In Confidence: Not to be quoted without reference to the Laboratory

CRUISE REPORT

FRS "Explorer"

18 August - 14 September 1969

Personnel:

Part 1	D N MacLennan	SSO (in charge)
	M J D Mowat	SEO
	D Cattanach	EO (part-time)
	W J McLeod	SA
	W R Leys	TO III
	R A Haines	AERE Harwell
	R Alexander	Naval Division, Elliott Ltd
	W Martin	FAO/Poland Deep Sea Fisheries Project
Part 2	D N MacLennan	SSO (in charge)
	M J D Mowat	SEO
	C Moir	HEO
	D Cattanach	EO (part-time)
	R Ferro	AEO
	D Galbraith	SA
	W R Leys	TO III
	R Alexander	Naval Division, Elliott Ltd
	W Martin	FAO/Poland Deep Sea Fisheries Project

Narrative

Part 1: "Explorer" arrived in Aberdeen on the morning of 18 August. The 920C computer system was transferred from the Marine Laboratory to the ship on that day, concurrently with the loading of gear and other scientific equipment. Repairs had to be carried out on one of the ship's generators, which delayed sailing until 1815 hrs on 20 August. The ship made a working passage, however, to Bergen, where she docked at 0900 hrs on 22 August.

After completing customs formalities, a modified otterboard instrument set was delivered to the ship by CIIR (Oslo), and a scientist from that institute joined "Explorer" to take part in the subsequent trials. "Explorer" sailed from Bergen at 0800 on 23 August, and tests with the new instruments were carried out using a midwater trawl in Bjorne Fiord. This programme was continued with short breaks in Bergen, firstly on 25 August to land the CIIR representative and Mr Cattanach, and secondly on 27 August to clarify the terms of the fishing permit. On 28 August a stoker was taken ill, necessitating an early return to Aberdeen. The ship arrived there at 0100 hrs on 29 August. Further trouble with the generators kept the ship in port until 1 September. "Explorer" sailed at 1600 hrs on that date for a short series of tests to be carried out at the Buchan deeps, and then returned to Aberdeen on the next tide.

Part 2: On 2 September a film crew, organised by the BBC, worked on "Explorer" to prepare a documentary on the use of the shipborne computer for gear research. The next day a bottom trawl was shot close to Aberdeen so that film could be obtained of the underwater instruments in use. Filming was completed by the time "Explorer" returned to Aberdeen at 1700 hrs on 3 September.

The next day new fishing gear was loaded on the ship, and then she sailed at 2000 hrs. The conductor cored trawl warps were streamed and

measured up at a deep water station North of Shetland on 5 September, and experimental trawling with bottom gears begun off Balta Sound on the 6th. This continued until the 12th, when strong winds from the east made it necessary to change the area of operations to the west side of Shetland. Gear trials were completed on 13 September, and "Explorer" returned to Aberdeen, docking there at 1400 hrs on 14 September.

Technique

At the beginning of the cruise several hauls were devoted to setting up the computer based data logging systems and to rectifying a number of faults in the instrumentation and processing equipment. It was also necessary for the scientific staff aboard to become used to the operation of this new equipment, at sea for its first major trip.

All available instruments were operated on-line to the 9200 computer for the production of haul records on paper tape. No significant problems were encountered in logging data from shipboard instruments, although it was found necessary to calibrate some of the equipment, and in particular the deck tension meters, at frequent intervals to maintain optimum performance. The underwater instruments operated well when trawling, but there were handling problems during shooting and hauling, resulting in occasional cable damage. On the other hand, the improved design of conductor incorporated into the trawl warps was found to be much superior to the prototype, and there was no trouble with terminations as had previously been the case.

A number of program faults were shown to be caused by features of the real data which could not be simulated ashore prior to the cruise. The more important faults of this type were, however, all cleared in the course of the trials. In particular the sub-program dealing with Decca readings suffered from phantom lane jumps, mainly when working areas of weak signal strength. This was corrected by incorporating a programmed integration of the Decca readings. While occasional lane jumps may still occur in marginal areas, it is thought that the computer output should now do this to a lesser extent than that on the mechanical indicators of the Navigator.

During this cruise the computer system demonstrated its inherent reliability by operating almost continuously in varying weather and temperature conditions. Both were less detrimental to the performance of machinery than of scientific staff. Those faults which did occur were rectified with a minimal down time, and without prejudice to the gear testing programme.

