

HISTORICAL DATA BANK/PACM

OVERVIEW

HISTORICAL INFO/COST RESEARCH
ORGN. 9230

AGENDA

- 0 BACKGROUND/CHARTER
- 0 HISTORICAL DATA BANK
- 0 COST RESEARCH ANALYSIS
- 0 PACM

BACKGROUND

- 0 JUNE 1981 - CORPORATE POLICY 6S1 WAS ISSUED
- 0 AUGUST 1982 - OAS/CM1 (MIA) DATA BASE WAS RELEASED
- 0 SEPTEMBER 1982 - PROPOSAL OVERSIGHT COMMITTEE ESTABLISHED BY CHESNUT
(C. BROWN, CHAIRMAN)
- 0 DECEMBER 1982/SEPT 1983 - SUBMITTED 3 FIRM MAJOR PROPOSALS USING PACM
 - CRSL COMPETITION
 - MRASM FSD
 - STRAT RADAR PRODUCTION
- 0 OCTOBER 1983 - HISTORICAL INFORMATION COST RESEARCH GROUP WAS ESTABLISHED
- 0 NOVEMBER 1983 - NEW SECTION ADDED TO DCAA AUDIT POLICY "PARAMETRIC ESTIMATES"
- 0 1984 - ADDED MORE PROGRAMS TO DATA BANK
- 0 1985 - FORMALLY DOCUMENTED SYSTEM
- 0 1986 - COST ELEMENT STANDARDIZATION; IMPROVING NON-COST DATA COLLECTION;
TRAINING
- 0 1987 - SUPPORT DATA USAGE

- CORPORATE POLICY 6S1 HIGHLIGHTS

- o ALL BOEING OPERATING ORGANIZATIONS WILL:

- 1) CAPTURE AND RETAIN PROGRAM HISTORICAL DATA

- COST
- PROGRAM
- PRODUCT

- 2) ACCOMPLISH BASIC COST RESEARCH

- TOOLS
- TECHNIQUES

- 3) MAKE INFORMATION AVAILABLE TO OTHER COMPANY MANAGERS AS APPROPRIATE

DCAA AUDIT POLICY - REVIEW OF PARAMETRIC COST ESTIMATES

using unit, dollar cost to type

- 0 USE OF PARAMETRICS IN PRICING & NEGOTIATING PROPOSALS
 - REDUCED ESTIMATING AND NEGOTIATION COSTS
 - HOWEVER ENTIRE NEW MANAGEMENT SYSTEMS MAY HAVE TO BE DEVELOPED

- 0 DATA USED IN PARAMETRIC ESTIMATES MUST BE:
 - ACCURATE, CURRENT RECONCILED TO SOURCE DOCUMENTATION
 - COMPARABLE TO WORK BEING ESTIMATED
 - STATISTICAL TESTED
 - EVALUATED AND DOCUMENTED PRIOR TO PROPOSAL SUBMISSION

- 0 CER'S MUST BE LOGICAL
 - CONSIDER ALL ALTERNATIVE VARIABLES

EXAMPLES: WEIGHT, DRAWING COUNT, TOOL COUNTS, COMPLEXITY

- 0 CONTRACTOR MAY USE COMPLEXITY FACTOR
 - MUST BE SUPPORTABLE

Cost Estimating Relationship

BMAC HISTORICAL DATA BANK DOCUMENTATION

0 HISTORICAL DATA BANK SYSTEM METHODS MANUAL D500-10595-6

0 EIS/BMAC WICHITA STRUCTURES DOCUMENTS

- B-52 OAS/CM1 D500-10019-1
- B-52 STRATEGIC RADAR D500-10544-1
- KC-135 RE-ENGINE D458-58916-3
- B-52 ALQ 117/172 D500-10845-1
- B-52 SYSTEMS ECP D500-10511-1
- B-52 ICSMS D500-11075-1
- WICHITA NEW AIRPLANE PROGRAM D500-11035-1 *757-761*
- CSRL D500-11076-1
- COMPANY WIDE D500-11105-1
- WST D291-60282
- A6 D500-11407-1
- EC135 D500-11306-1
- B1B AVIONICS D500-11597-1

*Wichita
757-761
7/1/60*

J. STARS

DATA BANK RETREIVAL FORMATS

0 FORMAT

- CALL TYPE REPORT CLASS BLOCK WBS FAMILY:

0 EXAMPLES

- CALL CETI	REPORT	MIA	LOT3	T	AC:
- CALL CE	REPORT	MIA	CMIFSD	D	AE:
- CALL PETI	REPORT	MIA	OASCM I	T	PR:
- CALL PE	REPORT	MIA	OASCM I	ACAB	PN:
- CALL WBCE	REPORT	SR	SRFSD	AE	82:

AS OF 10-3-85 COST ELEMENTS BY WBS REPORT
 CRUISE MISSILE INTEGRATION FULL SCALE DEVELOPMENT -0108

CE-WBS	B	TEST AND EVALUATION
TOTAL ENGINEERING HOURS		679,409
SYSTEMS ENGINEERING		43,734
DESIGN & DEVELOPMENT		31,339
HARDWARE DESIGN		21,540
ELECTRICAL/AVIONICS DESIGN		6,509
SOFTWARE DESIGN		
DESIGN TECH & SYSTEM DEV. (CAD)		100
OTHER DESIGN		3,110
LOGISTICS		1,895
LOGISTICS ENGINEERING		1,511
ON-SITE ILS		1,511
OFF-SITE ILS		
ILS R & E		
PUBLICATIONS		384
SPARES ENGINEERING		
DIRECT DISTRIBUTABLES		14,237
PROGRAM MANAGEMENT		1,064
S&C/CIS/OPS		6,338
SUPERVISION & CLERICAL		4,371
COSTS & SCHEDULES		824
ENGINEERING OPERATIONS		1,143
METROLOGY/LAB PLANNING		1,143
OTHER D.D. (INCL-AAB)		1,143
PRODUCT SUPPORT BATCH PROCESSORS		4,892
LIAISON		
SYSTEMS TEST		3,439
ON-SITE TEST		436,453
ON-SITE PROGRAM TEST		191,385
ON-SITE FLIGHT TEST		
OFF-SITE TEST		
SUPPORT		245,068
BUSINESS ADMIN. & OTHER SUPPORT		49,854
ON-SITE		9,925
OFF-SITE		5,290
SUBCONTRACT MANAGEMENT		4,635
SUBCONT. MGMT. ON-SITE		
SUBCONT. MGMT. OFF-SITE		
BMAC-AAB (ADVANCED AIRPLANE BRANCH)		39,929
SYSTEMS ENGINEERING		8,974
HARDWARE & ELECTRICAL DESIGN		21,162
SOFTWARE DESIGN		2,988
SYSTEMS TEST		4,773
SUPPORT & OTHER		2,112
BCS S/M LABOR SUPPORT (NOT IN ROLLUP)		
TECHNOLOGY STAFF		98,319
TEST & LABS		61,574
AVIONICS		3,368
PROPULSION & AIRCRAFT SYSTEMS		3,744
FLIGHT CONTROLS		965
AERODYNAMICS		11,573
STRUCTURES, MATERIALS, & STANDARDS		17,093
WEAPONS INTEGRATION		
SUSTAINING		137

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AS OF 12-31-86

(WBS BY COST ELEMENT REPORT
 B52 STRATEGIC RADAR FSED (F33657-82-C-2212)

753XX org. (A/10/1/86)

WBS*CE

AE 82

AVIONICS

WBS*CE	AE 82	AVIONICS
T	TOTAL B52 S.R. SYSTEM	8,694
A	PRIME MISSION EQUIPMENT	6,362
AA	SENSORS	5,006
AAA	RADAR RMS UPDATE	4,998
AAAA	ANTENNA MODIFICATION	4,995
AAAAJ	PILOT/COPILOT CLEARANCE PLANE	3
AAC	SPECIAL TEST EQUIPMENT (STE)	8
AACG	OTHER STE	8
AD	AUXILIARY EQUIPMENT	1,356
ADA	RADAR GROUP A KIT	1,356
ADAA	MECHANICAL GROUP A	1,350
ADAC	WAVEGUIDE GROUP A	6
C	SUPPORT EQUIPMENT	195
CA	ORGANIZATIONAL & INTERMEDIATE	195
CAM	PREPRODUCTION SE (PROTOTYPE RST)	195
D	SYSTEM TEST & EVALUATION	129
DA	DEVELOPMENT T&E	22
DAB	CONTRACTOR TESTING	22
DC	LAB TEST	107
DCD	RADAR LAB	11
DCDA	STE	11
DCE	ANTENNA RADOME TEST FACILITY	96
DCEA	NOSE RADOME MOCKUP	96
E	SYSTEM ENG/PROJECT MGMT	2,008
EA	SYSTEM ENG	1,938
EAA	ENG PROCESS	612
EAAC	IN-HOUSE DOCUMENTATION(REQUIREMENTS)	359
EAAJ	SPECIFICATIONS	250
EAAD	TECHNICAL REVIEWS	3
EAB	TECHNICAL PROG PLANS/PLANS CONTENTS	1,265
EAC	ENG INTEGRATION	1
EACB	ENG SPECIALTIES (RELIABILITY)	1
EAH	OTHER SYSTEM ENG	60
EB	PROJECT MGMT	70
EBH	PROPOSAL PREP	70
EBHA	PROPOSAL PREP FSD	46
EBHB	PROPOSAL PREP PRODUCTION	24

