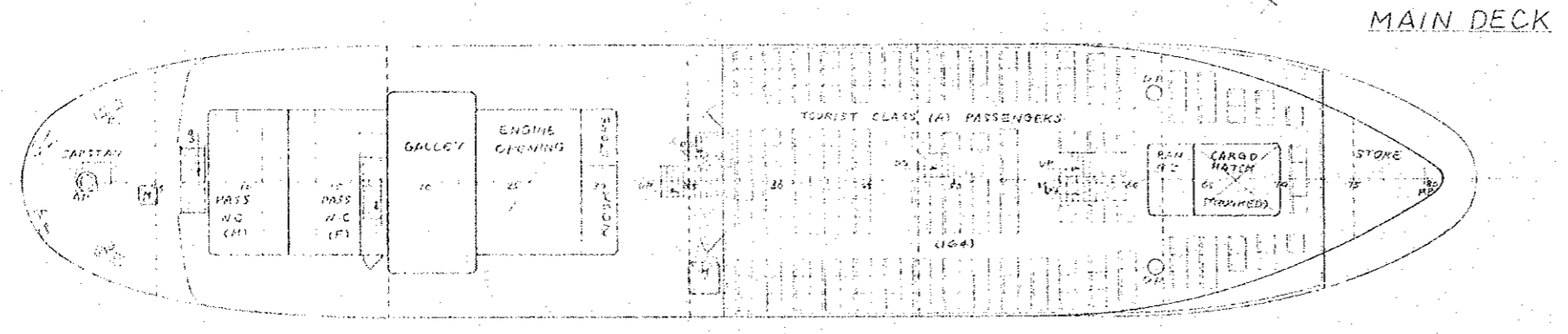
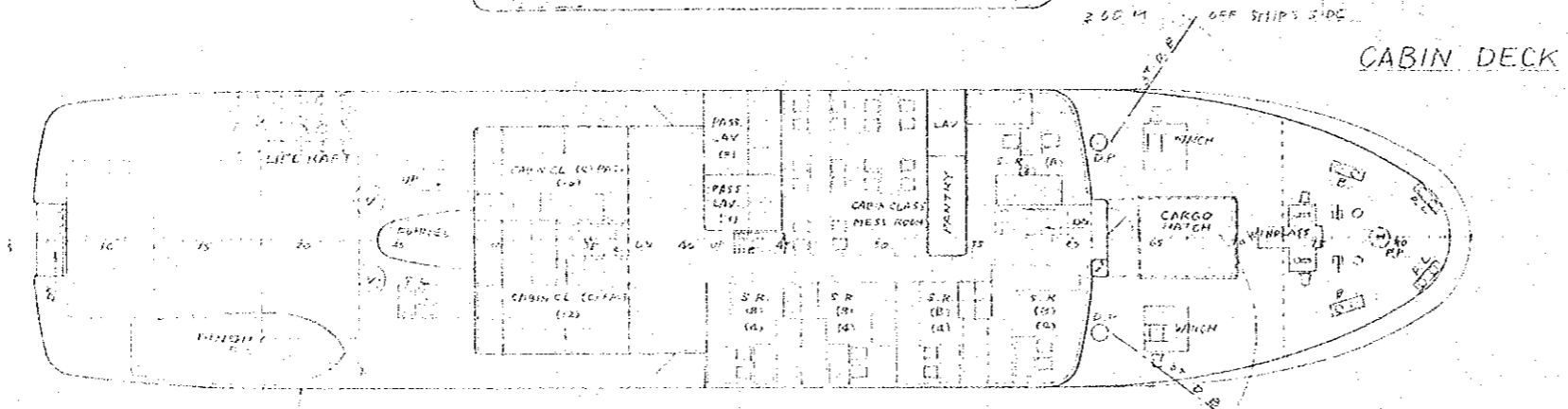
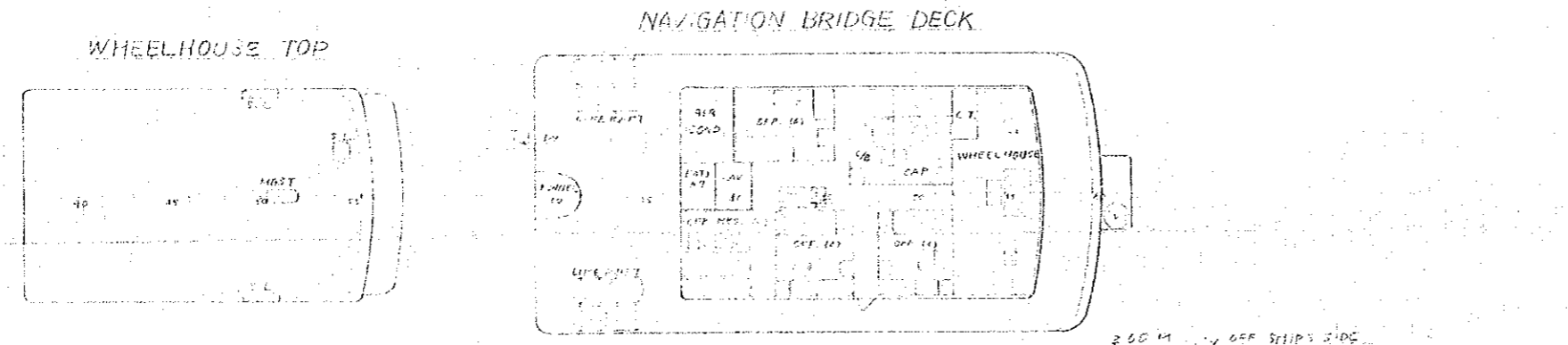


CABIN DECK



MAIN DECK





G.T. 580 T. PASSENGER & CARGO BOAT

GENERAL ARRANGEMENT

1/150

