



台灣國際造船股份有限公司
CSBC CORPORATION, TAIWAN

船舶通訊與航儀系統介紹

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- NAUTICAL SYSTEM WIRING DIAGRAM
- ARRANGEMENT OF WHEELHOUSE CONSOLE
- Q & A



Electric Nautical/Communication System

- Gyro compass (電羅經)
- Magnetic compass (磁羅經)
- Auto pilot (自動導航系統)
- Echo sounder (測深儀)
- Speed log (船速計)
- Anemometer (風向風速計)
- Radar and automatic radar plotting aids (ARPA)
(雷達與雷達自動測繪系統)
- DGPS navigator (全球衛星定位系統)



Electric Nautical/Communication System

- Automatic identification system (AIS) (自動識別系統)
- Electronic chart display and information system (ECDIS)
(電子海圖顯示及資訊系統)
- Bridge navigational watch alarm system (BNWAS)
(船橋航行守望警報系統)
- Voyage data recorder (VDR) (航行資料紀錄器)
- Sound reception system (外部聲音接收系統)
- Inertial navigation system (慣性導航系統)
- Public address (船內廣播系統)
- Common battery telephone (共電式電話)



Gyro compass (電羅經)

- A gyrocompass is a type of non-magnetic heading indicator that is based on the principle of rotation and the Earth's rotation.



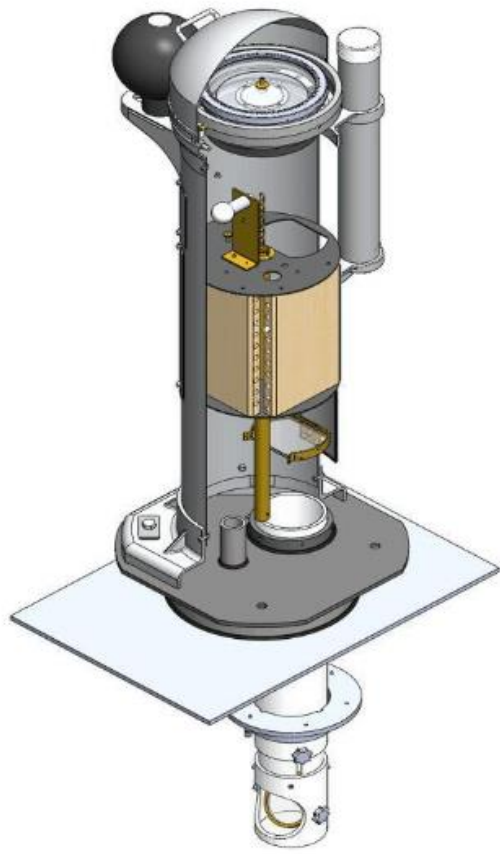
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hical





Magnetic compass (磁羅經)

- A magnetised needle corrections are needed with the true north and are neutralized.



magnetic North. Some
magnetic North is not coincident
with the ship itself has to be

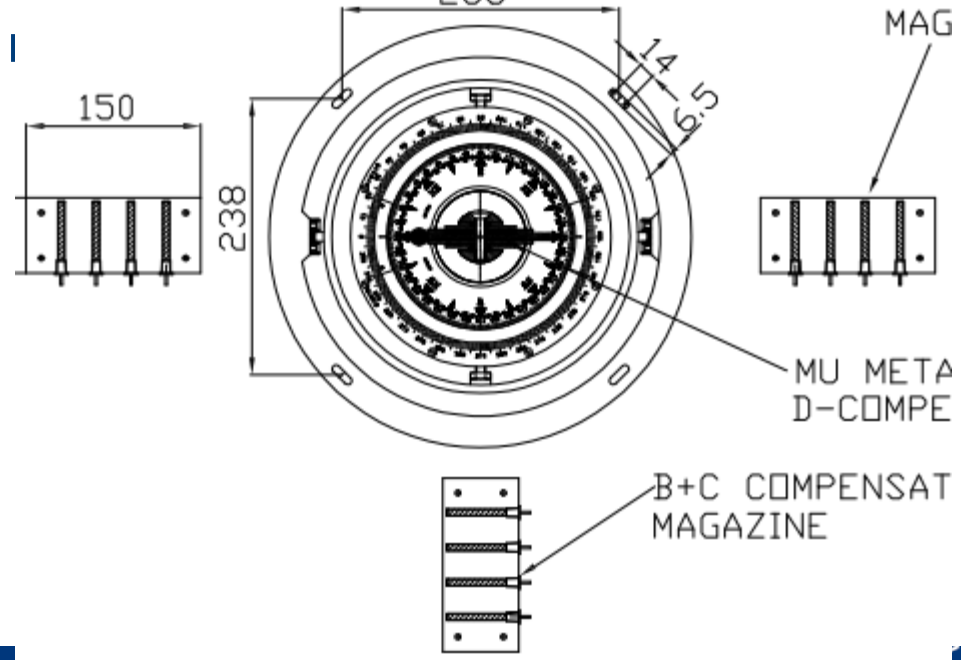


Magnetic compass (磁羅經)

- A magnetised needle which points to the magnetic North. Some corrections are needed because the magnetic North is not coincident with the true North.



the I





Auto pilot (自動導航系統)

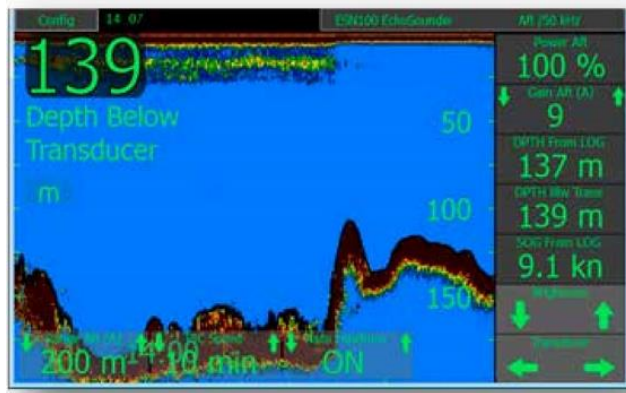
- Automatic control system used for automatic navigation. The system can sense the difference between the ordered course of the ship and the actual course and provide a corrective signal proportional to this difference to move the vessel on the correct heading without the need for manual intervention.





Echo sounder (測深儀)

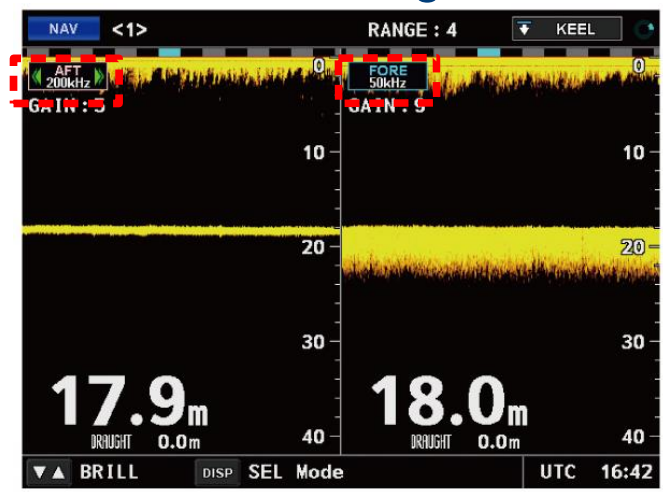
- Echo sounding is a type of sonar used to determine the depth of water by transmitting sound waves into water. The time interval between emission and return of a pulse is recorded, which is used to determine the depth of water along with the speed of sound in water at the time.





