R.V. FRANKLIN

NATIONAL FACILITY
OCEANOGRAPHIC RESEARCH VESSEL

R.V. FRANKLIN

RESEARCH SUMMARY

CRUISE FR10–11/89

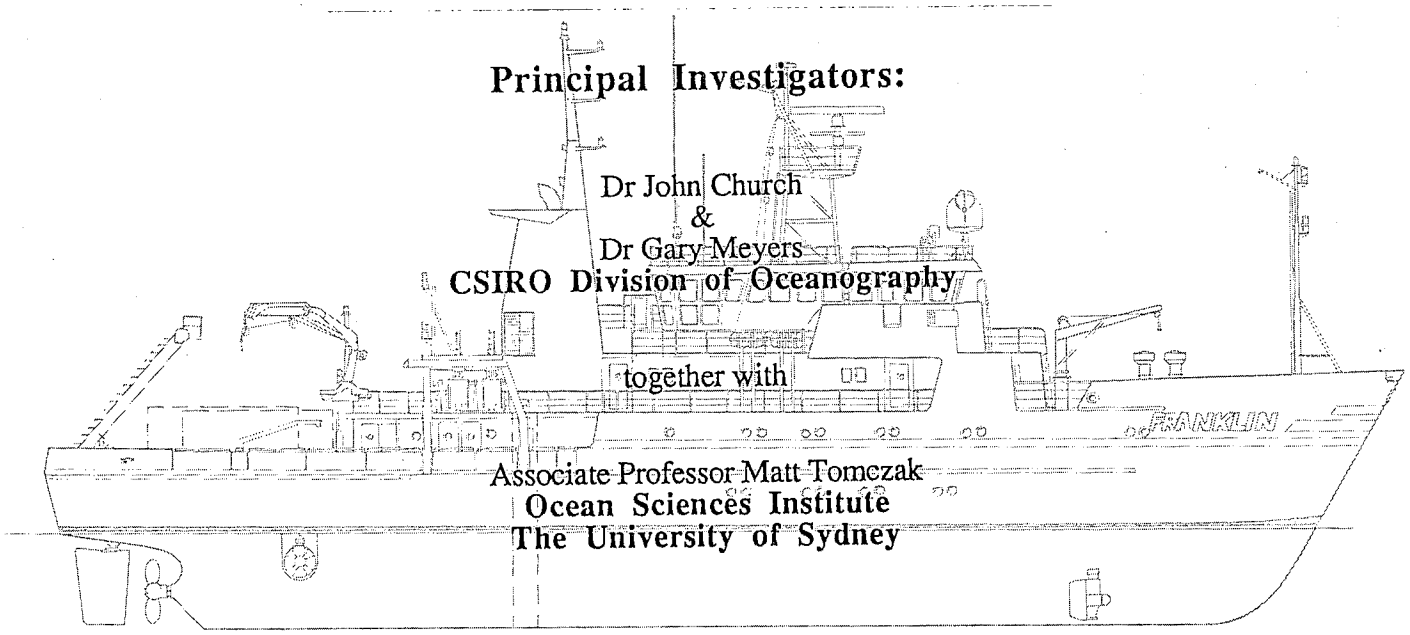
SAILED HOBART 1000 15 AUGUST 89
ARRIVED BRISBANE 0830 6 SEPTEMBER 89
SAILED BRISBANE 0830 7 SEPTEMBER 89
ARRIVED LAUNCESTON 0100 17 SEPTEMBER 89

Principal Investigators:

Dr John Church
&
Dr Gary Meyers
CSIRO Division of Oceanography

together with

Associate Professor Matt Tomczak
Ocean Sciences Institute
The University of Sydney



OCEAN TRANSPORT IN THE TASMAN SEA

For further information contact

ORV Operations Manager
c/– CSIRO Division of Oceanography
GPO Box 1538, Hobart, Tas. 7001
Telephone (002) 20 6222
Telex AA 57182

