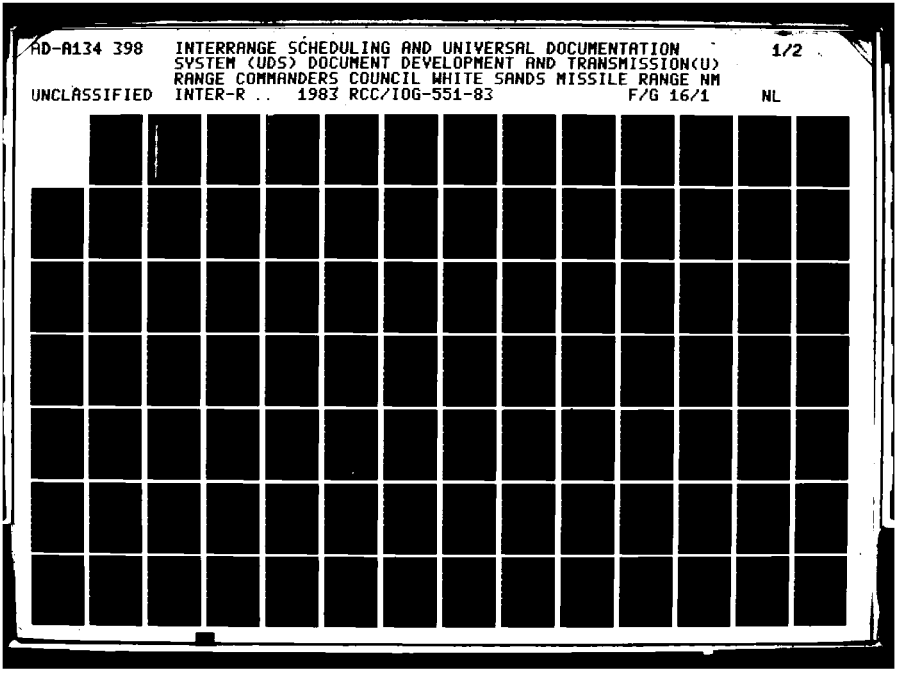
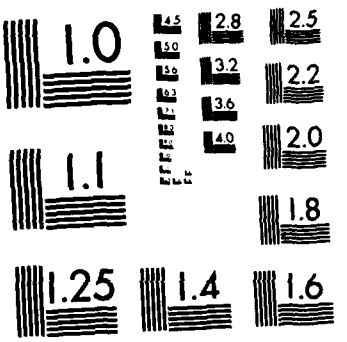
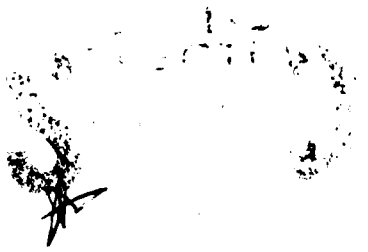

AD-A134 398 INTERRANGE SCHEDULING AND UNIVERSAL DOCUMENTATION SYSTEM (UDS) DOCUMENT DEVELOPMENT AND TRANSMISSION(U) RANGE COMMANDERS COUNCIL WHITE SANDS MISSILE RANGE NM
1/2
UNCLASSIFIED INTER-R .. 1983 RCC/IOG-551-83 F/G 16/1 NL



IOG

DOCUMENT 551-83

INTERRANGE SCHEDULING AND UNIVERSAL DOCUMENTATION SYSTEM (UDS) DOCUMENT DEVELOPMENT AND TRANSMISSION



INTERRANGE OPERATIONS GROUP

RANGE COMMANDERS COUNCIL

WHITE SANDS MISSILE RANGE
KWAJALEIN MISSILE RANGE
YUMA PROVING GROUND

PACIFIC MISSILE TEST CENTER
NAVAL WEAPONS CENTER
ATLANTIC FLEET WEAPONS TRAINING FACILITY
NAVAL AIR TEST CENTER

EASTERN SPACE AND MISSILE CENTER
ARMAMENT DIVISION
WESTERN SPACE AND MISSILE CENTER
AIR FORCE SATELLITE CONTROL FACILITY
AIR FORCE FLIGHT TEST CENTER
AIR FORCE TACTICAL FIGHTER WEAPONS CENTER

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Document 551-83	2. GOVT ACCESSION NO.: AD-A134 398
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE *(and Subtitle)*: Interrange Scheduling and Universal Documentation System (UDS) Document Development and Transmission	5. TYPE OF REPORT & PERIOD COVERED
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Interrange Operations Group, Range Commanders Council, White Sands Missile Range, NM 88002	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Same as block 7.	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS: Range Commanders Council, ATTN: STEWS-SA-R, White Sands Missile Range, NM 88002	12. REPORT DATE
	13. NUMBER OF PAGES: 172
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*: Same as Block 11.	15. SECURITY CLASS. *(of this report)*: UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

New document.

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

MRTFB Scheduling Systems Survey, results, interrange scheduling and documentation data transmission, automated range scheduling systems, mechanized range documentation systems, Universal Documentation System (UDS), range management system, information exchange/transfer, Mechanized Range Scheduling System (MRSS).

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

FOREWORD

See attached.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

FOREWORD

One of the original tasks assigned to the recently established Interrange Operations Group (IOG) was to determine an approach to (1) achieve individual, compatible, automated range scheduling systems to support increased interrange operations, (2) develop mechanized range documentation systems that will significantly reduce the manual effort required to develop, print, and distribute Universal Documentation System (UDS) documents, and (3) initiate the action to acquire the needed capability at all member ranges involved in interrange operations. A subgroup was established to conduct a survey of the Major Range and Test Facility Bases (MRTFBs) and determine what each organization has available in automated range management systems. This study included an analysis of these systems to determine the feasibility of information exchange/transfer by electronic means. In view of the work already completed by the RCC Documentation Group (DG) on Mechanized Range Documentation, this effort was limited to the Mechanized Range Scheduling System (MRSS) and the communications needs between systems.

Participating organizations/individuals were

Western Space and Missile Center (WSMC)/ROR	- Mr. Ken Ramsey (Chairman)
Eastern Space and Missile Center (ESMC)/ROS	- Mr. Larry Ebaugh
Pacific Missile Test Center (PMTC)/3200	- Mr. C. L. Zehmer
Naval Weapons Center (NWC)/622	- Mr. Robert Vorwerk
Yuma Proving Ground (YPG)/OPS	- Major Allen Green
Air Force Satellite Control Facility (AFSCF)/ROS	- Mr. Hal Smith
White Sands Missile Range (WSMR)/NR-C	- Dr. Jim Graves

INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

RESPONSIBILITY. The controlling DoD office will be responsible for completion of the Report Documentation Page, DD Form 1473, in all technical reports prepared by or for DoD organizations.

CLASSIFICATION. Since this Report Documentation Page, DD Form 1473, is used in preparing announcements, bibliographies, and data banks, it should be unclassified if possible. If a classification is required, identify the classified items on the page by the appropriate symbol.

COMPLETION GUIDE

General. Make Blocks 1, 4, 5, 6, 7, 11, 13, 15, and 16 agree with the corresponding information on the report cover. Leave Blocks 2 and 3 blank.

Block 1. Report Number. Enter the unique alphanumeric report number shown on the cover.

Block 2. Government Accession No. Leave Blank. This space is for use by the Defense Documentation Center.

Block 3. Recipient's Catalog Number. Leave blank. This space is for the use of the report recipient to assist in future retrieval of the document.

Block 4. Title and Subtitle. Enter the title in all capital letters exactly as it appears on the publication. Titles should be unclassified whenever possible. Write out the English equivalent for Greek letters and mathematical symbols in the title (see *"Abstracting Scientific and Technical Reports of Defense-sponsored RDT/E," AD-667 000*). If the report has a subtitle, this subtitle should follow the main title, be separated by a comma or semicolon if appropriate, and be initially capitalized. If a publication has a title in a foreign language, translate the title into English and follow the English translation with the title in the original language. Make every effort to simplify the title before publication.

Block 5. Type of Report and Period Covered. Indicate here whether report is interim, final, etc., and, if applicable, inclusive dates of period covered, such as the life of a contract covered in a final contractor report.

Block 6. Performing Organization Report Number. Only numbers other than the official report number shown in Block 1, such as series numbers for in-house reports or a contractor/grantee number assigned by him, will be placed in this space. If no such numbers are used, leave this space blank.

Block 7. Author(s). Include corresponding information from the report cover. Give the name(s) of the author(s) in conventional order *(for example, John R. Doe or, if author prefers, J. Robert Doe)*. In addition, list the affiliation of an author if it differs from that of the performing organization.

Block 8. Contract or Grant Number(s). For a contractor or grantee report, enter the complete contract or grant number(s) under which the work reported was accomplished. Leave blank in in-house reports.

Block 9. Performing Organization Name and Address. For in-house reports enter the name and address, including office symbol, of the performing activity. For contractor or grantee reports enter the name and address of the contractor or grantee who prepared the report and identify the appropriate corporate division, school, laboratory, etc., of the author. List city, state, and ZIP Code.

Block 10. Program Element, Project, Task Area, and Work Unit Numbers. Enter here the number code from the applicable Department of Defense form, such as the DD Form 1498, "Research and Technology Work Unit Summary" or the DD Form 1634. "Research and Development Planning Summary," which identifies the program element, project, task area, and work unit or equivalent under which the work was authorized.

Block 11. Controlling Office Name and Address. Enter the full, official name and address, including office symbol, of the controlling office. *(Equates to funding/sponsoring agency. For definition see DoD Directive 5200.20, "Distribution Statements on Technical Documents.")*

Block 12. Report Date. Enter here the day, month, and year or month and year as shown on the cover.

Block 13. Number of Pages. Enter the total number of pages.

Block 14. Monitoring Agency Name and Address *(if different from Controlling Office)*. For use when the controlling or funding office does not directly administer a project, contract, or grant, but delegates the administrative responsibility to another organization.

Blocks 15 & 15a. Security Classification of the Report: Declassification/Downgrading Schedule of the Report. Enter in 15 the highest classification of the report. If appropriate, enter in 15a the declassification/downgrading schedule of the report, using the abbreviations for declassification/downgrading schedules listed in paragraph 4-207 of DoD 5200.1-R.

Block 16. Distribution Statement of the Report. Insert here the applicable distribution statement of the report from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 17. Distribution Statement *(of the abstract entered in Block 20, if different from the distribution statement of the report)*. Insert here the applicable distribution statement of the abstract from DoD Directive 5200.20, "Distribution Statements on Technical Documents."

Block 18. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . . Translation of *(or by)* . . . Presented at conference of . . . To be published in . . .

Block 19. Key Words. Select terms or short phrases that identify the principal subjects covered in the report, and are sufficiently specific and precise to be used as index entries for cataloging, conforming to standard terminology. The DoD "Thesaurus of Engineering and Scientific Terms" *(TEST)*, AD-672 000, can be helpful.

Block 20. Abstract. The abstract should be a brief *(not to exceed 200 words)* factual summary of the most significant information contained in the report. If possible, the abstract of a classified report should be unclassified and the abstract to an unclassified report should consist of publicly- releasable information. If the report contains a significant bibliography or literature survey, mention it here. For information on preparing abstracts see "Abstracting Scientific and Technical Reports of Defense-Sponsored RDT&E," AD-667 000.

★ U.S. GPO: 1974—540-847/9052

DOCUMENT 551-83

INTERRANGE SCHEDULING AND UNIVERSAL DOCUMENTATION SYSTEM (UDS) DOCUMENT DEVELOPMENT AND TRANSMISSION

Prepared by

INTERRANGE OPERATIONS GROUP
RANGE COMMANDERS COUNCIL

Published by

SECRETARIAT
RANGE COMMANDERS COUNCIL
WHITE SANDS MISSILE RANGE,
NEW MEXICO 88002

TABLE OF CONTENTS

FOREWORD

One of the original tasks assigned to the recently established Interrange Operations Group (IOG) was to determine an approach to (1) achieve individual, compatible, automated range scheduling systems to support increased interrange operations, (2) develop mechanized range documentation systems that will significantly reduce the manual effort required to develop, print, and distribute Universal Documentation System (UDS) documents, and (3) initiate the action to acquire the needed capability at all member ranges involved in interrange operations. A subgroup was established to conduct a survey of the Major Range and Test Facility Bases (MRTFBs) and determine what each organization has available in automated range management systems. This study included an analysis of these systems to determine the feasibility of information exchange/transfer by electronic means. In view of the work already completed by the RCC Documentation Group (DG) on Mechanized Range Documentation, this effort was limited to the Mechanized Range Scheduling System (MRSS) and the communications needs between systems.

Participating organizations/individuals were

Western Space and Missile Center (WSMC)/ROR	- Mr. Ken Ramsey (Chairman)
Eastern Space and Missile Center (ESMC)/ROS	- Mr. Larry Ebaugh
Pacific Missile Test Center (PMTC)/3200	- Mr. C. L. Zehmer
Naval Weapons Center (NWC)/622	- Mr. Robert Vorwerk
Yuma Proving Ground (YPG)/OPS	- Major Allen Green
Air Force Satellite Control Facility (AFSCF)/ROS	- Mr. Hal Smith
White Sands Missile Range (WSMR)/NR-C	- Dr. Jim Graves

TASK PROPOSAL

1. Title: Interrange Scheduling and Universal Documentation System (UDS) Document Development and Transmission.

2. Scope and Specific Objectives: Determine an approach to achieve individual, compatible, mechanized range scheduling systems to support increased interrange operations and mechanized range documentaion systems that will significantly reduce the manual effort required to develop, print, and distribute UDS documents. Initiate the action to acquire the needed capability at all member ranges involved in interrange operations.

3. Utility of the End Product: The resulting capability would be used by all member ranges involved in interrange operations to handle the heavy workload, schedule conflict indentification, and schedule conflict resolution for interrange operations. Such operations normally have significant variations from the operational plan that must be handled in a real-time decision process usually within hours of the operation. Also, the capability would be used to initially develop, quickly modify, and rapidly transmit UDS documentation to support the flexibility needed to conduct interrange operations.

4. Approach: The following approach will be used to accomplish this task:

   a. Survey member ranges involved in interrange operations to determine the existing mechanized range scheduling capability and mechanized range documentation capability.

   b. Analyze the various existing capabilities for the potential to integrate them into a distributed network to allow the exchange of technical information from the respective data based on one range control agency to another in a very accurate and expeditious manner.

   c. Determine a common approach that can be used to achieve on-line mechanized scheduling of interrange operations and rapid UDS documentation development, modification, and transmission. This includes such factors as hardware, software, data, funding, and common procurement actions.

5. Assignment and Management: The Western Space and Missile Center (WSMC) (Mr. Ken Ramsey) will chair this committee. Committee members will be under control of individual ranges. The IOG will report on progress/ status of the effort.

6. Other Resources: Technical standing group members.

7. Milestones:

a.	Complete the survey	December 1981
b.	Complete the analysis	February 1982
c.	Recommend approach & assign tasks	(EC meeting in early 1982)

8. Participants: All member ranges involved in interrange operations.

9. Coordination Required: Coordinate with all appropriate technical standing groups to assure the practicality of the approach selected.

10. Completion Date: EC meeting in early 1982.

BACKGROUND

Heretofore, interrange activities requiring test documentation and scheduling support have been disjointed and functionally isolated. Individual range organizations have recognized a need for computer assistance in documentation and schedule management. However, computer programs and hardware systems have been developed and implemented by various organizations without giving consideration to how this information could be moved from one location to another except by manual means (Air Force Flight Test Center (AFFTC) and Western Space and Missile Center (WSMC) have entered into a joint development effort). The dynamics of the future Major Range and Test Facility Base (MRTFB) workload and the austere outlook for additional resources require the utmost in interrange systems management efficiencies. To this end, the rationale and the resources required to efficiently synthezise enhancements in the exchange of interrange support requirements must be fully understood and supported by senior functional managers of the MRTFBs.

DISCUSSION

The survey revealed that several range organizations have developed systems support for both documentation and schedule management. These systems range from simple, stand-alone word-processing stations to extensive, dedicated systems used for operations management tasks.

This report contains five sections:

I. Survey questionnaires and the survey.

II. Results of the survey.

III. An approach to interrange scheduling and documentation transmission.

IV. Summary and recommendations.

V. Systems descriptions.

Operating software development requires large expenditures of time and money. This document will provide the basis for organizations to review how other ranges operate (described in section V), to look at their operations systems, and to determine if other applications could be used in their effort.

SECTION I

MRTFB SCHEDULING SYSTEM SURVEY

SURVEY

The intent of the survey was to determine to what degree each organization has automated and to determine the effectiveness of the systems.

This analysis will be used for ranges to determine what exists and where they can get help. Hopefully, the results will be cost savings to the government by eliminating duplicate development costs between ranges who have not procured systems.

The following survey was submitted to each participating range.

PART I OF SURVEY

INSTRUCTIONS

1. Purpose of this evaluation is to determine those agencies who have developed/obtained a Mechanized Range Scheduling System (MRSS) or who are using a computer to assist in time management of operational support systems/facilities.

2. We have developed a list of those features which we feel should be included in an MRSS. These features are listed as "Attributes of an Automated Scheduling System" on pages I-3 and I-4. Request each organization review these items, and if you desire to add additional features please do so. Please evaluate your system and annotate the evaluation matrix as you deem appropriate.

3. On completion of the evaluation matrix, please evaluate the effectiveness of your system using the general scheduling system attributes (questions 1 through 11). On completion of the total evaluation, please make copies and bring the total package to the meeting on 19-20 April at Cape Canaveral.

4. Use the following symbols to denote your assessment:

P = Partial
X = Like to have
N = Do not have
Y = Feature exists
Blank = Don't need

ATTRIBUTES OF AN AUTOMATED SCHEDULING SYSTEM:

1. Automatic conflict-free schedule preparation.
2. Automatic conflict determination.
3. Individual resource scheduling related to events.
4. Complete data capture with predefined audit trails.
5. Automatic resource utilization accounting (system hours).
6. Workload forecasting and cost estimating.
7. Automatic electrical notification of schedule changes (TTY, etc.).
8. Direct interface with planning and control elements.
9. Conversational interactive user interface.
10. No contention with other users, dedicated system.
11. Full time availability (24 hours, 7 days).
12. Usefulness for cost accounting and direct cost reimbursement.
13. CMIS interface - automatic generation of actual & forecast use.
14. Compatibility with other range's scheduling systems.
15. Direct electrical teletype interface, including AUTODIN.
16. Direct electrical facsimile interface.
17. Minimum ADPS knowledge required of general users.
18. High efficiency related to volume of data to be processed.
19. Low labor intensity to support system needs (overhead).
20. Low failure rate - fail safe/soft design.
21. Low data redundancy within the data base.
22. High consistency of data formats and defintion.
23. On-line data sharing between many users.
24. Standardization of data meanings and usages.
25. Adequate data security features.

26. High degree of data integrity.

27. High degree of data independence for users.

28. Adequate terminals for required users.

29. Able to handle classified information.

30. Located in a controlled area.

31. Automated graphics and display capability.

32. Dedicated software support.

33. Adequate system documentation.

34. Structured programming.

35. Flexibility of software changes.

PART II OF SURVEY

INSTRUCTIONS

Evaluate the ability of the present scheduling system (manual and/or automated) to meet the requirements of the organization it supports. Rate each item on a scale of 0-5 based on its own merit. Do not limit the "requirement" to the capacity of the present system, but consider the overall requirement as it would exist for an idealized system of optimal capacity with adequate procedures, information, mechanization and personnel.

1. INFORMATION ACCURACY. Does the accuracy of the information meet the needs of the overall organization? Is it suspect in any way such that others do not, or cannot use it?

2. INFORMATION AVAILABILITY. Is the information readily available to all present and potential users? Can it be easily and quickly obtained when needed?

3. INFORMATION COMPLETENESS. Are there gaps in the information which must be filled in by other means, or which should be available?

4. INFORMATION VALUE. Does the information have sufficient value to justify the effort involved in collection, processing and maintenance? Is the information of significant value to others outside the scheduling organization to be useful?

5. INFORMATION SECURITY. Is the information adequately secured from loss by natural or man-made disasters, intentional sabotage, and unauthorized access?

6. SPEED OF WORK. Does the scheduling system allow the performance of work at an acceptable rate? Are the schedulers and others paced by the system, or does it respond as fast as people can think and work?

7. AMOUNT OF WORK. Does the system support the volume of work which is required? Is there other work which should be done, but can't be due to limited capacity of the system to do useful work?

8. EFFICIENCY OF WORK. Is there significant effort expended due to inefficiencies of the system which should be directed to more productive areas? What is the trade-off between useful work vs. work to support the system?

9. FLEXIBILITY. Does the system afford more than one means for solving a given problem or supporting a given task? Can it be easily changed to match changes in organization, procedures and/or personnel.

10. RESPONSIVENESS. How responsive is the system to short term changes? Can the system be quickly changed to meet one-time or emergency situations?

11. EXPANDIBILITY. Can the system be easily expanded to accommodate additional workload through the addition of personnel and/or facilities without significant redesign, cost and effort?

SECTION II

RESULTS OF THE SURVEY

The specific results of the survey are included in the Evaluation Matrix, Parts I and II, included herewith, and responses are summarized in this section.

Of the MRTFBs surveyed, the following agencies are employing computer assistance to some degree:

1) Air Force Satellite Control Facility (AFSCF), Sunnyvale, CA
2) Eastern Space and Missile Center (ESMC), Patrick AFB, FL
3) Pacific Missile Test Center (PMTC), Point Mugu, CA
4) Western Space and Missile Center (WSMC), Vandenberg AFB, CA
5) Air Force Flight Test Center (AFFTC), Edwards AFB, CA
6) Armament Division (AD), Eglin AFB, FL

Evaluation of Systems

1. Air Force Satellite Control Facility (AFSCF):

a. The AFSCF schedule is primarily a manually-produced, graphical display with an off-line computer. The graphical display is constructed on chart paper, with time oriented on the horizontal axis and ground resources oriented on the vertical axis. Satellite program supports are entered on the chart with colored Chart Pak tape and resources separated by horizontal lines. The chart is built and maintained by scheduling personnel through the assistance of a scheduling-specific computer SCRABL (Scheduling, Resource Allocation, and Buffer Linkage). The SCRABL is dedicated to the Range Scheduling function and provides for operation, maintenance and display of centralized data base of scheduling information. The data base describes AFSCF resources, satellite program requirements and scheduled resource assignments. The computer system is used to produce all messages, listings, schedules, and retrieval of historical information.

b. The AFSCF indicated that the SCRABL system did contain individual resources scheduling and was available full time and around the clock. They also indicated that the system had very little real-time application. The AFSCF's self-arrived score was 27.

2. Eastern Space and Missile Center (ESMC):

a. ESMC has a fully developed Mechanized Range Scheduling System (MRSS). It is operating on a CDC 730 on a shared basis. They are very high on the development scheme. The applications programs were developed by the Range Contractor using a composite structured design technique. The automated scheduling technique, as implemented at the ESMC Eastern Test Range has few serious problems other than the fact that is competes with real-time operations; however, this should be remedied in total by the pending acquisition of updated computers with expanded CPU and core memory capability. They experience few breakdowns except for commercial power outages during heavy summertime thunderstorm periods. The software support is excellent, with modification and

development continually in work to improve and expand its capability. The Mechanized Resource Management System (MRMS) is an interactive data base management system designed to maintain and update the MRMS resource/schedule data base. The program is divided into 10 more or less independent command modules. Each command module recognizes and executes a certain logical subset of the MRMS command language. The following command modules make up MRMS:

1) JON Commands
2) Card Commands
3) Resource Commands
4) OD Commands
5) Number Commands
6) Operation Commands
7) Schedule Commands
8) Conflict/Commitment Commands
9) File Command
10) Miscellaneous Commands

Modules 1 through 6 are data base update commands for maintaining the data base. Modules 7 and 8 produce specialized reports. Module 9 controls the handling of any print files created by the program. Module 10 contains various small commands used to control program execution parameters (e.g., default print files and schedule/history mode).

b. ESMC's self-evaluation indicates the program meets the majority of the predefined attributes of a Mechanized Range Scheduling (MRS) system. Their system does not have direct interface with the test planning community and does not have user participation. The ESMC scored the system as 43 (they did not indicate if the software applications and documentations are available to other government agencies).

3. Pacific Missile Test Center (PMTC):

a. The PMTC is operating on the CDC Cyber 175. They have had some problems with contention for the system; however, that will be solved in the near future with additional computer capability.

b. The in-house-developed Range Operations Automated Scheduling Information System (ROASIS) is a data entry and information retrieval system used in the preparation of weekly range utilization forecasts. The goals of the system are to

(1) Provide an automated means of allocating and scheduling PMTC resources in accordance with known priorities and in such a way as to optimize the use of resources and satisfy user requirements as near the time requested as possible.

(2) Provide the necessary post-operational processing reports to enhance prudent decisions by managment concerning operational priorities, procurement and personnel.

(a) The Phase I implementation of ROASIS is a functional replacement of the Range Operations Control System (ROCS) which has been operational at PMTC since 1968. Cutover to ROASIS-only operation was accomplished on October 1, 1981. Operations since then have proceeded normally and system enhancements are now being implemented to achieve the Phase II implementation of ROASIS. Phase II calls for fully automatic scheduling.

(b) ROASIS is running on the CDC CYBER 175 computer located in Building 53 at PMTC. As shown in the ROASIS OVERVIEW diagram, PMTC scheduling requests and completed operations data from Barking Sands, Hawaii, are entered via on-line terminals. Summary reports are prepared for the Barking Sands data, but scheduling is performed for the PMTC operations. Test operations of a diverse nature are conducted for both military and civilian agencies, making for complex demands on range resources. ROASIS must schedule these tests in such a manner that the range resources are utilized economically and advantageously. Schedule requests are entered into ROASIS by data entry personnel and schedulers via on-line terminals. These requests are compared to ROASIS Support Files to validate the requests, to locate scheduling conflicts, and to determine the costs entailed in resource utilization.

(c) A weekly forecast is prepared and distributed to Program Managers, range users, test conductors, and scheduling officers. As the week progresses, modifications to the weekly forecast can be entered and updated forecasts obtained. With the Phase I implementation of ROASIS, the actual schedule preparation is accomplished as it was with ROCS, i.e., manually, with the resulting schedule entered into ROASIS. Many reports are available and are regularly produced and distributed. In addition, reports of an ad hoc nature can be obtained using the Query and Report Generation capabilities of the CYBER. Completed operations are automatically saved in a History File and these History Files are periodically transferred to magnetic tape for safekeeping.

c. In the self-evaluation, PMTC indicated that the system was primarily an accounting system. Conflict indentification and functions which directly assist the scheduler in real-time decision making were not available.

d. PMTC scored the system as a 39. (They did not indicate if the application programs and documentation could be made available to other government agencies.)

4. **Western Space and Missile Center (WSMC):**

a. The Western Test Range (WTR) Range Operations Computer System (ROCS) is an automated data storage, processing and retrieval system supporting all aspects of test range operations planning, scheduling, control and historical reporting. The primary goal of the ROCS is to provide automated assistance to management and operating personnel in all areas of operations resource management to improve efficiency, productivity, and information integrity.

(1) The ROCS was developed and implemented in three phases as an independent network of small computers with multiple interactive terminals and an extensive informational data base available to multiple users.

(a) The first phase was to prototype a minicomputer system on which the basic concepts were developed and tested in a live environment. The prototype was never intended to be a full-scale operational system, but was useful to a limited degree in supporting the operations scheduling process.

(b) The second phase was a fully operational interactive system primarily for support of real-time scheduling activities.

(c) The third phase was a hardware expansion of the basic system to provide additional terminals, computer power and on-line disk storage. The present system has sufficient power to support both real-time scheduling and extensive reporting requirements on historical data. An additional enhancement to the ROCS is the integration of the operations planning and documentation system into the network, consolidating all operations management, planning, scheduling, and control functions into a single system.

b. Support to the operations planning function consists of an on-line data base of all operational documentation (UDS and supporting documents), plus software to manipulate the data and produce hard copy for review and publication. In addition to word processing, electronic filing/retrieval, and electronic mail facilities, an extensive system of interactive planning tools are being developed. These software tools will allow technical planners to interact with the data base (using video terminals) in their view of the plan, without regard to the format of final documents. All formatting for published documents will be under

software control, utilizing basic information entered by the various technical planners. Final documents are produced on a high-quality, high-speed laser printer, on either paper or offset masters for direct use by the printing plant. Additionally, documents may be electrically transmitted via either teletype (local and/or AUTODIN) or data communications to other data or word processing systems.

c. In the self-evaluation, WTR scored their system very high and believe it to be one of the most responsive and flexible systems in the MRTFB inventory. The application software was developed by WTR and the Center Technical Services Contractor (CTSC) (FEC).

d. WTR scored their system as 45.

5. Air Force Flight Test Center (AFFTC):

a. The AFFTC system is an outgrowth of the ROCS at WTR, and AFFTC uses the same type hardware and much of the software from ROCS. Since the AFFTC system was developed using WTR experience, the AFFTC system was operational within 24 hours after equipment installation. Continuing software and system support is provided to AFFTC by WTR and the CTSC.

b. In the self-evaluation, the AFFTC system scored as 41. Due to the similarity of the AFFTC system to the ROCS, a separate description of the AFFTC system is not included in Section V.

6. Armament Division (AD):

Although the AD participated in the self-evaluation, system information was not supplied. The AD has procured a new system by contract. The AD is very high on their new system, which is to be operational early next year. This system is described in the evaluation MATRIX as AD-2. Based on system specification, AD has evaluated it at a very high 54. It should be understood that this system is not operational, and the evaluation must be understood in that context.

EVALUATION MATRIX — Part I, Automated Scheduling Systems (Page 1 of 2)

	<——ARMY-->			<——NAVY——>				<——AIR FORCE——>						
	KMR	WSMR	YPG	PMTC	NATC	NWC	AFWTF	AD	AFFTC	ESMC	WSMC	TFWC	AFSCF	AD[2]
1 Automatic conflict-free scheduling														
2 Automatic conflict determination		NX	NX	NX		NX		P	Y	Y	Y		NX	X
3 Individual resource scheduling		NX	Y	Y		NX		Y	Y	Y	Y		Y	X
4 Comp. data capture w/audit trails		NX	NX	Y		NX		P	NX	Y	Y		NX	X
5 Auto. resource utilization acctg.		NX	NX	NX		Y		P	NX	Y	Y		NX	X
6 Wrkld forecasting & cost estimating		NX	NX	Y		NX		P	NX	Y	Y		NX	X
7 Auto. notification of sched. changes		NX	NX	NX		NX			NX	Y	Y		NX	X
8 Direct interface w/planning & control		NX	NX	NX					NX	NX	Y		NX	X
9 Convers. interactive user interface		NX	Y	NX		NX		P	Y	Y	Y		NX	
10 No contention w/other users		NX	Y	NX				P	Y		Y		Y	NET WRK
11 Full time availability(24 hrs/7 days)			Y	NX				P	Y	Y	Y		Y	
12 Useful for cost accounting & DCR		NX	NX	Y		NX		P	Y	Y	Y		NX	P
13 CMIS interface—auto. data prepara.		NX	NX			Y			NX	Y	Y		NX	
14 Compatibility w/other range's systems		NX	NX	NX					NX	Y	Y		NX	X
15 Dir teletype interface(local/AUTODIN)		NX		NX				P	NX	Y	Y		NX	X

(con. next page)

SYMBOLS (To indicate capability of system)

P = Partial Capability

Y = Have Capability

N = Do Not Have Capability

X = Don't Have, But Desirable

Blank = Don't Need Capability

EVALUATION MATRIX — Part I, Automated Scheduling Systems (Page 2 of 2)

	<——ARMY—>			<———NAVY———>				<———AIR FORCE———>						
	KMR	WSMR	YPG	PMTC	NATC	NWC	AFWTF	AD	AFFTC	ESMC	WSMC	TFWC	AFSCF	AD[2]
16 Direct facsimile interface				NX					Y		Y			
17 Min. user ADPS knowledge requirement		NX	Y	NX		NX		P	Y	Y	Y		NX	X
18 High efficiency—work volume vs cost			NX	NX		NX		P	Y	Y	Y		NX	X
19 Low labor intensity mtg system needs			Y	NX		NX		Y	Y	Y	Y		NX	Y
20 Low fail. rate—fail safe/soft design		NX	Y	Y		NX		Y	NX	Y	Y		NX	X
21 Low data redundancy within database		NX	Y	Y		NX			Y	Y	Y		NX	X
22 Hi consistency of data form & defin.		NX	Y	Y		NX		Y	Y	Y	Y		NX	X
23 Online data sharing betw. many users		NX	NX	Y		NX			Y	NX	Y		NX	X
24 Standard. of data meanings & usages		NX	Y	Y		NX			Y	Y	Y		NX	X
25 Adequate data security features		NX	N	NX				Y	Y	Y	Y		Y	X
26 High degree of data integrity		NX	Y	Y		NX		Y	NX	Y	Y		Y	X
27 Hi degree of data independence for users		NX	NX	Y		NX		Y	Y	NX	Y		NX	X
28 Adequate terminals for req'd. users		NX	NX	Y		NX		Y	Y	Y	Y		NX	
29 Able to handle classified info										Y			NX	X
30 Located in Controlled Area								Y	Y	Y	Y		Y	X
31 Automated graphics & display capabil.		N		NX		NX			NX	NX	NX		NX	X
32 Dedicated software support		NX	NX	NX		NX		P	Y	N	Y		NX	X
33 Adequate system documentation		NX	NX	Y		NX		P	Y	Y	Y		NX	X
34 Structured programming		NX								Y				
35 Flexibility of Software change		NX	NX	NX		NX		P	Y	Y	Y		NX	X

EVALUATION MATRIX — Part II, General Scheduling System Attributes

		<——ARMY—>			<————NAVY————>			<————AIR FORCE————>							
		KMR	WSMR	YPG	PMTC	NATC	NWC	AFWTF	AD	AFFTC	ESMC	WSMC	TFWC	AFSCF	AD^2	TOTALS
1	Information Accuracy		4	3	5		4		4	3	4	4		3	5	39
2	Information Availability		3	3	3		3		4	4	4	4		1	5	34
3	Information Value		2	2	4		4		4	4	4	4		4	5	37
4	Information Completeness		3	4	4		2		3	4	3	4		3	5	35
5	Information Accuracy		4	4	4		4		5	3	5	3		4	5	41
6	Speed of Work		2	3	2		4		3	4	3	4		2	5	32
7	Amount of Work		2	2	4		4		3	4	5	4		3	5	36
8	Efficiency of Work		1	2	3		2		2	4	3	4		3	4	28
9	Flexibility		1	3	3		4		2	2	4	5		2	5	31
10	Responsiveness		2	4	3		4		2	4	3	4		2	5	33
11	Expandibility		3	4	4		4		2	5	5	5		0	5	37
	Totals:		27	34	39		39		34	41	43	45		27	54	383

AD^2 = NEW MRD SYSTEM UNDER DEVELOPMENT AT EGLIN AFB

RATING VALUES:

0 - Totally unsatisfactory. Meets little or none of the requirements.

1 - Meets about 25% of the requirements.

2 - Meets about 50% of the requirements.

3 - Meets about 75% of the requirements.

4 - Meets about 100% of the requirements.

5 - Substantially exceeds meeting all requirements.

SECTION III

AN APPROACH TO INTERRANGE SCHEDULING AND DOCUMENTATION DATA TRANSMISSION

1. INTRODUCTION

This plan presents an approach for an interrange scheduling and documentation data transmission system for exchange of information between member ranges.

2. OBJECTIVES

The objective is to achieve an integrated, compatible and efficient means for electronic interchange of operations program planning and scheduling data between member ranges. After acceptance of an approach by a majority of member ranges, action should be initiated to acquire the needed capability at all member ranges involved in interrange operations.

3. FUNCTIONS

The major functions to be served by the network are the electronic dissemination of operations program planning documentation and scheduling data.

3.1 Program Planning Documentation

All documentation identified in the Universal Documentation System (UDS) handbooks will be transmitted electronically via the network. The major items covered are: Program Introduction (PI); Statement of Capability (SC); Program Requirements Documents (PRD); Program Support Plans (PSP); Operations Requirements (OR); and Operations Directives (OD). In addition, supplemental documents may be transmitted, such as Special Test Instructions (STI), Vehicle Peculiar Supplements (VPS), and Data Processing Plans (DPP). Other free-format documentation relating to program planning activities may be handled by the network as required, although it is not intended to be used as a general electronic mail system for administrative or other purposes.

3.2 Operations Scheduling Information

Information related to major operations and resource utilization which is of interest to other ranges will be made available for general use. This includes current daily schedules and weekly forecasts with resource assignments. Information will potentially be used for planning purposes, conflict identification and resolution. Support range scheduling requirements may be transmitted to specific addresses.