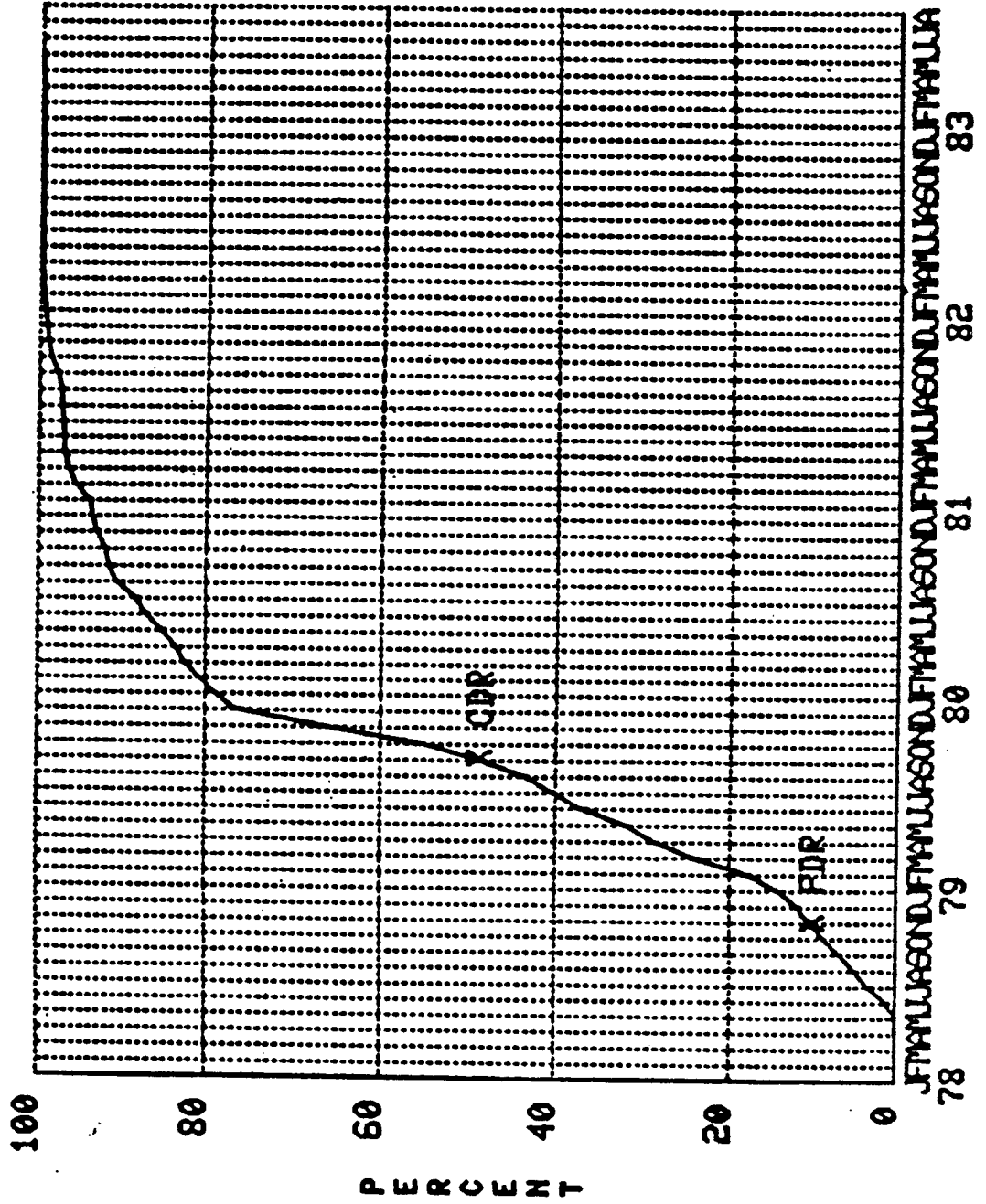
AS OF 10-3-85

COST ELEMENTS BY WBS REPORT
TIMESPREAD DATA BASE

OFFENSIVE AVIONICS SYSTEM FULL SCALE DEVELOPMENT -0500

CE-WBS	T	TOTAL PROGRAM
TOTAL ENGINEERING RELEASES		23,767
NEW DRAWING NUMBERS		3,453
NEW DRAWING SHEETS		9,195
EAMR RELEASES NET TOTAL		7,417
NEW EAMR'S		1,778
REVISED EAMR'S		5,753
ADCN'S		3,818
DCN'S		668
NEW SUBCONTRACT DRAWING NUMBERS		215
CHANGES-CLASS I		608
CHANGES-CLASS II		57
PRODUCTION MEMOS		

ENGINEERING RELEASE
DRAWING SHEETS
OASFS D



AS OF 10-3-85 COST ELEMENTS BY WBS REPORT
 OFFENSIVE AVIONICS SYSTEM FULL SCALE DEVELOPMENT -0500

CE-WBS	A BEC	EVS INTERFACE UNIT (EIU)
DRAWING NUMBER COUNT		
A SIZE DRAWINGS		37
A SIZE NEW DRAWINGS		10
A SIZE REVISED DRAWINGS		10
B SIZE DRAWINGS		20
B SIZE NEW DRAWINGS		20
B SIZE REVISED DRAWINGS		
C SIZE DRAWINGS		
C SIZE NEW DRAWINGS		
C SIZE REVISED DRAWINGS		
D SIZE DRAWINGS		1
D SIZE NEW DRAWINGS		1
D SIZE REVISED DRAWINGS		
J SIZE DRAWINGS		6
J SIZE NEW DRAWINGS		6
J SIZE REVISED DRAWINGS		
DRAWING SHEET COUNT		
A SIZE SHEETS		512
A SIZE NEW SHEETS		325
A SIZE REVISED SHEETS		325
B SIZE SHEETS		144
B SIZE NEW SHEETS		144
B SIZE REVISED SHEETS		
C SIZE SHEETS		
C SIZE NEW SHEETS		
C SIZE REVISED SHEETS		
D SIZE SHEETS		1
D SIZE NEW SHEETS		1
D SIZE REVISED SHEETS		
J SIZE SHEETS		42
J SIZE NEW SHEETS		42
J SIZE REVISED SHEETS		

AS OF 10-3-85 COST ELEMENTS BY MBS REPORT
OFFENSIVE AVIONICS SYSTEM FULL SCALE DEVELOPMENT -0500

CE-MBS	ABC	COMPUTATION SOFTWARE
NUMBER OF SOFTWARE MODULES		36
NUMBER OF MACHINE LEVEL INSTRUCTIONS		590,392
NUMBER OF PROGRAM UNITS		811
NUMBER OF SOURCE LINES OF CODES		163,845

Weight *Manufacturing*

AS OF 10-3-85 COST ELEMENTS BY WBS REPORT
OAS/CMI PRODUCTION F33657-79-C-0416

CE-WBS	ACCA	CM PYLON
MANUFACTURED UNIT WEIGHT (MUW)		
INPLANT MUW (MAKE)		3,846
PROCURED MUW		3,533
STANDARDS		313
POP OTHER		245
PURCHASED EQUIPMENT		8
GOV'T FURNISHED PART (GFP) WEIGHT		60
		481

DOCUMENTS
 Breakdown (over)
 (CDRL & ...)

NONCOST-TO-NONCOST CER
 CMFSD
 09/09/85

TITLE	DOCUMENTS	PAGES	PAGES/DOC
TOTAL DOCUMENT COUNT	629	72250	115
SYSTEMS ENGINEERING DOCUMENTS	133	15875	119
CRITICAL ITEM DEVELOPMENT SPECS	6	260	40
ELECTRO MAGNETIC COMPATIBILITY	5	381	76
HUMAN ENGINEERING	1	21	21
INTERFACE DEFINITION	6	1038	176
RELIABILITY & MAINTAINABILITY	7	692	99
REQUIREMENTS DOCUMENTS	45	3148	70
SAFETY & HAZARD ANALYSIS	17	3464	204
SAFETY OF FLIGHT	5	584	117
SPECIFICATIONS	26	4561	175
TEST REQUIREMENTS DOCUMENTS	5	578	114
OTHER SYS. ENG. DOCUMENTS	10	1156	116
PROGRAM MANAGEMENT DOCUMENTS	56	15291	273
CONFIGURATION MANAGEMENT	4	584	146
GOV T FURNISHED PROPERTY	4	707	177
HARDWARE AUTHORIZATION DOCUMENT	2	81	41
MASTER EQUIPMENT LIST	1	42	42
MANAGEMENT INFORMATION	9	737	82
PROPOSAL DOCUMENTS	35	13078	374
SCHEDULE INFORMATION	1	62	62
TEST DOCUMENTS	360	30565	90
TEST PLANS	30	1820	48
TEST PROCEDURES	94	7993	85
TEST DATA	153	13006	85
TEST REPORTS	55	7738	141
LSA DOCUMENTS	32	3965	124
PUBS DOCS. (PLAN & STATUS)	14	2210	158
SOFTWARE DOCUMENTS	18	1747	97
SOFTWARE DATA	8	656	82
OTHER DOCUMENTS	8	656	82
OPERATIONS	55	5620	102
BMAC SUBCONTRACT DATA	3	186	62
OTHER MISC. DOCUMENTS	5	215	43
SOURCE CONTROL DRAWINGS	9	671	75
TECH STAFF DATA	2	208	104
SPARES DATA	35	3773	108
SUPPORT EQUIPMENT DOCUMENTS	1	567	567
SYSTEMS ENG. S.E. DOCUMENTS	5	278	56
CIDS S.E.	3	92	31
SPECS S.E.	2	64	32
SERDS	1	28	28
ORL SERDS	1	18	18
CFE	1	18	18
T.O. SUPPT. EQUIP. MANUALS	1	18	18
	1	168	168

