


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<b>CAUTION</b>			
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TOTAL ( ) SHEETS WITH A COVER			
DEPT' NO.	DEPT' NAME	SHIP TYPE	
5690	ACCOMMODATION DESIG DEPARTMENT	56,000 DWT CLASS BULK CARRIER	
TEL. NO.	SHIP NO.	SHIP NAME	
3897	S001-S010, S023-026		
DATE 2002. 10. 10	APPROVED	NAME OF DRAWING	
	CHECKED	PROCEDURE OF NOISE MEASUREMENT (INCL. NOISE RESULT)	
	DRAWN	SCALE	DRAWING NO.
	HYUNDAI		REV. NO.
	MIPO DOCKYARD CO., LTD. ULSAN KOREA		ORI
		CONSOLIDATED	





**CONTENTS**

- 1. GENERAL
- 2. CONDITIONS OF MEASUREMENTS
- 3. MEASUREMENT PROCEDURES
- 4. MEASURING EQUIPMENT
- 5. MEASUREMENT POSITIONS
- 6. NOISE LEVEL LIMITS
- 7. RECORD OF NOISE LEVEL MEASUREMENT (FORMAT)
- 8. ALLOCATION OF MEASURING POSITIONS

NOTE : Noise level measurement shall be performed for the first vessel only.  
 For the subsequence vessels, the results achieved from the first vessel shall be provided.

**Attended Surveyors**

COMPANY	NAME	SIGNATURE
OWNER (TO BE NAMED)		
YARD (HYUNDAI MIPO DOCKYARD)		

**Accommodation Design Dep't**

Drawn	Checked	Checked	Approved

<2009.6.4 Test>



## NOISE LEVEL MEASUREMENT PROCEDURES

REV.

STANDARD NO.

0

HDS-56-A180

### 1. General

- 1) During official sea trial, measurement of noise levels in all spaces specified allocation of measuring positions in plan drawing shall be carried out under the operating conditions here in after.
- 2) Measured noise levels shall be recorded and submitted to the ship owner and other parties concerned, so that a copy of the report shall be carried onboard.
- 3) Where the measured noise level in machinery spaces (or other spaces) is greater than 85dB(A), Warning notice shall be displayed at entrances to such spaces in order to inform use of ear protector provided onboard by ship owner.

### 2. Conditions of measurements

Measurements shall be taken with the ship in the sea trial condition as follows.

- 1) The main propulsion machinery shall be run at normal continuous rating. Controllable pitch and Voith-Schneider propellers, if any, shall be in the normal seagoing position.
- 2) Other auxiliary machinery, navigation instruments, etc. shall be operated throughout the measurement period as required for normal sea going condition during sea trial.
- 3) Mechanical ventilation and air conditioning equipment shall be in normal operation, taking into account that the capacity is in accordance with the design conditions.
- 4) Door and windows shall be closed.
- 5) Spaces shall be furnished with all necessary equipment. Measurements without soft furnishings may be made but no allowance shall be made for their absence.
- 6) For the spaces containing emergency diesel engine driven generators, fire pumps or other emergency equipment that would normally be run only in emergency, or for test purposes, measurements shall be taken with such equipment operating. However, adjoining spaces need not be measured with such equipment operating.
- 7) The depth of water under the ship's keel and the presence of large reflecting surfaces in the ship's vicinity may affect the readings obtained, and shall, therefore be noted in the noise survey report.

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- 8) The meteorological conditions such as wind and rain, as well as sea state, shall be such that they do not influence the measurements. Wind force 4 and sea state 3 should not be exceeded. If this cannot be achieved the actual conditions shall be reported.

### 3. Measurement procedures

**:Noise level measuring shall be in line with IMO resolution 468.**

- 1) During noise level measurements, only those persons necessary for the operation of the ship and those persons taking the measurements shall be present in the space concerned.
- 2) The sound level meter shall be calibrated with the calibrator before and after measurements are taken. The batteries shall be also checked immediately before each period of use.
- 3) In general, the microphone shall be located with its direction of greatest sensitivity towards the noise source. In spaces which do not contain predominant noise sources, the microphone shall be pointed upwards.
- 4) Sound pressure level readings shall be taken in decibels using an A-weighting filter : dB(A).
- 5) The meter shall be set to "**slow**" response and the readings made only to the nearest decibel. A measuring time of at least 5 seconds shall be allowed. If a meter fluctuates in level within a range of no more than 5 dB(A) maximum to minimum, an estimate of the level shall be made by averaging with eye.
- 6) If the range fluctuations are in excess of 5dB(A), or the sound is cyclic, irregular or intermittent in operation, an integrating meter shall be used set to A-weighting. Integration shall be made over a period of at least 30 seconds.
- 7) At positions of high noise level, spot checks shall be made with the meter set to "fast" response if considered necessary to ensure the safety of a person taking measurements.
- 8) In accommodation spaces where the dB(A) limits are exceeded and where there is a subjectively annoying low frequency sound or obvious tonal components, the ISO noise rating(NR) number shall be determined by octave bands analysis taking measurements in octave bands between 31.5 and 8000Hz. The limits specified can be considered as satisfied if the ISO noise rating(NR) number does not numerically exceed the specified A-weighted value(dB(A)) minus 5.

△	NOISE LEVEL MEASUREMENT PROCEDURES	REV.	STANDARD NO.
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- 9) In machinery spaces(not continuously manned) where the operation of any equipment of machinery or part of machinery results in an emission of subjectively high frequency sound, the ISO noise rating (NR) number shall be also determined by octave band analysis as attached table for noise rating number for octave band analysis if the sound level of 105 dB(A) is exceeded.
- 10) A microphone wind screen shall be used when taking readings outside e.g. on navigating bridge wing or on deck, and below deck where there is any substantial air movements. The wind screen should not affect the measurement level of similar sounds by more than 0.5dB(A) in "no wind" condition.

4. Measuring equipment

The following equipments shall be used throughout the measurements.

