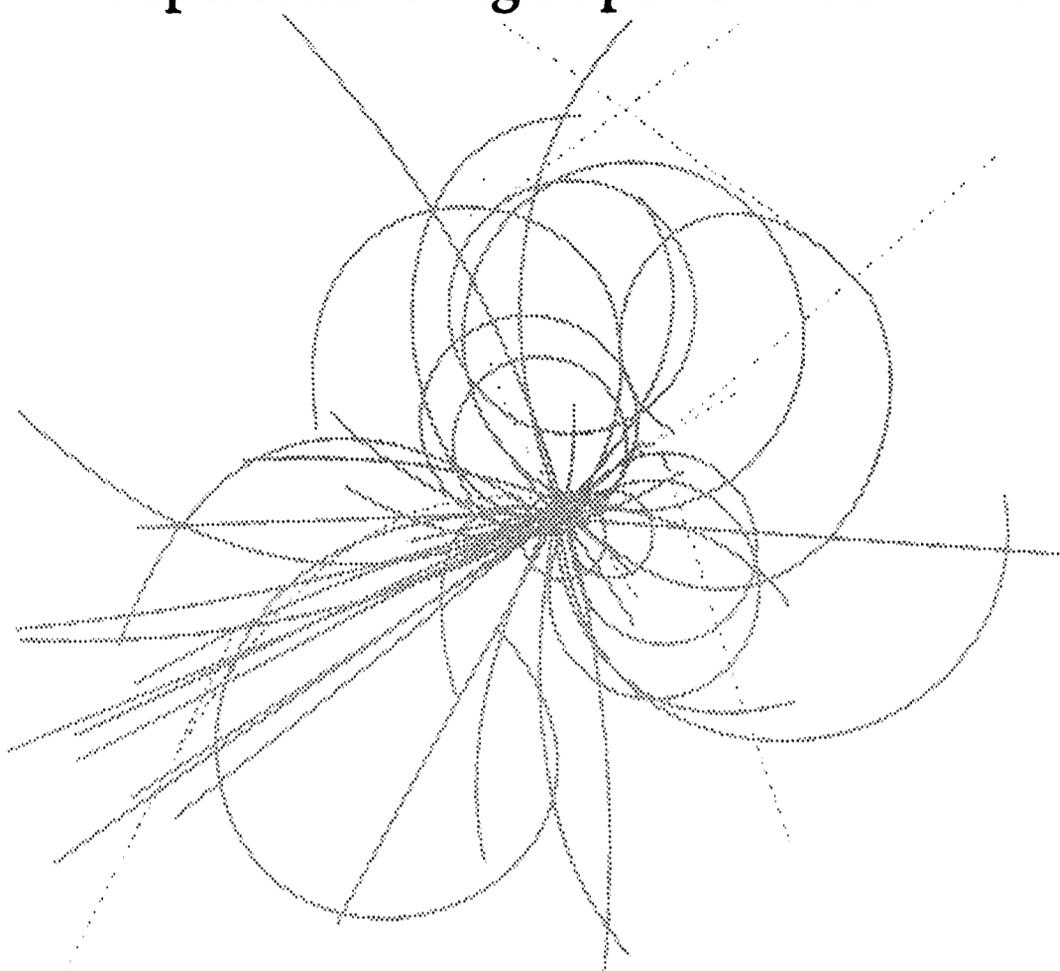


SSC-13

# Superconducting Super Collider Laboratory

SSC-13



## SSC Monthly Report

T. Elioff

February 1985

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SSC-13

April 1, 1985

Mr. Jay Hunze  
U.S. Department of Energy  
Chicago Operations Office  
9800 South Cass Avenue  
Argonne, Illinois 60439

Dear Jay,

The SSC Monthly Report for February is enclosed. The contents have changed from those of previous reports. Basically the write-up has been condensed and the cost data has been amplified by means of graphical displays.

We are assuming that the next SSC quarterly review will be held April 29 at LBL. An agenda is being prepared. Please let us know of any specific needs or suggestions.

Best Regards,

  
Tom Elioff

Enclosure

cc: W. Wallenmeyer (DOE)  
R. Fricksen (DOE)  
B. McDaniel (Cornell)  
J. Matheson (URA)  
K. Shirley (URA)

SSC MONTHLY REPORT

FEBRUARY 1985

CONTENTS

- A. Project Summary
  - B. Project Report
  - C. Project Cost Data
-

SSC MONTHLY REPORT

FEBRUARY 1985

A. Project Summary

- The A/E Selection process continued. Four finalists were interviewed at Chicago Operations.
- A Workshop on Commissioning and Operations of the SSC, hosted by the CDG, was held at Fermilab, February 26-27.
- The cost estimating program was initiated for both superferric and cosine theta magnets.
- An Aperture Task Force meeting was held at Fermilab on February 19. The Magnet Error group of the Aperture Task Force met at LBL on February 7 and 8 to outline a summary report.
- A Design D collaboration meeting was held at Fermilab on February 28 to provide a unified schedule.
- LBL. Magnet D12C-1, the first model of a collared coil with wide cable and the C-5 "Design D" cross section, was successfully tested and reached 6.2 T at 4.4K and 8.0 T at 1.8K.
- Fermilab. The first issue of the D Cryostat Design Criteria was provided. The first of the cable for use in the 4 cm aperture models has been received.
- BNL. The major effort continued on fabrication of magnet components and tooling for the first 4.5 m long model magnets based on Reference Design D.
- TAC. Measurements were completed on the first one meter, two-channel magnets and on the second 2-in-1 magnet.

## B. Project Report

### I. Central Design Group

Accelerator Theory and Computation. An Aperture Task Force Meeting was held on February 19 at Fermilab. One of the main issues concerned the actions to be taken for the April aperture interim report. It was decided that the interim report should be discussed with an audience of outside experts in the form of a workshop. The Magnet Error group of the Aperture Task Force held a meeting on February 7 and 8 at LBL to review their progress and to outline a summary report.

The wake field program for impedance calculations is now running on the VAX. A test bellow design was made and its impedance is being studied.

Accelerator Systems. The first meeting of the Operations Task Force (since the January "Workshop on Commissioning and Operations of the SSC") was held at Fermilab on February 26 and 27. Dates for material for the next meeting, March 25 and 26 at Fermilab, were set. So far, there are still no surprising implications to operations resulting from the magnet type.

Two mass spectrometers for the photon-induced gas desorption experiment have arrived at Fermilab. They are installed in the test apparatus, and are being baked-out prior to testing and calibration. The major portion of the beam line front-end has been installed at the NSLS.

Magnet Program. A cost estimating activity was initiated in February. Request for Proposals were sent to six companies with experience in both cryogenics and cost estimating. The scope of work involves consideration of manufacturing plans for typical low and high field designs. The CDG has devised a detailed Work Breakdown Structure for the cost estimating and will supply it together with detailed drawings and specifications of both a superferric and a cosine theta magnet. The drawings and specifications are being collected and reviewed by the CDG to insure uniform standards.

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Conventional Systems. Primary attention was devoted to work on the SSC Siting Document. Frequent meetings were held with the engineering subcontractor (CER Corp.) and the A/E firm (Parsons Brinckerhoff) concerning the development of site parameters and criteria. Following a review of the Reference Designs, an examination of selected technical features was undertaken. This work set the stage for extracting the facility requirements for the collider and led to a thorough study of the information that needs to be provided by states concerning proposed sites. The topics were formulated under the following headings: setting, environment, geology and tunneling, community resources, utilities, climate, and cost and schedule factors.

Meetings were held at Chicago Operations for selecting an A/E firm for the Conceptual Design of the SSC. Four firms were interviewed: DUSAB (Daniel, Urban, Seelye, and Bechtel); Morrison-Knudsen; Parsons, Brinckerhoff, Quade & Douglas; and RTK (Kaiser, Tudor, Keller Gannon-Knight). Thorough presentations were made by each firm or joint venture. A decision by DOE is expected soon. In preparation for initiating work with the selected firm, an evaluation of the scope of work is underway, and a description of the tasks and their priorities is being examined.