Echo sounder (測深儀)

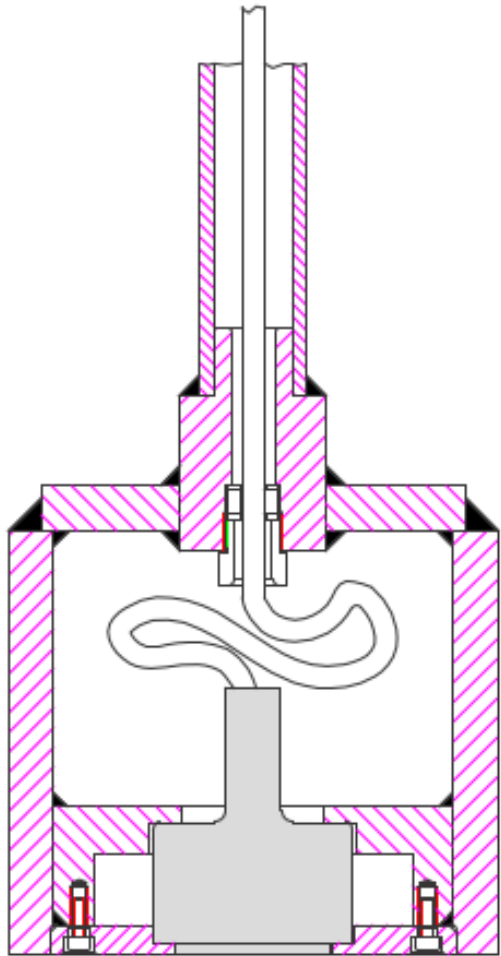
- Low frequency (50 kHz): A lower frequency tends to penetrate deeper but discriminates less background detail.
- High frequency (200 kHz): A high frequency will find it difficult to reach high depths, but will be able to distinguish the bottom with much more detail.





Echo s

- Low frequency (50 kHz) penetrates deeper but discriminates less
- High frequency (200 kHz) will find it difficult to reach the bottom with much more detail.



ends to penetrate deeper

will find it difficult to reach the bottom with much more detail.



Speed log (船速計)

- Ship speed measuring devices: Based on the Doppler effect in which the wave lengths of moving objects appear to shift in relation to the observer. This is related to speed.

- 1 knot

1 knot (n/h) = 1.852 km/h



SOG	Speed over ground
STW	Speed through water
WC	Water current



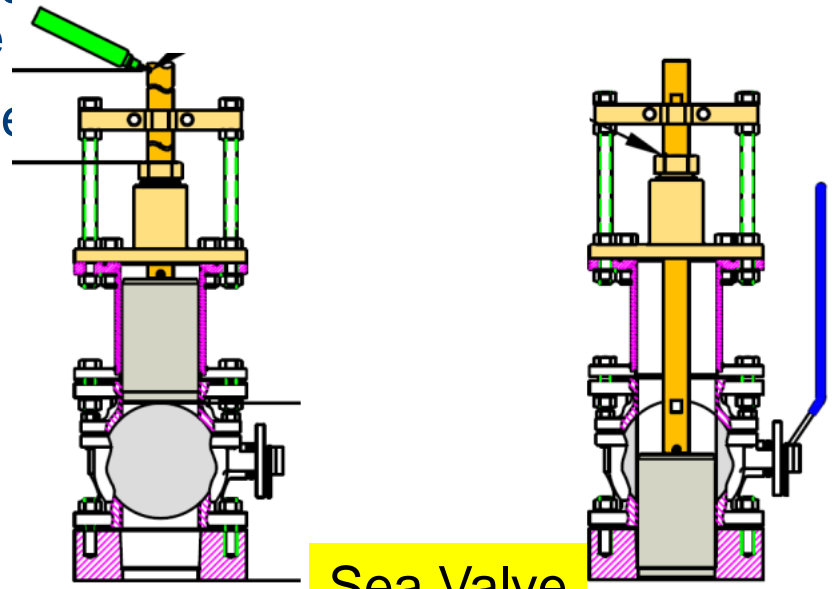


Speed log (船速計)

- Ship speed measuring devices: Based on the Doppler effect in which the wave lengths of moving objects appear to shift in relation to the observer. This shift can be
- 1 knots = 1 nautical mile per hour



Tank



Sea Valve

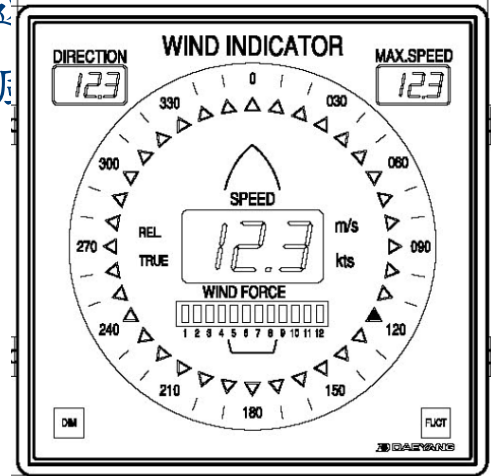




Anemometer (風向風速計)

- A device used to measure wind speed and direction relative to that of the ship.

- True Cup Type (風向風速計)



Ultrasonic Type





Radar and automatic radar plotting aids (ARPA) (雷達與雷達自動測繪系統)

- 1) 雷達(Radar)-無線電探測與定位，以電磁波回波原理，由天線發送電磁波束，當遇到障礙物，如陸地或船舶等，則反射由天線接受，據以計算其距離，另由於其天線具有指向性，而能夠獲得障礙物之方位，此即雷達之功能。
- 2) 總噸位滿500噸之船舶應裝置一套雷達。總噸位滿10000噸之船舶應裝置兩套雷達（S Band & X Band），每一裝置與其他裝置應彼此能單獨操作。裝設雷達者應具有雷達軌跡自動顯示設施。



Radar and ARPA (ARPA)

- S-Band (75~150 mm) 適合於遠程作用，但遠程掃描大型物標。
- X-Band (25~37.5 mm) 反射效果好，適合近程作用，雜波反射也比較少適合，X波段還能遠程掃描。但由於能量也相



ing aids

、傳送距離較遠，
較差，一般只用於

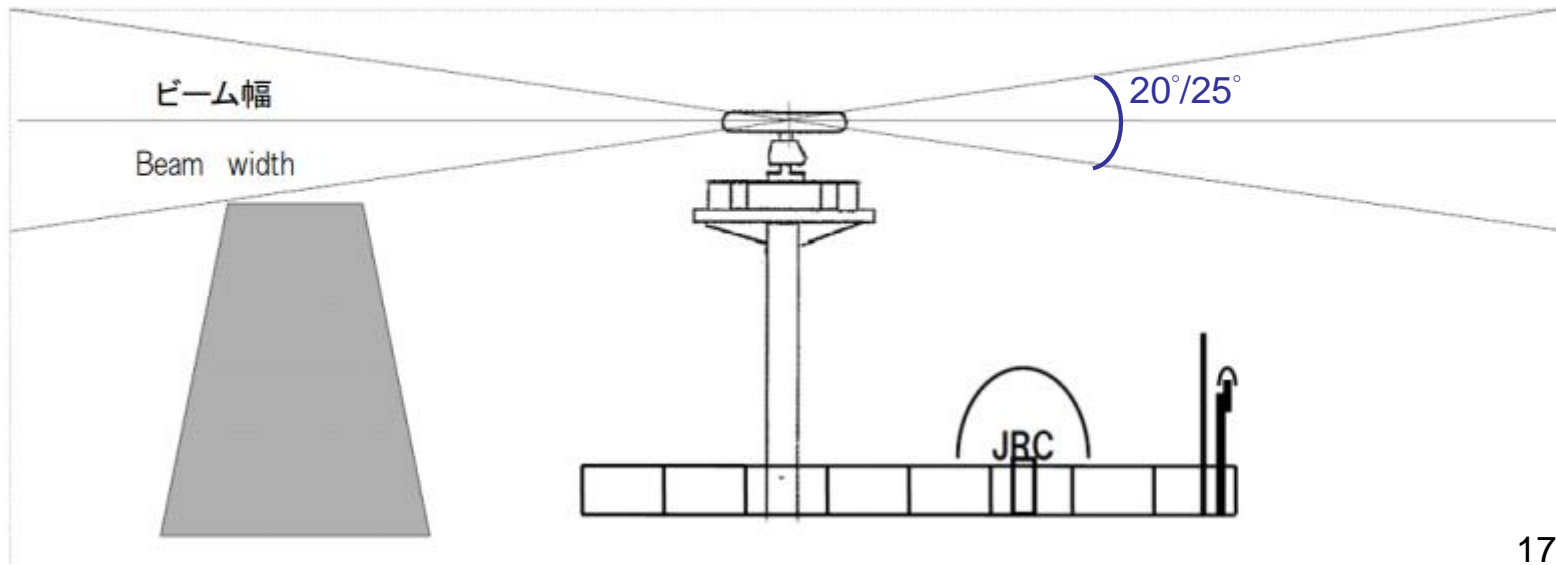
較佳，但是回波
感，雜波反射也比
也用來做搜救雷
程掃描。



Radar and automatic radar plotting aids (ARPA) (雷達與雷達自動測繪系統)