COST RESEARCH DOCUMENTATION

o STATISTICAL ANALYSIS INSTRUCTION

D500-10595-5

o COST ESTIMATING RELATIONSHIP (CER) CATALOG

D500-10538-1

o PRODUCT ENCYCLOPEDIA

D500-10583-2

← This refers to attach

POPULATION DATA
INITIAL DESIGN HOURS
STRUCTURE AND WIRING MBS

CONTRACT	MBS	TITLES	HOURS	DRAWINGS	SHEETS	SQ INCHES	MRS/DWG	HRS/SHT	HRS/SQ IN
CMFSD	Y7	STRUCTURE-FUSELAGE & IBA (CMI	23,281	70	107	617,571	332.6	217.6	.056
CMFSD	Y8	ENVIRONMENTAL CONTROL REVISION	5,801	24	57	67,694	241.7	101.8	.086
CMFSD	Y9	ELECTRICAL/ELECTRONIC REVISION	8,247	51	110	111,639	161.7	79.0	.074
CMFSD	Y10	CM UNIQUE WIRING INSTALLATION	8,868	9	142	49,181	985.3	62.5	.180
CMFSD	Y11	HYDRAULIC SYSTEMS MODS	1,467	31	39	30,388	47.3	37.6	.048
CMFSD	Y12	FUEL SYSTEM MODS	300	6	6	4,956	50.0	50.0	.061
CMFSD	X11	WING MOD OTHER	2,861	7	14	55,352	408.7	204.4	.052
CMFSD	X12	OTHER CMI GROUP A	1,092	2	62	11,594	546.0	17.4	.094
CMFSD	X23	PYLON STRUCTURE	104,283	382	663	2,360,969	273.0	157.3	.044
CMFSD	X26	PROVISIONS (FSD PYLON SYSTEMS)	32,270	167	623	493,213	193.2	51.8	.065
CMFSD	X83	PYLON I & A, TESTING	15,766	23	120	165,776	685.5	131.4	.095
OASFSO	Y6	STRUCTURE-OAS FSD	17,018	191	636	1,164,543	89.1	26.8	.015
OASFSO	Y8	ENVIRONMENTAL CONTROL REVISION	7,330	84	396	257,219	87.3	18.5	.028
OASFSO	Y9	ELECTRICAL/ELECTRONIC REVISION	49,746	567	2,011	1,440,087	87.7	24.7	.035
OASFSO	X36	OTHER-PYLON (FSD CM PYLON MOD)	6,307	48	181	146,982	131.4	34.8	.043
OASFSO	ACCD	SRAM LAUNCHER MOD KIT	3,943	67	322	194,574	58.8	12.2	.020
OASFSO	ACCE	SRAM PYLON MOD KIT (FSD)	4,834	33	47	136,417	146.5	102.8	.035
OASFSO	ACCH	CM LAUNCHER MODIFICATIONS (FSD)	42,450	164	817	283,025	1,445.9	1,084.4	.242
SRFSD	AAAA	ANTENNA MODIFICATION	5,986	41	145	113,696	146.0	61.3	.053
SRFSD	ADAA	MECHANICAL GROUP A	14,895	34	171	70,125	414.6	82.4	.201
SRFSD	ADAB	ELECTRICAL GROUP A	2,167	8	56	16,176	270.9	38.7	.134
SRFSD	ADAC	WAVEGUIDE GROUP A	38,510	101	192	716,958	381.3	200.6	.054
KCRUNITI	AAA	WING	15,562	25	46	175,219	622.5	338.3	.089
KCRUNITI	AAB	FUSELAGE	2,169	65	129	365,398	33.4	16.8	.006
KCRUNITI	AAC	EMPENNAGE	31,722	124	878	1,047,107	255.8	36.1	.030
KCRUNITI	AADA	STRUT STRUCTURE	10,167	70	390	443,377	145.2	26.1	.023
KCRUNITI	AADB	STRUT SYSTEMS	2,505	20	525	224,826	125.3	4.8	.011
KCRUNITI	AAEA	INLET	2,674	22	64	264,792	121.5	41.8	.010
KCRUNITI	AAEB	FAN COMB	472	11	16	60,588	42.9	29.5	.008
KCRUNITI	AAED	EXHAUST SYSTEM	21,667	64	727	847,110	338.5	29.8	.026
KCRUNITI	AAEF	EBU	22,726	102	407	700,783	222.8	55.8	.032
KCRUNITI	AAEG	FAN DUCT	2,826	152	187	383,818	18.6	15.1	.007
KCRUNITI	AAFA	MAIN L.G.	1,831	67	168	98,736	27.3	10.9	.019
KCRUNITI	AAFC	BRAKES & ANTISKID	20,318	63	354	425,145	322.5	57.4	.048
KCRUNITI	AAGA	ELECTRICAL SYSTEMS							