## II. Laboratory Programs

BNL. The chief effort this month continued to be fabrication of magnet components and tooling for the first 4.5 m long model magnets based on Reference Design D. First article inspection of coil collars and iron laminations was completed; high homogeneity cable sufficient for the first magnets was successfully cabled at New England Electric Wire Co. (NEEW); preparation of major production tooling continued, including coil winder and curing fixture.

A separate R&D coil winding arrangement was initiated for practice winding with 23 and 30 strand cable, using additional cable prepared for this purpose

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at NEEW. Commencement of winding of actual coils for the model magnets is expected at the end of next month. The collaborative design of a cryostat for Reference Design D was pursued in several working sessions at Fermilab. A cost effective and convenient method for testing "long" magnets was explored in detail; progress also continued to be made on instrumentation for such tests.

Fermilab. The Fermilab Reference Design D cryostat program is proceeding in cooperation with LBL and BNL. The first issue of the Cryostat Design Criteria was made on February 15. The first and subsequent issues will be used as the basis for cryostat designs being carried out at Fermilab. The details of the program to produce full size magnets with cryostats were discussed within the Design D collaboration.

The SSC Design D Cryostat Design Workshop was held at Fermilab on February 5-6, 1985. Representatives of BNL, Fermilab, and LBL, along with industry (General Dynamics) met to share experiences and to provide input information on cryostat designs.

LBL. Magnet D12C-1, the first model of a collared coil with wide cable and the C-5 Design D cross section, was successfully tested and reached 6.2 T at 4.4K and 8.0T at 1.8K. In-coil stresses and collar deformations were monitored from assembly through testing in liquid helium, and compared with predictions.

The first production quantity of the LBL cable was successfully produced at NEEW after introduction of the LBL mandril design; this cable was delivered to BNL for the first 4.5 m models.

Incorporation into the model program to stainless steel collars, molded coils, and improved ends, is proceeding well.

---

Extensive analysis was done on scaling of magnetic field errors, end design, cooldown of magnet strings, and quench propagation.

TAC. Measurements were completed on the first one-meter two-channel magnets and the second 2-in-1 magnet. The same results were obtained as in the tests at BNL on the first magnet thereby lending credibility to the measurement system. There is still a small difference between the measurements of b2 (3 units) and predictions. In the second magnet, all multipoles are as predicted except that b2 differs by seven units. The mu table in POISSON is being adjusted to correct for the above-mentioned three units of b2 in the first magnets. b2 in the second magnet will then be checked.

A one meter 1-in-1 magnet has been constructed in accordance with the latest design modifications; testing will begin in March.

The 25 foot 2-in-1 magnet has been completed and is being prepared for test measurements next month.

## C. Project Cost Data

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Fermi National Accelerator Laboratory	C-3	8
Lawrence Berkeley Laboratory	C-4	9
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TABLE C-1  
CENTRAL DESIGN GROUP - SUPERCOLLIDER  
FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR SERVICES	G & A	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET	
1.1 ADMINISTRATION	35	66	50	151	603	1650
1.2 PROGRAM PLANNING & MANAGEMENT	10	5	7	22	62	425
1.3 ACCELERATOR R & D	13	18	15	46	119	2150
1.4 CONVENTIONAL SYSTEMS DEVELOP.	1	26	13	40	43	1100
CDG TOTAL COSTS	59	115	85	259	827	5325
ESTIMATED COMMITMENTS					328	

TABLE C-2  
BROOKHAVEN NATIONAL LABORATORY - SUPERCOLLIDER  
FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR SERVICES	G & A	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET	
2.1 GENERAL	17	48	27	92	331	800
2.2 MAGNET MODELS	97	23	50	170	922	2200
2.3 TOOLING	24	43	27	94	356	800
2.4 MAGNET MEASUREMENT & DEVEL.	19	6	10	35	187	400
2.5 POWER SUPPLIES & QUENCH PROT.	10	0	4	14	118	280
2.6 CRYOGENIC TESTING	27	1	14	42	228	500
BNL SSC PROGRAM	194	121	132	447	2142	4980
2.7 SUPERCONDUCTOR DEVELOPMENT	25	22	19	66	338	899
2.8 CRYOGENIC SYSTEMS DEVELOPMENT	37	2	19	58	309	771
BNL ACCELERATOR RELATED PROG.	62	24	38	124	647	1670
BNL TOTAL	256	145	170	571	2789	6650
ADDITIONAL COMMITMENTS					435	

TABLE C-3  
 FERMI NATIONAL ACCELERATOR LABORATORY - SUPERCOLLIDER  
 FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR	SERVICES	G & A	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET
3.1 GENERAL	1.7	14.5	5.3	21.5	79.3	340
3.2 MAGNET MODELS	75.7	149.5	74.3	299.5	1363.2	3225
3.3 FACILITY DEVELOPMENT	<u>16.8</u>	<u>23</u>	<u>13.2</u>	<u>53</u>	<u>125.4</u>	<u>340</u>
<b>FNAL SSC PROGRAM</b>	<b>94.2</b>	<b>187</b>	<b>92.8</b>	<b>374</b>	<b>1567.9</b>	<b>3905</b>
-----						
3.4 SUPERCONDUCTOR DEVELOPMENT	-2.1	3.7	0.5	2.1	54.6	400
3.5 CRYOSTAT DEVELOPMENT	79.6	68.1	48.8	196.5	743.9	890
3.6 ACCELERATOR PHYSICS	<u>37.4</u>	<u>49.9</u>	<u>28.9</u>	<u>116.2</u>	<u>330.2</u>	<u>830</u>
<b>FNAL ACCELERATOR RELATED PROG.</b>	<b>114.9</b>	<b>121.7</b>	<b>78.2</b>	<b>314.8</b>	<b>1128.7</b>	<b>2120</b>
-----						
<b>FNAL TOTAL</b>	<b>209.1</b>	<b>308.7</b>	<b>171</b>	<b>688.8</b>	<b>2696.6</b>	<b>6025</b>
<b>ADDITIONAL COMMITMENTS</b>					<b>485.5</b>	

TABLE C-4  
 LAWRENCE BERKELEY LABORATORY - SUPERCOLLIDER  
 FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR	SERVICES	G & A	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET
4.1 GENERAL	4	5	5	14	63	115
4.2 MAGNET MODELS	17	2	9	28	163	395
4.3 ANALYSIS	8	2	5	15	61	125
4.4 INSTRUMENTATION/MEASUREMENTS	<u>6</u>	<u>0</u>	<u>3</u>	<u>9</u>	<u>57</u>	<u>155</u>
<b>LBL SSC PROGRAM</b>	<b>35</b>	<b>9</b>	<b>22</b>	<b>66</b>	<b>344</b>	<b>790</b>
-----						
4.5 ACCELERATOR THEORY	28	65	18	111	384	800
4.6 SUPERCONDUCTOR DEVELOPMENT	<u>4</u>	<u>42</u>	<u>22</u>	<u>68</u>	<u>145</u>	<u>410</u>
<b>LBL ACCELERATOR RELATED PROG.</b>	<b>32</b>	<b>107</b>	<b>40</b>	<b>179</b>	<b>529</b>	<b>1210</b>
-----						
<b>LBL TOTAL</b>	<b>67</b>	<b>116</b>	<b>62</b>	<b>245</b>	<b>873</b>	<b>2000</b>
<b>ADDITIONAL COMMITMENTS</b>					<b>209</b>	

TABLE C-5  
 TEXAS ACCELERATOR CENTER - SUPERCOLLIDER  
 FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR	SERVICES	G & A	EQUIP	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET
5.1 GENERAL	0	46.5	15.5		62	194.5	825
5.2 SHORT MAGNET MODELS	34.4	109.8	7.8		152	403.5	1150
5.3 LONG MAGNET MODELS	12.3	0	0		12.3	60.9	1660
5.4 TOOLING	0	0	0		0	0	630
5.5 THEORETICAL ANALYSIS	2.5	0	0		2.5	12.2	130
5.6 FACILITY DEVELOPMENT	0	0	0	10.5	10.5	68.2	605
	----	----	----	----	----	----	----
TAC SSC PROGRAM	49.2	156.3	23.3	10.5	239.3	739.3	5000

\*ADJUSTMENTS TO FIGURES REPORTED LAST MONTH HAVE BEEN MADE DUE TO CLOSE OUT OF THE CONTRACT YEAR.

