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UC-700

Final Report

MARINE TACTICAL COMMAND AND CONTROL SYSTEM (MTACCS) FIELD DEVELOPMENT SYSTEM-1 (FDS-1) ASSESSMENT

April 1992

Volume 2

Prepared for

Marine Corps Systems Command
Quantico, Virginia

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Pacific Northwest Laboratory
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MARINE TACTICAL COMMAND AND CONTROL SYSTEM (MTACCS) FIELD DEVELOPMENT SYSTEM-1 (FDS-1) ASSESSMENT - VOLUME 2

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April 1992

Prepared for
Marine Corps Systems Command
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The following appendices contain the detailed analysis data for the questionnaires and various FDS-1 after action reports submitted to the Marine Corps Systems Command (MARCORSYSCOM) Marine Tactical Command and Control System (MTACCS) Systems' Engineer. These reports have not been edited in any way. For the most part, they represent the best quality copy available.

APPENDIX A

QUESTIONNAIRE RESULTS

APPENDIX A

QUESTIONNAIRE RESULTS

This appendix contains the mean response values and number of respondents to the questions on the different questionnaires used during the evaluation.

A.1 COMMANDER, STAFF OFFICER AND OPERATOR QUESTIONNAIRES

Because the questions on the Commander's Questionnaire, Staff Officer's Questionnaire and Operator's Questionnaire were drawn from the same general set of issues their results are presented together. Each question is followed by its scale anchors, mean ratings, number of respondents. Note, many questions were only asked on certain questionnaires so a mean response value is not always applicable. A copy of each of these questionnaires is provided in Appendix A. There were a total of 8 respondents for the Commander's Questionnaire, 85 for the Staff Officer's Questionnaire, and 43 for the Operator's.

How would you rate your computer literacy relative to other USMC personnel?

1 = Below Average; 6 = Above Average

Commander:	2.50	Respondents:	8
Staff Officer:	3.81	Respondents:	85
Operator:	4.02	Respondents:	43

How extensively did you use TCO equipment during this exercise? (Circle the appropriate number or letter)

1 = Never; 6 = Occasionally

Commander:	2.00	Respondents:	8
Staff Officer:	3.40	Respondents:	85
Operator:	4.72	Respondents:	43

OPERATIONAL EFFECTIVENESS

How did TCO affect your ability to respond to changes in the tactical situation?

1 = Much Worse; 6 = Much Better

Commander:	2.28	Respondents:	7
Staff Officer:	3.00	Respondents:	64
Operator:	N/A	Respondents:	N/A

How did TCO affect your ability to:

Plan the simultaneous employment of forces?

1 = Much Worse; 6 = Much Better

Commander:	2.20	Respondents:	5
Staff Officer:	3.03	Respondents:	30
Operator:	N/A	Respondents:	N/A

Coordinate the simultaneous employment of forces?

1 = Much Worse; 6 = Much Better

Commander:	2.33	Respondents:	6
Staff Officer:	2.96	Respondents:	28
Operator:	N/A	Respondents:	N/A

Control the simultaneous employment of forces?

1 = Much Worse; 6 = Much Better

Commander:	2.60	Respondents:	5
Staff Officer:	2.90	Respondents:	30
Operator:	N/A	Respondents:	N/A

How did TCO affect your ability to conduct or coordinate employment of supporting arms?

1 = Much Worse; 6 = Much Better

Commander:	2.40	Respondents:	5
Staff Officer:	3.04	Respondents:	26
Operator:	N/A	Respondents:	N/A

How did TCO affect your ability to:

Prepare operational reports and information?

1 = Much Worse; 6 = Much Better

Commander:	3.00	Respondents:	6
Staff Officer:	4.19	Respondents:	64
Operator:	4.30	Respondents:	37

How did TCO affect your ability to:

Process operational reports and information?

1 = Much Worse; 6 = Much Better

Commander:	3.16	Respondents:	6
Staff Officer:	4.03	Respondents:	66
Operator:	4.30	Respondents:	37

Disseminate operational reports and information?

1 = Much Worse; 6 = Much Better

Commander:	3.71	Respondents:	7
Staff Officer:	4.19	Respondents:	68
Operator:	4.57	Respondents:	35

How did TCO affect your ability to:

Prepare logistic and administrative reports and information?

1 = Much Worse; 6 = Much Better

Commander:	4.20	Respondents:	5
Staff Officer:	4.48	Respondents:	44
Operator:	4.00	Respondents:	19

Process logistic and administrative reports and information?

1 = Much Worse; 6 = Much Better

Commander:	3.60	Respondents:	5
Staff Officer:	4.35	Respondents:	46
Operator:	4.33	Respondents:	21

Disseminate logistic and administrative reports and information?

1 = Much Worse; 6 = Much Better

Commander:	3.60	Respondents:	5
Staff Officer:	4.52	Respondents:	46
Operator:	4.35	Respondents:	20

How did TCO affect the ability of you and your staff to:

Distribute reports to subordinate units?

1 = Much Worse; 6 = Much Better

Commander:	3.00	Respondents:	5
Staff Officer:	3.80	Respondents:	50
Operator:	4.29	Respondents:	31

Distribute reports to adjacent units?

1 = Much Worse; 6 = Much Better

Commander:	2.50	Respondents:	6
Staff Officer:	4.00	Respondents:	55
Operator:	4.50	Respondents:	38

Distribute reports to higher units?

1 = Much Worse; 6 = Much Better

Commander:	3.42	Respondents:	7
Staff Officer:	3.99	Respondents:	70
Operator:	4.13	Respondents:	39

How did TCO affect your ability to:

Detect significant changes in the tactical situation?

1 = Much Worse; 6 = Much Better

Commander:	2.14	Respondents:	7
Staff Officer:	3.39	Respondents:	49
Operator:	N/A	Respondents:	N/A

Evaluate the significance of changes in the tactical situation?

1 = Much Worse; 6 = Much Better

Commander:	2.16	Respondents:	6
Staff Officer:	3.00	Respondents:	44
Operator:	N/A	Respondents:	N/A

How did TCO affect your ability to:

Develop potential courses of action?

1 = Much Worse; 6 = Much Better

Commander:	1.66	Respondents:	3
Staff Officer:	3.11	Respondents:	37
Operator:	N/A	Respondents:	N/A

Evaluate potential courses of action?

1 = Much Worse; 6 = Much Better

Commander:	1.66	Respondents:	3
Staff Officer:	3.09	Respondents:	35
Operator:	N/A	Respondents:	N/A

Generate plans and orders?

1 = Much Worse; 6 = Much Better

Commander:	2.50	Respondents:	6
Staff Officer:	4.02	Respondents:	41
Operator:	4.28	Respondents:	18

Distribute plans and orders?

1 = Much Worse; 6 = Much Better

Commander:	2.67	Respondents:	6
Staff Officer:	3.79	Respondents:	43
Operator:	4.63	Respondents:	19

Monitor the execution of plans and orders?

1 = Much Worse; 6 = Much Better

Commander:	2.60	Respondents:	5
Staff Officer:	3.00	Respondents:	35
Operator:	N/A	Respondents:	N/A

How did TCO affect the amount of work necessary to exchange information?

1 = Increased; 6 = Decreased

Commander:	N/A	Respondents:	7
Staff Officer:	3.40	Respondents:	68
Operator:	4.17	Respondents:	40

SYSTEM RESPONSE

How often were there noticeable delays in system response?

1 = Constantly; 6 = Never

Commander:	2.71	Respondents:	7
Staff Officer:	2.34	Respondents:	74
Operator:	2.60	Respondents:	42

How often did delays in system response to your actions negatively impact your performance?