- 1) Precision integrating sound level meter
  - Manufacture : **Bruel & Kjaer (Denmark)**
  - Manufacturer's type No. : **2236**
  - Manufacturer's serial Nc : **2100513**
  - Standard : **I.E.C. 651-1979 type 1 I**  
**I.E.C. 804-1985 type 1**
- 2) Measurement microphone
  - Manufacturer : **Bruel & Kjaer (Denmark)**
  - Manufacturer's type No. : **4188**
  - Manufacturer's serial Nc : **2051754**
- 3) Calibrator
  - Manufacturer : **Bruel & Kjer (Denmark)**
  - Manufacturer's type No. : **4231**
  - Manufacturer's serial Nc : **2095407**
  - Accuracy : **±0.2 dB(A)**

5. Measurement positions

In general, measurements shall be performed with the microphone at a height of between 1.2m and 1.6m from the deck. Unless specifically required, the measurements shall not normally be taken closer than 1.0m from operating machinery, or decks, bulkheads, or other major surfaces, or from air inlets. Measurements shall be taken at indicated on allocation of measuring positions where such positions are sorted by space definition/categorization as follows.

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1) Engine room

(1) Measurements shall be made at representative positions per each deck level in engine room to upper deck. The representative measuring positions shall include the positions of the maximum sound pressure level and cover the following positions.

- Machinery spaces throughout engine room, which are to be considered intermittently (not continuously) manned, if control room is provided. Accordingly, these spaces are to be considered as continuously manned if control room is not provided.
- Machinery rooms within engine room, e.g. fan rooms, refrigerating machinery room, purifier rooms, etc. (to be considered as not continuously manned machinery spaces).
- Main engine maneuvering stand or similar, if any.
- Work spaces other than enclosed workshop, normally being visited during routine inspection, adjustment and maintenance.
- Normally used access routes.

(2) Control room

: Separate measurements shall be carried out and the mechanical ventilation for em'cy shall be closed during noise level measurements.

(3) Enclosed workshop in engine room

: Separate measurements shall be carried out.

(4) Additional measurements shall be carried out at any specific positions where sound pressure levels vary significantly from the representative positions.

(5) When measuring noise levels at the intake and exhaust of engines and near ventilation, air conditioning and cooler systems, the microphone shall, where possible, be placed outside the gas stream at distance of 1m from the edge of the intake or exhaust opening and at a 30° angle away from the direction of the gas stream and as far as possible from reflecting surfaces.

2) Navigation spaces

(1) Wheel house or roofed bridge

: Measurements shall be taken with all auxiliary equipment such as radar, echo-sounder, window wiper & clear view screen, etc. in operation. However, audible signals, telephone or similar need not be taken into consideration.

Weather side doors and windows shall be closed and the lee side door and windows first open and than closed.

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(2) Navigating bridge wings

: Measurements shall be taken on both navigating bridge wings at the normal control position but shall only be taken when the navigating bridge wing to be measured on the lee side of the ship.

In case of roofed bridges, a reading shall be taken at the corner point of an open side window.

3) Accommodation spaces

(1) In general, one measurement shall be made in the middle of the following space

- Cabins and hospital
- Offices, mess room and recreation rooms
- Open recreation areas

(2) The microphone should be moved slowly horizontally and/or vertically over a distance of 1.0m and the mean reading recorded.

(3) An additional measurement shall be performed at other points of maximum sound pressure level, which may vary greater than 10dB(A) within the room, especially near the head positions of a sitting or lying person.

4) Service spaces.

(1) Galley : Measurements shall be taken without feed processing equipment operating.

5) Normally unoccupied spaces


(1) In order to avoid an unnecessarily large number of measurements and recordings, noise levels need not be recorded for the following space normally unoccupied, if such spaces are remote from sources of noise and where a rough check shows that the noise levels are well below the limit.

- Machinery spaces outside engine room.
- Cargo holds, deck areas and other non-specified work spaces.
- Defined work station within the above mentioned spaces.
- Other non-occupied spaces.

(2) Accordingly, measurements shall be made in locations with unusually high noise levels where crew may be exposed, even for relatively short periods and at intermittently used machinery locations.

(3) Readings shall not normally be taken closer than 1M from operating machinery which constitutes a sound source, or from decks, bulkheads or other large surfaces, or from air inlets/outlets. Where this is not possible, measurement shall be taken at a position midway between the machinery and adjacent reflecting surface.



	NOISE LEVEL MEASUREMENT PROCEDURES	REV.	STANDARD NO.
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(4) Measurement shall be made in the center of each room and at a height of 1.2m to 1.6m above the deck, platform or walkway. Measurements shall also be at the position of maximum sound level.

6. Noise level limits

Limits for noise levels are specified for various spaces as follows.

1) Work space	dB(A)
- Machinery space(continuously manned)	90
- Machinery space(not continuously manned)	110
- Machinery control rooms	75
- <b>Workshops</b>	<b>85</b>
- Non-specified work space	90
2) Navigation spaces	dB(A)
- Navigating bridge and chartrooms	65
- Listening post, including navigating bridge wings and windows	70
- Radio rooms (with radio equipment operating but not producing audio signals)	60
- Radar room	65
3) Accommodation spaces	dB(A)
- Cabin and hospital	60
- Mess rooms	65
- Recreation rooms	65
- Open recreation areas	75
- Offices	65
4) Service spaces	dB(A)
- Galleys, without food processing equipment operating	75
- Services and pantries	75
5) Normally unoccupied spaces	dB(A)
- Space not specified	90

# NOISE LEVEL MEASUREMENT PROCEDURES

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※ Table for noise number for octave band analysis.