TABLE C-6  
 PROGRAM SUMMARY - SUPERCOLLIDER  
 FEBRUARY 1985 COST REPORT (K\$)

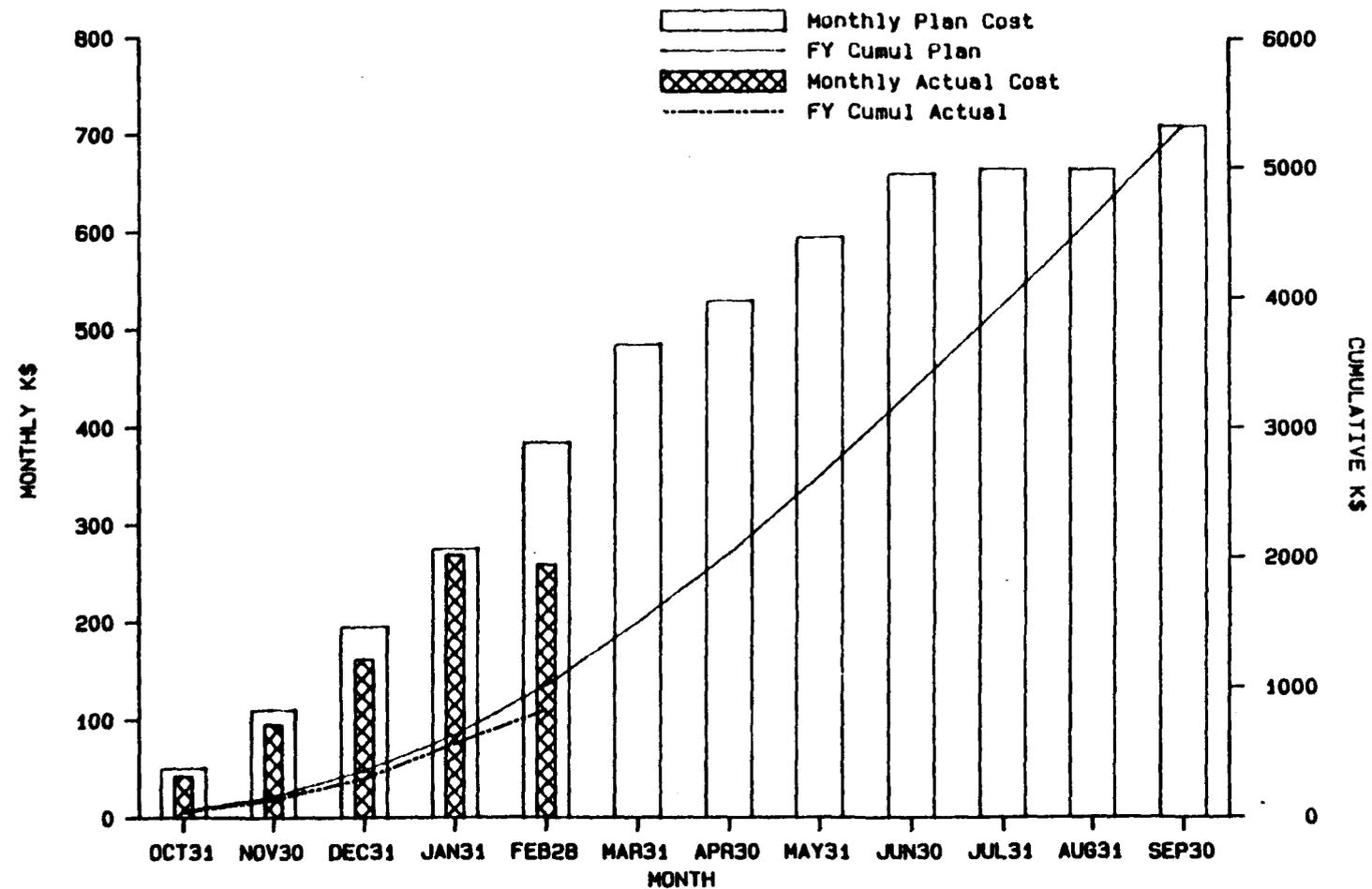
PROGRAM ELEMENT	MAT'L & LABOR	SERVICES	G & A	EQUIP	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET
1. CDG PROGRAM	59	115	85		259	827	5325
2. BNL SSC PROGRAM	194	121	132		447	2142	4980
3. FNAL SSC PROGRAM	94.2	187	92.8		374	1567.9	3905
4. LBL SSC PROGRAM	35	9	22		66	344	790
5. TAC SSC PROGRAM	49.2	156.3	23.3	10.5	228.8	739.3	5000
	----	----	----	----	----	----	----
TOTAL SSC PROGRAM	431.4	588.3	355.1	10.5	1374.8	5620.2	20000

TABLE C-7  
 SSC RELATED ACCELERATOR PROGRAM SUMMARY  
 FEBRUARY 1985 COST REPORT (K\$)

PROGRAM ELEMENT	MAT'L & LABOR	SERVICES	G & A	EQUIP	MONTH TOTAL	YEAR TO DATE	ANNUAL BUDGET
1. BNL SSC PROGRAM	62	24	38		124	647	1670
2. FNAL SSC PROGRAM	114.9	121.7	78.2		314.8	1128.7	2120
3. LBL SSC PROGRAM	32	107	40		179	529	1210
	----	----	----	----	----	----	----
TOTAL SSC RELATED ACCEL PROG	208.9	252.7	156.2	0	617.8	2304.7	5000

