



"The submitted manuscript has been authored by a contractor of the U.S. Government under contract No. DE-AC05-84OR21400. Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes."

SIX MONTHS R&D REVIEW FOR WBS K

- K*01 FASTENERS, FLANGES, CONNECTORS
- KA01 GENERAL PURPOSE MANIPULATOR

CONF-8706215--1-Vugraphs

DE87 012931

P. T. SPAMPINATO

FUSION ENGINEERING DESIGN CENTER/GRUMMAN CORPORATION

PRINCETON PLASMA PHYSICS LABORATORY

JUNE 9, 1987

DISCLAIMER

* Research sponsored by the Office of Fusion Energy, U.S. Department of Energy, under contract DE-AC05-84OR21400 with Martin Marietta Energy Systems, Incorporated.

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

EBB MASTER



WBS K: EX-VESSEL REMOTE MAINTENANCE

WORK PACKAGE K*01: REMOTE FASTENERS, FLANGES, CONNECTORS

STATUS: JANUARY - MARCH 1987

THE FOCUS OF THIS ACTIVITY IS TO DEVELOP A DRAFT OF THE CIT REMOTE MAINTENANCE DESIGN GUIDEBOOK, SUPPORT MOCKUP DEMO #1, AND DEVELOP MOCKUP DEMO #2.

- REVIEWED ORNL/FRD MANUAL AND EARLY DRAFT OF JET MANUAL
- STUDIED ACCESS REQUIREMENTS AND PRELIMINARY HARDWARE FOR DIAGNOSTIC VACUUM PIPES
 - REVISED UPPER IGLOO SHIELD CONFIGURATION
- ELECTRICAL CONNECTORS
 - LEMO (JET)
- MOCKUP DEMO #2 WAS TO DEMONSTRATE REMOTE HANDLING OF THE HYDRAULIC JACK TEST ASSEMBLY
 - ALTERNATE DEMONSTRATIONS WERE CONSIDERED



8182

COST CENTER

K*01

WORK PACKAGE

1002

JOB NUMBER

CIT
JOB ESTIMATE PROPOSAL
NETWORK AND RESOURCE PLAN

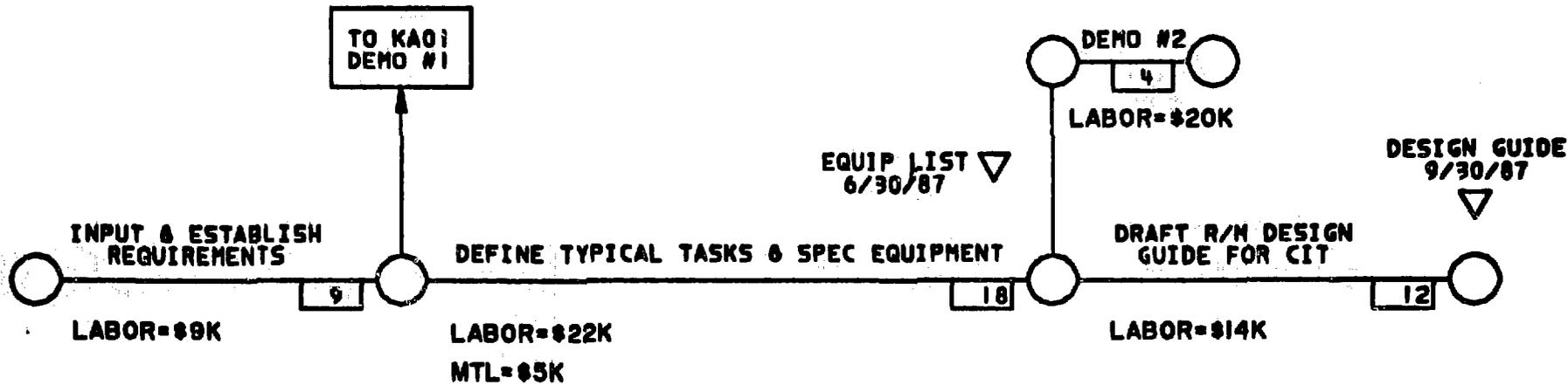
SHEET C
PAGE 1 OF 1
DATE: 1/9/87

REMOTE MAINTENANCE FASTENERS, FLANGES AND CONNECTORS

START
↓
1/1/87

DEMO #2 PLAN
6/1/87
▽

TO KA01
DEMO #1





WORK PACKAGE K*01: REMOTE FASTENERS, FLANGES, CONNECTORS (CONTINUED)