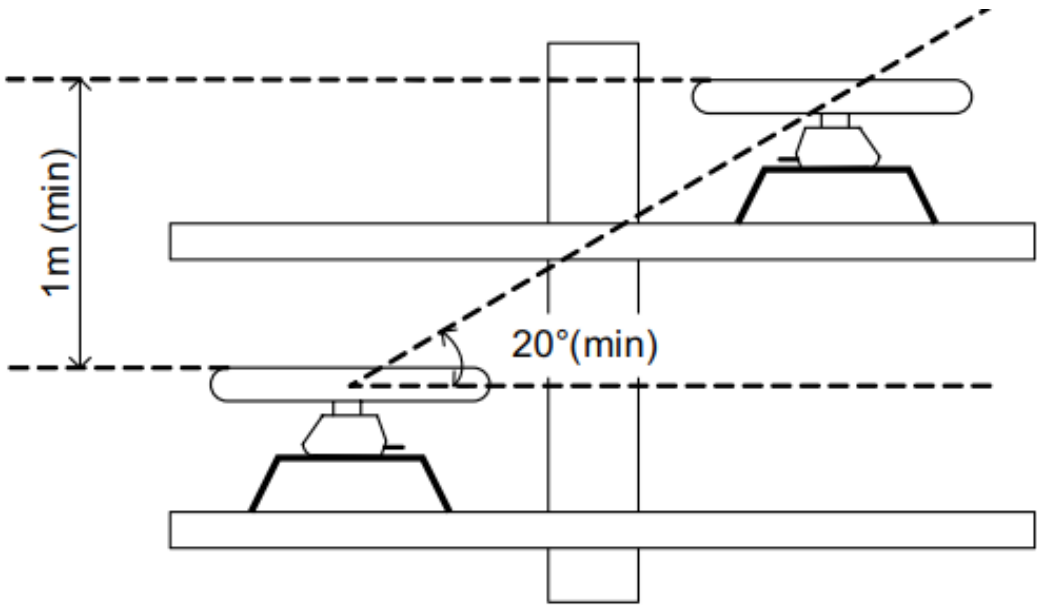
Vertical beam width of X-band: Approx. 20 (10.0 when the height of the radiating section is 0)

Vertical beam width of S-band: Approx. 25 (12.5 when the height of the radiating section is 0)



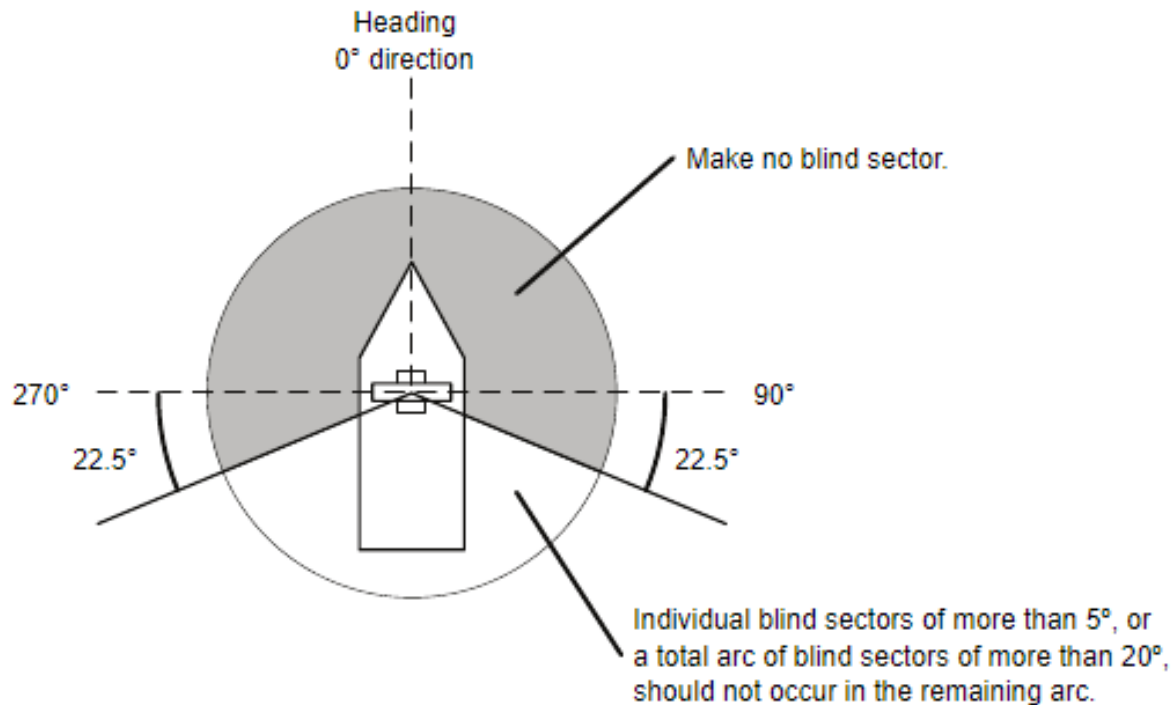


Radar and automatic radar plotting aids (ARPA) (雷達與雷達自動測繪系統)





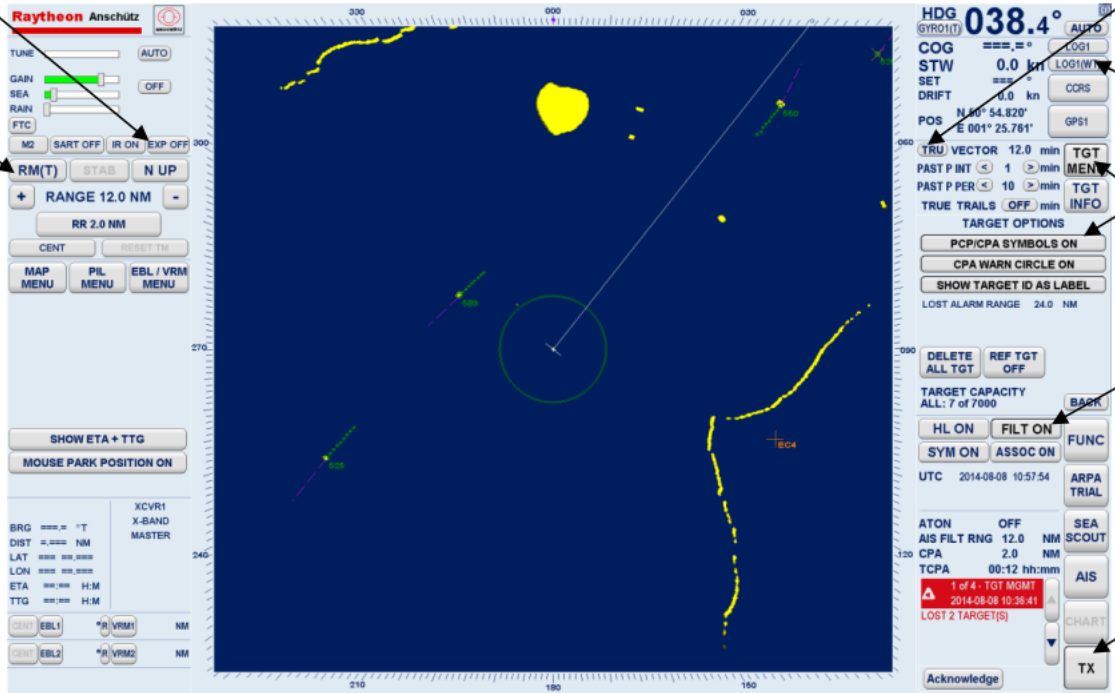
Radar and automatic radar plotting aids (ARPA) (雷達與雷達自動測繪系統)





