HONG KONG MARINE DEPARTMENT
STATEMENT / REPORT

File No. (65) in MDEAS 3-70/1/7/1 Section Engineering & Systems
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Recorded by Self in language English
At 1000 hours on 28 Nov 2012 at Office of Engineering & Systems Section
Interpreter Nil

States: -

I, YIM Kit-ming, am a member of the Institution of Engineering and Technology and a Chartered Engineer of the Engineering Council of UK. I graduated from the Hong Kong Polytechnic and the Hong Kong Polytechnic University with awards of Endorsement to Higher Certificate in Electrical Engineering and achieved Master Degree in Engineering Business Management (joint ventured with the University of Warwick of UK) respectively.

I had received training on the maintenance of the vessel traffic services (VTS) system and have been posted to the Hong Kong Marine Department as the System Specialist/VTS since 1 Sept 2006.

My job duties include supervising and monitoring maintenance activities for the VTS system of the Hong Kong Marine Department. I am also responsible for solving problems relating to equipment and system reliability and providing technical advices on matters concerning the operation, modification and upgrading of the VTS system.

<u>The Operation of the VTS System</u>

The VTS system (hereafter referred to as "the System") of the Hong Kong Maine Department consists of, among others, essentially the following six components:

i. The Radar subsystem which is made up of thirteen radars located at different radar sites detects and locates targets within and in the vicinity of Hong Kong waters. The radars complete one revolution in 3 seconds. While a radar in operation, it transmits pulses of radio frequency electromagnetic wave. The pulses are then reflected back by targets they hit and are received by the radar afterward. By measuring the time elapsed between the transmission and the reception, distances or ranges of targets from the radar could be calculated. By verifying the azimuth position of the radar antenna when it transmits the pulses,

bearings of targets from the radar are also known. Positions of targets are determined by ranges and bearings from the radar. The reflected pulses from targets are presented as radar echoes on the Display subsystem to the Vessel Traffic Services Operators (VTSOs), also known as Vessel Traffic Regulars (VTRs), at the Vessel Traffic Centre (VTC).

ii. The Radar Tracking subsystem automatically tracks radar echoes that are correlated as pertaining to individual targets. Track data such as position, course over ground (COG) and speed over ground (SOG) is derived during the tracking process. A unique track number is assigned to each tracked target for the purpose of identification. No other tracks in the system shall carry the same track number at the same time. Together with the track number, track data is shown as the label of a track target. The track labels are updated every 3 second and are presented on the Display subsystem. When coupled or info-linked with the vessel database, vessel particulars are also presented on the labels of the info-linked targets..

iii. The Automatic Identification System subsystem which is made up of six AIS base stations receives AIS messages broadcasted by the AIS transponders installed onboard the vessels within and in the vicinity of HK Waters. The AIS messages contain static information, such as ship name, length and breadth, etc. of the vessels as well as information of their positions, courses, speeds, callsigns, and Maritime Mobile Service Identity (MMSI) numbers. AIS information received from the transponder onboard the vessels is fused together with radar tracks and can be presented by AIS labels of the targets on the Display subsystem.

iv. The Display subsystem presents radar echoes, radar tracks, labels of track information and electronic maps as the traffic image to the VTSOs. As such, VTSOs are able to monitor and provide the VTS-participating vessels with navigation advice according to traffic situations within Hong Kong waters.

v. The Very High Frequency (VHF) Radio subsystem enables VTSOs to communicate verbally with vessels within respective monitoring sectors. For examples, vessels inside the harbour sector shall communicate with the VTSO by using Channel 14 while vessels in the east sector shall communicate with the VTR by using Channel 12.

vi. The Recording and Replay subsystem continuously and synchronously records VTS data of all voice communications, radar echoes, radar tracks and labels of

track information in a proprietary computer file format. Each recording file consists of one minute of the VTS data. A check code is calculated and embedded in the "minute" file. If there are any human alterations after the file is created, they could be detected by the system by validating the data against the embedded check code. The recorded "minute" files can be replayed by the system for scenario analysis.

Under normal conditions, these subsystems are synchronized to the GPS clock and works together for the System.

Capturing and Storing of the Information

During the period from 2000 to 2200 hours on 01 October 2012, the System was working in order as there were no anomalies reported by VTC or observed by the maintenance personnel on the operation of system.

The VTS data was being recorded by the Recording and Replay subsystem as described above in the "minute" files which were stored in the hard disk of the computer or the server for on-line storage. For every two hours, the "minute" files in the hard disk of the server were transferred to tape for long-term storage. A tape stored with one week's "minute" files is ejected out at 0000 hours every Monday and will be replaced by another one to start a new cycle of storage for the next week. The tape stored with the "minute" files of the Lamma Incident had been taken out and sealed for permanent storage.

