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Addendum to the RTK publication

Site-Specific Study of SSC Support Facilities for Four Generic Detector Designs

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In the conclusions of the July '89 support facilities study, three summary schedules were presented. These schedules illustrated the effects of modifying two assumptions used to generate the model schedules in chapter six of the report. The schedules suggested the degree to which each of these assumptions affected the schedule for construction of the K1 experimental hall and installation of the Large Solenoid Detector (LSD), so it was felt it would be useful to revise the other three IR schedules based upon these modified assumptions. The results of the exercise are presented in this addendum.

A set of three schedules for each of the four interaction regions (IRs) considered in the report are presented here. The first set consists of the K1 schedules already presented in the conclusion of the report and is included here for completeness. The next set of three contains the modified schedules for area K2, the next three for K5, and the final three for K6.

Within each of these four sets, the order of presentation is the same. The first schedule is a reproduction of the summary schedule of IR development presented in chapter six of the report. The second schedule shows the effect of modifying the start dates for design of the conventional facilities. The third schedule illustrates the effect of removing the schedule dependencies of detector development on detector component facilities at the IR site.

To derive the second schedule from the first, we modified the assumption that the stages of conventional construction design must begin only after receiving the proposals for experiments and then follow one another as quickly as possible. In the second schedule, the preliminary design studies begin upon receiving the letters of intent (LOIs) and more time is allowed for study of the conventional construction implications of each of the LOIs (time & motion studies for detector assembly, power, water, & cryogenic requirements, safety issues, etc.), studies which will aid the committees in making recommendations.

It is then assumed that during the transition from preliminary design to conceptual design, the proposals for experiments will be received. Shortly after receiving the proposals, Title I design would start for all proposals (it is assumed that the number of proposals received will not be much larger than the number to be approved) and is so timed that Title II for the selected experiments will begin upon Stage I approval. Finally, the duration of Title II design has been increased by two months.

This first modification will produce a greater variance for the east cluster facilities schedules (K5 & K6) than for the west cluster, for, in addition to rearranging the start of conventional construction design tasks, the funding restrictions for the east cluster have been discarded. In effect, this exercise also answers the question, 'When would the detectors be operational if all were funded at the same time?'

These changes and their consequences are presented as the second schedules in the four sets.

In going from the second to the third schedule in a set, the condition that each of the IRs have a complete and independent set of buildings for detector component fabrication and sub-assembly was discarded and it was assumed that common component facilities within the east and west clusters would become available to each experiment in a timely fashion. (This second, simplifying assumption was made because we have, as yet, no fully integrated schedule to give us more complete information.) The decoupling of the schedule from its dependency on the detector component facilities is shown by the absence of the 'SURFACE (Phase I)' bar and its associated milestone.

In examining the last schedule of each set, it can be seen that the two unmodified assumptions drove the four IR schedules to a widely

varying degree. The following table summarizes the results of this exercise.

	Approx. Time Savings (mo.)			
	K1	K2	K5	K6
Start Preliminary Design upon receiving LOIs	2.5	2.5	15	15
Decouple Availability of Detector Component Facilities	11.5	0	0	1.5
TOTAL	14	2.5	15	16.5

Several comments may be made about the information in this table.

In the second row, columns K2 and K5 show that removing dependencies on local detector component facilities from the schedules had no effect on the completion date of the Non-Magnetic Detector (NMD) or the Bottom Collider Detector (BCD). This is to be expected because, as shown in schedules K2-6 and K5-6 in chapter six, the surface facilities do not lie on the critical paths of these two model schedules.

The first row shows that the results of the first modification are the same for K1 & K2 and the same for K5 & K6. Again, this is to be expected because all the changes were made to tasks common to the west and east clusters.

Finally, the model for the K5 detector (BCD) illustrates an obvious, but important, point. In this report, we arbitrarily assigned the four detector models to the four IRs considered. Since the BCD was assigned to the east cluster, its schedule had a later start date (for fiscal reasons) and so the model suggests it may become operational only in late September of 1999. If the BCD had been assigned to the west cluster, its operational date would have fallen in early August of 1998. Thus, to the list of criteria for determining to which IRs the detectors for selected experiments will be assigned (geology, cost & operational savings, safety, etc.) must be added the need to bring the experimental program on-line in a timely fashion.

CONCLUSION

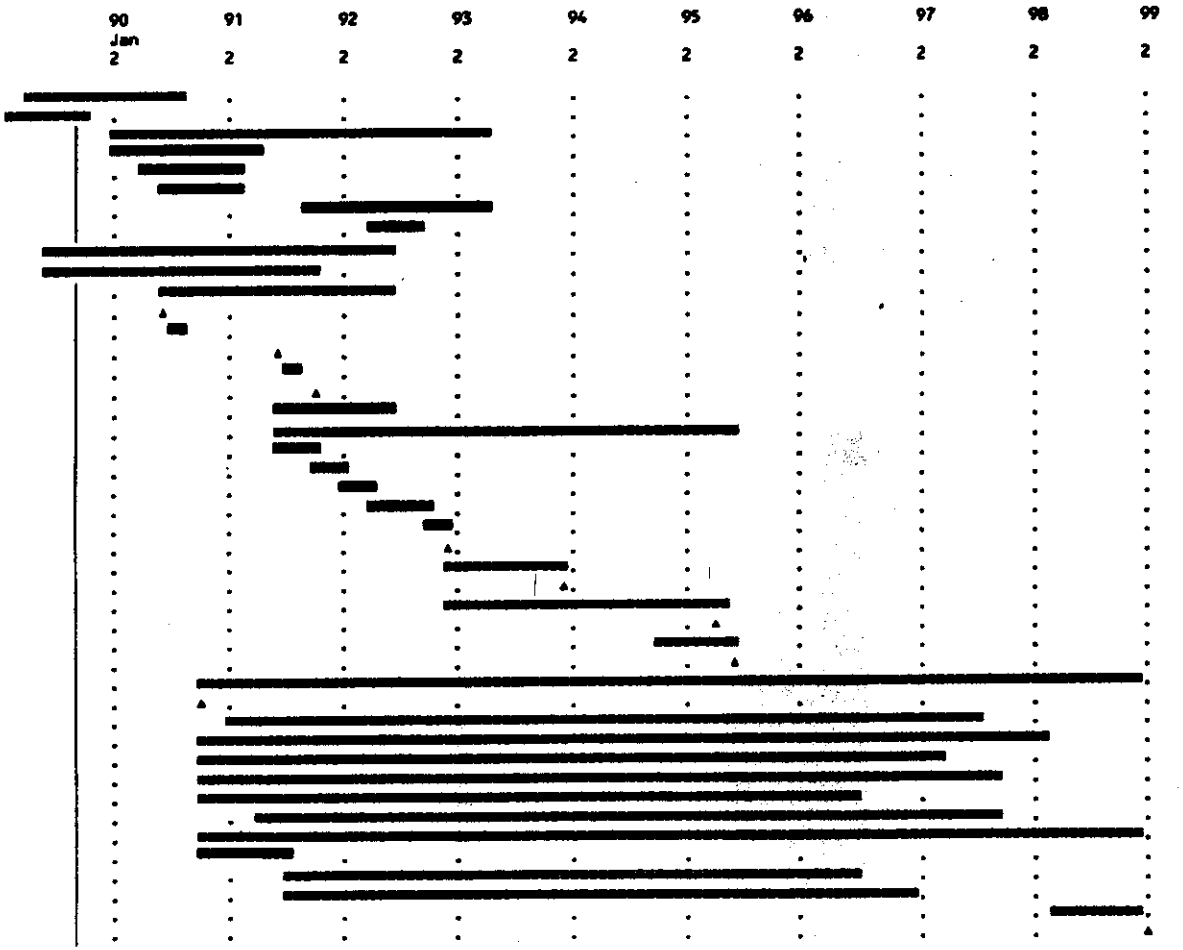
In the July '89 report, one of the criteria for model design was that each IR would have a complete set of buildings necessary for the fabrication and assembly of the components of the detector to be constructed at that site. It was thought that this might avoid delays in that the several detector constructions could proceed independently. This exercise seems to indicate that timely, common detector component facilities would allow the detectors to be operational at an earlier date. This goal may be accomplished by

starting the design process for the conventional facilities earlier and, perhaps, by making the design of the detector component facilities independent of the design of the experiment specific halls. The question which must be addressed now is whether the detector component facilities can be constructed in a timely manner. The possibility of this, and any conflicts which might prevent it, will be better understood once an integrated experimental facilities/ accelerator/campus schedule is generated.

Finally, it should be noted that the schedules as they stand are working models, not the definitive base line schedules. (Certainly, the comments made in the conclusions of the report apply to these schedules presented in the addendum too.) For a more complete picture, a schedule for test/calibration beams must be generated and integrated with the IR schedules. These schedules will then have to be revised to reflect the expected footprint specification decisions and to take account of the slippage in bringing the A-E/CM on-board. Also, as new funding availability profiles are produced, the impact of these profiles will have to assessed.