AUSTRALIA

R.V. FRANKLIN IS OWNED AND OPERATED BY CSIRO

Cruise Summary
R.V. Franklin
FR10-11/89

Itinerary

Departed Hobart:	1000Hrs	Tuesday, August 15, 1989
Arrived Brisbane:	0830Hrs	Wednesday, September 6, 1989
Departed Brisbane:	0830Hrs	Thursday, September 7, 1989
Arrived Launceston:	0100Hrs	Wednesday, September 27, 1989

Scientific Objectives

OCEAN TRANSPORT IN THE TASMAN SEA

1. To estimate the volume transport (and its time variability) of the EAC along the east Australian coast and in the Tasman Front using CTD, ADCP and current meter moorings.

2. To determine the large-scale general circulation of the Tasman Sea using patterns of tracers (temperature, salinity, oxygen and nutrients) and of density to estimate geostrophic circulation.

3. To determine temporal changes in surface pressure gradient between two points on the Lord Howe Rise, one at 28°S and the other at 38°S using two independent methods (steric height estimate and GEOSAT altimetry).

Principal Investigators

Dr. J.A. Church
CSIRO Div. of Oceanography
GPO Box 1538
Hobart, Tas 7001

Dr. G. Meyers
CSIRO Div. of Oceanography
GPO Box 1538
Hobart, Tas 7001

Dr M. Tomczak
Associate Professor
Ocean Sciences Institute
The University of Sydney
Sydney, NSW 2006

Cruise Narrative

The completed cruise tracks for FR10-11/89 are shown in the attached figures.

The ship left Hobart two hours late after the last of the mooring equipment was loaded with the recently repaired Hiab crane. We did a shallow CTD station in Storm Bay for Brian Griffiths then proceeded to the first CTD station on the western end of the 43°S section. CTD stations progressed normally except for a degree of spiky signal loss on one cast which required the wire to be re-spliced. The weather was very kind to us - sunny skies.

We made good progress on the CTD section, which we finished by midnight, August 22. After that it was the start of a long steam northwest to the first mooring site.

On August 24 we deployed a dynamic height mooring. The expected depth of 1200 metres was not found so we spent an extra hour in the region until we found a maximum of 1020 m of water. XBTs were dropped every two hours as we steamed north towards Cape Reinga. From there we headed north along 172.5° E at the start of another CTD section. The weather continued to be kind to us and we started the 28° S section, heading west, on August 27.

August 30 brought a strong westerly which made CTD marginal for a time, but we managed to continue working. Rain squalls were accompanied by 50kt gusts. The speed between stations slowed down considerably, to about 5 knots at times. We continued CTDs until the evening of August 31, then deployed the second dynamic height mooring. We had trouble finding less than 1500 m water depth, and finally shackled every spare piece of wire together to stretch the mooring to suit the deeper water. The design was for 1200 m. By September 2 the weather returned to excellent conditions and we are made good progress with the CTDs finishing all the deep stations to Stradbroke Seamount before heading inshore to start the moorings on September 4.

Mooring operations went smoothly except for one at 500m. A longliner had set his drifting lines at our planned site, so we were obliged to wait a couple of hours until the area was clear. On Tuesday, September 5, we steamed for Brisbane, arriving at 0830 the next day.

The first two days of FR11/89 were taken completing the last 8 CTD stations from FR10/89 and deploying the one remaining mooring (all at about 29°S offshore from Evans Head). We then steamed south to the start of the 34S section. Before station 205, we diverted to Sydney to put ashore a sick crewman.

By the time we had completed station 205, quite a bit of time had been lost

(completing the final stations from the previous cruise, diverting to Sydney and because of bad weather). To make up for lost time, we replanned the remainder of the cruise. We managed to save time by cutting corners at the eastern and western ends of the 38S section but still required to extend the cruise by one day. These changes will not have a major impact on the analysis of the cruise data.