BOEING PROPRIETARY
CER QUALIFIED ANALYSIS
INITIAL DESIGN HOURS
AVIONICS AND COMPLEX SUPPORT EQUIPMENT WBS

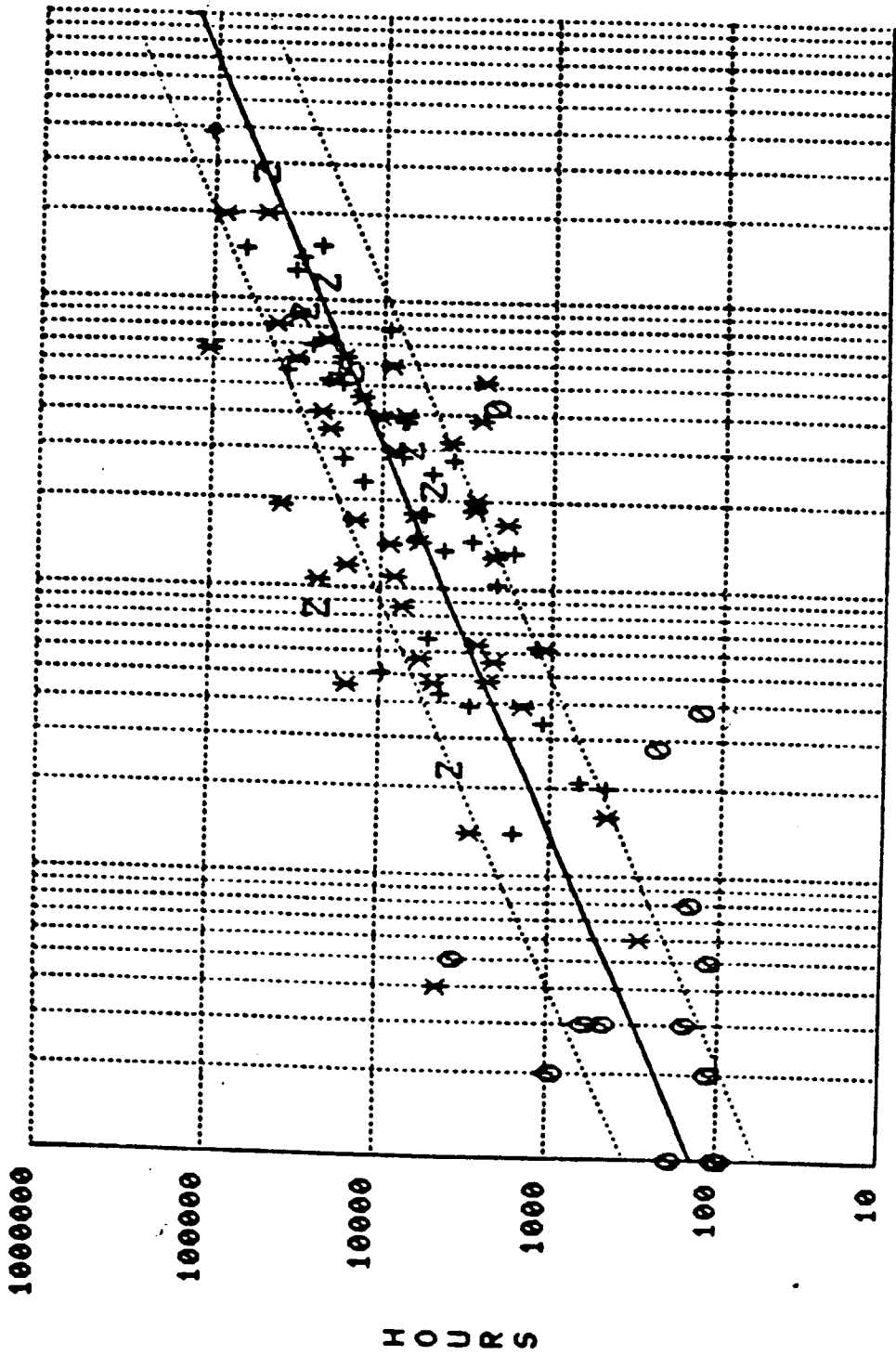
CONTRACT	WBS	TITLES	HRS/A SHT	HRS/B SHT	HRS/C SHT	HRS/D SHT	HRS/J SHT	TOTAL
CMIFSD	X10	DC POWER MOD	5.6	11.2	22.3	44.6	267.8	55.1
CMIFSD	ABDA	CONTROL INDICATOR		18.5		74.0		24.1
CMIFSD	X74	AVIONICS PRIMARY MISSION EQUIP				21.9	131.2	115.6
CMIFSD	X82	FACTORY TEST AND SUPPORT EQUIP			20.1	40.3	241.5	188.6
OASFSD	ABDC	RADAR PRESENTATION CONTROL	13.9	27.9		111.5	668.8	101.7
OASFSD	ABDD	WEAPON CONTROL PANEL	3.4	6.9		27.4	164.6	30.7
OASFSD	ABDE	COMPUTER CONTROL PANEL	3.1	6.2		24.8	148.8	26.6
OASFSD	ABDH	RADAR NAV. MGMT. PANEL	3.9	7.8		31.1	186.8	19.0
OASFSD	ABEB	RADAR INTERFACE UNIT (RIU)	7.4	14.8		59.4	356.3	33.3
OASFSD	ABEC	EVS INTERFACE UNIT (EIU)	6.5	13.0		52.1	312.8	33.6
OASFSD	ABED	ARMAMENT INTERFACE UNIT (AIU)	10.9	21.8		87.2	523.1	60.8
OASFSD	ABEE	C&D INTERFACE UNIT (CDIU)	13.6	27.1		108.4	650.6	59.7
OASFSD	ABEF	COMMON CORE REMOTE TERMINAL	6.5	13.0			311.7	11.6
OASFSD	ACAB	MISSILE INTERFACE UNITS	3.3	6.6	13.2	26.3	157.8	15.1
OASFSD	ADBA	CONTROLS & DISPLAYS TEST SET	11.5	23.1	46.1	92.2	553.3	32.3
OASFSD	ADBT	OTHER FSTE	5.3	10.6	21.3	42.5	255.1	21.4
OASCFI	CAAA	AN/ASM-479 MOD KIT	9.7	19.4	38.9	77.8	466.6	27.1
OASCFI	CAAC	479 TEST ADAPTER GROUP 1	5.0	10.0			239.1	20.0
OASCFI	CAAE	479 TEST ADAPTER GROUP 3	3.0	5.9		23.8	142.6	12.5
OASCFI	CAAF	479 TEST ADAPTER GROUP 4	3.2	6.4		25.5	153.1	19.2
OASCFI	CAAG	479 TEST ADAPTER GROUP 5	4.5	9.0		36.1	216.5	20.1
OASCFI	CAAH	479 TEST ADAPTER GROUP 6	4.0	8.1		32.2	193.3	15.8
OASCFI	CACD	WEAPONS PRELOAD TESTER	15.0	30.0		120.1	720.5	63.9
OASCFI	CACE	SYSTEMS AVIONICS TESTER	6.2	12.4	24.7	49.5	296.9	43.4
OASCFI	CACF	STRAY VOLTAGE TESTER	4.4	8.8		35.4	212.3	31.3
OASCFI	CACH	SAFE STATE TESTER	6.4	12.9	25.8	51.6	309.6	37.3
SRFSD	AAAB	ANTENNA ELECTRONICS UNIT	7.6	15.3	30.5	61.0	366.1	26.0
SRFSD	AAAC	TERRAIN DISPLAY CONT PANEL	9.1	11.9		72.5	434.7	32.8
SRFSD	AAAD	RADAR CONTROL/TEST PANEL	5.9	11.0		47.4	284.7	19.9
SRFSD	AAAH	RADAR INTERFACE UNIT MOD	5.5	11.0			265.0	13.7
SRFSD	AACG	OTHER STE	9.0	18.0	36.1	72.2	433.2	39.7
SRFSD	CAD	AN/ASM 479 TEST SET MOD	7.6	15.3		61.0	366.2	42.2
SRFSD	CAE	TEST SET GROUP 5 MOD	17.9	35.7		142.9		32.3
SRFSD	CAF	TEST SET GROUP 10 MOD	10.3	20.5		82.1	492.7	77.7
SRFSD	CAG	TEST SET GROUP 11 MOD	12.7	25.3		101.3	608.0	75.0
KCRUNIII	CA	PECULIAR SUPPORT EQUIPMENT	2.4		11.1	22.1	132.8	20.3

INITIAL DESIGN HOURS
COMPOSITE WBS - CER ANALYSIS

Y = 141.6943 X 28 0.7466
COR. COEF. SQUARED .794

STANDARD ERROR (+) 250.759X (-) 39.879X
COEF. OF VARIATION .995

- Z TRAINERS
- NONCOMPLEX S.E.
- ⊕ STRUCTURE & WIRING
- ⊘ AUTONICS & COMPLEX S.E.



1 10 100 1000 10000
DRAWING SHEET COUNT

Speaker Admitted no relation here

BOEING PROPRIETARY

SUB-POPULATION DATA
SYSTEMS ENGINEERING HOURS

CONTRACT	WBS	TITLES	HOURS	DOCUMENTS	PAGES	HRS/DOC	HRS/PAGE
OASFSD	EAAA	INTERFACE SUPPORT	100,530	193	13,731	520.9	7.3
OASFSD	EAAB	SYSTEM ANALYSIS & REQUIREMENTS	126,882	139	18,010	912.8	7.0
OASFSD	EABB	NUCLEAR SURETY PROGRAM	7,234	3	1,739	2,411.4	4.2
OASFSD	EABC	RELIABILITY/MAINTAINABILITY/SAFETY	32,482	21	3,991	1,546.7	8.1
OASFSD	EABD	HUMAN ENGINEERING	2,372	3	1,020	790.6	2.3
OASFSD	EABH	MASS PROPERTIES ANALYSIS	4,191				
OASFSD	EABI	SURVIVABILITY/VULNERABILITY	1,509	2	114	754.6	13.2
OASFSD	EABJ	ELECTROMAGNETIC CONTROL	7,765	2	108	3,882.4	71.9
OASFSD	EABL	OTHER-DISCIPLINES	9,571				
OASFSD	EAC	ILS ENGINEERING	35,750	63	10,577	567.5	3.4
OASFSD	EAI	OTHER-SYSTEM ENGINEERING	561				
OASFSD	EAJ	CRUISE MISSILE INTEGRATION (OASFSD)	11,703				
			=====	=====	=====	=====	=====
			340,550	426	49,290	799.4	6.9

BOEING PROPRIETARY

AS OF 07/04/85

SUB-POPULATION DATA
SYSTEMS TEST HOURS

CONTRACT	WBS	TITLES	HOURS	DOCUMENTS	PAGES	HRS/DOC	HRS/PAGE
OASFS	DAA	SYSTEM INTEGRATION TESTS	104,751	165	22,400	634.9	4.7
OASFS	DAB	FLIGHT TESTS	43,363	125	11,814	346.9	3.7
OASFS	DAC	EMC TESTS	11,937	17	4,800	702.2	2.5
OASFS	DADB	MAKE C&D TESTS	7,659	8	840	957.4	9.1
OASFS	DADC	INTERFACE EQUIPMENT TESTS	6,129	9	1,729	681.1	3.5
OASFS	DADD	GROUP A SUBSYSTEM TESTS	11,028	12	3,636	919.0	3.0
OASFS	DADE	MISSILE LAUNCH EQUIPMENT TESTS	822	7	440	117.4	1.9
OASFS	DADH	OTHER QUALIFICATIONS TESTS	2,172	10	1,330	217.2	1.6
OASFS	DAF	GROUND TESTS	26,148	93	12,238	281.2	2.1
OASFS	DAHA	RADIATION TESTING	4,843				
OASFS	DAH B	EMP TESTING	30,340	5	2,815	6,068.1	10.8
OASFS	DAHC	DESIGN VERIFICATION TESTING	1,947	12	252	162.3	7.7
OASFS	DAHI	OTHER-OTHER TESTS	15,698	11	830	1,427.1	18.9
OASFS	DAI	REMOTE TEST REQUIREMENTS	94,215	5	224	18,842.9	420.6
OASFS	DAJA	TEST SUPPORT FOR CM/SRAM PYLON	10,490				
OASFS	DAJB	TEST SUPPORT FOR CM/SRAM INTERNAL	22,770	1	160	22,769.5	142.3
OASFS	DBAA	AIR VEHICLE INSTRUMENTATION	39,489	5	899	7,897.9	43.9
OASFS	DBAB	GROUND INSTRUMENTATION	16,158	5	1,836	3,231.5	8.8
OASFS	DBAC	3RD ACU INSTRUMENTATION	9,442				
OASFS	DBB	TEST SUPPORT EQUIPMENT	5,644				
OASFS	DBF	DATA REDUCTION ANALYSIS	33,631	3	1,284	11,210.2	26.2
OASFS	DBG	SYSTEM OPERATION & MAINTENANCE	58,000	4	79	14,500.0	734.2
OASFS	DBHA	FUEL REQUIREMENTS	110				
OASFS	DBHB	CREW REQUIREMENTS	457				
OASFS	DBI	TEST PLANNING & SUPPORT	49,615	27	4,438	1,837.6	11.2
OASFS	DBJ	OVER AND ABOVE	1,319				
OASFS	DBK	OTHER TEST SUPPORT	2,936				
OASFS	X49	SILTF EQUIPMENT	30,353	8	2,253	3,794.1	13.5
OASFS	X50	SCP SOFTWARE	18,664	14	3,293	1,333.2	5.7
OASFS	X51	INSTRUMENTATION (SILTF)	8,081				
OASFS	X52	SILTF UPDATE FOR 3RD ACU	11,396				
OASFS	X53	OTHER-SILTF	58	1	67	58.1	.9
			679,665	547	77,657	1,242.5	8.8