SUMMARY OF MODEL SCHEDULE OF K1 DEVELOPMENT
(1)

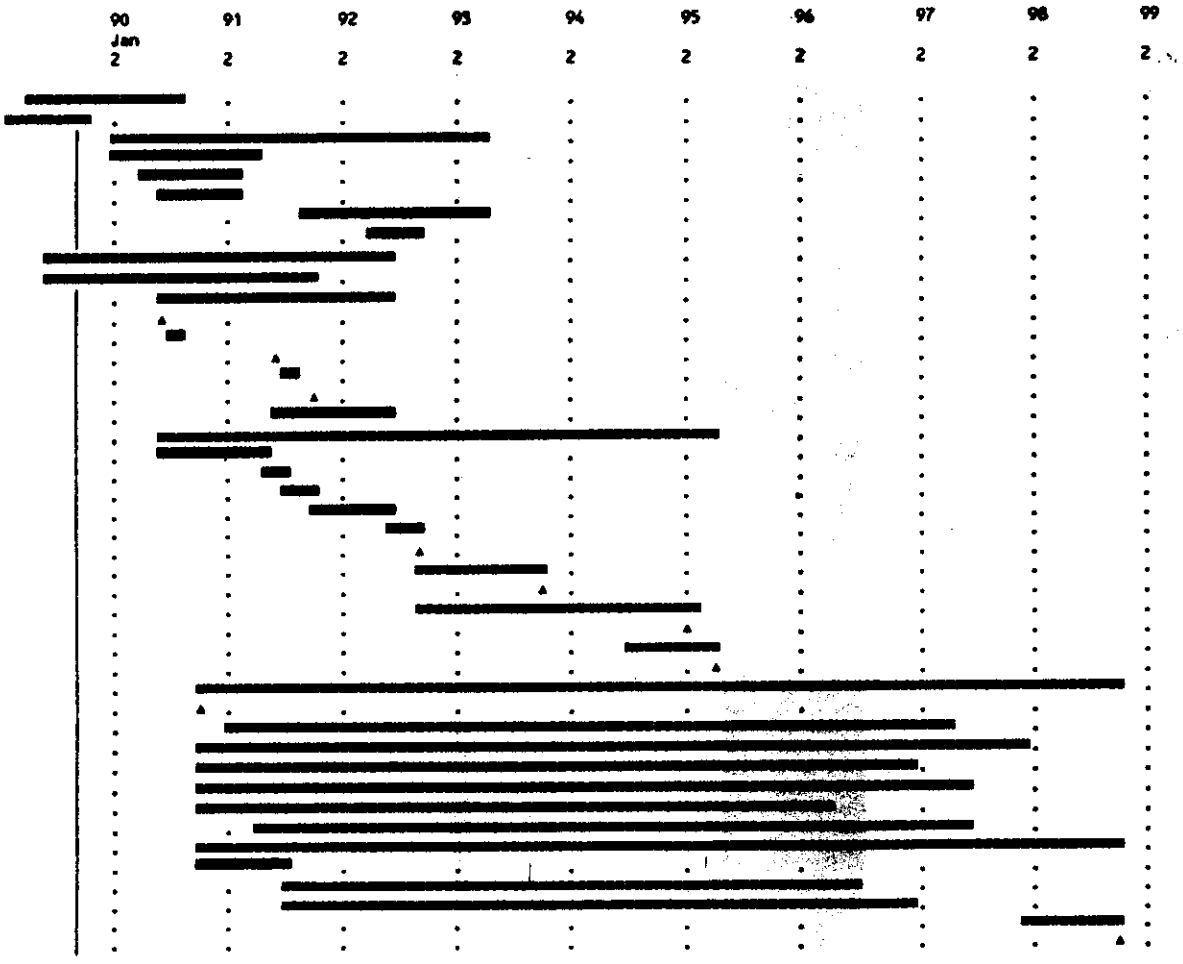
Task Name	Start Date	Duratn (Mths)	End Date
◆ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	24-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.6	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K1 IR Construction	15-May-91	48.2	21-May-95
Preliminary Design Studies	15-May-91	4.5	30-Sep-91
Conceptual Design	1-Oct-91	2.5	14-Dec-91
Title I	15-Dec-91	3	14-Mar-92
Title II	15-Mar-92	6	14-Sep-92
Contracts bid	15-Sep-92	2	14-Nov-92
CONTRACTS AWARDED	15-Nov-92	0	15-Nov-92
◆ K1 SURFACE (phase I)	15-Nov-92	12.5	30-Nov-93
Phase I Beneficial Occupancy	1-Dec-93	0	1-Dec-93
◆ K1 HALL CONSTRUCTION	15-Nov-92	28.9	11-Apr-95
Hall Beneficial Occupancy	10-Mar-95	0	10-Mar-95
◆ K1 SURFACE (phase II)	14-Sep-94	8.3	21-May-95
Phase II Beneficial Occupancy	22-May-95	0	22-May-95
K1 DETECTOR (Large Solenoid)	1-Oct-90	99.1	31-Dec-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ STEEL	2-Jan-91	78.3	9-Jul-97
◆ COIL	1-Oct-90	89.1	2-Mar-98
◆ MUON CHAMBER	1-Oct-90	77.3	8-Mar-97
LIQUID ARGON CALORIMETER	1-Oct-90	83.1	2-Sep-97
◆ LAC Modules	1-Oct-90	68.1	2-Jun-96
◆ LAC Cryostat	31-Mar-91	77.1	2-Sep-97
INTERNAL DETECTOR	1-Oct-90	99.1	31-Dec-98
Internal Detector Specifics	1-Oct-90	9	30-Jun-91
◆ Vertex Chamber	1-Jul-91	60	30-Jun-96
◆ Central Tracker	1-Jul-91	66	29-Dec-96
◆ Internal Detector Assembly	3-Mar-98	10	31-Dec-98
DETECTOR OPERATIONAL	2-Jan-99	0	2-Jan-99



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K1 DEVELOPMENT
(2) start Preliminary Design date based on Letter of Intent

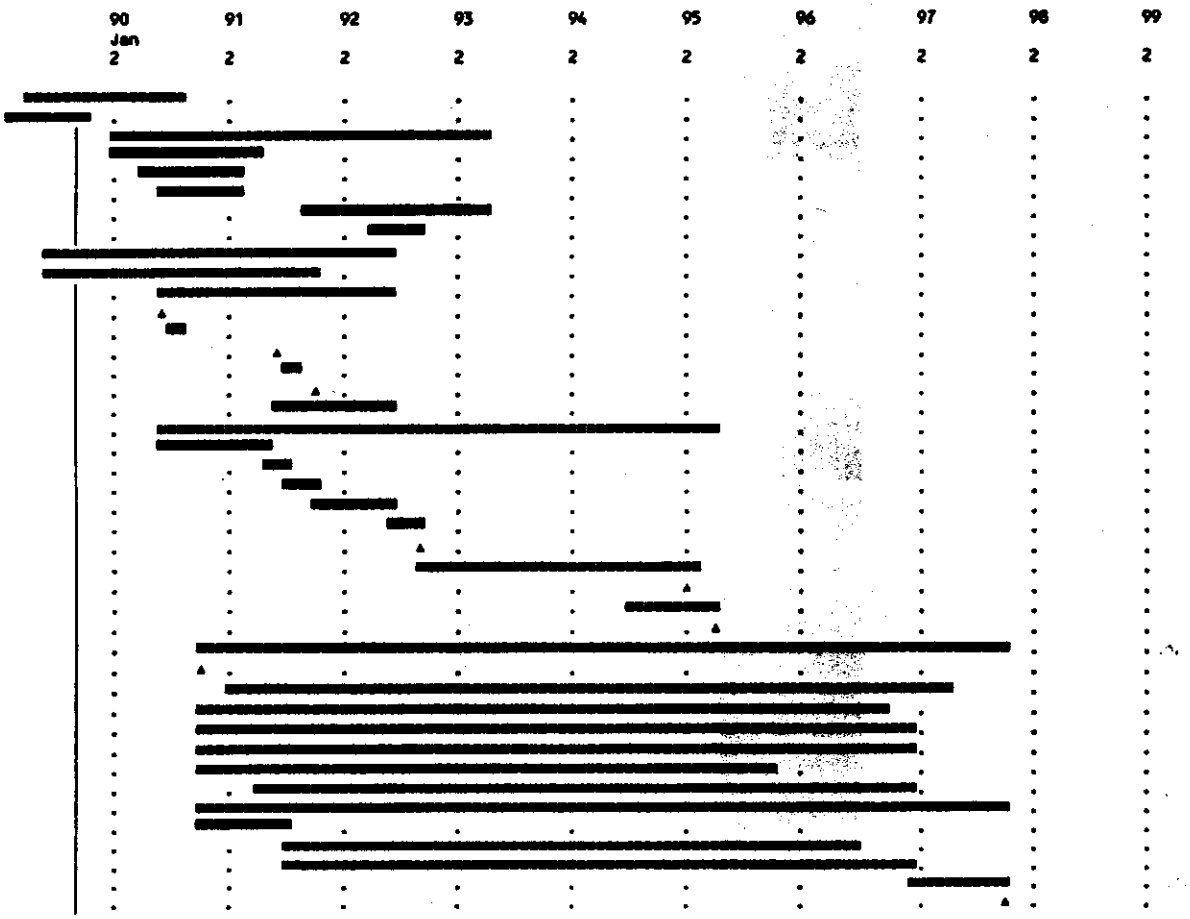
Task Name	Start Date	Duratn (Mths)	End Date
◆ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	24-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.4	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K1 IR Construction	15-May-90	57.8	8-Mar-95
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
◆ K1 SURFACE (phase I)	1-Sep-92	12.5	17-Sep-93
Phase I Beneficial Occupancy	18-Sep-93	0	18-Sep-93
◆ K1 HALL CONSTRUCTION	1-Sep-92	28.9	27-Jan-95
Hall Beneficial Occupancy	24-Dec-94	0	24-Dec-94
◆ K1 SURFACE (phase II)	30-Jun-94	8.3	8-Mar-95
Phase II Beneficial Occupancy	9-Mar-95	0	9-Mar-95
K1 DETECTOR (Large Solenoid)	1-Oct-90	96.6	17-Oct-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ STEEL	2-Jan-91	75.8	24-Apr-97
◆ COIL	1-Oct-90	86.6	16-Dec-97
◆ MUON CHAMBER	1-Oct-90	74.8	22-Dec-96
LIQUID ARGON CALORIMETER	1-Oct-90	80.6	18-Jun-97
◆ LAC Modules	1-Oct-90	65.6	19-Mar-96
◆ LAC Cryostat	31-Mar-91	74.7	18-Jun-97
INTERNAL DETECTOR	1-Oct-90	96.6	17-Oct-98
Internal Detector Specifica	1-Oct-90	9	30-Jun-91
◆ Vertex Chamber	1-Jul-91	60	30-Jun-96
◆ Central Tracker	1-Jul-91	66	29-Dec-96
◆ Internal Detector Assembly	17-Dec-97	10	17-Oct-98
DETECTOR OPERATIONAL	18-Oct-98	0	18-Oct-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K1 DEVELOPMENT
(3) removed dependencies on local detector facilities