1 = Constantly; 6 = Never

Commander:	2.86	Respondents:	7
Staff Officer:	2.63	Respondents:	68
Operator:	2.73	Respondents:	41

How well did the system indicate the cause and estimated duration of processing delays when they occurred?

1 = Poorly; 6 = Effectively

Commander:	N/A	Respondents:	N/A
Staff Officer:	1.75	Respondents:	61
Operator:	2.29	Respondents:	38

How often did the system allow you to interrupt processes that were causing delays?

1 = Never; 6 = Always

Commander:	N/A	Respondents:	N/A
Staff Officer:	1.83	Respondents:	52
Operator:	1.87	Respondents:	39

For your position, what was the overall effect of TCO on the time necessary to process information?

1 = Increased; 6 = Decrease?

Commander:	3.60	Respondents:	5
Staff Officer:	3.32	Respondents:	72
Operator:	3.97	Respondents:	40

With regard to the time needed to process information, did TCO have a positive or negative overall affect on mission accomplishment?

1 = Negative; 6 = Positive

Commander:	3.60	Respondents:	5
Staff Officer:	3.24	Respondents:	68
Operator:	N/A	Respondents:	N/A

INFORMATION TRANSFER

How often was it necessary for you to re-transfer previously transmitted data because of loss or corruption during the original transmission?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.33	Respondents:	69
Operator:	3.54	Respondents:	41

Did TCO have a positive or negative affect your ability to:

Transfer information to people or machines within the COC?

1 = Negative; 6 = Positive

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.41	Respondents:	69
Operator:	4.95	Respondents:	42

Transfer information to people or machines external to the COC?

1 = Negative; 6 = Positive

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.93	Respondents:	74
Operator:	3.52	Respondents:	40

USABILITY

How easy was it to use TCO?

1 = Difficult; 6 = Easy

Commander:	3.33	Respondents:	6
Staff Officer:	4.28	Respondents:	69
Operator:	5.17	Respondents:	42

When using the TCO system, how often were you exposed to terms and acronyms which were unfamiliar?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.00	Respondents:	68
Operator:	4.38	Respondents:	42

How often did you observe terminology used to describe functions or commands which was confusing or misleading?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	52
Operator:	4.98	Respondents:	42

How consistent was the use of terms and acronyms across the different screens and functions in the TCO system?

1 = Inconsistent; 6 = Consistent

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.89	Respondents:	38

How adequate were the control devices used by TCO (e.g. keyboard, trackball, mouse, touch screen etc.) in meeting your needs?

1 = Inadequate; 6 = Adequate

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.12	Respondents:	40

How consistent were the procedures across the different tasks and functions within TCO?

1 = Inconsistent; 6 = Consistent

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.56	Respondents:	41

ELECTRONIC MAP OVERLAYS

How well did the map overlay capability provided by TCO meet your requirements?

1 = Poorly; 6 = Very Well

Commander:	1.33	Respondents: 3
Staff Officer:	2.65	Respondents: 52
Operator:	3.84	Respondents: 31

Did TCO have a positive or negative affect on your ability to:

Distribute map overlay information to subordinate units?

1 = Negative; 6 = Positive

Commander:	1.50	Respondents: 2
Staff Officer:	3.41	Respondents: 34
Operator:	4.15	Respondents: 26

Distribute map overlay information to adjacent units?

1 = Negative; 6 = Positive

Commander:	1.50	Respondents: 2
Staff Officer:	3.58	Respondents: 31
Operator:	4.20	Respondents: 25

Distribute map overlay information to higher units?

1 = Negative; 6 = Positive

Commander:	N/A	Respondents: 0
Staff Officer:	3.77	Respondents: 31
Operator:	4.26	Respondents: 23

Using the map overlays, how easy was it to:

Display friendly force information such as unit size, type, location, and parent unit?

1 = Difficult; 6 = Easy

Commander:	4.50	Respondents: 4
Staff Officer:	4.26	Respondents: 39
Operator:	5.00	Respondents: 35

Interpret friendly force information such as unit size, type, location, and parent unit?

1 = Difficult; 6 = Easy

Commander:	4.20	Respondents: 5
Staff Officer:	4.30	Respondents: 43
Operator:	5.08	Respondents: 36

Display fire support control/coordination measures?

1 = Difficult; 6 = Easy

Commander:	3.33	Respondents: 3
Staff Officer:	4.74	Respondents: 31
Operator:	4.64	Respondents: 14

Interpret fire support control/coordination measures?

1 = Difficult; 6 = Easy

Commander:	3.66	Respondents: 3
Staff Officer:	4.86	Respondents: 29
Operator:	4.40	Respondents: 15

Display friendly and enemy unit locations?

1 = Difficult; 6 = Easy

Commander:	4.60	Respondents: 5
Staff Officer:	4.69	Respondents: 45
Operator:	5.15	Respondents: 34

Using the map overlays, how easy was it to:

Interpret friendly and enemy unit locations?

1 = Difficult; 6 = Easy

Commander:	4.20	Respondents: 5
Staff Officer:	4.13	Respondents: 46
Operator:	4.97	Respondents: 35

Display friendly force information such as task organization and current tactical status?

1 = Difficult; 6 = Easy

Commander:	3.67	Respondents: 3
Staff Officer:	3.59	Respondents: 29
Operator:	4.53	Respondents: 17

Interpret friendly force information such as task organization and current tactical status?

1 = Difficult; 6 = Easy

Commander:	3.67	Respondents: 3
Staff Officer:	3.73	Respondents: 26
Operator:	4.45	Respondents: 22

Display tactical control measures such as boundaries, objectives, phase lines, etc.?

1 = Difficult; 6 = Easy

Commander:	4.50	Respondents: 4
Staff Officer:	4.62	Respondents: 40
Operator:	4.70	Respondents: 33

Interpret tactical control measures such as boundaries, objectives, phase lines, etc.?

1 = Difficult; 6 = Easy

Commander:	4.00	Respondents: 3
Staff Officer:	4.53	Respondents: 38
Operator:	4.68	Respondents: 34

Using the map overlays, how easy was it to:

Display man-made obstacles such as minefields, barriers, etc?

1 = Difficult; 6 = Easy

Commander:	3.00	Respondents: 3
Staff Officer:	4.70	Respondents: 27
Operator:	4.97	Respondents: 32

Interpret man-made obstacles such as minefields, barriers, etc.?

1 = Difficult; 6 = Easy

Commander:	3.33	Respondents: 3
Staff Officer:	3.89	Respondents: 28
Operator:	4.84	Respondents: 31

Using the map overlays, how easy was it to access friendly force information on logistics/maintenance status such as equipment status, supply status, critical shortages, etc.?

1 = Difficult; 6 = Easy

Commander:	1.80	Respondents:	5
Staff Officer:	3.24	Respondents:	21
Operator:	4.42	Respondents:	19

Using the map overlays, how easy was it to access personnel data such as friendly unit strength, KIAs/WIAs, critical shortages, etc.?

1 = Difficult; 6 = Easy

Commander:	2.00	Respondents:	3
Staff Officer:	3.58	Respondents:	19
Operator:	4.87	Respondents:	15

How easy was it to identify individual map symbols?

1 = Difficult; 6 = Easy

Commander:	4.57	Respondents:	7
Staff Officer:	4.78	Respondents:	64
Operator:	4.92	Respondents:	39

To what extent did TCO employ standard Marine Corps map symbology?

1 = Never; 6 = Constantly

Commander:	4.20	Respondents:	5
Staff Officer:	4.85	Respondents:	61
Operator:	4.81	Respondents:	32

How well did map graphics, such as unit symbols and control measures, convey the appropriate information about the item represented?