For most of the remainder of the cruise we had good weather and this allowed us to complete the 34S section and the revised 38S section. During the latter stages of the 38S section we completed a test CTD station for the back-up underwater unit (No. 4). The last station was completed off Cape Barren at about 1100 on Tuesday, September 26.

We then steamed to Launceston.

Equipment Report

A detailed electronics and computing report are attached. In summary, all of the electronics and computing equipment appears to have worked very well although some minor problems were experienced.

At the end of FR10/89, the PDR trace became very noisy. This problem continued on FR11/89 although the trace became cleaner at the end of the cruise. It is suspected to be caused by some additional turbulence around the transducer.

The thermosalinograph thermistor was damaged during replacement of the thermosalinograph pump prior to the start of FR11/89 and as a result only sea surface salinity (and not temperature) were recorded.

As advised prior to the cruise, GPS data became inaccurate on September 21. The GPS gave anomalous positions and velocities. This appeared to create problems with the ADCP which crashed twice. To overcome the problem, GPS was disabled.

No problems were experienced with the CTD or XBT systems. There was some doubt about at least one of the CTD station salinities. This may be a biological fouling problem and should be resolved during calibration of the CTD data.

Minor problems were experienced with the new 24 bottle rosette. On a couple of stations the bottom bottle was fired but the dial did not move - the bottle appears to have been triggered. On a couple of other stations the bottom two bottles appeared to have been closed simultaneously at the bottom of the cast. There are some corrosion problems with the new rosette and frame.

The rosette frame needs some type of restraining cradle on the floor of the wet lab as in moderate weather problems were experienced with the rosette sliding.

On a number of stations it was not possible to get to the bottom because of problems with the spooling. This needs attention to allow stations to the bottom.

The ADCP worked very well. An alignment test indicated the misalignment was about -0.5° and that the scale factor was about 1.005.

The most serious problem experienced during the cruise was the variability of the deep nutrient data. On FR10/89 it was noted that for some casts the nutrient data gave a smooth profile whilst on other curves they showed a noisy profile. Subsequently (the last half of FR10/89 and all of FR11/89) all nutrient samples were filtered. This did not completely remove the problem. Another possible cause is that some of the bottles were leaking intermittently. However, bottle tests showed only a couple of leaking bottles. A third possibility is that the tubes for the nutrient samples were overfilled. Final resolution of this problem will require further analysis in Hobart.

Results

A total of 85 CTD stations were completed during FR10/89 and 78 during FR11/89 - almost all to within 50 m of the bottom (Figures 1&2). A total of 169 XBTs were dropped (108 on FR 10/89 and 61 on FR11/89). The ADCP operated continuously and appeared to give excellent results.

Some of the uncalibrated CTD data as well as the nutrient and ADCP data was plotted during the cruise. At 28S, the CTD/ADCP section indicated a strong southward flow of the East Australian Current (EAC). Some of this flow appeared to return northward further offshore. An eddy or meander of the EAC was present on the 34S section. The eddy was still clearly visible at a depth of 2500 m.

On the 43S section there was some indication of a deep western boundary current. The signature of the different deep basins (the Tasman Sea, the New Caledonia Basin and the Fiji Basin) is clearly evident in the deep Q/S (and Q/O_2)data. The deep salinities on the 43S section were similar to those in the SCORPIO data. The anomalously high salinity that was present (at depths of 3000 m) at the western end of the 28S SCORPIO section was not present.

The Antarctic Intermediate Water had a greater variability (and indicated interleaving of different salinity water) than is present in the SCORPIO data. At 28S, the Antarctic Intermediate Water was fresher than found in the SCORPIO expedition.

The data set collected is probably the most complete data set collected on the circulation of the Tasman Sea. Most of the data appears to be of high quality (with some doubt about some of the deep nutrient data).. The data should allow significant progress towards meeting the scientific objectives of the program.