NR	Octave band sound pressure levels (dB)									Remark
	Center frequencies (Hz)									
	31.5	63	125	250	500	1000	2000	4000	8000	
0	55.4	35.5	22.0	12.0	4.8	0	-3.5	-6.1	-8.0	
5	58.8	39.4	26.3	16.6	9.7	5	+1.6	-1.0	-2.8	
10	62.2	43.4	30.7	21.3	14.5	10	6.6	+4.2	+2.3	
15	65.6	47.3	35.0	25.9	19.4	15	11.7	9.3	7.4	
20	69.0	51.3	39.4	30.6	24.3	20	16.8	14.4	12.6	
25	72.4	55.2	43.7	35.2	29.2	25	21.9	19.5	17.7	
30	75.8	59.2	48.1	39.9	34.0	30	26.9	24.7	22.9	
35	79.2	63.1	52.4	44.5	38.9	35	32.0	29.8	28.0	
40	82.6	67.1	56.8	49.2	43.8	40	37.1	34.9	33.2	
45	86.0	71.0	61.1	53.6	48.6	45	42.2	40.0	38.3	
50	89.4	75.0	65.5	58.5	53.5	50	47.2	45.2	43.5	
55	92.9	78.9	69.8	63.1	58.4	55	52.3	50.3	48.6	
60	96.3	82.9	74.2	67.8	63.2	60	57.4	55.4	53.8	
65	99.7	86.8	78.5	72.4	68.1	65	62.5	60.5	59.8	
70	103.1	90.8	82.9	77.1	73.0	70	67.5	65.7	64.1	
75	106.5	94.7	87.2	81.7	77.9	75	72.6	70.8	69.2	
80	109.9	98.7	91.6	86.4	82.7	80	77.7	75.9	74.4	
85	113.3	102.6	95.9	91.0	87.6	85	82.8	81.0	79.5	
90	116.7	106.6	100.3	95.7	92.5	90	87.8	86.2	84.7	
95	120.1	110.5	104.6	100.3	97.3	95	92.9	91.3	89.8	
100	123.5	114.5	109.0	105.0	102.2	100	98	96.4	95.0	
105	126.9	118.4	113.3	109.6	107.1	105	103.1	101.5	100.1	
110	130.3	122.4	117.7	114.3	111.9	110	108.1	106.7	105.3	
115	133.7	126.3	122.0	118.9	116.8	115	113.2	111.8	110.4	
120	137.1	130.3	126.4	123.6	121.7	120	118.3	116.9	115.6	
125	140.5	134.2	130.7	128.2	126.6	125	123.4	122.0	120.7	
130	143.9	138.2	135.1	132.9	131.4	130	128.4	127.2	125.9	

	RECORD OF NOISE LEVEL MEASUREMENT	REV.	STANDARD NO.
		0	HDS-56-A180

DECK	SPACE		NOISE LEVEL dB(A)		
	ROOM NO.	ROOM NAME	CONT. SPEC.		MEASURED
			BASE		
NAV	501	WHEEL HOUSE	65		63
C	402	4TH ENGR	60		51
C	406	CADET1	60		49
C	409	CAPTAIN'S BEDROOM	60		52
C	412	OWNER	60		49
B	302	FITTER	60		53
B	307	AB2	60		54
B	308	C/OFFR'S DAYROOM	65		53
B	311	STEWARD	60		53
B	313	BOATSWAIN	60		55
A	201	CREW'S MESS ROOM	65		58
A	203	CREW'S DAY ROOM	65		54
A	206	ORDINARY SEAMAN 2	60		54
A	208	OFFRS' DAY ROOM	65		55
A	210	OFFRS' MESS ROOM	65		60
A	212	GALLEY	75		76
UPPER	102	GYMNASIUM	65		58
2ND		E.C.R	75		72
2ND		NEAR MAIN ENGINE	110		95
3RD		NEAR MAIN ENGINE	110		104
FLOOR		NEAR MAIN ENGINE	110		106

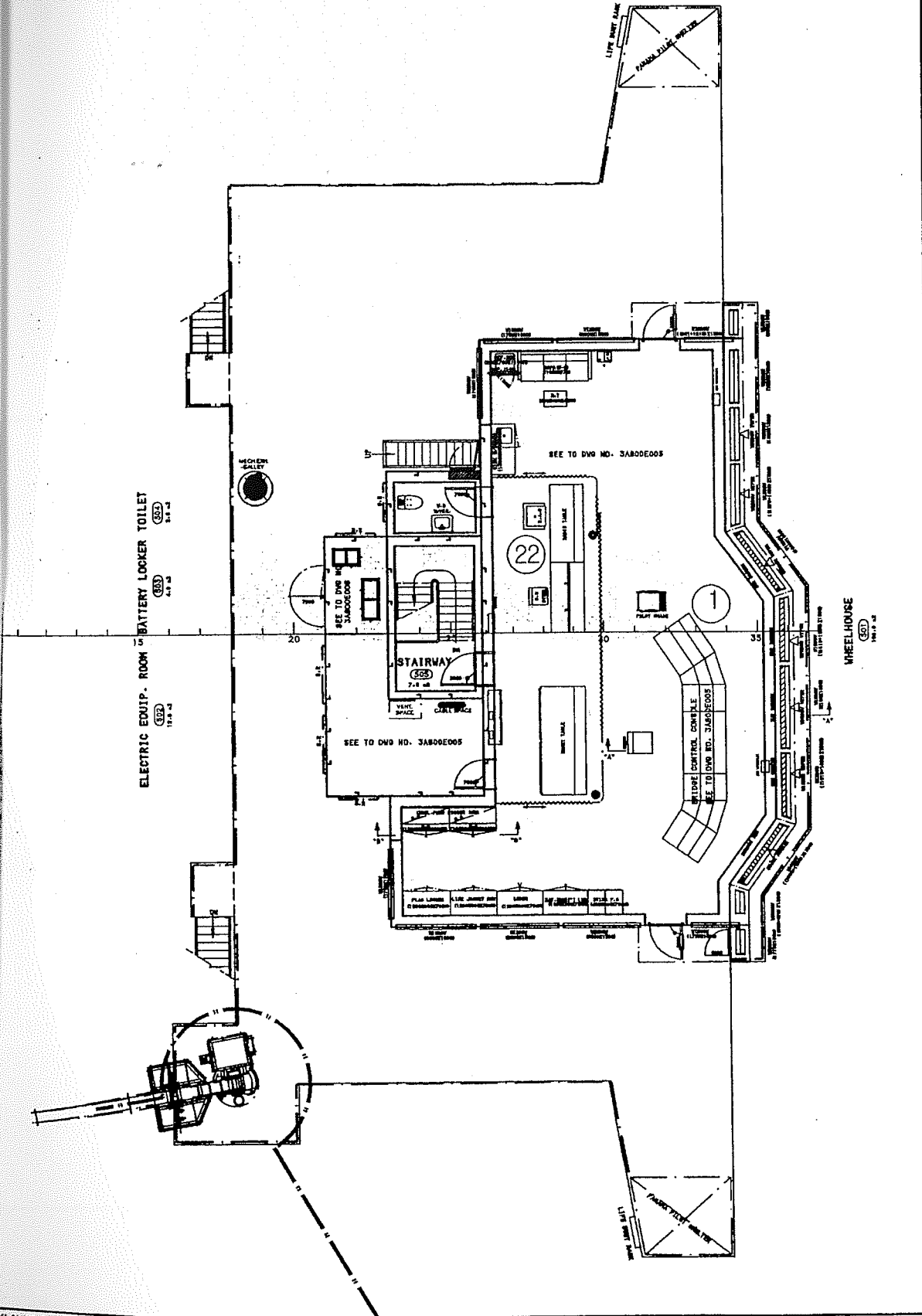
RECORD OF NOISE LEVEL MEASUREMENT			REV.	STANDARD NO.
			0	HDS-56-A180
DECK	SPACE		NOISE LEVEL dB(A)	
	ROOM NO.	ROOM NAME	CONT. SPEC.	
			BASE	MEASURED
NAV	501	near RADIO SPACE	60	60
C	403	C/ENGR'S BEDROOM	60	50
C	404	C/ENGR'S DAYROOM	65	51
C	407	3RD MATE	60	50
C	411	PILOT	60	53
C	413	ELECTRICIAN	60	52
B	301	MOTORMAN1	60	55
B	304	2ND ENGR'S DAYROOM	65	60
B	306	AB1	60	53
B	309	C/OFFR'S BEDROOM	60	51
B	312	C/COOK	60	55
A	204	STEWARD	60	53
A	217	DUTY MESS ROOM	65	59
UPP	107	CHANGING ROOM	75	71
UPF	112	SHIP'S OFFICE & B.C.R	65	60
UPP	115	HOSPITAL	60	57
UPP	119	SUEZ CREW	60	57
2ND		WORK SHOP	85	82
2ND		inside STEERING GEAR ROOM	for reference	87