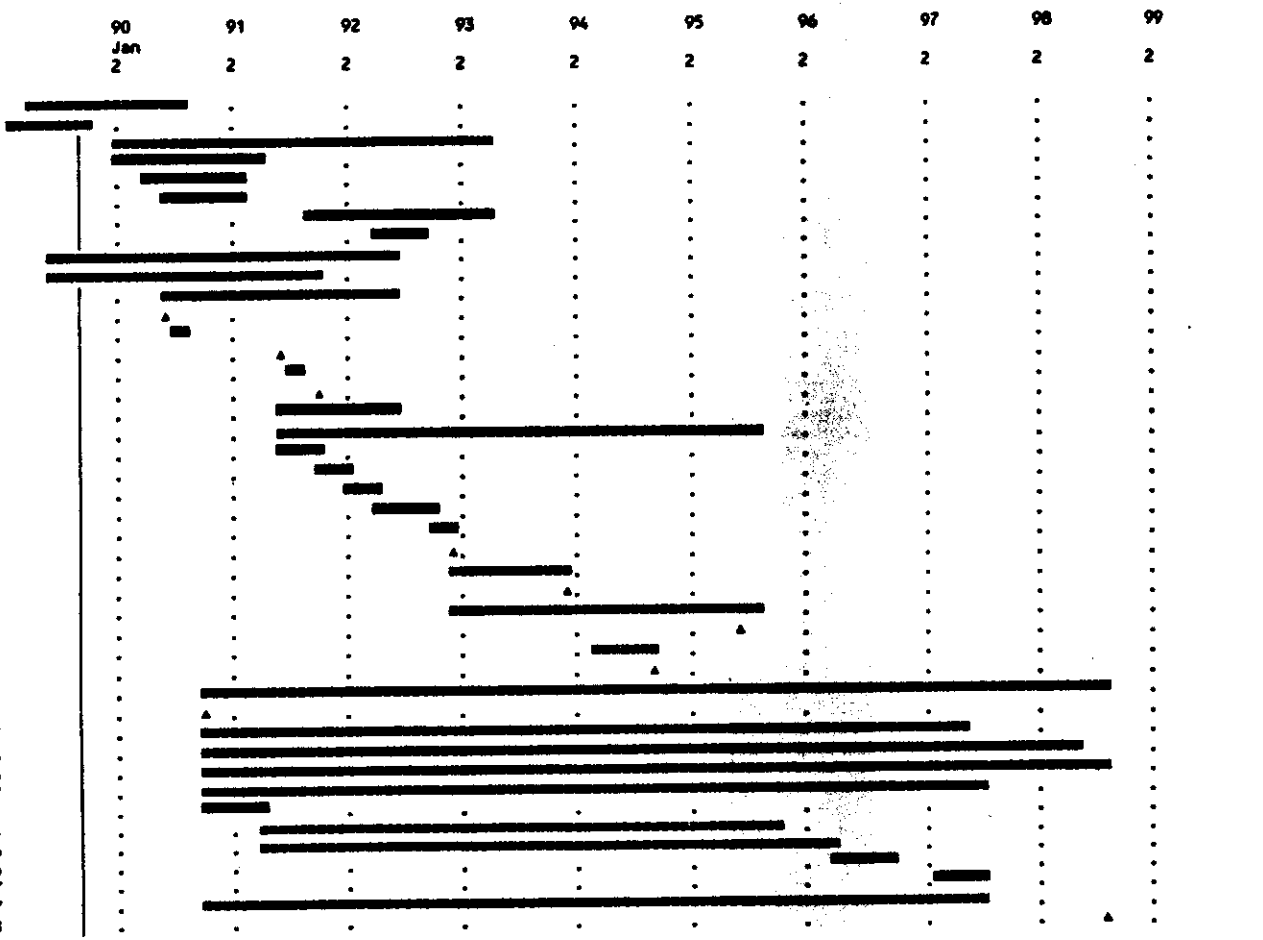
Task Name	Start Date	Duratn (Mths)	End Date
◆ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	26-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.4	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage 1 approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K1 IR Construction	15-May-90	57.8	8-Mar-95
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
◆ K1 HALL CONSTRUCTION	1-Sep-92	28.9	27-Jan-95
Hall Beneficial Occupancy	24-Dec-94	0	24-Dec-94
◆ K1 SURFACE (phase II)	30-Jun-94	8.3	8-Mar-95
Phase II Beneficial Occupancy	9-Mar-95	0	9-Mar-95
K1 DETECTOR (Large Solenoid)	1-Oct-90	85	30-Oct-97
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ STEEL	2-Jan-91	75.8	24-Apr-97
◆ COIL	1-Oct-90	71.8	24-Sep-96
◆ MUON CHAMBER	1-Oct-90	74.8	22-Dec-96
LIQUID ARGON CALORIMETER	1-Oct-90	75	30-Dec-96
◆ LAC Modules	1-Oct-90	60	1-Oct-95
◆ LAC Cryostat	31-Mar-91	69.1	30-Dec-96
INTERNAL DETECTOR	1-Oct-90	85	30-Oct-97
Internal Detector Specifica	1-Oct-90	9	30-Jun-91
◆ Vertex Chamber	1-Jul-91	60	30-Jun-96
◆ Central Tracker	1-Jul-91	66	29-Dec-96
◆ Internal Detector Assembly	31-Dec-96	10	30-Oct-97
DETECTOR OPERATIONAL	31-Oct-97	0	31-Oct-97



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K2 DEVELOPMENT
(1)