4. CONDITIONS

The following conditions are considered basic to the design of a network:

a. The system will be essentially hardware independent. Existing computer systems will be used, with only a requirement to provide a data communications interface with the network.

b. The requirement for software changes or development will be limited to only that necessary to output and input data in a common format. Additionally, local report generation modules may be developed to utilize the data available from the network into CRT displays, printed reports, and to store data on local media (e.g., disks or tapes). In isolated cases, it may be necessary to develop an interface module to handle network log-on/log-off, inquiry statements and/or communications protocols.

c. Participation in the network may vary from manual to full interactivity. Users who have no automation facilities may participate by purchasing low cost terminal equipment (CRT and printer) or utilize existing teletype facilities. Users who have existing automation may utilize simple file transfer functions or interactive access.

d. In order to assure effective data interchange, standards for data element definitions and record formats must be established. For example, all free-format documentation should conform to the standard ANSI print file format, and all formatted data (e.g., scheduling information) should conform to an established and agreed-to standard for meaning, format and content.

5. ALTERNATIVES

There are three basic alternatives to establishing a network for the stated purpose:

a. Allow each user to establish communications and protocols between themselves and all other users.

b. Utilize existing data communications networks.

c. Establish a specialized network for the purpose of interrange operational program data communications.

The first alternative (a) is impractical because of the complexity of the solution. Each user must establish communications, potentially different, for each other user. For example, in a six-node network (see figure 1), each user must provide individual communications protocols, hardware, and data interface with five other users (total of thirty links). The software and hardware requirements for interface

with one user must be repeated by each of the other users (in this case, five times for each user). As more users are added to the network, all other users must add hardware and software to complete the network.

The second alternative (b) is only a partial solution in that it solves the hardware and communications protocol problem, but does not address the software requirements of format standardization and conversion. Each user would still have to provide software to translate data formats from all other users. Generally, interface with an established network will require each user to configure to the one network standard for communications and data.

The third alternative (c) solves both problems of hardware and software. Each user must provide only one communications interface and develop software to handle the standard formats (see figure 2). The network would contain specialized intelligence to provide communications protocol conversion, handle data in a standard format regardless of source, and provide whatever data conversion is needed to assure effective information exchange.

6. INTELLIGENT NETWORK FEATURES

The following features are considered essential to implementation of a viable network:

a. Each user will be required to provide one gateway into the network. This gateway will be configured to each user's capability for data communcations within reasonable limits. The network will make provisions for a wide variety of data communications types and protocols, and effectively provide protocol conversion.

b. The addition or removal of any node will be transparent to all other users. No hardware or software changes of any kind should be required of any user because of changes on the network.

c. Each user may participate commensurate with individual needs such as manual or automatic data submission/retrieval, local automation equipment capabilities, etc.

d. The network will be available full-time (24 hours, 7 days) to provide users independence for posting and retrieving data. The network must provide "mail box" features such that the sending of data from one user to another does not require both to "meet" on the network. Data can be submitted and retrieved at the convenience of each user.

e. Overall impact on all users must be minimal. New hardware and software requirements, procedures or practices changes must be kept to an absolute minimum. The majority of the development will be concentrated in the network itself to minimize impact and provide a single coordinated interface.

7. REQUIREMENTS

Each user of the network will be required to provide the following:

a. One communications gateway into the network. The gateway will be a standard EIA RS-232 or RS-488 data communications port interface for connection to a standard modem.

b. Development of software and internal procedures to output and input data in standard interchange formats. This includes modules to extract, translate and format data from the local data base into a format acceptable to the network, and modules to accept data in the same standard format for local display, printing, processing, and/or storage.

c. Submit data into the network in a timely manner for retrieval by other users. This applies primarily to operations scheduling data which must be kept current to be of value.

d. Provide a fair share of funding to support network development, operation and maintenance.

8. IMPLEMENTATION

Implementation of the network will require the organization of a technical management team to perform the following actions:

a. Develop policy for implementation and management of the network.

b. Define how configuration management will be administered.

c. Develop system specifications for development of the network.

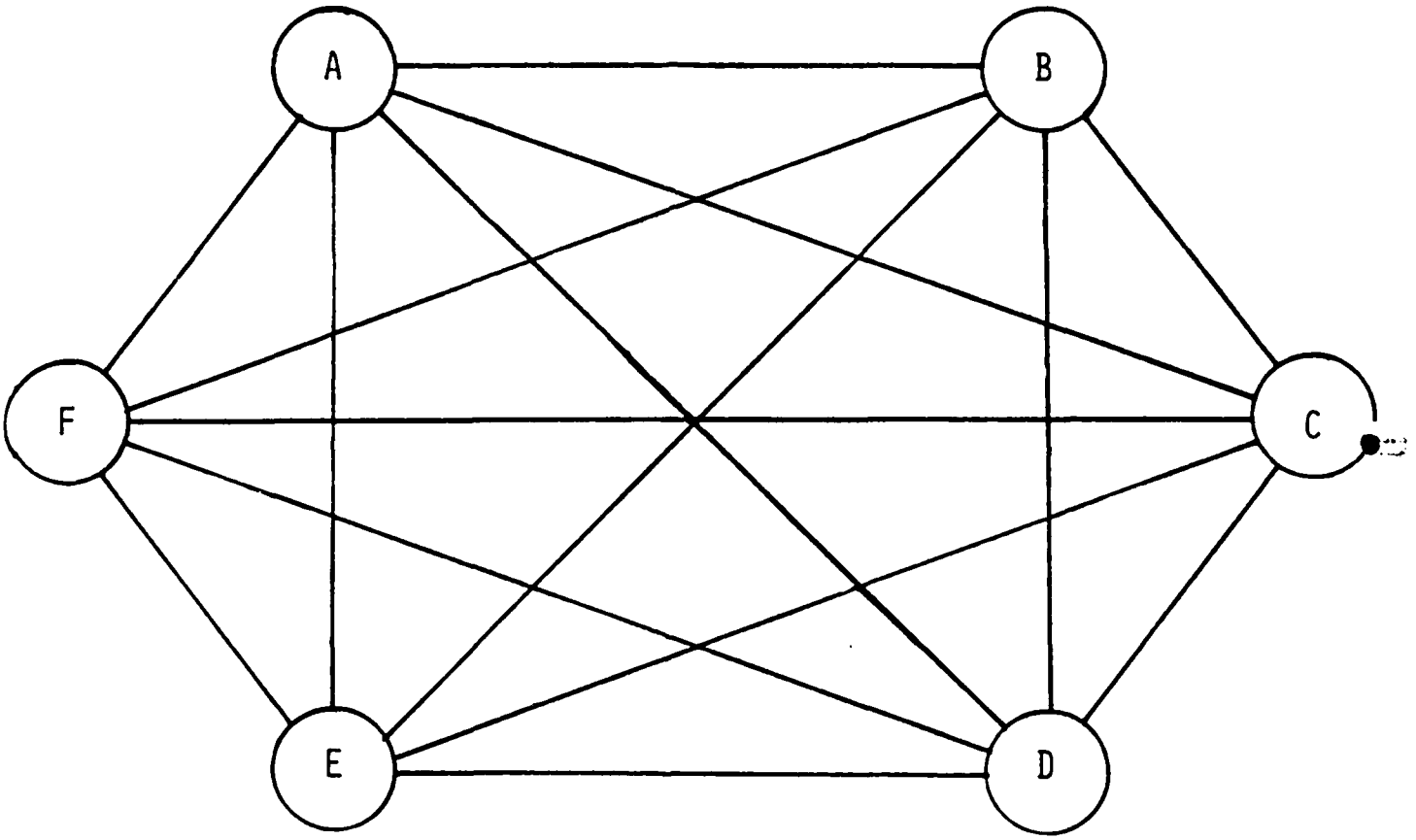
d. Coordinate all actions with the appropriate agencies.

e. Determine how the network will be funded.

f. Determine geographic location of the network hub.

g. Arrange for communications facilities for each user.

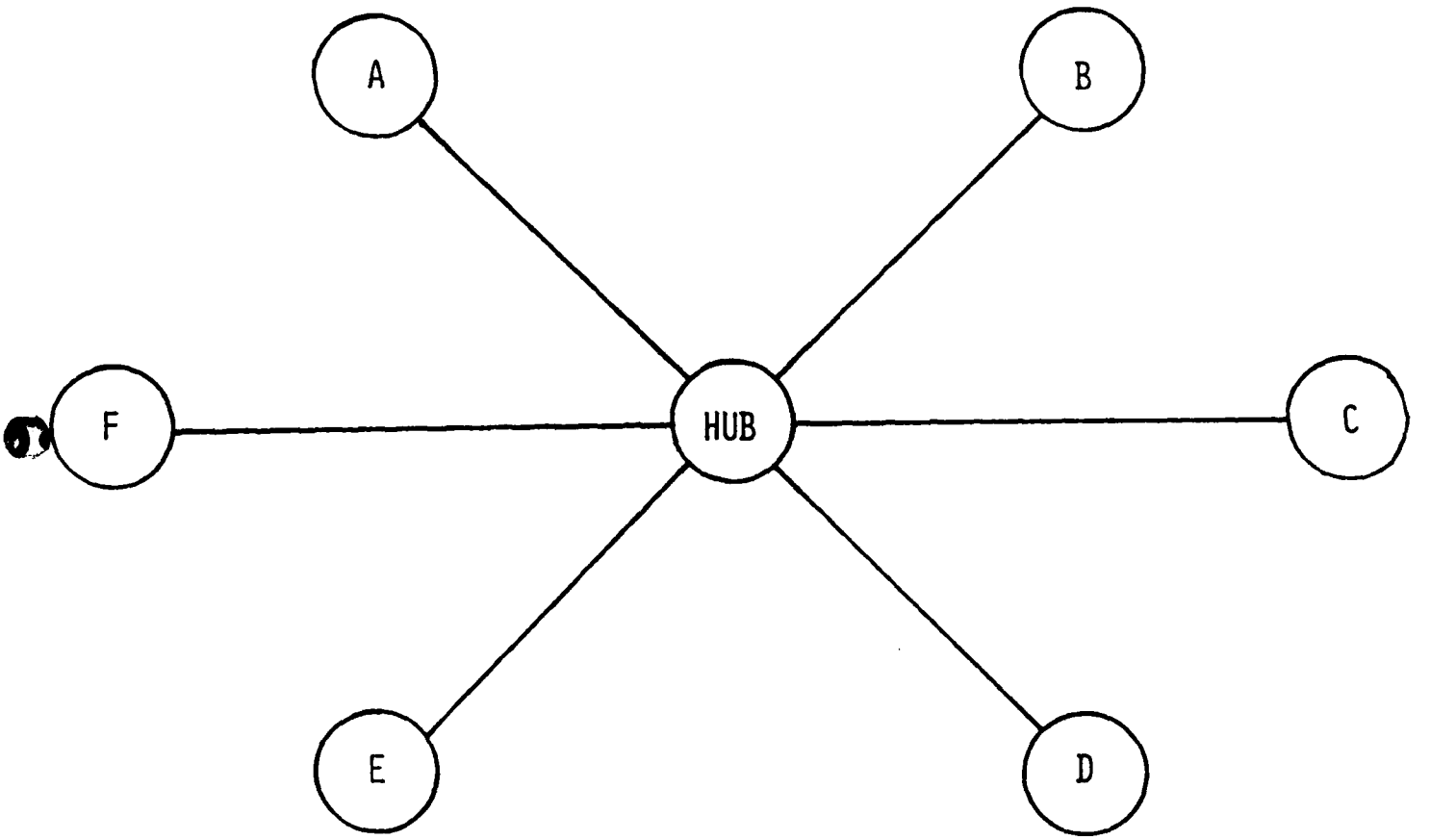
DIRECT CONNECTION NETWORK



REQUIRES: N x (N-1) COMMUNICATIONS LINKS TO CONNECT ALL NODES.
N-1 COMMUNICATIONS PROTOCOLS AT EACH NODE.

Figure 1

INTELLIGENT NETWORK



REQUIRES: ONE COMMUNICATIONS LINK PER NODE
INTELLIGENT HUB TO: STORE AND FORWARD DATA
TRANSLATE PROTOCOLS
TRANSLATE DATA VALUES
STANDARD DATA FORMAT (SEND AND RECEIVE)

Figure 2

SECTION IV

SUMMARY, CONCLUSION AND RECOMMENDATIONS

SUMMARY

A two-part survey was distributed to KMR, WSMR, YPG, PMTC, NATC, NWC, AFWTF, AD, AFFTC, ESMC, WSMC, TFWC, AND AFSCF; responses were received from all but KMR, NATC, AFWTF, and TFWC.

The first part of the survey was designed to determine the degree of automation already implemented and the effectiveness of that automation. Most sites reported a relatively low degree of automation already implemented, except for ESMC and WSMC, who both reported a high degree of automation; AD reported plans for a substantially automated system. A lesser degree of automation was reported by PMTC, AD, and AFFTC.

The second part of the survey quantified general scheduling system attributes of existing manual and automated scheduling systems. This part of the survey indicated an overall need for increased information availability, improved speed of work, greater efficiency of work, more flexibility, and better responsiveness.

In addition to identifying sites and functional areas where increased automation is desired, the survey reflected the strengths of automated scheduling facilities at ESMC and WSMC. Considering both parts of the survey together, the need for increased automation and information exchange is clear.

This combination of needs and strengths presents an opportunity for a cost effective method to upgrade overall MRTFB automation. Since advanced automated scheduling systems already exist, there is no need to redevelop new systems on a case-by-case basis. Establishment of an intelligent network would provide automation to presently manually operated sites at low cost by permitting them to subscribe to the services of a larger, automated facility. Furthermore, the intelligent network would improve the combined effort of the ranges by facilitating computer-to-computer exchange of information and documentation. An intelligent network will

1) Limit costs by reducing the necessity for additional equipment, transmission lines, and software.
2) Permit participation commensurate with each user's needs.
3) Provide user independence and full-time availability.
4) Reduce data redundancy.
5) Improve speed of information exchange/dissemination.

CONCLUSION

It is the consensus of the IOG that a real need exists for an interrange scheduling and documentation network for the purposes of exchanging schedules and transmitting documentation.

RECOMMENDATIONS

1. It is recommended that task IO-1 be accepted as complete and the report published.

2. In order to initiate the action to acquire the capability at the various ranges (reference section III of plan), it is recommended that the follow-on task being presented be approved.

SECTION V

MRTFB SCHEDULING SYSTEMS DESCRIPTIONS

The Major Range and Test Facility Base (MRTFB) organizations which participated in the survey are

*Provided description of their scheduling system and/or statement of their needs.

DEPARTMENT OF THE ARMY
US ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002

REPLY TO ATTENTION OF

STEWS-NR-C

2 December 1981

SUBJECT: Schedule Mechanization

Commanding Officer
Western Space and Missile Center
ATTN: Mr. Ken Ramsey
Chief, Scheduling Control Branch
WSMC-ROR
Vandenberg AFB, CA 93437

1. At the recent meeting of the Interrange Operations Ad Hoc Group you asked the members to provide a statement concerning degree of schedule mechanization achieved.

2. Scheduling at WSMR is mechanized insofar as publication and distribution is concerned, but not in the area of production or schedule determination. The schedule for a day of operations is initiated seven days in advance, i.e. schedule requests are listed in standard format and posted for consideration by various resource schedulers. The availability of resources, including personnel, and conflicts are determined/resolved through a dynamic interplay between schedulers representing the range users, the Operations Control Division, data acquisition and analysis groups, and the communications agency, interfacing with various support functions as required. This process is not automated in any way, nor is it currently assisted by computer or automated data system access. The schedule building process is completed three days prior to the scheduled day with the publication and distribution of the final result. Word processing and teletype systems disseminate the schedule to all concerned. Necessary changes after schedule publication are accomplished using communication systems ordinarily available.

3. In conjunction with an update of an existing range control system, WSMR will be considering the possible implementation of computer assisted scheduling. It is not planned to attempt automated scheduling in the sense that computer algorithms would be employed for all decision making, but rather a data storage, handling, display, and communication system to serve the scheduling process. Minor algorithms, e.g. to determine and display conflicts, may be used, but decisions will still be required of those creating the schedule. Such "mechanized" scheduling will be but part of an overall operating and management system.

FOR THE COMMANDER:

James C. Scott

JAMES C. SCOTT
Chief, Operations Control

DEPARTMENT OF THE ARMY
US ARMY WHITE SANDS MISSILE RANGE
WHITE SANDS MISSILE RANGE, NEW MEXICO 88002

REPLY TO
ATTENTION OF

15 SEP 1982

STEWS-NR-C

SUBJECT: Interrange Scheduling

Commander
Western Space and Missile Center
ATTN: Mr. Ken Ramsey Chief, Scheduling Control WSMC-ROR
Vandenberg AFB, CA 93437

1. Responding to your discussion for the Interrange Operations Ad Hoc Group, and in support of Task 10-1, a copy of White Sands Missile Range's (WSMR) scheduling regulation (WSMRR 70-3) is provided here at Inclosure 1. Information contained in our letter of 2 December 1981, which you included in the preliminary Interrange Scheduling Document, is still a current description of WSMR's scheduling process and should be retained. WSMR agrees with preparation of an RCC document on this subject, and it is understood that a working group meeting is anticipated during the month of November.

2. WSMR does support the concept for systems acquisition to provide an intelligent network with hub at some central location. However, it is felt that the extent of data translation at the hub should perhaps be limited, and it is understood that this as well as other system capabilities has yet to be discussed in detail.

FOR THE COMMANDER:

James C. Scott
JAMES C. SCOTT
Chief, Operations Control

1 Incl
as

Policies, procedures and responsibilities for scheduling and controlling White Sands Missile Range (WSMR) operations are contained in WSMR Regulation 70-3, Daily Operations Scheduling, Execution, and Control, which is excerpted on the following pages.

1. Purpose. This regulation assigns responsibilities and prescribes policies and procedures for scheduling and controlling White Sands Missile Range (WSMR) operations.

2. Scope. This regulation applies to all range users/sponsors, the Range Scheduling Committee (RSC), the Operations Control Division (NR-C), National Range Operations Directorate (NR), and WSMR elements, including tenants, providing support to scheduled operations.

3. Explanation of Terms.

a. Abort. An operation which starts, actually using some of its scheduled range time, but terminates before accomplishing its scheduled operational plan.

b. Aircraft/Target Coordinator. An NR-C representative who coordinates directly with the Project Controller and Range Controller when an aircraft/aerial target is utilized in a scheduled test operation.

c. Block Time Scheduling. The blocking of a portion of the Range workday during which time a number of firings may be conducted without regard to a specific T-time.

d. Cancellation. An operation which is on the daily National Range Schedule and is deleted prior to any use of scheduled range time.

e. Change. Any change to an operation after the completion of the daily scheduling meeting. (Examples are changes in range support frequencies, patterns, etc.)

f. Data Systems/Support Controller. A representative appointed by a Major Coordinate Element (MCE) having the responsibility for support operations. Prepares and conducts the mission reporting to the applicable Range Analyst or Range Controller during scheduled test operations.

g. Data Support Limitation (DSL). An actual or predicted decrease in data coverage or quality as specified in the approved documentation caused by conditions existing or expected to exist at the time of the operation.

h. Day Code. A two-character alpha code arrived at by assigning the code AA to the first day of the calendar year, AB to the second day, etc., through the entire alphabet until reaching AZ, omitting the letters I and O. The next day code, following AZ, will be BA. The process above is repeated until 365 days (or 366 days for leap years) are coded.

i. Execution Readiness Code. The color codes used in the Range Control System, project, and support readiness are:

(1) Green - All elements ready and can support in accordance with (IAW) the Operations Directive (OD) or scheduled commitment.

(2) Red - Not ready; hold operation; abort commitment.

j. Hold. Any delay during the conduct of any operation for any cause, other than a slide caused by another operation.

k. Major Coordinate Element (MCE). A WSMR or tenant organization having responsibility for a specific functional area in the provision of support services to users.

(1) Data systems elements. Those functional elements of operational support which are considered to be in the data production chain, such as radar, optics, and electronics systems; analysis and computation; computer and display systems; meteorological systems; and data handling, formatting, transmitting, and timing systems.

(2) Support systems elements. Those functional elements which are an integral part of operational support but not directly associated with data production, such as meteorological forecasting, radio command guidance, frequency surveillance, range and air surveillance, ground and flight safety, recovery and air support, target support, interrange coordination, operations schedule management, etc.

l. Master Countdown (MCD). The OD checklist which contains critical events occurring between the beginning and end of scheduled range time used during the execution of test operations. Critical events are those events which must be completed during the execution of a scheduled operation.

m. Mission Control. The Air Force Branch, Deputy for Air Force (AD/RU), is responsible to the Commander, WSMR, for daily coordinating and allocating the use of airspace over WSMR.

n. Monthly National Range Forecast. A published list of planned major test operations to be conducted in a given month.

o. National Range Schedule. A list of operations approved by the RSC to be conducted during a specific workday.

p. NR Form 1 (National Range Schedule). A schedule request defining conditions of test and support requirements, submitted by a member of the RSC representing the user.

q. National Range Operations Directorate Project Engineer. A representative, appointed by WSMR, responsible for user test operations requirement analysis, program and test planning, coordination, and Operations Directive publication. National Range Operations (NR) Project Engineers' functions in the execution of an Operations Directive are monitoring of the operation and consultation with the Test Conductor and the Chief, NR-C, or the Range Controller.

r. Operations Control Division. The WSMR agency responsible for coordinating and controlling the use of all National Range time and facilities and providing liaison, technical and professional consultation, and other services relevant to range scheduling and mission execution.

s. Operations Directive (OD). A document prepared by the Range that defines the support to be provided and establishes the basis for scheduling a particular type of test. The OD contains specific instrumentation and equipment to be operated and other support to be provided, but does not include procedures or methods of operation.

t. Operation Index. A two-character alpha code assigned at T-4 days to an NR Form 1 for operations appearing on the National Range Schedule or on operations added after T-4 days.

u. Operations Requirement (OR). A document prepared by the range user to identify requirements directly related to the conduct of a particular test or series of identical or similar tests.

v. Project Controller or Test Conductor. The representative appointed by the user to coordinate directly with the Range Controller during a scheduled test. This person is the final authority for declaring project readiness during test execution.

w. Range Analyst. The NR-C representative controlling WSMR support elements as a total data system for an operation in the realtime or online configuration. The system configurations involve combinations of radar, optics, electronics, data transmission, data handling, data processing, and communications support. The Range Analyst provides an NR Directorate level validation of subsystems supporting realtime or online configuration operations.

x. Range Controller. The NR-C representative who coordinates directly with the Project Controller or Test Conductor during the execution of a scheduled operation. This person serves as the principal interface between the user and the Range during execution of scheduled tests. All operational support and systems functions coordinate through the Range Controller during the execution of a scheduled operation, who is the final authority for declaring range readiness in support of a test operation.

y. Range Control System. That combination of personnel, facilities, interconnecting circuits and procedures that brings operations activities under centralized management and operational control during execution of the daily range schedule.

z. Range Day. An 8-hour period of time (0800 through 1600) during which the range is available to support user testing. Support during this period is provided at standard rates. Outside this period, support is provided at premium rates.

aa. Range Operational Configuration. The alignment and location of various major range equipment and facilities engaged in support of a user test. Four basic types of operational configurations are used:

(1) Real Time. Those utilizing various data systems configured with the centralized computer complex for real-time data processing, display, and feedback into the system under test.

(2) On-line. Those utilizing various data systems configured with the centralized computer complex for processing and recording of usable data for immediate delivery to the user.

(3) Central Record. Subconfigurations are:

(a) Those utilizing various data systems and data transmission facilities to centrally record raw data for later processing.

(b) Those utilizing the central record facility in conjunction with a real-time or on-line configured operation.

(4) Off-line. Those utilizing various data systems independently configured for post-test data processing, analysis, and reduction.

ab. Range Operations Control and Display Facility. A facility designed for the display and/or control functions required for the execution of a test at WSMR. Principal facilities are: Building 300 (Range Control Center); King I (Holloman Air Force Base); and Stallion Range Center (North Range).

ac. Range Operations Manager (ROM). The senior representative responsible to the Chief, NR-C, for the total execution of the daily range schedule.

ad. Range Scheduling Committee (RSC). Composed of four members; one each appointed by the Deputies for Air Force and Navy, and Directors of Army Materiel Test and Evaluation (TE) and National Range Operations. The NR Directorate member will be the chairman.

ae. Range Scheduling Committee Advisor. An individual designated by an MCE to represent that MCE and assist the RSC members during scheduling. The RSC advisor has access to the necessary knowledge of all support aspects of the MCE represented and makes support commitments as required.

af. Range Sponsor. A WSMR-based agency which serves as the representative of a range user.

ag. Range Time. The time scheduled from start to completion for the conduct of a test operation. The term "range time" connotes use or intended use of WSMR facilities, land areas, or airspace.

ah. Range User. Any U.S. Government agency, industrial concern, or foreign government authorized use of WSMR.

ai. Reschedule. An operation which does not complete the major phases of its operational test and is reassigned to a different time block on the same day's schedule.

aj. Scheduling Month. The calendar month with workdays added or deleted so that all weeks contain 5 workdays, exclusive of weekends. (A holiday observed any day Monday through Friday is considered a workday for schedule development.) The scheduling month will have either 4 or 5 workweeks. The number of weeks is determined as follows: When the calendar month contains a workweek of less than 3 days, those days are added to the preceding or following month to fill out 5-day workweeks in those months.

ak. Slide Time. An adjustment which applies to the scheduled start time of an operation because of late termination of a previous operation. This adjustment may or may not affect the scheduled T-time and completion times.

al. Special Users. A government or private organization that, due to special exigencies, cannot be sponsored by Deputies of Army, Navy, or Air Force.

am. Standby. An operational status given any operation on the schedule that cannot be executed but is allowed to remain on the schedule pending reschedule, abort, or cancellation.

an. Support Addition. Support which is not an authorized OD commitment but is authorized by the Chief, NR-C, or the Chairman of the RSC.

ao. Support Commitments. WSMR resources to be committed for an authorized operation.

ap. Support Deletion. The absence or removal of previously scheduled support commitments.

aq. Support Systems Manager. An NR-C representative controlling the range support elements engaged in nondata production activities during an individual test operation such as ground safety, air and ground surveillance, meteorological support, recovery, roadblocks, and evacuations. The Support Systems Manager is also the representative responsible for accomplishing X-ray scheduling, schedule changes, or reschedules during any operational day.

ar. Support Waiver. The deletion of an authorized OD support commitment by the user or by the Range and accepted by the user.

as. Test. Any operation conducted at WSMR under the authority of an OD requiring the scheduled use of range time. A scheduled test is synonymous with the term "scheduled mission." Two types of tests are executed at WSMR:

(1) Prime tests. Fundamental operations for which an OD was planned and derived. Prime tests may include hot firings, drops, ejections, balloon launches, tracking operations, captives, dress rehearsals, simulations, etc.

(2) Readiness tests. Operations scheduled for the purpose of verifying readiness of the user and/or range for conduct of a prime test.

at. Test Limits. The land and airspace envelope specified in the OD within which the test is supportable. Test limits are derived from the data collection/data reduction/flight safety plan prepared by the range to support a single test defined in the OR.

au. Test Support Code. A one- or two-letter code added to the five-digit OD number to designate the test support plan contained in the OD.

av. Test Support Plan. The Range's plan of support for a particular test or for two or more similar tests which require the same range support.

aw. Variation. The extent to which a single flight trajectory/pattern may vary.

ax. Weekly National Range Schedule. A list of test operations planned and published daily for the seventh subsequent calendar day; i.e., at T-7 calendar days.

ay. X-Day Schedule. An operation that is added to the National Range Schedule after the T-4 day schedule has been published.

4. Objectives.

a. Define operations execution, management, operational control, and achieve a more effective utilization of range resources through early planning and defining of scheduling procedures.

b. Assign responsibilities, recordkeeping, and operational authority.

5. Policies.

a. The NR-C is the action office for scheduling and executing all test operations.

b. All operations requiring range support, or those which limit the use of the range to others, will be scheduled. Scheduled operations will be executed based on a schedule request originated by a range user/sponsor and processed through the RCS. Daily operations will be executed in accordance with official range schedule.

c. Operations will be executed to achieve maximum utilization of range resources and to best meet the user requirements. Toward these objectives, WSMR is divided into operational areas; i.e., South Range, Mid-Range, North Range, Small Missile Range, and off-range areas. Tests are scheduled for execution in these respective areas in accordance with user requirements. Building 300 functions as the central control center, but tests may be conducted independently or on a decentralized basis for greater efficiency.

d. A scheduled operation may be permitted to continue when range readiness reports indicate that less than the support specified in the OD will be available, provided that support has been waived by the Project Controller or Test Conductor.

e. Only the support stipulated in the OD will be provided to an operation unless deviation is authorized by the Director, NR; NR Technical Director; Chief, NR-C; or Chief, Range Programs Division (NR-R). Minor changes in operational requirements that originate during a scheduled mission, including alternate data routing, alternate or additional stations for resolution of schedule mix, conflicts, etc., may be made as necessary.

f. Operations will be executed in accordance with the support stipulated on the range schedule and the OD master countdown. Master countdown will be altered, as required, by the Range Controller commensurate with the scheduled support.

g. Extension of scheduled range time, allowable holds, or any other authorization of time beyond the scheduled T-time or complete times may be allowed dependent upon the availability of time and resources, and the priority of the user's test operations. (See "range priorities," below.) Extensions of time are not to be automatic extensions of the scheduled time and may be denied by Chief, NR-C, in order to efficiently utilize time and resources in support of all users. The cumulative delay or hold time allowable to a scheduled operation, if accepted by the Chief, NR-C, will be:

(1) Ground tests or checks - 15 minutes.

(2) Captive or tracking tests - 15 minutes.

(3) Ground- or air-launched missile firing at a ground- or space-target - 15 minutes.

(4) Ground- or air-launched missile firing at ground- or air-launched operational aerial target - 30 minutes beyond the scheduled T-time of the attacking missile.

(5) Ground- or air-launched research and development (R&D) aerial targets - 15 minutes.

(6) Ground- or air-launched missiles involving multiple firings at the same time or different targets - 30 minutes beyond the last scheduled T-time.

(7) Multiple bomb drops at the same or different targets - 15 minutes beyond the last scheduled drop.

(8) Projects in the early stages of R&D, off-range launches, and those with specific operations of a critical nature that may require longer delays than authorized above. Each case will be treated as a special situation, considered on its individual merits, and referred to the Chief, NR-C, for decision.

h. Block time scheduling is applicable only when a section of the range can be set up to operate independently of other range activities. All supporting agencies will be prepared to support the first firing at the beginning of the block time. Minimum firing separations will be governed by the time required for all agencies concerned to recycle for subsequent firings. Firing times will be determined by the range user after receiving a range "green" from the Range Controller.

i. Backup schedules will not be considered a normal part of the scheduling process.

j. A schedule request which exceeds the test limits or the test support plan defined in the OD will not be accepted for scheduling unless authorized by the Chairman, RSC. All support deletions, waivers, data support limitations or additions to the OD, and scheduled tests which exceed test limits will be a matter of record.

k. Tests appearing on the monthly National Range Forecast will normally take precedence over tests of equal or lower priority added at a later date.

l. Normally, tests will not be scheduled without an OD approved by the Director, NR, or the NR Technical Director. However, in order to efficiently operate WSMR and to avoid costly delays to range users, tests may be conducted without an OD provided:

(1) A written flight safety plan, if applicable, exists and is approved by the Chief, NR-C.

(2) All applicable MCE's have completed necessary support plans.

m. Unless approved by the Director, NR, tests will not be scheduled without project-provided funds necessary to pay for the support being requested.

n. Range Priorities.

(1) All range user programs accepted by WSMR are assigned a priority for use of range time and range support. These range priorities are as follows:

(a) National priority (NP). Assigned to programs identified by name in the National Master Urgency List (MUL) as having "brickbat" priority. (To obtain equal priority for related programs, Department of Defense (DOD), approval must be obtained.)

(b) Priority 1. Assigned to guided missile and high energy laser (HEL) research and development programs.

(c) Priority 2. Assigned to other types of guided missile firings and HEL programs.

(d) Priority 3. Assigned to other programs.

(2) While priorities and precedence ratings are a primary condition, test support schedules shall also recognize specific time restrictions and minimize delays to lower priority projects. Deviations will sometimes be necessary under conditions such as the following:

(a) When adherence to the usual precedence would obviously result in excessive waste of range time or resources.

(b) When excessive workload conditions exist, the priority structure addressed in TECOM Regulation 70-9 will be used to resolve scheduling conflicts.

(c) When specific programs are given special emphasis in connection with military contingencies, appropriate priority will be granted on a case-by-case basis when the requirement is authenticated by the sponsoring military department.

(d) When the success of a specific test operation is dependent upon particular celestial events or environmental conditions, operations will be considered on their individual merits and may be treated as special cases.

(e) When an operation is required in direct association with, or in support of, a high priority "hot" operation (i.e., target drone support of an R&D missile firing), the supporting operations will have the same priority as that being supported.

(3) The occasions for deviation described above usually arise in scheduling; hence, conflicts are detected early. While range priorities might be considered, potential conflicts are usually resolved through mutual agreements by the users concerned. Range priorities are considered in the different types of off-range operations as follows:

(a) Global operations involving orbital manned or unmanned flights. Regardless of assigned range priority, these operations may have precedence for range support. Since the schedule for manned flights is usually firm 14 days before the mission, daily range schedules are arranged to allow for this support.

(b) Operations requiring evacuation of civilians from designated impact areas are tentatively scheduled on the monthly National Range Forecast under the assigned range priority. This evacuation is considered firm 15 days before the operation, IAW DF, STEWS-NR-CR, 15 April 1979, subject: Range Evacuation Area Operations. Range time and support committed will not be diverted to a higher priority program not previously scheduled on the monthly National Range Forecast.

(c) Nonorbital operations involving orbital participation of another major range or test facility base are tentatively scheduled on the monthly National Range Forecast under the assigned range priority. Once the inter-Range schedule is firm (normally 7 days before the mission) the operation is exempt from preemption of range time and support.

6. Responsibilities.

a. The Chairman, RSC, is responsible for the National Range Forecast and Schedules. With the aid of the other RSC members and advisors, the Chairman will:

(1) Develop, publish, and distribute the monthly National Range Forecast no later than the Monday of the week preceding the scheduled month.

(2) Continuously update the monthly National Range Forecast.

(3) Review daily and amend the weekly schedules.

(4) Decline to accept for scheduling a test which exceeds the test limits or the test support plan specified in the OD, referring such requests to the NR Project Engineer for validation. After day T-4, the proposed test will be referred to the Chief, NR-C, for validation, determination, and action.

b. The range user is responsible for requesting X-ray schedules, reschedules, changes, or additions to the operational schedule through his designated sponsor during the administrative workday (0745 through 1615) or through the Support Systems Manager (SSM) during period outside the administrative day. If the support systems console is not manned, requests can be handled by a Range Controller.

c. The range sponsor, during the administrative day, will submit all X-rays and additions to the operating schedule to the assigned RSC representative who will request schedule consideration from the SSM. The Chairman, RSC, will represent all programs not represented by a service (sponsor) member of the committee. The range sponsor's detailed responsibilities are outlined in Chapter 1, volume 1, Range User's Handbook.

d. The Chief, NR-C, is responsible for executing the official range schedule prepared by the RSC and for adjusting the daily schedule, as required, to meet user or changing conditions in an efficient and orderly manner. In performing this responsibility, the Chief, NR-C, will:

(1) Provide an operational point-of-contact for all users requiring alteration to the daily range schedule.

(2) Provide liaison, technical, and professional consultation and other services relevant to the execution of the daily range schedule and use of resources.

(3) Ensure proper processing of all X-ray schedules, reschedules, additions, deletions, waivers, and other coordination, as required, to maintain an efficient utilization of time. Responsibility is applicable to both the alteration and execution of the range schedule during each operational day.

(4) Furnish a Range Controller for each scheduled operation, except in special cases as determined by the Director, NR.

(5) Provide timely information to Project Controllers on the specific details of support limitations.

(6) Prepare applicable internal Standing Operating Procedures (SOP's) for governing the Range Control system, ROM, Range Controller, Range Analyst, and the Support Systems management functions required in the execution of daily scheduled operations.

e. The MCE's are responsible for internally scheduling instrumentation, manpower, and logistical support necessary to carry out commitment in support of the range schedule. MCE's will also assist the RSC, proposing data-gathering arrangements for compatible operations.

f. The ROM is responsible for executing daily scheduled operations and direct coordination of the use of time and facilities, including inter-Range operations.

g. The Range Controllers are responsible for controlling, executing, and coordinating the use of range time.

h. The SSM is responsible for executing that portion of the Range Control function which involves schedule management, range surveillance, and control of the support elements engaged in nondata production activities.

i. The Range Analyst is responsible for operationally controlling and validating WSMR data-producing systems when in real-time or on-line configuration. (The Data Systems/Support Controllers perform these functions when in central record or off-line configurations.) The Range Analyst responsible for evaluating the support systems contributing to the scheduled operation and for taking action necessary to resolve support conflicts for range equipment malfunctions.

j. The NR Project Engineer is responsible for after-action analysis of overall user/range systems performance and preparation of the post-test counterorder.

k. The AD/RU is responsible for controlling airspace required by missions operating on WSMR. As agent of the Commander, WSMR, he will interface with the Federal Aviation Administration (FAA) in all matters pertaining to WSMR airspace or other airspace necessary to the WSMR mission. Operation of the WSMR restricted airspace, including remote launch sites (e.g., Green River, Utah, etc.), will be performed by AD under FAA regulations.