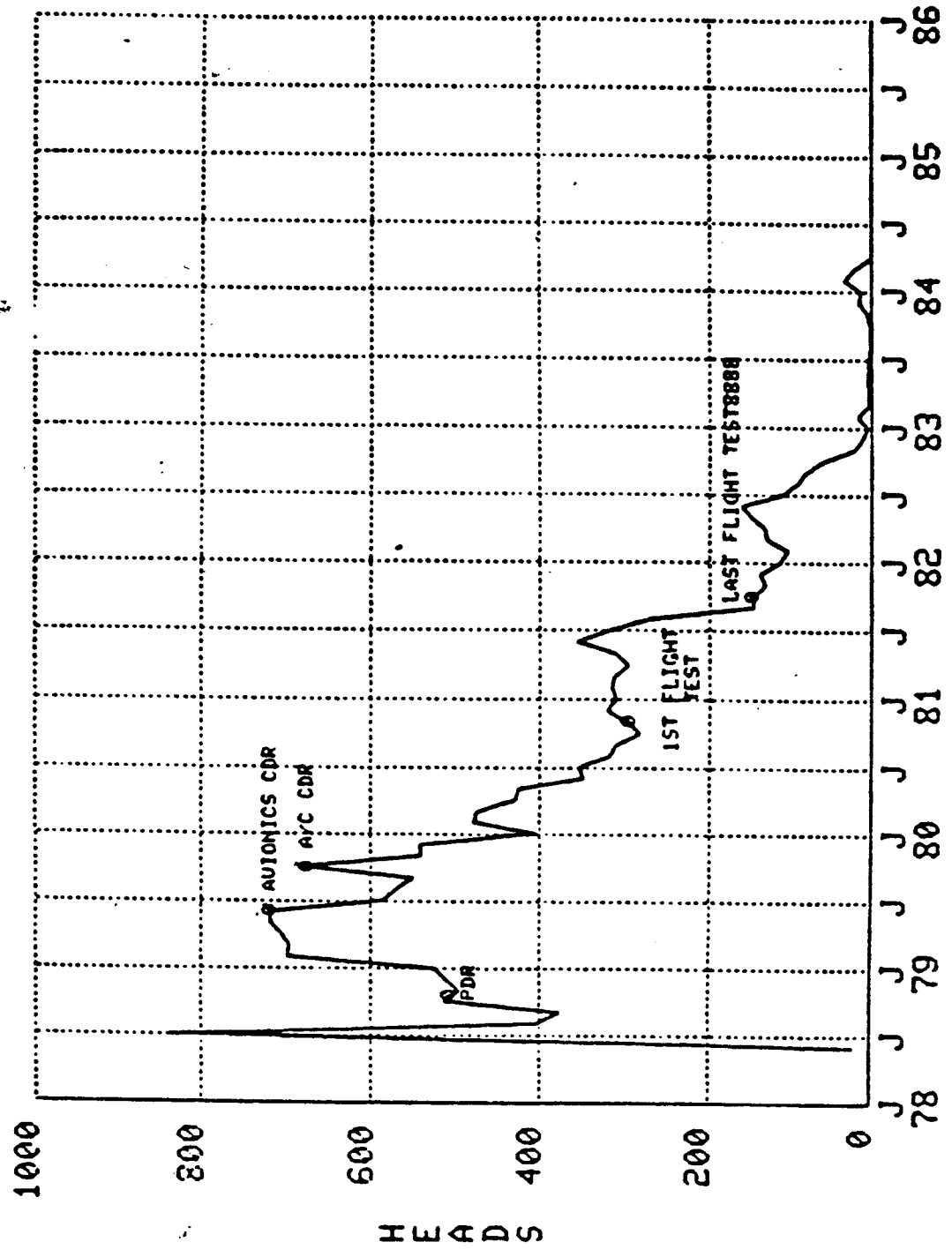
AS OF 07/06/85

TECHINCAL ORDER PUBLICATIONS MBS
POPULATION DATA

CONTRACT	MBS	TITLES	HOURS	DOCS	HRS/DOC	INITIAL PAGES	REVISION PAGES	GROSS PAGES	HOURS /PAGE
OASCHI	FAA	FLIGHT/WEAPON DELIVERY MANUALS	46,397	48	966.6	7,376	3,957	11,333	4.1
OASCHI	FAB	ORG. MAINT./WEAPON LOADING MAN	236,160	286	818.7	16,664	34,028	50,692	4.6
OASCHI	FAC	PME/SE INTERMEDIATE MANUALS	242,112	172	1,407.6	16,010	21,872	37,882	6.4
OASCHI	FAD	PME/SE DEPOT MANUALS	123,542	107	1,154.6	4,961	176	5,137	24.0
OASCHI	FAE	TECH PUBS PLANNING/DOC	55,233	2	27,616.5	237	881	1,118	49.4
OASCHI	FAF	TECH PUBS SOURCE/MOD DATA	20,608	108	190.8	1,038		1,038	19.9
OASCHI	FAG	OAS TRAINER MANUALS	72,804	8	9,100.5	2,952	669	3,601	20.2
OASCHI	FAH	OAS TRAINING VIDED TAPES							
OASCHI		OTHER-TECH PUBS	5,624						
OASCHI	FA	TECHNICAL PUBLICATIONS	800,560	731	1,095.0	49,238	61,563	110,801	7.2
SRFSD	FA	TECHNICAL PUBLICATIONS	13,633.	11	1,239.4			1,239.4M	4.4

* SRFSD - TECHNICAL PUBLICATIONS PAGES ARE COLLECTED AS NET PAGE COUNTS.

OASFSD
TOTAL EQUIVALENT ENGINEERING HEAD COUNT
ACTUALS

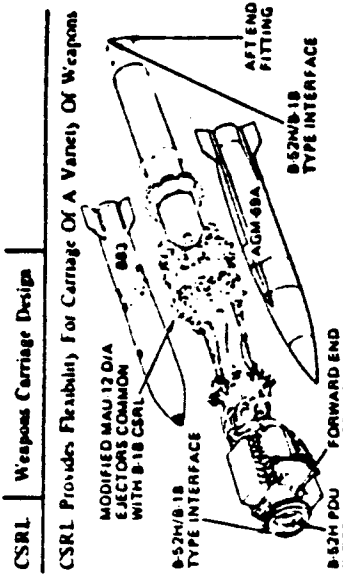


P=1.336 Q=3.320

**COMMON STRATEGIC ROTARY LAUNCHER
COMMON STRATEGIC ROTARY LAUNCHER INTEGRATION**

**FULL SCALE DEVELOPMENT PROGRAM SUMMARY
F3357-83-C-0533**

The Common Strategic Rotary Launcher, a competitive bid, and the B-52 Integration, a sole source bid, combined under one contract was developed to provide SAC with enhanced capability for internal carriage of designated weapons on the B-52H or B-1B aircraft. The program consists of a Rotary Launcher providing internal weapons carriage, launch, and ejection capabilities for the B-52H and B-1B, and the B-52 aircraft modification required to install the launcher.



- **FSD CONTRACT DATA**
 - Initial Program Go-Ahead 06/83
 - PDR 09/83
 - CDR 03/84
 - Flight Test Complete 02/85
 - Type of Contract FPI
 - Total Contract Cost \$121,300K
 - Period of Performance 05/83-09/88
 - No. Launchers 7
 - (B-1B 4/B-52 3)

- **MAJOR SUPPLIERS**
 - Sundstrand Power Drive Unit
 - Scott Ejector
- **MAKE/BUY PLAN**
 - Make 38%
 - Buy 62%

- **QTY DELIVERED AS OF 9/85**
 - 5 S/S complete

CSRL Weapons Carriage Design

CSRL Provides Flexibility For Carriage Of A Variety Of Weapons

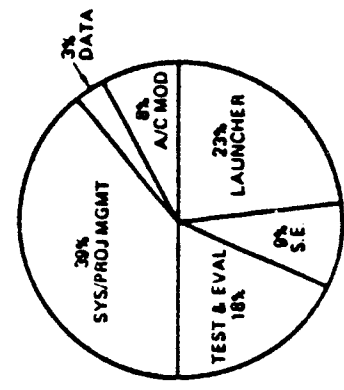
	WEIGHT	INPLANT	PART CARDS PURCHASED
Launcher	2985	1118	N/A
PDU	275	18	N/A
Ejector System	15	56	N/A
Aircraft Mod	1765	997	1065
Weapons Interface	845	345	N/A
A/C Integration	228	280	N/A
Total B52 AGM 86B	6113	2814	