# NAVI-DECK

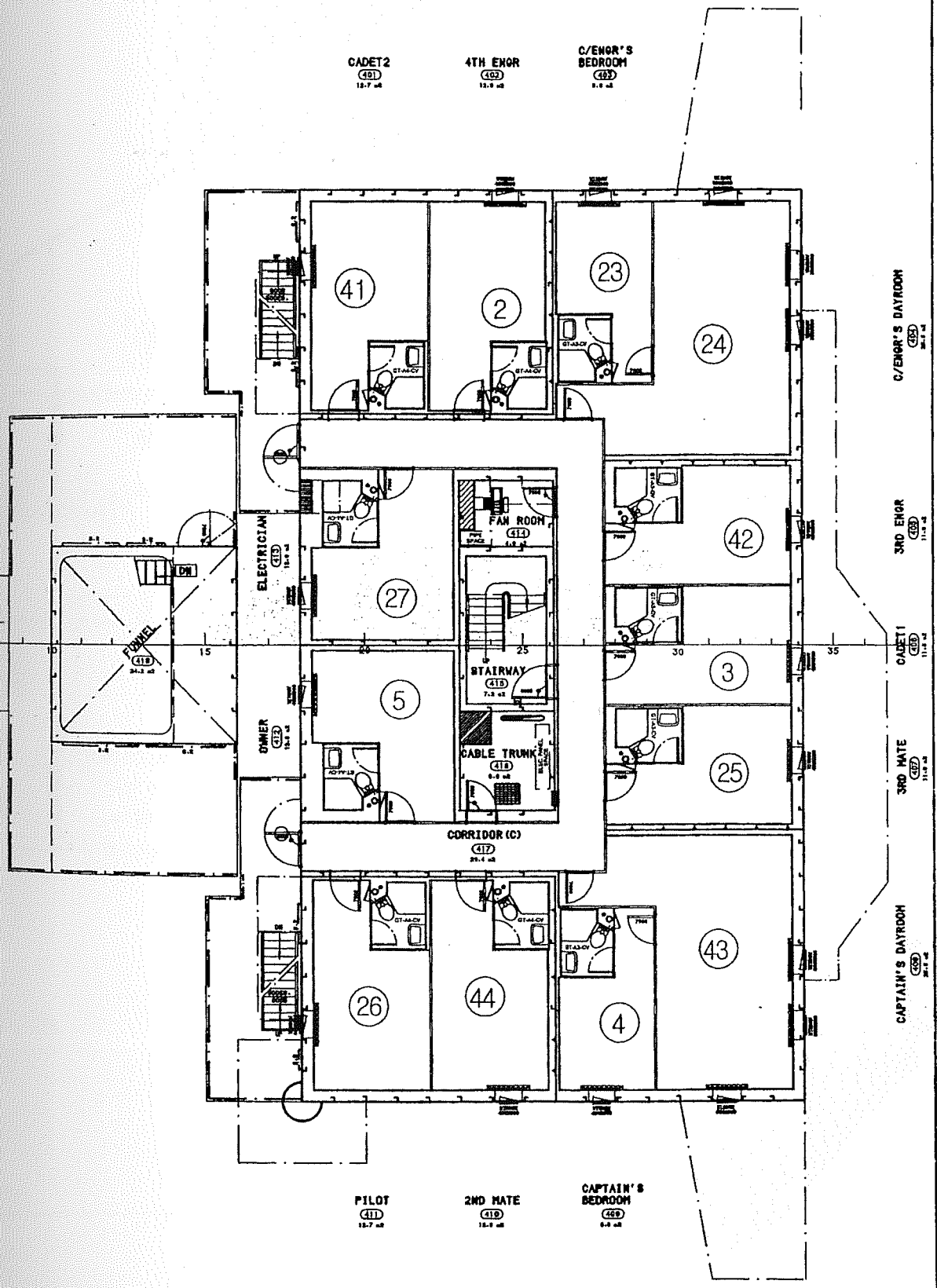
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# C-DECK