7. Procedures.

a. General.

(1) The ROM's principal channels of communication within the RCS will be the Range Controller and the Support and Data Systems Controller.

(2) The Range Controllers will act as the operations liaison between range elements and users and will execute the operations assigned to them by the POM. All operations will be executed in accordance with the MCD as published in the approved OD. Range Controllers will have the authority to take actions, as required, to execute assigned operations within the scope of the published range OD's and the scheduled range support.

(3) The SSM primary information flow will be with the assigned Range Controller, the Support Controllers of the nondata elements supporting scheduled operations, and with the user's scheduling agents to facilitate quick reactions to changes to the daily operational schedule. The SSM's will ensure personnel safety and perform range surveillance activities.

(4) The Range Analyst's primary information flow will be the assigned Range Controller and the Data Systems Controllers when in direct support of scheduled missions. The Range Analyst will serve as a Range Controller for the system readiness checkout period prior to T-time and will assume a monitoring role upon completion of readiness tests. Status of individual systems will be reported to the assigned Range Controller independent of the Range Analyst.

(5) The Mission Control representative will control WSMR airspace and provide clearance to-and-from assigned areas, ensuring safe separation between air missions. Ready/Hold or voice communications will be utilized between Mission Control, Range Controllers, and the SSM to accomplish execution of the daily range schedule in accordnce with the published OD's.

b. Scheduling.

(1) Inter-Range operations and range tests will be scheduled through the Chairman, RSC.

(2) The Director, NR, may assign special users to the Chairman, RSC, for purposes of scheduling.

(3) Any request for scheduling through normal channels which cannot be supported on the day requested will be recorded and the reason noted on the STEWS-NR Form 1..

(4) Tests involving range instrumentation for purposes of training, verification, demonstration, or data validation may be scheduled concurrent with user tests provided.

(a) No charges are incurred by the user conducting the prime test.

(b) There is no interference to the prime user tests, and user concurrence is received prior to test execution.

(5) All scheduling requests by MCE's for range instrumentation tests will be submitted to the Chairman, RSC, for processing.

c. Monthly National Range Forecast.

(1) Range sponsors.

(a) Submit to the responsible RSC member all planned major tests/operations in the week desired for the coming month. Assignment of tests to specific days will be undertaken by the RSC to achieve a workable monthly forecast.

(b) Submit immediately all deletions of requirements to the responsible member of the RSC.

(2) RSC members will ensure that each scheduling request submitted complies with the following:

(a) Specifies an OD number and the week desired.

(b) Identifies variations in requirements specified in the OR.

(c) Includes user-authenticated indication of available funds to cover costs of requested schedules.

(3) The Chairman, RSC, will meet with the RSC and MCE advisors to arrange the requested operations into a monthly forecast. The Chairman will use, to the greatest extent possible, compatible data-gathering arrangements in formulating each weekly schedule within the monthly forecast. As practicable, tests/operations will be assigned to days of the week that use similar data-gathering arrangements, thus reducing "turnaround" time between operations.

(4) Backup schedules will not be considered as a normal part of the scheduling process. Test operations that require long lead time, real estate evacuations, operational windows, tactical troop deployment, and those that require massive mission-peculiar development of range and user instrumentation will be given individual consideration by the Director, NR, or the NR Technical Director. Only one backup schedule per scheduled test will be allowed and, unless otherwise directed, the backup schedule will be approved only on the basis that other scheduled missions will not be adversely affected.

d. Weekly National Range Schedule.

(1) A daily meeting will be held where a complete schedule will be developed with all support firmly committed for definite times.

(2) Highest priority projects will receive first consideration for utilization of unused range time. If such operations cannot be worked into the schedule, they may be considered on an overtime or Saturday basis.

(3) Highest priority operations will be given first consideration for overtime scheduling (before or after the normal duty day or on weekends).

(4) Exceptions to the above procedures may be required on occasion. Such exceptions will only be approved by the Chief, NR-C, the Director of NR, or the Deputy Commander or Commander, WSMR, as applicable.

e. Daily National Range Schedules.

(1) Each administrative workday, the RSC will meet to firm up, assign operation indexes, and publish and distribute the National Range Schedule for the third following workday. Example: The RSC will prepare the schedule for Thursday and distribute it by about 1300 on the preceding Monday.

(2) Requests for weekend schedules not already shown in the weekly or monthly schedule will be presented to the RSC prior to 1200, Tuesday, except for inter-Range operations which may be accepted at any time. Requests received after 1200, Tuesday, will be evaluated and referred to the Chief, NR-C, or the Director or Technical Director, NR.

(3) Schedules for weekend work will be published prior to noon, Wednesday, to ensure that all concerned are given early notification of overtime required.

(4) The placement of a schedule request on or after T-7 days by the user's representative to the RSC is binding on the user and is authority for the Range to initiate all work specified by the OD. Specific items of support may be deleted or added by the RSC member provided such deletions or additions do not adversely affect safety considerations and, in the case of addition, are supportable.

f. Change to the Daily National Range Schedule.

(1) The Chairman, RSC, is the action officer for all changes to the National Range Schedule until execution day (T-0).

(2) All X-ray requests prior to execution day will be processed by the RSC. Those submitted after the start of the current day's schedule will be submitted to, and processed by, the SSM. Acceptance of any X-ray request will be entirely dependent upon the ability of the Range to support the operation. X-ray scheduling is a process designed to use previously unscheduled time or resources. It will not be used as a substitute for normal scheduling.

(3) Exceptions to the above procedures will be required on occasion. Such exceptions will be approved by the Director, NR or Deputy Commander or Commander, WSMR, as appropriate.

g. Accounting for Changes to the National Range Schedule.

(1) A notation of the support elements or range user causing a change to the National Range Schedule (cancellations or data-gathering limitations) will be entered on the STEWS-NR Form 1 and will include a brief explanatory statement describing the reason for the change.

(2) Notations will generally be limited to the direct support (DS) elements or range user. However, when known, a further breakdown as to the type of data or support element causing the action will be made (e.g., radar, telemetry, microwave, targets, Military Police, etc.).

(3) Notations of changes to the National Range Schedule caused by indirect or secondary support elements will not be included. These are the elements that support and are accountable to the DS elements. If further explanations of secondary support are required, they will be supplied by the DS elements.

(4) Changes to the National Range Schedule caused by weather or user operational problems are defined as those "beyond the control of the range."

7 September 1982

REPLY TO ATTN OF: R. F. Vorwerk, Head, Range Operations Division (Code 622)
Naval Weapons Center, China Lake, CA 93555

SUBJECT: Interrange Scheduling and Universal Documentation System Document (RCC Task IO-1); review of

TO: Mr. Ken Ramsey, Western Space and Missile Center (WSMC-ROR), Vandenberg Air Force Base, CA 93437

Encl: (1) Subject Document

1. Enclosure (1) has been reviewed and is hereby returned with appropriate corrections. The sample Daily Test Schedule and the Instrumentation Code List were missing and have been included with the document. There is nothing more to be added to the Naval Weapons Center (NAVWPNCEN) portion of the document.

2. On Part III, "Approach to Interrange Scheduling and Documentation Data Transmission," the network depicted in Figure 2 would be the simplest system to implement. This is effectively the network being established for the users of the R-2508 restricted airspace complex. The hub is to be the Central Coordinating Facility (CCF) located at the Edwards AFB RAPCON. The CCF will communicate with AFFTC, George AFB, Fort Irwin, and NAVWPNCEN.

3. The NAVWPNCEN has historically been a support range for some projects requiring interrange coordination. It is unlikely this role will change. Scheduling and communication of requirements have not been major problems, therefore a link between China Lake and a national scheduling/documentation system would probably be of minimum utility to the overall effort.

4. The NAVWPNCEN is interested in continuing participation in the IOG with the purpose of supporting the larger ranges in efforts to make interrange testing a more efficient and productive operation.

R. F. VORWERK

30 November 1981

REPLY TO ATTN OF: R. F. Vowerk, Head, Range Operations Division (Code 622)
Naval Weapons Center, China Lake, CA 93555

SUBJECT: Scheduling Process at the Naval Weapons Center, China Lake, CA

TO: Mr. Ken Ramsey, Western Space and Missile Center (WSMC),
Vandenberg Air Force Base, CA 93437

Encl: (1) Sample Weekly Range Plan
(2) Sample Daily Range Test Schedule
(3) Instrumentation Code List
(4) Sample Test Plan

1. Test range and resource scheduling at the Naval Weapons Center (NWC), China Lake, CA is primarily a manual effort. Project Engineers, who represent range customers, input requests for range and resource time to the Scheduling Office. The requests are due in the Scheduling Office by 1100 of the Thursday preceding the week of the requested time. A scheduling meeting is held at 1430 on Thursday. Representatives of the instrumentation groups, test conductors, Project Engineers, and Scheduling Office discuss and agree on a schedule for the following week. The agreed upon schedule is entered in the Univac 1110 Central Computer to establish the data base and print the weekly schedule (enclosure (1)).

2. A daily schedule, enclosure (2), is typed and distributed to all concerned on the day preceding the schedule day. The daily schedule is based on the weekly schedule plus changes that may be required. Changes must be in the Scheduling Office by 1100 of the scheduling day to be coordinated with the performing work centers. The schedule is typed and distributed by telecopier to the work centers by 1430 of the day preceding the scheduled work.

3. A Data Vision D-1500 terminal is used to input the daily schedule to the NWC closed circuit TV system for display. The schedule for the day is on video all day and is modified in real time as changes occur.

4. The weekly and daily schedules contain an instrumentation code defined in enclosure (3). The instrumentation code for each test is taken from the test plan, enclosure (4).

5. NWC does not plan to automate the test range and resource scheduling, but the new Range Control Center Integrated Processing System will contain computer programs in SEL 3277 machines that maintain test plan files to permit the scheduler ready access to test requirements and hard copy schedule production without typing.

6. The process described aboved is for restricted airspace R-2505 and R-2506. R-2524 is used for Electronic Warfare work primarily and is scheduled independently with a similar process. Any project requirements for joint use of airspace, land-space or other resources are manually scheduled as they arise. Schedules for use

30 Nov 1981

Subj: Scheduling Process at the Naval Weapons Center, China Lake, CA

of R-2508 airspace are sent to the Central Coordinating Facility (CCF) at Edwards AFB via telecopier. There the NWC schedule is coordinated with Edwards AFB, George AFB, and Fort Irwin schedules for determination and resolution of conflicts. Presently the CCF is a manual operation, but specification will soon be completed for an automated system to be procured by the R-2508 Enhancement Program.

7. Finally, after a test schedule has been established all the RF frequencies to be used the following day are sent to the NWC Frequency Coordinator for conflict determination and transmittal to the Western Area Frequency Coordinator via secure teletype.

8. If further information regarding NWC scheduling is needed, please contact R. F. Vorwerk, Autovon 437-2641.

R. F. VORWERK

SAMPLE

FOR OFFICIAL USE ONLY

WEEKLY RANGE PLAN

	MON 11/30/81	TUE 12/01/81	WED 12/02/81	THUR 12/03/81
Project Title ----------▶		AIM54C CAPTIVE FLT	SKIPPER AIR LAUNCH	SKIPPER AIR LAUNCH
Test Ranges Used ------▶		G/APL/COSO	G 2RPZCCCeA4:	G 2RPZCCCeA4
Instrumentation Code ▶		U'RPCT(T)DG A/C Source	M4FVT(T)T(wC)T(Y)EwL(D):	M4FVT(T)T(wC)T(Y)EwL(D)
Range Time ----------▶		0930-1030 2056 0 TRX: 1330-1500	0900-1030 2044LN HAL:	0900-1030 2044LN HAL
		HARM CAPT T.P.# P.E.	HARM CAPT	HARM CAPT
		E/G	E/G	E/G
		T(T)T(N)	T(T)T(N)	T(T)T(N)
		0900-1030 2097 0 MCD:	0900-1030 2097 0 MCD:	0900-1030 2097 0 MCD
	APT TRG TEST	APT TRG TEST	HARM OPEVAL OPF9 LAUNCH:	HAC SEEKER
	G/B/C/APL/CO 3U5R3FC12A:	G/B/C/APL/CO 3U5R3FC12A:	G/B/APL/CF 4R4P3CDTJ2:	G/P/APL
	CRT(TwER)w(S)V2N(G)G(C):	CRT(TwER)w(S)V2N(G)G(C):	ZGOFHwS&XNSGSMV9FIVY	2·PCG
	0945-1345 2C5410 GEDZJ MCD	B/U 2C5410 GEDZJ MCD	1100-1230 2072 0 MCD:	1100-1230 2043 0 TRX
			SIDEARM LAUNCH	SIDEARM LAUNCH
			G	G
			RCPG5A4MVW2FH(F)	RCPG5A4MVW2FH(F)
			1000-1100 2021 V EDM:	B/U 2021 V EDM
		HARM AF-S DRESS REHEAR.:	HARM A.F.	HARM A.F.
		G/B/APL/CF 4R4P3CDTJZ:	G/E	G/E
		GH(F)VoXN(SG)4	T(T)	T(T)
		2085 0 MCD:	1230-1400 2047 0 MCD:	1230-1400 2047 0 MCD
	PHALANX TOW TEST	PHALANX A/C TRACKING	PHALANX DUAL A/C TRKG	PHALANX TOW TEST
	G6/G	G6/G	G6/G	G6/G
	2RPC2E2F	RPC	2RPC	2RPC2E2F
	PF 2202 G SND:	2.0 2200 G SND:	2.0 2201 G SND:	2.0 2202 G SND
			AIM54C CAPTIVE FLT	AIM54C CAPTIVE FLT
			G/APL/COSO	G/APL/COSO
			U'RPCT(T)DG	U'RPCT(T)DG
			0900-1030 2056 0 TRX: 1330-1500	0900-1030 2056 0 TRX 1330-1500
				PARA OPS
				G/DZ
				UCMV
				AM 2901 N PET

V-19

V-4

SAMPLE

Test and Evaluation Directorate
Naval Weapons Center

PROJECT

Range: G-1, G-2 FOR EVALUATION ONLY Test No. [illegible]
Name: AMAPS (5" MODS) (Confidential Supplement [ ])

Purpose of Test: To conduct tests of AMAPS (Attack Warning and Protection System).

Coord: D. L. Harp 2534 Code: 0632 Ext: 6281 Appx. Starting Date: 1 April 1981
Proj. Contact: R. K. Perrine Activity: NWC Code: 33112 Ext. 3023
Description of Test: A TA-4 aircraft carrying the AMAPS pod will fly over G-2 range under ground control at 360 feet AGL and approximately 390 KIAS. The 5"54 gun at G2 will be loaded with inert projectiles. Ground control will time countdowns such that when the aircraft is at the desired point, an inert projectile will be fired.

Classification	Film	Firing	Rounds	Field Records	Assessed Data
	U	U	U	U	U

Type Ordnance: Inert 5" projectiles, std charge (pyro) HE [ ] Laser [ ]
Rnds/Pass: One Rnds/Flt: Approximately ten.
A/C Type: TA-4 No:
Chase [ ] Type: Tgt A/C [ ] Type: Nolo [ ] Type:

Range Requirements: Inst. Code: CGPR

	Target Prep.	X	Plotting Boards		F-Pad	X	Timing
	Spotting	X	Computer Tape		B-1 IM		TV
	Panel	X	Data Printout		Mobile IM		TV Spotting
			Oscillograph		Land Line IM		Specials/High Speed
	Recovery				Reprats		Bowens
	E.O.D.		Moving Target		SHORT IM		Code 34 Doc Photo
	Main Magazine		Midas				Weather (Radiosonde)
X	Ordnance Prep.				Roadblocks		Weather (Other)
X	Gun/Launcher Prep.		Coord. Instruct		Special Comm.		Survey
X	Material Support		Range Control		RF Targets	X	6224 Data Reduction

X Radars - Types: Mike Persons [ ]
Askanias - Location:
M-15 - Location:
Frequencies to be Scheduled:
Remarks:

Coord	0632	3023	0633 Date Received
D. L. HARP		R. K. PERRINE	C. L. KENT
1	2%	Test Director	

Test Title: AAAS (5"/54 MK) Test No. 1245

Operational Instructions: For Additional Info See Page

The aircraft will fly a pattern at 345° grid heading (parallel to Centerline Road, 329.5° magnetic) at altitude 500 feet AGL and 500 feet/s (approximately 300 KIAS) over the G-2 5"54 gun as shown on p. 6. When the aircraft is at the test point specified on p. 5, an inert projectile will be fired. 5,6

MAR 26 1981

FOR INFORMATION ONLY

Radars	Track	Beacon Specs
Nike	Aircraft	None

AIMAS: Freq. Track Freq. Track

Plotting Boards: 9000'/in.

Computers/Printouts: Ten (10) points/s. Realtime function 1, 2, 3, 8, 11, 17.
Ref. Centerline Road (345° grid).
G2 5"54 gun site.

TV:

TM: (Detailed Info Directly to Code 6242)

Other:

Data Reduction: (Detailed Info Directly to Code 6224)

Antenna [ ] M-45 [ ] Radar [X] IR [ ]

Other [ ] (Specify):

Remarks:

Classification

Type of Service Desired
Optical Instrumentation | [6221] | Test No. | 1245

MAR 26 1981
FOR INFORMATION ONLY

Firing/Telemetering	[ ] [6231]	[X] [6234]	[ ] [ ]

Provide signal for calibration of time code generator in AWAPS pod.

Radars, Communication, Closed Circuit Television	[X] [6221]	[ ] [6234]	

Range Operations & Other	[X] [6221]	[X] [6223]	[ ] [6232]	[ ] [6238]

Code 6221: Man plotting board.
Coordinate communications with gun site and aircraft.
Issue countdown.

Code 6223: Assemble inert projectiles.
Prepare 5"/54 gun and firing circuits.

[UNCLASSIFIED]

Ammunition and Material Required	Source	Date Available	Held For
(20) Empty warhead cases.	G-2	Now	
(20) Inert fuze simulations.	G-2	Now	
Plaster or sand for filling warheads.	G-2	Now	
(20) Pyro charges, 5"/54, standard	G-2	Now	

Information Pertinent to Reduction of Data

Additional Information Pertinent to Preparing and Firing Test

MAR 26 1971

FOR INFORMATION ONLY

UNCLASSIFIED

AWAPS

X = Horizontal distance perpendicular to flight path from gun to aircraft when gun is fired, (see p. 6).

Y = Horizontal distance parallel to flight path from gun to aircraft when gun is fired, (see p. 6).

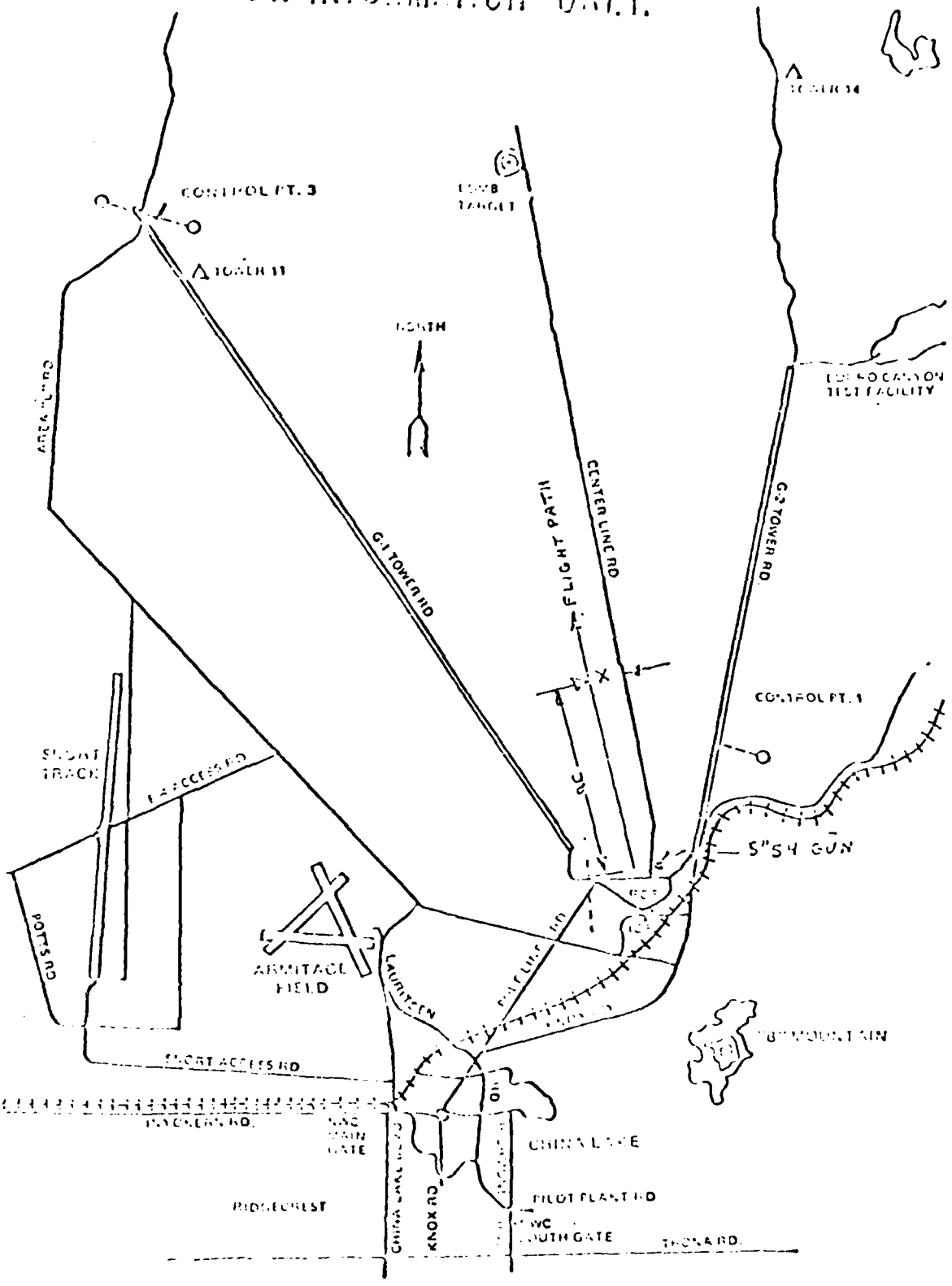
A = Gun azimuth.

E = Gun elevation.

AWAPS TEST POINTS
(Gun Aiming Direction)

X (ft)	Y (ft)	Azimuth A(deg-min)	Elevation E(mil)	X (ft)	Y (ft)	Azimuth A(deg-min)	Elevation E(mil)	X (ft)	Y (ft)	Azimuth A(deg-min)	Elevation E(mil)
0	1936	342°45'	217	500	1871	327°47'	226	1000	1658	311°39'	2[illegible]
0	2958	342°45'	151	500	2915	333°01'	153	1000	2784	323°00'	1[illegible]
0	3969	342°45'	88	500	3937	335°31'	89	1000	3841	328°09'	[illegible]
0	4975	342°45'	62	500	4950	336°59'	63	1000	4873	331°09'	6[illegible]
0	5979	342°45'	45	500	5958	337°57'	45	1000	5895	333°07'	4[illegible]
0	6982	342°45'	33	500	6964	338°39'	33	1000	6910	334°31'	34

TABLE 1



DEPARTMENT OF THE AIR FORCE

HQ ADDRESSEE: AIR FORCE SATELLITE CONTROL FACILITY (AFSC)
SUNNYVALE AIR FORCE STATION (SPACE)
SUNNYVALE, CALIFORNIA

REPLY TO ATTN OF ROSD

15 DEC 1982

SUBJECT AFSCF Scheduling System Description

TO HQ WSMC/ROR (K. Ramsey)

1. The enclosed documentation is submitted as a final response to the Interrange Operations Group committee action. Please discard all previous information. The contents of this documentation are:

a. A general summary which gives an overview of the current scheduling system. (Atch 1)

b. A general description of the scheduling specific "SCRABL" computer system. (Atch 2)

c. A current copy of AFSCR 55-2 Vol III, Chapter 1, which is a detailed description of the scheduling process. (Atch 3)

2. We are currently pursuing some type of updated system. A follow-on to the SCRABL system which has been under development since 1978 has some major problems and may not be delivered. The work of this committee will be of major interest to the SCF since we are currently "on the look" for a new system which will meet our needs.

Harold D. Smith

HAROLD D. SMITH
Chief, Range Plans and Analysis

3 Atch
1. General Summary SCRABL
2. General Description SCRABL
3. AFSCF 55-2 Vol III, Ch 1

SUMMARY OF THE
AIR FORCE SATELLITE CONTROL FACILITY (AFSCF) SCHEDULING SYSTEM

1. The AFSCF scheduling system is unique in that it must be capable of successfully allocating resources consisting of

a. Eight remote tracking stations.

b. Four remote antenna systems which are switchable to two ground systems at the Satellite Test Center.

c. Two remote antennas dedicated to particular ground resources.

d. A multitude of off-line computer systems and mission control complexes. Daily support for approximately 50 DOD satellites consisting of prepass, pass and post-pass activities are merged with daily requirements to maintain ground resources.

2. The AFSCF schedule is primarily a manually produced, graphical display with an off-line computer. The graphical display is constructed on chart paper, with time oriented on the horizontal axis and ground resources oriented on the vertical axis. Satellite program supports are entered on the chart with colored Chart Pak tape and resources separated by horizontal lines. The chart is built and maintained by scheduling personnel through the assistance of a scheduling specific computer system (SCRABL). The SCRABL is dedicated to the Range Scheduling function and provides for operation, maintenance and display of a centralized data base of scheduling information. The data base describes AFSCF resources, satellite program requirements and scheduled resources assignments. The computer system is used to produce all messages, listings, schedules, and retrieval of historical information.

3. Scheduling and planning of resources begins 6 months in advance with a forecast of major range downtime and maintenance activities. The next milestone is a 90-day forecast of all launch and rehearsal activities, produced every 2 weeks. The AFSCF 7-day schedule is produced once per week and covers a period from Monday to Monday. Resource requirements for hardware and software development, remote station maintenance, on orbit satellite passes and rehearsals of upcoming launches are all merged together in the 7-day schedule, and initial conflict resolution begins. Final requirements are entered onto a 24-hour schedule which is produced daily. Requirements are deconflicted and the schedule is produced via teletype messages and computer listings. Conflicts are resolved through verbal interaction of users managed by Range Scheduling personnel. Changes are commonplace, and a usual day will find 30-40 percent of all scheduled items changing from the time the 24-hour schedule is produced through real-time.

4. The SCRABL system operates on a Varian 73 computer equipped with a card reader, printer, paper tape punch, magnetic tape, disk storage and one

input/output CRT terminal. The input/output terminal is an IBM 2250 CRT display equipped with light pen, function keyboard and alphanumeric keyboard The SCRABL system is over 14 years old.

5. The AFSCF is currently implementing a Data System Modernization (DSM) program which essentially replaces all Remote Tracking Station and Satellite Test Center computer resources. Part of the modernization program is an automated scheduling option which is currently being studied by the contractor as to content. A phased implementation approach with each phase being more automated is anticipated. In meeting real-time satellite program requirements a fully automated system will not be possible. A system with better user interface, updated graphical displays and improved response time will be the goal.

HAROLD D. SMITH
AFSCF/ROS

Atch 1

GENERAL DESCRIPTION OF THE SCRABL SYSTEM

1. The Scheduling, Resource Allocation and Buffer Linkage (SCRABL) is a computer system located at the Air Force Satellite Control Facility (AFSCF) which provides for generation, maintenance, and display of a centralized data base of scheduling information. This data base describes AFSCF resources, their status, demands upon AFSCF resources and the allocation of resources to satisfy demands.

2. The SCRABL system operates on a Varian 73 (EBC) computer equipped with a card reader, printer, paper tape punch, magnetic tape and disk storage, and two input/out terminals. The input/output terminals are IBM 2250 CRT displays, both equipped with light pen, function keyboard, and alphameric keyboard. The CRTs are used to communicate with the computer and provide access to the data base. The printer is used to furnish a permanent record of data base information and the paper tape punch is used to generate teletype site support and acquisition message for tracking stations. The card reader and tapes are used to enter bulk data such as vehicle acquisitions, AFSCF environment cards, and requests for nonpass task (qualification) activities.

3. Specific capabilities of SCRABL are as follows:

a. Construct from card, magnetic tape, and/or CRT input, a data base containing a definition of AFSCF resources, referred to as the environment, and up to 14,500 individual "tasks" which describe service requirements such as vehicle passes over tracking stations, station qualification activities, and EBC Bird Buffer (BB) and 3800 Flight Support Computer (3800) activities.

b. Provide access to and control of the information in the data base through various media.

(1) Printed listings - site schedules, BB and 3800 schedules, vehicle acquisition lists, preplan conflict lists, available time slots list, generalized task description list, and environment list.

(2) List tapes - site schedules, BB and 3800 schedules, vehicle acquisition list, and generalized task description list.

(3) Teletype format paper tape - site schedules and vehicle acquisition lists.

(4) Interactive CRT displays - plot of site activity, vehicle acquisition list, BB and 3800 schedules. Alphameric keyboard and light pen allow modification of individual tasks using these displays.

c. Provide data base maintenance functions.

(1) Delete, add, or modify individual tasks.

Atch 2

(2) Delete a group of tasks.

(3) Slide the times associated with a group of tasks.

(4) Edit the data base, deleting tasks prior to a specified time.

(5) Remove schedule change flags.

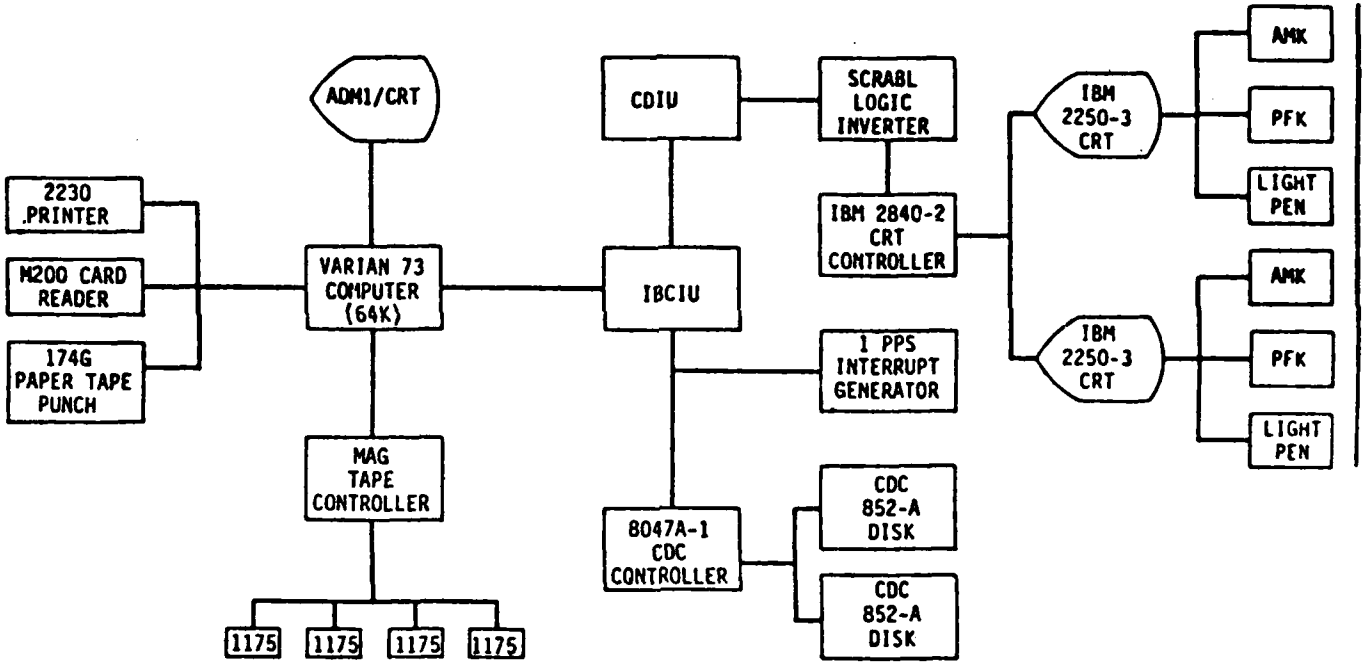
d. Provide assistance in the process of schedule generation.

(1) Assign the resources of the AFSCF to the servicing of tasks on the basis of available equipment and tasks already scheduled, according to a priority scheme specified by the operator.

(2) Inform the operator as to conflicts which arise in scheduling tasks.

e. Provide backup for the current data base in the format of schedule (backup) magnetic tapes.

4. The last page of this summary is a block diagram of the SCRABL Equipment Configuration. Note that even though both IBM 2250-3 CRTs are shown in the configuration, only one terminal can be initialized and operating at a time.



SCRABL EQUIPMENT CONFIGURATION

Atch 2

Chapter 1

MANAGEMENT AND SCHEDULING OF RESOURCES

1-1. POLICY. Air Force Satellite Control Facility (AFSCF) resource users, as well as the elements responsible for providing these resources, must comply with the scheduling policies and guidance in this chapter and the applicable detailed instructions contained in the Satellite Test Center (STC) operations procedures (STCOPs), and remote tracking station (RTS) operations procedures (RTSOPs).

1-2. RESPONSIBILITIES:

a. The Range Plans and Analysis Branch (AFSCF/ROSD) and the Range Control Branch (AFSCF/ROSS) perform the AFSCF scheduling functions. These functions include: the scheduling of operations support of all AFSCF activities, the use of the STC bird buffer computers, and all network nonflight activities that last 1 hour or longer, or that have recovery time that is 10 minutes or longer. These functions do not include the scheduling of the STC 3800 computers (para c) or the scheduling of recovery resources, a function that is performed by the Deputy for Satellite Operations (AFSCF/VO) (see volume II of this regulation).

b. Range Control Branch. AFSCF/ROSS is designated as the primary directing and controlling point within the AFSCF for the allocation of operational range resources and the identification of communications requirements. AFSCF/ROSS is also responsible for obtaining resolutions to realtime operational conflicts. Conflict priorities may be appealed if users are not satisfied with AFSCF/ROSS decisions. Range Control has the authority to redirect any resource allocation if insufficient time is available for normal conflict resolution or for meeting emergency support requirements.

c. Flight Support Branch (AFSCF/RODF). AFSCF/RODF prepares and publishes the STC 3800 computer schedule, and provides related studies and forecasts.

d. Remote Tracking Stations. Each RTS, applicable support contractors (e.g., Network Support, Engineering Services and Modifications, Automated Data Processing Modification and Maintenance), and applicable AFSCF elements, provide inputs to the 6-month forecast document (para 1-3b). The inputs are a prediction of the RTSs requirements for AFSCF resources to be used to support installations, modifications, tests, and exercises. In response to the 6-month forecast, each RTS submits a request to AFSCF/ROSD for the allocation of resources needed to support contractor- and RTS-initiated tests, exercises, installations, modifications, and inspect and repair as necessary (IRAN), depot-level maintenance (DLM), or preventive maintenance activities that are to be conducted during a specific 7-day period.

e. Prelaunch Facilities. The AFSCF uses the Remote Vehicle Checkout Facility (RVCF) at the Eastern Space and Missile Center (ESMC) for

the prelaunch checkout of AFSCF vehicles, and the Vandenberg Tracking Station's resources to support activities at the launch pads at Vandenberg AFB. Requests are submitted to AFSCF/ROSD and AFSCF/ROSS by the appropriate mission director.

1-3. PROCEDURES:

a. Forecasting and Scheduling. The scheduling of AFSCF resources (except for the 3800 computer, and recovery resources) is accomplished by AFSCF/ROSD and AFSCF/ROSS which jointly develop the 7-day schedule/forecast and AFSCF historical support data. All scheduled activities are divided into the following categories: flight preparation, flight support, and nonflight activities. Flight preparation includes the following activities that are performed before countdown: rehearsal operations, mode checkouts, AFSCF exercises, and RTS readiness checks. Flight support consists of any activity performed to provide direct launch or flight support of a satellite or ballistic vehicle. It also comprises countdown activities, prepass transmissions, command messages, playbacks, ephemeris updates, and RTS/vehicle contacts. Nonflight activities are scheduled tasks that are not directly related to launch or on orbit support of a particular satellite program. These include the development activities of hardware and or software contractors, equipment maintenance and modification tasks, operations and maintenance evaluation activities, and personnel training activities requiring RTS hardware.

b. 6-Month Forecast. AFSCF/ROSD compiles, plans, and publishes the 6-month forecast during the first week of each month. This forecast is based on information received from resource users, and contains only nonflight activities. The information concerns engineering change proposals (ECPs), maintenance, evaluation, testing, and checkout of AFSCF resources that require eight or more hours of downtime. Resource users submit their initial and updated requirements for AFSCF resource support to AFSCF/ROSD on or about the 15th of the month as detailed in the 6-month forecast input schedule. Users submit the request on SD Form 231, SCF Resources Utilization Request, or via teletype message. Users of STC resources submit requests for downtime on SD Form 294, STC Downtime. The 6-month forecast officially notifies resource users of the intention to schedule an activity.

c. 90-Day Launch and Operations Forecast. AFSCF/ROSD compiles, plans, and publishes the 90-day launch and operations forecast. This forecast contains secret flight-related information, and is published every other Tuesday. The mission directors submit information concerning launch dates, support durations and flight preparation requirements by letter every other Thursday according to the 90-day launch and operations forecast input schedule. The 90-day launch and operations forecast describes a sequence of requirements during the time period under consideration and officially notifies operating elements of the AFSCF's intention to schedule the forecasted activity.

d. 7-Day Schedule/Forecast. The 7-day schedule/forecast is the first schedule that identifies each RTS's support requirements at specific times. During compilation of the 7-day schedule/forecast, low- and medium-altitude orbit support requirements, high-altitude orbit

support requirements, nonflight requirements, and flight preparation activities are scheduled in the foregoing sequence to minimize conflicts.

