# R.V. FRANKLIN

## NATIONAL FACILITY
## OCEANOGRAPHIC RESEARCH VESSEL

**RESEARCH PLAN**

**CRUISE FR 10/90**

Sail Sydney 0700 Tuesday 27 November 1990
Arrive Hobart 1400 Friday 14 December 1990

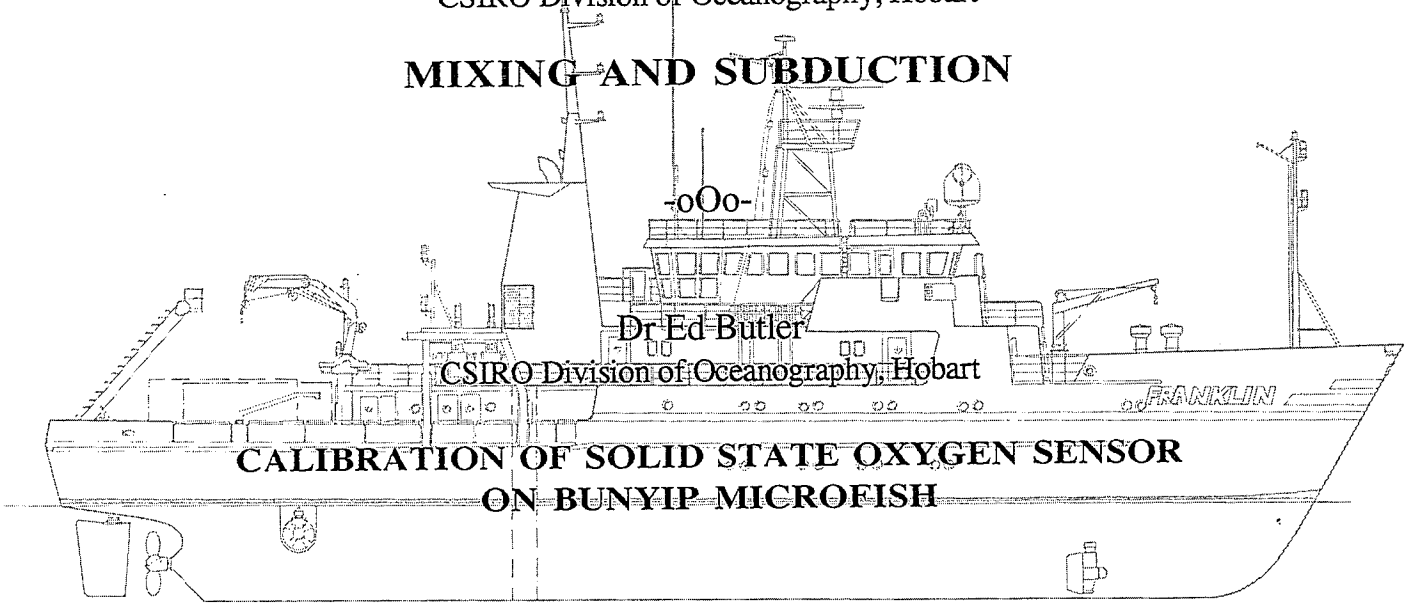
**Principal Investigators**

Dr Trevor McDougall
CSIRO Division of Oceanography, Hobart

**MIXING AND SUBDUCTION**

-oOo-

Dr Ed Butler
CSIRO Division of Oceanography, Hobart




**CALIBRATION OF SOLID STATE OXYGEN SENSOR ON BUNYIP MICROFISH**

26 September 1990

**For further information contact**

**ORV Operations Manager**
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AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

**Research Plan RV Franklin**
**FR10/90**

**Itinerary**
Sail Sydney 0700hr Tuesday 27 November
Arrive Hobart 1400hr Friday 14 December

**Scientific Program**
This cruise involves the use of Bunyip in three different locations. First, in very turbulent regions of low Richardson number that are commonly observed where the East Australian Current leave the NSW coast, second in mapping of three-dimensional volumes of the ocean just downstream of where subduction is thought to occur in the central Tasman Sea near the sub-tropical convergence, and third in the central Tasman Sea, both for the measurement of mixing activity and also for the characterization and calibration of dissolved oxygen sensors.

The Richardson number represents the propensity of the water column to overturning motions and turbulent activity. Potential vorticity is a conserved quantity in the absence of mixing processes, and it represents the rotation rate of a water parcel

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**Cruise Objectives**

(1) Low Richardson numbers and upwelling filaments To locate vertically-extensive patches of low Richardson number in frontal regions near the New South Wales Coast, and then to (i), examine the mixing intensity in these regions, and (ii), to map the three-dimensional fields of salinity and potential vorticity.

(2) Preliminary Subduction Experiment During the Spring restratification, to map the three-dimensional fields of salinity and potential vorticity just below the mixed layer in the central Tasman Sea.

(3) Mixing in the thermocline During the transit between the central Tasman Sea and the NSW coast, to deploy Bunyip to at least 800 m and to collect microstructure data.

(4) Field Calibration of Solid-State Dissolved Oxygen Sensor Mounted on Bunyip Micro-fish. To calibrate the solid-state dissolved oxygen sensor on the Bunyip micro-fish against the conventional dissolved oxygen micro-electrode mounted on the same vehicle. To further relate data from these devices to dissolved oxygen measurements made by the conventional electrode mounted on the CTD, and ultimately to the primary discrete determinations of dissolved oxygen by the Winkler titration.

