PROGRESS REPORT ON REBC

CERN/EF/EHS-CC/81-122
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1. CHAMBER & VACUUM ASSEMBLY

1.1. Chamber Assembly

The chamber and valve vessel were delivered to CERN as separate items on July 21st. The chamber was unfinished on arrival and was completed after trial fitting and the valve vessel attached to it. The assembly was pressure and vacuum tested satisfactorily before and after installation in the vacuum tank, with instrumentations radiation shields and superinsulation.

Room temperature seals were replaced by indium and the main assembly completed by October 23rd.

1.2. Main Window

Some cleaning problems with the second window still to be resolved.

1.3. Window Gasket

The first gasket was installed unfinished and outside tolerance. It was satisfactorily pressure and vacuum tested and Watt type seals were made to a high standard.

The contract with MORFAX has been terminated and all components, enough for two further gaskets have been delivered to CERN for completion.

1.3. Vacuum Tank

The complete tank with low mass entry and exit windows was installed, pressure and vacuum tested before installation of the chamber. There were, however, problems with the main studs, which had to be replaced; this problem has still to be resolved.

2. OPTICAL SYSTEM

2.1. Telecentric Lenses

Two lenses were delivered to CERN in September with the first light box and the first camera was assembled on the lens plate by early October.

2.2. Illumination System

The two remaining units and the spare are at RL undergoing tests. They will be delivered in January and installed.

2.3. Small Windows

One intermediate window is still outstanding from Grubb-Parsons.

3. TEMPERATURE

3.1. Control System

The system was fully installed for the first cooldown except for the synoptic panel.

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4. EXPANSION SYSTEM

4.1. Piston-bellows Assemblies

The second assembly was installed in the chamber with a degraded scotchlite surface due to the mounting process. The third assembly is nearing completion at RL and should be at CERN early in January.

5. VACUUM SYSTEMS

These were fully installed and tested before the cooldown but without the Penning gauges oriented optimally for use in the magnetic field.

6. MECHANICAL HANDLING

All handling equipment was a CERN for the assembly and performed exceptionnally well contributing significantly to the short assembly time.

7. ACCESSORIES FOR CONTROL AND MONITORING

7.1. Pressure Transducers

Two additional CEC units are available at CERN.

8. IRON STRUCTURE

9. TRANSPORT

10. FIRST TEST RUN

10.1. Preparation

No problems with purging and evacuation - all cold pump-outs good.

10.2. Cooldown

Begun with helium in the system since some work was incomplete - this was changed to hydrogen after about three days. The cooldown went very smoothly at 2-3 K/hr.

The Δts were small and the main vacuum improved until operating temperatures were reached when it became sensitive to the refrigerant pressure. The main window gasket was made at $\sim$80 K but was not entirely satisfactory and did not seal at 8 bars.

There was no misting up of any internal window but some condensation on the external camera windows.

At the lower temperatures, strong convection was experienced in the backing gas space which was then evacuated for filling and operation.

10.3. Filling

This was carried out without the full pre-cooling system. $\sim$10 l/hr was achieved and the chamber was full on November 21st. The liquid was very clean and all cold pump outs except the gasket were good. Subsequent tests using the pre-cooling system showed a filling rate of >20 l/hr to be achievable.

10.4. Cycling

About four hours after the first photograph of a cosmic ray track was obtained. Subsequently over 100,000 expansions were performed mostly at 10 Hz (10 expansions in one second every 5-10 seconds). Some operation was for 20 expansions in 2 seconds every 10 seconds as anticipated for the first physics run next Summer. We also closed up the pulses to give 18 Hz for a short period. The inflatable gasket was a source of spurious boiling, as expected and was operated with the pump-out on the window side open to the chamber.

Temperature control was not ideal due to coupling between the vapour pressure thermometers and either the body or the heat exchanger loops.

Vibrational problems appeared well controlled under the conditions used.

10.5. Optics

The single camera produced high contrast, good resolution tracks despite the poor scotchlite and thermal turbulence from the gasket boiling.