(1) Generation of 7-Day Schedule/Forecast. Generation of the 7-day schedule/forecast begins on Thursday of each week. It covers the 7-day period that begins at 0000Z of the second Monday after the generation cycle has begun. If requested to do so, AFSCF/ROSS personnel will generate and distribute a weekly preplan listing to mission control team personnel. This listing contains all RTS contacts for each satellite and, when necessary, includes a listing of potential conflicts. By 2000Z each Monday, all STC/RTS users submit nonflight and flight preparation requirements to AFSCF/ROSD; flight support activities are submitted to AFSCF/ROSS. Resource users unable to meet this schedule may be given time extensions on a case-by-case basis. Flight support requirements for the 7-day schedule/forecast are submitted by annotating the preplan listing and returning it to AFSCF/ ROSS, or by submitting program action plans (PAP) or flight profiles by mission control team personnel. The RTSs submit the coordinated contractor and RTS generated requirements via teletype, using the scheduling forecast and/or confirmation message format identified in figure 1-1.

(a) Resource requirements for rehearsals are identified by either a program action plan (PAP) or a flight profile that indicates all manned passes. These and other inputs to the rehearsal schedule must specify command message, playback, and wideband link/ground station requirements. A set of DRFI cards or magnetic tapes must accompany all rehearsal requests.

(b) Resource users (other than mission support elements) who wish to use resources in conjunction with an orbiting vehicle, must submit their requirements to the applicable mission director and or mission control team which then submits these requirements to AFSCF/ ROSD and AFSCF/ROSS.

(c) After receiving inputs from the various users, AFSCF/ ROSD and AFSCF/ROSS assembles the requirements for nonflight activities, integrates them with the flight preparation and flight support requirements, and produces a schedule for the 7-day period beginning the following Monday. The 7-day schedule/forecast contains nonflight and rehearsal requirements only, and is used to make the initial definitive support assignments for the operating elements; it indicates, by station, specific support times scheduled for each task with specific equipment listed for all nonflight activities.

(2) Publication of 7-Day Schedule/Forecast. The 7-day schedule/forecast (see figure 1-2) is published each Thursday. Flight preparation and nonflight activities only are published in the schedule/ forecast. In addition, the 7-day schedule/forecast includes frequency control messages for Hawaii, Guam, and Vandenberg tracking stations (HTS, GTS, VTS) and in-house listings of the vehicles supported from each MCC.

(3) Changes to the 7-Day Schedule/Forecast. Changes to scheduled flight support activities are submitted directly to AFSCF/ ROSS. Mission control team requests for scheduling changes will be

accomplished by submittal of a Manning Change Request to AFSCF/ROSS. RTS requests for scheduling changes and notifications of their approval or disapproval by AFSCF/ROSS are handled via telephone and operational messages.

e. Daily Support Plan. The daily support plan consists of a combination of the daily conflict briefing, the 24-hour support message, and the appropriate segment of the 3800 schedule.

(1) Daily Conflict Briefing. AFSCF/ROSS identifies conflict resolutions between activities that are scheduled for a 24-hour period that begins at 1600Z on the following day. Conflict resolution consists of validating all RTS requirements, identifying and resolving conflicts, and rearranging schedules within established ground rules. The conflict resolution process is described in chapter 5 of this volume. AFSCF/ROSS coordinates all conflict resolutions prior to their incorporation into published schedules. AFSCF/ROSS will inform each mission control complex (MCC) of their conflicts at the earliest possible time. Resolutions must be coordinated by 2200Z or within 3 hours of identification (whichever is later) to avoid delays in the publication of the 24-hour support message.

(2) 24-Hour Support Message. AFSCF/ROSS transmits the RTS portions of the daily support plan by 0600Z daily to operating elements as the 24-hour support message. Included in the 24-hour support message (see figure 1-3) are the internal and external schedules for the VTS microwave link to the STC ground station, FM wideband support, M22 requirements for all sites, DSIS support from applicable stations, operational use of the Development Test Facility, the schedule for the command data processing area (AFSCF/CDPA), and the STC bird buffer schedule.

(3) 3800 Computer Schedules. AFSCF/RODF prepares and publishes the 3800 computer schedule each Friday, covering the 7-day period beginning Saturday at 0000L (local time). The computer schedule is implemented by the 3800 supervisor, who rearranges computer assignments to satisfy realtime requirements. AFSCF/RODF may assign uncommitted time periods as necessary to meet support requirements. Emergency requests for the immediate use of computer resources are submitted to AFSCF/RODF by the responsible mission control team member. Conflicts between user requirements are resolved by AFSCF/RODF in coordination with requesting users based upon priorities.

(4) Daily Bird Buffer Computer Schedules. AFSCF/ROSS publishes the daily bird buffer schedule in conjunction with the 24-hour support message. Bird buffer computer schedules are implemented by the data systems controller, who rearranges computer assignments to satisfy realtime requirements. The data systems controller may assign uncommitted time periods or rearrange the schedule as necessary to meet support requirements (provided that previously scheduled activities are not deleted). In the event of a hard realtime conflict, Range Control will be contacted to provide resolution.

f. Realtime Scheduling Activity. Realtime scheduling involves those events that occur during any period covered by a published 24-hour

support message. The following general items apply to realtime:

(1) Nonflight Activities:

(a) AFSCF/ROSS issues assignment schedules that are used by AFSCF elements who utilizes the resources needed to provide program support. AFSCF/ROSS is notified by telephone as soon as an AFSCF element or resource user has determined that an assignment schedule cannot be met.

(b) AFSCF resources are to be fully operational by the end of a scheduled downtime period.

(c) An outage report is filed on any system, subsystem, or piece of equipment that is not or will not be capable of supporting test operations 30 minutes before the expiration of authorized downtime.

(d) Unscheduled activities cannot be performed in lieu of those activities originally scheduled.

(2) Flight Activities:

(a) Realtime extensions of scheduled on-orbit support must be approved by AFSCF/ROSS which may direct any schedule changes that are necessary to resolve problems of priority.

(b) Scheduling of RTS activities involving STC bird buffer hookup or realtime voice direction in support of a specific interrange operations number (IRON) is requested by the mission director or mission control team.

(c) Changes to flight support requirements (including playbacks) that differs from published schedules must be coordinated with AFSCF/ROSS by the responsible mission director or representative as soon as the requirement is known.

(d) Scheduled flight activities that an RTS/CDPA is unable to support because of an outage remain on the station schedule and are listed as lost on the 24-hour support summary. An exception is made only when a specific flight activity is rescheduled at a later time or is switched to another RTS/CDPA.

(e) A loss of on-orbit support caused by an outage must be reported to AFSCF/ROSS by the affected MCC.

g. AFSCF Historical Support Data. The historical data for the number and type of AFSCF launches are maintained by AFSCF/ROSD. Launches are categorized as either AFSCF or non-AFSCF. An AFSCF designation is assigned to a vehicle that is supported and maintained in the official inventory for more than one day. A non-AFSCF designation is assigned to a vehicle that is supported for one day or less and is not maintained in the official inventory. AFSCF historical support data are compiled in two major report forms.

(1) Resource Utilization Report. The AFSCF resource utilization report is prepared by AFSCF/ROSD for the Deputy Commander for Range Operations (AFSCF/RO) and provides resource utilization statistics to AFSCF and Space Division (SD) staff offices. This report serves as a historical record and contains detailed information concerning resource utilization in support of flight, flight preparation,

and non-flight activities, and information on AFSCF contractor(s) performance. Data are published monthly, and consolidated reports are published quarterly and annually (calendar year).

(2) 24-Hour Support Summary. The 24-hour support summary is published by AFSCF/ROSS. It includes a list, by station and side, of each supported rehearsal and flight operation. The summary includes the requested, scheduled, and actual support totals as well as an explanation of any differences between them. In addition, the summary contains predicted support for the 24 hours following the publication of the summary. The summary is published daily by 0530L, and reflects the actual and predicted support totals as of the cutoff time of 0800Z.

1-4. GENERAL SUPPORT DOCUMENTATION. Numerous documents are generated to support the AFSCF mission. Detailed requirements for various messages, such as the vehicle information message, L -6 hour/ -4 hour/ -2 hour/ -1 hour, orbit achieved, and addressees will be obtained from the specific Memoranda of Agreements for the supporting agencies. The following are general support documents generated at the STC applicable to the RTSs:

a. Launch Notification Message. The launch notification message (see figure 1-4) is prepared by the Operations Center (AFSCF/VOO) 7 days prior to launch of a specific IRON. Addressees include all supporting RTSs and other agencies as specified by the appropriate mission director office. This message is released by AFSCF/VOO, following mission director coordination. Changes to the launch notification message are transmitted as necessary.

b. Launch Confirmation Message. The launch confirmation message (see figure 1-5) is prepared by AFSCF/VOO 1 day prior to the launch of a specified IRON. Addressees include all supporting RTSs and other agencies as specified by the appropriate mission director office. This message is released by AFSCF/VOO following mission director coordination. Changes to the launch confirmation message are transmitted as necessary.

c. Optimization. The message provides the results of the optimization study conducted by AFSCF/ROSS. This message contains a forecast of anticipated support conflicts that may occur within different time increments of the launch window. The messages are required for ballistic vehicles only and are retransmitted at L -2 days. Prelaunch conflict identification and analysis for orbital vehicles are accomplished by AFSCF/ROSS at the mission director's request. The optimization messages are released by the AFSCF/ROSS chief or the duty range operations controller.

d. IRON Control. AFSCF/ROSD provides interrange operations numbers (IRON) for satellites supported by the AFSCF. Program representatives who require an IRON assignment for a specific vehicle should submit a written request for the assignment to AFSCF/ROSD. AFSCF/ROSD prepares a message containing a program-designator/IRON cross-reference. This message is sent to AFSCF supporting elements and other agencies; it is normally sent monthly and covers the 90-day period following its release date.

e. 6-Month 3800 Operational

Loading Forecast. The 6-month 3800 operational loading forecast is published monthly by the Data Systems Division (ROD) to provide a forecast of the anticipated 3800 computer loading for each month of the 6-month period. Inputs are submitted by each user office by the 10th of each month and are published not later than the 15th of the same month. The forecast is intended as a management tool to identify periods of unusual 3800 computer activity. The forecast is republished as necessary to reflect major changes in rehearsal or launch activities.

f. Outage Summary. All Category X outages will be entered on SD Form 32, Significant Remote Tracking Station Outages, by the STC workload control section of AFSCF/RORACW and forwarded to AFSCF/ROSD (Range Analyst) not later than 5 work days after the preceding month. The SD Form 32 will accurately identify sites, systems, equipment and pertinent information related to the outages. Data extracted from this form will be used as a vital source document for the monthly range operational summary report.

JOINT MESSAGEFORM						(AS REQUIRED)				
PAGE	DTG/RELEASED TIME			PRECEDENCE		CLASS	SPECAT	CMPT	TTY	DMHC MSG. IDENT
	DATE TIME	MONTH	YR	ACT	INFO					
01 01				PP						
BOOK	MESSAGE HANDLING INSTRUCTIONS									

FROM: RESOURCE REQUESTER (COMPLETE ORGANIZATION TITLE, MESSAGE ADDRESS, AND OFFICE SYMBOL)

TO: AFSCF SUNNYVALE AFS CA// ____(SEE NOTE 4)//

(CLASSIFICATION) OPS MSG

SUBJ: SCHEDULE OR FORECAST CONFIRMATION FOR THE PERIOD XXXXZ TO XXXXZ. MSG IN XXXX PARTS.

PART ONE:

1. IDENTIFICATION NUMBER/FUNCTION CODE LETTER/ECP, TEST OR MODEL NUMBER/JOB REQUIRED TO SUPPORT IRON XXXX (IF APPLICABLE).
2. PLACE TO BE PERFORMED.
3. DESCRIPTION OF AND REASON FOR JOB.
4. EARLIEST START TIME/ADVANCE NOTICE REQUIRED.
5. EQUIPMENT REQUIRED.
6. RESPONSIBLE OFFICE, STATION, OR COMPANY/NAME AND TELEPHONE EXTENSION OF CONTACT.
7. SHIFT - DAY, SWING, GRAVE, ALL/CONSECUTIVE WORKABLE SHIFTS/IF SHIFT LIMITATIONS, GIVE REASON.
8. TOTAL TIME REQUIRED/MINIMUM USABLE INCREMENTS/EMERGENCY RECOVERY TIME.
9. WORK PLAN, OTHER DOWNTIME WHICH CAN/CANNOT BE DONE CONCURRENTLY, REMARKS, ETC., GDS (DECLASSIFICATION DATE), OR REVIEW (DATE)

6 5 4 3 2 1 0

DISTR

DRAFTER TYPED NAME TITLE OFFICE SYMBOL PHONE	SPECIAL INSTRUCTIONS
(ENTER APPROPRIATE INFO)	
RELEASER: TYPED NAME TITLE OFFICE SYMBOL AND PHONE: (RESOURCE REQUESTER)	
SIGNATURE	SECURITY CLASSIFICATION: (AS REQUIRED) / DATE TIME GROUP

DD FORM 173/1 PREVIOUS EDITION IS OBSOLETE

Figure 1-1. Format of Scheduling Forecast and/or Confirmation Message

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS EASTERN SPACE AND MISSILE CENTER (AFSC)
PATRICK AIR FORCE BASE, FLORIDA 32925

REPLY TO ATTN OF: ROS

27 April 1982

SUBJECT: Ad Hoc Committee Action Item for ESMC/ROS

TO: HQ WSMC/ROR (K. Ramsey)

1. The basic scheduling technique for scheduling at the Eastern Space and Missile Center is as follows:

2. The Scheduling Division is charged with the management of all critical Range resources through a rigidly controlled resource scheduling process. The authority for this control is in ESMC Regulation 80-6 attached.

a. The use of primary support resources of telemetry, radar, command control/destruct, communications, computers, Range Instrumentation Ships, base support resources etc. to include test support, scheduled maintenance, modification, IRAN and any other use appears on a daily formal support schedule. The schedule is a chronological listing of numbered conflict free operations and is produced by inputting operations data in a computer program. The purpose of the Mechanized Resource Management System (MRMS) software is four fold; first to provide a conflict free schedule of operations to field support units and management; second, to provide resource utilization data to local and higher headquarters; third, to provide resource utilization data used by the comptroller to bill users for reimbursement and finally to provide empirical historical data from which Range utilization models are developed for budgeting and workload projection. Weekly scheduling meetings are held with all Users to develop a consolidated ETR operations schedule. Schedules are published and updated twice daily. The software is resident on a redundant pair of CDC 730 computers and the software competes with other computer users including realtime test operations.

b. The Scheduling Center is manned by a qualified civil service scheduler on a 24 hour per day 7 day per week basis. This scheduler is authorized to make any decision necessary to maintain the current operations schedule and the 18 month long range forecast of major operations.

3. Whenever a User wishes to add, delete, change or modify the schedule in any way, they call the scheduling center and request the change. The scheduler evaluates the request, makes the necessary coordination and if the change is within the resource capability of the Range and its manpower, they officially change the schedule and make necessary notifications.

4. The User must provide the following minimum information to the scheduler at the time of requesting support:

a. The User's name must appear on the authorized list of schedulers for their program.

b. The User must provide a support card number which has specific authorization to schedule test support and determines reimbursability.

c. The User must provide the specific Job Order Number which is to be used for billing by the comptroller.

d. The User must provide the date, time, and duration of the test.

e. The User must provide the test conductors name and telephone number for technical coordination.

f. The User must provide the Operations Document (OD) number under which the test is to be conducted.

g. The User must provide any requested deviations, additions or changes to the OD. If there are no changes, the program will receive the exact support as specified in the OD.

5. Following each scheduled operation, the resource utilization is adjusted in the data base for actual time expended and this utilization information is transmitted to the comptroller for billing and to the Air Force System Command headquarters in summary fashion for the Command Management Information System (CMIS-T).

6. Software support is provided by RCA under level-of-effort contract by the following personnel assigned to the operation and maintenance of MRMS.

Mr. Tim Gabriel	AV 467-9546
Mr. Herb Smith	AV 467-9546
Mr. Jim Weirich	AV 467-9546

7. The automated scheduling technique, as implemented at the ESMC Eastern Test Range has few serious problems other than the fact that it competes with realtime operations; however, this should be remedied in total by the pending acquisition of updated computers with expanded CPU and core memory capability. We experience few breakdowns except for commercial power outages during heavy summertime thunderstorm periods. The software support is excellent with modification and development continually in work to improve and expand its capability.

8. Interrange programs current and future are attached.

LAWRENCE W. EBAUCH
Chief, Scheduling Division
Directorate of Range Operations

2 Atch
1. ESMCR 80-6
2. Interrange Programs

Policies, procedures and responsibilities for scheduling tests at the Eastern Space and Missile Center (ESMC) are defined in ESMC Regulation 80-6, Range Scheduling, which is excerpted on the following pages.

1. Definition of Terms:

a. Range Scheduling. That process of allotting a specific period of Range time and committing Range instrumentation, as necessary, for the conduct of a test.

b. Range User. An agent or agency authorized to conduct testing, training, or other operations on the Eastern Test Range.

c. Test Engineer/Project Officer/Test Director. A representative of the Range User responsible for the direction of a test operation.

d. Test Conductor. A Range User representative who is responsible to the User for the technical conduct of a test.

e. Range Control Officer. An agent of ESMC responsible for controlling real time test support activities. This may include allocation of Range resources, imposing test cutoffs, determining reasons for holds and scrubs, and authorizing test support changes as deemed necessary during major test countdowns.

f. Tests. Any procedure that requires the use of Range instrumentation or frequency protection. Such procedures are assigned an official test number.

(1) Launch Operation Test. A complete countdown including ignition firing and lift-off of a missile or other launch vehicle.

(2) Major Support Test. A support test considered to be a major milestone toward meeting overall program objectives.

(3) Associated (Parasitic) Test. A test operation that relies on some other major test as the basic data source.

(4) Active Test. Any test operation which involves electromagnetic radiation from any electronic source regardless of strength.

(5) Passive Test. Any test that does not involve electromagnetic radiation from an electronic source.

(6) Static Test. A complete countdown with ignition of engine for a short duration while under restraint. No lift-off intended.

(7) Minor Support Test. Any test support required which is not defined in Operations Directives or Internal Testing Procedures. Minor support tests should be restricted to User needs for which a minimum of prior planning is required.

g. Test or Launch Forecast. The monthly forecast of major tests and launches. This is updated on a weekly basis as a forecast of tests to give Range Users a planning tool for advance warning of impending test support conflicts.

h. Weekly Range Operations Schedule. A document transmitted weekly by the Scheduling Division immediately following the Range Scheduling Conference which specifies the date and time of all known tests to be supported during the subsequent week.

i. Operations Directive (OD). A detailed operations plan specifying support to be provided by ESMC for a particular type or series of tests.

j. Range Instrumentation. Equipment (radars, telemetry, communication, command systems, and so forth) necessary for the technical support of Range/Range User requirements

k. Run or Terminate. The completion of a scheduled test whether successful or unsuccessful.

l. Hold. A delay in the orderly countdown of a test.

(1) Range User Hold. A delay caused by factors under the control of the Range User.

(2) Range Hold. A delay caused by factors under the control of the Range.

Atch 1

(3) Miscellaneous Hold. A delay caused by factors beyond the control of the Range or the Range User. Included in this category are such factors as:

(a) Weather. Delays caused by weather conditions exceeding the minimum defined in the Range User launch rules, applicable Operations Directives, Range Safety Test Supplements, and Range Operations Instructions.

(b) Priority Conflicts. A delay or reduced support caused by a conflict with a test of higher priority.

(c) External Factors. Delays or reduced support caused by unforeseeable factors external to the ETR complex or beyond Range and Range User control except as outlined above.

m. Scrub. The removal of a test from the Range Schedule for any reason.

n. L-Day. Launch Day.

o. Range Count Time. That period during the countdown of a test when ESMC and the Range User count simultaneously inclusive of built-in-hold time.

p. Zulu Time (Z). Greenwich Mean Time. (Eastern Standard Time plus five hours or Eastern Daylight Savings Time plus four hours.)

q. T-Time. The intended time that a launch or major milestone will occur.

r. S-Time. The time the Range begins to meet Range User's requirements. NOTE: Equipment setups and calibrations are accomplished prior to this time.

s. Project Office (Mission Office). The Range User office designated as the Office of Primary Responsibility (OPR) for conduct of tests on the Eastern Test Range (ETR). This is the official single point of contact within ESMC for the accomplishment of the Project Office's assigned programs and missions.

t. Test Support. Work performed by the ESMC in response to the requirements of a scheduled test.

u. Built-in Hold. A Range User hold programmed (built-in) to occur during the orderly progress of the Range countdown.

v. Test Number. A four-digit number used to place a test operation on the Range Schedule. This number is assigned by the Scheduling Division and is used by all Range/ Range User people to commonly identify scheduled test operations.

w. Not Mission Capable (NMC). A condition that exists when a Range Resource is unable to perform at its normal design capability, or cannot be called up for operations support.

x. Fully Mission Capable (FMC). A condition that exists when a Range Resource is able to perform at its normal design capability.

y. Downtime. Time required to remove a Range Resource from Fully Mission Capable (FMC) status for maintenance, modification, repair, lack of operator personnel, and so on and consequently removes a Range Resource from Call-up by the ESMC Scheduling Division.

2. Objectives and Policies. The objective of ESMC Scheduling is to insure that all tests are scheduled and fully supported as closely as possible to the Range User's requested date and time. This must be consistent with Range capability, economy of operation, and the standard Range working day. In attaining this objective, the following specific scheduling policies will be applied:

a. Standard Range Working Day. The Range working day is 8 hours daily, Monday through Friday, excluding legal holidays. Hours of operation are:

(1) At Cape Canaveral AFS and Patrick AFB:

(a) Normal Shift. 0730-1615, Monday through Friday. Range Contractors Industrial support is available 0730-1600 only; liquid propellant support 0730-1530.

(b) Overtime. All other operating hours.

(2) At the downrange stations:

(a) Normal shift. Same operating hours, local time, as Cape Canaveral and Patrick AFB operating hours. The normal shift may slide occasionally on a reasonable basis, as necessary for test support.

(b) Extra shift. As arranged for at specific instrumentation sites and on a fully reimbursable basis only.

(c) Overtime. Not applicable at downrange stations.

(3) Ships:

(a) These facilities will be operated and maintained as necessary for mission support of authorized Users without reference to normal, extra shift, or overtime operating hours when at sea.

(b) The Range Instrumentation Ships (USNS H.H. Arnold, USNS H.S. Vandenberg, and USNS Redstone) are required to undergo annual inspections and recertifications, in a shipyard for a period normally not to exceed 60 days and are not available for test support during that time. Ships Engineering Division (ESMC/RSN) is responsible for scheduling these shipyard periods and will provide the Sched-

uling Division (ESMC/ROS) with a schedule at least 90 days prior to shipyard date.

b. Range Overtime Policy:

(1) In the event requirements are imposed which require overtime work, the overtime costs will be a Range User responsibility and will be authorized on a reimbursable basis only. The Range User requiring this support will be obligated to commit to reimbursement prior to work being scheduled. Tests involving overtime will normally be requested on ESMC Form 102, Test Schedule/Forecast Request, or ESMC Form 50, Launch Test Schedule Request, in sufficient time to allow for ESMC/ROS response at the Scheduling meeting. If overtime Range support requirements cannot be anticipated at the time of the weekly scheduling conference, such support may be requested in real time. Whenever support operations dictate the necessity for overtime, the Scheduling Division, when requested, will advise the affected Range User of this fact and provide an estimate of the overtime hours involved.

(2) Reimbursement policies and procedures for Range Users are specified in ESMCR 170-1, ESMC Reimbursement Policy.

c. Observers at Range Instrumentation Sites. Observers will not normally be allowed at instrumentation sites or onboard Range ships. When the specific test makes the presence of observers necessary in the view of the Range User, written approval should be requested from the Scheduling Division (ESMC/ROS) as far in advance of the test as possible. Request for observers onboard Advanced Range Instrumentation Ships (ARIS) and Range Instrumentation Ship (RIS) Redstone must be processed through the Ships Management Division (ESMC/RSO). Blanket approvals will not be granted.

d. Allocation of Range Resources. Range resources are committed for support by the Scheduling Division upon request and in accordance with applicable Operations Directives, teletype instructions, and verbal agreements deemed necessary to insure efficient use of Range resources. Resources will be allocated to support the maximum number of test requirements.

(1) All use of Range Instrumentation resources for the purpose of operations (test) support, programmed or unprogrammed maintenance, calibration, engineering checks, and so forth, whether institutional or reimbursable, will be requested through and scheduled by the ESMC Scheduling Division.

(2) Downtime required for repair, overhaul, maintenance, engineering change and modification, which will create a NMC condition to exist will be scheduled through the Scheduling Division before-the-fact.

(3) When Range Instrumentation Resources become Not Mission Capable, that fact will be reported immediately to the ESMC Scheduling Division with an explanation of cause (if known) and an estimate of the time required to return the resource to Fully Mission Capable (FMC) condition.

e. Scheduling Priority. In the event of an unresolved scheduling conflict, the Scheduling Division shall assign priorities when placing tests on the weekly Range Operations Schedule. To this extent:

(1) Corrective Maintenance on instrumentation and prelaunch-launch support will normally have priority over other instrumentation requirements.

(2) Tests required to effect the scheduled launch of a vehicle will generally displace other support tests.

(3) Prelaunch instrumentation calibration checks will normally be scheduled during normal duty hours on the workday preceding launch. These checks may carry the associated launch test priority.

(4) Additional factors such as interrange support, worldwide communications, national urgency, space achievement, or scientific problem-solving will be strongly considered.

f. The Weekly Range Operations Schedule is firm after the schedule meeting. Changes will be limited and subject to the following rules:

(1) The addition of requirements to the schedule will be allowed if no previously scheduled requirement exists for the desired time period and the instrumentation necessary is available.

(2) Instrumentation operating hours will not be changed without prior coordination and approval of the Scheduling Division.

g. Acceptance of Test Schedule Requests:

(1) All tests which have a valid Operations Directive (OD) or which fall within the definition of minor support will qualify for scheduling. All other requests for test support will be considered for scheduling only after it has been determined by the Scheduling Division that sufficient information and time are available to develop and disseminate a plan for support.

(2) Tests will be accepted for scheduling only after they are in compliance with ESMCR 127-1 (or a waiver obtained) and the hazardous procedures to be used have been approved by Directorate of Safety. Such com-

pliance and approval requirements apply to launches, prelaunch and countdown tests, operations of high pressure systems, handling of propellants, and ordnance/radioactive source handling. Launches will not be placed on the schedule without the positive verification to the Scheduling Division (ESMC/ROS) by ESMC/SE that all procedures have been approved.

(3) Major support tests and launches will not be scheduled with less than 24 hours between T-Zero unless technical, manpower, and overtime constraints can be resolved.

(4) Deviations from the OD or test document should ordinarily reach the Scheduling Division no later than 1200E on the day preceding the test. If for any reason ESMC cannot support the deviation as requested, the Range User will be requested to take the following action:

(a) Withdraw the deviation and run the test as initially requested (paragraph 3b); or

(b) Reschedule the test at a later date so that proper coordination with all agencies concerned may be accomplished.

h. Schedule Control. Scheduling problems arising during the conduct of test or during the current day's operation will be resolved by the Range Control Officer or Scheduling Division, as appropriate, in consultation with the affected Range Users. Authorization for minor support and deviations from test requirements, resolutions of Range and Range User conflicts, scrubbing of tests in progress, and assignment of scrubs to the responsible agency are the function of the Scheduling Division.

i. Test Cutoff Time. When it is necessary to schedule more than one launch test on a normal workday, in the interest of efficient Range Operations, a test termination time (cutoff) may be imposed by the Range. The Scheduling Division will coordinate each case with the Range User concerned.

3. Scheduling Procedures:

a. Scheduling of Tests. Requests for test scheduling will be submitted on ESMC Form 50 or ESMC Form 102, as appropriate, to the Scheduling Division at Cape Canaveral AFS (CCAFS) prior to 1200E on Wednesday of each week. In using the Range Contractor Support Card System for requesting or changing test support, the card holder must have the letter "K" and individual authorization number for each type of support required for the test.

b. The Test Request. In submitting these forms as indicated in a above, Range Users will list their scheduling requirements for missile launches, static firings, and major support tests for the succeeding one and two week periods.

c. Range Scheduling Conference. The Range Scheduling Conference is normally held each Thursday at 0900 in the Range Control Test Scheduling Office at CCAFS. This conference will finalize the weekly Range Operations Schedule for the week commencing the following Monday. Scheduling agencies will be notified if circumstances require the conference to be held at a different time or place. All agencies requesting tests and providing test support should be represented at this meeting. Scheduling conflicts will be resolved at the Range Scheduling Conference.

(1) During the scheduling conference, major tests are forecast for the second succeeding week to assist support agencies in planning for and meeting requirements. The major launch forecast for the succeeding 14 days will be presented and a determination of the ability of the Range to support this forecast will be made. If a Range User does not submit an ESMC Form 50 for a launch previously forecast on an ESMC Form 10, Six Month Launch Forecast, the launch date will be carried as indefinite until a revised ESMC Form 10 or ESMC Form 50 is submitted.

(2) The absence of Range User scheduling representatives from the Range Scheduling Conference will, if necessary, be construed to indicate concurrence with or lack of requirements for the weekly schedule.

d. Adding requirements to a Scheduled Test. When a test is scheduled, all support appearing in the OD will be committed to that test except for deletions requested by or agreed to with the Project Officer. Any agency requiring instrumentation or facilities not listed in the OD must contact the Scheduling Division for a determination of availability and approval, as may be necessary, for use of the equipment or facility. The Scheduling Division will coordinate with the appropriate ESMC or Range Contractor planning offices to determine the ability of the Range to support the added requirements and to insure coordinated planning. If support can be provided and adequate coordination accomplished, the equipment or facility will be added to the test. This will constitute commitment and authorize planning agencies to issue the necessary instruction. Additional requirements for tests should be requested not later than 1200E on L-1 day.

e. Scheduling of Associated Tests:

(1) An associated test which involves radiation/realtime flight together with launch operation will not be scheduled without the written approval of the Project Office conducting the primary test. It is the responsibility of the Range User to request such approval directly from the launch project office.

The Range User desiring to schedule this type schedule this type of test will present such, written approval to the Scheduling Division (ESMC/ROS) prior to or at the time of requesting scheduling of the associated test. Associate tests which are passive (nonradiating) will be scheduled in the normal manner.

(2) Prime test preflight trajectory data, for use with an associate test, will not be released to any Range User (other than the launch agency) without written approval of the launch agency. Range Users responsible for associate tests will submit requests for this data directly to the launch project office. Prior to the time the launch agency submits the trajectory tape to the Range, the launch project office will provide the Program Support Management Division (ESMC/ROP) with the list of associated tests for which the preflight trajectory data can be released.

f. Requests for Minor Support. In general, minor support consists of requirements not specifically covered by an OD. This includes such items as radar beacon readouts, telemetry center frequency and signal strength readouts, transmission line checkout, command checks, timing, sequencers, communications, pad services, and so forth. Minor support tests will be considered on a noninterference basis with other tests. Requests for minor support may be made to:

(1) The Scheduling Division at any time.

(2) The Superintendent of Range Operations/Range Control Officer (SRO/RCO) if the requested support is in conjunction with a test that is in progress.

(3) Cape Support, whenever industrial support is required (generators, shop support, air conditioners, and so forth).

g. Test Scrub. The Scheduling Division will be notified immediately when Range Users decide to scrub a scheduled test. If a scheduled test is to be scrubbed or terminated by the Range, ESMC and Range User will jointly evaluate the circumstances involved and explore possible alternate solutions prior to a decision. If a test is in progress, the decision to scrub or terminate will be jointly coordinated and agreed to between ESMC and the Range User prior to any announcement. Any test which is to be scrubbed must be scrubbed individually by official action as follows:

(1) During duty hours and prior to pickup of Range count, all requests for scrubs will be directed to the Scheduling Division.

(2) If a test is to be scrubbed during nonduty hours or prior to pickup of Range count, the Range Operations Duty Officer will be contacted.

(3) During the count, the Range Control Officer will be the official agent for accepting scrubs.

h. Rescheduling Action Following a Scrub. A reschedule may be requested immediately if a scrub was caused by weather, aircraft, Range instrumentation, or causes under the control of the Range User.

i. Notification of Schedule Changes. Notification of schedule changes are made by telephone and teletype message as soon as possible after a change request is approved. Only those agencies requiring reschedule information will be notified of schedule changes. Agencies requiring notification of schedule changes should furnish their requirements, listing the ODs of interest, prior to being added to the notification list.

j. Forecast of Major Launches. Three working days prior to the end of the month, Range Users submit their anticipated launch test requirements to the Scheduling Division on ESMC Form 10. After initial requirement submission, only changes, additions, or deletions need be submitted. These should be submitted as soon as they are known. Information from ESMC Form 10 will be used to prepare a long-range forecast of launches.

k. Assignment of Responsibility for Scrubs or Delays. The Scheduling Division is responsible for determining the agency to which a scrub or delay is charged. The categories into which these may fall are:

(1) Range User. Anytime a test is removed from the schedule or changed for reasons under the control of a Range User.

(2) Range. Anytime a test is removed from the schedule or changed for reasons under the control of the Range.

(3) Miscellaneous. Anytime a test cannot be conducted and is changed for reasons beyond the control of the Range or Range User. Included in this category are such functions as:

(a) Weather. Variations due to weather conditions contained in Range User launch rules, applicable ESMC Operations Directives, and RAnge Operating Instructions (ROIs). Scrubs or delays declared for weather not exceeding these minimums are considered as Range Users or Range scrubs. In cases where Range or Range User problems are involved, final assignment of responsibility well be at the discretion of the Range Control Officer.

(b) Intrusion of Priority Test (IPT). Variations due to a conflict with a test of higher priority. Conflicting tests scheduled in error do not fall in this category and are considered as Range-caused.

(c) External Factors. Schedule changes due to unforeseeable interference from sources external to ESMC complex, interrange agencies inability to support, and for any other reasons beyond control of the Range or Range Users.

l. Frequency Scheduling. All frequency scheduling will be performed in accordance with ESMC Range Communications Electronics Instruction No. 30-29.

m. Extending a Test. Any active test conducted on the ETR that cannot be completed during the scheduled time period will be terminated at the scheduled completion time unless a request for extension of time is approved by the ESMC Scheduling Division or by a Range Control Officer when present at a console position.

n. Test Termination Reporting. The Range User will immediately report completion, scrub, or termination of all active test operations to the ESMC Scheduling Center (853-5941) whenever a Range Control Officer (RCO) or the Superintendent of Range Operations (SRO) is not available at a Range Control Center console position.

4. Classification of Schedules:

a. The Range Operations Schedule will be classified only when it is necessary.

b. Reference to classified remarks such as classified frequencies must be avoided in unclassified communications.

c. Unclassified reference to any test may be made by using only the test number, T-time, and date.

d. The classification of scheduled tests will be in accordance with the appropriate security classification guide. Included in the classification constraints are restrictions placed by the payload, booster, and also the overall system objectives. In cases where the Scheduling Division is not provided a security classification guide, classification will be assigned to the schedule based on the appropriate OD or direction by the Range User project office. NOTE: The Range Contractors, Missile Contractors and others not bound by "FOR OFFICIAL USE ONLY" will disseminate this schedule information on an official need-to-know basis only.

5. Downgrading of Scheduling Information. The Department of Defense or National Aeronautics and Space Administration public releases identifying the launch of specific missiles at the ETR will not automatically remove the classification of local Range scheduling information (test number, scheduled T-time, and missile name). This information will not be declassified unless specifically approved by the local Range User project office. Frequently, the remarks column of the Range Operations Schedule contains classified information not affected by the DOD/NASA releases. The Office of Public Affairs (ESMC/PA) will be the office of record for DOD and NASA releases which apply to the ESMC launch operations.