**Cruise Track**

The research plan involves towing Bunyip with full turbulence-measuring gear in three different areas, (1) near the continental shelf of the NSW coast offshore of the East Australian Current, (ii) between this location and the site of the subduction experiment at about 42.5°S, 155.5°E and (iii) the work at this subduction site. The work on the dissolved oxygen sensors will be done on route, most likely in the first half of the cruise just after the low Richardson number work. See the attached chart for an approximate cruise track.

**ORV Equipment Required**

CTD
ADCP
Bunyip mainfish and Bunyip winch
Satellite thermal image reception and display equipment

**User Supplied Equipment**

Bunyip micro-fish and small winch
Dissolved oxygen sensors

**Time Estimates**

| | |
|---|---|
| Find low Richardson No. region | 50hr |
| Low Ri box | 70 hr |
| Mixing in thermocline and $O_2$ calibration | 40 hr |
| Trial subduction box | 142 hr |
| Total transit time | 80 hr |
| Allowance for bad weather/breakdowns | 50 hr |
| Total | 432 hr = 18 days |

**Personnel**

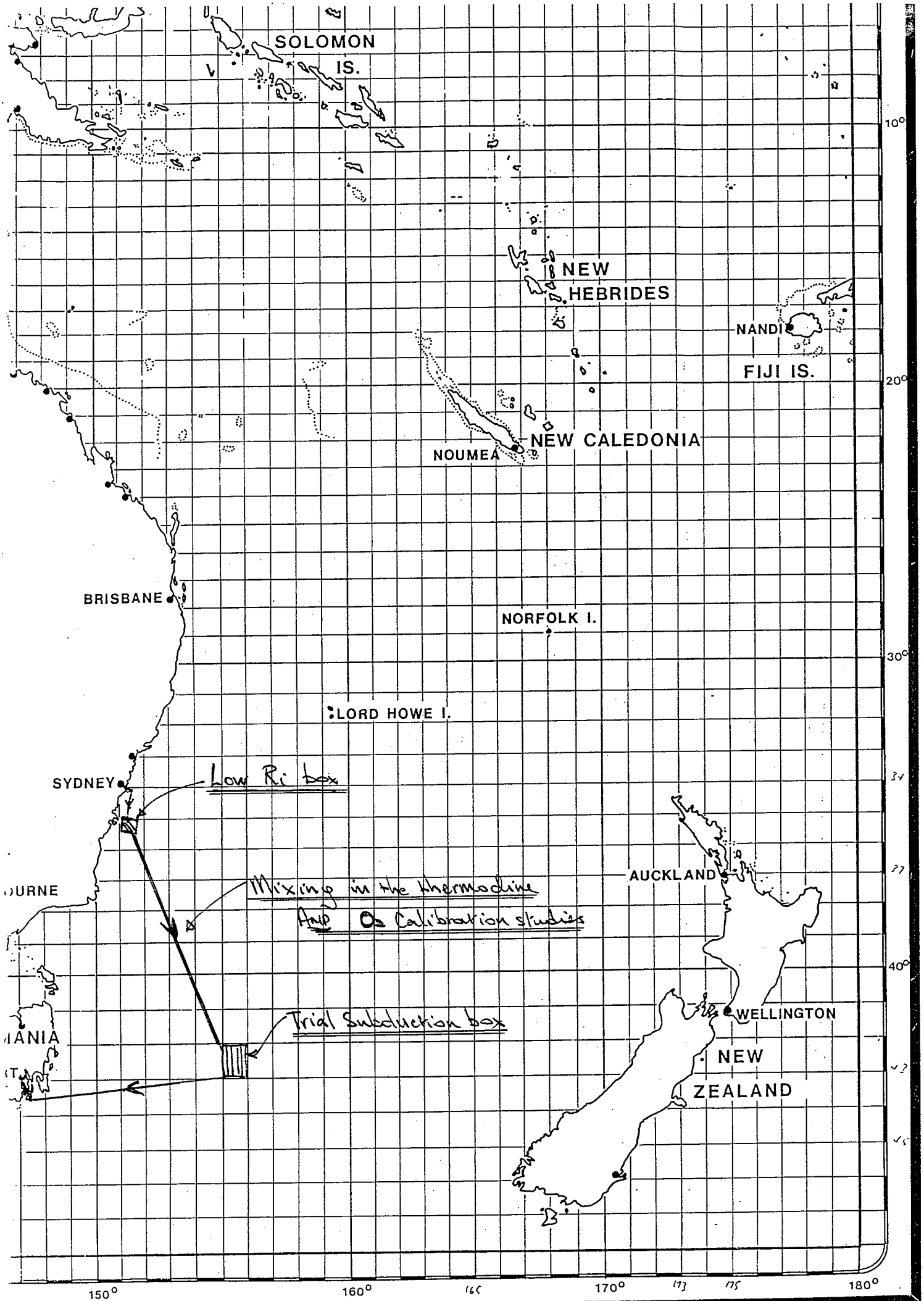
| | |
|---|---|
| Dr T. J. McDougall | CSIRO Division of Oceanography (Cruise Leader) |
| Dr. L. F. Pender | CSIRO Division of Oceanography |
| Mr I. Helmond | CSIRO Division of Oceanography |
| Mr A. Papij | CSIRO Division of Oceanography |
| Mr S. Swan | CSIRO Division of Oceanography |
| Mr Eric Madsen | CSIRO Division of Oceanography |
| Mr Bob Griffiths | CSIRO Division of Fisheries Research |
| Mr Michael Long | CSIRO Division of Oceanography |

This Cruise Plan is in accordance with the directions of the National Steering Committee for the oceanographic research vessel, RV Franklin.

A. D. McEwan
CSIRO Division of Oceanography

D. H. Green
National Facility Steering Committee

September 1990

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