1 = Poorly; 6 = Very Well

Commander:	3.75	Respondents:	4
Staff Officer:	4.05	Respondents:	60
Operator:	4.48	Respondents:	33

How well did TCO display current and predicted weather information?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	0
Staff Officer:	1.22	Respondents:	9
Operator:	1.00	Respondents:	3

INFORMATION PRESENTATION

How well did TCO allow you to highlight, hide, or arrange displayed data?

1 = Poorly; 6 = Very Well

Commander:	3.00	Respondents:	5
Staff Officer:	2.98	Respondents:	54
Operator:	N/A	Respondents:	N/A

How well did the content, format, and organization of the information displayed by TCO meet your requirements?

1 = Poorly; 6 = Very Well

Commander:	2.83	Respondents:	6
Staff Officer:	3.37	Respondents:	68
Operator:	4.20	Respondents:	40

How easy was it to customize data displays (i.e., screen setup to accommodate specific missions and tactical situations?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	2.59	Respondents:	39
Operator:	3.80	Respondents:	25

How consistently were blanks, spacing, lines, color coding or other means used to separate groups of information?

1 = Inconsistent; 6 = Consistent

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.45	Respondents:	31

How clearly did TCO notify you when priority messages were received?

1 = Poorly; 6 = Very Clearly

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.63	Respondents:	41

DATA ENTRY

How adequate were the plan and order templates provided by TCO?

1 = Unacceptable; 6 = Very Acceptable

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.33	Respondents:	39
Operator:	4.39	Respondents:	18

How well did TCO prevent you from inputting the wrong type of data? (ex. inputting letters in number fields, etc.

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.06	Respondents:	33
Operator:	3.97	Respondents:	30

How well did TCO data entry procedures minimize the number of actions required to enter data?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.03	Respondents:	58
Operator:	3.92	Respondents:	37

How did the forms provided by TCO affect your ability to perform your tasks?

1 = Hindered; 6 = Improved

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.58	Respondents:	62
Operator:	N/A	Respondents:	N/A

How often was it necessary to manually enter data that was already elsewhere in the system?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	3.94	Respondents:	32

How consistent were the data entry procedures throughout TCO?

1 = Consistent; 6 = Inconsistent

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.82	Respondents:	39

How adequate was the system feedback concerning the acceptance or rejection of data you entered into TCO?

1 = UnAcceptable; 6 = Very Acceptable

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.12	Respondents:	33

How often were there instances when you were required to enter data in units that were unusual or out of the ordinary?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.61	Respondents:	31

SCREEN DESIGN

How well did the labels and names used by TCO indicate what they represented?
1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.21	Respondents:	68
Operator:	4.85	Respondents:	41

How easy was it to understand and remember the labels used to identify the display screens?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.62	Respondents:	66
Operator:	5.07	Respondents:	41

How well did the display screen labels in TCO indicate where each display screen was relative to other display screens?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.80	Respondents:	45
Operator:	4.58	Respondents:	38

DATA DISPLAY

How similar are the data displays used by TCO to current format for displaying data?

1 = Different; 6 = Identical

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.45	Respondents:	49
Operator:	N/A	Respondents:	N/A

How often were the formats used for data display consistent throughout TCO?

1 = Never; 6 = Always

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.46	Respondents:	46
Operator:	N/A	Respondents:	N/A

How easy was it to immediately use the data provided by TCO (i.e., did data often require further manipulation?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.13	Respondents:	60
Operator:	4.43	Respondents:	37

How often were there instances when a naturally occurring order (e.g. chronological or sequential) in the data were not reflected in the TCO display?

1 = Constantly; 6 = Never

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.60	Respondents:	25

How easy was it to detect signals, alerts and alarms?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	3.97	Respondents:	30

NETWORK ISSUES

How easy was it for you to determine system status information (i.e., network busy, terminal down, etc. when using the TCO system?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.18	Respondents:	67
Operator:	4.07	Respondents:	41

Using TCO, how easy was it to route appropriate messages and parts of messages to the appropriate organizations and echelons?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.39	Respondents:	76
Operator:	4.72	Respondents:	39

How easy was it to set up and modify access privileges for individual users?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.67	Respondents:	18
Operator:	5.00	Respondents:	22

How easy was it to locate and enter network addresses for other individual users on the LAN?

1 = Difficult; 6 = Easy

Commander:	N/A	Respondents:	N/A
Staff Officer:	4.72	Respondents:	43
Operator:	5.17	Respondents:	30

How well did TCO accommodate access privileges across terminals when you moved from one work station to another?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	4.48	Respondents:	23

LARGE AND MEDIUM SCREEN DISPLAYS (LSD AND MSD)

How well did the design of the LSD/MSD meet your requirements?

1 = Poorly; 6 = Very Well

Commander:	3.00	Respondents:	4
Staff Officer:	3.16	Respondents:	45
Operator:	N/A	Respondents:	N/A

How do you rate the text and graphics display characteristics of the LSD/MSD?

1 = Unacceptable; 6 = Acceptable

Commander:	4.00	Respondents:	5
Staff Officer:	4.23	Respondents:	47
Operator:	4.86	Respondents:	21

How well did the LSD/MSD functional capabilities meet operational needs?

1 = Poorly; 6 = Very Well

Commander:	3.67	Respondents:	3
Staff Officer:	3.25	Respondents:	44
Operator:	N/A	Respondents:	N/A

How easy was it to read map legends, labels and other information through the electronic map overlay (LSD or MSD?)

1 = Difficult; 6 = Easy

Commander:	3.67	Respondents:	6
Staff Officer:	3.85	Respondents:	41
Operator:	4.82	Respondents:	22

MOBILITY

What affect would the introduction of the TCO system, as configured for FDS-, have on the mobility of your organization?

1 = Negative; 6 = Positive

Commander:	1.86	Respondents:	7
Staff Officer:	2.06	Respondents:	80
Operator:	N/A	Respondents:	N/A

In your opinion, what would be the impact of the introduction of TCO, as configured for FDS-1, on your organization's vehicle requirements?

1 = Increase; 6 = Decrease

Commander:	1.57	Respondents:	7
Staff Officer:	1.81	Respondents:	73
Operator:	N/A	Respondents:	N/A

LOG-ON/LOG-OFF/SECURITY

How well did TCO prevent data loss from occurring as a result of accidentally logging-off?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	2.58	Respondents:	45
Operator:	3.68	Respondents:	38

How clearly did TCO notify you when information was updated?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	2.83	Respondents:	42
Operator:	3.12	Respondents:	34

How well did TCO ensure that data base updates were only made by authorized users?

1 = Poorly; 6 = Very Well

Commander:	N/A	Respondents:	N/A
Staff Officer:	N/A	Respondents:	N/A
Operator:	3.58	Respondents:	19

TRAINING

How much of the knowledge necessary to effectively use TCO could be acquired through on-the-job as opposed to special training?

1 = None; 6 = All

Commander:	3.86	Respondents:	7
Staff Officer:	4.14	Respondents:	77
Operator:	4.48	Respondents:	42

How much additional knowledge would be required of persons in your MOS to effectively use TCO?

1 = None; 6 = A Lot

Commander:	4.33	Respondents:	6
Staff Officer:	3.69	Respondents:	78
Operator:	3.51	Respondents:	39

In your estimation, how many of the Marines who would use this system in the future would have the necessary skills to operate TCO?

1 = None; 6 = All

Commander:	4.00	Respondents:	6
Staff Officer:	4.06	Respondents:	79
Operator:	N/A	Respondents:	N/A

How useful was the on-line help in TCO?