Scientific Personnel

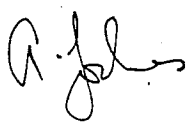
Personnel on board were:

FR10/89 (all CSIRO, Division of Oceanography)

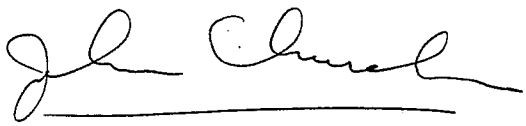
A. Forbes	(Chief Scientist)
N. White	
H. Phillips	
B. Baker	
F. Boland	
K. Miller	
D. McLaughlan	
R. Plaschke	
M. Rayner	

FR11/89

J. Church	CSIRO, Division of Oceanography	(Chief Scientist)
G. Meyers	CSIRO, Division of Oceanography	
D. Vaudrey	CSIRO, Division of Oceanography	
E. Madsen	CSIRO, Division of Oceanography	
R. Beattie	CSIRO, Division of Oceanography	
B. Barker	CSIRO, Division of Oceanography	
G. Critchley	CSIRO, Division of Oceanography	
R. Morrow	OSI, University of Sydney	
J. Luick	OSI, University of Sydney	
Song Haiguang	OSI, University of Sydney	



Andrew Forbes
(Chief Scientist, FR10/89)



John Church
(Chief Scientist, FR11/89)

FRANKLIN CRUISE REPORT

CRUISE FR-10-89

TECHNICIAN: P.ADAMS

DATE: 05-08-89

EQUIPMENT STATUS

A.D.C.P.
The ships heading read 359.9 continuously,the leds remained unaltered.The fault was traced to an incorrectly placed connector.

C.T.D

The dissolved oxygen sensor failed to operate from the start of the cruise.A new sensor was fitted along with a new recepticle,there are no more serviceable 02 sensors on board,the old receptacle needs repairing.The CTD wire was reterminated 3 times during the cruise the loss of cable being approx 10 meters.

ROSETTE SAMPLER

The rosette u/w unit was removed from its frame after corrosion appeared on the upper and lower plates.On reassembly the rosette was isolated from the frame in as many places as possible,and extra sacrifical anodes were attached.

THERMOSALINOGRAPH.

The TGS pump burnt out and the salt water pump from the wet lab was used in its place.The modified plumbing did not pass through the temp sensor,sea surface temp was available only through the conductiivity cell temp probe.

SIMRAD EK400.
The EK400 developed a noise problem towards the end of the cruise.The system worked ok at low speeds however at speeds above 3 knots the transducer large amounts of noise.The problem had not been resolved at the end of the cruise.

X.B.T.

The X.B.T. system worked well using the hand launcher with the extension on it.The other hand launcher was not used on this cruise,but had previously given erratic temperatures near the surface.

GENERAL.

A second cable was installed between the library and the decserver,it provides a fourth general purpose input into the network.(to be used with the mac)
The cable information sheet book was ckecked, updated and placed onto a 123 spreadsheet, then formatted using Word.

ELECTRONICS REPORT FOR FR11/89

CTD #2 AND ROSETTE SAMPLER

Excessive corrosion of the 24 bottle rosette sampler was evident from the previous cruise, 6 additional sacrificial anodes were attached to the s/steel frame, level with the rosette top plate in order to stem the corrosion. As the firing pins are very close on this rosette it was found advantageous to leave bottle 24 off to avoid miss firing of bottles 1 and 2. The top ring of the support frame is distorting the rosette plate and causing one of the bottles some times not to close, although the stepper motor did turn. Some modifications are required to this frame to make easier access to the rosette sampler top plate assembly, to isolate it from the s/steel frame and to make room for a large, sacrificial anode. Modifications to the holding mechanism in the wet lab are also required as the larger frame tends to slide in rough weather A broken Y-cable caused loss of communication during a deep station, thus necessitating repeating the station. As the ctd wire is now 2.5 - 3 yrs old, the master requested that a piece of it be tested to breaking point by Bullivants, on a regular basis.