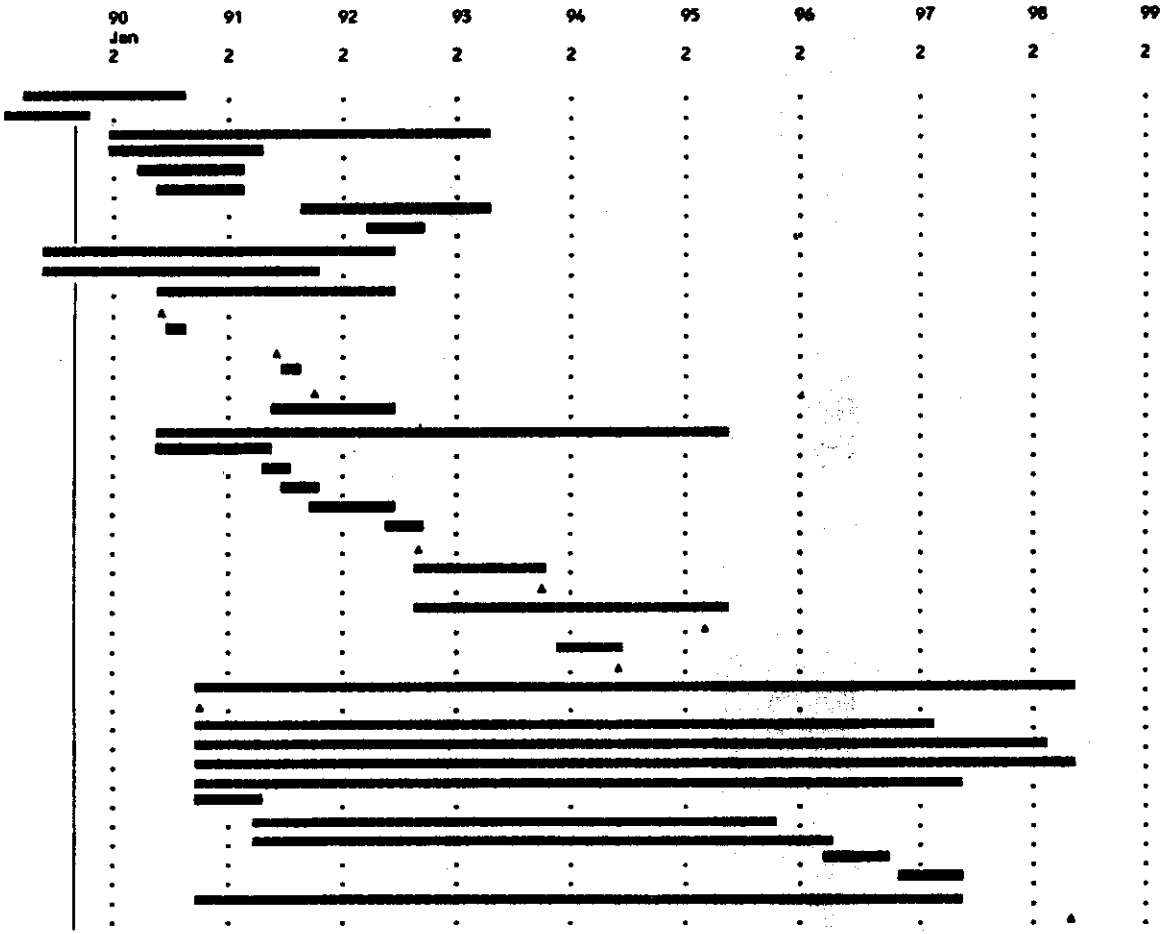
Task Name	Start Date	Duratn (Mths)	End Date
◆ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	24-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.4	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K2 IR Construction	15-May-91	49.9	13-Jul-95
Preliminary design studies	15-May-91	4.5	30-Sep-91
Conceptual Design	1-Oct-91	2.5	14-Dec-91
Title I	15-Dec-91	3	14-Mar-92
Title II	15-Mar-92	6	14-Sep-92
Contracts bid	15-Sep-92	2	14-Nov-92
CONTRACTS AWARDED	15-Nov-92	0	15-Nov-92
◆ K2 Surface (phase I)	15-Nov-92	12.5	30-Nov-93
Phase I Beneficial Occupancy	1-Dec-93	0	1-Dec-93
◆ K2 Hall Construction	16-Nov-92	31.9	13-Jul-95
Hall Beneficial Occupancy	3-May-95	0	3-May-95
◆ K2 Surface (phase II)	11-Feb-94	5.8	5-Aug-94
Phase II Beneficial Occupancy	6-Aug-94	0	6-Aug-94
K2 DETECTOR (Non-Magnetic D)	1-Oct-90	94.1	2-Aug-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ STEEL	1-Oct-90	79.1	2-May-97
◆ MUON CHAMBER	1-Oct-90	91.1	2-May-98
◆ MUON TRIGGER	1-Oct-90	94.1	2-Aug-98
CALORIMETER	1-Oct-90	82	31-Jul-97
Calorimeter Design	1-Oct-90	6	31-Mar-91
◆ Calorimeter Vessel	1-Apr-91	54	30-Sep-95
◆ Calorimeter Module	1-Apr-91	60	31-Mar-96
Install Modules in Vessels	1-Apr-96	6	30-Sep-96
Install Calorimeter & Cable	1-Feb-97	6	31-Jul-97
◆ CENTRAL TRACKER	1-Oct-90	82.1	1-Aug-97
DETECTOR OPERATIONAL	3-Aug-98	0	3-Aug-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K2 DEVELOPMENT
(2) start Preliminary Design based on Letter of Intent

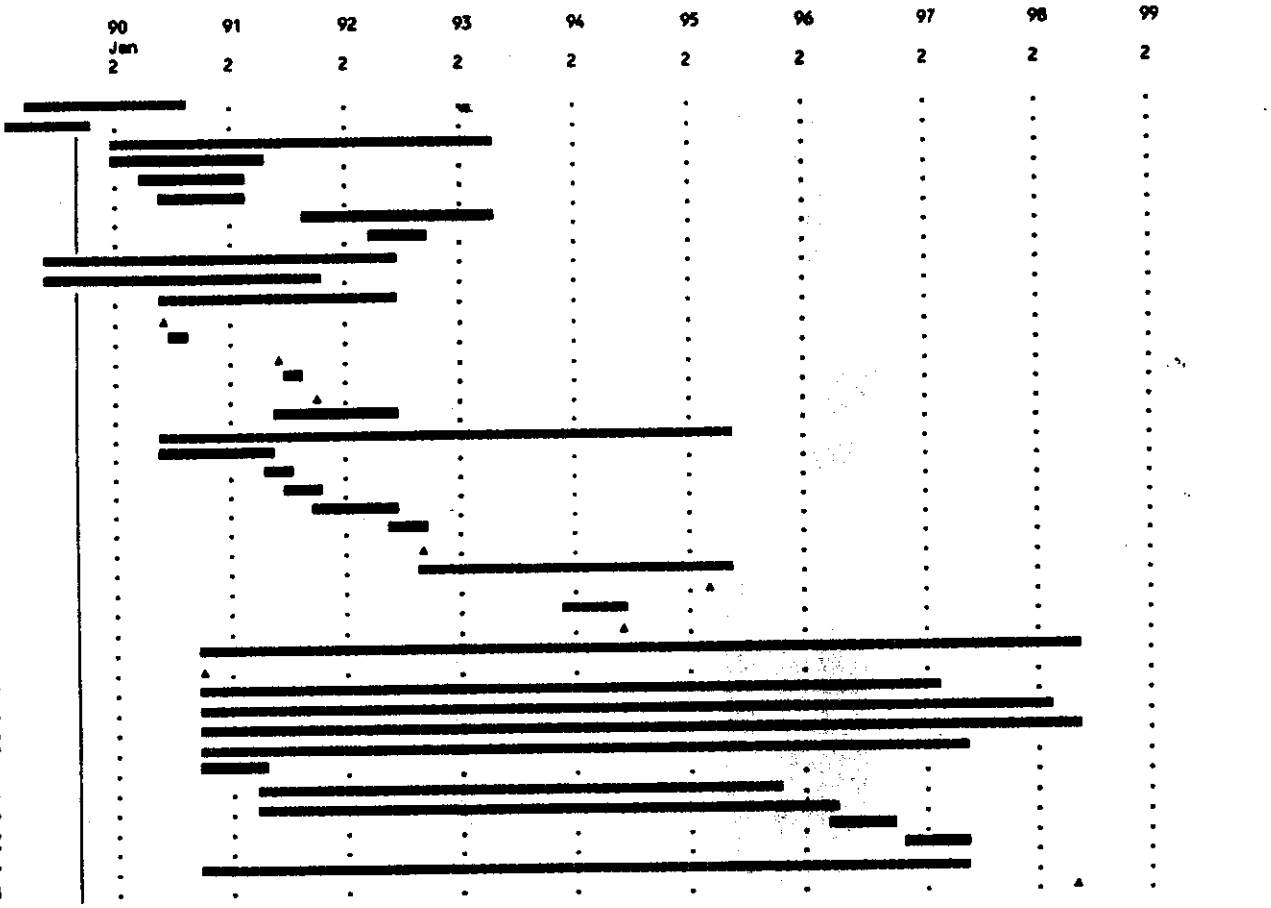
Task Name	Start Date	Duratn (Mths)	End Date
◆ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	24-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.4	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K2 IR Construction	15-May-90	59.4	27-Apr-95
Preliminary design studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
◆ K2 Surface (phase I)	1-Sep-92	12.5	17-Sep-93
Phase I Beneficial Occupancy	18-Sep-93	0	18-Sep-93
◆ K2 Hall Construction	1-Sep-92	31.9	27-Apr-95
Hall Beneficial Occupancy	17-Feb-95	0	17-Feb-95
◆ K2 Surface (phase II)	26-Nov-93	5.8	20-May-94
Phase II Beneficial Occupancy	21-May-94	0	21-May-94
K2 DETECTOR (Non-Magnetic D)	1-Oct-90	91.6	17-May-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ STEEL	1-Oct-90	76.6	16-Feb-97
◆ MUON CHAMBER	1-Oct-90	88.6	16-Feb-98
◆ MUON TRIGGER	1-Oct-90	91.6	17-May-98
CALORIMETER	1-Oct-90	79.5	15-May-97
Calorimeter Design	1-Oct-90	6	31-Mar-91
◆ Calorimeter Vessel	1-Apr-91	54	30-Sep-95
◆ Calorimeter Module	1-Apr-91	60	31-Mar-96
Install Modules in Vessels	1-Apr-96	6	30-Sep-96
Install Calorimeter & Cable	16-Nov-96	6	15-May-97
◆ CENTRAL TRACKER	1-Oct-90	79.6	16-May-97
DETECTOR OPERATIONAL	18-May-98	0	18-May-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K2 DEVELOPMENT
(3) removed dependencies on local detector facilities