PROGRAM	RANGES/AGENCIES												
	KSC	WFC	JSC	ESMC	AFFTC	EGTR	WSMR	PMTC	WSMC	KMR	USAEPG	AFSCF	GSFC
Shuttle	X	X	X	X	X	X	X	X	X	X	X	X	X
Titan	X			X					X	X		X	X
Delta	X			X					X				X
Trident I	X	X		X									X
Poseidon	X	X		X									X
777				X								X	
Trident II	X	X		X									X
Atlas Centaur	X	X		X									X
Pershing I	X			X									X
Pershing II	X			X									X
DOD Shuttle Payloads	X			X								X	X
ITV	X	X		X									
Tide	X	X		X									
Adv SRAM	X			X									X

EASTERN SPACE & MISSILE CENTER

SCHEDULING DIVISION

MECHANIZED RESOURCE MANAGEMENT SYSTEM

Title: Tha Anatomy of A Successful Project

or

Success thru Composite Structured Design

Outline:

I The Project

This section defines the nature and magnitude of the project and its environment including available manpower and the computer facility used.

II The Tools

This section discusses the tools used in terms of expected benefits vs. expected problems.

Tools dicussed:

Fortran 5

Structured Programming

Structured Composite Design

Structure Charts

Interface Charts

DMS 170

Algorithm statement instead of Flow charts

Structured walk thrus

III. The Philosophy and Plan for the team.

A. Project Priority

1. On-time completion
2. Provide all required capabilities
3. Resonsive to Users needs and desires
4. Maintainable Program
5. Efficient use of storage
6. Code in a single consistent style

B. Sequence of tasks

1. Write Programming Standards Manual
2. Design Data Base
3. Design man-machine interface
4. Write Users Manual
5. Define Major Program Sections
6. Design utility routines
7. Document utility routines
8. Code utility routines
9. Design test data base
10. Create test data base
11. Detail structure design of major sections
12. Document major sections
13. Code major sections

The rational of this sequence is discussed in terms of expected contribution to the priorities.

C. Landmark events / User interface

Formal reports to the User and the informal user/ programmer interface is discussed.

IV Execution

Discusses in process modifications, additions, deletions to the initial plan.

V Result, Evaluation, Comments

1. Programmer Productivity
2. Goals met and not met
3. Applications to other projects
4. Program statistics .
5. Literature references

THE ANATOMY OF A SUCCESSFUL PROJECT

OR

SUCCESS THRU COMPOSITE STRUCTURED DESIGN

INTRODUCTION

It is impossible to write a good program with a bad design.
It is difficult to write a bad program with a good design.
It is cheaper to do it right.
It is faster to do it right.

These four statements summarize the attitude of the team throughout the project. The report that follows shows that, at least for this project, the attitude was justified.

I. The Project

The subject project was to design and implement an interactive system to:

a. Support ETR Range Scheduling operations and

b. Provide accurate and accountable resource utilization hours in support of direct cost reimbursement using a unit service charge concept.

ETR was committed to implement reimbursement under unit service charge at the start of FY 82.

Range Scheduling had an operational interactive system which contained in its data base a portion of the resource utilization data needed to meet the new requirements. No other existing system contained any of this data. The existing system required expansion to meet expanded scheduling needs, including the ability to include classified operations in its data base. Initial analysis showed that it would require

more effort to modify the old system to meet the new needs than it would to design and implement a new system.

The old scheduling support system, MRSS (Mechanized Range Scheduling System), maintained a data base of seven files.

1 Schedule File
2 History File
3 OD/Annex File
4 Resource File
5 Test Number File
6 Support Card Validation File
7 Resource Utilization File

MRSS consisted of 13 CDC CYBER 74 programs which maintained the data base; outputted daily, weekly, monthly and other internal reports as well as on-demand reports; and assisted the scheduling operations in its daily activities.

There was considerable redundancy in the MRSS data base.

MRSS was not as responsive to the schedulers needs as it should have been.

MRSS was limited to unclassified operations.

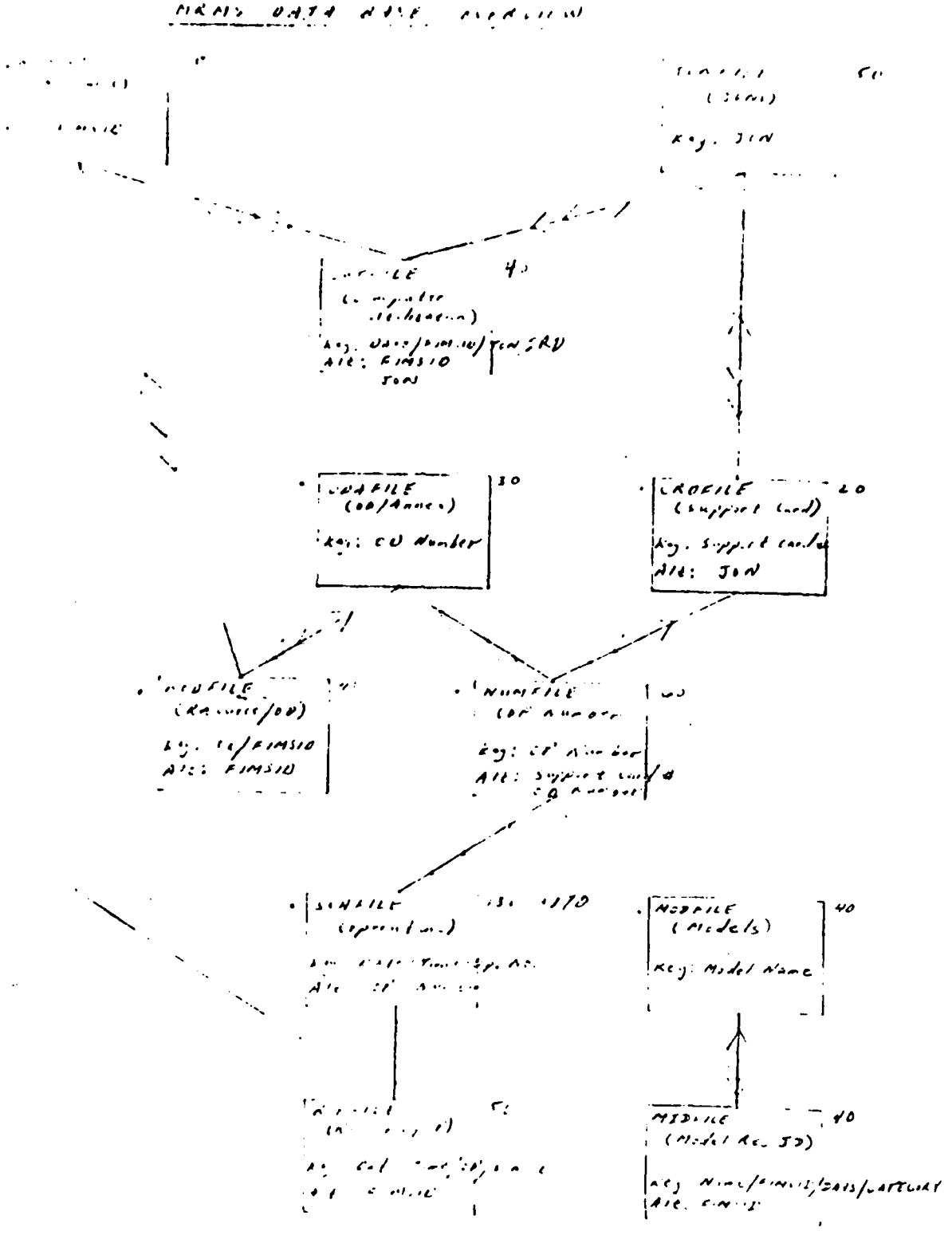
The new system, MRMS (Mechanized Resource Management System) was to use the same data base as MRSS with some relatively minor expansions. Where MRSS was a collection of independent programs MRMS was to be a single program subdivided into ten independent sections processing the various input types:

1 Job Order Number Commands
2 Support Card Commands
3 Resource Commands
4 OD Commands
5 Number Commands
6 Operations Commands

7 Schedule Commands
8 Conflict/Commitment Commands
9 File Commands
10 Miscellaneous Commands

The first six of these sections are used to maintain the data base. These commands are used to add to, delete from, or modify the contents of the various files in the data base. Sections 7 and 8 produce special reports required for the normal operations of Range Scheduling. Section 9 controls the handling of any print files created by the program. Section 10 contains a set of small commands which control various program execution parameters which defy classification (e.g., default print files, schedule/history mode, etc.).

There was also to be a section to produce the numerous standard reports produced by the system.


Key: JON
CROFILE
(Support Cond)
Key: Support Cond #
Alt: JON
Key: CO Number
Key: JON/FIMSID/JON SRV
Alt: FIMSID
JON
Key: Model Name
Key: JON/FIMSID/DATE/BATTERY
Alt: FIMSID

II. The Tools

A. Structured Programming:

The time was right for structured programming. L. M. Holland had recently presented a three day in-house course on structured programming to many of our RCA analysts/programmers. CDC had just released its FORTRAN V. The literature was saturated with the virtues and vices of structured techniques. (The virtues appeared to be clear-cut winners over the "sour-grapes" vices.) We clearly needed all the positive features promised by structured techniques, so this project was selected as a pilot project for structured programming. While it is generally risky to try new things on a major project, the potential benefits far outweighed the risk factor.

B. FORTRAN V:

The use of "structured FORTRAN" was dictated by the decision to use structured programming techniques. This introduced three negative considerations:

1. A new language and the necessary learning time on the part of the programmers,
2. Existing software was not compatible and numerous library routines had to be rewritten in FORTRAN V so they could be used for this project,
3. A new release is frequently full of hidden errors.

The team selected for this project tended to minimize the risks. Both programmer analysts were new to CDC FORTRAN and therefore learning FORTRAN V would be only slightly more difficult than learning CDC-unique features in FORTRAN IV. Also, both were recent graduates and had been exposed to some structured techniques in their schooling. The lead analyst was sympathetic with structured techniques.

The software incompability was a cost of progress kind of thing. Sooner or later we were going to go to FORTRAN V. Why delay?

The risk of software bugs was considered acceptable (CDC had 16 months before implementation to get the bugs exterminated). Actually these bugs did cause some minor problems as seen in Section IV.

C. Structured Design:

This is the most significant tool used. Without structured design MRMS would still be floundering in a prolonged debug phase and I would be making up excuses for a failure instead of presenting a paper on a success.

It is difficult to write a bad program from a good design.

The MRMS team is unanimous in its praise of Glenford Meyer's "Composite Structured Design" as a tool for good design. In fact, this particular tool was selected by the team and not suggested by management. Surely the risks associated with any unknown untried technique exist, but this team was so enthusiastic about this choice that they refused to recognize any risk.

D. DMS-170 (Query/Update):

DMS-170 is CDC's data base management system. This system was purchased for us in the very early days of this project. The team viewed DMS-170 with very mixed feelings. This was a totally new tool to us and as such was a very intriguing toy. But it was also a threat. We felt confident we could meet our due date using our plan. Query offered a tempting promise for a short cut but one that might be booby-trapped. Query was designed so it could be used by a naive user--does it have sufficient power to meet MRMS requirements? If it has sufficient power to meet the need, does it also have sufficient power to allow our naive user to destroy his data base? Did we have time to explore this tool and still have time to complete our planned approach should DMS-170 be either too powerful or not powerful enough? The only choice we felt comfortable with was to proceed with our plan and investigate DMS-170 in time available with an eye to future applications.

E. Algorithm Statement [Pseudo Code, PDL (Program Definition Language)] instead of Flow Charts:

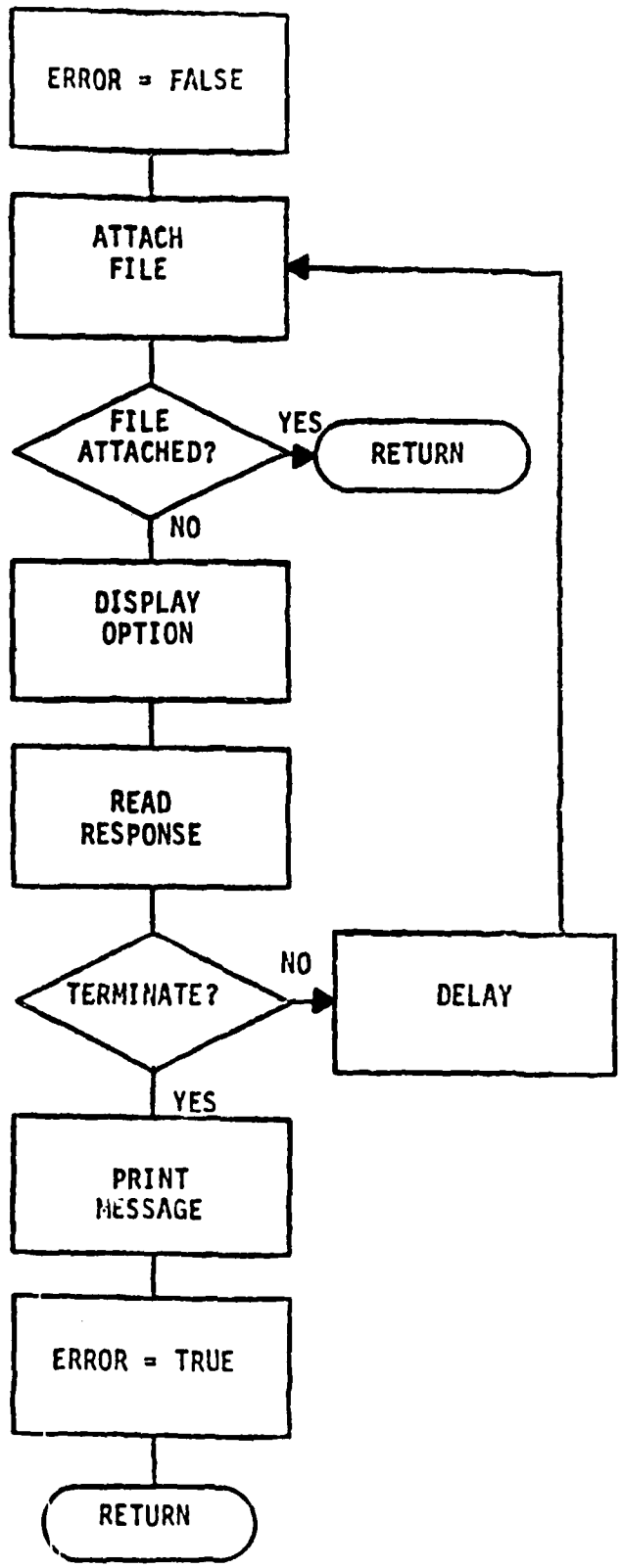
Flow charting is a tried and true tool--why abandon it on a critical project? It is also an abused tool. Few flow charts are worth the effort taken to create them. Flow charts are tedious to draw and both difficult and costly to revise. An algorithm description is easy to write and easy to revise. Algorithm descriptions provide a better insight into program structure than flow charts--especially if they are written in a pseudo-FORTRAN V, as they are.

The following is an example of the algorithm specification used during the design phase. The algorithm specifies the steps to be taken when "attaching" a data base file to the program. If a file cannot be "attached," the terminal operator is given the option of making another try or terminating the procedure.

The corresponding flow chart is also shown.

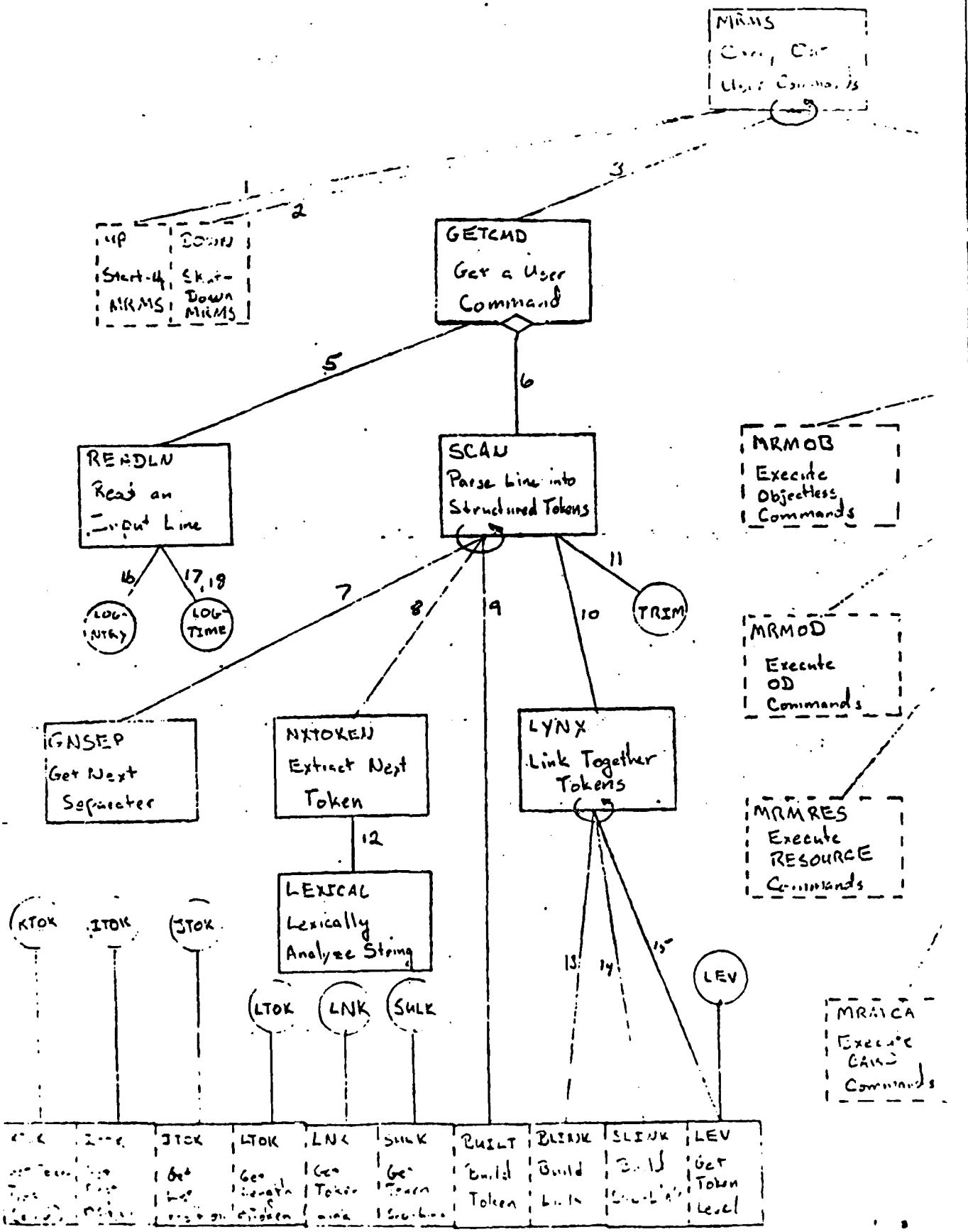
E. ALGORITHM

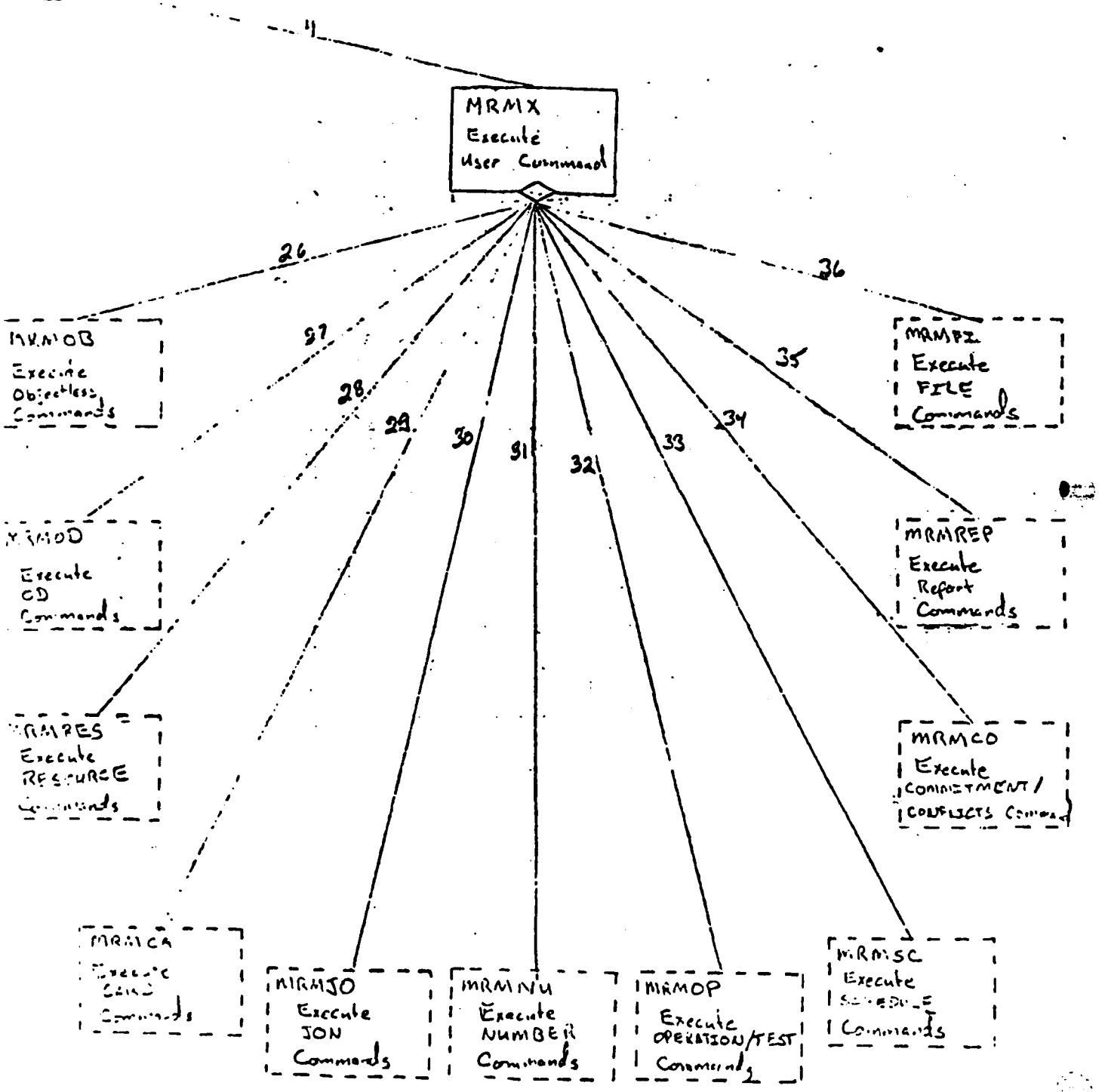
```
ERROR ← False
Loop:
   Attempt ATTACH
   Exitif (attach good)
   Give operator option to terminate
   Erase prompt
   If (terminated) then
      Print terminate message
      ERROR ← True
      Exit loop
   Endif
   Wait before next try
End Loop
Return
```



F. Structure Charts

Structure charts are a subtool of structured design. A structure chart shows how each program module is related to each other module.

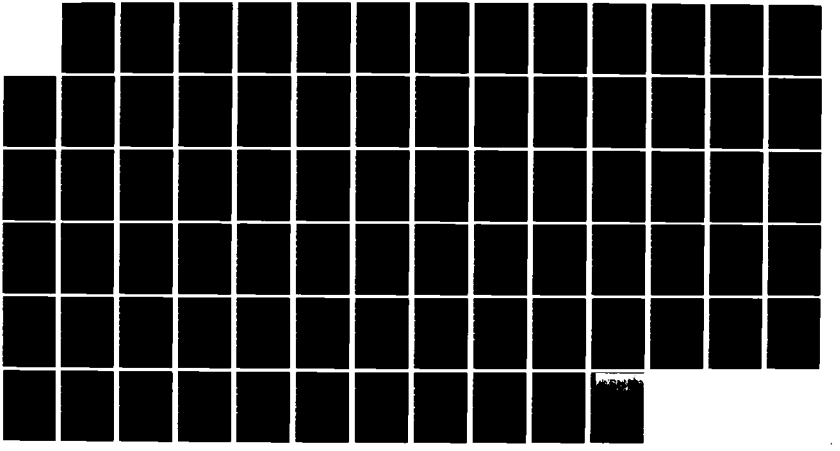

MRMS
Comp, Cat
User Commands
1
2
3
UP
Start-Up MRMS
DOWN
Shut-Down MRMS
GETCMD
Get a User Command
5
6
READLN
Read an Input Line
SCAN
Parse Line into Structured Tokens
MRMOB
Execute Objectless Commands
16
17,18
LOG-INTRY
LOG-TIME
7
8
9
10
11
TRIM
MRMOD
Execute OD Commands
GNSEP
Get Next Separater
NXTOKEN
Extract Next Token
LYNX
Link Together Tokens
MRMRES
Execute RESOURCE Commands
12
LEXICAL
Lexically Analyze String
KTOK
ITOK
JTOK
LTOK
LNK
SNLK
13
14
15
LEV
MRMCA
Execute CAIS Commands
KTOK
ITOK
JTOK
Get Token
LTOK
Get Length Token
LNK
Get Token
SNLK
Get Token
BUILT
Build Token
BLINK
Build Link
SLINK
Build
LEV
Get Token Level

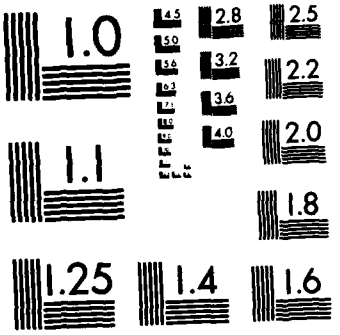

MRMX
Execute
User Command
26
27
28
29
30
31
32
33
34
35
36
MRMOB
Execute
Objectless
Commands
MRMOD
Execute
OD
Commands
MRMRES
Execute
RESOURCE
Commands
MRMJCA
Execute
JOB
Commands
MRMJO
Execute
JON
Commands
MRMNU
Execute
NUMBER
Commands
MRMOP
Execute
OPERATION/TEST
Commands
MRMSC
Execute
SCHEDULE
Commands
MRMCO
Execute
COMMITMENT/
CONFLICTS Commands
MRMREP
Execute
Report
Commands
MRMFI
Execute
FILE
Commands

AD-A134 398 INTERRANGE SCHEDULING AND UNIVERSAL DOCUMENTATION SYSTEM (UDS) DOCUMENT DEVELOPMENT AND TRANSMISSION(U) RANGE COMMANDERS COUNCIL WHITE SANDS MISSILE RANGE NM

2/2

UNCLASSIFIED INTER-R .. 1983 RCC/IOG-551-83 F/G 16/1 NL





G. Interface Charts:

Interface charts detail the way data is passed between modules. Use of these charts force an early definition of variables and tends to stabilize design.

Interface Chart

Program MRMS

Interface #	Calling Module	Called Module	IN	OUT	Compiling	Type of Call	Prob of call
1	MRMS	UP	PGM	—	Data	N	100
2	"	DOWN	—	—	Data	N	100
3	"	GETCMD	—	LINE, NTOK, TOKEN	DATA	I	100
4	"	MRMX	LINE, TOKEN	—	DATA	I	99
5	GETCMD	READLN	—	LINE, ENDFILE	DATA	N	100
6	"	SCAN	LINE	NTOK, TOKEN	DATA	C	99
7	SCAN	GNSEP	LINE, CURSOR	NEXT, SEP	DATA	I	100
8	"	NXTOKN	LINE, CURSOR	CURSOR, ITOKEN, JTOKEN, KTOKEN	DATA	I	100
9	"	BUILT	TOKEN, NTOK, ITOKEN, JTOKEN, KTOKEN LEVEL	fun., NTOK	DATA	I	100
10	"	LYNX	TOKEN, NTOK	TOKEN	DATA	C	90
11	"	TRIM	LINE	fun	DATA	N	100
12	NXTOKN	LEXICAL	LINE, ITOKEN, STATES, CHARS	CURSOR, KTOKEN	DATA	N	100
13	LYNX	BLINK	TOKEN, LAST, IT	fun, TOKEN	DATA	I	100
14	"	SLINK	TOKEN, (IT-1), IT	fun, TOKEN	DATA	I	100
15	"	LEV	TOKEN, IT	fun	DATA	I	100
16	READLN	LOGNTRY	—	—	DATA	N	100
17	"	LOGTIME	—	—	DATA	N	99
18	"	LOGTIME	—	—	DATA	N	1
19							
20							
21							
22							
23							
24							
25							

H. Structured Walk-Thru:

Structured walk thrus maintain team identity and keep team members on the same track and fully informed on what each team member is doing.

III. Philosophy and Plan

A. Priorities:

1. The first and overriding priority for this project was to finish on time. Until the last few months the ETR was committed to implementation of direct cost reimbursement by unit service costs on October 1, 1981. Until this mandatory date was slipped for a year the implementation date was mandatory.

2. Implement all planned features of the program by the due date.

3. Be responsive to the user's needs.

4. Provide a maintainable program. This priority relates very closely to the decision to use structured techniques.

5. The fifth priority was efficient use of storage. Elimination of redundancy within the data base also enhances long term stability of the system by eliminating the possibility of divergence of data in the redundant sections. Divergence will eventually occur when data in one file is updated and another file is not--perhaps thru system failure.

6. Code in a single consistent style. This last priority is of little import to the value of the system but is rather a symptom of the determination of the team to show that it can be done.

B. Task Sequencing:

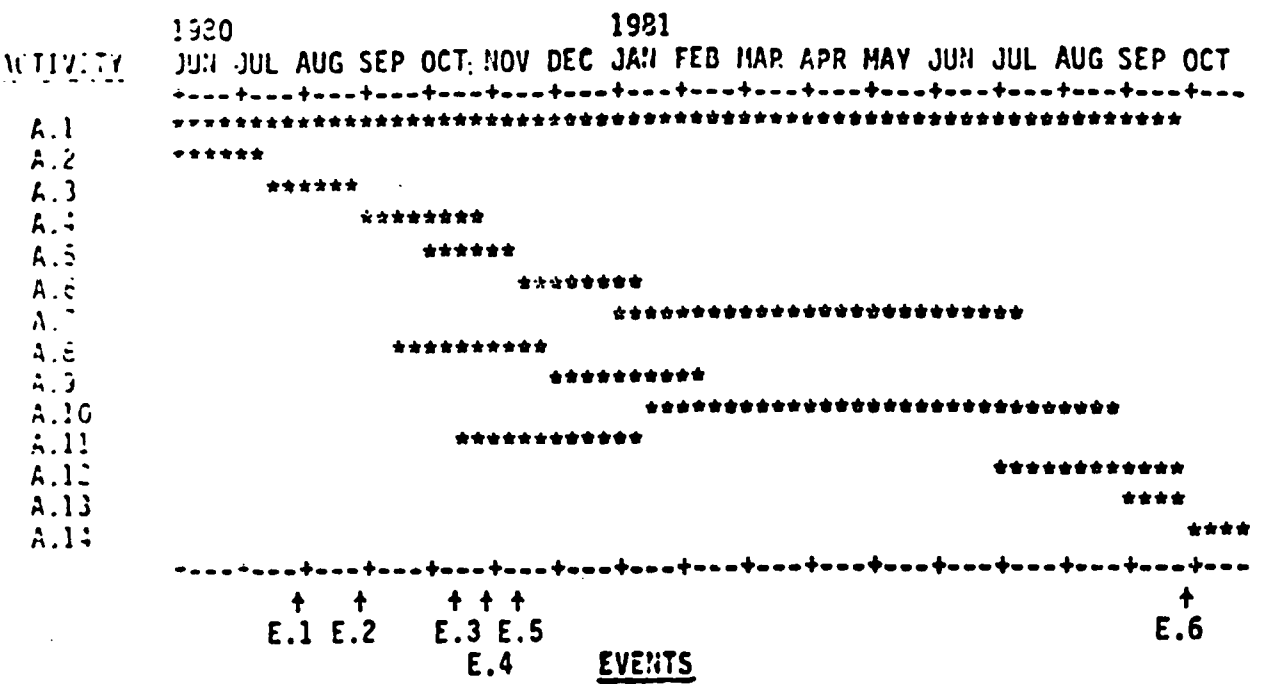
1. The first task for the team was to write its own Project Standards Manual. This may appear paradoxical as this task relates to the last item on the priority list, but this task has hidden values. The act of cooperatively defining a style and consistent mode of approach establishes a team identity; it removes the tiny decisions of styles from the production phase; it promotes compatibility in form which increases usefulness of utility type subroutines; and it tended to cement a team spirit with the challenge of making a program written by two or more programmers appear as if it had been done by one programmer. This is another facet of the "egoless programming" that has appeared so much in data processing literature.

2. Having established a team identity the next task was to design the data base. This must be the first stage of the design because the data base design drives all other phases of the design effort. It is impossible to design a program to maintain a data base that has not been defined.

3. The next task was to design the man/machine interface. This task is to define the language that the scheduler will use to perform his tasks with the computer.

4. Having defined the language the next task is to document the language by writing the User's Manual. Having the User's Manual written at an early stage in the project allows the user to pre-examine the product to see if he understands and if he approves of the product. Hopefully, it opens a dialogue between programmer and User which will continue throughout the project.

PROJECT SCHEDULE



ACTIVITY

MRSS
A.1 - Production Maintenance
A.2 - Implement Security Mod

MRSS/MRMS
A.3 - Orientation and Training for Project Team

MRMS
A.4 - Design Data Base
A.5 - Design Man/Machine Interface
A.6 - Design (0,0) and Primary Overlay Modules
A.7 - Design Secondary Overlay Modules
A.8 - Prebuild: Utility and Service Routines, CCL, etc.
A.9 - Build (0,0) and Primary Overlay Modules
A.10 - Build Secondary Overlay Modules
A.11 - Create Data Base for Software Testing
A.12 - Training for User Personnel
A.13 - Acceptance Testing
A.14 - Production Maintenance

EVENTS

E.1 - Programming Standards Manual
E.2 - Receive Detailed Report Formats from ROS
E.3 - Receive Data to Create Resource File from ROS
E.4 - Design Review for Data Base and Man/Machine Interface
E.5 - Users' Manual
E.6 - Certification

NOTE: Monthly progress reports to RCA Management starting 1 August and to ROC and ROS Management starting 1 December (i.e., after design review).

5. We are now ready to define the major program sections which were at least conceived during the writing of the User's Manual. In fact, from here on out we were driven by what was put in the User's Manual. High-level structure charts and interface charts will now begin to appear.

For the first five steps the order is strictly definable. The remaining activities are orderable within groups but not between groups. There are two types of groups: programming and data base.

The internal order within the programming groups is:

1. Design
2. Document
3. Code
4. Test

The steps in the design process are:

1. Identify the tasks that must be performed to accomplish the purpose of the program. Each task becomes a module of the program.
2. Define an algorithm to accomplish the task of each module.
3. Organize the tasks into an appropriate structure to accomplish the program purpose (structure charts).

Documentation is nothing more than recording the results of the design process so that it can be used to produce the code.

The steps in the data base group are design and create. (The data base we are talking about here is the test data base to be used to test the program.)

IV. Execution Of The Plan

The initial plan and schedule was followed with remarkable accuracy. The project Standards Manual was late in completion but the basic procedures had been verbally agreed upon by the team and documenting them seemed much less important then designing the data base.

A major deviation from the plan occurred very early when it was decided not to maintain the MRSS data structure but rather to redesign the file structure to eliminate redundancy. Surprisingly enough this change did not in any way impact the schedule.

A second major deviation from the plan was the relative infrequency of structured walk-throughs which were held only just before wrap-up of the analysis of a module and then only if the programmer asked for it. Structured walk throughs were not pushed by the lead analyst because the two programmers were consulting each other on a daily basis and a free interchange of problems and solutions was taking place without the more formal walk-through procedure. Walk-throughs were held when needed and were valuable in resolving some sticky problems but for the most part were not needed.

Another deviation from the plan was the discontinuance of interface charts. In the early stage of the project these charts were carefully maintained and appeared to be useful but as the number of modules began to expand rapidly, it was found that the value of the charts diminished and the effort to maintain them increased, so they were discontinued.

The most significant deviation from the initial plan came late in the program. Although DMS-170 was purchased early in the project it was not implemented until the project was in its last few months. Experimenting with Query rapidly led the team to the conclusion that the report generating portions of the system not only could be handled by Query, but that this part of the effort could be significantly reduced and system performance enhanced by use of Query.

One FORTRAN V problem was not resolved until after the first release of MRMS. The write end of record command did not work. This command was essential to one of the MRMS functions--a direct line teletype output of the schedule for downrange stations. The first version (released but not implemented) did not contain this broadcast capability. As soon as this command was working a second release activated the broadcast capability.

V. Results, Evaluation, Comments

The results of this effort are well summarized in the Verification Test Report which is included here in full.

VERIFICATION TEST REPORT
MECHANIZED RESOURCE MANAGEMENT SYSTEM
(MRMS)
16 October 1981

I. PURPOSE OF PROGRAM

MRMS is an interactive data base management system designed to maintain and update the MRMS resource/schedule data base. The program is divided into ten more or less independent command module Each command module recognizes and executes a certain logical subset of the MRMS command language. The following command modules make up MRMS:

1. JON Commands
2. Card Commands
3. Resource Commands
4. OD Commands
5. Number Commands
6. Operation Commands
7. Schedule Commands
8. Conflict/Commitment Commands
9. File Commands
10. Miscellaneous Commands

Modules 1 through 6 are data base update commands for maintaining the data base. Modules 7 and 8 produce specialized reports. Module 9 controls the handling of any print files created by the program. Module 10 contain various small commands used to control program execution parameters (e.g., default print files, schedule/history mode, etc.)