1 = Useless; 6 = Very Useful

Commander:	N/A	Respondents:	N/A
Staff Officer:	2.53	Respondents:	30
Operator:	3.83	Respondents:	23

How useful were the TCO training manuals?

1 = Useless; 6 = Very Useful

Commander:	N/A	Respondents:	N/A
Staff Officer:	3.50	Respondents:	34
Operator:	3.54	Respondents:	37

MISCELLANEOUS

In your estimation, how well will the design of TCO support a jump command post?

1 = Poorly; 6 = Very Well

Commander:	1.75	Respondents:	4
Staff Officer:	3.06	Respondents:	70
Operator:	N/A	Respondents:	N/A

How much additional training do you feel would be necessary for you to effectively use the current implementation of TCO?

1 = A Lot; 6 = None

Commander:	N/A	Respondents:	4
Staff Officer:	3.30	Respondents:	74
Operator:	N/A	Respondents:	N/A

A.2 REQUIREMENTS QUESTIONNAIRES

The following is a list of the questions on the requirements questionnaire followed by the mean rating and the number of people who responded to the question. There were a total of 74 respondents to the Requirements Questionnaire. A copy of the Requirement's Questionnaire is provided in Appendix A. The following rating scale was used for each question.

Negative Impact		Inconsequential		Desired Capability		Significant Enhancement		Necessary Requirement	
0	1	2	3	4	5	6	7	8	

1. The ability to prepare plans using an automated tool.
   Mean Rating: 6.26 Respondents: 74

2. The ability to prepare orders using an automated tool.
   Mean Rating: 6.39 Respondents: 71

3. The ability to prepare courses of action using an automated tool.
   Mean Rating: 6.04 Respondents: 71

4. The ability to prepare reports using an automated tool.
   Mean Rating: 6.79 Respondents: 73

5. The ability to prepare requests using an automated tool..
   Mean Rating: 6.78 Respondents: 73

6. The ability to import or export to other software programs (e.g., WordPerfect, Enable etc.).
   Mean Rating: 6.27 Respondents: 71

7. The ability to display situational maps on a computer screen.
   Mean Rating: 5.85 Respondents: 72

8. The ability to display the situation over a paper map on a large screen display (LSD) using electronic map overlays.
   Mean Rating: 5.64 Respondents: 69

9. The ability to display the situation over a paper map on a medium screen display (MSD) using electronic map overlays.
   Mean Rating: 5.03 Respondents: 69

10. The ability to generate map overlays using a computer.
    Mean Rating: 6.44 Respondents: 70

11. The ability to transmit and receive messages through a computer.
    Mean Rating: 6.81 Respondents: 73

12. The ability to transmit and receive graphics through a computer.
    Mean Rating: 6.35 Respondents: 72

13. The ability to update the situation map automatically, based on incoming messages.
Mean Rating: 6.11 Respondents: 73

14. The ability to reconfigure communications paths to accommodate system component failures.
Mean Rating: 6.60 Respondents: 68

15. The ability to generate backup situation maps.
Mean Rating: 5.78 Respondents: 68

16. The ability to generate backup map overlays.
Mean Rating: 5.67 Respondents: 69

17. The ability to plot computer graphics on acetate.
Mean Rating: 5.52 Respondents: 66

18. The ability to access instructional information using a computer (i.e., an "on-line help" function).
Mean Rating: 5.97 Respondents: 72

19. The ability to send messages to everyone on the system (i.e., the ability to "broadcast" messages).
Mean Rating: 6.46 Respondents: 74

20. The ability to maintain an automated journal at each station.
Mean Rating: 6.29 Respondents: 70

21. The ability to maintain an automated journal at the COC.
Mean Rating: 6.47 Respondents: 74

22. The ability to recall messages from a journal.
Mean Rating: 6.67 Respondents: 72

23. The ability to determine when a message was transmitted.
Mean Rating: 6.53 Respondents: 74

24. The ability to determine when a message was received.
Mean Rating: 6.50 Respondents: 74

25. The ability to determine when a message was read.
Mean Rating: 5.23 Respondents: 70

26. The ability to determine when a message was action complete.
Mean Rating: 5.64 Respondents: 70

27. The ability to read or "overhear" messages transferred on the LAN that were not directed to you specifically.
Mean Rating: 4.73 Respondents: 74

28. The ability to transmit text to other units using computers.
Mean Rating: 6.93 Respondents: 73

29. The ability to transmit graphics to other units using computers.
Mean Rating: 6.43 Respondents: 72

30. The ability to quickly establish voice communications.
Mean Rating: 7.29 Respondents: 73

31. The ability to determine friendly unit status of class 1 through 10.
Mean Rating: 6.05 Respondents: 61

32. The ability to display real time information from PLRS.
Mean Rating: 6.48 Respondents: 65

33. The ability to display real time information from ATACC.
Mean Rating: 6.16 Respondents: 51

34. The ability to send messages to PLRS units.
Mean Rating: 5.97 Respondents: 60

35. The ability to receive updates from GPS.
Mean Rating: 6.46 Respondents: 61

36. The ability to display color graphics.
Mean Rating: 5.49 Respondents: 68

37. The ability to monitor the current status of requests.
Mean Rating: 5.92 Respondents: 71

38. The ability to transmit/receive information to/from LFADS.
Mean Rating: 5.98 Respondents: 53

39. The ability to transmit/receive information to/from MAGTF II.
Mean Rating: 5.45 Respondents: 53

40. The ability to transmit/receive information to/from MIPS.
Mean Rating: 6.18Respondents: 57

41. The ability to monitor personnel status.
Mean Rating: 5.96 Respondents: 67

42. The ability to handle EPW.
Mean Rating: 5.10 Respondents: 62

43. The ability to track WIA.
Mean Rating: 5.87 Respondents: 67

44. The ability to determine the availability of communication assets.
Mean Rating: 5.65 Respondents: 65

45. The ability to process classified data using a computer.
Mean Rating: 6.74 Respondents: 69

46. The ability to limit access to data for security.
Mean Rating: 6.96 Respondents: 69

47. The ability to backup data on a computer using floppy disks.
Mean Rating: 7.19 Respondents: 70

48. The ability to recreate a computer environment (data, communications configuration, etc.) using floppy disks.
Mean Rating: 6.74 Respondents: 62

49. The ability to perform automated terrain analysis.
Mean Rating: 6.37 Respondents: 59

50. The ability to automatically identify mobility corridors.
Mean Rating: 6.46 Respondents: 61

51. The ability to automatically predict weather information.
Mean Rating: 5.42 Respondents: 59

52. The ability to automatically predict enemy courses of action.
Mean Rating: 5.58 Respondents: 59

53. The ability to automatically create INTEL collection plans.
Mean Rating: 6.28 Respondents: 57

54. The ability to automatically perform logistics/time analysis.
Mean Rating: 6.30 Respondents: 61

A.3 REPORTS QUESTIONNAIRE

The following table indicates the number of people who rated each type of form on the Reports questionnaire, how many people felt it was an improvement over current methods, and the mean rating given the questionnaire on a five point scale where "1 = unsatisfactory" and "5 = acceptable". There were a total of 42 respondents to the Reports Questionnaire. A copy of the Reports questionnaire is included in Appendix A.

