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MODERN PROGRAMMING PRACTICES STUDY REPORT

Sperry Univac

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**ROME AIR DEVELOPMENT CENTER
AIR FORCE SYSTEMS COMMAND
GRIFFISS AIR FORCE BASE, NEW YORK 13441**

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This technical report and report summary show that for the surveyed program developments: a. Top-down program development reduced cost by 15% b. Regardless of the method for development used labor was generally distributed as follows: //		

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- . 10% for analysis
 - . 30% for design
 - . 35% for coding and debugging
 - . 25% for testing
- c. Program testing was automated using real-time on line-simulation, scenario control, data recording and reduction.
- d. Software quality assurance and configuration management were formal disciplines.
- e. Through system design, operating system software provided real-time on-line casualty recovery of system functions from hardware failures.
- f. - Through system design, operating system software allowed for on-line maintenance testing of hardware equipments while continuing real-time operation.
- g. Software tools found effective on the surveyed programs were described and evaluated.

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LIST OF ABBREVIATIONS AND ACRONYMS

ASCII	Computer Program Design Specification
American Standard Code for Information Interchange	CPI
AUTO	Computer Program Library
Automatic	CPOM
C and CS	Computer Program Operator's Manual
Command and Control System Operational Program	COP
CCB	Computer Program Package
Change Control Board	CCPB
CDI	Computer Program Problem Report
Casualty Diagnostic Interface (Module) of the Common Program	CDI
CDR	Computer Program Performance Specification
Critical Design Review	CDR
CEP	Central Processing Unit
Common Error Processing	CEP
CI	Central Processing Unit A, opposed to B of the same computer.
Configuration Item	CI
CM	Central Processing Unit B
Configuration Management	CFM
CMS-2	Computer Program Test Plan
Compile Monitor System	CMS
COM	Computer Program Test Procedure
Computer Output Microfilm	COM
CP	Common System Arithmetic Test (routine of the Common Program)
Common Program	CP
CPCI	Common System CPU monitor test (routine of the Common Program)
Computer Program Configuration Item	CPCI
CPCO	Computer Program Design Document
Computer Program Change Order	CPCO
	Computer System Interface Test

LIST OF ABBREVIATIONS AND ACRONYMS

CPDS Computer Program Design Specification

CPL Computer Program Library

CPOM Computer Program Operator's Manual

CPP Computer Program Package

CPPR Computer Program Problem Report

CPPS Computer Program Performance Specification

CPU Central Processing Unit

CPUA Central Processing Unit A, opposed to B of the same computer.

CPUB Central Processing Unit B

CPTPL Computer Program Test Plan

CPTPR Computer Program Test Procedure

CSARITH Common System Arithmetic Test (routine of the Common Program)

CSCPU Common System CPU monitor test (routine of the Common Program)

CSDD Computer Subprogram Design Document

CSIT Computer System Interface Test

CSMIOT
 Common System Memory, Input/Output Test (routine of the Common Program)
 CSOT
 Computer System Operational (Operability) Test
 D/A
 Digital/Analog
 DCN
 Document Change Notice
 DOD
 Design Object Drawing
 DODO
 Design Object Drawing Outputter
 DSD
 Defense Systems Division
 DRO (Memory)
 Direct Read Out
 ECP
 Engineering Change Proposals
 ESR
 Executive Service Request
 FAT
 Factory Acceptance Test
 FCN
 Field Change Notices
 GFE
 Government Furnished Equipment
 GFI
 Government Furnished Information
 HZ
 Hertz, Cycles Per Second

IDS	Common System Memory, Input/Output Test (routing of the Common Program)
Interface Design Specification	
INSTR.	Computer System Operational (Operability) Test
Instruction	
I/O	D/A
Input/Output	Digital/Analog
IOA	
Input-Output Adapter	DCN
IOC	Document Change Notice
Input-Output Controller	DOB
IOC/IOA	Design Object Drawing
Input-Output Controller/Adapter	DODO
IPR	Design Object Drawing Output
In-Process Review	DBD
ISM	Defense Systems Division
Interim Software Maintenance	PRO (Memory)
LBEF	Direct Read Out
Land Based Evaluation Facility	ECF
MC	Engineering Change Proposals
Monitor Console	ESB
MCC	Executive Service Request
Monitor Control	FAT
MIN	Factory Acceptance Test
Minute	FCN
MMU	Field Change Notices
Mass Memory Unit	FPT
MOD X2	Government Purchased Equipment
Model X (experimental) 2 (revision)	GTC
MRR	Government Purchased Information
Management Responsibility Reporting	HX
	Hours, Cycles Per Second

MSEC	RR
Millisecond, 10^{-3} second	Reconfiguration Routines
N/A	RIPS
Not Applicable	Remote Integrated Programming System
NDRO	SC
Non Destruction Read Only Memory	Software Configuration Model
NTDS	SCCB
Navy Tactical Data System	Software Change Control Board
PCA	SCM
Physical Configuration Audit	Software Configuration Management
PDR	SDC
Preliminary Design Review	Signal Data Converter
PDS	SDI
Program Design Specification	Software Development Instruction
PET	SEC
Processing Evaluation Tool	Second
PM	SHAMP
Performance Monitoring Module	Ship Application Project Manager
PML	SL
Program Maintenance Log	System Loader (module of Program)
PPS	SPW
Program Performance Specification	Statement of Work
POFA	SPFA
Performance Operability Function Appraisal (Test)	Software
PP	STR
Program Package	Software Trouble Report
PPS	TE AND I
Program Performance Specification	Test, Evaluation and Interchange
PROMIS	TIPS
Program Management Information System	Trace Report Processing Output

RR		MSRM
Reconfiguration Routines	10 ⁻³ seconds	Millisecond
RIPS		N/A
Remote Integrated Programming System		Not Applicable
SC		NDRO
Software Configuration Module		Non Destruction Read Only Memory
SCCB		NTDS
Software Change Control Board		Navy Tactical Data System
SCM		PCA
Software Configuration Management		Physical Configuration Audit
SDC		PDR
Signal Data Converter		Preliminary Design Review
SDI		PDS
Software Development Instruction		Program Design Specification
SEC		PEI
Second		Processing Evaluation Tool
SHAPM		PM
Ship Acquisition Project Manager		Performance Monitoring Mode
SL		PML
System Loader (module of Program)		Program Maintenance Log
SOW		PPS
Statement of Work		Program Performance Specification
SQA		POFA
Software Quality Assurance		Performance Operability Function
STR		PR
Software Trouble Report		Program Package
TE AND I		PRC
Test, Evaluation and Integration		Program Performance Specification
TIPO		PROMIS
Trace Inputs Processing Outputs		Program Management Information System

UPAK

Utility Package (module of the Common Program)

USEC

Microsecond, 10⁻⁶ second

VSS

Video Signal Simulator

WBS

Work Breakdown Structure

WS - 8506

**Weapons Specification - 8506 (NAVORD) documentation standard
for computer programs.**

Roger W. Weber
ROGER W. WEBER
Project Engineer

Utility Package (Module of the Common Program)

EVALUATION

This report describes the software development technology and management practices employed on four specific developments by Sperry Univac.

The intent of the RADC program to which this document relates is to describe and assess software production and management tools and methods which significantly impact the timely delivery of reliable software.

The study contract is one of a series of six with different firms having the similar purpose of describing a broad range of techniques which have been found beneficial.

RADC is engaged in promoting utilization of Modern Programming Technology, also called Software Engineering, especially in large complex Command and Control software development efforts.

Roger W. Weber

ROGER W. WEBER
Project Engineer

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