# 1.0 CENTRAL DESIGN GROUP - SUPERCOLLIDER

Planned vs. Actual Costs for FY 1985



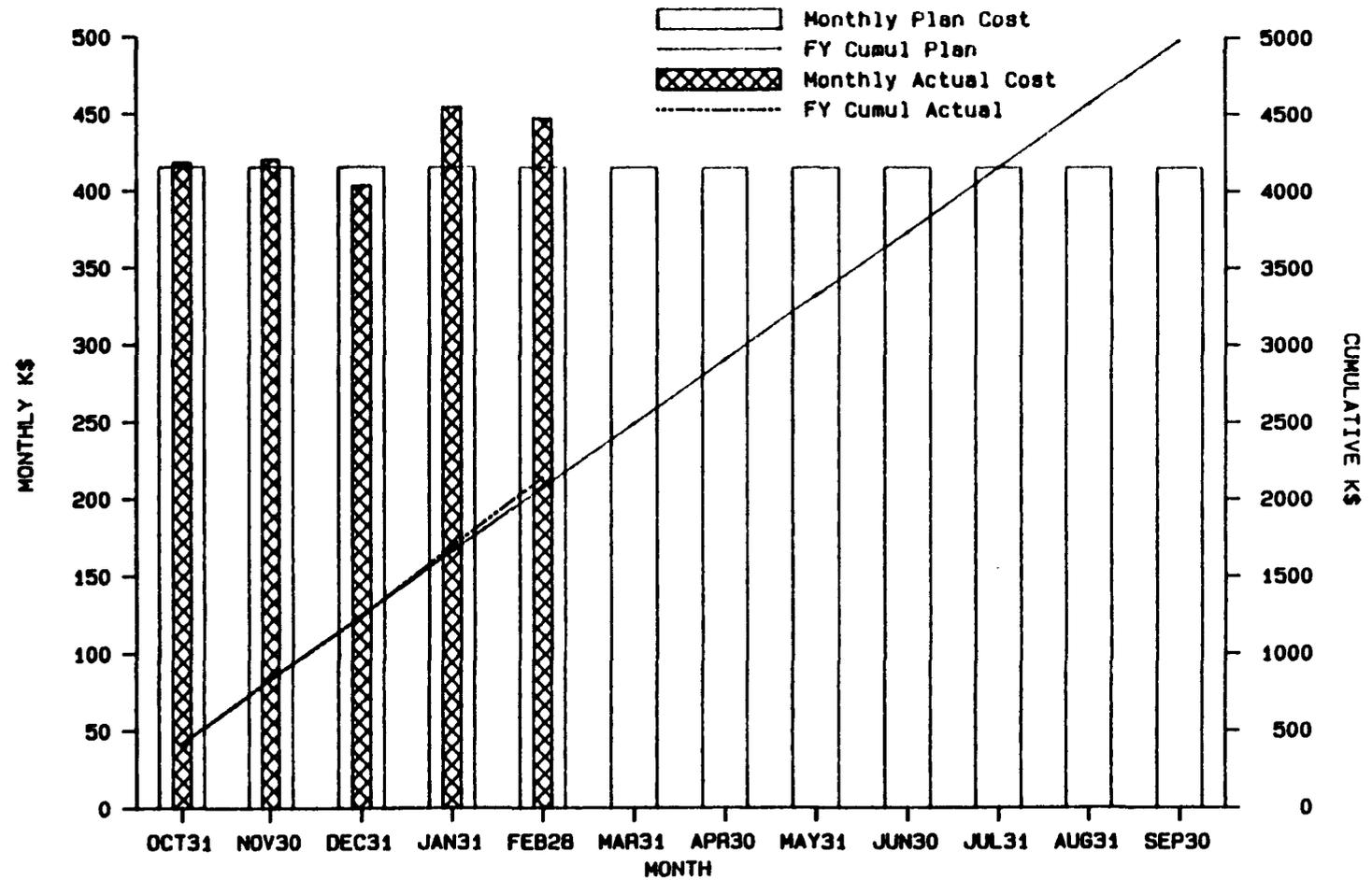
FISCAL YEAR 1985												
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	50	110	195	275	385	485	530	595	660	665	665	710
FY Cumul Plan	50	160	355	630	1015	1500	2030	2625	3285	3950	4615	5325
Monthly Actual	42	95	162	269	259							
FY Cumul Actual	42	137	299	568	827							

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(JSZ)  
3:26 pm  
27-MAR-85

Fig. 1

## 2.0 BROOKHAVEN NAT'L LAB - SUPERCOLLIDER

Planned vs. Actual Costs for FY 1985



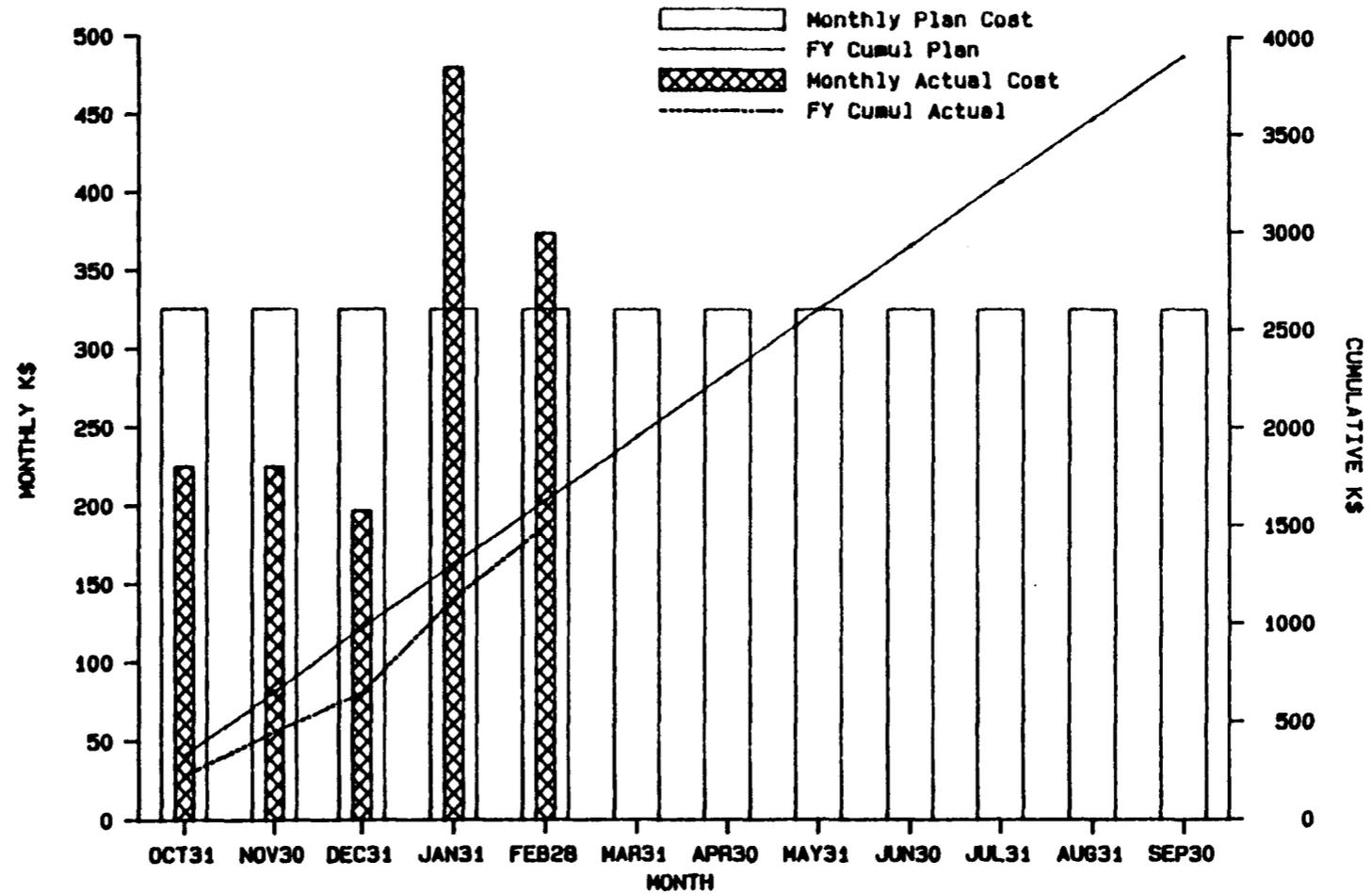
	FISCAL YEAR 1985											
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	415	415	415	415	415	415	415	415	415	415	415	415
FY Cumul Plan	415	830	1245	1660	2075	2490	2905	3320	3735	4150	4565	4980
Monthly Actual	418	420	403	454	447							
FY Cumul Actual	418	838	1241	1695	2142							