CTD #4

This ctd was tested to 2000m. at posn app. 40'S, 150'E and appeared to be performing satisfactorily. D.Vaudrey has data tape which will be calibrated for salinity and temperature from niskin bottles and thermometers.

THERMOSALINOGRAPH

The TSG pump motor failed during the previous cruise and was replaced in Brisbane, however during the replacement the main temperature thermistor was broken and requires replacement. In the mean time the main temperature is logged as -2.05'C.

EK400 SOUNDER

The previous cruise report stated problems with the 12Khz sounder, I did a number of tests on it and came to the conclusion that either the transducer was loose in its mounting or some external device was causing turbulence, proportional to ships speed over the transducer surface. Later talks with ships officers revealed that problems were had with the bow thruster during the previous cruise and the flush cover was possible warped. This ties in well with my diagnosis of the sounder symptoms.

ACOUSTIC DOPPLER PROFILER

This performed faultless for the duration of the cruise, and only on two occasions did I have to re-boot micro7 to overcome some soft ware problems.

GPS NAVIGATOR

Although we were advised from AWA prior to the cruise that the gps constellation would be down for the period 20 Sep. - 4 Oct. we were still able to use the gps for all of 20 Sep. and about half the coverage window for 21 Sep., at this time I disabled all satelites as there was some evidence of false positions, however they were all re-enabled on 23 Sep. and appeared to operating normally. All satelites were supposed to be set unhealthy from 20 Sep., but this did not eventuate at all.

COMPUTER EQUIPMENT

This is the first cruise in recent times where there were no serious problems associated with the computing equipment

FOR ORV ELECTRONICS. E Knudsen

COMPUTING REPORT

FR11/89 was one of the quietest cruises, computerwise, that I have been involved with. Almost without exeception, the equipment worked well and there were no unexpected problems with the logging software. I feel that the software and documentation are now such that we are approaching the point where the computer systems can be operated by relatively inexperienced personnel.

There were few blackouts during the cruise and those that did occur had no effect on the logging equipment as the UPS is now working.

Work Done

DELP routine DISPLA was modified so that the display blinks for programs and cpu's that are 'down'.

I restored additional VAX system disk files that were lost in the crash during FR7/89. They included 'C' and LSE. (except that LSE is missing [SYSEXE]LSEDIT.EXE and [SYSMGR]LSE$STARTUP.COM.)

The batch procedure for processing the VAXed ADCP data was rewritten so that it would be automatically scheduled to run each day.

I wrote a program to merge the Sat Nav and GPS fixes and access routines to enable John Church to access this data