Radar and automatic radar plotting aids (ARPA) (雷達與雷達自動測繪系統)

- The ARPA number of vectors or antenna, and the time



monitor these as of the own ship



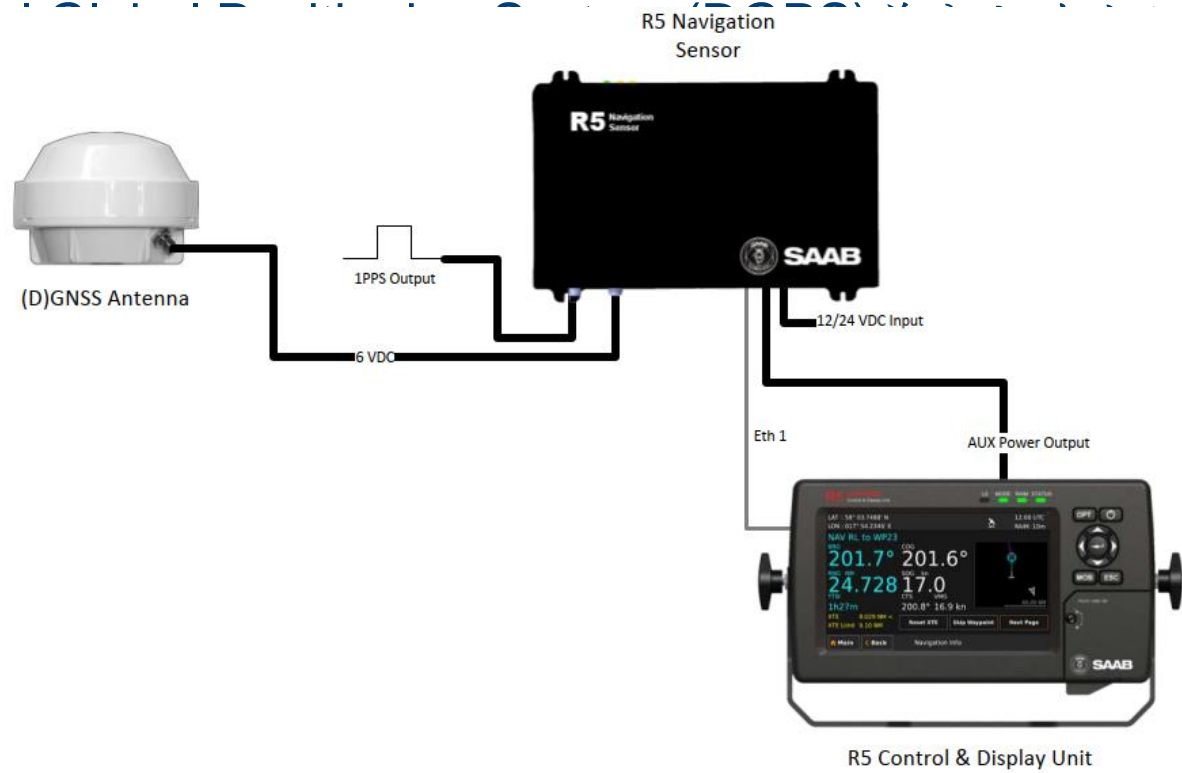
DGPS navigator (全球衛星定位系統)

- Global Positioning System (GPS)全球衛星定位系統
- 1) 太空衛星部份：由 24 顆繞極衛星所組成，分成六個軌道，運行於約 20200 公里的高空，繞行地球一周約 12 小時。每個衛星均持續發射載有衛星軌道資料及時間的無線電波，提供地球上的各種接收機來應用。
- 2) 地面管制部份：這是為了追蹤及控制上述衛星運轉，所設置的地面管制站，主要工作為負責修正與維護每個衛星能保持正常運轉的各項參數資料，以確保每個衛星都能提供正確的訊息給使用者接收機來接收。
- 3) 使用者接收機：追蹤所有的 GPS 衛星，並即時地計算出接收機所在位置的座標(WGS-84 世界測量座標系)、移動速度及時間。



DGPS navigator (全球衛星定位系統)

- Differential DGPS (Differentially Corrected GPS) 出來的系統測點利用差點接收衛星點實際位置至未知測點



系統
度而發展
對兩不同

三離與參考
方式傳送





Automatic identification system (AIS) (自動識別系統)

- 1) 1998年由IMO海事安全委員會 (MSC) 通過「自動識別系統 (Universal Shipborne Automatic Identification System, AIS) 性能標準」 (IMO Resolution A.817(69))，所有300總噸及以上的国际航行船舶和非国际航行船舶應要求配備AIS。
- 2) 船舶自動辨識系統採用VHF頻道 (161.975 MHz) 一般約20-30哩左右，其穩定可靠的通訊範圍可達數百海哩之遠。

GPS antenna
RX



VHF antenna
RX/TX



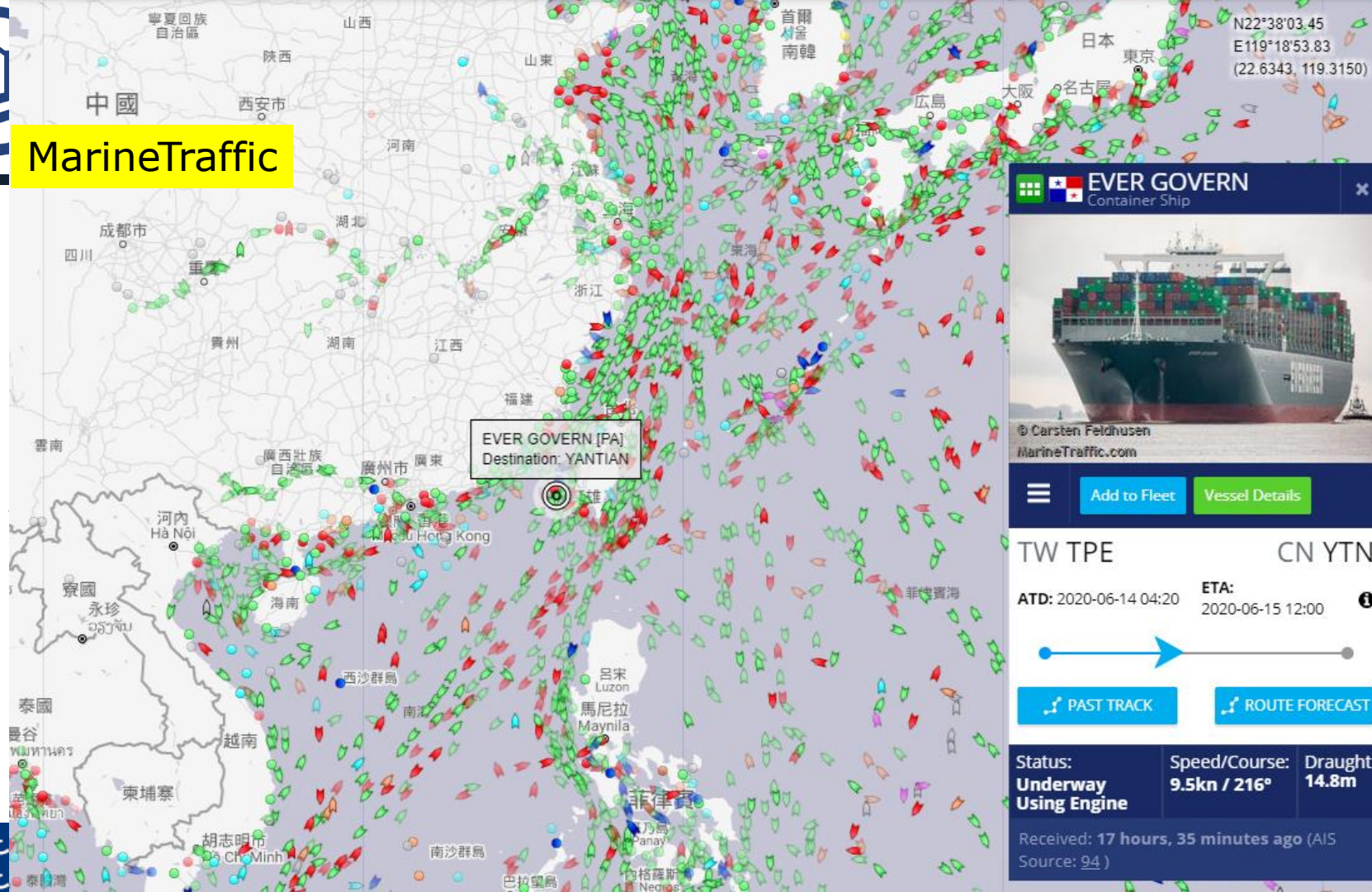
自動識別系統 (AIS) 是國際航運中不可或缺的一部分。根據IMO總噸及以上的国际航行客船及油輪，應要求配備AIS。