II. VERIFICATION

Verification was carried out in two parts. The first part consisted of providing Range Scheduling with a version of the program for their own use and verification. Some time was spent in training Scheduling personnel in the use of MRMS.

The second part of verification consisted of dividing the various command modules among three analysts for complete checkout and verification. Each module was checked out by an analyst who had done no programming in that particular module.

Checkout of the command modules consisted of using the MRMS User's Guide as a standard. Each data field defined by the user's guide was entered with the ADD command and modified with the CHANGE command where applicable. Fields were tested from both the command line and from edit mode. Printouts of the data base were ordered before and after any data manipulation and were used to verify that the data base was correctly updated. Additionally, data dumps produced by query-update were compared to program generated printouts.

In checking out the OPERATION commands, the week of August 31 through September 6 was chosen to be entered by hand into the data base. This week consisted of 224 operations and provided a very thorough checkout of the scheduling portion of the program.

Two modules, the FILE and MISC. Commands were not individually verified, but were used in all the other module checkouts.

III. RESULTS

In each command module all data manipulation commands were found to conform to the user's guide description. Printouts of the data base showed that the modified fields were in fact correctly updated. Query-Update dumps and printouts matched those produced by the program.

Comparison of the schedule for the week of August 31 to September 6 showed that the MRMS schedule compared very closely to the MRSS schedule. Any differences found consisted of either typing errors or neglect to change the default resource time spans obtained from an OD.

When comparing the conflict analysis reports, several major differences were found. These differences were expected however, and were caused by three reasons.

1. Mismatching time spans between the two data bases. In entering so much data by hand, it was inevitable that some typos had occurred.

2. The NIB (Non-Interference Basis) flag eliminated many "false" conflicts in the data base.

3. Conflicts in MRSS were based on 15-minute intervals beginning between quarter hour divisions. In MRMS 15-minute intervals were used also, but began on the quarter hour divisions rather than between. This only effects "borderline" conflicts where there is resource usage in the same 15-minute block, but no actual overlap.

All discrepancies found in the conflicts printouts can be attributed to one or more of the above reasons.

No problems occurred when using the FILE or MISC. command modules.

Range Scheduling reported the following problems from their use of the program:

Checking back to see how well our goals were met we found the following:

1. On-time completion. Almost. The 1-year slippage of the implementation date for the direct cost reimbursable/unit service change allowed some relaxation at the end of the effort. Our first release was 2 weeks late.
2. Provide all capabilities. Met--including the new ones generated by in-process interaction with the user.
3. Responsive to user's need and desires--met (see 2. above and the Verification Test Report).
4. Maintainable program. Only time can confirm this but this program has all of the proprieties defined in the literature as proper design for maintainability.
5. Efficient use of storage. Elimination of redundancy from the data base met this goal.
6. Code in a single style. Met--but the individual programmers' unique trademarks can be detected if you look hard enough.

The real payoff is the answer to the question of applicability of these techniques to other projects. Unfortunately few firm conclusions can be drawn at this time. It is sure that the same team would handle any project of this type at least as well as they did this one. Other teams may have done as well on this project, some other teams would surely have failed. In any project the people are the most important ingredient. Good tools help but tools are valueless until properly used. What has been demonstrated by this project is that the tools used were good tools for this type of project. Their universal applicability is till much in doubt--but might be well worth trying.

Programmer productivity for this project was exceptionally high. The total time spent on the project was 5087 man-hours, 33017 lines of code were produced. This yields a productivity value of 52 lines of code per day per programmer. A truly exceptional figure especially when it is remembered that those are both inexperienced programmers who learned not only FORTRAN V but also the DMS-170 language in time charged to this project.

MRMS PROJECT STATISTICS

Man-hours Spent - 5087

Program Statements Produced

A.	FORTRAN V	28090	
B.	CCL procedure Lines	580	
C.	Query Commands	3172	
D.	Conversion Programs (DB)	1125	
	Total	33017	(52 lines/Man-day)

Documentation (Permanent)	Pages
Project Standards Manual	31
User's Manual	42
Maintenance Manual	822
Verification Test Report	4
SDJ Report	24
	923

In Process Documentation

- Structure Charts
- Interface Charts
- Status Reports

REFERENCES

Structured Analysis and Systems Specifications
Tom DeMarco
Prentice Hall

Composit/Structured Design
Glenford Meyers
Van Nestrand Reinhold Company

Computer Data Base Organization
James Martin
Prentice Hall

The Elements of Programming Style
Kernighan and Plauger
McGraw-Hill

PACIFIC MISSILE TEST CENTER
Range Scheduling Abstract

The Range Operations Department is the scheduling agency for the resources of the Pacific Missile Test Center (PMTC). Test operations at PMTC are scheduled on a weekly basis (Mon-Sun) with computer assisted procedures. Agencies using PMTC facilities make known their basic requirements via the Universal Documentation System. After a program has been accepted on the range and a Program Identification Code (PIC) number is issued the program is eligible for scheduling. The resource plan document is entered into an especially coded computerized data base file resulting in a complete list of range resources required for each operation. This document is then identified on the schedule request.

The Operations Conductors (OC) submit requests to the Scheduling Office by noon on Tuesday for projects to be tested the following week on the range. On Wednesdays the schedulers formulate a schedule from the computer readout of requests considering time requirements, range resource availability, and priorities. The result is a conflict free schedule that best utilizes the range assets. The schedule is then reviewed by the OC for compatibility with their range needs. On Friday the forecast of operations for the succeeding week is promulgated. During the week of activity an updated schedule is issued daily.

Changes made to the schedule after the distribution of the printed copy are disseminated via teletype or CRT. As operations progress the degree of success or failure of each one is recorded using a completion code listing. These statistics are later published in the form of weekly, monthly, and quarterly summaries.

Reimbursable costs for each operation are computed automatically using a standard cost table. These range costs are entered into the computer system for ultimate billing to the customer.

RANGE OPERATIONS PROCEDURAL MEMORANDUM 4-82

From: Range Operations Officer

Subj: Scheduling operations with the Pacific Missile Test Center; instructions for

Ref: (a) COMPMTC INST 3100.1
(b) RCC DOC 501-70, Vol 1 and 2
(c) RANDIRPROMEMO #7-77 of 19 May 77

Encl: (1) PMTC Sea Test Range
(2) Prerequisites and Procedures for Scheduling Operations with the Pacific Missile Test Center (PMTC)
(3) Operations Completion Codes

1. Purpose. To promulgate procedures and to define the prerequisites for scheduling missile or other type operations with the Pacific Missile Test Center (PMTC) national range.

2. Cancellation. This memorandum supersedes Range Operations Procedural Memoandum 1-79 of 30 Mar 1979

3. Scope. This memorandum affects all agencies and activities conducting operations which utilize range facilities, frequencies, areas, aircraft, targets, etc., under the control of the Commander, Pacific Missile Test Center.

4. Discussion

a. General. The PMTC is a national range which provides support and services to approved national range programs. Organizational responsibilities include coordination and scheduling control of all operations to be conducted on the range, and scheduling authority for the restricted and warning areas depicted in enclosure (1).

b. Scheduling Authority. The authority for scheduling operations within scheduling area one described in reference (a) is delegated through the Director, Range Directorate (DIRRANDIR) to the Range Operations Officer(ROO). The ROO is responsible for interrange/intrarange scheduling and coordination with Pacific Missile Range Facility Hawaiian Area (PACMISRANFAC HAWAREA) as well as outside agencies for the fulfillment of the PMTC operational mission.

c. Range Scheduling Facilities. The official range schedule is maintained by the ROO in the PMTC Range Scheduling Office at Point Mugu.

5. Policy. Range scheduling policy is in accordance with reference (a). The PMTC Range Scheduling Office will coordinate, determine, and promulgate the PMTC weekly forecast and daily schedule. Additionally the PMTC Range Scheduling Office will coordinate and issue all official changes that occur to the schedule. Agencies desiring to utilize PMTC facilities will make knowntheir

basic requirements via the Universal Documentation System to the Project Management Group, as outlined in reference (b). After a program has been accepted on the range, through the acceptance of valid program documentation and issuance of a Program Identification Code (PIC) as delineated in reference (c), the program will be eligible for scheduling on the range in accordance with the procedures contained in enclosures (2) and (3).

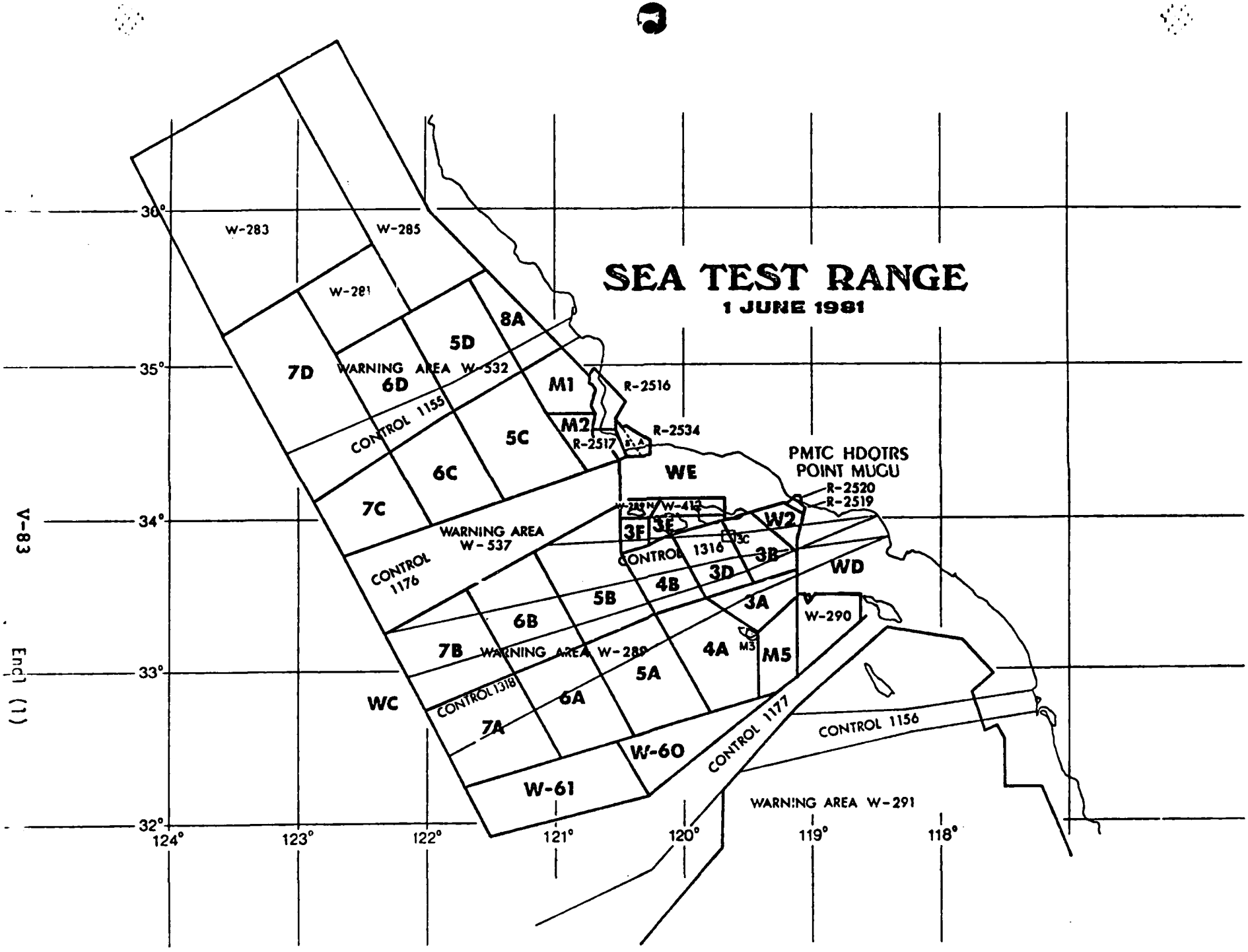
6. Summaries and Reports. The ROO will disseminate post operation information through the following summaries and reports:

a. Weekly Operational Reports. Each Friday, the operational forecast and weekly resume will be distributed locally. The forecast contains the launch and support operations scheduled for the subsequent week. The resume contains a tabulation of launch and support operations scheduled Monday through Sunday of the preceding week.

b. Monthly Report. Prior to the tenth day of each month a tabulated report of launch and support operations conducted the preceding month is distributed.

c. Quarterly Report. Prior to the last working day of January, April, July, and October a complete statistical report of the quarter's operations is published.

d. Special Reports. With prior approval of the ROO, special statistical reports will be prepared upon request.


SEA TEST RANGE
1 JUNE 1981
W-283
W-285
W-281
8A
5D
7D
WARNING AREA W-532
6D
M1
R-2516
CONTROL 1155
5C
M2
R-2517
R-2534
6C
WE
PMTC HDQTRS
POINT MUGU
R-2520
R-2519
7C
W-289N
W-412
3F
3E
3C
W2
WARNING AREA
W-537
CONTROL 1316
3B
CONTROL
1176
3D
WD
4B
5B
3A
6B
W-290
7B
WARNING AREA W-289
4A
M3
M5
5A
WC
CONTROL 1318
6A
7A
CONTROL 1177
CONTROL 1156
W-60
W-61
WARNING AREA W-291
30°
35°
34°
33°
32°
124°
123°
122°
121°
120°
119°
118°

V-83

Encl (1)

PREREQUISITES AND PROCEDURES FOR THE SCHEDULING OF OPERATIONS ON THE PACIFIC MISSILE TEST CENTER NATIONAL RANGE

Ref: (a) COMPMTC 5100.2 series
(b) RCC Doc 501-70, Vol 1 and 2

1. The following defined acronyms and abbreviations are used throughout this enclosure and are listed for a ready reference:

ACRONYM	DEFINITION
COMTHIRDFLT	Commander, Third Fleet
DOD	Department of Defense
ESA	Explosive Safety Approval
IP	Instrumentation Plan
JPASO	Joint Pacific Area Scheduling Office
LA	Launch Approval
LONOTES	Local Notice to Ships
OC	Operations Conductor
NOTAM	Notice to Airmen
PMTC	Pacific Missile Test Center
RAMDIR	Range Directorate
RCO	Range Control Officer
ROS	Range Operations Supervisor
ROO	Range Operations Officer
RSA	Range Safety Approval
RSO	Range Scheduling Officer
RSOP	Range Safety Operational Plan
RST	Requirements for Scheduled Tests
SR	Schedule Request
DSP	Diving Support Plan

2. Prerequisites for requesting operations to be scheduled on the PMTC National Range include the completion and issuance of the Operations Directive which includes but is not limited to:

a. ESA. Official issuance of an ESA is required prior to the first scheduled operation. ESAs for the Point Mugu/San Nicolas Island areas are issued by the Ordnance and Launching Division, Range Operations Department (Code 3260).

b. IP. Official issuance of an IP for operations requiring instrumentation is required prior to the first scheduled operation. The IP is prepared and issued by the Data Collection Division (Code 3410), Range Instrumentation Systems Department. It serves as a guide and instruction to all participating in the data collection function. An IP must be issued prior to acceptance for scheduling of any operation or series of similar operations in which PMTC instrumentation services or facilities are utilized. The IP is identified by number on the PMTC Daily Operations Schedule.

c. RST. The RST is prepared by the OC/ROS and shall include a complete listing of specific facilities, areas and altitude, frequencies, instrumentation,

communications support, frequency monitoring, range aircraft, range boats, surveillance, general operation support, geophysics, launching, recovery area (from PMTC resource listing), project ships, project boats, squadrons, project aircraft, the applicable documentation, and targets required to support an operation. An RST must exist for every test or operation conducted at PMTC. For those programs still active and not having completed range documents, the RST may be used for scheduling, subject to prior approval of the ROO. The RST will be submitted by the OC/ROS to the Range Scheduling Office (Code 3200-3) for review and final approval and entry into the scheduling data base. The OC may obtain assistance in preparation of the RST from Code 3200-3 personnel. Reproduction and distribution of the RST, under the supervision of the RSO, must be completed prior to requesting a firm schedule date for the operation. RST must be submitted to the Range Scheduling Office for induction in the scheduling data base, one week prior to submission of schedule requests.

d. Approval by Range Safety. The Range Safety Office (Code 3030) is responsible for preparing and issuing all RSAs, LAs, and RSOPs required at the PMTC. Range Safety plans must be issued prior to submitting an SR. For the purpose of range safety, launch operations are divided into two sub-divisions.

(1) Type I. Thoselaunch operations not incorporating a flight termination system, and having a valid RSA number prior to being scheduled.

(2) Type II. Those launch operations which require a flight termination system, having a valid RSOP prior to being scheduled and an LA for the specific launch prior to the operation. The LA is contained in the RSOP in certain operations.

(3) All range safety data outlined in reference (a) must be submitted in accordance with the required time schedule to obtain the above approvals prior to scheduling.

3. Procedures for Scheduling Operations

a. The SR will be submitted via appropriate channels to the RSO (Code 3200-3), prior to 1200 local time on Tuesdays for the 1-week period commencing the following Monday. The SR form may be used to request as many as five operations providing each operation is exactly the same except for dates/times. If the intended flight profile of a missile or vehicle and any associated target extends beyond PMTC controlled areas, the request must include the proposed flight path to facilitate the coordination with outside agencies, by COMPMTC, and the promulgation of appropriate NOTAM, Hydrographic Office Notice, LONOTES, warnings, etc..

b. Forecasts for operations which involve the use of facilities of other national or service ranges (interrange operations) will be submitted to the RSO, PMTC when available to facilitate inclusion in the JPASO forecast if appropriate. SRs are due 1200 local time on Tuesday, 1 week prior to the date of the operation. Coordination of the scheduling of the PMTC facilities and for the scheduling of other national or service range facilities will be accomplished by the PMTC RSO.

c. Each Wednesday prior to the week of intended operations the RSO will integrate all combined range requirements and formulate a 1-week schedule This integration will be done in a manner that avoids or identifies conflicts in time, area, frequencies, instrumentation facilities, etc., while satisfying range user requests in priority order, and at the same time realizing maximum utilization of PMTC facilities.

d. After 1000 each Thursday, unless otherwise specified, users may come to the scheduling forecast room for the purpose of confirming the proposed schedule, resolving conflicts, etc., and establishing a firm schedule of operations for the week commencing the following Monday. All PMTC users and agencies having operations scheduled and all PMTC supporting activities (targets, surface craft, photo, etc.) may attend or provide qualified representation. When Thursday is a national holiday, the PMTC scheduling forecast will be finalized on Wednesday.

e. Operations will be scheduled in accordance with known priorities. These priorities will be based on directives issued by proper authority and from deadlines established in connection with other DOD agency support commitments. Target operations (involving actual flight) are launch operations, and when in support of a missile launch, will be scheduled as an associated operation.

f. The ROO or his designated representative will act for the Director, Range Directorage in resolving conflicts on all matters pertaining to range scheduling. Conflicts which cannot be resolved will be referred to the COMPMTC, via appropriate channels.

4. The ROO will disseminate the scheduling information as follows:

a. The weekly forecast will be published on Friday containing operational activity for the ensuing Mon-Sun. Other national range scheduling officers will be contacted as required for support.

b. An official PMTC daily operation schedule will be distributed the morning of the day preceding the date of the schedule. The daily schedule will also be disseminated on the PMTC Range Scheduling Office teletype circuit each afternoon for the forthcoming day. The official PMTC daily operation schedule will be delivered by messenger to local representatives. It will establish definite range time periods and designate facilities to be used for each operation. Operations may appear on this schedule at times and in areas differing from those designated by the weekly forecast, due to changes in other range requests or requirements. It is, therefore, mandatory that all OCs check the daily schedule and PMTC Range Scheduling Office teletype for firm time and not rely entirely on the weekly forecast.

c. Hydropacs will be issued setting forth times and areas outside PMTC warning areas when operations hazardous to surface vessels are to be conducted.

d. The RSO will issue a NOTAM describing time, area, and altitude which will be addressed to cognizant authorities on each occasion, as appropriate, of an operation presenting a hazard to air navigation to be conducted in part or entirely outside the PMTC controlled area.

e. Special notices and/or individual clearances to nonscheduled ships or aircraft to transit or operate in PMTC areas will be issued, as required.

5. Changes and/or Deviation from the Schedule

a. Additions to the schedule or rescheduling of cancelled or scrubbed operations, will be accomplished as facilities, time and required areas become available. Operations of high priority may be rescheduled as required except when outside coordination is necessary. Rescheduled and added operations will then be accepted if coordination can be accomplished. When conflicts with other scheduled operations occur, they will be resolved by the ROO.

b. No add-on operation or rescheduled operation involving the use of San Nicolas Island (SNI), which requires manning of range instrumentation, will be accepted for the impending weekend after 1000 Friday, unless the range user obtains approval from the Vice Commander or the Commander, PMTC. No add-on operation or rescheduled operation involving the use and manning of the Point Mugu complex range instrumentation system will be accepted for the impending weekend after 1200 Friday, unless the range user obtains approval from the Vice Commander or the Commander, PMTC.

c. Range facilities scheduled and committed for an operation by a range user and not required for range safety may be deleted or waived on request of the OC to the RSO. However, requests for additional facilities assignment, over and above those provided for in the scheduled IP or RST, are subject to normal scheduling procedures for necessary coordination.

d. The RSO will notify appropriate PMTC user and PMTC support offices of changes to the operations schedule, as well as range facilities assigned, through the medium of the Range Scheduling Office teletype loop.

e. Operations must be completed by the end of the range time period specificially designated in the Daily Operation Schedule. All extensions of scheduled time must be requested from the PMTC RSO. Inability of the range user to complete operations within the scheduled range time may require cancellation or scrubbing of the operation. Acting for the ROO, the RSO and RCO have the authority to cancel or scrub operations when the situation so dictates.

6. Operational Procedures for Conduct of Operation

a. The OC will disseminate the countdown information by appropriate and available means to all concerned.

b. To standardize terms and to facilitate reporting, the following expressions will be used in conjunction with the teletype reporting code in enclosure (3).

(1) Cancelled. An operation terminated before the T minus 120-minute warning for launches and T minus 60-minute warning for support operations. The word "cancelled" will be used followed by items from the established code

to denote the reason thereof. Further amplification may be used if appropriate. The RSO and RCO have the authority to cancel operations as deemed necessary, and it is mandatory that all OCs abide by their actions.

(2) Scrubbed. An operation terminated after having sounded the appropriate T minus 120 or T minus 60-minute warning but not yet collecting usable data. The word "scrubbed" will be used followed by items from the established code to denote the reason thereof. The RSO and RCO have the authority to scrub operations as deemed necessary and it is mandatory that all OCs abide by their actions.

(3) Added. An operation not appearing on the weekly forecast but appearing on the firm daily schedule or on RSO teletype circuit, will be designated as "added".

(4) Complete. Operations that acquire data/expend ordnance or partially or wholly accomplished the assigned task are considered "complete".

c. OCs are responsible for notifying the PMTC Range Scheduling Office, or when appropriate, the RCO, who will in turn notify the PMTC Range Scheduling Office of the following:

(1) Progress of countdown (hold, delays, etc.)

(2) Cancellation and scrubs and completions of schedule operations using the completion code that best defines the action being taken.

INTRARANGE SCHEDULING PROCEDURES

1. Purpose

This procedure defines the responsibilities of the scheduling offices at PMTC headquarters and the Pacific Missile Range Facility Hawaiian Area (PACMISRANFAC HAWAREA) for exchange of scheduling information. It provides a basis for the coordinated effort between the two offices, hereby reducing the possibility of repetition in the scheduling and range data recording functions.

2. General

The master scheduling office for the PMTC is located at Point Mugu. This office executes the scheduling function of the Point Mugu area and the PMTC operations requiring downrange support. It maintains the range usage accountability system for all sites and facilities within PMTC. The Hawaii Range Scheduling Office is located at Barking Sands, Hawaii, and is responsible for the scheduling function in the Hawaiian Area. The Hawaii Range Scheduling Office does not maintain a complete range usage accountability system but is responsible for providing schedules and resumes to the PMTC Range Scheduling Office within prescribed deadlines. It is mandatory that an RST be prepared for every test operation scheduled by either office.

3. Areas of Responsibility

a. PMTC Range Scheduling Office will:

(1) Provide scheduling information in a timely manner for interrange operations requiring support in the Hawaiian Area.

(2) Maintain an accountability system to include downrange operations and disseminate this information to the Hawaii Range Scheduling Office.

(3) Provide current PIC lists (alpha and numeric) to the Hawaii Range Scheduling Office.

(4) Provide current RST lists to the Hawaii Range Scheduling Office.

(5) Provide a current list of test identity to the Hawaii Range Scheduling Office.

(6) Assign test identity digits when requested.

(7) Provide PIDS Lists to the Hawaii Range Scheduling Office.

b. The Hawaii Range Scheduling Office will:

(1) Provide necessary information to the PMTC Range Scheduling Office for establishment of all new PIDS and RSTs.

(2) Provide resumes of HAWAREA operations.

(3) Assign the 6, 7, and 8 digits of the PIC number to new RSTs, or

request same from the PMTC Range Scheduling Office.

4. Scheduling Timetable. The timetable for HAWAREA inputs to Point Mugu is as follows:

a. PIDS/RST Assignment Requests. As soon as an officially recognized program is known to have reached an active operational stage but prior to scheduling.

b. Resumes. Monthly by the fifth working day containing data for the entire previous month.

FIRST CHARACTER

CHAR	CHAR MEANING
1	COMPLETED
2	SCRUBBED
3	CANCELLED
4	CANCELLED

SECOND CHARACTER

CHAR	CHAR MEANING
E	SATISFACTORY
S	SATISFACTORY-OBJECTIVE PARTIALLY ACHIEVED
U	UNSATISFACTORY
B	CIRCUMSTANCES BEYOND PROJECT/RANGE CONTROL
P	PROJECT
R	RANGE
T	TARGET
W	WEATHER
C	CONTRACTOR
X	NOT SCHEDULED

ENCLOSURE (3)

THIRD AND SEVENTH CHARACTER

CHAR	CHAR MEANING
A	AIRCRAFT
B	MISSILE
C	SPACECRAFT
D	AREA
E	DOCUMENTATION
F	FREQUENCY
G	INSTRUMENTATION
H	TORPEDO
I	S.A.R.
J	HAZARD AREA
K	SHIP
L	BOAT
M	LAUNCH(ER)(ING)
N	PERSONNEL
O	TARGET
P	COMMUNICATIONS
Q	SCHEDULE(D)(S)
R	CONTROLLER
S	COMPUTER
T	OP CONDUCTOR
U	EQUIPMENT
V	DASH
W	RANGE SAFETY
X	DATA
Y	OPERATION
Z	RCO
1	SURVEILLANCE CENTER
2	RUG
3	AIR FIELD
4	NAFC
5	SURVEILLANCE ACFT
6	SATELLITE
9	PROJECT
0	

FOURTH AND FIFTH CHARACTER

CHAR	CHAR MEANING
AA	PRIOR TEST REQUIRED
AB	TO GO WITH ASSOC/PARENT OP THAT SCRUB/CANC, OP
AC	TO EXTEND OP
AD	TO RESKD OP
AE	TO RESKD UN/AT
AF	TO ADD OP
AG	FOR THE FOLLOWING REASON
AH	OBJECTIVE ACHIEVED ON PRIOR OP
AI	IMPROPER SUN ANGLE
AJ	UNABLE TO MEET RANGE TIME
AK	NON-RANGE FACILITIES NOT AVAIL
AL	REQUIRED ADDED RANGE RESOURCE NOT AVAIL
AM	DESTRUCT MISSILE
AN	LAUNCHER FAILURE
AO	MECHANICAL FAILURE
AP	NOT AVAILABLE
AQ	IN DOWN STATUS
AR	PERSONNEL NOT AVAILABLE
AS	TARGET NOT REQ'D
AT	NOT AVAIL DUE TO HIGHER PRIORITY COMMITMENT
AU	NO SHOW
AV	SYSTEM FAILURE
AW	HANG FIRE
AX	MISS-FIRE
AY	INTERCEPTED-DAMAGED TGT
AZ	FAILURE AFTER LAUNCH
BA	DID NOT ACHEIVE ORBIT
BB	FAILURE
BC	NOT REQUIRED
BD	RELINQUISH RANGE TIME OR RESOURCES TO HIGHER PRIORITY OP
BE	LIMITED FUEL ALLOCATION
BF	NO SECONDARY TGT ALLOCATION DUE TO PRIMARY TGT LOST
BG	NO TGT ALLOCATION
BH	CASUALTY
BI	ENGINEERING CASUALTY
BJ	INTERCEPTED - DESTROYED TGT
BK	TO EVALUATE DATA FROM PREVIOUS OP
BL	DAYLIGHT HOURS REQD
BM	UNABLE TO LOCATE FOR RECOVERY
BN	UNABLE TO LOCATE DUE TO DARKNESS
BO	DESTROYED BY MISSILE
BP	DAMAGED BY MISSILE, RECOVERED
BQ	IN-FLIGHT MALFUNCTION,
BR	NOT AT REQUIRED ALTITUDE

FOURTH AND FIFTH CHARACTER

CHAR	CHAR MEANING
BS	NOT AT REQUIRED SPEED
BT	NO FLARE IGNITION
BU	NO ENGINE START
BV	PREMATURE CHUTE
BW	RECOVERY CHUTE MALFUNCTION
BX	CRASHED DURING LAUNCH PHASE
BY	LAUNCH A/C NOT AVAIL
BZ	DESTROYED ON PREVIOUS OP
CA	AUGMENTATION FAILURE
CB	PINGER FAILURE
CC	OUT OF PARAMETERS
CD	RECOVERED
CE	LOST DURING RECOVERY
CF	DAMAGED DURING RECOVERY
CG	DAMAGED BY MISSILE NOT RECOVERED
CH	TOW A/C NOT AVAILABLE
CI	BALLISTIC WINDS
CJ	INSUFFICIENT SEA STATE
CK	INSUFFICIENT CLOUD COVERAGE
CL	RAIN CONDITION
CM	SEA STATE TOO HIGH
CN	VISIBILITY CONDITION
CO	WIND CONDITION
CQ	EXCESS CLOUD COVERAGE
CP	ELECTRICAL STORM
CR	RELINQUISHED TO AIRFIELD APPROACH CONTROL
CS	FOULED
CT	UNSCHEDULED RANGE CLOSURE
CU	PREDICTED WEATHER
CV	OIL ENROACHMENT
CW	LOGISTICS FLIGHT TO SNI DELAYED FOR WEATHER
CX	SECURITY
CY	SUPPORT - RANGE FAILURE
CZ	SUPPORT - RANGE RESOURCE NOT AVAIL
DA	HARDWARE
DB	INTERFERENCE
DC	AREA CLEARANCE NOT AVAIL
DD	POWER FAILURE
DE	RF FAILURE
DF	COMMAND CONTROL / DESTRUCT FAILURE
DG	MICROWAVE FAILURE
DH	NEGATIVE ACQUISITION
DI	DTS FAILURE
DJ	TERMINATED MISL FLIGHT

FOURTH AND FIFTH CHARACTER

CHAR	CHAR MEANING
DK	COMM FAILURE
DL	T/M FAILURE
DM	RADAR FAILURE
DN	BEACON FAILURE
DO	NOT COMPLETED
DP	SUSPENDED
DQ	ERROR
DR	NOT REQUESTED
DS	SOFTWARE
DT	PLOTBOARD FAILURE
DU	INSTRUMENTATION
DV	ITCS FAILURE
DW	EATS A/C EQUIP FAILURE
DX	EATS A/C NOT AVAIL
DY	EATS (MROC) FAILURE
DZ	TARGET NOT AVAIL.
EA	AIR FIELD OPERATING HOURS LIMITATIONS
EB	NOT READY
EC	FREEZING CONDITION
00	

SIXTH CHARACTER

CHAR	CHAR MEANING
F	FAIR-IMPROVEMENT REQUIRED
G	GOOD
H	EXCELLENT
I	GOOD-IMPROVEMENT REQUIRED
J	GOOD-CHAR 7 UNSATISFACTORY
K	FAIR-CHAR 7 UNSATISFACTORY
L	UNSATISFACTORY
0	

RANGE OPERATIONS AUTOMATED SCHEDULING AND INFORMATION SYSTEM (ROASIS)

AN OVERVIEW

1 NOVEMBER 1981

Prepared by _____
Tom Heurter
Mathematician

Reviewed by _____
Julian Tarleton
Supervisory, Mathematician

Approved by _____
Lloyd Hynds
Head, Data Processing Division

DATA PROCESSING DIVISION
RANGE INSTRUMENTATION SYSTEMS DEPARTMENT
PACIFIC MISSILE TEST CENTER
POINT MUGU, CALIFORNIA

I. EXECUTIVE SUMMARY

The Range Operations Automated Scheduling Information System (ROASIS) is a data entry and information retrieval system which is used in the preparation of weekly range utilization forecasts. The goals of the system are to:

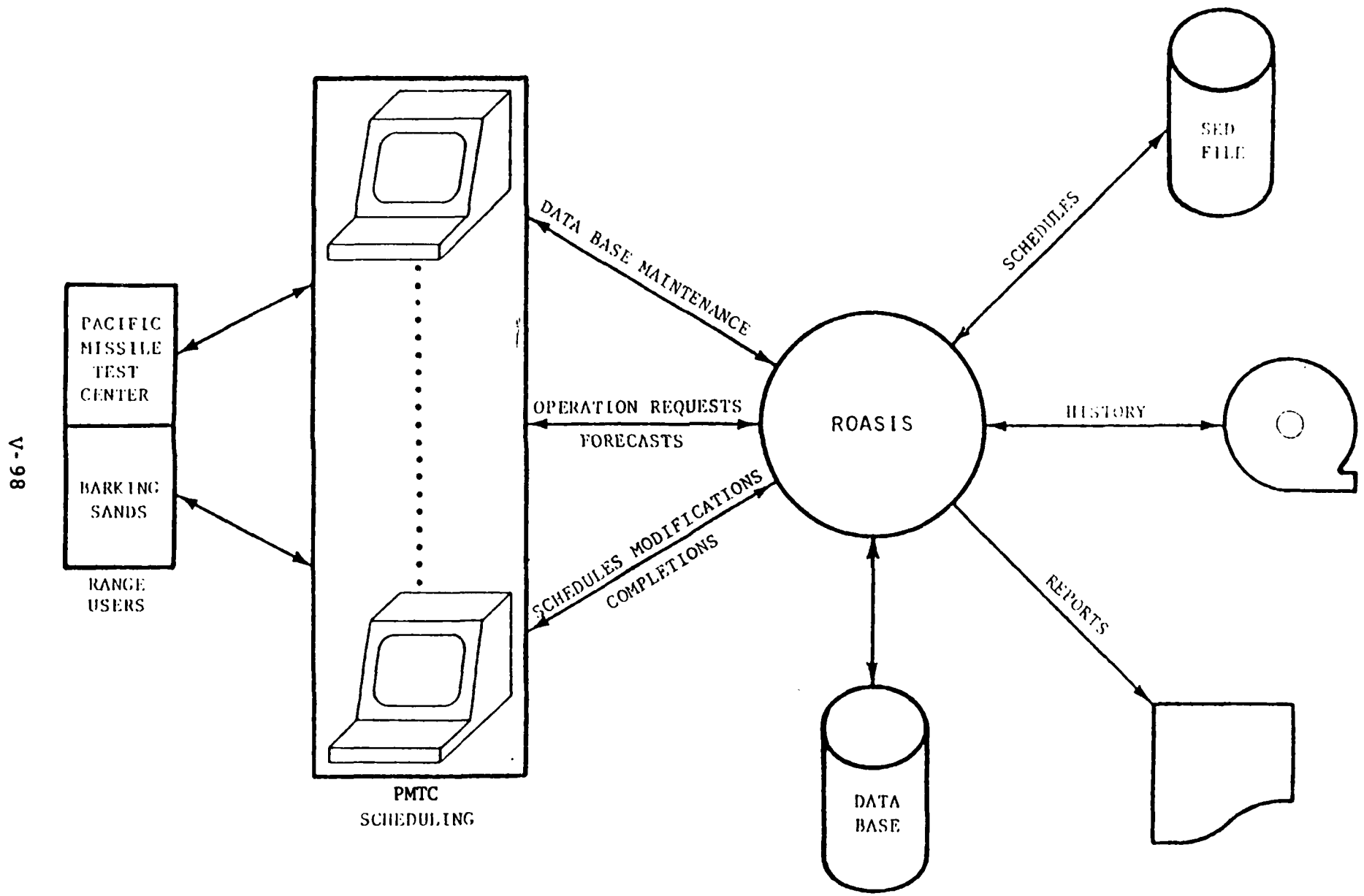
1. Provide an automated means of allocating and scheduling Pacific Missile Test Center (PMTC) resources in accordance with known priorities and in such a way as to optimize the use of resources and satisfy user requirements as near the time requested as possible;

2. Provide the necessary postoperational processing reports to enhance prudent decisions by management concerning operational priorities, procurement and personnel.