Respondents	Improvement (Y/N)	Mean Rating (N)
AFUBAMOUP	3	2/14 (1)
CASREP	18	14/43.76(17)
DISREP	6	3/34.25 (4)
DUMPSTATREP	9	7/24.0 (7)
FIRECAP	6	4/25.0(2)
FIREPLANREP	6	4/23.67(3)
FREE TEXT	37	32/54.06(34)
INTSUM	10	8/23.62(8)
ITUSPOT	4	3/13.67(3)
LOGSUM	11	8/33.75(8)
MIJIREP	8	7/13.80(5)
ENMINEREP	10	7/34.50(6)
FRNDMINEREP	9	6/34.60(5)
NBC 1	23	20/34.16(19)
NBC 3	21	17/44.25(16)
NBC 4	20	16/44.20(15)
PERINTSUM	7	6/14.60(5)
SALUTEREP	22	17/54.00(16)
SENREP	7	5/24.33(3)
SHELLREP	12	9/30.11(9)
SITREP	26	21/54.13(23)
SPOTREP	24	18/63.85(20)
TARGETREP	6	3/34.00(4)
PERSTATREP	11	10/13.80(10)
PERSTRENREP	11	10/13.70(10)
CASPROJ	7	7/03.57(7)

APPENDIX B

7th MEB AFTER ACTION REPORT

NARRATIVE SUMMARY OF IMPRESSIONS

I. BACKGROUND. The 7th MEB received its initial brief in mid-June 1991 from MCRDAC on the Marine Tactical Command and Control System (MTACCS) and accepted the tasking to conduct the evaluation of Field Development System-1 (FDS-1). The original date proposed by MCRDAC for the evaluation was late August. As planning began it became apparent that, for a variety of reasons, an August evaluation date was ambitious. At a 1 July meeting in Ft. Wayne, IN, between the CG, 7th MEB; Deputy CG, MCRDAC and contractor representatives the period 16-22 November was decided upon for conducting the evaluation. An Initial Planning Conference was held on 20-21 August and a Final Planning Conference on 1-2 October.

II. PREPARATION. The decision by the Officer Scheduling the Exercise (OSE) and Officer Conducting the Exercise (OCE) to conduct the FDS-1 evaluation at MCAGCC in a field environment required that extensive logistical preparations be made to support exercise participations. Despite field duty being prescribed, the anticipated cost of the evaluation rose. Significant numbers of personnel and equipment were deployed from MCB Camp Pendleton and MCAS El Toro, to include an offbase displacement of the I MEF TWSEAS suite from the Los Flores area at Camp Pendleton to MCAGCC. The total number of exercise participants eventually approached 1200. Two major exercise nodes were erected at MCAGCC, one in a gymnasium facility at Mainside (the Tactical Exercise Control Group) and one spread over several kilometers in the Oasis training area (the Exercise Force), separated by some six miles. The displacement, the field conditions and the separation distances involved all contributed to the realism of the CPX play. During the preparation period it was decided to conduct the evaluation in three phases: Phase I: hardware only, Phase II: hardware and limited radio, Phase III: radio and displacement of the GCE.

III. TRAINING. Individual and collective training in preparation for the evaluation was conducted at the MCTSSA compound aboard Camp Pendleton from 15 October to 7 November. 263 officer and enlisted personnel were trained in one or more subsystems of MTACCS that involved 12,764 training manhours. Use of the MCTSSA facility, and the trained cadre of communications/computer experts available was essential to the success of the FDS-1 evaluation. The lengthy training period was required to familiarize Marines with the various components of MTACCS. Overall the training sessions were successful, giving first individuals and then staffs the minimal knowledge necessary to operate the systems being evaluated. Two major problems with the contractor-prepared training package were a lack of familiarity with standard Marine Corps operational methods (spending hours attempting to teach Corporals and Sergeants how to draft Operations Orders) and a lack of time to instruct operators and supervisors in all the various facets of the MTACCS software programs. Additionally, due to equipment limitations, the first time the entire MTACCS suite was wired together was several hours prior to the start of collective training; significant training time was therefore spent troubleshooting the system during the early

stages of collective training.

IV. PILOT TEST. The pilot test period of the evaluation lasted from 16-19 November, and was designed to be an operational check for MTACCS in a field environment/configuration. Although a three-day CommEx had preceded the pilot test, it was not until all operators and supervisors were at their stations in each command node that significant problem identification and troubleshooting could begin.

Several problems were identified during the first two days of the pilot test. While communications between the TCO/auxiliary stations within each command node was quickly established and maintained, connectivity between separate nodes and between the exercise force and the TECG could not be maintained with any consistency. These connectivity problems were of such a severity as to threaten conduct of the evaluation. After many hours of effort and numerous technical meetings, it was decided to disconnect the MTACCS terminals from all military communications equipment and to hardwire all nodes together. Effectively, this created an enormous local area network (LAN) out of the entire exercise force. While this solution improved communications connectivity to the point where the evaluation could begin, it prevented the evaluation from proceeding to Phases II and III. Throughout the pilot test and subsequent field evaluation, the inability to pass MTACCS digital information over current USMC analog communications equipment was the most significant shortcoming.

The remaining two days of the pilot test passed without major incident. Scenario operational play was conducted at a relatively low, pre-hostilities level to allow operators and supervisors to more thoroughly familiarize themselves with MTACCS and its various subsystems.

V. FIELD EVALUATION. The formal field evaluation period was scheduled from 20-24 November, with extended operations planned for the last day to test system durability. A defensive scenario had been selected, to ease the exercise force and the MTACCS into a high tempo of operations. This meant that initially the MEB command element and the ACE were fully employed in fighting the deep battle, while the GCE and the CSSE were operating at a much lower degree of intensity while awaiting the enemy attack.

An initial finding during the field evaluation was that while the centerpiece of MTACCS, TCO, proved in many respects more functional and durable in operation than had been predicted, the same could not be said for many of the ancillary systems that were brought to the evaluation to play off of, and provide information to, TCO. While a certain degree of "swivel chair" connectivity had been expected, it soon became apparent that several of the ancillary systems were only capable of making a marginal contribution. For example, the Data Link Simulator Personnel Computer (DLS PC), which provided air tracks to the Advanced Tactical Air Command Center (ATACC) and Air Situation Display System (ASDS), became manually operational for only the last two days of the evaluation. Without

the automated DLS PC functional, "swivel chair" connectivity was required to evaluate ATACC and ASDS.

During the evaluation, TCO at the MEB level proved capable for a prototype system, and kept watch officers in the MEB COIC situationally aware of the scenario as it progressed. Down time for most of the TCO systems at the MEB level was minimal, and despite numerous power fluctuations and system "crashes" the great majority of combat essential information was retained and quickly redisplayed. Only one catastrophic information loss, which would have taken the MEB CE out of the picture during real operational activity, occurred over four days of operation. In this respect TCO surpassed the expectations of those personnel evaluating it at the MEB CE level. The G-2 section was an exception. The modems for G-2 TCO suites were incapable of handling the volume of data and experienced extensive system "crashes". This resulted in the G-2 section abandoning TCO and implementing a manual system.

Other problems with TCO were evident throughout the rest of the exercise force. TCO software in its current state of development is cumbersome and time consuming, the graphics are inadequate, and system durability/reliability does not begin to approach that required for an operational system.

While the field evaluation was continuing, tests were conducted nightly to determine if the interface between MTACCS/TCO and USMC communications equipment could be effected with enough reliability to proceed to Phases II and III of the evaluation. It was concluded that successful connectivity was not possible by radio. Due to the inability to proceed to Phases II and III the OCE decided to terminate the FDS-1 evaluation 24 hours earlier than planned.

VI. FINDINGS

A. APPLICABILITY. The applicability of automated systems to the various levels of command appears directly proportional to the level of command. The automated systems are equipment intensive and do not lend themselves well to rapid displacement. Higher headquarters are required to move less often and are more likely to have the power sources required. Limitations impact most severely on the infantry battalions and to a lesser extent the infantry regiments, who must remain highly mobile. The ACE and CSSE, because they are normally located at fixed facilities, may not suffer as severely at lower level as the GCE.