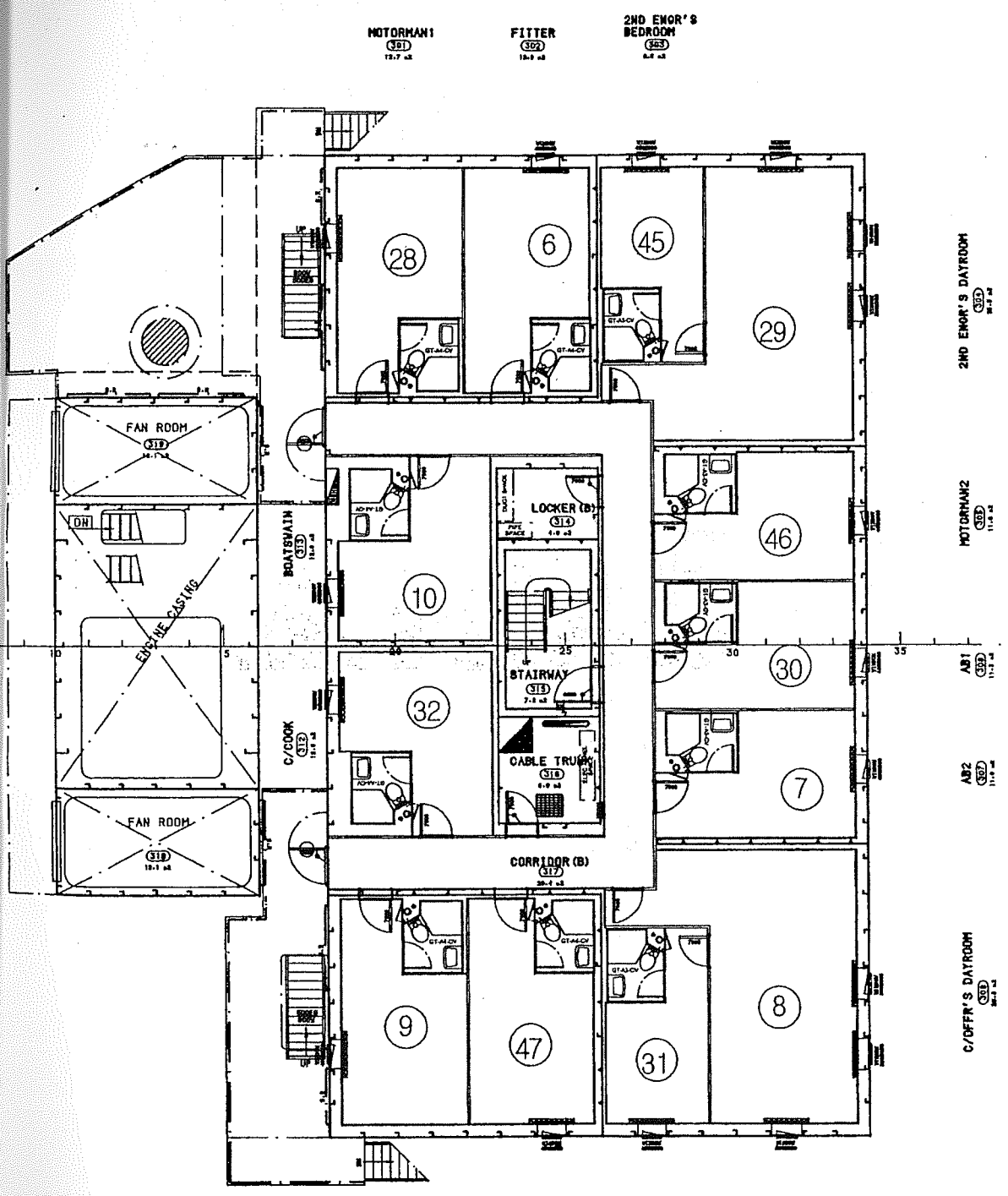
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REV.	ORI		
DATE			



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# B-DECK

HDS NO :			
REV.	ORI		
DATE			







# A-DECK

HDS NO :

REV. DATE

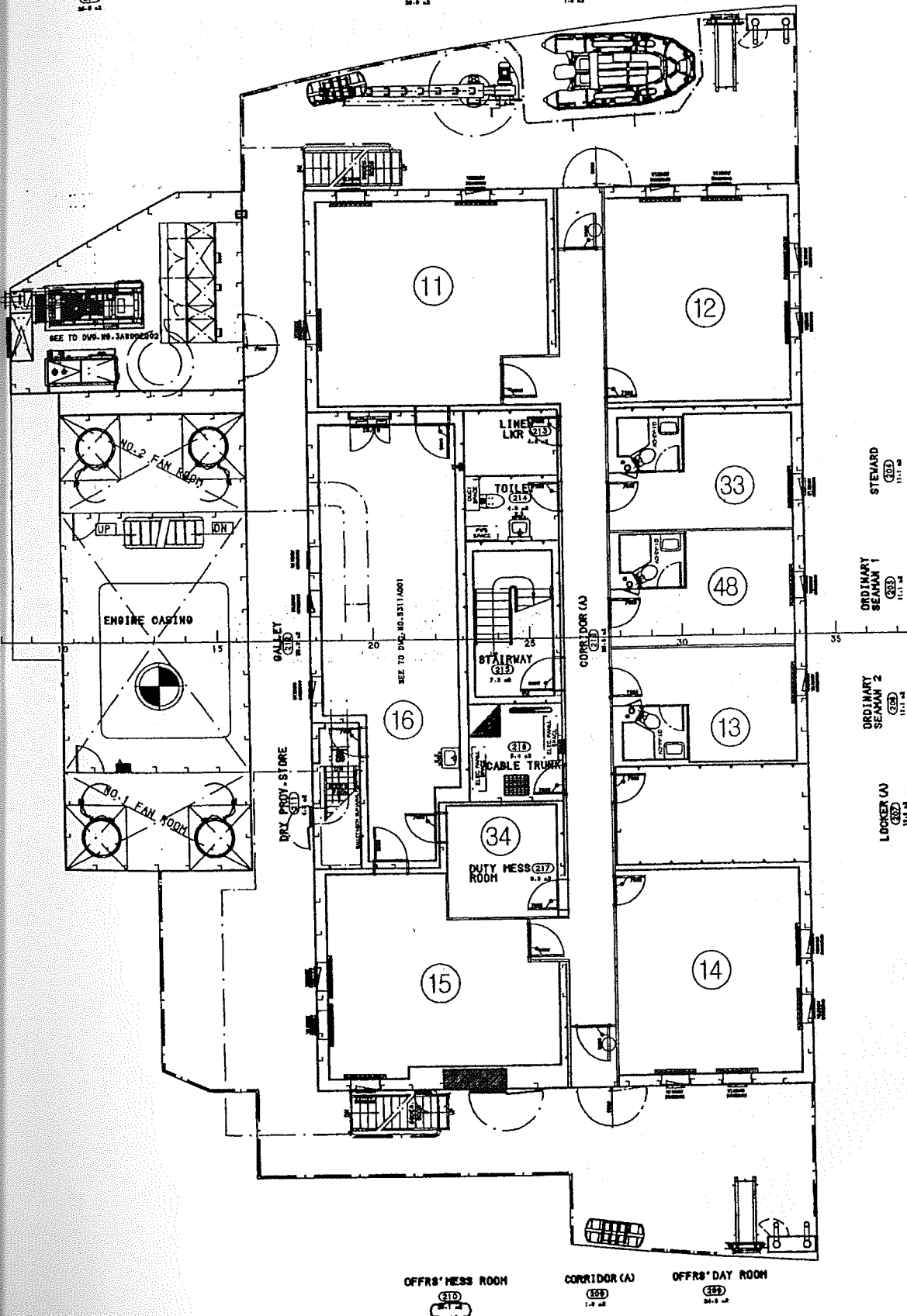
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EM'GY D/O ROOM  
(212)  
24.9.02