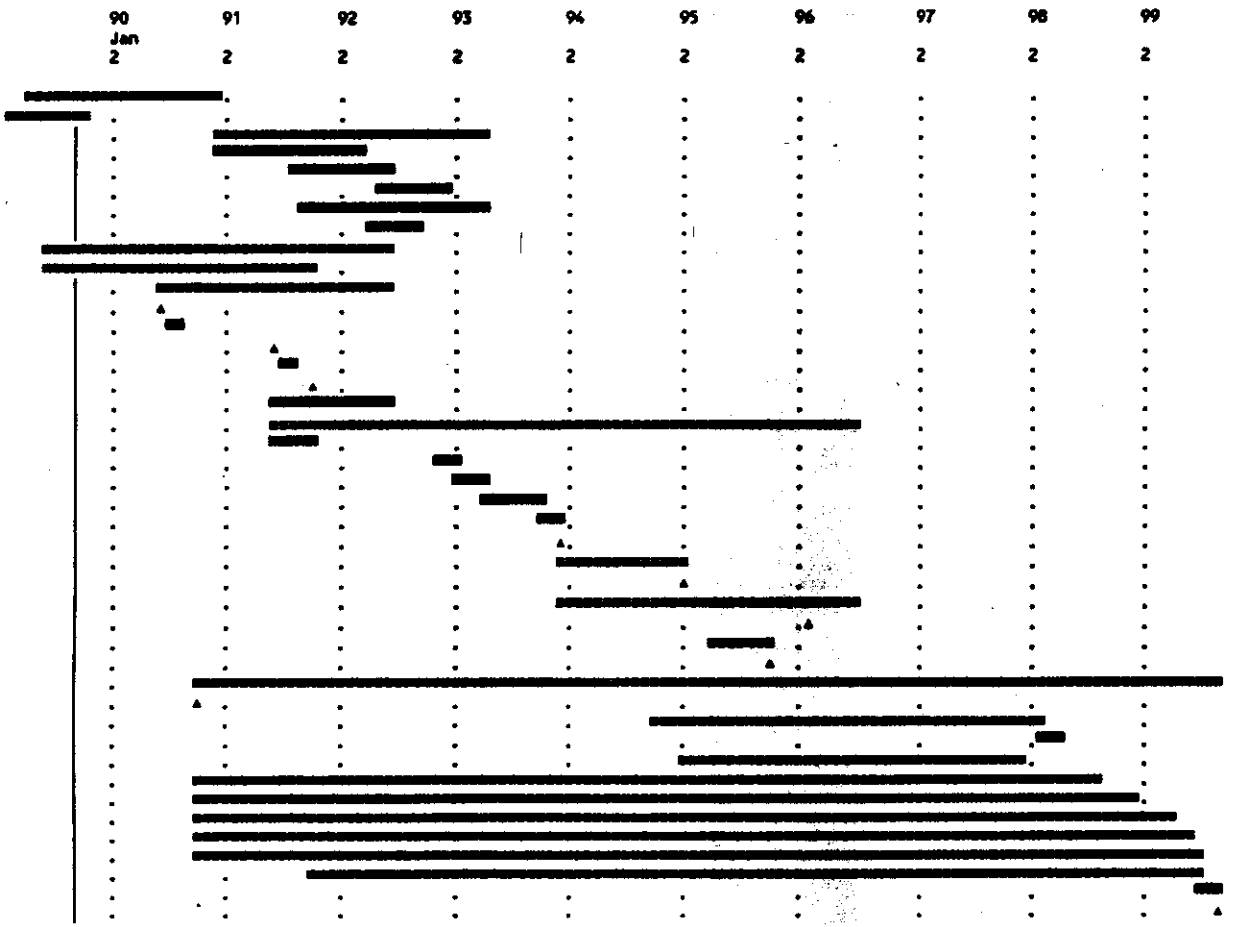
Task Name	Start Date	Duratn (Mths)	End Date
+ Near Cluster Land Acquisition	1-Apr-89	15.3	9-Jul-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Near Cluster Infrastructure	2-Jan-90	38.7	24-Mar-93
Electrical (Title 1-3)	2-Jan-90	14.4	15-Mar-91
Water (Title 1-3)	1-Apr-90	9.5	15-Jan-91
Communications (Title 1-3)	1-Jun-90	7.2	6-Jan-91
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K2 IR Construction	15-May-90	59.4	27-Apr-95
Preliminary design studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
+ K2 Hall Construction	1-Sep-92	31.9	27-Apr-95
Hall Beneficial Occupancy	17-Feb-95	0	17-Feb-95
+ K2 Surface (phase II)	26-Nov-93	5.8	20-May-94
Phase II Beneficial Occupancy	21-May-94	0	21-May-94
K2 DETECTOR (Non-Magnetic D)	1-Oct-90	91.6	17-May-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ STEEL	1-Oct-90	76.6	16-Feb-97
+ MUON CHAMBER	1-Oct-90	88.6	16-Feb-98
+ MUON TRIGGER	1-Oct-90	91.6	17-May-98
CALORIMETER	1-Oct-90	79.5	15-May-97
Calorimeter Design	1-Oct-90	6	31-Mar-91
+ Calorimeter Vessel	1-Apr-91	54	30-Sep-95
+ Calorimeter Module	1-Apr-91	60	31-Mar-96
Install Modules in Vessels	1-Apr-96	6	30-Sep-96
Install Calorimeter & Cable	16-Nov-96	6	15-May-97
+ CENTRAL TRACKER	1-Oct-90	79.6	16-May-97
DETECTOR OPERATIONAL	18-May-98	0	18-May-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K5 DEVELOPMENT
(1)