B. UTILITY

1. The utility of MTACCS to the operational FMF commander appears to be in three broad, general areas: planning, decision making support, and information dissemination. FDS-1 has successfully demonstrated the tremendous potential of MTACCS in all three of these areas; it remains to be seen whether the plethora of problems that were identified can be surmounted.

2. MTACCS does not seem to provide much benefit to the infantry battalion. Their area of concern is limited to where a battalion commander and his staff can maintain situational awareness through conventional methods. A comment provided by an infantry battalion staff officer: "We'd rather have good, reliable voice communications." To overcome this reluctance to rely on digital communications a lighter, more streamlined configuration for MTACCS must be developed for use at battalion level.

3. The infantry regiment will have a greater ability to configure the system for its required mobility in such vehicles as the AAVC-7 or the LAV C2, and the TCO functionality may provide more effective command and control for the regiment. However, the configuration used in the FDS-1 evaluation of 9 TCO terminals is too bulky for mobility purposes; development of smaller, lighter hardware and other similar software efforts could make the system more manageable.

VII. CONCLUSIONS

A. The FDS-1 evaluation demonstrated that automated digital command and control systems have potential to serve as a means to expedite and enhance the areas of planning, decisionmaking support and information dissemination.

B. The evolutionary approach of the FDS-1 evaluation, which allowed operational end user input into the developmental process much earlier than usual, is an innovative step and crucial to the continued successful development of MTACCS.

MCLLS AFTER ACTION REPORT

1. All elements of the exercise force provided input to the after action items. Duplicate items were condensed and submitted as a single item. This enclosure presents those items selected for the MCLLS system.

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21105-52501 (00001), submitted by J.J. MARCHRZAK, COL, 7TH MEB G-3, 957-7483, (619)368-7483.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: 1ST MARINE REGIMENT, 3D BN 1ST MAR, 3D BN 7TH MAR, 2D MAW, 7TH MEB, ACE, ACQUISITION, ADMINISTRATION, ADP/COMPUTERS, ASDS (AIR SIT DISP SYS), ATACC (ADVTACAIRCMDCENTL, AUTOMATED SYSTEMS, BSSG, C2, CE, COMMAND POST, COMMUNICATIONS, COMPUTERS, CONTROL GROUP, CPX, CSSCS (CBT SVC SPT CTL SY, DESERT, DEVELOPMENT, DIGITAL COMMUNICATIONS, DIGITAL SYSTEMS, EXERCISE ISSUE, EXFOR (EXERCISE FORCE), FDS-1, FIREFLEX, GCE, HARDWARE, I MEF, IAS (INTEL ANALYSIS SYS), INTELLIGENCE, LAND WARFARE, LFADS (LDG FRC ASSET DIST, LOGISTICS, MAGTF, MAGTF II, MAW, MCAGCC, MCAS EL TORO, MCB CAMP PENDLETON, MCRDAC, MEB, MECHANIZED OPERATIONS, MIPS (MAR INTEG PERS SYS), MSEL (MASTER SCN EV LIST), MTACCS (MAR TAC C2 SYS), OCE (OFF CONDUCTING EXER), OPERATIONS, RADIOS, SOFTWARE, SOUTHWEST ASIA, STAFF FUNCTIONS, TCO (TACT CBT OPS), TRAINING, TRANSMISSION SYSTEMS, TWSEAS, USMC, VHF.

4. (U) TITLE: SUMMARY - FIELD DEVELOPMENT SYSTEM-1 (FDS-1) EVALUATION

5. (U) GENERAL DESCRIPTION:

a. FDS-1 Evaluation was a command post exercise conducted by FMF units in support of CG, MCRDAC.

b. Purpose of the evaluation was to test various elements of the MTACCS currently in development, with emphasis on TCO, and provide operational/end user feedback in order to guide further development.

c. Officer scheduling exercise (OSE): CG, I MEF. Officer conducting exercise (OCE): CG, 7th MEB.

d. Scenario play/OPFOR for the CPX was provided by a Tactical Exercise Control Group and TWSEAS, which deployed from MCB Camp Pendleton in support of the evaluation.

6. (U) DATES:

a. Training - 15 October to 7 November 1991

b. Deployment - 7 to 13 November 1991

c. Employment - 13 to 22 November 1991

d. Redeployment - 22 to 26 November 1991

7. (U) LOCATION OF OPERATIONS:

a. Pre-evaluation training was conducted primarily at MCB Camp Pendleton, CA. The evaluation was conducted at Marine Corps Air Ground Combat Center (MCAGCC), Twentynine Palms, CA.

b. The exercise simulated mechanized operations in Southwest Asia.

8. (U) LOCATION OF PERSONNEL:

a. All participants were located at MCAGCC.

b. Personnel deployed from MCB Camp Pendleton and MCAS El Toro to participate in the evaluation.

9. (U) OBJECTIVES: Specific objectives for the FDS-1 Evaluation were to:

a. Identify those aspects of the system concept and design that:

(1) Provide improved capability in performing C2.

(2) Provide no benefit to the commander and staff in the performance of C2.

(3) Can be enhanced in future prototypes of MTACCS.

(4) Are not currently present and need to be incorporated to improve C2.

b. Provide input into the MTACCS system design for the FDS-2 evaluation based on the evaluation results.

c. Establish standard procedures to be used in future MTACCS FDS evaluations.

d. Evaluate requirements for a mobile jump command post as part of the MTACCS FDS-1 evaluation.

10. (U) PHASES: Conduct of exercise scheduled into three phases:

a. Phase I: hardwire only

b. Phase II: hardwire and limited radio

c. Phase III: radio and displacement of GCE

11. (U) LIMITATIONS:

a. Due to the inability to maintain automated system connectivity via single-channel radio (VHF), the FDS-1 evaluation was limited to Phase I vice the three progressive

phases originally envisioned.

b. Due to various developmental states of the MTACCS auxiliary systems, and compatibility problems between those systems and TCO, not all of the auxiliary systems (IAS, LFADS, ASDS, etc.) received thorough evaluation as functioning components of MTACCS.

12. (U) MAJOR PARTICIPANTS:

a. 7th MEB Command Element.

b. 1st Marine Regiment staff, plus staffs from the 3d BN, 1st MAR, 3d BN, 7th MAR and 1st BN, 11th MAR.

c. 3d MAW ACE staff.

d. Brigade Service Support Group 5 staff.

13. (U) COMMANDERS COMMENTS:

a. The FDS-1 evaluation demonstrated that automated digital command and control systems have potential to serve as a means to expedite and enhance the areas of information dissemination, decisionmaking support and planning.

b. The approach of the FDS-I evaluation, which allowed operational user input into the developmental process much earlier than usual, is an innovative step to the development of MTACCS.

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21101-21330 (00002), submitted by AC/S G-2 7TH MEB. -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/15/91.

3. (U) KEYWORDS: AAW (ANTIAIR WARFARE), ADMINISTRATION, AIR DEFENSE, AIR WARFARE, ASIA, CPX, FA, FDS-1, FIRE SUPPORT, INTELLIGENCE, LAND WARFARE, LOGISTICS, MC&G (MAPPING, CHARTING), OPERATIONS, ORDNANCE, PERSONNEL.

4. (U) TITLE: TCO ENEMY SYMBOL GENERATION

5. (U) OBSERVATION: TCO Enemy Symbol Generation.

