

## PROGRESS REPORT ON RCBC

## 1. CHAMBER AND VACUUM ASSEMBLY

1.1 Chamber Assembly

The support tube and the hydrogen shield have been welded to their appropriate end flanges, not without some difficulties which necessitated some rewelding. The top heat exchanger is now fully assembled and this together with the beam entry and exit windows are the only 'small' items that remain to be welded to the chamber at this stage.

The National engineering strike finished officially in October and data from our Contracts Department suggests that delays of about 8 weeks are to be expected from firms affected by the strike. In addition MORFAX have been affected by continued action since the official end of the strike, with the result that the chamber assembly is not expected to be delivered until March.

This delay means that if the original programme is followed we are unlikely to have a first cooldown in 1980. The only way to save time is to avoid duplication in the programme, to this end we have asked MORFAX to accept the valve vessel and to weld up the refrigerant lines instead of making temporary plugs and pipes for pressure and vacuum tests. In addition we propose that the pressure and vacuum tests of the assembly at RL, which are to be repeated at CERN, be left out. The net effect of these changes will be to allow the chamber assembly to be delivered to CERN during May and for a first cooldown in November.

1.2 Main Windows

The window flange assembly has been completed and inspected.

The window test assembly is virtually complete and is expected to be delivered early in December.

1.3 Window Gasket

Following the rejection of the first spinnings, we are pursuing two sources for the shells. The CERN special projects workshop is attempting

to produce spinnings while a commercial firm is using hydraulic pressing techniques. Both expect to have made their first shells by early December.

#### 1.4 Vacuum Tank

The vacuum tank has been delivered to CERN and trial fitted in the iron structure.

The second centre section has been delivered to Lucas Aerospace for chemical machining.

The half-scale model beam window section with GRP support has been prepared and tests have begun.

The optics end plate has been machined and will be inspected shortly.

#### 1.5 Beam Entry and Exit Windows

The first beam exit window was rejected because of too low a yield strength and too high operating stresses due to its shape.

The second window was formed without intermediate annealing to a better shape after modifying the mould. The calculated stresses are still larger than for the ideal shape but the window has been accepted by National Vulcan after examining the stress calculations and witnessing a pressure test at 19.5 bars.

The window is being machined and should be available at the end of November.

## 2. OPTICAL SYSTEM

### 2.1 Telecentric Lenses

We have now taken delivery of the first three lenses and have taken photographs with four different apertures in the range f/11 to f/18.

New filters of superior quality are being made to replace those at present fitted to the lenses.

The fourth, spare, lens will be ready before Christmas.

## 2.2 Lens Mounting Plate

This has been completed and delivery is expected at the end of November after inspection.

The assembly frame has been delivered.

## 2.3 Illumination System

The design has been completed and costs obtained for the light box castings. The non-imaging concentrators are being machined.

The power supplies for the flash tubes are almost complete after some delays on the panelwork.

The flash tubes and pellicles have been delivered.

## 2.4 Small Windows

Grubb Parsons are reworking the small windows. The new delivery dates are end of November for the camera windows and January 1980 for the auxiliary windows. So far five camera windows have been submitted for acceptance and are considered to have a satisfactory surface finish.

## 2.5 Data Board

The RCBC data board is expected at the end of the year.

The software and hardware for controlling the data board relays has been completed and tested at RL. It will be delivered to CERN early in December and two RL staff will carry out further tests at CERN.

## 2.6 Cameras

Camera 1 has been assembled and operated satisfactorily. Components for cameras 2 and 3 have been used to provide a pair of cameras for LEBC.

# 3. CHAMBER TEMPERATURE CONTROL

## 3.1 Valve Vessel

The radiation shields have been fitted and insulation is being fitted to individual pipes.

### 3.2 Control System

Assembly of the units is proceeding. A revised synoptic panel design is being prepared.

## 4. EXPANSION SYSTEM

### 4.1 Piston-Bellows Assemblies

#### 4.1.1 First Prototype

This has to be prepared for installation in the chamber.

#### 4.1.2 Second Prototype

The assembly is complete and has been vacuum tested. After the indium seal has been made to the back plate it will be delivered to CERN for a short test programme. It has the bellows treated to reduce the possibility of surface crazing. A modified seal housing will be fitted.

## 5. VACUUM SYSTEMS

Two further rotary-Roots units are ready for delivery to CERN.

The warm pump-out panel has been delivered and checked. It is now being wired up.

## 6. MECHANICAL HANDLING

All such equipment has now been ordered and some items are ready for delivery.

## 7. ACCESSORIES FOR CONTROL AND MONITORING

A number of control panels have been completed and some six racks delivered to CERN.

## 8. IRON STRUCTURE

Nothing to report.

## 9. TRANSPORT TO CERN

Nothing to report.

