Exhibit "41"
Inquest touching the death of
Sydney Hobart
State Coroner's Court, 44-46
Parramatta Road Glebe
Date 13. 3.00
Court Officer

1998 SYDNEY HOBART RACE - COMMUNICATI

INTRODUCTION

Communications Bands

The Radio Spectrum is broken up into a number of common bands for ease of reference and due to physical requirements. They are characterised as follows:

Band Designation	Frequency	Comments/Use
VLF	3-30 kHz	Global Coverage with ocean penetrating qualities. Large infrastructure, aerial, and power requirements. Extensively used for Naval Submarine Communications and Time Signals. Impractical for yachts and commercial craft due size and cost.
LF	30-300 kHz	As Above
MF	300-3000 kHz	Beyond Line of Sight (BLOS) communications using sky wave propagation path. Significant Ground wave propagation. Relatively large aereial requirements. Traditional band for maritime mobile communications using both sky and ground wave. Extensive use in maritime communications for military and commercial (including yachts)
HF	3-30 MHz	As above
VHF	30-300 MHz	Horizon Range communications using Line Of Sight (LOS). Moderate sized equipment with small whip aerials. Used extensively for the International Maritime Mobile Band. Extensive use in maritime communications for military and commercial (including yachts). Portable handheld equipment is available.
UHF	300-3000 MHz	As above. Also includes L Band Satellite Communications for EPIRBs and Mobile Telephony (INMARSAT, MOBILESAT) including mobile phones. GPS also in this band. Portable handheld satellite communications are available
SHF	3-30 GHz	LOS for Satellite Communications. Directional aerials required with tracking facilities. Generally impractical for smaller yachts. Cost prohibitive.
EHF	30-300 GHz	As above

MF/HF are applicable to the Sydney-Hobart Race as they permit the race control organisation the ability to communicate with all participants in a dispersed fleet. VHF International Maritime Mobile (IMM) is applicable for horizon range line of sight

communications. UHF communications can be used through mobile telephones and some satellite communications products.

Frequency Plans

The International Telecommunications Union (ITU) regulates international use of the Radio Spectrum. These regulations are represented in Australia through the Australian Radiofrequency Spectrum Plan as coordinated through the Spectrum Management Agency. This plan includes details of users, licensing fees and requirements to minimise harmful interference.

SOLAS/GMDSS

Within the Spectrum Plan are international requirements for Distress and Safety Communications as agreed under the Safety of Life at Sea (SOLAS) Convention and the recent adoption of Global Maritime Distress and Safety System (GMDSS). This convention applies to vessels of greater than 300 GRT and passenger vessels on international voyages. Smaller vessels (ie those under 300 GRT) and pleasure craft fall outside the scope of SOLAS convention and the responsibility for providing communications services falls to State and Territory Governments. The Sydney Hobart Race of 1998 was conducted during the implementation phase of GMDSS (01 Feb 92 – 01 Feb 99).

The following summarises aspects of the SOLAS/GMDSS requirements for communications.

500 kHz — International Distress and Calling. Auto Alarm Watch Radio Telegrapht (Morse). Was removed from auto watch requirements on 01 Feb 99 with implementation of GMDSS requirements.

518 kHz — MF NAVTEX. Dissemination of Maritime Safety Information (MSI) by Narrow Band Direct Printing (NBDP). Provides safety information, weather warnings and forecasts within relevant areas. Australia does not plan to introduce NAVTEX due to the length of coastline and large ocean areas. Australia will use the alternate INMARSAT EGC service.

2182 kHz — International Calling and Distress HF. Voice Telephony with an auto alarm capability. Was removed from auto watch requirements on 01 Feb 99 with implementation of GMDSS requirements.

2187.5, 4207.5, 6312.0, 8414.5, 12577.0, 16804.5. MF/HF Digital Selective Calling Distress and Safety Frequencies. Initial contact between station is by a burst of digital data as an altert message. Subsequent communications must be established through radio telephony or NBDP

121.5 MHz — Aeronautical Emergency. Also a transmitting frequency for 121.5 MHz EPIRBs with the COSPAS-SARSAT System (Real Time Mode). 10 nautical mile accuracy is provided. Median time to detect and locate in Tasman Sea is approximately 1 Hour.

156.8 MHz	International Distress and Safety (International maritime Mobile Ch 16). Radios must also be capable of Ch 13 and 6. VHF Digital Selective Calling Distress Alert (Ch70). Same as MF/HF DSC requirements. Not madated for Australian Coastal Stations.
406 MHz	Global coverage mode for COSPAS-SARSAT System EPIRB. This band also contains unique identity code. Approximately 3 nautical mile accuracy. EPIRBs with 406 MHz capability also radiate on 121.5 MHz for aircraft homing.
1.5/1.6 GHz	L Band EPIRBS (INMARSAT System) Uplink from mobile terminals. Not approved for Australian use.
4/6 GHz	C Band INMARSAT downlink to Land Earth Station (LES).
9 GHz	Search and rescue,Transponder (SART). 3cm or X Band radar transponder. Required for vessels greater than 500 GRT.