6. (U) DISCUSSION: The function which allows the construction of new enemy units is not flexible enough to allow for the construction of units which are not in the preplanned menu. The menu for constructing enemy units is identical to the type of one used for constructing friendly units. Military map symbols were created to allow for instant understanding of a unit at a glance. The limitations imposed by a menu not specifically geared toward enemy symbols is unacceptable. An example is illustrated by an attempt to construct an SA-2 Surface to Air Missile (SAM) unit and an air defense artillery unit. The current menu allows only a basic air defense symbol which does not even specify between ADA and SAMs. The ability to caveat these symbols within the unit editor function exists; however, it is time consuming and still does not allow for a satisfactory graphic presentation. The "other" field, which was provided for a minuscule amount of flexibility does not affect the symbol in any way when populated.

7. (U) LESSON LEARNED: None

8. (U) RECOMMENDED ACTION: Further grooming of the enemy symbols menu, under the supervision of an experienced intelligence analyst, who is currently holding a fleet billet, and preferably familiar with the style of enemy symbol notation used in Southwest Asia. The menu needs to be revised to display specific threat options and include increased flexibility in constructing ad hoc symbols.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21101-40955 (00003), submitted by AC/S G-2 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: AIR WARFARE, AOB (AIR ORDER OF BATTLE), C2, CDIC, COMMUNICATIONS, COUNTERINTELLIGENCE, CPX (COMMAND POST EXER), ELINT (ELECTRONIC INTEL), FDS-1, FIIU (FLT IMG INTERP UNIT, GOB (GRN ORDER OF BATTLE), IAS (INTEL ANALYSIS SYS), IMINT (IMAGERY INTEL), INTELLIGENCE, LIAISON, MAFC (MAR ALL-SRC FUSION), OPERATIONS, RECONNAISSANCE, SENSORS, SIGINT (SIGNALS INTEL).

4. (U) TITLE: IAS TERMINAL OWNERS

5. (U) OBSERVATION: IAS-Terminal Owners.

6. (U) DISCUSSION: While the current IAS configuration identifies part of the necessary stations, it does not identify the actual number of analysts which will require continuous access to this type of system. Within the MAFC, the current configuration only allows access for the watch officer, GOB analyst, AOB analyst, and collections. The Genser station only allows access for one consolidated analyst.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Within the MAFC, the number of ports must be enlarged to include continual access for the watch officer, two GOB analysts, two AOB analysts, two collections personnel, two CI personnel, one to two SIGINT analysts, one to two ELINT analysts, and one to two IMAGERY analysts (more IMAGERY analysts if collocated with the FIIU's analysis team). Within the CDIC, there should be a station for the journal/workbook, a RECON liaison, a SIGINT liaison, a collections liaison, etc. This would allow the MAFC and CDIC to more fully integrate their analysis efforts, and ultimately better assist the commander.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21101-57026 (00004), submitted by AC/S G-3 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, HARDWARE, SERVICE PUBLICATION, SOP (STANDING OP PROC).

4. (U) TITLE: OVERHEARD MESSAGES

5. (U) OBSERVATION: Overheard messages serve no useful purpose in a digital environment.

6. (U) DISCUSSION: The concept of overheard messages is a valid one, provided you are in a voice environment. "Hearing" a message over a computer system is not beneficial since you must deal with those messages that are specifically addressed to you first, then read each overheard message. Many of these messages have already been readdressed to those terminals that require them. In addition, several copies of the same message end up in this queue, since each time a terminal on your "net" sends this message it is "Overheard". The result is time wasted reading redundant messages that are of no real use. If the tempo of operations increases to the point that you are unable to read these messages, then they are equally unusable.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That a comprehensive SOP be developed, specifically dealing with the proper distribution of messages over TCO; that it be strictly adhered to; and that the "overheard" function be eliminated.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

1. (U) MCLLS NUMBER: 21101-92618 (00005), submitted by AC/S G-3 7TH MEB, CAPT GUZIK, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/15/91.

3. (U) KEYWORDS: AFATDS, C2 (COMMAND AND CONTROL), COMMUNICATIONS, CONTROL MEASURES, CPX (COMMAND POST EXER), FA (FIELD ARTILLERY), FDS-1, FIRE SPT COORDINATION, FIRE SPT PLANNING, FIRE SUPPORT, INTELLIGENCE, LAND WARFARE, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), OPERATIONS, ORDERS/GUIDANCE, SASS (SPTG ARMS SPEC STAF, TARGETING, USMC (US MARINE CORPS).

4. (U) TITLE: FIREFLEX OVERVIEW AND DIFICIENCIES

5. (U) OBSERVATION: FIREFLEX was evaluated by both the GCE and the MEB CE during FDS-1. It was generally well received in the GCE, but has serious limitations which hamper its potential for use in a MAGTF CE.

6. (U) DISCUSSION: During the Field Development System - 1 (FDS-1) evaluation, a component of the FIREFLEX system, the Fire Support Data Device (FSDD), was used by the Brigade Supporting Arms Special Staff (SASS). FIREFLEX was designed to automate artillery fire support planning and execution. It is an interim solution to the requirement for a supporting arms command and control system while the Advanced Field Artillery Tactical Data System (AFATDS) undergoes development.

The mission of the MAGTF SASS is to monitor and advise the Commanding General on fire support throughout the MAGTF's AOR. As such, the SASS does not concern itself with the level of detail that an FSCC does; it needs the larger picture. Targeting, especially for deep targets, becomes a much higher priority than in the GCE.

The FIREFLEX system evaluated did not meet the requirements of the SASS at the MEB level. Details are provided below. It should be noted, however, that the deficiencies noted were not because the system failed to accomplish what it was designed to do. The FIREFLEX system was included for FDS-1 evaluation in a staff section and at a level of command where it was not designed to be. Comments received from the GCE HQ and subordinate unit FSCCs indicate that it performed sufficiently well at their level.

Detailed shortcomings of the fireflex were as follows:

a. FIREFLEX has an auto-relay function which cannot be modified by the operator. This function passes all messages received which are from a specific category from the FIREFLEX to the Operations TCO. This is unsatisfactory as it information not needed by the G-3 and it rapidly fills his message queue.

b. The FIREFLEX can only send one Fire Support Coordination Measure at a time to TCO. This makes sending these measures a slow process. Discussions with the Magnavox representatives explained the reasons for this. The operators should be able to send these control measures at least as an overlay.

c. FIREFLEX does not process and cannot print Latitude/Longitude. This presents a real deficiency at the MEB and higher level.

d. The system can store a ten digit grid but does not allow for the insertion of the Grid Zone designator.

e. The system is limited to a 100,000 square meter area which is fine for Regimental Artillery and below but not for the MEB level.

f. TCO can not send operational graphics to FIREFLEX (boundaries, etc.). We could talk in free text as a work around but it was not particularly effective for sending graphic type information. FIREFLEX can send Fire Support Coordination Measures to TCO.

g. To truly serve as a Fire Support Coordination tool, this system must incorporate, at a minimum, aspects of NGF, CAS, and CIFS. The current program is truly effective for artillery only.

h. FIREFLEX needs to capability to maintain a "target card" type file system to record BDA and target disposition.

i. The MSD graphics on the FIREFLEX terminal needs to be provided the capability to display a wider area to allow use for MEB coverage, or an LSD needs to be provided.

j. Finally, when this type of system becomes operational, we will begin to rely quite heavily on it. Its inability to function properly has greater affects across the board. System reliability needs to approach 100%.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Targeting/SASS software needs to be developed, whether in FIREFLEX, AFATDS, or TCO, which will meet MEB level and higher requirements. The system should include the capability for fighting the deep battle complete with full grid information including Grid Zone designators and ten digit grids as they be required in targeting for some systems due to accuracy. The capability for Latitude/Longitude conversion should be included in the system.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21102-01955 (00006), submitted by AC/S G-3 7TH MEB, LTCOL BREEN, -, ( ) -.