CREW'S MESS ROOM  
(221)  
24.9.02

CORRIDOR (A)  
(222)  
1.8.02

CREW'S DAY ROOM  
(223)  
24.9.02



STEWARD (224)  
11.1.02

ORDINARY SEAMAN 1 (225)  
11.1.02

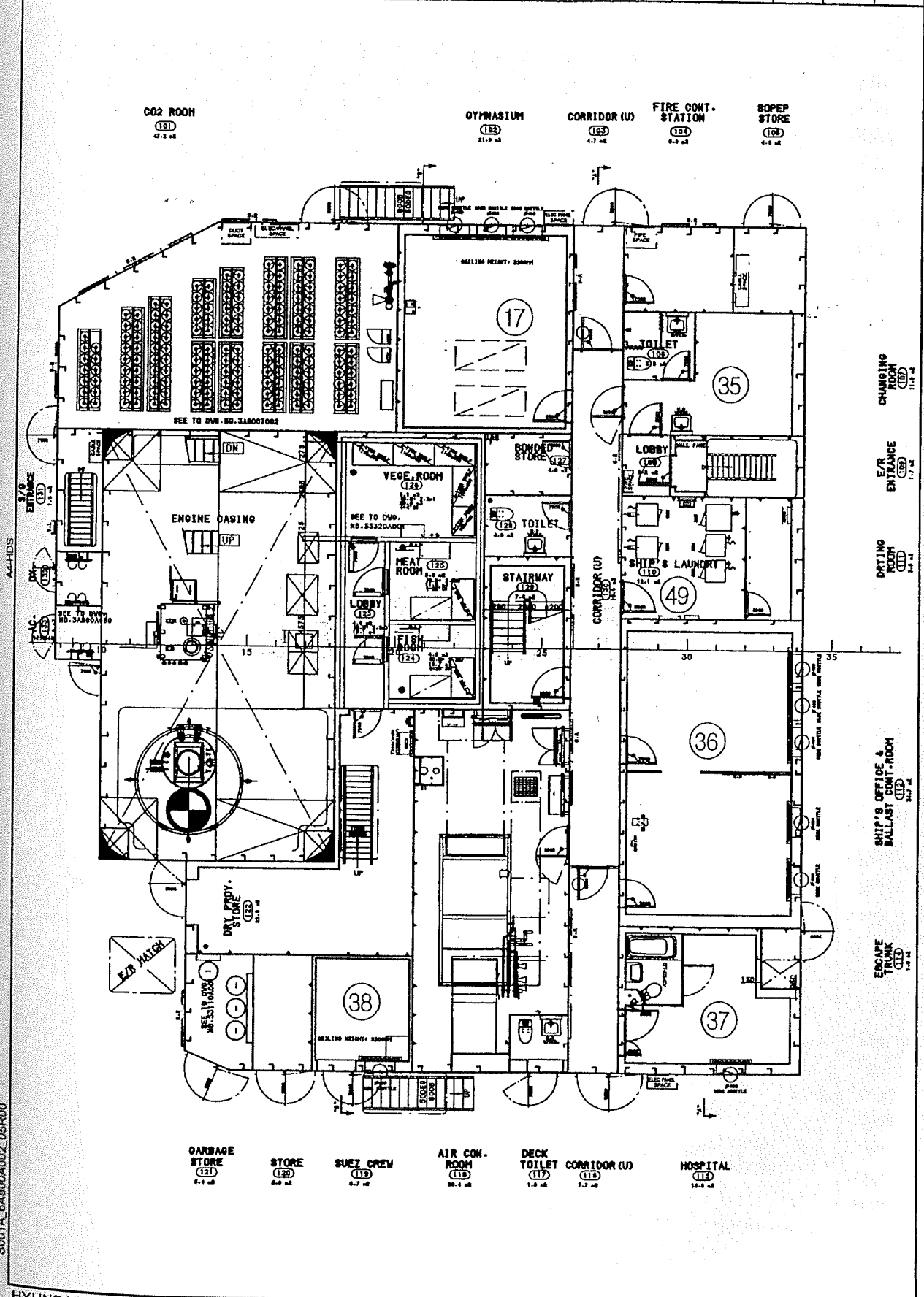
ORDINARY SEAMAN 2 (226)  
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LOCKER (A) (227)  
10.1.02