## 10. PROGRAMME

The proposed programme, valid on 26th November is attached. Points to note are as follows:-

- 10.1 The delayed delivery of the chamber which now includes the attachment of the valve vessel to the second half of March.
- 10.2 The reduced programme at RL which allows delivery of the chamber to CERN by the end of May 1980 and thus maintains the possibility of a first cooldown in 1980.
- 10.3 The completion of a number of major items eg. the three lenses, lens plate, vacuum vessel.

## 11. FINANCIAL

11.1 A financial statement, valid at 1st November is attached. Points to note are as follows:-

11.1.1 The commitment has reached £839,879.

11.1.2 The latest revised estimate including items being worked on by CERN personnel is ~13% more than the original estimate after correction for inflation.

11.1.3 The inflation correction factor is shown in Figure 1.

R W NEWPORT  
Technology Division  
Rutherford Laboratory

27 November 1979

FINANCIAL STATEMENT  
 RAPID CYCLING BUBBLE CHAMBER FOR EHS CERN  
 PROJECT NOS NA71500 - NA71799 INCLUSIVE  
 PROGRESS STATEMENT AS AT 1 NOVEMBER 1979

	INITIAL COST ESTIMATE 15.2.77	LATEST COST ESTIMATE * 31.5.79	COMMITTED TO 31.10.79	FORECAST DELIVERY DATE	TOTAL SPEND IN PRIOR YEARS	ACTUAL SPEND IN CURRENT YEAR TO 31.10.79	SPEND FORECAST 1979/80
	£	£	£	£	£	£	£
1. Chamber & Vac Enclosure	297,235	313,096	376,794	30.4.80	128,165	39,121	-
2. Optical System	86,925	93,468	91,167	28.2.80	8,060 <sup>c</sup>	14,810 <sup>c</sup>	-
3. Chamber Temp Control	46,640	46,640	47,682	30.4.80	31,464	16,314	-
4. Expansion System	58,488	64,071	67,443	31.12.79	49 <sup>c</sup>	- <sup>c</sup>	-
5. Vacuum Systems	36,559	53,000	64,174	30.11.79	44,004	9,911	-
5. Acc for Control etc	17,798	17,798	11,998	31.12.79	3,927	8,062	-
7. Mech Handling Equipment	29,120	30,920	37,248	30.4.80	6,031 <sup>c</sup>	4,115 <sup>c</sup>	-
8. Iron Support Structure	78,000	118,956	135,639 <sup>+</sup>	DELIVERED	137,094	-	-
9. Transport to CERN	18,200	18,200	7,734	-	7,734	99	-
10. Miscellaneous	1,040	1,040	-	31.12.79	-	-	-
	670,000	757,189	839,879	-	366,528 <sup>c</sup>	92,432 <sup>c</sup>	250,000

+ £9,500 will be paid from another CERN budget

Contract Price £670,000 (+15% Contingency) at 15.2.77 prices.

<sup>c</sup> Not including payments by CERN

\* at 15.2.77 prices.

All prices exclude VAT.

# PRICE CORRECTION FOR INFLATION

C

$$P = CP_0$$

$$C = 0.15 + 0.35 \frac{M}{M_0} + 0.54 \frac{L}{L_0}$$

P = PRICE AT 15.2.77

M<sub>0</sub> = MTLIS INDEX AT 15.2.77

L<sub>0</sub> = WAGES INDEX AT 15.2.77.

