



ATLAS SCT Barrel Module FDR/2001

SCT-BM-FDR-2

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SCT Barrel Module FDR Document

SCT Barrel Module: Project Plan

Abstract

This document outlines the responsibilities and schedule for the SCT Barrel Module Project.

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APPENDIX 1: BARREL MODULE SCHEDULE

1 SCOPE OF THE DOCUMENT

This document outlines briefly the SCT plans and responsibilities for:

- The supply of the components making up the SCT barrel modules;
- The assembly of these components into modules;
- Module QA;
- The assembly of modules to cylinders;
- Procurement.

2 BARREL MODULE CLUSTERS

The responsibility for producing the barrel modules for the SCT is devolved to four *clusters*:

Cluster	Contact Physicist	Cluster Composition	Number of Modules to be delivered by cluster to the barrel assembly sites ¹
Japan	Y. Unno	Hamamatsu Photonics, Hiroshima, KEK, Kyoto-edu, Okayama, Tsukuba	606
Scandinavia	R. Brenner	Bergen, Oslo, Uppsala	404
UK-B	A. Carter	Birmingham, Cambridge, QM, RAL	549
US	C. Haber	LBL, Santa Cruz	663

¹The numbers given for the modules to be delivered by clusters to the barrel assembly sites are estimated as 5% more than the final number of modules assembled on the SCT barrel.

The overall co-ordinators of the barrel module programme are A. Carter and Y. Unno.

3 BARREL MODULE COMPONENT SUPPLY

The components of the ATLAS SCT barrel modules are described in SCT-BM-FDR-5. They are, for each module,:

- 4 single-sided silicon microstrip detectors.
- 1 VHCPG baseboard with epoxy coating and 4 beryllia facings fused onto the structure.
- 1 hybrid consisting of a flex circuit, with passive components and glass pitch-adaptor mounted, glued to two carbon bridges.
- 12 ABCD3T-A readout ASICs.

- Electrically conducting epoxy (Eotite P-102) for gluing the ASICs to the hybrid and making electrical contact to the back of the detectors.
- Structural epoxy (AW106/HV953U) with a boron nitride additive (PT1045) for gluing the detectors and the hybrid onto either side of the baseboard.

The responsibility for providing the fully tested components to each module assembly site is summarised in Table 1.

Component	Cluster	Responsible for cluster supply	Component Source	Location of SCT QA of component
Silicon Detectors	Japan&US	Y. Unno	Hamamatsu	Hamamatsu, Hiroshima, KEK, Tsukuba
	Scandinavia	B. Stugu	Hamamatsu, Sintef ¹	Bergen
	UK-B	J. Carter	Hamamatsu	Cambridge, RAL
VHCPG Baseboard complete with BeO facings	All	A. Carter	Industry and Baseboard assembly facility at CERN	CERN
Hybrid	All	Y. Unno	Industry	KEK
ASICs	Japan, Scandinavia US	A. Grillo	Atmel	Santa Cruz, CERN
	UK-B	A. Carter	Atmel	RAL
Electrically conducting epoxy	All	Y. Unno	Industry	KEK
Epoxy with boron nitride additive	All	M. Gibson	Industry	RAL

¹ Up to 30% of the detectors used by the Nordic cluster may be supplied by Sintef, subject to acceptance of the Sintef Pre-series in 2001.

Table 1: Responsibilities for Module Component Supply

4. ASSEMBLY OF COMPONENTS INTO MODULES

The barrel modules are assembled from their components and tested within the clusters. These tasks are described in SCT-BM-FDR-6 and SCT-BM-FDR-7. For series production, the tasks will be located according to Table 2:

Cluster	ASICs mounted on hybrids and bonded	Full QA of hybrid+ASIC assembly	Module assembled / bonded	Full thermal and mechanical QA of individual modules	Full electrical QA of individual modules
Japan	Industry	KEK	Hamamatsu	KEK	KEK
Scandinavia	Industry	Oslo	Oslo/Uppsala	Uppsala	Bergen, Oslo, Uppsala
UK-B	Birmingham	Birmingham	RAL	RAL	Birmingham, Cambridge, QM, RAL
US	Industry	LBL, Santa Cruz	LBL	LBL	LBL, Santa Cruz

Table 2: Module assembly and test locations during series production

The modules reported at this FDR come from the Japanese, Scandinavian and UK-B clusters, with the industrial steps of Table 2 carried out within the SCT cluster. The modules have been constructed with the full assembly equipment described in SCT-BM-FDR-6, which is commissioned in all four clusters. The full qualification of all the assembly sites for series module production will take place between October 2001 and February 2002 (see Appendix 1).