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(JSZ)  
3:27 pm  
27-MAR-85

Fig. 2

### 3.0 FERMI NAT'L ACCEL LAB - SUPERCOLLIDER

Planned vs. Actual Costs for FY 1985



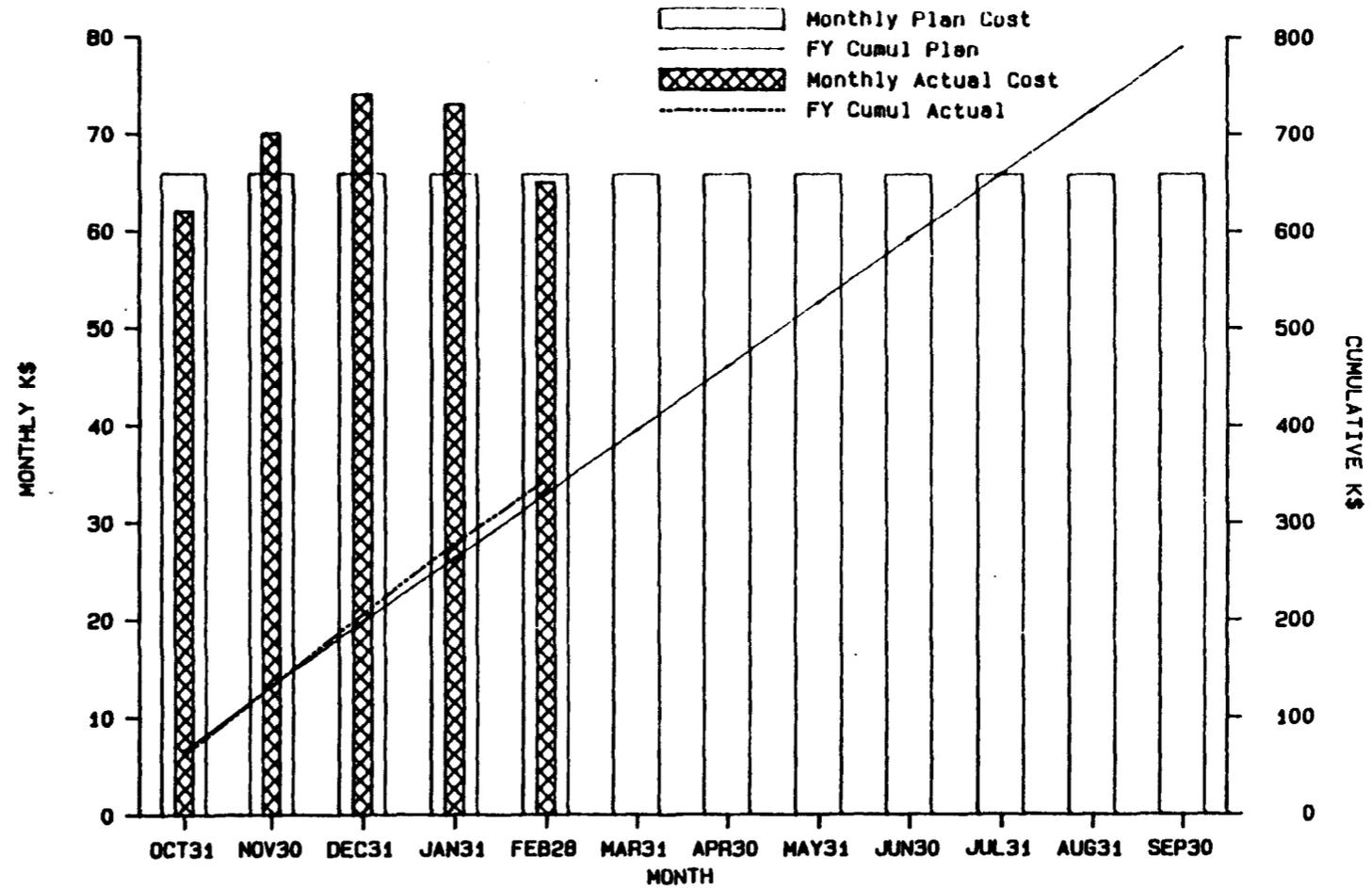
	FISCAL YEAR 1985											
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Monthly Plan	325	325	325	325	325	325	325	325	325	325	325	325
FY Cumul Plan	325	650	975	1300	1625	1950	2275	2600	2925	3250	3575	3900
Monthly Actual	225	225	197	480	374							
FY Cumul Actual	225	450	647	1127	1501							

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(JSZ)  
3:28 pm  
27-MAR-85

Fig. 3

# 4.0 LAWRENCE BERKELEY LAB - SUPERCOLLIDER

Planned vs. Actual Costs for FY 1985



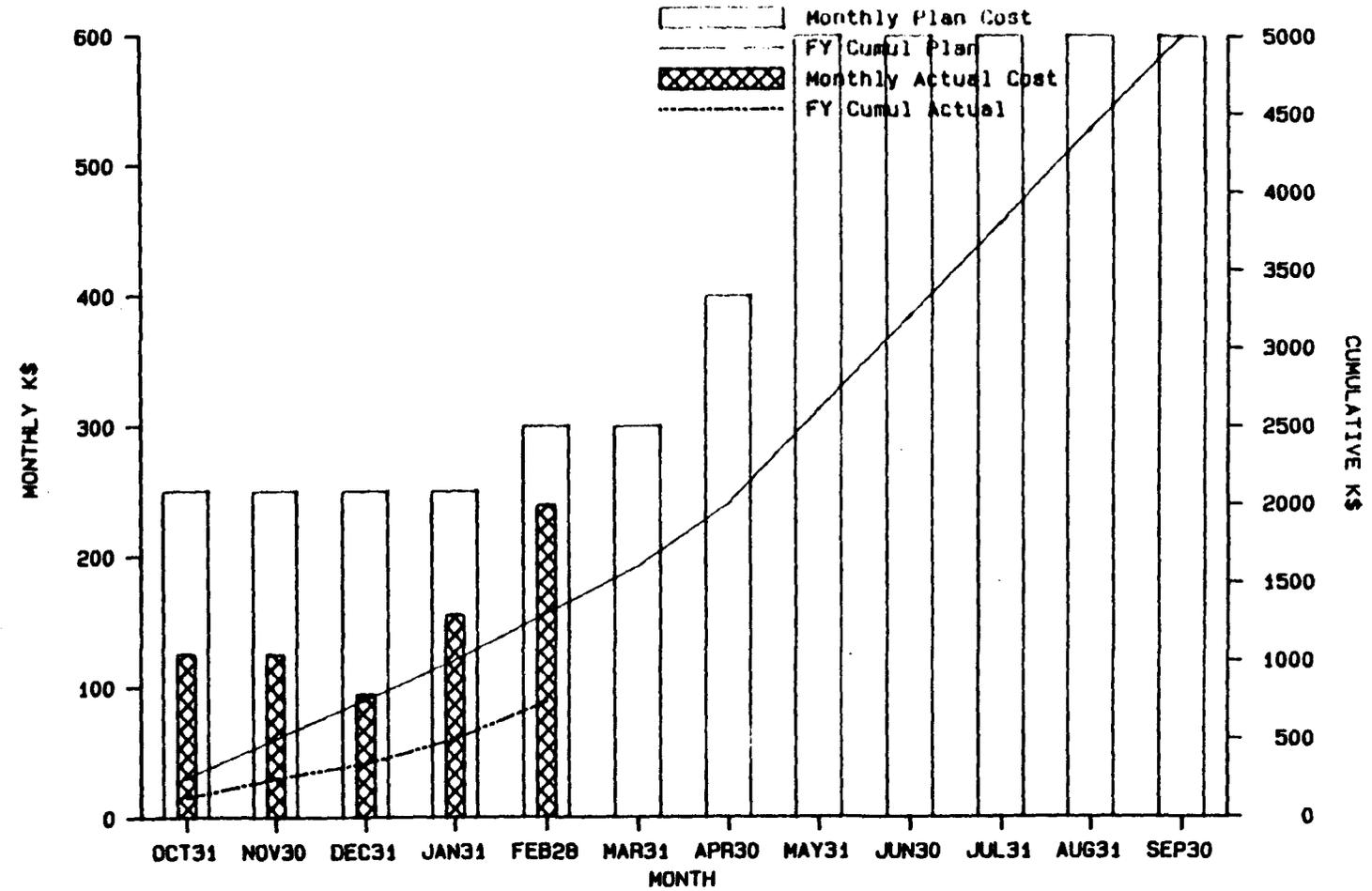
FISCAL YEAR 1985												
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Monthly Plan	66	66	66	66	66	66	66	66	66	66	66	66
FY Cumul Plan	66	132	198	263	329	395	461	527	593	658	724	790
Monthly Actual	62	70	74	73	65							
FY Cumul Actual	62	132	206	279	344							