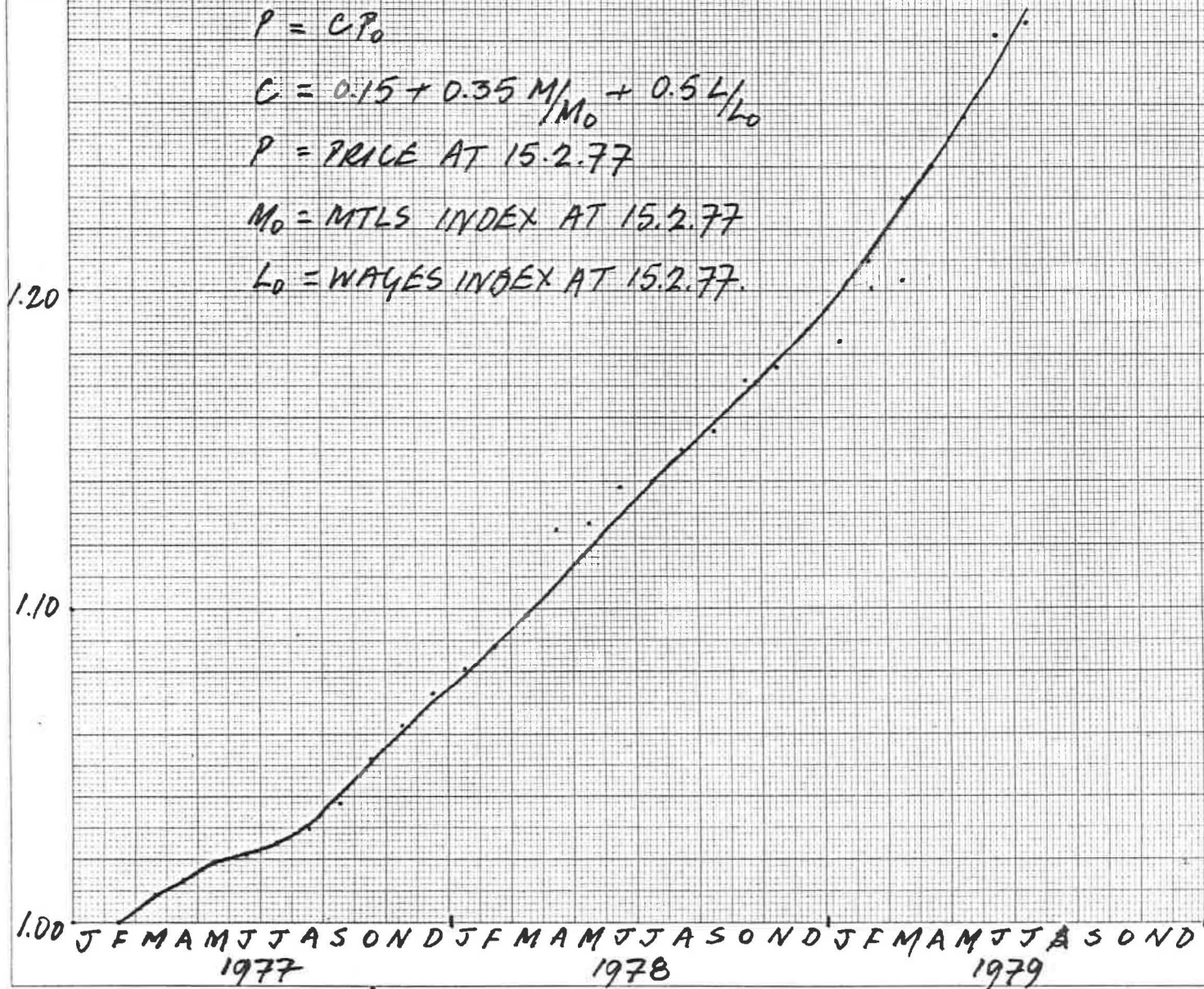


FIGURE 1.

27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

WINDOW GASKET

SPINNINGS

CHAMBER WINDOW

ASSEMBLY DUMMY WINDOW FLANGE

PISTON - BELLOWS ASSEMBLY

TEST RIG ASSEMBLIES

CHAMBER ASSEMBLY

SUPPORT

VALVE VESSEL

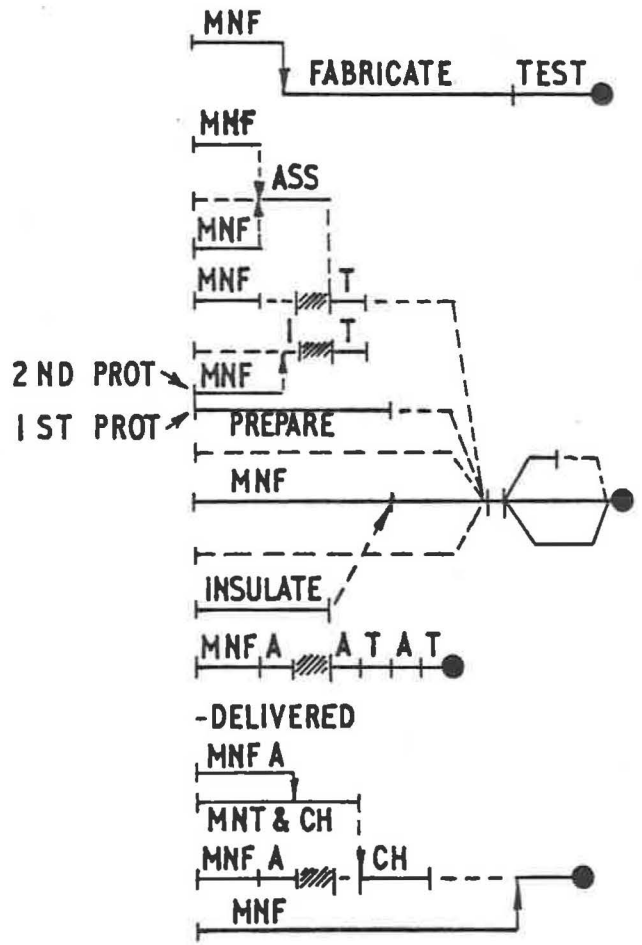
INSULATE

VACUUM ENCLOSURE

OPTICS END ASSEMBLY

LENS SYSTEM

LENSES SUB MTS L.PLATE L.SOURCES



● DELIVER TO CERN

M A M J J A S O N D J F M A M J

1979

1980

RCBC PROGRAMME 26 NOV 1979