船舶自動辨識系統採用兩個國際性的AIS專用VHF頻道 (161.975 MHz) 其穩定可靠的通訊範圍可達數百海哩之遠。

由於電磁波導現象的影響，收訊範圍可



MarineTraffic



N22°38'03.45
E119°18'53.83
(22.6343, 119.3150)

EVER GOVERN
Container Ship



© Carsten Feldhusen
MarineTraffic.com

[Add to Fleet](#) [Vessel Details](#)

TW TPE CN YTN

ATD: 2020-06-14 04:20 ETA: 2020-06-15 12:00



[PAST TRACK](#) [ROUTE FORECAST](#)

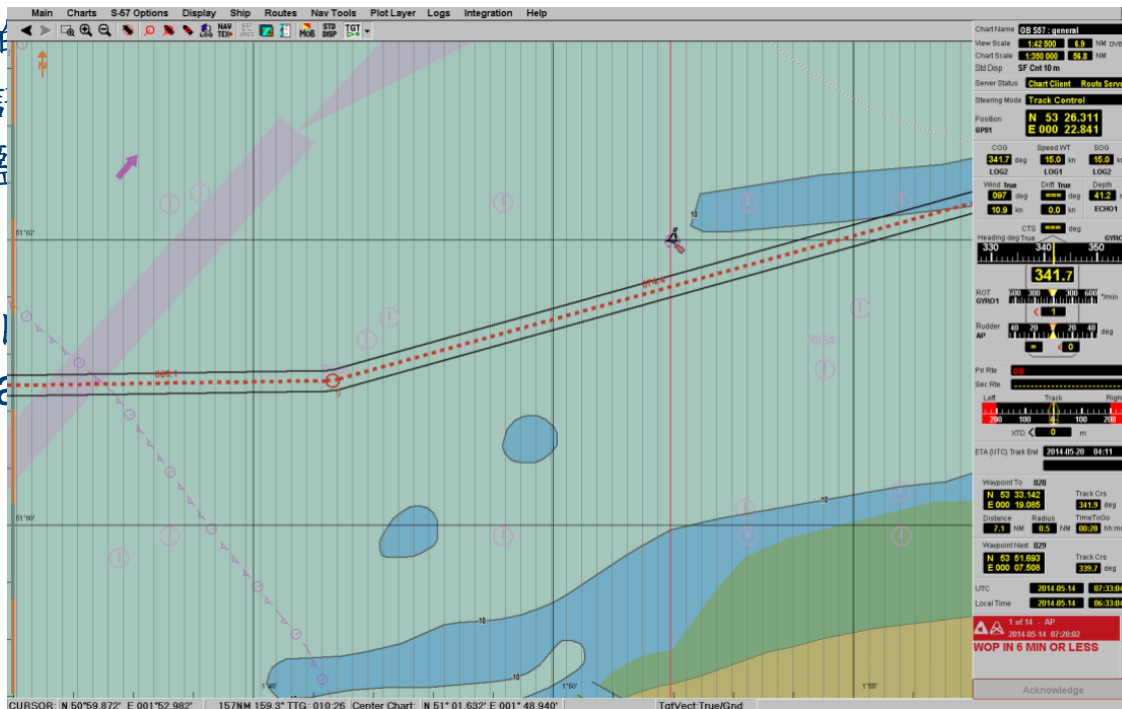
Status: Underway Using Engine	Speed/Course: 9.5kn / 216°	Draught: 14.8m
--	--------------------------------------	--------------------------

Received: 17 hours, 35 minutes ago (AIS Source: 94)



Electronic chart display and information system (ECDIS) (電子海圖顯示及資訊系統)