The Phase I implementation of ROASIS is a functional replacement of the Range Operations Control System (ROCS) which has been operational at PMTC since 1968. Cutover to ROASIS only operation was accomplished on October 1, 1981. Operations since then have proceeded normally and system enhancements are now being implemented to achieve the Phase II implementation of ROASIS. Phase II calls for fully automatic scheduling.

ROASIS is running on the CDC CYBER 175 computer located in building 53 at PMTC. As shown in the ROASIS OVERVIEW diagram, PMTC scheduling requests and Completed Operations data from Barking Sands, Hawaii, are entered in via on-line terminals. Summary reports are prepared for the Barking Sands data but scheduling is performed for the PMTC operations. Test Operations of a diverse nature are conducted for both military and civilian agencies, making for complex demands on range resources. ROASIS must schedule these tests in such a manner that the range resources are utilized economically and advantageously. Schedule Requests are entered into ROASIS by data entry personnel and schedulers via on-line terminals. These requests are compared to ROASIS Support Files to validate the requests, to locate scheduling conflicts, and to determine the costs entailed in resource utilization.

A Weekly Forecast is prepared and distributed to Program Managers, Range Users, Test Conductors, and Scheduling Officers. As the week progresses, modifications to the Weekly Forecast can be entered and updated Forecasts obtained. With the Phase I implementation of ROASIS, the actual schedule preparation is accomplished as it was with ROCS, ie. manually, with the resulting schedule entered into ROASIS. Many reports are available and are regularly produced and distributed. In addition reports of an adhoc nature can be obtained using the Query and Report Generation capabilities of the CYBER. Completed operations are automatically saved in a History File and these History Files are periodically transferred to magnetic tape for safekeeping.



ROASIS OVERVIEW

II. FUNCTIONAL DESCRIPTION

The heart of ROASIS is the CDC Data Management System (DMS-170). By building ROASIS upon DMS-170 several important benefits have been realized. The programming task has been lessened, the system life cycle lengthened, and capabilities such as on-line query of the data base are available. The ROASIS file network is depicted in the diagram ROASIS DATA-BASE OVERVIEW. In this diagram SKDINFO is a SUB-SCHEMA through which the data base is accessed. The SUPPORT FILES contain source information such as available range resources, utilization cost factors, completion codes, program information, etc. from which Schedule Request can draw information. The SCHEDULE files contain Daily Schedules and Weekly Forecasts. The COMPLETED OPS files contain historical information pertaining to completed operations for both PMTC and Barking Sands.

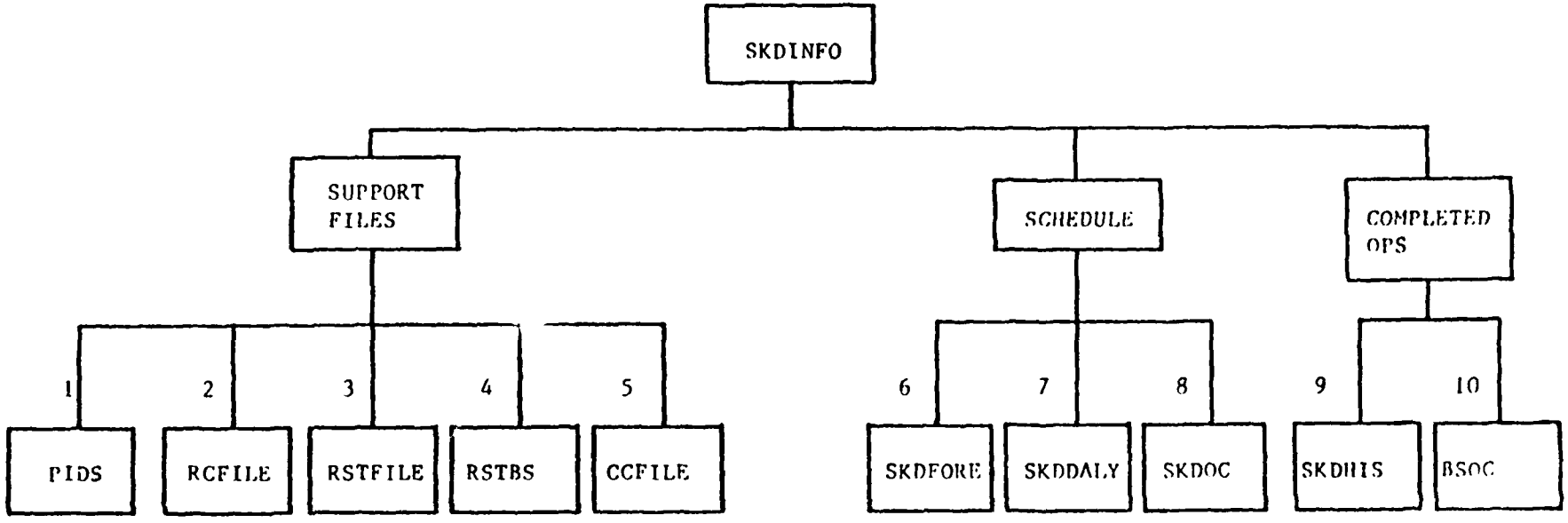
The attributes of PHASE I and II are detailed in the diagram ROASIS PHASES. Phase II contains all of the attributes of PHASE I except automatic scheduling is performed. Automatic Scheduling is a highly desirable feature in that the scheduling task is very time consuming and requires skilled and experienced schedulers. It is doubtful, however, that the scheduling function can be completely automated due to the need for mature judgements based on sometimes intangible, unprogrammable factors. The real goal of Phase II is therefore to assist the scheduler to a much higher degree than in Phase I but to leave final scheduling authority to them.

An important area in which the computer will play a role in Phase II is in the location of Scheduling Conflicts. In Phase I it is the responsibility of the Scheduler to notice conflicts and to resolve them. The computer can be very helpful in this task by determining a tentative schedule and highlighting any conflicts. The Scheduler can then resolve these conflict by entering into ROASIS changed requests; ROASIS will then generate a new schedule and highlight remaining conflicts. This iterative process is performed until an acceptable schedule is obtained. Closely related to this is the Phase II capability to perform on-line rescheduling. Rescheduling is frequently necessary for many reasons and must be quickly and easily accomplished.

A Configuration Management Plan is being defined for ROASIS to ensure that a formal procedure is implemented to manage changes to ROASIS that may become necessary as experience dictates. The Configuration Management Program will provide ROASIS users a means to report incidents to a Change Control Board (CCB). The form in the diagram ROASIS INCIDENT REPORT is used for this purpose. The CCB will consist of a small group of formally appointed individuals from various areas of the ROASIS community. Among them will be users, system developers, and documentation specialists. The CCB will consider the incident reports and will decide upon appropriate responses. In some cases actual errors may be uncovered calling for program modifications; in other cases system enhancements may be desirable or no action may be required. In each case an appropriate response is necessary. In those cases where system modification is decided upon, the modifications must be monitored for completion and validation.

A Training Program is being developed for the ROASIS community. Data entry personnel, schedulers, users, and administrators must each be adequately informed of ROASIS capabilities, protocols, and usage inorder for ROASIS to realize its potential to schedule range operations so that range resources are used to best advantage.

ROASIS DATA BASE OVERVIEW
AS DEFINED WITHIN DMS-170
(DATA BASE MANAGEMENT SYSTEM)



FILE DESCRIPTIONS.

1.	PIDS	Program information data systems.
2.	RCFILE	List of PMTC resource capabilities.
3.	RSTFILE	Test Conductor Resource Plans.
4.	RSTBS	Resource file for Barking Sands.
5.	CCFILE	Completion Codes.
6.	SKDFORE	Forecast for following week.
7.	SKDDALY	Schedule for current week.
8.	SKDOC	OPs Completed for current week.
9.	SKDHIS	OPs Completed > 1 week <= 3 months.
10.	BSOC	Barking Sands OPs Completed.

SIGNIFICANT OUTPUTS:

1.	PIDS	PIDLIST
2.	RCFILE	RCLIST
3.	RSTFILE	RSTLIST
5.	SKDFORE	DAILY/WEEKLY BASIC FORMAT (SKDDW)
6.	SKDDALY	STRIP CHARTS
	SKDDALY	TTY
7.	SKDOC	DAILY RESUME
	SKDOC	COST REPORT
	SKDOC	WEEKLY RESUME
8.	SKDHIS	MONTHLY RESUME
		QUARTERLY RESUME
		RANGE HOURS MISSILES SUMMARY

PHASE I

1. On-line multi-user data entry and information retrieval
2. On-line data base with High Order Language (COBOL)
3. On-line testing and validation
4. Cost reports
5. Summaries
   - Weekly
   - Monthly
   - Quarterly
   - Range-Hours-Missiles
6. Large on-line storage capacity
7. Manual Scheduling

PHASE I +

1. Conflict Resolution
2. Automatic Scheduling/on-line rescheduling
3. Preoperational cost estimates
4. Increased reporting capability
5. Analysis of ROCS historical information
6. Configuration Management Program
7. Training Program

PHASE II

ROASIS PHASES

ROASIS INCIDENT REPORT		
PART I		
DATE:	TIME:	RIR#:
REPORTED BY:	ORGANIZATION:	PHONE:

PROBLEM AREA:	PROBLEM SERIOUSNESS:
HARDWARE	HIGH
SOFTWARE	MEDIUM
DOCUMENTATION	LOW

INCIDENT DESCRIPTION:

RECOMMENDATIONS:

PART II

ANALYSIS/CORRECTIVE ACTION:

DISPOSITION:

NAR DTF SCN# CR#

DOCUMENTS AFFECTED:

III. REPORTS

The following reports are programmed to satisfy well defined needs and are run at appropriate times and distributed to their target audience. Other reporting capability of an adhoc nature is available with the CYBER Query programs to answer varying and less well defined needs.

1. Program Information Data System (PIDLIST)

This report contains information about each individual test program at PMTC. The information provided includes a unique Program Identification Code Number (PICN), security classification, objectives, the Range Task Manager, the support ranges required, general comments, and other program identifying information. There are approximately 200 test programs currently ongoing at PMTC.

2. Resource Identification Table (RCLIST)

This report lists resources that can be scheduled for test operations, their set-up costs and cost per hour of utilization, their status, and resource descriptions. These resources are used by the Test Conductor in establishing Resource Plans.

3. Requirements For Scheduled Tests (RSTLIST)

This is a report of the Resource Plans of which there are about 500 currently on file. A Resource Plan contains the resources required to support particular types of operations. Other information such as preferred altitudes, required altitude separation, etc. are also specified in Resource Plans.

4. Daily Resume

This report lists the operations completed on a specified date along with pertinent facts such as Completion Codes with code definition, time of day, launch data, the Operation Conductor, and other information. The Daily Resume is distributed to Program Managers, Test Conductors, and Scheduling Officers.

5. PMTC Schedule of Operations (Daily and Weekly)

This is a report of the operations that are currently scheduled. A Daily Schedule can be obtained any time during the week and contains the most up-to-date schedule. The Weekly Schedule is produced once per week and contains the schedule for the following week. Included in the report are the requirements for each operation. PMTC currently conducts an average of 40 operations per day or 200 operations per week.

6. Weekly and Monthly Summaries

These summaries present statistical data which is organized according to several criteria giving a number of reports, each similar in format but different in viewpoint. For example there are similar reports for PMTC and Barking Sands test data. Only a few of these reports are included in this OVERVIEW.

7. Range Hours/Missile Summary

This report is produced monthly and quarterly for both PMTC and Barking Sands and shows Range utilization statistical data by user for missile tests.

8. Standard Cost Report

The Standard Cost Report is produced for specified days and shows the actual cost factors for each operation conducted.

PROGRAMS INFORMATION DATA SYSTEM (PIDS)

PROG NAME=NASA, GENERAL

PROG DESCRIPTION=NO DOCUMENTATION. SUPPORT PROVIDED TO NASA SPONSORED PROGRAMS ON A ONE TIME BASIS. GENERALLY RESTRICTED TO OPERATIONS REQUIRING LITTLE OR NO INSTRUMENTATION.

OBJECTIVE=

PROG CHARACTER=

PROG ASSN AUTH=BASIC MISSION

RNG USER PROJ AUTH=
1.
2.

LEAD [illegible] SUPPORT RNG=

PROG SECURITY CLASS=UNCLAS

RNG READINESS DATE=

FLT [illegible] COMP DATE=INDEF PROG STATUS=ACTIVE

RNG TASK MGR=ZEHMER, C. L. CODE=3200-3

DOCUMENTATION=PI DATE= REV.DATE/NO= / RSC DATE= REV.DATE/NO= /
PR DATE= REV.DATE/NO= / PSP DATE= REV.DATE/NO= /
OR DATE= REV.DATE/NO= / OD DATE= REV.DATE/NO= /

SUPERSEDE FL PROG= - MAJOR RANGE AREA=PT MUGU

	CURRENT QTR			REMAINDER THIS CALENDAR YEAR			FORECAST NEXT CALENDAR YEAR				SECOND CALENDAR YEAR			
LAUNCHES	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR	QTR
PUBLIC SALES														
RANGE SALES														
SUPPORTS														
PUBLIC SALES														
RANGE SALES														

DATA [illegible] BY=

APPROVED BY=

PIDS [illegible] BY=L. YATES

DATA [illegible] BY=J. DUBSKY

DATE [illegible]=STANDARD

DURATION=

RESOURCE IDENTIFICATION TABLE

CATEGORY	FUNCTION	CODE NO./SITE	DESCRIPTION	SET-UP QTR/HR	SET-UP COST ($)	COST PER HOUR OF RNG TIME	COST PER OP ($)	STATUS	HOLDING ACCOUNT NUMBER
CS	COMM	OLA000	SPECIFIC L.P. COMMAND CONTROL/DESTRUCT(1KW)		000	000	000	UP	
CS	COMM	OL8301	LAGUNA PEAK COMMAND CONTROL/DESTRUCT SITE(10KW)		000	000	000	UP	
CS	COMM	OLHA	LAGUNA PEAK COMM CONTROL AND TRANSMISSION		000	000	000	UP	
CS	COMM	OLH9	LAGUNA PEAK RF TRANSMITTER/RECEIVER FACILITY		000	000	000	UP	
CS	COMM	158A	SANTA CRUZ IS COMM CONTROL AND TRANSMISSION		000	000	000	UP	
CS	COMM	158B	SANTA CRUZ IS RF TRANSMITTER/RECEIVER FACILITY		000	000	000	UP	
CS	COMM	146A	SAN CLEMENTE ISLAND COMM CONTROL & TRANSMISSION		000	000	000		
CS	COMM	146B	SAN CLEMENTE ISLAND RF TRANSMITTER/RECEIVER FAC		000	000	000		
CS	COMM	CS-1	MUGU COMM CONTROL + TRANSMISSION		079	079	000		
CS	COMM	CS-2	CS-1 PLUS ONE RF SITE		118	118	000		
CS	COMM	CS-3	CS-2 PLUS ONE ADDITIONAL RF SITE		158	158	000		
CS	COMM	CS-4	CS-3 PLUS ONE RF SITE		197	197	000		
CS	COMM	CS-5	CS-3 PLUS TWO RF SITES		224	224	000		
CS	COMM	CS-6	CS-3 PLUS THREE RF SITES		263	263	000		
CS	COMM	CS-7	CS-3 PLUS FOUR RF SITES		303	303	000		
CS	COMM	CS-8	CS-3 + 3 RF, 1 COMMAND CONTROL/DESTRUCT OR ITCS		329	329	000		
CS	COMM	CS-9	CS-3 + 3 RF, 2 COMMAND CONTROL/DESTRUCT OR ITCS		369	369	000		
CS	COMM	CS-A	MUGU COMM CONTROL		013	013	000		
CS	COMM	CS-B	MUGU, SNI, SCI COMM CONTROL AND TRANSMISSION		158	158	000		
CS	COMM	CS-S	LIMITED COMM SUPPORT-RADAR		039	039	000		
CS	COMM	CS10	CS-3+4RF,2 COMM CONTROL/DESTRUCT OR ITCS/LINK11		395	395	000		
CS	COMM	CS2A	CS-1 PLUS ONE COMMAND CONTROL/DESTRUCT		118	118	000		
CS	COMM	CS2B	CS-1 PLUS NIDS LINK-11		118	118	000		
CS	COMM	CS2C	CS-1 PLUS SCI COMM CONTROL AND TRANSMISSION		118	118	000		
CS	COMM	CS2D	CS-1 PLUS ITCS		118	118	000		
CS	COMM	CS3A	CS-2 PLUS NIDS LINK-11		158	158	000		
CS	COMM	CS3B	CS-2 PLUS ITCS		158	158	000		

CATEGORY	FUNCTION CODE NO./SITE	DESCRIPTION	SET-UP QTR/HR	SET-UP COST ($)	COST PER HOUR OF RNG TIME	COST PER UP (%)	STATUS	HOLDING ACCOUNT NUMBER
IN	PLOT 0064-2	ANY TWO PLOTTING BOARD	01	038	040	000	UP	
IN	PLOT 0064-3	ANY THREE PLOTTING BOARD	02	057	060	000	UP	
IN	PLOT 0064-4	ANY FOUR PLOTTING BOARD	02	076	080	000	UP	
IN	PLOT 0064-5	ANY FIVE PLOTTING BOARD	03	095	100	000	UP	
IN	PLOT 0064-6	ANY SIX PLOTTING BOARD	03	114	120	000	UP	
IN	PLOT 0064-7	ANY SEVEN PLOTTING BOARD	03	133	140	000	UP	
IN	PLOT 0064-8	ANY EIGHT PLOTTING BOARD	04	152	160	000	UP	
IN	PLOT 0064-9	ANY NINE PLOTTING BOARD	04	171	180	000	UP	
IN	PLOT ALPHA	TRACK AND CONTROL ROOM-ALPHA		000	000	000		
IN	PLOT BRAVO	TRACK AND CONTROL ROOM-BRAVO		000	000	000		
IN	PLOT CHARLIE	TRACK AND CONTROL ROOM-CHARLIE		000	000	000		
IN	PLOT DELTA	TRACK AND CONTROL ROOM-DELTA		000	000	000		
IN	PLOT ECHO	TRACK AND CONTROL ROOM-ECHO		000	000	000		
IN	PLOT T&C REQD	REQUIRE T & C ROOM		000	000	000		
IN	R/D 0066	RADAR RTRDS		030	000	000	UP	
IN	R/D 006D	ANALOG RADAR DISPLAY		000	000	000	UP	
IN	R/D 006F	ROCC LARGE SCREEN DISPLAY(MODS)	04	063	037	000	UP	
IN	R/D 006F	ROCC CONSOLE DISPLAY SYSTEM(MODS)	04	063	037	000	UP	
IN	R/D 006T	TM RTRDS		000	000	000	UP	
IN	R/D 006M	TM MODEM RTMDS		000	000	000	UP	
IN	R/D 00F1	T&C ROOM ANALOG TM METER DISPLAY		000	000	000	UP	
IN	RADAR 0030-1	ANY ONE MODU FPS-16		000	000	000		
IN	RADAR 0030-2	ANY TWO MODU FPS-16		000	000	000		
IN	RADAR 0030-3	ANY THREE MODU FPS-16		000	000	000		
IN	RADAR 0030-4	ANY FOUR MODU FPS-16		000	000	000		
IN	RADAR 003001	SPECIFIC MODU FPS-16	02	066	080	000	UP	
IN	RADAR 003002	SPECIFIC MODU FPS-16	02	066	080	000	UP	

REQUIREMENTS FOR SCHEDULED TEST (LAST UPDATE = 29 JUL 81) PAGE 1

PROGRAM NAME: SPARROW AIM-7M DTE | TYPE TEST: C/F | TEST IDENTIFICATION:

VARIATION DESCRIPTION: 3 PLANE CAPTIVE | LEAD RANGE: PMTC | SPONSORING AGENCY: NAVY

RSA NO: N/A | RSOP NO: N/A | ESA-NO: N/A | OD NO: N/A | OTHER RNG(S) OD:

OP PREFERRED ALT=5-60K K, MIN.-MAX. ACCEPTABLE ALT=5-65K K

OP ALT= K, CAN NON-FIRING BE SKED ABOVE 7=NO IF YES, ALT SEPARATION OF K REQUIRED.

RESOURCE GROUP	OPTION	ALTITUDE	SPECIAL SET-UP DTN-HR	RESOURCE DESCRIPTION
SA	1			W-289 SUB-AREA - PMTC
SB	1			W-289 SUB-AREA - PMTC
SD	1			W-289 SUB-AREA - PMTC
SF		2		W-289 SUB-AREA - PMTC
SA	1	2		W-289 SUB-AREA - PMTC
SB	1	2		W-289 SUB-AREA - PMTC
SA		2		W-289 SUB-AREA - PMTC
SB		2		W-289 SUB-AREA - PMTC
SD		2		AREA 60 - PMTC
SL	1			L-289 SUB-AREA - PMTC
[illegible]	1	2		TR/TV MICROWAVE SNI TO MUGU
[illegible]	1	2		TR/TV MICROWAVE LAGUNA PEAK TO MUGU
CS-A	1	2		CS-B PLUS THREE RF SITES
MUGU	1	2		MUGU FREQUENCY MONITORING SITE
SNI	1	2		SNI FREQUENCY MONITORING SITE
TSG_APLP	1	2		TIMING
CBDC-S	1	2		3-"C" BAND BEACON(PMTC MAINTAINED/INSTALLED)
UHF-C	1	2		300-3000 MHZ
ICC	1	2		MUGU INSTRUMENTATION CONTROL CENTER
RCO	1	2		MUGU RANGE CONTROL OFFICER
SKED	1	2		MUGU RANGE SCHEDULING OFFICE
SNI-ALL	1	2		SNI-ALLOWANCE
GEO-GEN	1	2		GEOPHYSICS GENERAL
MSSR-S	1			ANY THREE MUGU RADAR
MDBP	1	2		MUGU RANGE TIMING
PDP4-S	1	2		ANY THREE PLOTTING BOARD

PIC NUMBER: V125U100708 PROGRAM NAME: SPARROW AIM-7M DTE TYPE TEST: C/F TEST IDENTIFICATION:

TYPE RESOURCE	RESOURCE CODE	OPTION	ALTITUDE	SPECIAL SET-UP QTR-HR	RESOURCE DESCRIPTION
TM	0066	1 2			RADAR RTRDS
TM	0072-4	1 2			ANY FOUR MUGU TM SEPARATION & DISPLAY STATIONS
TM	0075-2	1 2			ANY TWO MUGU TM RECEIVER SYS
TM	0076-2	1 2			ANY TWO MUGU TM TAPE STATION
TM	0078-2	1 2			ANY TWO MUGU GKR MEDIUM GAIN ANTENNA
TM	007K	1 2			MUGU TM RETRANSMISSION RECEIVER SYSTEM
TM	007P	1 2			MUGU PROCESSING SYSTEM
TM	007U	1 2			MUGU TM USER DISPLAY PROCESSING SYSTEM
TM	0090-1	1 2			ANY ONE MUGU UNIVAC 1230 COMPUTER
TM	009L	1 2			REALTIME COMPUTER RADAR DATA REDUCTION
TM	013X-3	2			ANY THREE SNI RADAR
TM	0160	1 2			SNI TIMING
TM	0175-2	1 2			ANY TWO SNI TM RECEIVER
TM	0176-2	1 2			ANY TWO SNI TM TAPE STATION
TM	0178-2	1 2			ANY TWO SNI GKR MEDIUM GAIN ANTENNA
TM	017T	1 2			SNI TM RETRANSMISSION, TRANSMIT
TM	0L75-1	1 2			ANY ONE LAGUNA PEAK TM RECEIVER SYS
TM	0L76-1	1 2			ANY ONE LAGUNA PEAK TM TAPE STATIONS
TM	0L7E-1	1 2			ANY ONE LAGUNA PEAK GKR LOW GAIN ANTENNA
TM	0L7T	1 2			L.P. TM RETRANSMISSION, TRANSMIT
SV	SRV2	1 2			SURV RADAR SYS REQUIRED BY PLEAD CONTROL

JO= 1N33CH1R

REMARKS =

COMMENTS=ACFT, TM FREQ, & SED NBR TO BE INPUT AT SKED TIME.

RDJ=MASON OC=JOHNSON/BRITTAN

DAILY OPERATIONS RESUME POINT MUGU AREA FOR TUESDAY 03NOV81 PAGE 01

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
1402	6610721200	0800-1400	1545	02NOV 3PAA000	KAISER	00	00	01

RESULT * * * CANCELLED * PROJECT * AIRCRAFT * IN DOWN STATUS * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
3035	V900200040A	1115-1400	1545	02NOV 3P9AA00	CHRISTENSEN	01	00	01

RESULT * * * CANCELLED * PROJECT * PROJECT * PRIOR TEST REQUIRED * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
8054	V0211200040A	0800-0900	0900	03NOV 2PAAU00	RNG SURV OFF	00	00	01

RESULT * * * SCHEDULED * PROJECT * AIRCRAFT * NO SHOW * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
8055	V0211200040A	1130-1230	1230	03NOV 1E00000	RNG SURV OFF	00	00	01

RESULT * * * COMPLETED * SATISFACTORY * * * * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
8067	V0211200040A	1030-1130	1130	03NOV 1E00000	RNG SURV OFF	00	00	01

RESULT * * * COMPLETED * SATISFACTORY * * * * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
8084	V020820030A	1130-1330	1609	02NOV 3PU8000	RANGE SURV OFF	00	00	01

RESULT * * * CANCELLED * PROJECT * EQUIPMENT * FAILURE * * *
COMMENTS *

OP NO	PIC NO	SKD TIME	REL TIME / DATE	RESULT	OP CONDUCTOR	MSLS SKD	MSLS LCHD	TIMES SKD
8095	V737033590B	1100-1330	1609	02NOV 3PYA800	VALENCIA	00	00	01

/S T [illegible] TABLE (BANNED)
RESULT * * * CANCELLED * PROJECT * OPERATION * TO GO WITH ASSOC/PARENT OP THAT SCRUB/CANC, OP * * *
COMMENTS *

DAILY VOLUME

6157 01 NAVY,OPTEVFOR,GENERAL M/F PAC=F18 TGT= RA= SO= RAC= RBT=
(TMA) F18
TIME=0900-1000 RSA=N/A F4
RST=NF-53-81 ESA=N/A TA4
IP=N/A MSUP=N/A PSH= PRT=
PIC=V020820070 OP=1 JO=2
A/O= P/O= MSL=00 OD=N/A RSH=
OC=JOHNSON/BRITIAN RUS=MASUN M5
INTER-RNG DESIG= 90
GEN=RCO SKED SNI=ALW
GFU=GEO-GEN OVERALL ALT=7=40K
FR=265.3 270.5

CS=CS-2
SV=SRV2
ARM=WILL ACCEPT 3A,B,D

6166 01 FLT AIR WPNS ASM EASTPAC A/L PAC=A7E=4 TGT=SMI TGT RA= SO=V8=41 RAC= RBT=
BOMB DROP 83=2
TIME=0900-1000 RSA=941
RST=AL-11-81 ESA=N/A
IP=N/A MSUP=N/A PSH= PRT=
PIC=V112A92658 OP=2 JO=2327DA01
A/O=6171 P/O= MSL=12 OD=V1124 RSH=
OC=FLEET BRANCH RUS=FLEET BRANCH W412 O=3K
INTER-RNG DESIG= W289N
GEN=RCO SKED 3F
OVERALL ALT=0=10K
FR=280.7

RM=3F INSIDE ADIZ.
ARM=V3-41 BOMBEX

PMTC RANGE OPS SUMMARY BY CATEGORY WITHIN AGENCY
FOR 02 MAY 77 – 08 MAY 77
POINT MUGU AREA

SECTION 1 – US NAVY (LESS FLEET) (PIC = V -------- 30)

	OPERATIONS					SCRUB DISTRIBUTION				CANC DISTRIBUTION				PCT OF TOTAL OPS			
**LAUNCH OPS	SKED	COMP	SCRUB	CANC	W/L	PROJ	RNG	TGT	WX	PROJ	RNG	TGT	WX	COMP	SCRUB	CANC	W/L
A. AIR TO AIR	4		1	3	1	1				3					25.0	75.0	25.0
B. AIR TO SURFACE																	
C. SURFACE TO SURFACE																	
D. SURFACE TO AIR	12	4	4	4	8	2	2			4				33.3	33.3	33.3	66.6
E. SATELLITES																	
F. PROBES																	
G. SUB-SURFACE																	
H. TARGETS	8	3	3	2	6	2	1			2				37.5	37.5	25.0	75.0
**TOTAL LAUNCHES	24	7	8	9	15	5	3			9				29.1	33.3	37.5	62.5
**TOTAL SUPPORTS	86	38	10	38	48	9	1			35	1		2	44.1	11.6	44.1	55.8
**TOTAL OPERATIONS	110	45	18	47	63	14	4			44	1		2	40.9	16.3	42.7	57.2

SECTION 2 – US NAVY FLEET (PIC = V -------- 65; 69)

	OPERATIONS					SCRUB DISTRIBUTION				CANC DISTRIBUTION				PCT OF TOTAL OPS			
**LAUNCH OPS	SKED	COMP	SCRUB	CANC	W/L	PROJ	RNG	TGT	WX	PROJ	RNG	TGT	WX	COMP	SCRUB	CANC	W/L
A. AIR TO AIR	2	2			2									100.0			100.0
B. AIR TO SURFACE	2	1		1	1					1				50.0		50.0	50.0
C. SURFACE TO SURFACE																	
D. SURFACE TO AIR	10	4	2	4	6	1		1		4				40.0	20.0	40.0	60.0
E. SATELLITES																	
F. PROBES																	
G. SUB-SURFACE																	
H. TARGETS	4	3		1	3					1				75.0		25.0	75.0
**TOTAL LAUNCHES	18	10	2	6	12	1		1		6				55.5	11.1	33.3	66.6
**TOTAL SUPPORTS	19	18		1	18					1				94.7		5.2	94.7
**TOTAL OPERATIONS	37	28	2	7	30	1		1		7				75.6	5.4	18.9	81.0

(CONTINUE THROUGH SECTION 15)

PMTC RANGE OPS SUMMARY BY CATEGORY WITHIN AGENCY
FOR 02 MAY 77 – 08 MAY 77
HAWAIIAN AREA

SECTION 3 – US MARINES (PIC = V -------- 90)

**LAUNCH OPS	OPERATIONS SKED	COMP	SCRUB	CANC	W/L	SCRUB DISTRIBUTION PROJ	RNG	TGT	WX	CANC DISTRIBUTION PROJ	RNG	TGT	WX	PCT OF TOTAL OPS COMP	SCRUB	CANC	W/L
A. AIR TO AIR	8	5		3	5					3				62.5		37.5	62.5
B. AIR TO SURFACE																	
C. SURFACE TO SURFACE																	
D. SURFACE TO AIR																	
E. SATELLITES																	
F. PROBES																	
G. SUB-SURFACE																	
H. TARGETS																	
**TOTAL LAUNCHES	8	5		3	5					3				62.5		37.5	62.5
**TOTAL SUPPORTS	41	21	4	16	25	4				12			4	51.2	9.7	39.0	60.9
**TOTAL OPERATIONS	49	26	4	19	30	4				15			4	53.0	8.1	38.7	61.2

SECTION 4 – PMTC SUPPORT EFFORT (PIC = MO---------)

**LAUNCH OPS	OPERATIONS SKED	COMP	SCRUB	CANC	W/L	SCRUB DISTRIBUTION PROJ	RNG	TGT	WX	CANC DISTRIBUTION PROJ	RNG	TGT	WX	PCT OF TOTAL OPS COMP	SCRUB	CANC	W/L
A. AIR TO AIR																	
B AIR TO SURFACE																	
C. SURFACE TO SURFACE																	
D. SURFACE TO AIR																	
E. SATELLITES																	
F. PROBES	8	5	1	2	6		1				2			62.5	12.5	25.0	75.0
G SUB-SURFACE																	
H. TARGETS																	
**TOTAL LAUNCHES	8	5	1	2	6		1				2			62.5	12.5	25.0	75.0
**TOTAL SUPPORTS	55	42	10	3	52	6	4			3				76.3	18.1	5.4	94.5
**TOTAL OPERATIONS	63	47	11	5	58	6	5			3	2			74.6	17.4	7.9	92.0

(INCLUDE SECTIONS 1 THROUGH 15)

PMTC OPERATIONS SUMMARY BY PROJECT WITHIN MAJOR AREA
FOR 01 JUL 77 – 31 JUL 77
SUPPORT OPERATIONS

HAWAIIAN AREA

PROJECT (PIC ORDER)		OPERATIONS SKED	COMP	SCRUB	CANC	WK/LD	SCRUB DISTRIBUTION PROJ	RNG	TGT	WX	CANC DISTRIBUTION PROJ	RNG	TGT	WX	PERCENT OF TOTAL OPS COMP	SCRUB	CANC	WK/LD
SKOL E410640000	M/S	1	1	0	0	1	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
OPERATIONAL RANGE SUPRT M030024400 SAR	M/F	1	1	0	0	1	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
OPERATIONAL RANGE SUPRT M030040000	M/S	1	1	0	0	1	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
RANGE CONTROL M033028000 ACFT SURVEILLANCE FLT	M/F	31	22	2	7	24	1	1	0	0	5	2	0	0	71.0	6.5	22.6	77.4
RANGE CONTROL M033047000 AREA SURVEILLANCE	M/S	21	21	0	0	21	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
AREA CONTROL SHIP M033148000 EXERCISE	M/S	16	10	1	5	11	1	0	0	0	5	0	0	0	62.5	6.3	31.3	68.8
AREA CONTROL PLANE M033222400 EXERCISE	M/F	24	22	2	0	24	2	0	0	0	0	0	0	0	91.7	8.3	.0	100.0
DEEP SUBMERGE SUPPT(HAW) M050540000	M/S	5	0	0	5	0	0	0	0	0	5	0	0	0	.0	.0	100.0	.0
BSURE M054040000	M/S	6	5	0	1	5	0	0	0	0	1	0	0	0	83.3	0	16.7	83.3
SYS, EQUIP EVAL,CAL,ACCPT M070040600 ACCEPT TEST	M/S	5	5	0	0	5	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
SYS, PERF ANAL (RIPE) M071044300 RADAR CALIB CK	M/S	6	6	0	0	6	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
EDA M415126100 BALLOON TRK FLT	M/F	12	9	1	2	10	0	1	0	0	0	2	0	0	75.0	8.3	16.7	83.3
EDA M415144600 ORDNANCE LOADOUT	M/S	1	1	0	0	1	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
ARMY SAMEX B146444600 ORDNANCE LOADOUT	M/S	2	1	1	0	2	1	0	0	0	0	0	0	0	50.00	50.0	.0	100.0
ARMY READIEX (EDRE) R835640000	M/S	4	4	0	0	4	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
ARMY READIEX (EDRE) R835645000 TARGET	M/S	1	1	0	0	1	0	0	0	0	0	0	0	0	100.0	.0	.0	100.0
AREA TOTALS																		

MONTHLY SUMMARY

PMTC SUMMARY OF OPERATIONS BY AGENCY
FOR 01 APR 78 – 30 APR 78
HAWAIIAN AREA TOTAL OPERATIONS

	OPERATIONS					SCRUB DISTRIBUTION				CANC DISTRIBUTION				PCT OF TOTAL OPS			
	SKED	COMP	SCRUB	CANC	W/L	PROJ	RNG	TGT	WX	PROJ	RNG	TGT	WX	COMP	SCRUB	CANC	W/L
US NAVY – (OTHER)	363	189	32	142	221	22	3		7	130			12	52.0	8.8	39.1	60.8
US NAVY – SED	596	489	70	37	559	56	2	4	8	31			6	82.0	11.7	6.2	93.7
US NAVY – T&E TGTS	97	64	29	4	93	27			2	4				65.9	29.8	4.1	95.8
US NAVY – OPNL TGTS	229	200	12	17	212	5	6		1	13	4			87.3	5.2	7.4	92.5
US NAVY – COMOPTEVFOR	126	99	8	19	107	4	1		3	17			2	78.5	6.3	15.0	84.9
US NAVY – NAV LAB																	
US NAVY – FLEET																	
US NAVY – FLEET TGTS																	
US MARINES																	
PMTC SUPPORT EFFORT																	
US AIR FORCE																	
US ARMY																	
NASA																	
DOE																	
OTHER DOD AGENCIES																	
TOTAL OPERATIONS	1411	1041	151	219	1192	114	12	4	21	195	4		20	73.7	10.7	15.6	84.4

RANGE HOURS/MISSILES SUMMARY
POINT MUGU BY USER FOR
01 MAR 78 – 31 MAR 78

PAGE 1

P I C 1 2345678 90	PROGRAM DESCRIPTION	HOURS SKED	HOURS USED	MSL REQD	MSL LCHD	MSL AVG	OPS SKED	NUMBER COMPLETED IE	IS	ID	IU	OPS SCRUB	OPS CANC	WORK LOAD
F 0201200 00	AIRFORCE, GENERAL	25	19				12	7				3	2	10
281 00		69	46				28	18				1	9	19
M 4151B28 00	EDA	14	4	7*	1*	1.00	7	1*	*	*	*	1	5	2
B30 00		36	29	26*	19*	1.58	16	8*	2*	*	2*	3	1	15
261 00		7	2				7	2					5	2
00	TOTAL	1,304	1,096	43*	24*	1.41	255	179	2		2	17	55	200
V 0204A91 30	NAVY, GENERAL	13	13	198	1		2	1				1		2
B95 30		17	17	1	1		1	1						1
V 9013100 30	V9013	12					5						5	
30	TOTAL	1,099	1,001	*	*		111	83				7	21	90
V 1107100 40	SHRIKE	2	2				1	1						1
V 1221A00 40	AIM-7F GLAT	17	2	15*	1*	1.00	8	1*	*	*	*		7	1

RANGE HOURS/MISSILES SUMMARY
POINT MUGU BY USER FOR
01 MAR 78 – 31 MAR 78

PAGE 2

P I C 1 2345678 90	PROGRAM DESCRIPTION	HOURS SKED	HOURS USED	MSL REQD	MSL LCHD	MSL AVG	OPS SKED	NUMBER COMPLETED IE	IS	ID	IU	OPS SCRUB	OPS CANC	WORK LOAD
V 6185A91 40	EJECTABLE C/M D TESTS	4		198			2						2	
40	TOTAL	318	116	29*	4*	1.00	125	30	4		1	24	66	59
V 6355B00 49	MQM-107 (T&E)	2		1*	*		1	*	*	*	*		1	
V 6359200 49	G P TOW TGT (TDU-34A)	8	4				5	2				1	2	3
49	TOTAL	107	48	14*	3*	1.00	42	16	1		1	3	21	21
V 6307B00 59	BQM-34A (OPNL)	46	15	40*	5*	1.00	20	4*	*	*	1*	3	12	8
V 7378400 59	DD/DE SHIP TARGET (OPNL)	125	65				27	13				2	12	15
412 59		27	17				15	10					5	10
59	TOTAL	489	253	62*	7*	1.00	121	48			1	17	55	66
V 0211200 90	MARINE CORPS GENERAL	49	43				31	19				9	3	28
90	TOTAL	49	43	*	*		31	19				9	3	28
	AREA TOTAL	3,980	2,962	293*	70*	1.45	882	468	7		6	105	296	586

*HOT MISSILE FIRINGS

Range Hours/Missile Summary for Point Mugu Area.