PLANS: APRIL - SEPTEMBER 1987

- ISSUE FIRST DRAFT OF R/M DESIGN GUIDEBOOK (9/87)
 - MODELLED AFTER JET
 - EMPHASIS ON CONNECTIONS AND MANIPULATORS
- DESIGN AND FABRICATE MOCKUP DEMO #2
 - ADD IGLOO FRAMES AND SHIELD MODULE TO DEMO #1 FOR REACH AND VIEWING STUDIES; DESIGN COMPLETED 5/87
 - MODIFIED VACUUM FLANGE TO STUDY ALIGNMENT AND SEAL POSITIONING; INCLUDES VACUUM TESTS
 - SCHEDULED FOR FIRST AND LAST WEEKS OF JULY; ISSUE REPORT
- PROCURE CEFILAC COUPLINGS/SEALS FOR 2" AND 4" PIPES

PROBLEM:

- MOST OF THE MARCH COSTS SHOULD HAVE BEEN CHARGED TO KA01



WORK PACKAGE KA01: GENERAL PURPOSE FORCE-REFLECTING SERVO-MANIPULATORS

STATUS: JANUARY - MARCH 1987

THE FOCUS OF THIS ACTIVITY IS TO DEFINE THE PERFORMANCE LIMITS OF MANIPULATORS AND THE IMPACT TO MACHINE AND COMPONENT DESIGNS. TWO MOCKUP DEMONSTRATIONS USING THE ORNL M-2 MANIPULATOR ARE PLANNED.

- REVIEWED COMMERCIALY AVAILABLE MANIPULATOR EQUIPMENT
- MORE THAN ONE TEST CELL SYSTEM IS NEEDED FOR FULL COVERAGE
- MODELLED M-2, ASM, RM-10 MANIPULATORS INTO CATIA GRAPHICS
- DESIGNED/FABRICATED DEMO #1 MOCKUP OF UPPER MACHINE QUADRANT, INCLUDING DIAGNOSTIC VACUUM PIPES
- DEVELOPED PLANS FOR DEMO #3 MOCKUP OF RF MODULE AND MIDPLANE PORT