- 1) ECDIS 顯示電子海圖相關資訊、航路設計、航路監控
- 2) 可結合自動操縱系統(Track Control)進行船舶自動循跡控制



顯示電子海圖相關資訊、航路設計、航路監控

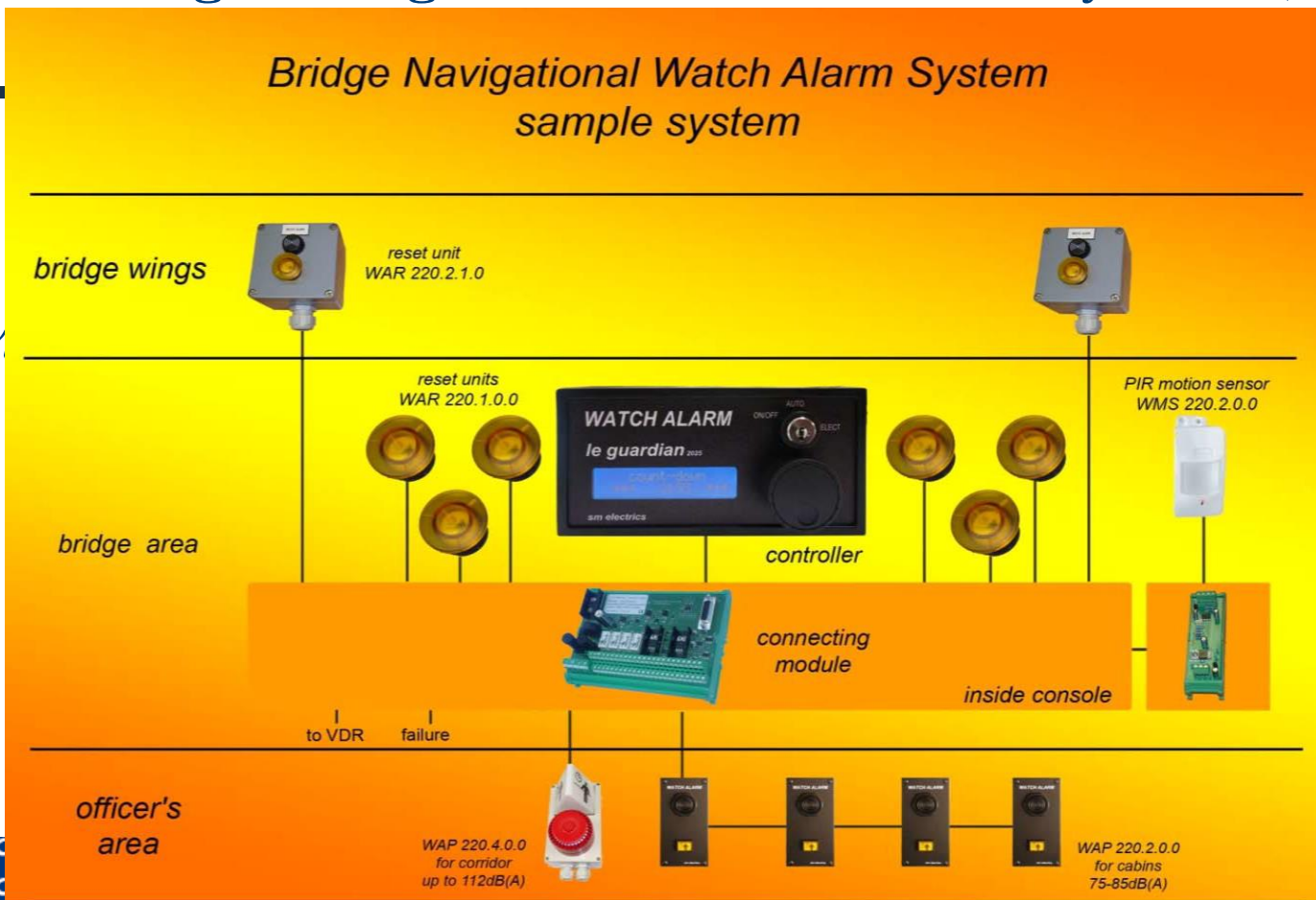
可結合自動操縱系統(Track Control)進行船舶自動循跡控制



Bridge navigational watch alarm system (BNWAS)

- 1) 為系統。
- 2) 以以確

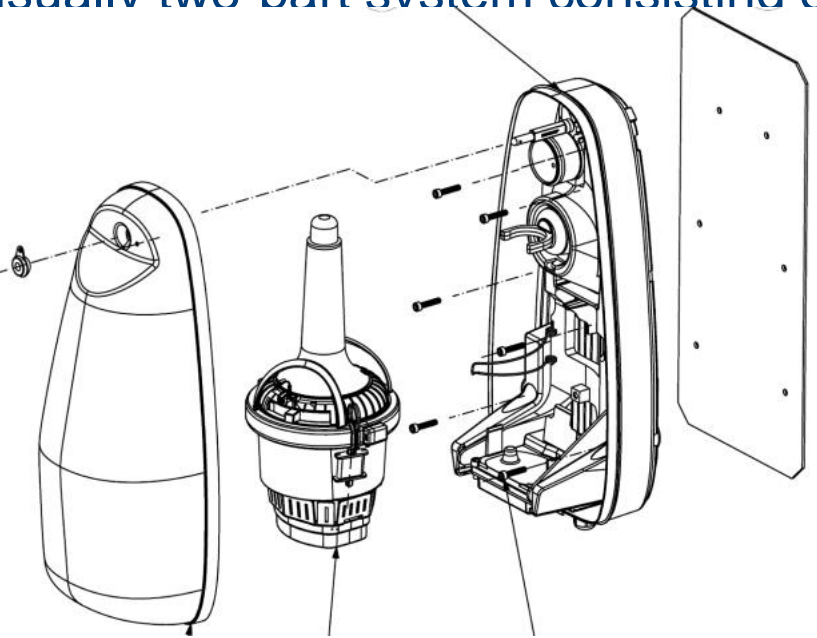
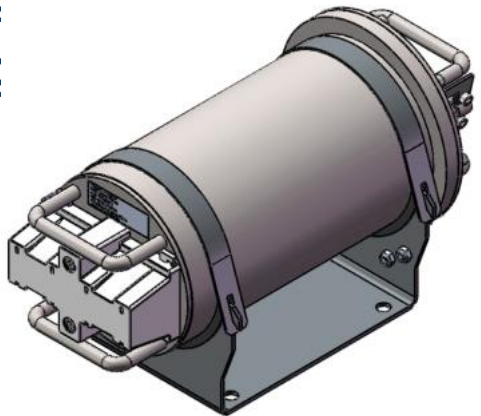
監控系
執勤，





Voyage data recorder (VDR) (航行資料紀錄器)

- A maritime “black box”. VDR is usually two-part system consisting of a data collecting unit, and a protected retriever. The main component is installed on the ship and is connected to a deck-house, depth sounder, speed log, gyro compass, heading scale, etc. The data is stored in a solid state memory, and is protected by a tamper-proof design.



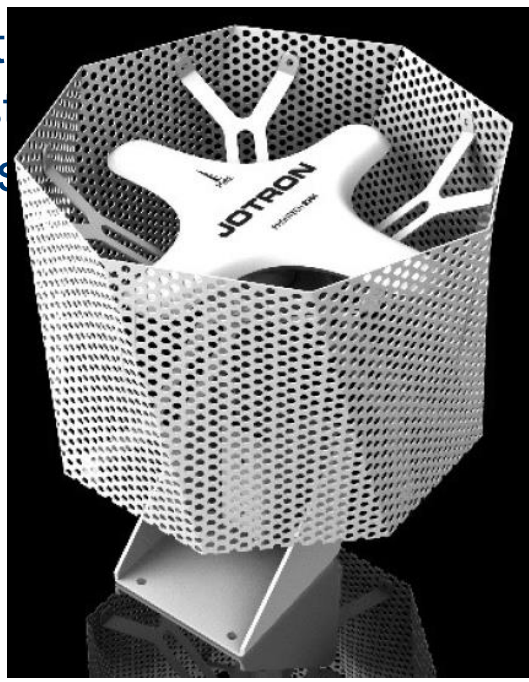
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Sound reception system (外部聲音接收系統)

- It is acoustic electronic navigational aids to enable the officer on the water to receive sound signals at totally enclosed bridge. This system receives sound signals in all directions and produces these signals electrically inside the bridge.





Inertial navigation system (慣性導航系統)

- 慣性導航系統是一個使用加速計和陀螺儀來測量物體的加速度和角速度，通過檢測系統的加速度和角速度，慣性導航系統可以檢測位置變化（如白甫或白西的運動）、速度變化（速度大小或方向）和姿態變化（傾角）。



Range 範圍	
Heading: 船艙向	0° to 360°
Roll / Pitch: 橫搖/縱傾	±60°

Accuracy 準確性	
Heading: 船艙向	0.1° secant latitude RMS 0.1° 正割緯度 RMS
Roll / Pitch: 橫搖/縱傾	0.018° (for ±60° amplitude) RMS 0.018° (±60° 幅度) RMS

Settling Time 設定時間	
Accuracy within 0.5° error : 精度在 0.5° 誤差範圍內 :	< 5 minutes <5 分鐘
Full accuracy (all conditions): 完全準確 (所有條件) :	< 30 minutes <30 分鐘





Public address (船内廣播系統)

- Loudspeakers in cabins, mess rooms, etc., and on deck via which important information can be broadcast from a central point, mostly from the navigation bridge.