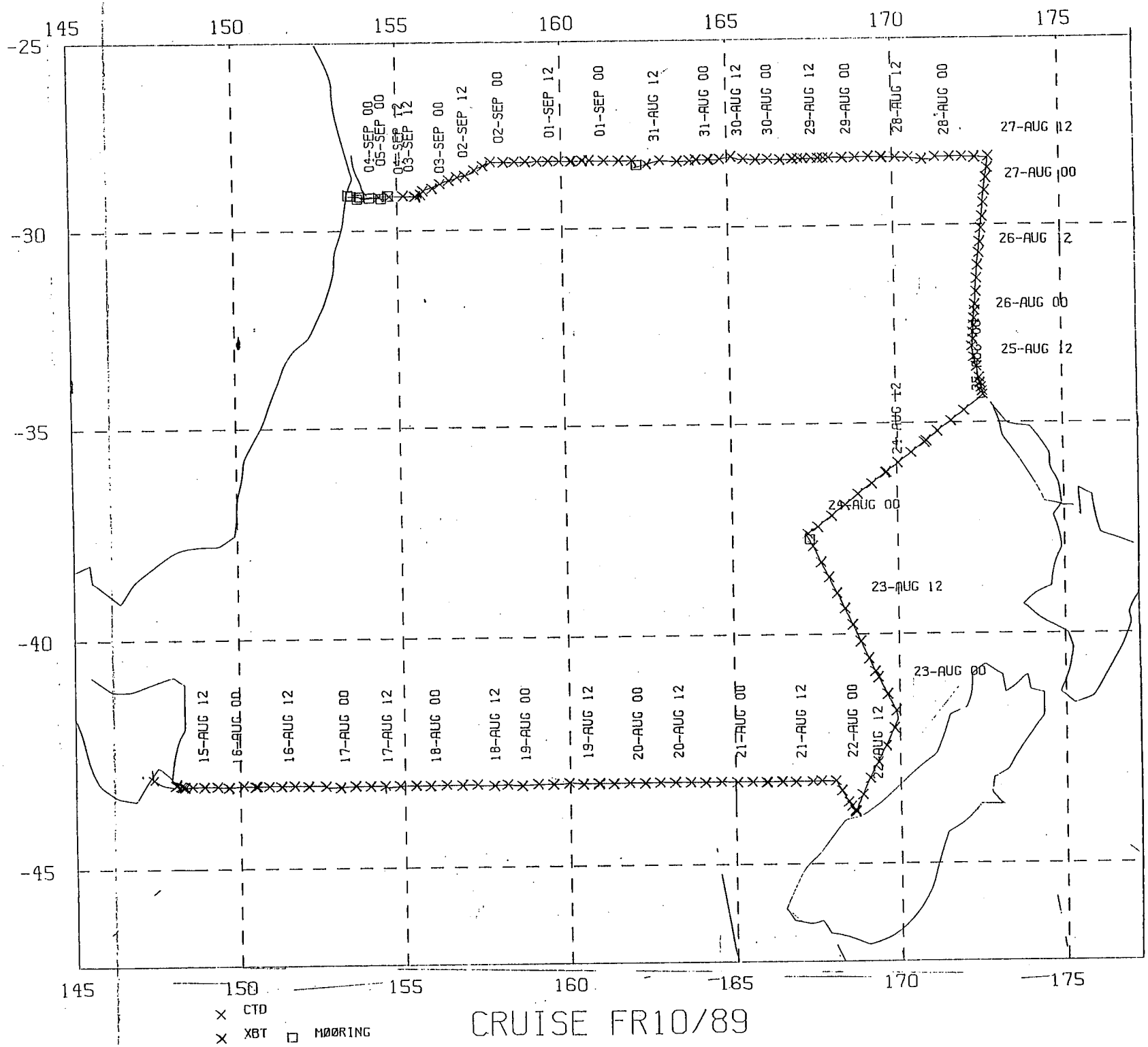
David Crooks' Hydrology and MTSPOL manuals were converted to Microsoft Word. A number of other manuals, including the Cookbook and the VAX Utilities Manual, were updated. (We desperately need the hard disk on the ship's Mac. There was insufficient space on a diskette to 'save' the Cookbook after an editing session, even when using a very stripped down system.)