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(JSZ)  
3: 28 pm  
27-MAR-85

Fig. 4

# 5.0 TEXAS ACCELERATOR CENTER - SUPERCOLLIDER

## Planned vs. Actual Costs for FY 1985



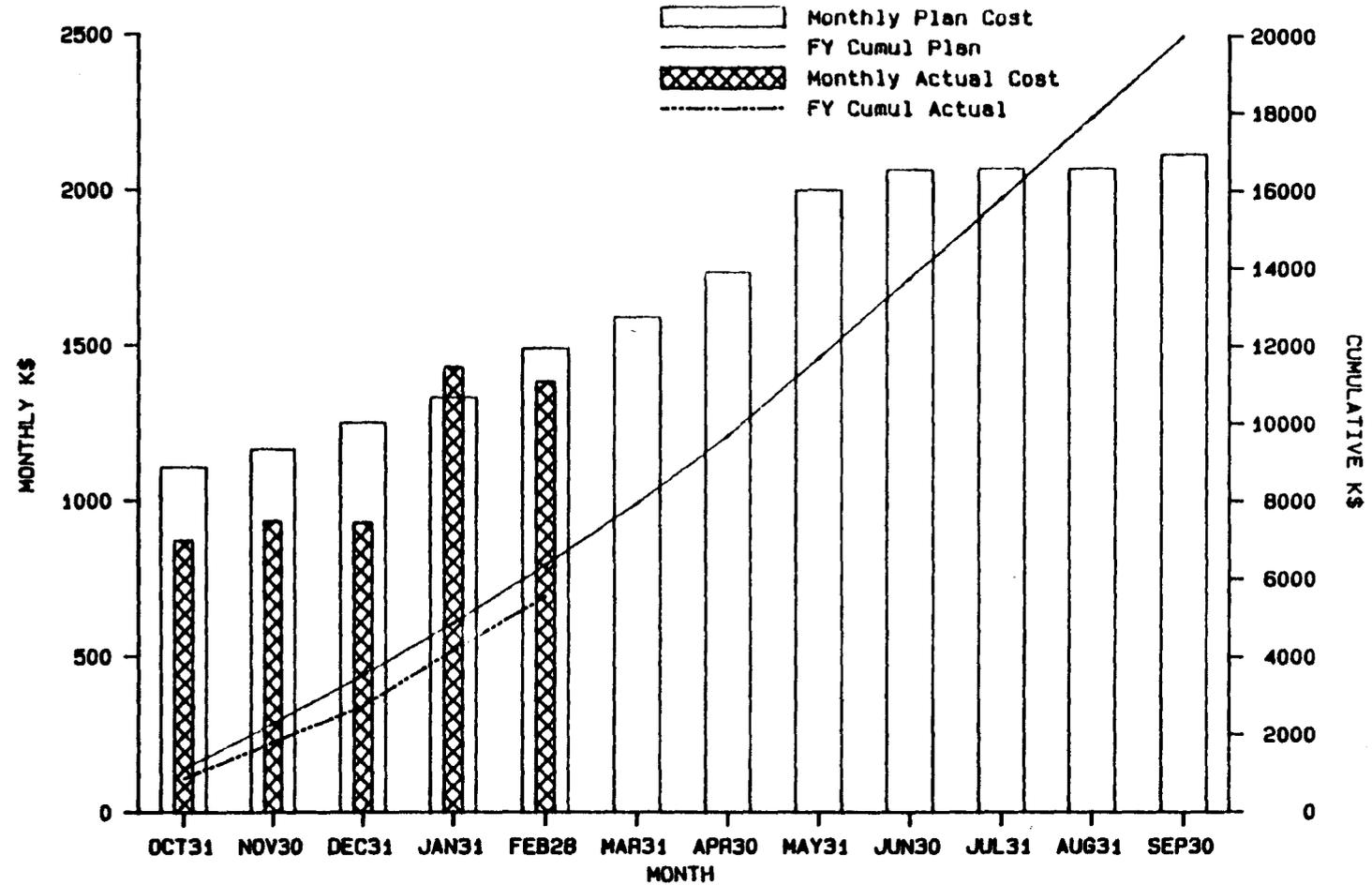
FISCAL YEAR 1985												
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	250	250	250	250	300	300	400	600	600	600	600	600
FY Cumul Plan	250	500	750	1000	1300	1600	2000	2600	3200	3800	4400	5000
Monthly Actual	125	125	94	155	239							
FY Cumul Actual	125	250	345	500	739							

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(JSZ)  
3:29 pm  
27-MAR-85

Fig. 5

# 0.0 PROGRAM SUMMARY - SUPERCOLLIDER

Planned vs. Actual Costs for FY 1985



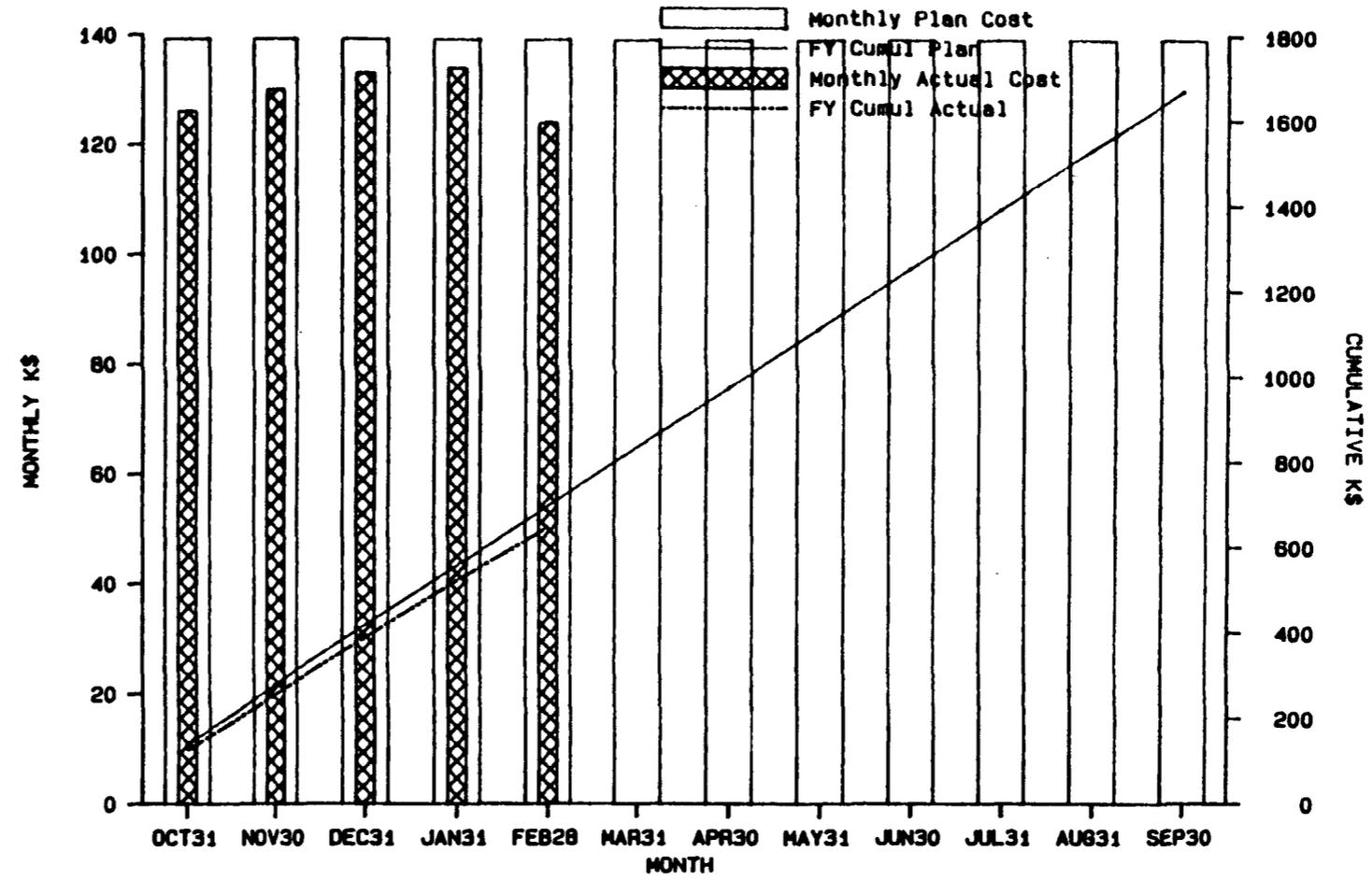
FISCAL YEAR 1985												
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	1106	1166	1251	1331	1491	1591	1736	2001	2066	2071	2071	2116
FY Cumul Plan	1106	2273	3524	4855	6346	7938	9674	11675	13741	15813	17884	20000
Monthly Actual	872	935	930	1431	1384							
FY Cumul Actual	872	1807	2738	4169	5553							