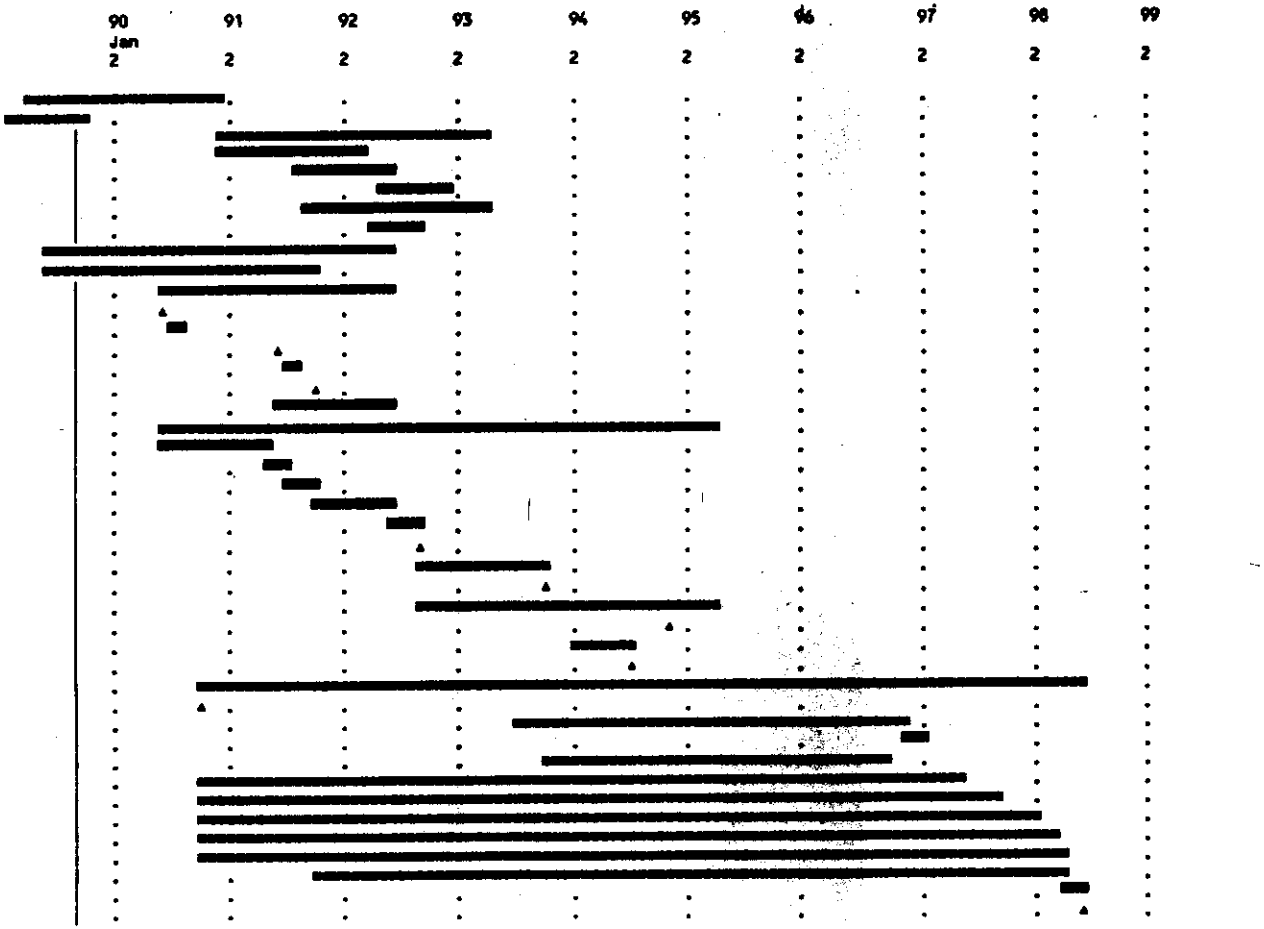
Task Name	Start Date	Duratn (Mths)	End Date
+ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Far Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K5 IR Construction	15-May-91	61.4	26-Jun-96
Preliminary design studies	15-May-91	4.5	30-Sep-91
Conceptual Design	15-Oct-92	2.6	31-Dec-92
Title I	2-Jan-93	3	31-Mar-93
Title II	1-Apr-93	6	30-Sep-93
Contracts bid	1-Oct-93	2	30-Nov-93
CONTRACTS AWARDED	1-Dec-93	0	1-Dec-93
+ K5 Surface (phase I)	1-Dec-93	12.5	14-Dec-94
Phase I Beneficial Occupancy	15-Dec-94	0	15-Dec-94
+ K5 Hall Construction	1-Dec-93	30.9	26-Jun-96
Hall Beneficial Occupancy	23-Jan-96	0	23-Jan-96
+ K5 Surface (phase II)	30-Mar-95	5.8	22-Sep-95
Phase II Beneficial Occupancy	23-Sep-95	0	23-Sep-95
K5 DETECTOR (Bottom Collider)	1-Oct-90	107.7	20-Sep-99
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ MAGNET ASSEMBLY (1 & 2)	15-Sep-94	41.3	22-Feb-98
INSTALL MAGNET 2	23-Feb-98	2	22-Apr-98
+ MUON CHAMBERS	15-Dec-94	36.3	22-Dec-97
+ EM CALORIMETRY	1-Oct-90	94.8	22-Aug-98
+ TRANSITION RADIATION DETECTORS	1-Oct-90	98.8	21-Dec-98
+ RING-IMAGING CHEREMKOV DETECTR	1-Oct-90	102.8	22-Apr-99
+ TRACKING - STRAWS	1-Oct-90	104.7	21-Jun-99
+ VERTEX DETECTOR	1-Oct-90	105.7	21-Jul-99
+ DATA ACQUISITION SYSTEM	1-Oct-91	93.7	22-Jul-99
INSTALL MAGNET 1	22-Jul-99	2	20-Sep-99
DETECTOR OPERATIONAL	21-Sep-99	0	21-Sep-99



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K5 DEVELOPMENT
(2) start of Preliminary Design based on Letter of Intent

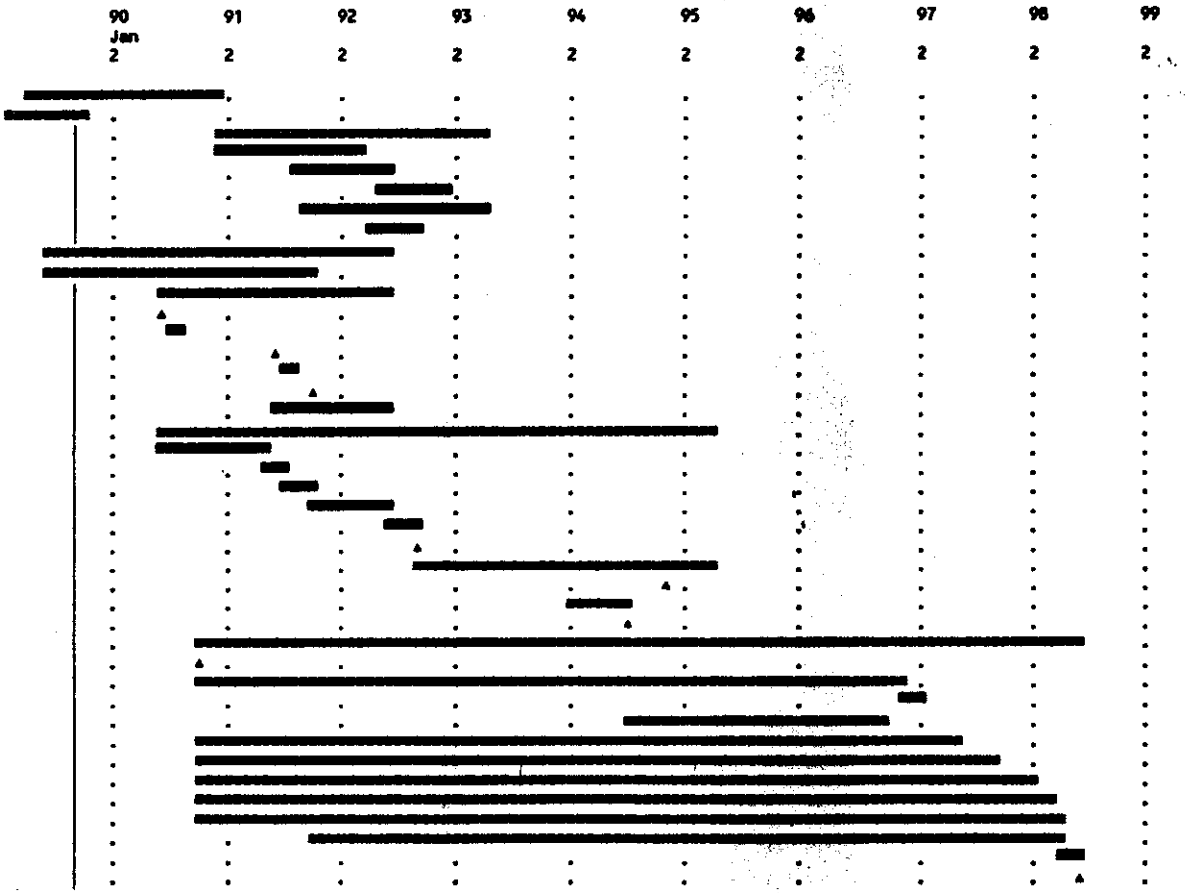
Task Name	Start Date	Duratn (Mths)	End Date
◆ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
◆ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
For Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
◆ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K5 IR Construction	15-May-90	58.4	28-Mar-95
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
◆ K5 Surface (phase I)	1-Sep-92	12.5	15-Sep-93
Phase I Beneficial Occupancy	16-Sep-93	0	16-Sep-93
◆ K5 Hall Construction	1-Sep-92	30.9	28-Mar-95
Hall Beneficial Occupancy	23-Oct-94	0	23-Oct-94
◆ K5 Surface (phase II)	29-Dec-93	5.8	22-Jun-94
Phase II Beneficial Occupancy	23-Jun-94	0	23-Jun-94
K5 DETECTOR (Bottom Collider)	1-Oct-90	92.7	20-Jun-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
◆ MAGNET ASSEMBLY (1 & 2)	15-Jun-93	41.3	22-Nov-96
INSTALL MAGNET 2	23-Nov-96	2	22-Jan-97
◆ MUON CHAMBERS	16-Sep-93	36.3	23-Sep-96
◆ EM CALORIMETRY	1-Oct-90	79.8	22-May-97
◆ TRANSITION RADIATION DETECTORS	1-Oct-90	83.8	22-Sep-97
◆ RING-IMAGING CHERENKOV DETECTR	1-Oct-90	87.8	22-Jan-98
◆ TRACKING - STRAWS	1-Oct-90	89.7	22-Mar-98
◆ VERTEX DETECTOR	1-Oct-90	90.7	20-Apr-98
◆ DATA ACQUISITION SYSTEM	1-Oct-91	78.7	21-Apr-98
INSTALL MAGNET 1	21-Apr-98	2	20-Jun-98
DETECTOR OPERATIONAL	21-Jun-98	0	21-Jun-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K5 DEVELOPMENT
(3) removed dependencies on local detector facilities