• A/C MOD KIT DESCRIPTION & PARAMETERS

ACTUAL COST SUMMARY (IN THOUSANDS) THRU 9/85

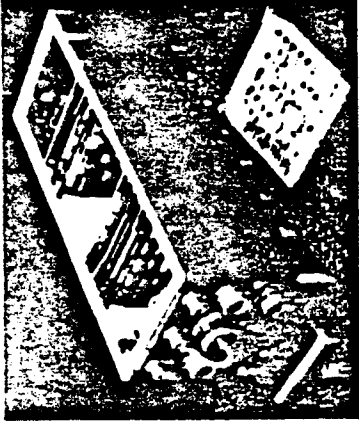
	HOURS	DOLLARS
LABOR		
Engineering	1,150	17,746
Production	238	3,469
Developmental	87	984
Tooling	53	963
Quality Control	39	434
Other	102	1,461
TOTAL LABOR	1,702	25,059
NON-LABOR		
Production PP	2,038	2,038
Developmental	1,340	1,340
Tooling	223	223
Purchased Equipment	4,174	4,174
Outside Production	526	526
TOTAL MATERIAL		8,311
DIRECT OTHER CHARGES		8,088
TOTAL NON-LABOR		14,400
OVERHEAD *		34,037
GRAND TOTAL	1,702	77,490
EAC		171,300

CSRL/CSRLI FSD WBS COST DISTRIBUTION



CONTRACT: OASFSD (4500);
WBS: 139200 (ABEB)

OAS/EMI PRODUCTION (4410) (4078)
13511 (ABEB)



TASK DESCRIPTION: The Radar Interface Unit (RIU) is part of the Interface Unit Subsystem, and as such provides signal scaling and conversion, power supplies, data formatting, storage and control, and bus interface functions necessary to communicate with the ACUs. The RIU provides the main interface to the radar LRUs and autopilot, with partial interface to the angle-of-attack computer, AHRs, EVS, bomb release, KNMP, master bomb control and the data buses.

The RIU consists of a machined cast chassis, printed circuit cards, a power supply, wired circuit board receptacle, and wire harness assembly. The chassis is approximately 7.6" h x 7.5" w x 19.6" d.

PHYSICAL CHARACTERISTICS:

Total Weight	34.6
Inplant	22.8
Procured	11.8
Drawing Count (FSD)	36
Drawing Sheets (FSD)	552
Part Card Count	1,041
Inplant	119
Procured	922
Parts Count	3,321
Inplant	166
Procured	3,155
Circuit Cards	17
Avg Layers/Card	7
Avg Component/Card	97
Wires	159
Wire Harness	1
Connectors	11
Part Number	675-11438-604

TOTAL COSTS (IN THOUSANDS)*:

1963 \$ UNIT	QTY
OASFSD	\$ 492
Lot 1	\$ 243
Lot 2	\$ 74
Lot 3	\$ 41
Lot 4	\$ 32**
Lot 5	
Lot 6	
Lot 7	

*80%? mil 2000 unit
for 2000 unit*

*Includes Burn-In Costs
**Refer to Qualifier #3

PACM DOCUMENTATION

o PROPOSAL ACQUISITION COST MODEL (PACM) INSTRUCTION

D500-10595-4

OP-8000-75/NO. 61 SECTION VI

BMAC PARAMETRIC ESTIMATE SYSTEM

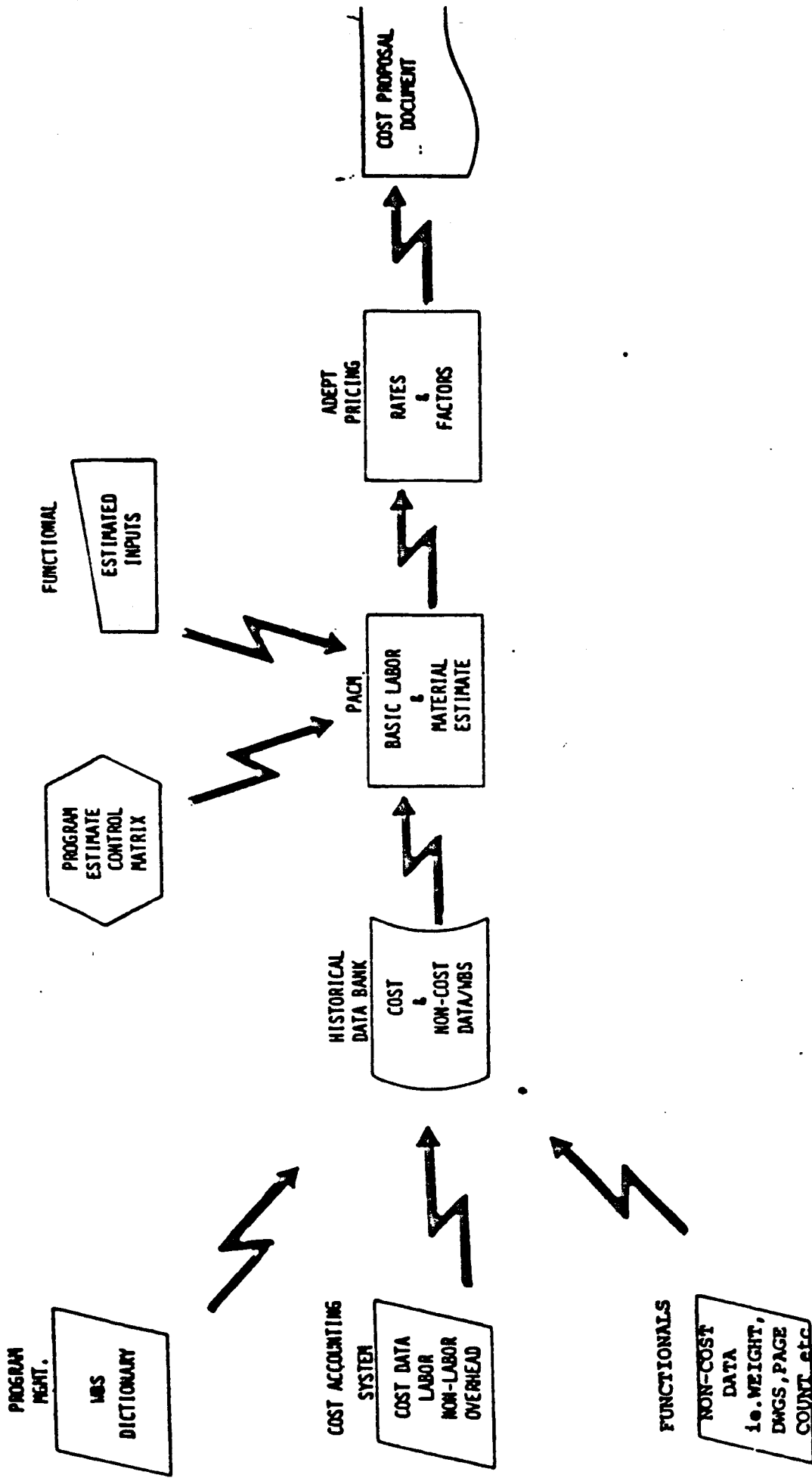


Figure 1-1 BMAC Parametric Estimate System

PACM ELEMENTS

- 0 PRIMARY USE IN NEGOTIATED PROPOSALS
- 0 SIMILAR-TO ITEM
 - IDENTIFICATION OF SIMILAR-TO TASK FROM EIS HISTORICAL DATA BANK
- 0 COST ESTIMATE RELATIONSHIP (CER)
 - HOURS/DRAWING SHEET
 - HOURS/DOCUMENT PAGE
- 0 COMPLEXITY FACTOR
 - A MEANS OF ADJUSTING FOR DIFFERENCES THAT CANNOT BE DISCREETLY MEASURED
 - I.E. EXPERIENCE
 - STATE OF THE ART
 - CHANGING PROCESSES