Outstanding Problems

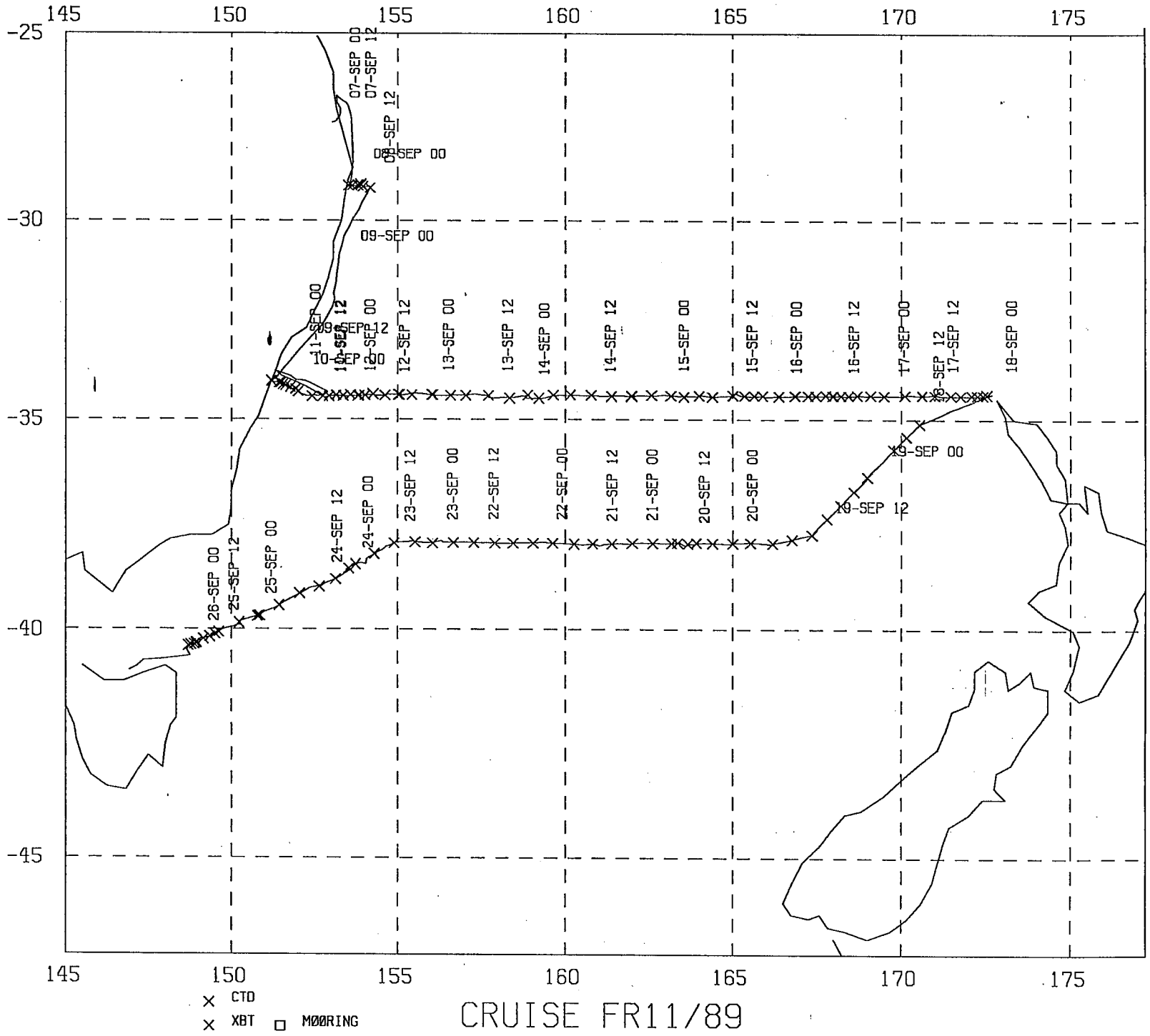
- The ADCP manual needs more documentation of the meaning of the various error messages and of how to recover from the error. As many of the error conditions as possible should be fixed automatically, rather than relying on the operator intervention. eg the display task DSP should be restarted by the system if it finds that it has exited.
- The console log files for MICRO6 are not being taped. This is because the console files require privileged access but the console device (CO:) has to be unprivileged to prevent problems with the CTD archiving program.
- The CTD software can have problems with the real-time display when logging is changed from one underwater unit to another and then back to the first. If the same master file is used on both occasions for the first underwater unit, the option program has no way of getting the correct unit number and framing parameters. A copy of an option file from

the first session must be saved and then be renamed as the highest version when the first CTD unit is re-installed.

- DLPEVN crashed a number of times. I tried to make an overlaid version that did not have to use the Fortran Cluster Library, but did not succeed.because of subtle problems with the overlay structure.
- The Zeta plotter has been experiencing origin shifts, and it will have to be returned to the agent for servicing. It also requires a new pen carriage.
- The VAX rebooted unexpectedly on 2 occasions. No error messages were printed and the cause remains a mystery.



CRUISE FR10/89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