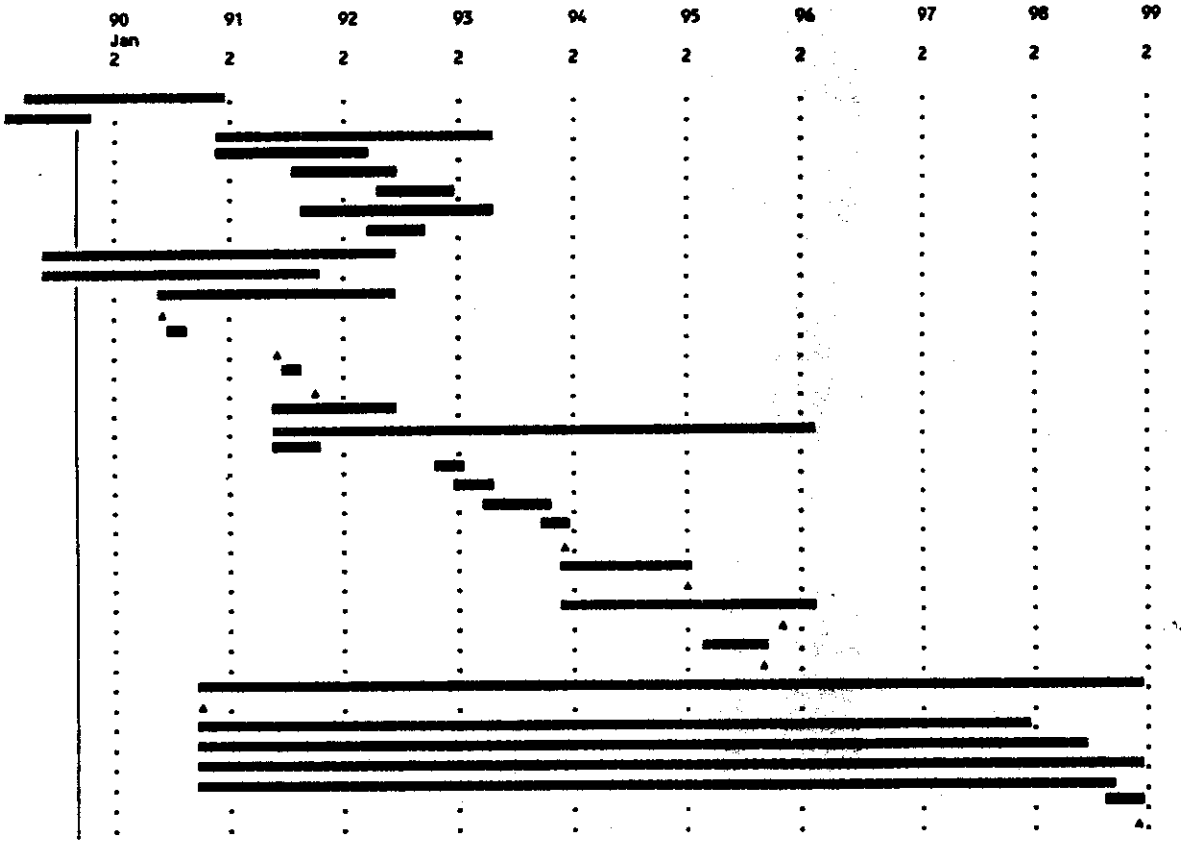
Task Name	Start Date	Duratn (Mths)	End Date
+ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
For Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K5 IR Construction	15-May-90	58.4	28-Mar-95
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	31-May-92
Contracts bid & review	1-Jun-92	3	31-Aug-92
CONTRACTS AWARDED	1-Sep-92	0	1-Sep-92
+ K5 Hall Construction	1-Sep-92	30.9	28-Mar-95
Hall Beneficial Occupancy	23-Oct-94	0	23-Oct-94
+ K5 Surface (phase II)	29-Dec-93	5.8	22-Jun-94
Phase II Beneficial Occupancy	23-Jun-94	0	23-Jun-94
K5 DETECTOR (Bottom Collider)	1-Oct-90	92.7	20-Jun-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ MAGNET ASSEMBLY (1 & 2)	1-Oct-90	73.8	22-Nov-96
INSTALL MAGNET 2	23-Nov-96	2	22-Jan-97
+ MUON CHAMBERS	17-Jun-94	27.3	23-Sep-96
+ EM CALORIMETRY	1-Oct-90	79.8	22-May-97
+ TRANSITION RADIATION DETECTORS	1-Oct-90	83.8	22-Sep-97
+ RING-IMAGING CHEREMKOV DETECTR	1-Oct-90	87.8	22-Jan-98
+ TRACKING - STRAWS	1-Oct-90	89.7	22-Mar-98
+ VERTEX DETECTOR	1-Oct-90	90.7	20-Apr-98
+ DATA ACQUISITION SYSTEM	1-Oct-91	78.7	21-Apr-98
INSTALL MAGNET 1	21-Apr-98	2	20-Jun-98
DETECTOR OPERATIONAL	21-Jun-98	0	21-Jun-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K6 DEVELOPMENT
(1)

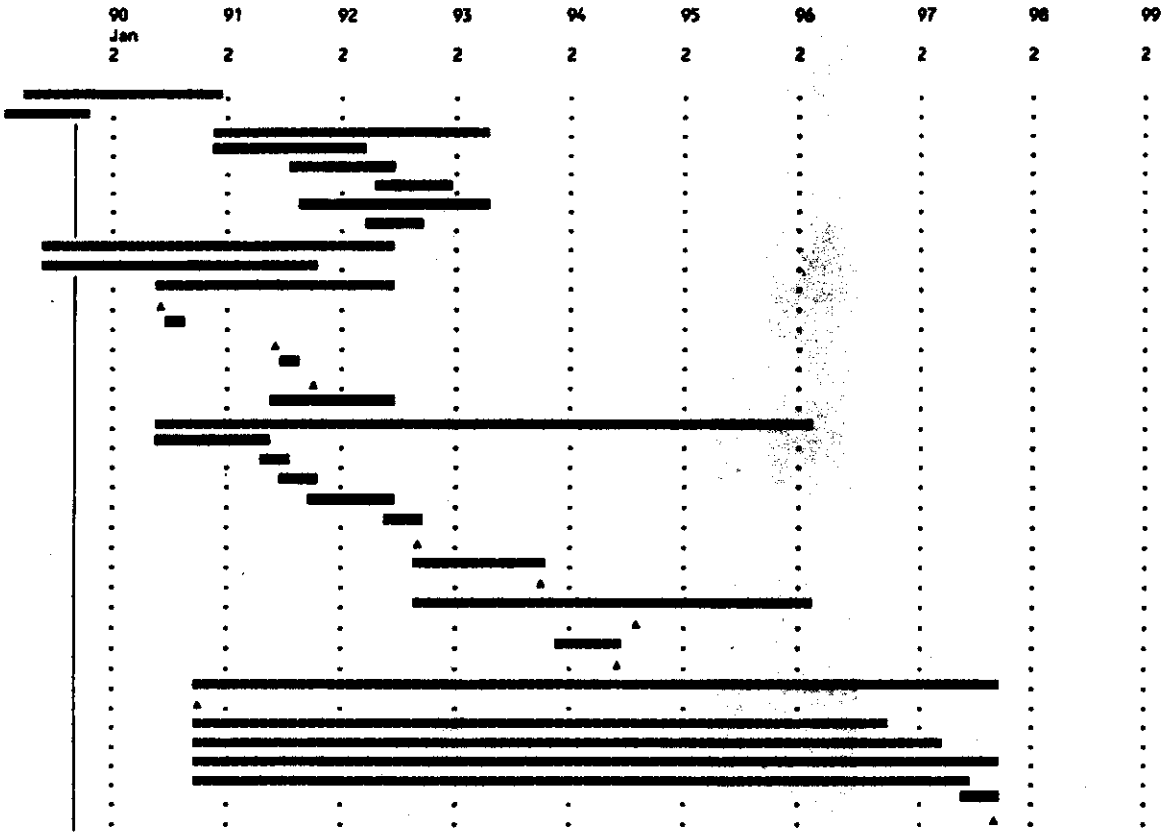
Task Name	Start Date	Duratn (Mths)	End Date
+ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Far Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K6 IR Construction	15-May-91	55.9	12-Jan-96
Preliminary design studies	15-May-91	4.5	30-Sep-91
Conceptual Design	15-Oct-92	2.6	31-Dec-92
Title I	2-Jan-93	3	31-Mar-93
Title II	1-Apr-93	6	30-Sep-93
Contracts bid	1-Oct-93	2	30-Nov-93
CONTRACTS AWARDED	1-Dec-93	0	1-Dec-93
+ K6 Surface (phase I)	1-Dec-93	12.5	14-Dec-94
Phase I Beneficial Occupancy	15-Dec-94	0	15-Dec-94
+ K6 Hall Construction	1-Dec-93	25.4	12-Jan-96
Hall Beneficial Occupancy	31-Oct-95	0	31-Oct-95
+ K6 Surface (phase II)	23-Feb-95	5.8	17-Aug-95
Phase II Beneficial Occupancy	18-Aug-95	0	18-Aug-95
K6 DETECTOR (Up-graded DO)	1-Oct-90	98.5	14-Dec-98
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ STEEL	1-Oct-90	86.5	14-Dec-97
+ CALORIMETER	1-Oct-90	92.5	14-Jun-98
+ MUON CHAMBER	1-Oct-90	98.5	14-Dec-98
+ CENTRAL TRACKER	1-Oct-90	95.5	14-Sep-98
Close & Move Inner Detector	15-Sep-98	3	14-Dec-98
DETECTOR OPERATIONAL	15-Dec-98	0	15-Dec-98