STANDARD COSTS BY OPERATION NBR

03 AUG 81

BILL TO JO-1NG241AR

OP NBR -3364 OP WINDOW: 0600-1000 PROG DESC-MARINE TARGET M/F TRANSIT

A/O NBR-3217 PIC NO. VT37226059 OPTION-01 COMPLETION CODE-1E00000
P/O NBR-0150

RESOURCE	HOLDING ACCT	QTR HRS USED	SET-UP-COST	REGULAR COST OF SKED TIME	COST PER OP	OVERTIME COST	TOTAL COST
CS-5	1HA3B71G	016	323	930	000	645	1398
SRV2	1HA3B31A	016	000	050	000	075	0125
SRV2	1HA3B31H		000	052	000	078	0130
SRV2	13CRN6RC		000	030	000	045	0075
SKED	1HA3BA1A		000	000	026	000	0026
SKED	13CRP6RC			000	018	000	0018
RCO	1HA3B31E	016	000	040	000	060	0100
GEO-GEN	1HA3B51A		000	000	135	000	0135
	TOTALS		0323	0602	0179	0903	02007

TOTAL 3B COSTS = 01914

TOTAL 3C COSTS = 00093

WESTERN TEST RANGE

RANGE OPERATIONS COMPUTER SYSTEM

The WTR Range Operations Computer System (ROCS) is a realtime range resource control system which incorporates program/test planning, task assignments, schedule commitments, sensor status, resource utilization accounting, and workload forecasting (system hours and dollar costs), into a single database which is readily available to the WTR decision-makers in an interactive environment.

The ROCS is an outgrowth of the Mechanized Range Scheduling (MRS) System and the Mechanized Range Documentation (MRD) System, which have been under development for the past several years at WTR. Recenty, the management and development efforts of the two systems has been incorporated into a single system identified as ROCS, and the MRS has evolved to the Range Scheduling System (RSS), and the MRD has become the Range Planning System (RPS).

Range Planning System (RPS):

The mission of the WTR is to manage, develop, operate, and maintain a national range to meet the needs of the testing and evaluation community (i.e., DOD, NASA, and others). The services and resources are provided in consonance with national range policies as established in DOD Directive 3200.11.

Success in achieving the WTR mission requirements is, to a great extent, determined by how well the Program Planning Control Division (WSMC/ROP) provides planning, guidance, and control of program objectives to supporting range elements.

Planning and development tasks for programs are far more sophisticated and complex than when the range began in 1965. The test and evaluation of state-of-the-art weapons systems have been met by a matched evolution in range services and resources. To meet the needs of the test and evaluation community, the WTR RPS has been upgraded with the tools to do the test planning in a fashion which will insure that most of the objectives of the test agencies are met and at the same time the most economical posture for the range is maintained.

In 1973, a small automated processing system was acquired to alleviate manual test document development. The RPS merely supports test documentation development and maintenance.

Action has been taken to provide the Range Operations Program Planning Control Division a state-of-the-art automated system that not only handles the variety and volume of the Universal Documentation

System (UDS) test, but in addition gives the PSM total visibility and control over all the elements of the programs for which he is responsible. These elements, including program test engineering and analysis, are:

a. The Universal Documentation System (UDS).

b. Technical capabilities of WTR resources and other national range shared resources.

c. Complete financial status (funding, estimating, direct cost reimbursement, and cost projecting).

d. Technical criteria to support trajectory coverage, satellite selection, antenna selection, etc.

e. RSS linkage for current operational activity, resource status, electronic mail, etc.

f. On-line capability with TDMAS for program communication development, electronic mail, etc.

g. Maintenance of historical data, project milestones, etc.

h. Task system data for levels of effort and status.

i. Standardized data products.

Range Scheduling System (RSS):

The development and procurement process of the RSS at the WTR was unique. Therefore, aspects and results of this development effort should be discussed.

First of all, after several years of observing the efforts of other organizations' attempts to produce a usable computerized scheduling system, it was our belief that the reason for generally unsuccessful results, in most cases, was due to the method of developing the software and the selection of hardware. Most scheduling systems were "hung" on mainframe-type computers, programmed in languages oriented towards scientific or batch processing, and made subordinate to the other tasks for which the mainframe was justified and used. After extensive analysis of the scheduling process, it was determined that a dedicated timeshared interactive computer with a language which was very strong in I/O versatility and character string manipulation was a major consideration.

Second, the methods used in normal data processing systems development did not meet our requirements. Usually, the first question

asked by a systems analyst of the user is: "What are your requirements?". After several years of attempting to identify and organize the range scheduling requirements into an intelligent document which could be used as a basis for systems development, we came to the conclusion that we didn't know what our requirements were as related to a data processing environment. We determined that if this development effort was to be successful, actions must be taken to marry the efforts of the data processing analysts and the users working together.

Action was initiated to produce a "bare bones" stand-alone system which could be used in a real-time (on the floor) development effort. The selection of the programming language was a critical factor, in that it must be oriented toward interactive business applications with strong timesharing, string handling, well developed interactive I/O (CRT, keyboard, disk) instruction sets, and versatile file handling capabilities. Also, a System Analyst and a Programmer were dedicated to the RSS development effort. The developers spent several months learning the jobs or the tasks accomplished in the range scheduling and management functions. Direct "one-on-one" interface was established between the developers and the users.

Once the developers fully understood the job to be accomplished, they produced a System Specification document with the assistance of the users, to serve as a guide through the RSS development. This method broke down the communications barriers between the developers and the users. A rapport was established between the two groups which permitted the software development of the RSS. The software was written and tested on the prototype system in the realtime arena. The old cliches of the user saying: "The system design people didn't program what we wanted!", or the developers saying: "We gave you exactly what you identified as your requirements!" were eliminated.

This breadboarding concept may have cost slightly more up front, but the long haul has resulted in a system designed for the function to be performed which works. The RSS concept was proven in a hands-on environment. To our knowledge, the use of a dedicated miniprocessor based network for an operations resource management system was developed and used for the first time by the WTR. During this initial phase of the RSS development, the versatility of such a system and its adaptability to the range resource management effort was recognized, and the "on-the-floor" breadboarding concept was qualified as a proven success.

RSS was implemented using a business oriented computer system, tailored to meet the requirements of the Operations Resource Control functions, including scheduling, resource status, data production, system hour accounting, and complete history of all scheduling transactions.

Data is filed for quick interactive retrieval of batch reports in support of several major WTR operations functions, including:

a. Range Operations scheduling (conflict analysis, automatic scheduling transactions, and teletype dissemination).

b. Range utilization measurement and workload forecasting.

c. Charge code control and monitoring.

d. Data production status monitoring

e. Word processing.

f. Auxilary command post support.

g. Data base administration.

h. On-line software development.

i. Direct cost reimbursement and cost forecasting.

The system was not developed to perform automatic scheduling; rather, the system puts all the necessary information at the Controller's fingertips, then lets him make the decisions. However, when the Controller unintentionally schedules a conflict, the system points out or identifies the potential problem/conflict. Resolution is left to the discretion of the Controller.

In addition to the internal workload management, the WTR has a requirement to schedule and support interrange operations involving the AFFTC at Edwards AFB. To accomplish this effort, the individual range scheduling systems must be compatible. Past experience showed that major differences/incompatibilities existed between the AFFTC and WTR systems. These major incompatibilities had a direct bearing on the WTR's ability to successfully support existing domestic workload and at the same time support such programs as ALCM, Tomahawk, PMALS, and Shuttle recovery, which originated from or involved the AFFTC. It was imperative that these incompatibilities be corrected to insure continued support between AFFTC and the WTR. To accomplish this task in the most cost effective manner for the Air Force, the AFFTC requested WTR to modify its RSS applications software and provide it to the AFFTC for their use. This modified software would then meet the peculiarities of the AFFTC range and at the same time insure direct compatibility with the software used on the WTR system. AFFTC transferred funds to WTR to offset the reprogramming costs. Although not fully completed, the system is on-line and being used by AFFTC at this time. It is expected for the system to fully be operational by early 1983.

In addition to the scheduling control activities, a large amount of statistical data is derived from the scheduling activity. From this data, the Resource Utilization Measurement System (RUMS) was developed. By scheduling the total activities of all sensors and maintaining accurate records, statistical data is formulated into various reports to indicate the workload (with a numerical value) of the range. Scheduling personnel may request any information in the data base for display or printing, or input basic transaction data which invokes all the automatic record-keeping and information dissemination activities of the system. One of the established functions with RSS, for both systems and output, are the charge code control and monitoring functions. This control had aided in the range scheduling effort by preventing use of range resources by those without funding or authorization, while the range utilization measurement function provides a statistical means for reporting the workload represented by the operations schedule history.

As with any successful business-type system, new needs evolved as participating offices continued to visualize system potentials. The statistical methods from range utilization measurement were adapted for workload forecasting. The data production status system was developed primarily to record delivery of data items to range users, secondarily to track their production. With the advent of new technology, word processing (fully compatible with the data processing data base already on-line) was seen as an obvious move. The WSMC Emergency Action Center needed a computer respository for some of its files (i.e., facilities and personnel accounting and tracking). Higher headquarters dictated that WTR increase its level of direct cost reimbursement. This requirement was satisfied, in part, through the joint efforts of WSMC/AC and WSMC/ROR in the development of a system hours cost accounting system using RUMS. This, in turn, led naturally to a requirement to forecast requirements in future years.

Reflecting needs for quicker response times and additional functional requirements, the original RSS has been expanded through several stages to the current configuration with 120 megabytes of disk, eight processors totalling 1.2 megabytes of core, 9 printers, 21 video display terminals, and interconnection of processors through a communications system network transferring data at near memory speeds (2.5 megabytes per second).

The two processors are set aside for the single task of providing disk I/O services and cache memory (a large memory buffer) to the system. Other processors, relieved of disk management tasks, devote all their time to servicing terminals and other processing tasks. The distinct advantage over mainframe (single processor) architecture has been the fact that independent processing tasks can take place on the system concurrently, not degrading each other's performance, since each as a separate CPU.

Finally, the RSS system, over the past 4 years, has experienced a very controlled rate of growth. This growth was envisioned early in the development of RSS and was the basis of a paper prepared and published by WSMC/ROR on 23 April 1979 entitled "A Reasonable Alternative." The RSS is providing operational data for all levels of management. As such, by definition, it is an Operations Control System which has the ability to produce data which can be used by management for decision-making. Of itself, it is not a Management Information System (MIS), nor can it substitute for such a system. The information in the database is limited to the Range Resource Control function. It is only one "slice of the pie" used by WTR for total range management tasks.

When networked with the remainder of the Range Control Systems now under development, it will provide one "spoke" of the Range Operations Computer System "wheel."

Western Test Range (WTR) Range Operations Computer System (ROCS):

ROCS is an automated data storage, processing and retrieval system supporting all aspects of test range operations planning, scheduling, control and historical reporting. The primary goal of the ROCS is to provide automated assistance to management and operating personnel in all areas of operations resource management to improve efficiency, productivity, and information integrity.

The ROCS was developed and implemented as an independent network of small computers with multiple interactive terminals and an extensive informational database available to multiple users.

Support to the operations planning function consists of an on-line database of all operational documentation (UDS and supporting documents), plus software to manipulate the data and produce hard copy for review and publication. In addition to word processing, electronic filing/retrieval, and electronic mail facilities, an extensive system of interactive planning tools are being developed. These software tools will allow technical planners to interact with the data base (using video terminals) in their view of the plan, without regard to the format of final documents. All formatting for published documents will be under software control utilizing basic information entered by the various technical planners. Final documents are produced on a high-quality, high-speed laser printer, on either paper or offset masters for direct use by the printing plant. Additionally, documents may be electrically transmitted either via teletype (local and/or AUTODIN), or via data communications to other data or word processing systems.

The common ROCS data base allows direct use of the planning data by scheduling and control elements. Schedulers can introduce a schedule request into the system by simply specifying the planning document number along with the requested date and time. No further entry is required unless there are one-time deviations from the planned operation. No attempt has been made to automate the actual scheduling process due to the extensive array of tangible and intangible variables which do not lend themselves to logical resolution. It has been that most scheduling decisions are based on informed judgement by Scheduling personnel, as opposed to simple logical decisions based on priority schemes. In many cases, priority schemes become superficial when applied to the real world scheduling process. For this reason, there is no formal priority scheme in effect at the WTR, except that generally range user requirements override range internal activities. Scheduling is performed by loading the schedule as requested by all users, then producing a conflict report showing real or probable conflicts. The scheduler then moves conflicting operations into free time slots until the schedule is conflict-free, or until conflicts are reduced to an acceptable level (sometimes operations can be conducted simultaneously with no mutual interference).

All primary control centers (e.g., instrumentation, communications, data processing) have interactive ROCS terminals from which summary or detailed planning and scheduling information can be requested. Actual support data are entered during and after each operation to complete the historical data records. In this manner, the data base reflects the planned configuration, any changes that occurred during support, and the actual support configuration.

After a data verification process is completed on the data base, it is committed to history for processing and archival. The processing of historical data occurs in near real time to derive actual resource utilization data and other management reports. The actual utilization data are further processed to derive actual costs for budgetary and reimbursement purposes, and to update workload models to be used for workload and cost forecasting.

The ROCS incorporates a relational data base architicture consisting of many data files with embedded logical linkages. Individual data files are carefully defined and controlled to eliminate redundancy and guarantee consistent linkage with other elements of the database.

Most of the data inquiry and update processes are performed via interactive application programs written in a high-level interactive business-oriented language. These predefined applications insulate the general user from the internal data structures and computer protocols, providing the desired logical views of the data.

Application programs fall into four general categories:

a. Data Editors - provide the means for changing the contents of one or more data files as needed in an interactive mode. These programs are highly conversational with extensive prompting, data error checking/correcting, and data lookup for automatic fill-in where possible.

b. Report Generators - provide the means for producing pre-defined report formats on the CRT screen or in printed form based on the entry of selected parameters by the user. The parametric query technique is used extensively throughout the system to minimize the knowledge of computer protocol and database structure required of the general or occasional user, and to provide standard and predictable report formats and contents.

c. Utility Functions - as required to maintain the system and provide special functions. System maintenance functions incude data access control, system utilization monitoring, error detection and correction, print or job spooling/queueing, data archival actions, data purging/merging/restructuring, and data backup.

d. Special Functions - include a general query facility for ad hoc reports, a data dictionary, a batch job facility, software development and maintanence facilities, and other functions. Interactive word processing with electronic document filing/searching and electronic mail facilities are also available for document generation.

The WTR ROCS is implemented on a dedicated computer system, physically and functionally separate from the scientific mainframe computers which are dedicated to operations support or scientific data processing. The stand-alone implementation was considered mandatory for two primary reasons:

1. Uninterrupted full-time interactive access is required (24 hours per day, 7 days per week) by the operations planning, scheduling and control community. The only practical means to remove the possibility of priority conficts with operational requirements, red/black considerations, software development activities, etc., was to obtain a dedicated system.

2. Use of an interactive business oriented system (hardware and software), as opposed to a scientifically oriented system, was found to be more adaptable, flexible, cost effective and easier to use.

The WTR ROCS utilizes state-of-the-art distributed data processing techniques. A network of small processor nodes and ADP resources (terminals, printers, disks, etc.) are functionally and physically dispersed and configured to meet the needs of each element

of the ROCS community. Through the use of multiple modular ADP resource units, the failure of any one unit cannot totally disable the network. This "fail-soft" technique allows the physical for logical substitution of modules to maintain support of critical functions with only degraded response, as opposed to total loss of support. Depending on the type of failure, some less critical functions may be delayed or sidelined until repairs are completed. This technique has resulted in zero downtime for critical functions over the past 18 months for any reason other than general power outage.

The policies, procedures and responsibilities for scheduling Western Space and Missile Center (WSMC) resources are contained in WSMC Regulation 57-3, Range Resource Scheduling and Control, which is excerpted on the following pages.

OPERATIONS POLICIES

1-1. Introduction. It is the objective of the Western Space and Missile Center (WSMC) to insure that all test operations, and associated data requirements, are fully supported at a date and time selected by the range user or as close to the range users' requested date and time as is possible. Therefore, WSMC/ROR will honor each authorized user's schedule requests, consistent with mission priorities, range capabilities, economy of operations, and established safety criteria.

1-2. Hours of Operation. Western Test Range (WTR) resources are normally operational 0800-2400 Local (L), Monday through Friday, excluding holidays. The Operations Resource Control Center (ORCC) is operational 24 hours a day, seven days a week. Certain range resources are available on other than the normal schedule to accommodate data requirements or in the interest of efficiency. Tests will be restricted to normal range working hours except when overtime is specifically authorized. The "range week" begins at 0001 Monday and extends through 2400 Sunday.

1-3. Overtime Operations. Operations may be scheduled outside the normal operating hours when urgency of the test or test objectives so dictate. All overtime support, including setup time, is fully reimbursable by the range user.

1-4. Extension of Overtime Operations. Operations scheduled outside the normal range hours may be extended if resources are available. Extensions will not normally be for more than four hours. However, reschedule of such tests will be accepted, if resources are available, with a start time as labor and resources can be secured.

1-5. Schedule Control. Problems or conflicts pertaining to the established schedule will be resolved by WSMC/ROR, after negotiations with the affected users and support agencies.

1-6. Allocation of Range Resources. Range resources are scheduled in accordance with applicable Operations Directives (OD), internal test directives, teletype instructions, and verbal agreements deemed necessary to insure efficient use of these resources.

1-7. Hazardous Test Operations. Hazardous test operations will be accepted for scheduling only if they are in compliance with WSMCR 127-1, and only after the hazardous procedures to be used have been approved by the WSMC Director of Safety.

1-8. Operational Support System Certification. Instrumentation, Communications, and Data Systems (both hardware and software) normally will be committed for use by WSMC/RS only after formal operational certification procedures have been completed. See paragraph 6-10 for exceptions. After the support system certificate has been signed, scheduling of operational resources will be in accordance with paragraph 1-6.

1-9. WTR Users' Handbook. This regulation, by necessity, is a condensed version of the procedures described in the Western Test Range Users' Handbook. Range users should be referred to the Range Users' Handbook when a more detailed explanation is required.

FORECAST PLANNING AND CONTROL

2-1. Responsibility. WSMC/RORA will integrate and publish the weekly schedule, including range users' scheduling requirements and range preparation tests, maintenance, modifications, software development, etc. RORA has approval responsibility for proposed systems downtime and all major tests for Vandenberg AFB for the next 18 months.

2-2. Joint Pacific Area Scheduling Office (JPASO). RORA will provide the administrative support (facilities and personnel) for operation of the JPASO in accordance with the DOD Deputy Director for Research and Development and Engineering Charter approved 26 Mar 1968.

2-3. Eighteen Month Forecast. JPASO will publish and distribute an 18 month forecast of operations, including sensor status, so that all interested agencies are kept advised of the long range resource utilization schedule. The forecast will include:

a. A three month expanded schedule of operations to include use of major range resources and mobile sensors.

b. An 18 month summary of all major operations to include date and time (if available), operation number, job order number (JON), booster, and program name for unclassified operations.

c. Projection of sensor status for Pacific Area Support Facilities, which include the Navy's Pacific Missile Test Center (PMTC) and the Army's Kwajalein Missile Range (KMR).

d. A consolidated Advanced Range Instrumentation Aircraft (ARIA) schedule. This schedule will include missions, maintenance, modifications, ground tests, etc.

2-4. Weekly Forecast. A weekly scheduling conference will be held at 0900 each Thursday morning in the theater, building 7000. All attendees will receive a detailed schedule of all range operations for a seven day period starting the following Sunday at 0001L time.

2-5. ARIA Scheduling. WTR/ROR will act as the lead range for all ARIA missions in support of WSMC test operations. In addition WSMC/ROR will provide scheduling support for all users and ranges in the geographic area westerly from 100 degrees West to 90 degrees East longitude. WSMC/ROR will also participate with the 4950th Test Wing and the Eastern Space and Missile Center (ESMC) Scheduling Office in forecast mission planning and the daily scheduling of ARIA resources.

CURRENT SCHEDULE AND CONTROL

3-1. Responsibilities. WSMC/RORB will:

a. Provide realtime scheduling in response to requests for specific range resources to support prelaunch, launch and postlaunch activities.

b. Resolve test data production priority conflicts and investigate all test data inquiries or complaints.

c. Assist WSMC Program Managers and launch site supervisors in obtaining emergency assistance in case of accident or incident.

d. During nonduty hours, manage JPASO activities and issue required JPASO reports.

3-2. Procedures. WSMC/RORB will publish an official WTR schedule which conforms to the following rules:

a. Assign operational resources identified in the OD.

b. Insure that realtime range support is provided in accordance with mission priorities and established safety criteria, and is consistent with the optimum use of support facilities.

c. Verify that reimbursement funding is available and adequate before scheduling tests for OD support.

GEODETIC EARTH ORBITING SATELLITE (GEOS)-3 OPERATION

4-1. Responsibility. WTR has responsibility for the GEOS-3 satellite scheduling, analysis, and control functions. A consolidated GEOS-3 schedule will be transmitted to all ranges each Thursday and is valid for the following week.

4-2. Scheduling Procedures.

a. Scheduling requirement (messages) should be addressed to RUWJSLC/WSMC VANDENBERG AFB CA//ROR/FEC RO220//.

b. Support requirements must be submitted to ROR not later than Monday for the following range week. Requested format is: ZULU date, ZULU time, requesting agency, number of sites, and comments. Comments should include items such as "S-band," non-coherent oscillator ("non-COHO), "APS," etc. COHO C-Band operations will be assumed for all GEOS-3 support unless comments indicate otherwise.

4-3. Reports. Tracking summary reports are required immediately after support, as problems occur, and each week for routine support. Reports should be addressed the same as paragraph 4-2a using the following format: First Acquisition of Signal (AOS) and final Loss of Signal (LOS) in ZULU, Pulse Recurrence Frequency (PRF), number of radars, and comments. Comments should include items such as S-band, nonCOHO, or anything unusual.

4-4. GEOS Technical Questions. Technical questions on GEOS satellite operations should be directed to the WSMC Performance and Evaluation Division (ROE).

USER RESPONSIBILITIES AND PROCEDURES

5-1. Prerequisites for Scheduling. Before a user can schedule a test or series of tests on the WTR, the preliminary steps of documenting test requirements with the WSMC Program Planning Control Division (ROP) must be accomplished. In addition, the user must designate in writing to WSMC/ROR, primary and alternate persons authorized to submit scheduling requests and represent the user on matters pertaining to scheduling. These individuals will be referred to as the range users' scheduling officers.

5-2. Scheduling Actions by Range Users. Prior to submitting the first forecast of planned test activity, the range user's scheduling officer will meet with WSMC/ROR to discuss standard procedures. Eighteen month forecasts and requests for weekly schedules will be submitted as follows:

a. An updated forecast of planned test activity for the ensuing 18 months will be submitted to WSMC/ROR at least five working days prior to each JPASO conference. The forecast, submitted on WSMC Form 146, Eighteen Months Missile Launch Forecast, will include information applicable to each test such as:

(1) Operation Number, if assigned.

(2) Month and date of test to be conducted.

(3) Program Job Order Number (if not classified).

(4) Vehicle type and serial number.

(5) OD number.

(6) Point of aerial debarkation (PAD)

(7) Mobile sensor requirements.

(8) Impact area.

b. Weekly Schedule Request. This request lists the range user's firm schedule requirements for tests and launch activities for the succeeding range week period. The request will be submitted to ROR on WSMC Form 15A, Schedule Request, prior to 1200 local each Tuesday and will include the following information for each test:

(1) Date and time test is desired.

(2) Earliest and latest time test can be scheduled.

(3) The Missile Operations Support Requirements (Reference 1STRADM 55-1), when applicable.

(4) OD number, and any exceptions or additions.

(5) Job Order Number (JON).

(6) Location or launch complex.

(7) WSMC Program Support Manager (PSM) and telephone extension.

(8) Identity of range user and test conductor.

(9) Associated launch operation number.

(10) For prelaunch support operations, define data items required if greater or less than specified in OD.

NOTE: ROR maintains a supply of WSMC Forms 15A and 146 which are available on request.

5-3. Other Responsibilities of Range Users. The range user will:

a. Provide representation at the JPASO six week conference and the WSMC/ROR weekly scheduling meetings.

b. Inform JPASO of the status of all operations on the 18 month forecast.

c. Inform the ORCC of the current status of the weekly missile and aeronautical prelaunch tests. Changes to this schedule should be coordinated as early as possible.

d. Upon completion of a scheduled test, advise the ORCC of the test completion time, state whether or not the test support was satisfactory, and identify any problems. This information will be entered into the final range record of the test for historical purposes.

e. Notify the ORCC if data is required from completed or cancelled operations.

f. At no time levy support requirements directly on the WSMC Center Technical Services Contractor (CTSC).

TEST DATA PRODUCTION AND CONTROL

6-1. Responsibilities. The WSMC Operations Resource Controller(ORC) on duty in the ORCC manages WSMC Data Production and coordinates with range users, support ranges, and WTR agencies on data production planning and scheduling, data evaluation, and data delivery.

6-2. Test Data. Test Data requirements are submitted to the PSM who list them in the OD and supporting documentation. The Data Distribution List (DDL) is a computer generated list of all deliverable data items, required data delivery times, and data recipients for a particular OD. Changes to the established data requirements can be made as follows:

a. Forward changes to published test data requirements to the PSM. If the change is valid, the PSM will revise the documentation. If the PSM is not available, and the test is within 12 hours, the ORC will accept emergency technical changes for test data and will see that appropriate instructions are given to the supporting sites to meet the revised data requirement.

b. When it becomes necessary to change data requirements during the conduct of an operation, the following rules apply:

(1) If the existing documentation contains the statement "Test data technical requirements may be changed at the discretion of the designated Telemetry Monitoring Official (TMO)," the Station Controller will accept realtime changes to the test data requirements directly from the TMO. This direction is limited to run speeds, display formats, pen assignments, deletions, etc. The TMO must be designated before the operation on WSMC Form 16, Operational Support Entry Request for Controlled Areas, which is the authority for the TMO to have access to the data center during the operation.

(2) If the foregoing statement is not listed on the documentation, the Data Center Supervisor will take realtime direction only from the designated TMO on WSMC Form 53, Data Time Interval Requirements (see WSMCR 310-4). The forms are available from the Data Center Supervisor, who will assist the range user's TMO in completing them. WSMC Form 53 is then handcarried to the ORCC for approval by the ORC.

c. If the range user wishes to delete, modify, or increase data requirements after the completion of a scheduled test, the range user should call the ORC to discuss the new data requirements. The ORC will either dispatch a Data Courier to pick up the Data Request (WSMC Form 11) for the new data items, or will take the information directly from the range user, fill in WSMC Form 11, and direct the CTSC to generate the data.

6-3. Data Status. Information pertaining to specific data items (when and how shipped etc.) will be provided by the ORC on request.

6-4. Data Discrepancies. In the event the range user finds errors in the test data, they should contact the ORC as soon as the discrepancy is discovered and provide answers to the following questions:

a. Does the range user want complete replacement data?

b. Will the range user accept partial replacement of the errant data?

c. May the range have the data back? If so, when?

d. If the range user is unable to return the data, is the data available for viewing by a representative from WSMC?

e. How soon is replacement data required?

After the ORC obtains the answers to the forgoing questions, the ORC will submit a Data Request directing the CTSC to make new replacement data in time to meet the range user's specified delivery time.

6-5. Range Data Questionnaire (RDQ). An RDQ (WSMC Form 152) and a WSMC letter on Data Quality are issued with each data package delivered to range users. Range users are strongly encouraged to comply with the letter's request for comments by filling in WSMC Form 152 whenever there is a discrepancy in the test data provided to them.

6-5. Data Requests. The Data Request (WSMC Form 11) is designed to provide a quick-response method of getting individual data items after the range user has submitted his total test data requirements.

a. WSMC Form 11 will be used to:

(1) Request a one-time data item from a single test.

(2) Obtain a special data item that was not previously identified in the original list of data requirements.

(3) Obtain follow-up data that is required because of unexpected results from previous tests.

(4) Have data tapes picked up, degaussed, recertified, and put back in service when magnetic tapes are no longer required by range users.

(5) Identify a data requirement for a data item that is not in the Standard Operational Data Identification Manual (SODIM).

(6) Increase the number of copies of a data item that are listed in the OD.

(7) Activate delivery on data items coded "On Request" in the documentation.

b. The Data Request will not be used to circumvent the submission of data requirements in accordance with the Universal Documentation System (UDS).

c. Because all labor, equipment time, and material expended in production of test data are subject to direct cost reimbursement, a Data Request will not be accepted unless the requestor can identify a valid CTSC task, JON, OD, operations number or computer charge code to which the costs can be charged.

d. Data Requests from aerospace contractors will not be accepted without the specific approval of the military sponsor or contract monitor.

e. Data produced in response to a Data Request is produced on a "first-in, first-out" basis. Normal delivery for "routine" data requests is 48 hours and for "expedite" data requests, 24 hours. However, these times are subject to range activity and equipment management decisions. In any case, the ORC will contact the requester and confirm the data delivery time.

f. Data Requests may be submitted by mail, telecopier, or telephone. Range users are encouraged to overprint, on WSMC Form 11, the information they need in submitting successive data requests. Computer generated Data Requests are also acceptable, provided ROR has an opportunity to review the format before it is put into use.

6-7. Data Handling. The WTR operates a Data Courier Service for the pickup and distribution of test data. All test data deliveries on Vandenberg AFB will be made via a Data Courier (see WSMCR 310-9,Data Courier Service). Test data is shipped out via United Parcel Service (UPS) or Fourth Class Parcel Post, unless it is classified data, in which case it goes out as First Class Registered mail. The Data Handling Center attempts to send most unclassified data out via United Parcel Service (UPS) since it is faster and cheaper. All test data Postal and UPS shipping costs are paid by the host base and not the range user.

6-8. Data Quality Control. The CTSC performs a sample inspection of all WTR data. Reproduced data from the Base Printing Plant (4392 AEROSG/DAR) is rarely inspected. Normally, most data items which have been inspected will have an inspection stamp on the label. During the inspection process, the inspector may find some data which has minor deficiencies in the labels, minor dropouts, or a pen failure. If there are minor discrepancies which do not invalidate the data, the discrepancies will be identified with a Quality Control Synopsis. If the test data recipient does not agree with the inspector's assessment of the data, notify the ORC immediately.

6-9. Data Storage. The WTR does not have the capability to store range users' test data for long periods of time. Therefore, range users are required to accept permanent custody of their own test data upon delivery by a Data Courier. When "On Request" data has not been requested after an operation, the test data will be retained in accordance with WSMCR 12-2, Test Data Retention.

6-10. Test Data Planning. There are times when the quality of test data cannot be guaranteed due to unusual test conditions. These conditions are:

a. Engineering Test Basis (ETB) Data. Test data generated during a test to satisfy an internal WTR engineering objective, will not be released to external range users.

b. Limited Commitment Basis (LCB) Data. The WTR may commit range resources that are not fully developed or that have not met all acceptance criteria established by the appropriate range agencies in order to meet range user objectives. Any LCB system called up will be at the range user's cost and the LCB data will be on a "best available basis." Since data timeliness and data quality cannot be guaranteed, LCB data will be delivered to the range user only after the approval of the PSM.

6-11. Postlaunch User-Supplied Parameters. The range user is required to provide various launch "event times" to the WTR within two hours after launch. Postlaunch data processing can not start until WTR has the event times. These event times must be in writing and be signed by the military sponsor or contract monitor.

SCHEDULES AND STATISTICAL REPORTS

7-1. Forecasts and Schedules. The items listed below are prepared and distributed by WSMC/ROR. Agencies desiring any of these items must send a written request, with justification, to WSMC/ROR. Requests from nongovernment agencies must be indorsed by the requester's military sponsor, or contracting officer prior to forwarding to WSMC/ROR.

a. Eighteen Month Forecast of Launch Operations. This schedule is published every six weeks by JPASO for the succeeding 18-month period and includes all launch operations at Vandenberg AFB as well as all major tests using WSMC resources.

b. One-week Schedule. A forecast of all range activity for a seven day period starting the following Sunday. This schedule is published each Thursday morning after the weekly scheduling meeting.

c. Daily Schedule. A daily operations schedule is distributed by operational teletype in the morning of each workday. Operations may appear on this schedule at times differing from those designated in the weekly schedule due to changes in range requirements. Therefore it is mandatory that all agencies associated with the operation check the daily schedule for final scheduled times.

7-2. History of Operations. A complete history of all operations scheduled is maintained and distributed to "need-to-know" agencies. Range users must be very precise in their completion, scrub, or cancellation statement to the ORC to insure correctness in direct cost reimbursement billing and workload summary reports.

7-3. Resource Utilization Summary. The WTR Operations and Workload Summary is published monthly and provides a quantitative measurement of the capacity of range systems to do work and the amount of work performed on the range systems. This report is generated from data that is collected, stored, and processed in the Range Utilization Measurement System (RUMS). Requests for changes in distribution requirements for the document are to be submitted in writing to WSMC/ROR.

7-4. Forecasts of Resource Utilization. From the resource utilization data collected within the RUMS system, the range has the ability to forecast future workload in terms of reimbursable dollars and system hours. Historical and projected data has been used to support MRTFB, TESRP, budget submissions and numerous special studies. Requests for utilization data should be submitted to WSMC/ROR.

OPERATIONS SECURITY

8-1. Schedule Classification. Some range schedules are classified to protect the number and types of classified tests that are scheduled. For these classified tests, neither the pad nor the missile and project name may be associated with the operation number and lift off time unless by secure means. Program names, missile type and model, serial number, and inpact coordinates will not be used in telephone conversations or other unclassified communications. Detailed security guidance is available in the Security Classification Guide and the security matrix in the applicable OD. Weekly and daily schedules are always unclassified.

a. Unclassified reference to classified tests is limited to the operation number, date, time, OD, and MOSR designators.

b. The fact that the operation has been completed does not mean that the operation is declassified. Therefore, to protect the security of the post operation activity associated with this test, all post operation references should have the same security protection as used prior to the actual operation unless otherwise specified by the range user.

8- . Operations Security (OPSEC) Practices. A great deal of "operation information" is not classified, but must be treated on a need-to-know basis. Observations of general launch complex activities, certain correspondence and telephone calls during routine business, and the implementation of various plans and activities related to the conduct of operations can all be indicators for a pending operation. All personnel must be aware that unclassified information, if freely discussed, can compromise classified information by implication. Information pertaining to any aspect of test operations is not to be discussed with anyone except those whose duties incident to the operation require the information. Strangers, neighbors, friends, and relatives are not in this need-to-know category. Such terms as Launch, Firing Operation, or other terms denoting an actual operation will be avoided whenever possible. The ORC will not provide telephone information on status of a scheduled operation unless it is requested by Operation Number only.

END

FILMED

11-83

DTIC