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(JSZ)  
3: 25 pm  
27-MAR-85

Fig. 6

## 2.0 BROOKHAVEN NAT'L LAB. RELATED ACCEL PROG

Planned vs. Actual Costs for FY 1985



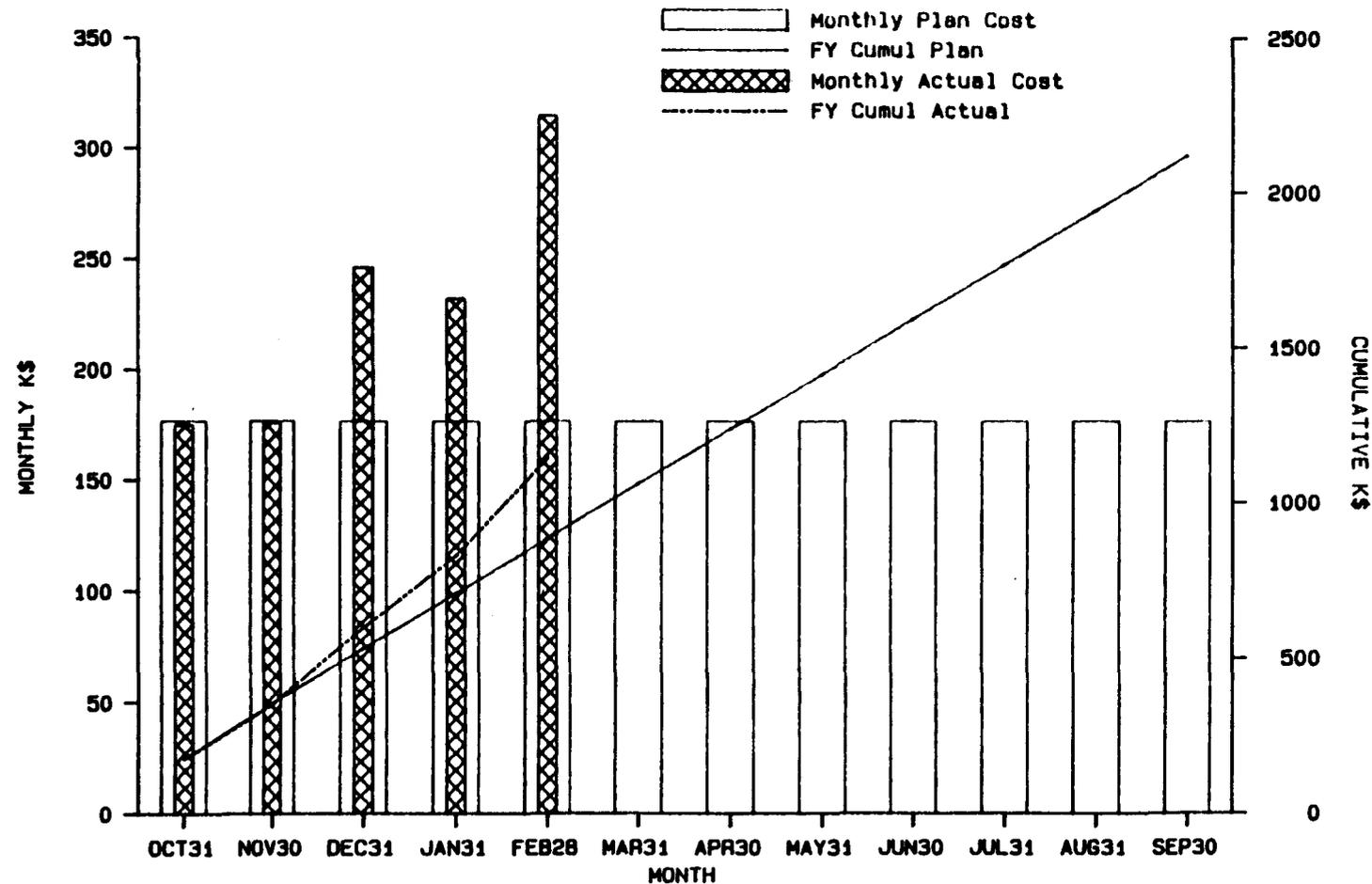
	FISCAL YEAR 1985											
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	139	139	139	139	139	139	139	139	139	139	139	139
FY Cumul Plan	139	278	418	557	696	835	974	1113	1253	1392	1531	1670
Monthly Actual	126	130	133	134	124							
FY Cumul Actual	126	256	389	523	647							