PA main unit



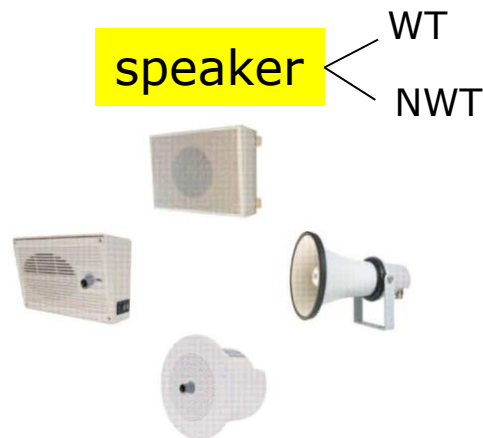
Remote control unit



microphone



speaker





Pub

- Loudspeakers in important information from the navigation

SPEAKER OPERATION TABLE

PRIORITY ORDER	SPEAKER SELECTOR	WORKING SPEAKER	WHISTLE	COMPASS DK	WING STBD	WING PORT	BOW	AFT	SGR	ENG ROOM	CABIN&PASS	W/H REMOTE	MAIN UNIT	NEAR LIFE BOAT	
		MICROPHONE PLACE													
SP OUTPUT POWER															
1	W/H EMERG. SPEECH (OVERRIDE)				●	●	○	○	●	○	●	●		●	
2	FCS EM'CY SPEECH	EM'CY			●	●	○	○	●	○	●	●		●	
3	GEN EM'CY ALARM (OVERRIDE)	W/H(AUTO)	○		●	●	○	○	●	○	●	●	●	●	
	GEN EM'CY ALARM (OVERRIDE)	OTHER			●	●	○	○	●	○	●	●	●	●	
4	FIRE ALARM (OVERRIDE)				●	●	○	○	●	○	●	●	●	●	
	ENGINE CALL ALARM (OVERRIDE)				●	●	○	○	●	○	●	●	●	●	
5	W/H REMOTE	OFF	W/H REM											○	
		COMPASS DK	W/H REM	○										○	
		TALK-BACK	W/H REM												○
			WING (STBD)				○	○	○	○			○	○	
			WING (PORT)				○						○	○	
			BOW				○			○	○		○	○	
			AFT				○			○	○		○	○	
		SGR				○	○	○	○			○	○		
		ENG ROOM	W/H REM								○	○		○	
CABIN&PASS	W/H REM									○	○	○			
EM'CY	W/H REM									●	●	●			
6	MAIN UNIT	OFF	MAIN UNIT										○		
		COMPASS DK			○								○		
		TALKBACK				○	○	○	○				○		
		ENG ROOM										○	○	○	
		CABIN&PASS										○	○	○	
		EM'CY											●	●	●
7	PAGING CALL	"0" DIAL	AUTO TEL										●		

統)

on deck via which central point, mostly

* NOTE : AT mark ● speaker, the maximum volume is used neglecting the set position of volume controls attached.



Common battery telephone (共電式電話)

- It is used for communication in the control room, and the steering gear room, and the steering gear room.
- It adopts the input and output signals (bell, light, etc.)

In the engine control room, it is used for emergency and for communication when necessary.

It is used to deliver communications

COMMON BATTERY TELEPHONE NUMBER TABLE	
共電式電話號碼表	
NO. 號碼	LOCATION 位置
1	WHEEL HOUSE 駕駛台
2	ENGINE CONTROL ROOM 機艙控制室
3	STEERING GEAR ROOM 舵機房
4	M/E MANU. STATION 主機備用站
5	緊急發電機
6	DECK 甲板
7	BUNK 右舷
8	BUNK 左舷
9	ENGINEER'S QUARTER (F DECK) 輪機員住艙通道(F甲板)

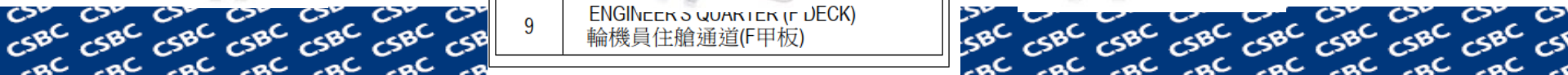
Flush mounted



Wall mounted



Portable



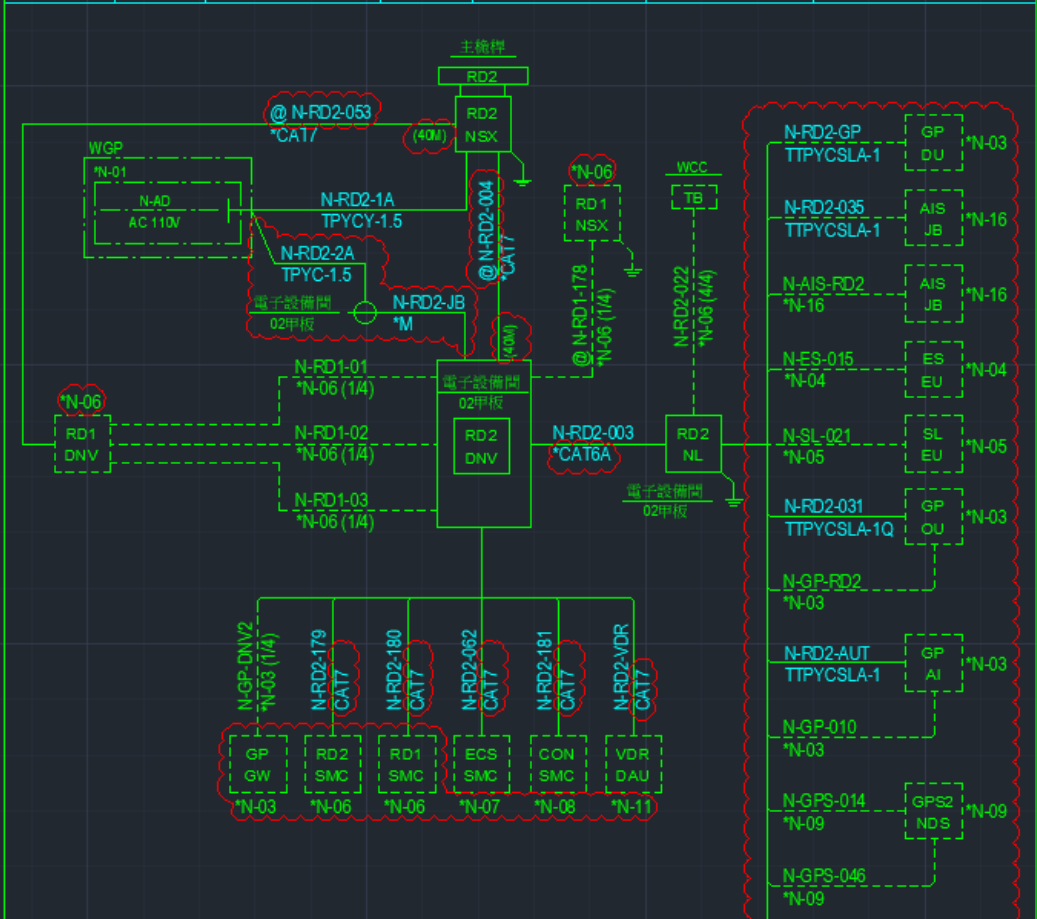


NAUTICAL SYSTEM WIRING DIAGRAM

MARK	TITLE	DWG. NO.
* P	: ELECTRIC POWER SYSTEM WIRING DIAGRAM	K5100300
* L	: ELECTRIC LIGHTING SYSTEM WIRING DIAGRAM	K5300300
* C	: INTERIOR COMMUNICATION & NAVIGATION SYSTEM WIRING DIAGRAM	K5410300
* F	: FIRE DETECTING SYSTEM	K5410350
* N	: NAUTICAL SYSTEM WIRING DIAGRAM	K5440300
* R	: ELECTRONIC SYSTEM WIRING DIAGRAM	K5800300
* K	: ENGINE MEASURING & CONTROL SYSTEM WIRING DIAGRAM	K5451300



RD2	雷達與雷達自動測繪系統 (二號雷達 X波段)			DWG. NO.	K5440300
	MAKER	Raytheon	TYPE	SYNOPSIS NX	SHEET NO.