5. ASSEMBLY OF MODULES ON TO CYLINDERS

The modules from the Scandinavian, UK-B and US clusters will all be sent to Oxford, where they will be assembled on to three of the four SCT cylinders (barrels 3, 4 and 6). The modules for barrel 5 are being made in Japan and will be assembled on to barrel 5 at KEK. The complete and fully tested barrels will be sent individually to CERN. At CERN they will be re-tested and assembled together into the four barrel structure. An X-ray survey will be carried

out on the complete four barrel structure.

References to full descriptions of the assembly to cylinders, commissioning and survey processes are given in SCT-BM-FDR-1.

6 SCHEDULE AND PROCUREMENT RELEASE

The work plan of the SCT is being developed with the aim of delivering the complete sub-detector on the schedule required by ATLAS.

This requires series barrel module production to start in late 2001, with completion in the first half of 2003. The current SCT barrel module schedule is shown in Appendix 1.

The requirement for barrel module production to begin in 2001 is also driven by budgetary issues; in particular the cost of retaining trained staff on the project to carry out the module assembly tasks.

The long (and different) lead times of the major module components have required the procurement phases to begin in advance of the barrel module FDR or PRR. The procurement status is as follows:

- **Silicon microstrip detectors;** contracts are placed for the total supply and the series release has been authorised (SCT-BM-FDR-5.1). The delivery of series production is in progress.
- **Baseboards;** tenders have been sent out for the VHCPG and the BeO facings. These tenders will be opened in May 2001, just before this FDR. The approval for placing the Contracts in early June is requested from this FDR.
- **Hybrids;** tenders are to be sent out immediately following this FDR.
- **ASICs;** it is planned to release the full series production order in July 2001, following both an ASIC PRR and detailed negotiations with Atmel. In the meantime, sufficient ASICs are being purchased to support the start of series barrel module production according to the appended schedule.

Full funding is secured from the SCT institutes for the procurement of the barrel module components, for module assembly and for the barrel engineering and assembly.

Appendix 1: Barrel Module Schedule

ID	Task Name	Duration	Start	Finish	2001	2002	2003	2
1	SCT Barrel Modules (A. Carter, Y. Unno)	563 days	01/05/2001	26/06/2003	▶			
2	SCT Barrel Module FDR	0 days	25/05/2001	25/05/2001	◆ 25/05			
3								
4	Delivery of Tested Silicon Detectors	429 days	01/05/2001	20/12/2002	▬			
5								
6	Order VHCPG & BeO	0 days	30/05/2001	30/05/2001	◆ 30/05			
7	Delivery of Tested Baseboards	320 days	01/10/2001	20/12/2002	▬			
8								
9	Order Hybrids	0 days	30/05/2001	30/05/2001	◆ 30/05			
10	Delivery of Tested Hybrids	220 days	15/10/2001	16/08/2002	▬			
11								
12	Order ASICs	0 days	30/05/2001	30/05/2001	◆ 30/05			
13	Delivery of Tested ASICs	285 days	01/10/2001	01/11/2002	▬			
14								
15	SCT Barrel Module Site Qualification	80 days	15/10/2001	01/02/2002	▶			
16	Japan	1 day	15/10/2001	15/10/2001				
17	Scandinavean	1 day	30/11/2001	30/11/2001				
18	UK-B	1 day	15/10/2001	15/10/2001				
19	US	1 day	01/02/2002	01/02/2002				
20								
21	SCT Barrel Module production	431 days	01/11/2001	26/06/2003	▶			
22	Japan	350 days	01/11/2001	05/03/2003	▬			
23	Nordic	350 days	03/12/2001	04/04/2003	▬			
24	UK-B	350 days	01/11/2001	05/03/2003	▬			
25	US	350 days	22/02/2002	26/06/2003	▬			