8182

COST CENTER

KA01

WORK PACKAGE

1003

JOB NUMBER

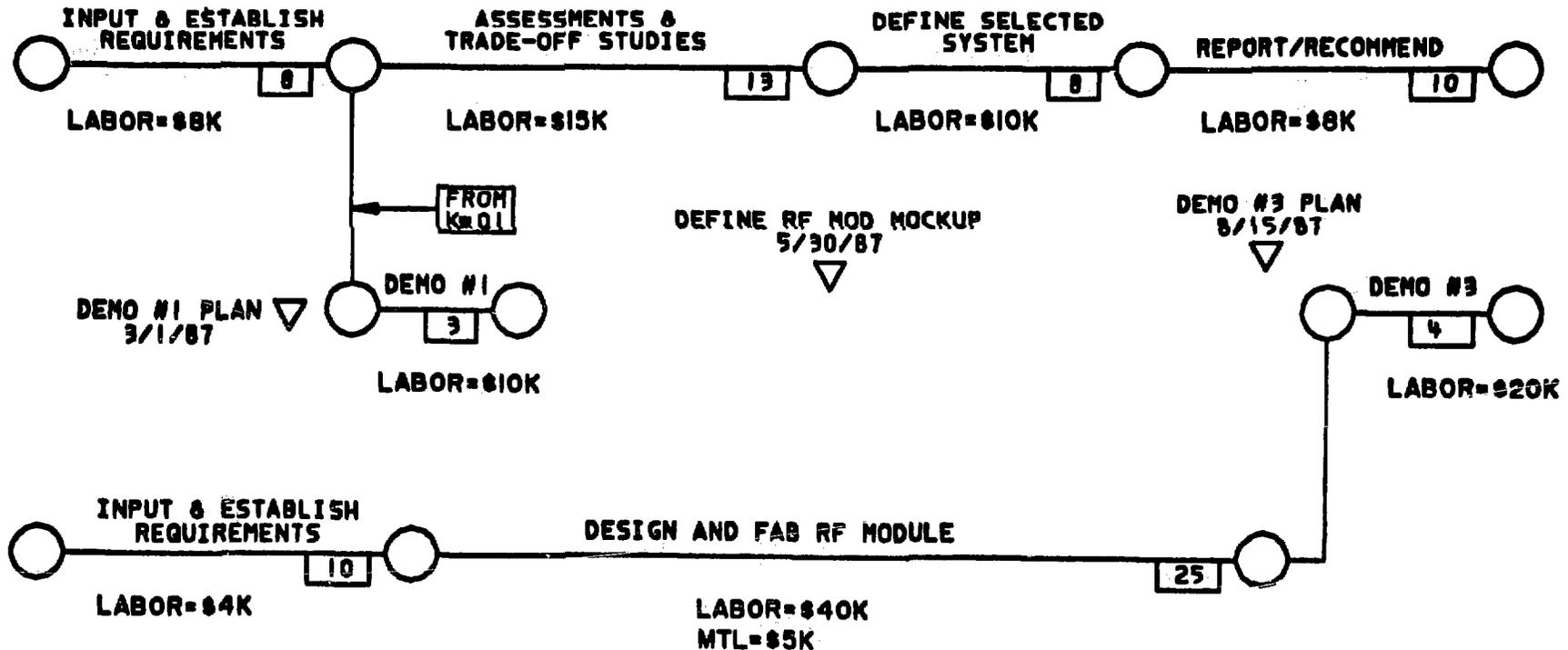
CIT
JOB ESTIMATE PROPOSAL
NETWORK AND RESOURCE PLAN

SHEET C
PAGE 1 OF 1
DATE: 1/9/87

GENERAL PURPOSE FORCE-REFLECTING SERVO-MANIPULATORS

START
1/1/87

PRELIMINARY
REPORT
9/30/87





WORK PACKAGE KAO1: GENERAL PURPOSE FORCE-REFLECTING SERVO-MANIPULATORS (CONT)

PLANS: APRIL - SEPTEMBER 1987

- DEMO #1
 - ASSEMBLY/DISASSEMBLY OF VACUUM PIPES AT ORNL FACILITY IN APRIL
 - ISSUE REPORT IN MAY
 - PROVIDE INPUT TO DEMO #2

- DEMO #3
 - DESIGN AND FABRICATE RF MODULE AND SUPPORT STAND
 - DESIGN AND FABRICATE MIDPLANE PORT AND THERMAL SHIELD
 - DEMONSTRATE ASSEMBLY/DISASSEMBLY IN SEPTEMBER; ISSUE REPORT

- ESTABLISH PRELIMINARY REQUIREMENTS FOR TEST CELL MANIPULATOR SYSTEM



6 MONTHS COST PERFORMANCE DATA FOR WBS H AND K

WORK					6 MOS.	FY 87	SCH		COST	
<u>PKG. NO.</u>	<u>TITLE</u>	<u>BCWS</u>	<u>BCWP</u>	<u>ACWP</u>	<u>COMMIT.</u>	<u>BUDGET</u>	<u>VAR</u>	<u>SPI</u>	<u>VAR</u>	<u>CPI</u>
H*01	HYD. PRESS	44	4	1	1	120	-40	0.09	3	2.86
K*01	REM. FAST..	15	15	37	37	70	0	1.00	-23	0.40
	FLGS, CONN.									
KA01	G.P. MANIP.	33	17	21	21	120	-16	0.52	-4	0.81

SCH. VAR. = BCWP - BCWS

SPI = BCWP / BCWS (SCHEDULE PERFORMANCE INDEX)

COST VAR. = BCWP - ACWP

CPI = BCWP / ACWP (COST PERFORMANCE INDEX)



FUSION ENGINEERING DESIGN CENTER

CIT/WBS K R&D ACTIVITIES FOR FY 1987

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>
K*01 (Jan. 19 doc.)	4.4	4.0	6.3	6.6	6.3	6.6	22.8	7.9	51
Cumulative		8.4	15.1	21.7	28.0	34.6	57.4	65.3	70.4
KA01 (Jan. 19 doc.)	6.2	7.0	19.4	13.0	12.4	13.4	10.9	24.2	24.2
Cumulative		13.2	32.6	45.6	58.0	71.4	84.8	95.7	119.9
Combined K*01, KA01	10.6	11.0	25.7	19.6	18.7	20.0	36.2	18.8	29.3
Cumulative		21.6	47.3	66.9	85.6	105.6	141.8	160.6	189.8
<hr/>									
ORNL Estimate	10.5	10.5	20.2	30.2	27.2	24.2	31.0	8.0	28.0
Cumulative		21.0	41.2	71.4	98.6	122.8	153.8	161.8	189.8
<hr/>									
<u>Reported Costs</u>									
K*01	3.8	3.6	29.8	5.3	6.4				
		7.4	37.2	42.5	48.9				
KA01	8.6	5.3	6.8	3.2	7.0				
		13.9	20.7	23.9	30.9				
Combined	12.4	8.9	36.6	8.5	13.4				
		21.3	57.9	66.4	79.8				