# UPP-DECK

HDS NO :			
REV. DATE	ORI		



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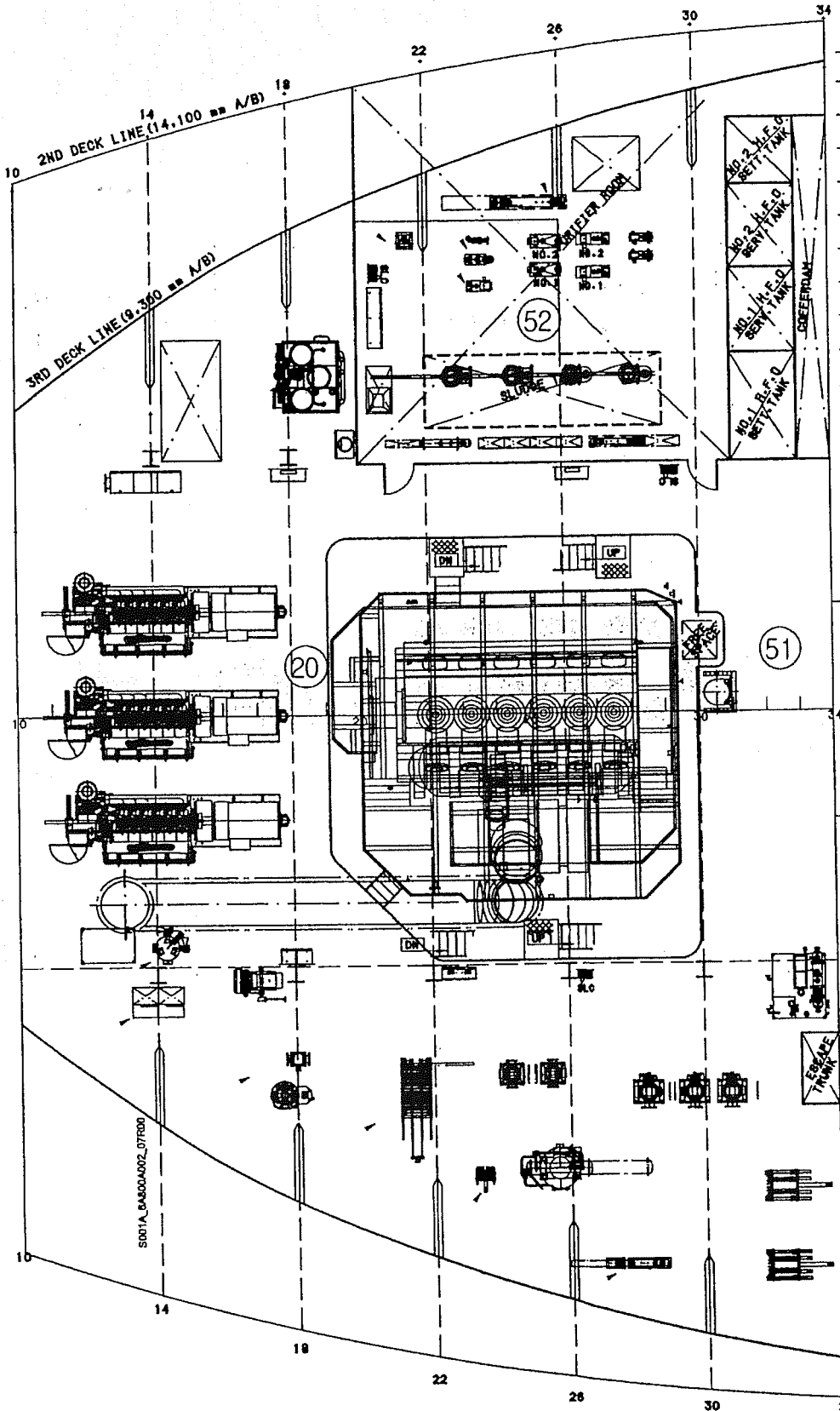




# 3RD DECK

HDS NO :