COMMUNICATIONS PLANNING ISSUES

In the planning stages the following should be considered:

- Efficient and economic use of available equipment/resources (including appropriate physics)
- Provision of adequate facilities and personnel to meet requirements
- Information flows (What is the purpose)

These points are basic principles of naval/military communications planning, but are equally applicable in the civil community.

Communications Equipment

The race participants are fitted with VHF and HF equipment.

VHF (in the maritime bands) provides reliable communications for line of sight to the horizon. The power and aerial requirements are not large and suitable for yachts. The aerial on fitted systems is generally located at the mast head (vulnerable to dissmasting and rollover incidents). Portable handheld VHF transceivers are available and should be carried as a backup.

HF provides communications for extended ranges but is affected by a range of physical factors. These being:

Aerial design and efficiency. Yacht aerials are inefficient. They are extremely constrained by yacht design and are generally employed as a backstay arrangement which is lost should a failure of the mast occur.

Power output. Limited to the power available in the yacht. Decreased by the aerial inefficiencies. Power has a small impact on ground wave communications. Generally has a heavy drain on battery power.

Aerial angle. Highly mobile platform that is not controllable. This volatile movement affects take off angles for HF communications using the sky wave path.

Ground Wave. Almost any frequency is suitable for Ground Wave propagation, therefore the 4MHz is suitable for use in the dispersed fleet within a 100 nautical mile radius.

Sky Wave. For extended distances. RCC/RRV link requires both day and night frequencies to use the sky wave path until within range of the ground wave. Prediction models indicate that 4-12 MHz would have been suitable for the race.

Frequency Management. The only controllable is frequency selection. Very little evidence of frequency management other than use of the 4MHz yacht frequency.

In the naval sense we are limited to the same extent as the yacht community due to physical design limitation of ships. We therefore concentrate using best practice in our shore station to overcome the limitations of the seagoing end of a link (ie Efficient Aerials with high power transmitters and sensitive receivers).

The ability of aerials to withstand the physical aspects of yacht mishaps is generally poor. A downed mast will remove aerials and a rollover will damage battery and power supplies. Therefore cost effective communications redundancy should be considered.

Communications Plan

In the simplest terms the Race Communications Plan needed to address the following (as a minimum):

- A system capable of maintaining reliable communications for race coordination and dissemination of information to all race participants and control elements.
- A Distress Plan
- A SAR Plan to permit those going to the aid of those in distress

Race Communications

The number of net participants would have always been a challenge. If the information was restricted to race management information from the Radio Relay Vessel to race participants and for the receipt of regular position reports (in a structured order), a single HF net should suffice.

If more traffic between participants - RRV or between participants the use of a working channel or channels should have been considered. This would require the promulgation of a frequency/channel plan and competent operators capable of executing this. Sufficient infrastructure would need to be in place to support the additional working frequencies (This is a standard practice in maritime communications happens on VHF through the use of Ch 16 as a calling before shifting to a working frequency).

As proved the requirement of RRV and RCC communications on the same calling/working frequency was unsuitable. Frequency planning should/would dictate a discrete frequency if HF was to be used. Technology through satellites offer other solutions (Mini-M INMARSAT and OPTUS MOBILE NET) which should be explored.

If a Radio Relay Vessel is used, the plan must provide enough equipment to ensure it is viable without denuding the Radio Relay Vessel of its inherent requirements to communicate with appropriate authorities.

VHF IMM Ch 16 guard should be maintained on a continuous basis, with a working channel being standard for the race.

The Race Communications Plan is the responsibility of the authority running the race. (This is the same as a naval plan which belongs to the commander it is intended to support).

Distress Communications Plan

Sufficient detail needs to be promulgated so that all race participants are aware of the procedure for declaring an emergency. The Race communications are suitable, but the use of existing dedicated distress frequencies, channels and equipment must be included. The plan must be robust to ensure it is workable after a sailing incident (dissmasting/rollover etc).

The Distress Communications Plan should reflect the various International, Commonwealth and State Legislative and Treaty requirements applicable to the race participants and be disseminated to all participants and any organisation which may be required to respond/monitor.

The decision to declare an emergency remains that of the skipper, but he must be given the resources and redundancy to ensure he has been able to communicate his decision. This must be possible from the liferaft.

The EPIRB requirements should include the 406 MHz as mandatory as providing greater information, positional accuracy to assist SAR response assets.

SAR Communications Plan

Those units assigned to a SAR mission must be able to communicate with:

SAR Coordinator
SAR assets
Those in distress

The participants need to be able to communicate with the SAR assets (including when in the liferaft). Portable equipment should be available in the event of the fitted systems. SAR assets need to ensure they have the ability to communicate with the participants.

Dedicated frequencies are provided, but control of assets must be coordinated. The on scene commander needs to pull together the communications resources from deployed assets to ensure a comprehensive information picture is available. This information needs to collated, displayed and then acted upon.