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(JSZ)  
3:31 pm  
27-MAR-85

Fig. 7

### 3.0 FERMI NAT'L ACCEL LAB, RELATED ACCEL PROG

Planned vs. Actual Costs for FY 1985



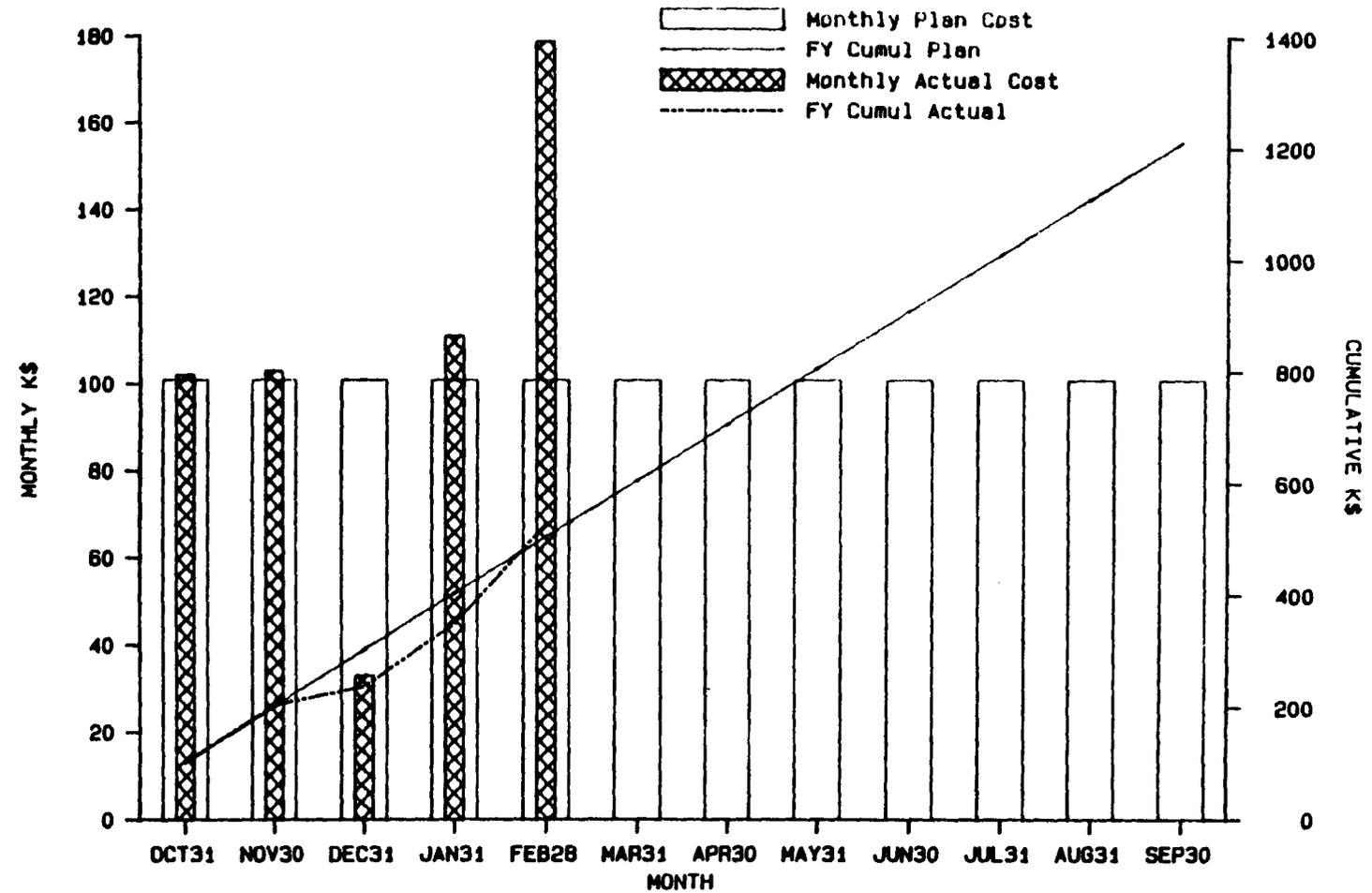
		FISCAL YEAR 1985											
		OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan		177	177	177	177	177	177	177	177	177	177	177	177
FY Cumul Plan		177	353	530	707	883	1060	1237	1413	1590	1767	1943	2120
Monthly Actual		175	176	246	232	315							
FY Cumul Actual		175	351	597	829	1144							

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(JSZ)  
3:31 pm  
27-MAR-85

Fig. 8

### 4.0 LAWRENCE BERKELEY LAB, RELATED ACCEL PROG

Planned vs. Actual Costs for FY 1985



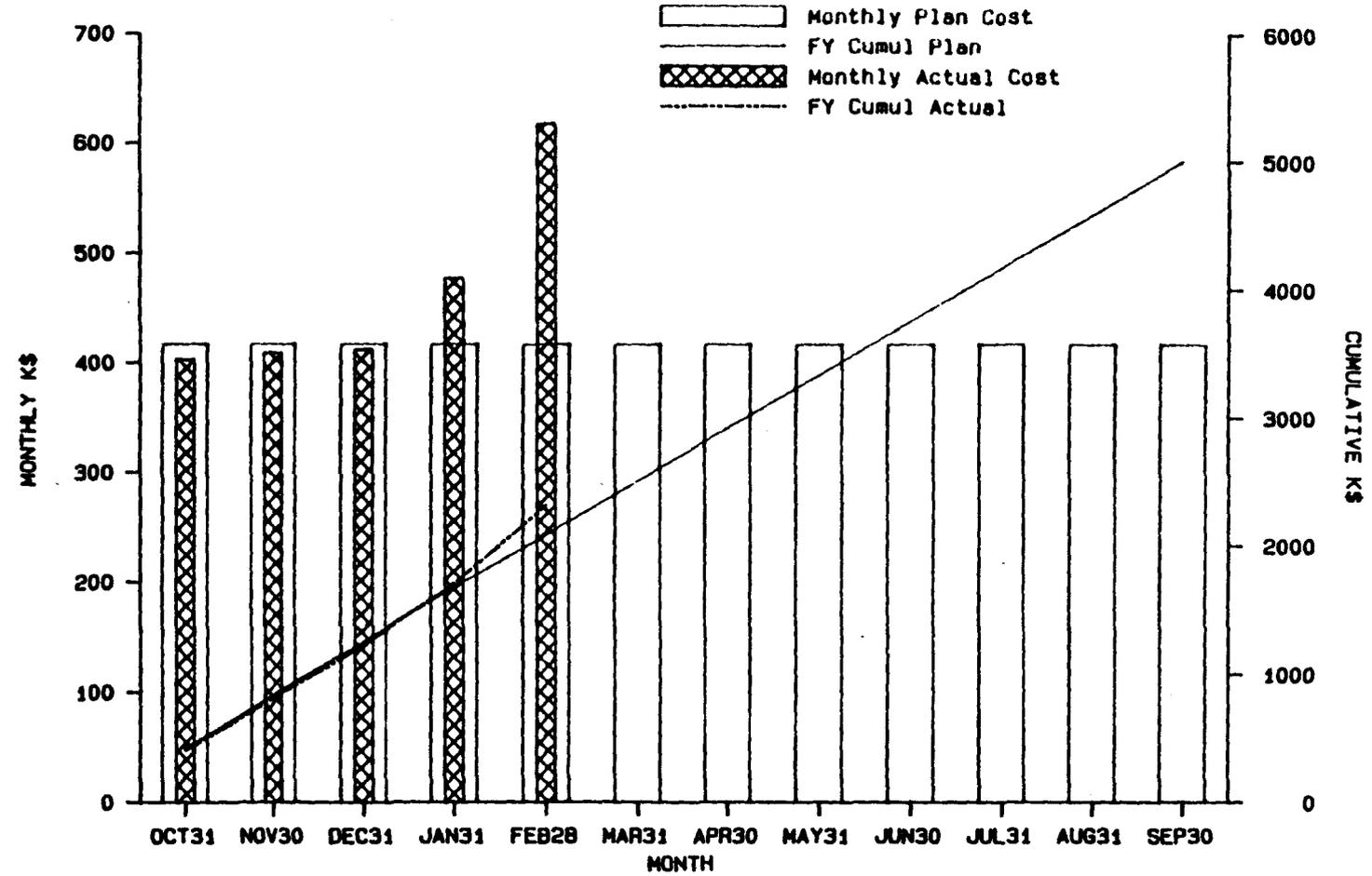
FISCAL YEAR 1985												
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	101	101	101	101	101	101	101	101	101	101	101	101
FY Cumul Plan	101	202	303	403	504	605	706	807	908	1008	1109	1210
Monthly Actual	102	103	33	111	179							
FY Cumul Actual	102	205	238	349	528							

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(JSZ)  
3:32 pm  
27-MAR-85

Fig. 9

### 0.0 SSC RELATED ACCELERATOR PROGRAM SUMMARY

Planned vs. Actual Costs for FY 1985



FISCAL YEAR 1985												
	OCT31	NOV30	DEC31	JAN31	FEB28	MAR31	APR30	MAY31	JUN30	JUL31	AUG31	SEP30
Monthly Plan	417	417	417	417	417	417	417	417	417	417	417	417
FY Cumul Plan	417	833	1250	1667	2083	2500	2917	3333	3750	4167	4583	5000
Monthly Actual	403	409	412	477	618							
FY Cumul Actual	403	812	1224	1701	2319							

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(JSZ)  
3:30 pm  
27-MAR-85

Fig. 10