discreetly

PACM ESTIMATE FLOW

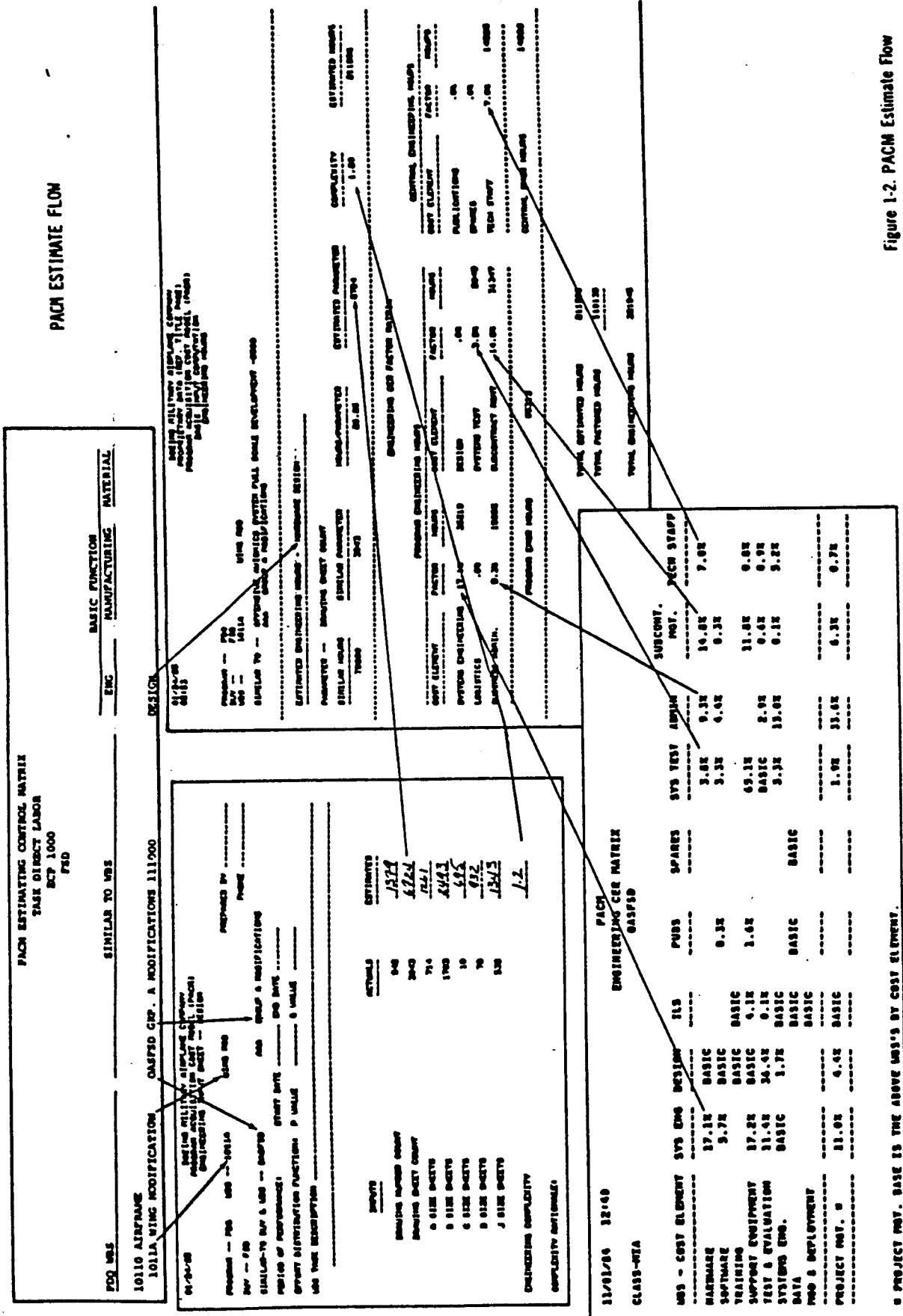


Figure 1-2. PACM Estimate Flow

B-52 PRODUCT DESIGN QUALITY PROPOSAL
 BOEING PROPRIETARY DATA
 (REF. TITLE PAGE)

PACM ESTIMATING CONTROL MATRIX
 TASK DIRECT LABOR
 ECP 1000
 FSD

7.

DQ WBS	SIMILAR TO WBS	BASIC FUNCTION		
		ENG	MANUFACTURING	MATERIAL
0110 AIRFRAME				
1011A WING MODIFICATION	OASFSD GRP. A MODIFICATIONS 111000	DESIGN		
	OAS/CFI LOT 1, 11, 111 OAS GRP A KIT 11140		PRODUCTION	X
0120 WEAPON DELIVERY				
1012A PYLON	CMIFSD CM PYLON 4211	DESIGN		
	OAS/CFI LOT 1, 11, 111 CM PYLON 14320		PRODUCTION	X
0130 NAVIG-GUIDANCE				
1013A RADAR INTERFACE UNIT	OASFSD RADAR INTERFACE UNIT (RIU) 139200	DESIGN		
	OAS/CFI LOT 1, 11, 111 RIU 13511		PRODUCTION	X
0140 COMPUTATIONAL SOFTWARE				
1014A OPERATIONAL S/W	OASFSD COMPUTATION S/W 137000	S/W DESIGN		
0210 EQUIPMENT				
1021A MAINTENANCE TRNRS.	OAS/CFI LOT 1, 11, 111 MLC TRNR 22900	DESIGN	BYPASS	BYPASS
0220 SERVICES				
1022A FLIGHT CREW TRNG	THROUGHPUT	LOGISTICS		
0510 DEVELOPMENT T & E				
1051A SYS. INTEGRATION TEST	OASFSD TEST & EVALUATION 500000	T & E		
0610 SYSTEM ENG				
1061A REQUIREMENTS ANAL	CMIFSD SYSTEMS ENG 1061	SYSTEMS ENG		
0710 TECH PUBS				
1071A S.E. TECH PUBS	OAS/CFI LOT 1, 11, 111 TECH PUB 71000	PUBS		
0720 ENG DATA				
1072A ENG & CONFIG MGMT	OASFSD OTHER DATA 700000	BYPASS		

30
 64

Figure 3-1 PDQ Estimating Control Matrix

02/07/85 BOEING MILITARY AIRPLANE COMPANY
 PROGRAM ACQUISITION COST MODEL (PACM)
 ENGINEERING INPUT SHEET -- DESIGN PARAMETRIC ESTIMATE

PROGRAM -- PDQ WBS -- 111000 WING MOD _____ PREPARED BY _____
 BUY -- FSD _____ PHONE _____
 SIMILAR-TO BUY & WBS -- OASFSD AAA GROUP A MODIFICATIONS
 PERIOD OF PERFORMANCE: START DATE _____ END DATE _____
 EFFORT DISTRIBUTION FUNCTION: P VALUE _____ Q VALUE _____
 WBS TASK DESCRIPTION _____

INPUTS -----	ACTUALS -----	ESTIMATES -----
DRAWING NUMBER COUNT	842	_____
DRAWING SHEET COUNT	3043	_____
A SIZE SHEETS	714	_____
B SIZE SHEETS	1703	_____
C SIZE SHEETS	10	_____
D SIZE SHEETS	78	_____
J SIZE SHEETS	538	_____
ENGINEERING COMPLEXITY		_____
COMPLEXITY RATIONALE:		_____

Figure 5-2. PACM Engineering Input Form -- Design Parametric Estimate

04/24/85 BOEING MILITARY AIRPLANE COMPANY
 PROGRAM ACQUISITION COST MODEL (PACM)
 ENGINEERING INPUT SHEET -- SYSTEMS ENGINEERING PARAMETRIC ESTIMATE

PROGRAM -- PDQ WBS -- 1061A REQUIREMENTS ANALYSIS PREPARED BY _____
 BUY -- FSD PHONE _____

SIMILAR-TO BUY & WBS -- CHIFSD EAA REQUIREMENTS ANALYSIS

PERIOD OF PERFORMANCE: START DATE _____ END DATE _____

EFFORT DISTRIBUTION FUNCTION: P VALUE _____ Q VALUE _____

WBS TASK DESCRIPTION _____

	ACTUALS		ESTIMATES	
	DOCUMENT COUNT	DOCUMENT PAGE COUNT	DOCUMENT COUNT	DOCUMENT PAGE COUNT
TOTAL SYSTEMS ENGINEERING	86	9366		
SOURCE CONTROL DRAWINGS	2	208		
SYSTEMS ENGINEERING DOCUMENTS	84	9158		
CRITICAL ITEM DEVELOPMENT SPEC	6	240		
ELECTRO MAGNETIC COMPATIBILITY	0	0		
HUMAN ENGINEERING	0	0		
HARDWARE REQUIREMENTS	0	0		
INTERFACE CONTROL	0	0		
INTERFACE DEFINITION	6	1058		
RELIABILITY & MAINTAINABILITY	1	41		
REQUIREMENTS DOCUMENTS	38	2818		
SAFETY & HAZARD ANALYSIS	0	0		
SAFETY OF FLIGHT	0	0		
SPECIFICATIONS	26	4561		
PARTS SUBSTITUTION	0	0		
SURVIVABILITY & VULNERABILITY	0	0		
SIRDS	0	0		
TEST REQUIREMENTS DOCUMENTS	0	0		
OTHER SYS. ENG. DOCUMENTS	4	348		
SYSTEMS ENG. S.E. DOCUMENTS	3	92		
CIDS S.E.	2	64		
HDWE REQUIREMENTS S.E.	0	0		
INTERFACE DEFINITIONS S.E.	0	0		
SPECS S.E.	1	28		
SIRDS S.E.	0	0		
OTHER SYS. ENG. S.E.	0	0		

ENGINEERING COMPLEXITY

COMPLEXITY RATIONALE:

PACM
ENGINEERING CER MATRIX
OASFSD

CLASS-MIA

WBS - COST ELEMENT	SYS ENG	DESIGN	ILS	PUBS	SPARES	SYS TEST	ADMIN	SUBCONT MGT	TECH STAFF
HARDWARE	17.1%	BASIC				3.8%	9.3%	14.8%	7.0%
SOFTWARE	5.7%	BASIC		0.3%		3.3%	4.4%	0.3%	
TRAINING		BASIC	BASIC						
SUPPORT EQUIPMENT	17.2%	BASIC	4.1%	1.6%		65.1%		11.8%	0.8%
TEST & EVALUATION	11.4%	36.4%	0.1%			BASIC	2.9%	0.6%	0.9%
SYSTEMS ENG	BASIC	1.7%	BASIC			3.3%	13.0%	0.1%	5.2%
DATA			BASIC						
MOD & DEPLOYMENT			BASIC	BASIC	BASIC				
PROJECT MGT *	11.0%	4.4%	BASIC			1.9%	33.6%	6.3%	0.7%

* PROJECT MGT BASE IS THE ABOVE WBSs BY COST ELEMENT.