Trawling

The initial tests were carried out using a mid-water trawl with suberkrub otterboards. This gear was used as a means of providing the most favourable conditions for checking out the instrumentation, and so a comprehensive set of data was not obtained.

On changing over to bottom trawling, a standard 48 ft gear was used, so that the information recorded on this test may be compared with previous data for correlation purposes. The third gear used was a new design of wide opening bottom trawl, which was fished with cambered otterboards and double sweeps. The first results on this gear, however, showed that the net width was much smaller than the theoretical design figure. The backstrop positions on the otterboards were changed in an attempt to rectify this, but the gear was then too unstable to fish properly. Next the headline flotation was drastically reduced but again no evident improvement in performance was noted. Further design changes are now being made to this gear, which will be tested again in the near future.

A sample of the data recorded from a haul with the last gear is attached to this report. The data is presented in blocks, each headed by a time and Decca position and containing the data obtained during the past 30 seconds. The final analysis of these data would not of course be made on the printed record, but rather on the primary paper tape output from the computer using additional programs.

D N MACLENNAN
31 December 1969

TABLE 1 FRS EXPLORER — HAUL E.69/166

A	B	C	D	E	F
TIME	01 44½				
DECCA	060 45'01.61"N		000 34'21.53"W		
GYRON	-0.9806	120	0.0064	-0.978	-0.983
GYROE	-0.1959	120	0.0065	-0.185	-0.208
LOGF	2.769	120	0.191	3.23	2.36
LOGX	- 0.363	120	0.219	0	- 0.80
LOGN	- 2.787	120	0.177	- 2.39	- 3.25
LOGE	- 0.193	120	0.235	0.27	- 0.65
T5F	0.8309	3	0.0357	0.868	0.799
T5A	0.9516	3	0.0843	1.049	0.899
SPREAD	35.183	2	0.772	35.72	34.65
T6F	1.5646	3	0.1671	1.690	1.374
T6A	-0.1364	3	0.0041	-0.131	-0.139
THRUST	7.560	120	0.117	7.84	7.31
DEPTH	57.5	22	2.1	58	56
RPM	80.00	15	0.83	81.0	79.0
RN	0.010:				
RE	2.738:				
SN	- 3.41:				
SE	- 1.44:				
DIV	0.8134	240	0.0078	0.832	0.793
DEC	20.919	240	1.133	22.58	18.93
WINDF	- 9.47	60	0.79	- 7.8	- 10.7
WINDX	4.54	60	0.76	6.2	2.8
T1A	2.827	480	0.038	3.09	2.70
T1F	3.494	480	0.097	3.86	3.19
T0F	3.410	120	0.094	3.57	3.31
T0A	3.099	120	0.021	3.25	3.01
SP6	35.523:				

TIME	01 45				
DECCA	060 44'59.51"N		000 34'23.69"W		
GYRON	-0.9815	120	0	-0.978	-0.984
GYROE	-0.1914	120	0.0078	-0.179	-0.208
LOGF	2.706	120	0.219	3.07	1.93
LOGX	- 0.346	120	0.239	0.04	- 0.83
LOGN	- 2.725	120	0.215	- 1.95	- 3.16
LOGE	- 0.187	120	0.234	0.40	- 0.57
T5F	0.7432	8	0.0131	0.750	0.729
T5A	0.9277	8	0.0082	0.933	0.922
SPREAD	39.939	8	2.265	41.54	38.34
T6F	1.4152	8	0.1512	1.576	1.277
T6A	-0.1364	8	0.0041	-0.131	-0.139
THRUST	7.565	120	0.140	7.92	7.19
DEPTH	57.6	20	1.8	58	56
RPM	79.94	15	0.72	82.0	79.0
RN	- 0.025:				
RE	2.720:				
SN	- 3.15	8	4.69	0.2	- 6.5
SE	- 1.20	8	2.73	0.7	- 3.1
DIV	0.8212	240	0.0150	0.860	0.790
DEC	20.730	240	1.051	22.56	18.49
WINDF	- 9.50	60	0.58	- 8.4	- 10.7
WINDX	2.80	60	0.93	4.7	0.9
T1A	2.902	480	0.185	3.35	2.53
T1F	3.607	480	0.191	4.10	3.34
T0F	3.446	120	0.106	3.61	3.29
T0A	3.129	120	0.061	3.38	3.04
SP6	32.612:				

NOTES

The 6 columns contain:

A Name of parameter

B Mean value during past 30 seconds.

C Number of readings taken.

D Standard deviation

E Maximum reading

F Minimum reading