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K6 DEVELOPMENT
(2) start of Preliminary Design based on Letter of Intent

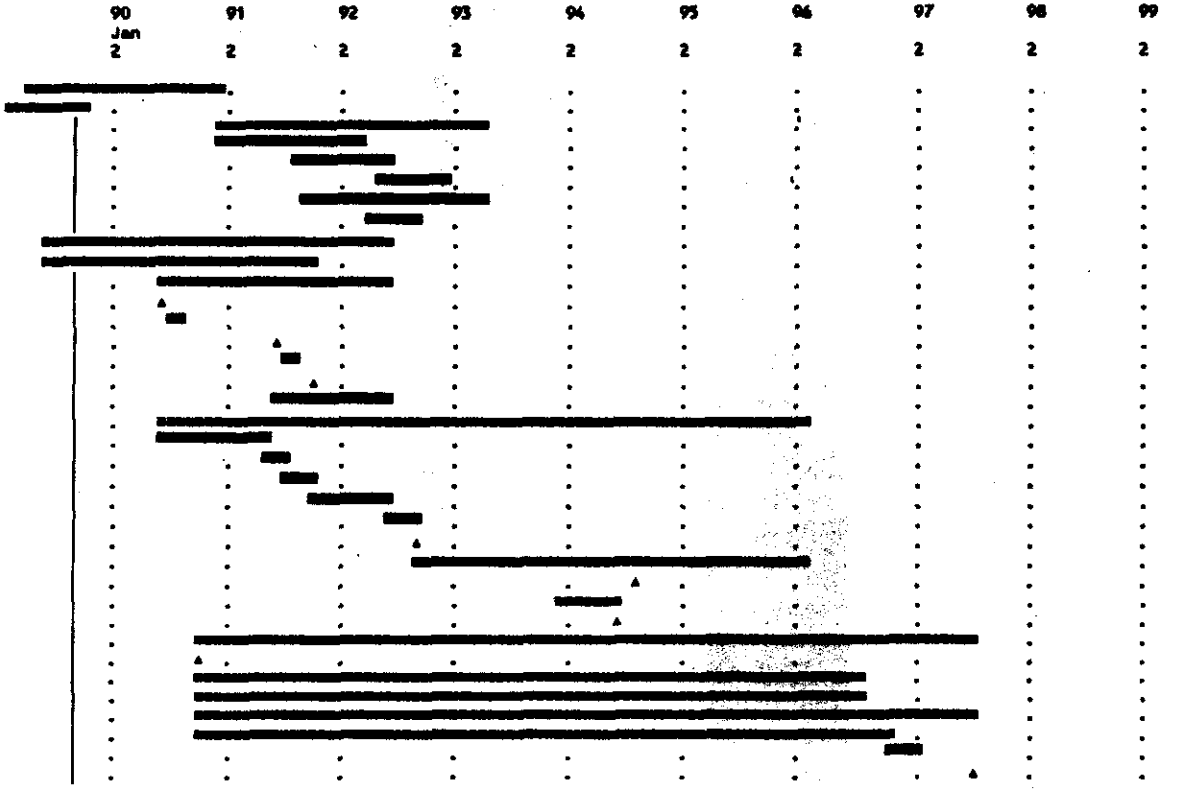
Task Name	Start Date	Duratn (Mths)	End Date
+ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
Far Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K6 IR Construction	15-May-90	67.9	12-Jan-96
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	30-May-92
Contracts bid & review	31-May-92	3	30-Aug-92
CONTRACTS AWARDED	31-Aug-92	0	31-Aug-92
+ K6 Surface (phase I)	31-Aug-92	12.5	14-Sep-93
Phase I Beneficial Occupancy	15-Sep-93	0	15-Sep-93
+ K6 Hall Construction	31-Aug-92	40.4	12-Jan-96
Hall Beneficial Occupancy	31-Jul-94	0	31-Jul-94
+ K6 Surface (phase II)	22-Nov-93	5.8	16-May-94
Phase II Beneficial Occupancy	17-May-94	0	17-May-94
K6 DETECTOR (Up-graded DO)	1-Oct-90	83.5	14-Sep-97
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ STEEL	1-Oct-90	71.5	14-Sep-96
+ CALORIMETER	1-Oct-90	77.5	14-Mar-97
+ MUON CHAMBER	1-Oct-90	83.5	14-Sep-97
+ CENTRAL TRACKER	1-Oct-90	80.5	13-Jun-97
Close & Move Inner Detector	14-Jun-97	3	14-Sep-97
DETECTOR OPERATIONAL	15-Sep-97	0	15-Sep-97



Detail Task Summary Task ▲ Milestone

SUMMARY OF MODEL SCHEDULE OF K6 DEVELOPMENT
(3) removed dependencies on local detector facilities

Task Name	Start Date	Duratn (Mths)	End Date
+ Cluster Land Acquisition	1-Apr-89	19.3	9-Nov-90
+ A-E/CM Selection	15-Jan-89	8.6	1-Oct-89
For Cluster Infrastructure	1-Dec-90	27.7	24-Mar-93
Electrical (Title 1-3)	1-Dec-90	14.5	15-Feb-92
Water (Title 1-3)	20-Jul-91	9.5	2-May-92
Communications (Title 1-3)	20-Apr-92	7.2	25-Nov-92
Roads (Title 1-3)	15-Aug-91	19.3	24-Mar-93
Auxiliary Systems (Title 1-3)	15-Mar-92	5	15-Aug-92
Phys Rsrch Div Detector Activ.	1-Jun-89	35.5	15-May-92
+ Preliminary detector R&D	1-Jun-89	28	1-Oct-91
Approval process	15-May-90	24.1	15-May-92
First letter of intent	15-May-90	0	15-May-90
PAC Meeting	1-Jul-90	1	1-Aug-90
Proposal for experiments	15-May-91	0	15-May-91
PAC Meeting	1-Jul-91	1	1-Aug-91
Stage I approval	1-Oct-91	0	1-Oct-91
DETECTOR DESIGN REPORT	15-May-91	12.1	15-May-92
K6 IR Construction	15-May-90	67.9	12-Jan-96
Preliminary Design Studies	15-May-90	11	14-Apr-91
Conceptual Design	15-Apr-91	2.5	30-Jun-91
Title I & review	1-Jul-91	3	30-Sep-91
Title II & review	1-Oct-91	8	30-May-92
Contracts bid & review	31-May-92	3	30-Aug-92
CONTRACTS AWARDED	31-Aug-92	0	31-Aug-92
+ K6 Hall Construction	31-Aug-92	40.4	12-Jan-96
Hall Beneficial Occupancy	31-Jul-96	0	31-Jul-96
+ K6 Surface (phase II)	22-Nov-93	5.8	16-May-94
Phase II Beneficial Occupancy	17-May-94	0	17-May-94
K6 DETECTOR (Up-graded D0)	1-Oct-90	82	30-Jul-97
FUND ENG. DESIGN & SPECIF. R&D	1-Oct-90	0	1-Oct-90
+ STEEL	1-Oct-90	70	30-Jul-96
+ CALORIMETER	1-Oct-90	69.9	28-Jul-96
+ MUON CHAMBER	1-Oct-90	82	30-Jul-97
+ CENTRAL TRACKER	1-Oct-90	72.9	27-Oct-96
Close & Move Inner Detector	28-Oct-96	3	28-Jan-97
DETECTOR OPERATIONAL	31-Jul-97	0	31-Jul-97



Detail Task Summary Task ▲ Milestone