Figure 5-1. Engineering CER Matrices (Sheet 2 of 4) - For Example Only

BOEING MILITARY AIRPLANE COMPANY
 PROPRIETARY DATE (REF TITLE PAGE)
 PROGRAM ACQUISITION COST MODEL (PACM)
 BASIC INPUT COMPUTATION
 ENGINEERING HOURS

PROGRAM -- PDQ
 BUY -- FSD
 WBS -- 111000 WING MOD
 SIMILAR TO -- OFFENSIVE AVIONICS SYSTEM FULL SCALE DEVELOPMENT -0500
 AAA GROUP A MODIFICATIONS

ESTIMATED ENGINEERING HOURS -- HARDWARE DESIGN

PARAMETER -- DRAWING SHEET COUNT

SIMILAR HOURS	SIMILAR PARAMETER	HOURS/PARAMETER	ESTIMATED PARAMETER	COMPLEXITY	ESTIMATED HOURS
79890	3043	26.25	6724	1.20	211806

83
 0500-10595-4

THE BOEING COMPANY

ENGINEERING CER FACTOR MATRIX

PROGRAM ENGINEERING HOURS

COST ELEMENT	FACTOR	HOURS	COST ELEMENT	FACTOR	HOURS	COST ELEMENT	FACTOR	HOURS
SYSTEMS ENGINEERING	17.1%	36219	DESIGN	.0%	PUBLICATIONS	.0%		
LOGISTICS	.0%		SYSTEMS TEST	3.8%	SPARES	.0%		
BUSINESS ADMIN	9.3%	19698	SUBCONTRACT MGMT	14.8%	TECH STAFF	7.0%	14826	
PROGRAM ENGR HOURS			PROGRAM ENGR HOURS			CENTRAL ENGR HOURS		
95313			95313			14826		

TOTAL ESTIMATED HOURS	211806
TOTAL FACTORED HOURS	110139
TOTAL ENGINEERING HOURS	321945

Figure 6-1. PACM Parametric Estimate Output Sheet -- PDQ Example

FEBRUARY 7, 1985
TIME: 9:35

PDQ FULL SCALE DEVELOPMENT

SUMMARY REPORT

	000000	1000000	1100000	1110000	1200000	1210000	1300000	1310000
TOTAL ENGINEERING HOURS	3895551	984571	321945	321945	195577	195577	28392	28392
SYSTEMS ENGINEERING	376037	78599	36219	36219	17253	17253	3194	3194
DESIGN & DEVELOPMENT	1194304	756687	211806	211806	141415	141415	18679	18679
LOGISTICS	1094661	1861	0	0	707	707	0	0
LOGISTICS ENGINEERING	17356	424	0	0	424	424	0	0
ON-SITE ILS	17356	424	0	0	424	424	0	0
OFF-SITE ILS	0	0	0	0	0	0	0	0
PUBLICATIONS	1075466	1437	0	0	283	283	0	0
SPARES ENGINEERING	1839	0	0	0	0	0	0	0
SYSTEMS TEST	928883	37154	8049	8049	15697	15697	710	710
ON-SITE TEST	928883	37154	8049	8049	15697	15697	710	710
OFF-SITE TEST	0	0	0	0	0	0	0	0
SUPPORT	122712	74762	51045	51045	1131	1131	6501	4501
BUSINESS ADMIN. & OTHER	75766	39497	19698	19698	1131	1131	1737	1737
SUBCONTRACT MANAGEMENT	47946	35265	31347	31347	0	0	2764	2764
ON-SITE	47946	35265	31347	31347	0	0	2764	2764
OFF-SITE	0	0	0	0	0	0	0	0
TECHNOLOGY STAFF	178954	35508	14826	14826	19374	19374	1308	1308

	140000	141000	200000	210000	211000	220000	221000	500000
TOTAL ENGINEERING HOURS	438657	438657	53599	50217	50217	3382	3382	1332159
SYSTEMS ENGINEERING	21933	21933	3965	3716	3716	229	229	99715
DESIGN & DEVELOPMENT	384787	384787	34280	31230	31230	3050	3050	318389
LOGISTICS	1154	1154	159	156	156	3	3	875
LOGISTICS ENGINEERING	0	0	31	31	31	0	0	875
ON-SITE ILS	0	0	31	31	31	0	0	875
OFF-SITE ILS	0	0	0	0	0	0	0	0
PUBLICATIONS	1154	1154	128	125	125	3	3	0
SPARES ENGINEERING	0	0	0	0	0	0	0	0
SYSTEMS TEST	12698	12698	3010	2998	2998	12	12	874694
ON-SITE TEST	12698	12698	3010	2998	2998	12	12	874694
OFF-SITE TEST	0	0	0	0	0	0	0	0
SUPPORT	18085	18085	8716	8713	8713	3	3	30614
BUSINESS ADMIN. & OTHER	16931	16931	2595	2592	2592	3	3	25366
SUBCONTRACT MANAGEMENT	1154	1154	6121	6121	6121	0	0	5248
ON-SITE	1154	1154	6121	6121	6121	0	0	5248
OFF-SITE	0	0	0	0	0	0	0	0
TECHNOLOGY STAFF	0	0	3489	3404	3404	85	85	7872

Figure 6-5. PDQ Summary Report (1 of 2)

get CECRA on similar program, this historical group, this contract admin group, this group has this, as does contract admin group, this group may have more information to gauge responsibility

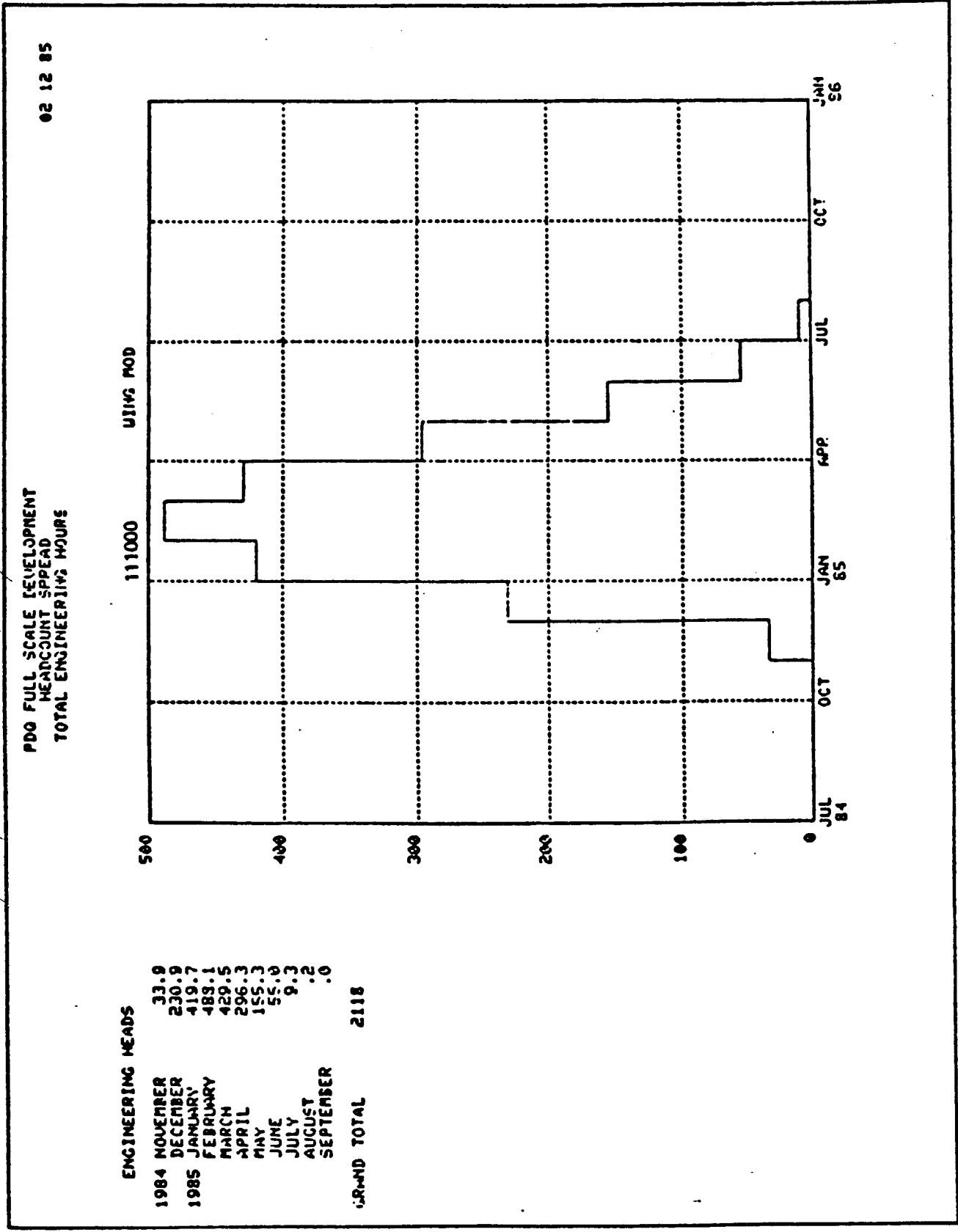


Figure C-1. PDQ Summary Graphs (4 of 4)