NAUTICAL SYSTEM WIRING DIAGRAM

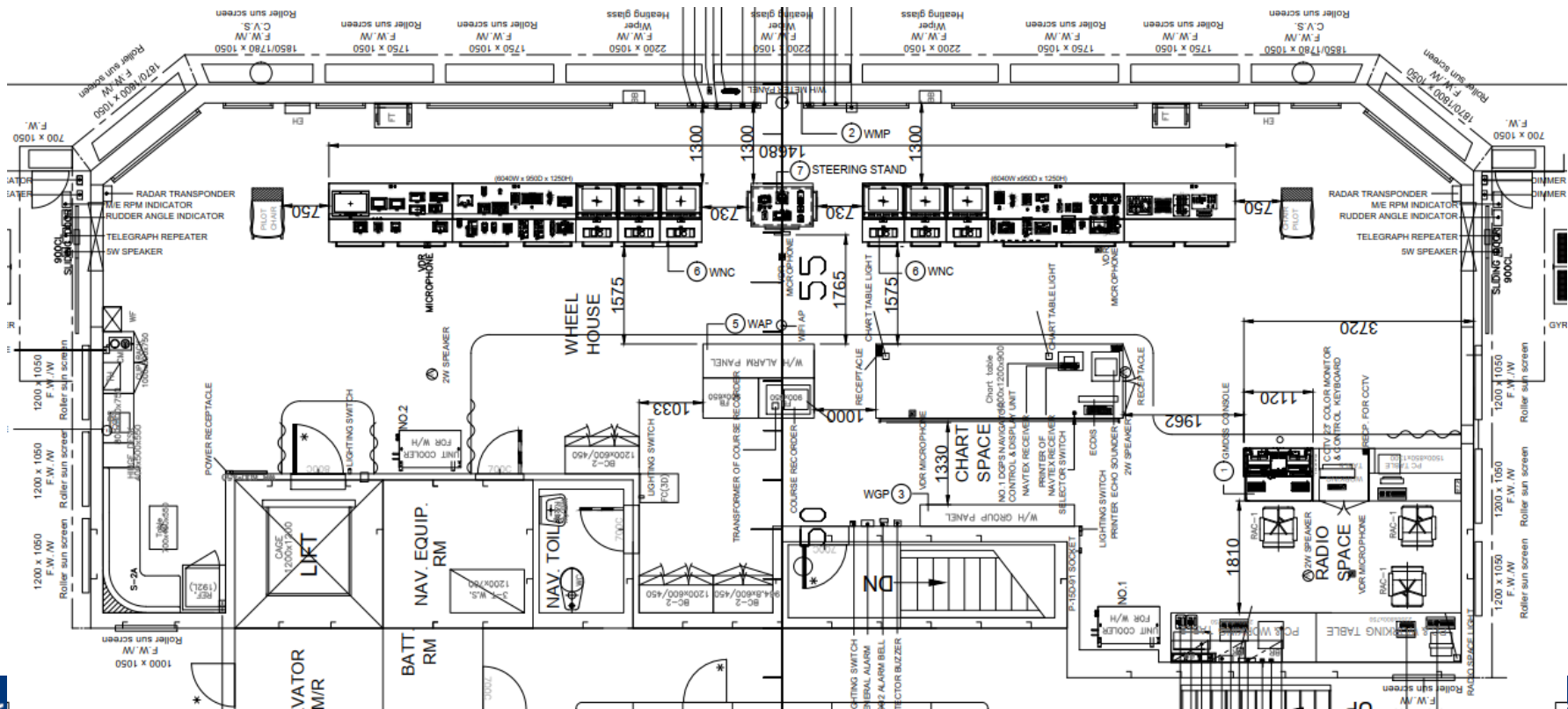
標示 "M" 電纜由廠家提供

符號	說明	數量	備註	符號	說明	數量	備註
RD2 NL	NAUTOPLEX 8PLUS8 LWE 數據路由埠	1	138-135.NG003	RD2 DNV	SWITCH 24 PORT GIGABIT DNV 24埠 Gigabite 交換器	1	138-136.NG001
RD2 NSX	NSX X UP 230V 天線旋轉掃描底座	1	770-001.NG001	RD2	8-FT X-BAND ANTENNA 天線 (8FT)	1	LPR-A25

CSBC Corporation, Taiwan



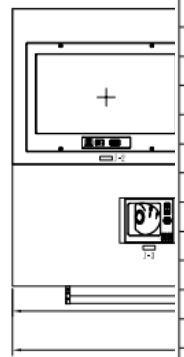
ARRANGEMENT OF WHEELHOUSE



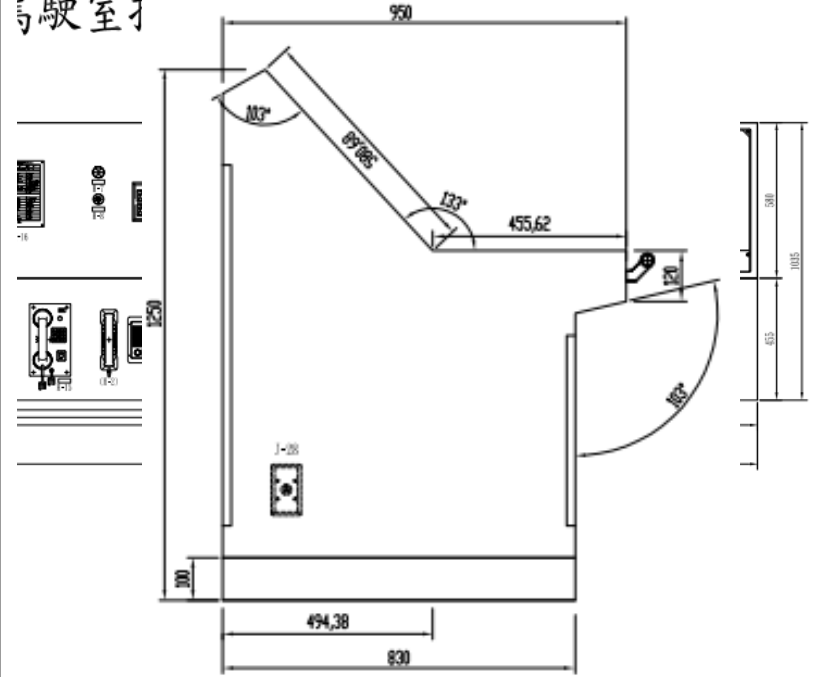


ARRANGEMENT OF WHEELHOUSE CONSOLE

No.	Equipment	Maker	Type
H-1	No.2 VHF Controller W/Flush Mount Kit	JRC	NCM-1770
H-2	No.2 VHF Hand Set	JRC	NQW-261
H-3	No.2 VHF Power Supply Unit	JRC	NBD-865
H-4	No.2 VHF Em'cy Light	JRC	7ZLND0001
H-5	No.2 VHF Transceiver	JRC	NTE-770S
H-6	Air Horn PushButton (Flush Type)	Kockum Sonics	TL-80P
H-7	Watch Alarm Buzzer	SPERRY	S0210
H-8	Watch Alarm Reset Unit	SPERRY	S0207
H-9	Gooseneck Light With Dimmer SW.	CHAN TA	
H-10	Window Wiper Switch Box	JUNG-A MARINE	SERIES-813M
H-11	Clear View Screen Controller	JUNG-A MARINE	SERIES-D500
H-12	Heater Glass Controller	SAMGONG	PT-1000Ω SENSOR
H-13	Sound reception Main Unit with speaker	MRC	8300 MK II
H-14	Sound reception Power Supply Unit	MRC	MPS-030A
H-15	Auto Telephone W/ Dimmer	MRC	LC-215A
H-16	Auto Telephone Number Plate W/ Dimmer	CHAN TA	
H-17	No.2 Common Battery Telephone W/ Dimmer	MRC	LC-616A
H-18	No.2 Common Battery Power Supply	MRC	MPS-300D
H-19	Common Battery Number Plate W/ Dimmer	CHAN TA	
H-20	Inmarsat-FBB500 External Buzzer	JRC	NCE-6824A
H-21	Inmarsat-FBB500 Telephone	MRC	LC-215C
H-22	Inmarsat-FBB500 Telephone Joint Box	JRC	NQE-3058C
H-23	No.1 Inmarsate-C Remote Distress Button	JRC	NQE-3225
H-24	No.2 Inmarsate-C Remote Distress Button	JRC	NQE-3225
H-25	Steering Gear Alarm Panel	FLUTEK, LTD	FTESG-45K-AL1



駕駛室





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