The recorded VTS data can be replayed on the Display subsystem to reproduce traffic scenarios as needed for traffic situation analysis by retrieving the "minute" files from the storage tape to the Display Processors (DPs). For the case of the Lamma incident, I retrieved the recorded VTS data to the Display subsystem for reproducing Items 1 - 8 as described in the List of Records to Commission of Inquiry.

While the DP was so used in the course of reproducing Items 1 to 8, appropriate measures were in force for preventing unauthorized interference with the computer. The DP was working properly and was not that in any respect affect the reproduction of those Items and accuracy of their contents.

Interpretation of Items 1 to 8

Item 1 is the recording of the traffic image captured during the replay of the VTS data showing the movement of Sea Smooth from leaving Central Pier at about 2004 hours until berthing at Yung Shue Wan Pier at about 2030 hours. During the course of Sea Smooth's movement, the Lamma incident occurred. The AIS label of Sea Smooth was shown during the replay. Interpretation of the AIS label is shown as follows:

Line	Contents	Remarks
1	"+" <Ship Name>	The "+" sign indicates that the ship carries AIS transponder
2	<COG><SOG>><Length in meters><Breadth in meters>	COG - Course Over Ground; SOG - Speed Over Ground
3	<Navigation status> <Position Accuracy> <Position>	U - Underway; L - Low accuracy (>10m); Position - Latitude and Longitude
4	<Callsign><Ship Name><MMSI>	
5	<Type of Ship Code>	40 - High Speed Craft (HSC)
6	<Time Stamp>	The time stamp of last received AIS information
7	<Antenna Position>	Distance from the bow, stern, port and starboard of the vessel in meters
8	<Transponder Type><Assignment Mode>	Class A - Class A transponder; S - Scheduled

Item 2 is the recording of the traffic image captured during the replay of the VTS data showing the traffic scenario of Sea Smooth and radar track "7622" (later believed to be Lamma IV) while the incident was occurring. The Closest Point of Approaching (CPA) and Time to Closest Point of Approaching (TCPA) between Sea Smooth and radar track "7622" as calculated by the System were shown on the traffic image for reference. Interpretation of the radar track label of radar track "7622" is shown as follows:

Line	Contents	Remarks
1	<Track Number>	"7622" - Track Number identifies the radar track by the System
2	<SOG><SOG><Length in meters>	
3	<Track Number> <Length in meters><Breadth in meters>	Lng / Brt - Radar detected length and breadth
4	<Track Number>	

Interpretation of the CPA / TCPA label is shown as below:

The 1st column shows the CPA and TCPA information between the two vessels, for example, 02:32 on the 1st row is the TCPA in minutes and seconds; 84 on the 2nd row is the CPA in meters; and 0.05 on the 3rd road is the CPA in Nautical mile (NM).

The 2nd column shows the distance to the CPA point of the first vessel, for example, SEA SMOOTH on the 1st row is the name of the first vessel; 1840 on the 2nd row is the distance in meters to the CPA point of the 1st vessel; and 0.99 on the 3rd row is distance in NM to the CPA point of the 1st vessel.

The 3rd column shows the distance to the CPA point of the second vessel, for

example, "7622" on the 1st row is the track number of the second vessel; 832 on the 2nd row is the distance in meters to the CPA point of the 2nd vessel; and 0.45 on the 3rd row is distance in NM to the CPA point of the 2nd vessel.

Item 3 is the recording of the traffic image captured during the replay of the VTS data showing the traffic scenario of Sea Smooth and radar track "7622" while the incident was occurring. Bearing and distance between the two vessels as calculated by the System were shown on the traffic image for reference. Interpretation of the bearing / distance label is shown as follows:

The figure on the 1st row is the bearing relative to North of radar track "7622" as measured from Sea Smooth. The figure on the 2nd row is the bearing relative to North of Sea Smooth as measured from radar track "7622". The figure on the 3rd row is the distance between the two vessels in meters while the figure on the fourth row is the distance between the two vessels in NM.

Items 4 is the zoom in version of the recording of the traffic image captured during the replay of the VTS data showing the traffic scenario of Sea Smooth and radar track "7622" while the incident was occurring.

Item 5 is the audio recording of the radio communication on VHF Channel 14 from 2015 to 2130 hours on 01 October 2012.

Item 6 is the audio recording of the telephone communications on Ext. 806 from VTC to the mobile phone of Sea Smooth from 2031 to 2032 hours on 01 October 2012.

Item 7 is the audio recording of the telephone communications on Ext. 806 from the mobile phone of Sea Smooth to VTC from 2033 to 2035 hours on 01 October 2012.

Item 8 is the audio recording of the telephone communications on Ext. 806 from VTC to the mobile phone of Sea Smooth from 2036 to 2037 hours on 01 October 2012.

The above statement (5 pages) is true and correct to the best of my knowledge and belief.

(YIM Kit-ming)
System Specialist/VTS/Engineering & Systems