REV.	ORI		
DATE			



- LP18 (10,350)
- LP18 (14,590)
- LP17 (13,820)
- LP16 (13,080)
- LP15 (12,290)
- LP14 (11,910)
- LP13 (10,740)
- LP12 (9,870)
- LP11 (9,200)
- LP10 (8,400)
- LP08 (7,880)
- LP08 (6,720)
- LP07 (8,890)
- LP06 (8,040)
- LP05 (4,200)
- LP04 (3,380)
- LP03 (2,820)
- LP02 (1,880)
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- (15,350)
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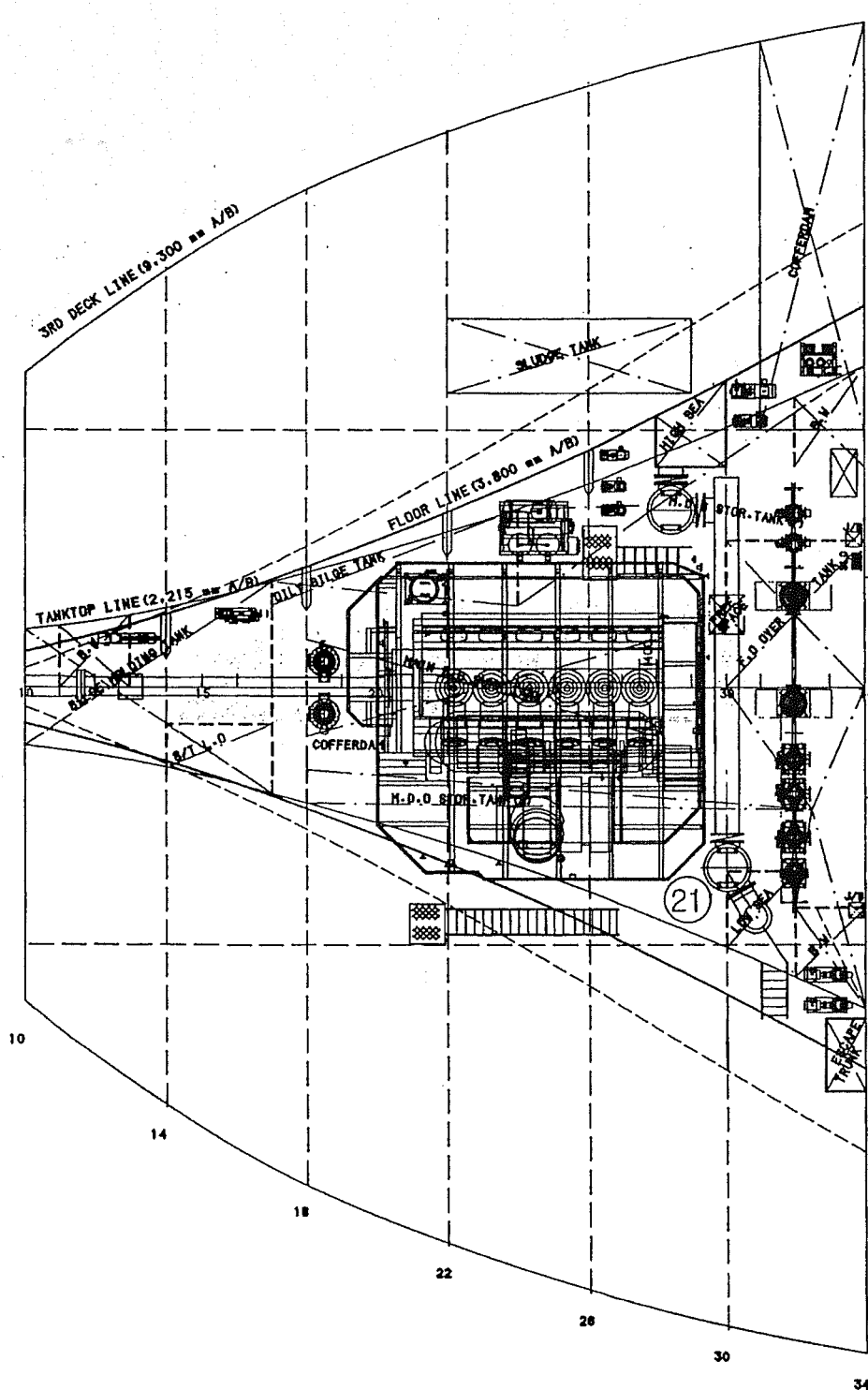
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HDS NO :

REV. DATE

ORI

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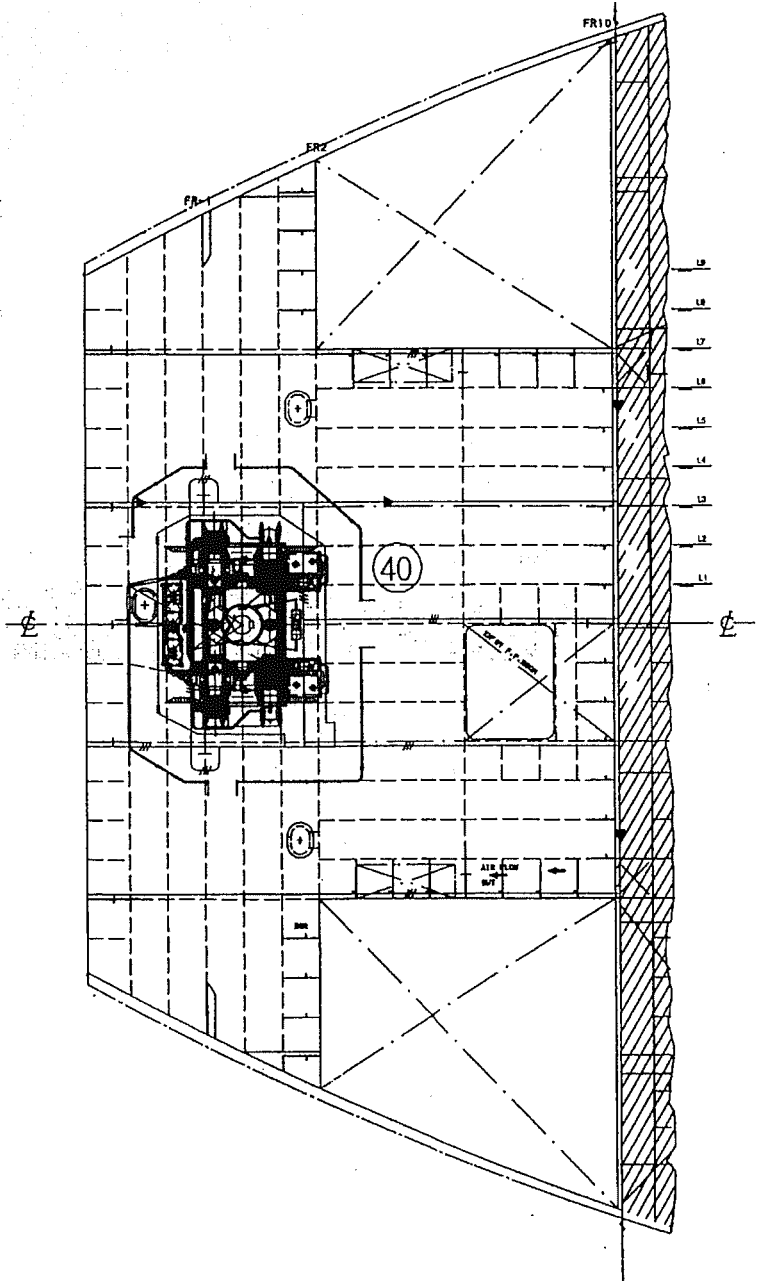


- LP18 (11.340)
- LP18 (14.800)
- LP17 (13.820)
- LP16 (13.800)
- LP15 (11.310)
- LP14 (11.740)
- LP13 (9.870)
- LP11 (9.800)
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- LP08 (7.800)
- LP08 (9.720)
- LP07 (6.800)
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- LP06 (4.200)
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- (10.740)
- L813 (11.310)
- M14 (12.800)
- LP18 (13.800)
- LP18 (13.820)
- (13.800)
- LP18 (14.800)
- (14.800)
- LP18 (14.800)



# STEERING GEAR ROOM

HDS NO :			
REV. DATE	ORI		



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