2. (U) CPX FDS-1 conducted by CO 7TH MEB on 11/15/91.

3. (U) KEYWORDS: ACE, AIR WARFARE, ASDS (AIR SIT DISP SYS), ATACC (ADVTACAIRCMDCENTL), CE, COMMUNICATIONS, COMPUTERS, CONTROL MEASURES, CPX (COMMAND POST EXER), FDS-1, FEZ (FIGHTER ENGAGE ZONE), MAGTF (MAR AIR GND TF), MAW (MAR AIRCFT WING), MCRDAC, MEB, MEZ (MSL ENGAGE ZONES), ORDERS/GUIDANCE, T/E (TABLE OF EQUIPMENT), USMC (US MARINE CORPS).

4. (U) TITLE: AIR SITUATION DISPLAY SYSTEM (ASDS) OVERVIEW

5. (U) OBSERVATION: Despite numerous problems, the ASDS in the MEB COC demonstrated tremendous potential during FDS-1.

6. (U) DISCUSSION: During FDS-1, the ASDS demonstrated that it has the potential to provide a viable, real time, exchange of information for the MAGTF Commander and his aviation component. The system potentially allows the Air Officer to input data file "overlays" of Aviation oriented battlefield control measures; Missile Engagement Zones (MEZ's), Minimum Risk Routes (MRR's), Target Area of Influence (TAI's), etc., as well as GCE control measures such as unit locations, Forward Line of Troops (FLOT), FSCL, etc. The merging of these two components and the ability to select and present a wide range of information allows the MAGTF Commander a degree of situational awareness never before seen in a non-aviation USMC COC. As tested during FDS-1, ASDS was limited in this ability to the degree that it was not directly linked to the ATACC except for TADIL-B, the air picture. With the integration of data file transfer over and above TADIL-B, the MAGTF HQ and ACE will have a real time exchange of the battlefield situation.

Although ASDS may not be the chosen follow-on format for development, there is a valid requirement for the MEB CE to have a complete air picture. An ATACC remote would suffice, provided battlefield management overlays could be input to the remote separate from the ATACC operations. ASDS as tested was adequate in that it allowed for the MEB to input overlays separate from TACC operations. It was inadequate in the function of passing data files from ATACC to ASDS and vice cersa. There needs to be connectivity with ASDS and ATACC to correlate and validate overlays. For example, if TACC changes a MEZ, that overlay should be capable of being imported to the MEB or all terminals on the net. At present, there is no connectivity of ASDS for the MEB and ATACC except for TADIL-B for the air picture. Whatever the follow-on system to be developed, two terminals are required in the MAGTF CDIC. One would be utilized administratively to input various and ever changing control measures, update and input MEZs, FEZs, and engagement areas.

The second terminal would be utilized to work current operations, display and monitor the air picture for the CG.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Continue development of a system with the capabilities demonstrated by ASDS during FDS-1, for evaluation as part of FDS-2 and eventual fielding with MTACCS.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21102-04696 (00007), submitted by AC/S G-3 7TH MEB, GYSGT TIMMER, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/15/91.

3. (U) KEYWORDS: AMPHIBIOUS SHIPPING, CPX (COMMAND POST EXER), FDS-1, INTELLIGENCE, MC&G (MAPPING, CHARTING), NAVAL WARFARE, USN (US NAVY).

4. (U) TITLE: TCO CAPABILITY TO DISPLAY DIGITIZED MAPS

5. (U) OBSERVATION: TCO Needs the Capability to Display Digitized Maps.

6. (U) DISCUSSION: The TCO capability to display/show different map sizes (e.g. 1:25k, 1:50k, 1:100k, etc.) is a good feature. This feature needs to be expanded to include the capability to display maps up to 1:1M. Even though the TCO has the capability to change map sizes so quickly, the drawback is the LSD and the need to change folded maps in the LSD. With the enhancement of digitized terrain, the Operations Officer or Commander could immediately grasp the terrain perspective of the situation and better make tactical decisions.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Enhance the TCO with digitized maps and terrains features, plus the capability to view screens on the scale of 1:12.5K (urban terrain) to 1:1M (theater ops).

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21171-95019 (00008), submitted by AC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: AUTOMATED SYSTEMS, BSSG (BDE SERV SPT GRP), CE (COMMAND ELEMENT), CPX (COMMAND POST EXER), CSSCS, DEVELOPMENT, FDS-1, LOGISTICS, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), MTACCS, SUPPLY, TRANSPORTATION, USMC (US MARINE CORPS).

4. (U) TITLE: CSS TRACKING SYSTEM

5. (U) OBSERVATION: A CSS tracking system should be developed for FDS-2.

6. (U) DISCUSSION: TCO and CSSCS have many desirable capabilities. their orientation is more towards the BSSG than the MAGTF CE. At the MEB level, the focus is more on the theater logistical environment looking 30-45 days out. Interfaces with transportation systems/means are more important at the CE level. A cradle to grave (i.e. supply depot to user) tracking system is needed.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: For future iterations of MTACCS, develop a CSS/logistic tracking system for use by the MEB CE.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 2117)-96629 (00009), submitted by AC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/15/91.

3. (U) KEYWORDS: ADMINISTRATION, CPX (COMMAND POST EXER), FDS-1, LOGISTICS, MEDEVAC (MEDICAL EVAC), MEDICAL, PERSONNEL, SUPPLY, TAMMIS.

4. (U) TITLE: USE OF TAMMIS WITH TCO

5. (U) OBSERVATION: Use of the Theater Army Medical Management Information System (TAMMIS) with TCO is not currently possible.

6. (U) DISCUSSION: The interface between TCO and TAMMIS has not been developed. The full capabilities of TAMMIS must be evaluated including Maint Mgmt, Med supply, MEDEVAC, etc.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Develop TAMMIS interface with TCO. Train medical regulators and MEDLOGCO personnel to use the system. Develop medical play to test the system.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21171-98754 (00010), submitted by AC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, C2 (COMMAND AND CONTROL), COMMUNICATIONS, FDS-1, INFORMATION MANAGEMENT, LFADS, LOGISTICS, MAINTENANCE, MIMMS (MAR INTEG MAINT S), SASSY (SPT ACT SUP SYS), SOFTWARE, SUPPLY.

4. (U) TITLE: MIMMS DATA

5. (U) OBSERVATION: MIMMS data should be incorporated into the Landing Force Asset Distribution System (LFADS) to increase logistical efficiency.

6. (U) DISCUSSION: A key element of a Commander's information is the readiness of his equipment. MIMMS AND LFADS (SASSY) are not mutually exclusive entities. They share virtually the same information and should share the same database. By adding a MIMMS module into LFADS, types and functions of data should be combined.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: In future MTACCS development, MIMMS (PC) should be a module of LFADS vice a stand alone maintenance management system.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

---- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-24163 (00011), submitted by AC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, BSSG (BDE SERV SPT GRP), C2 (COMMAND AND CONTROL), CE (COMMAND ELEMENT), COMMUNICATIONS, COMMUNICATIONS EQUIP, CPX (COMMAND POST EXER), DEVELOPMENT, FDS-1, HARDWARE, INFORMATION MANAGEMENT, LAN (LOCAL AREA NETWORK), LOGISTICS, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), MODEM, TCO, TRANSMISSION SYSTEM, USMC (US MARINE CORPS).

4. (U) TITLE: COMBAT SERVICE SUPPORT OVERLAYS

5. (U) OBSERVATION: Combat Service Support overlays could not be transmitted between command nodes during FDS-1.

6. (U) DISCUSSION: The capability of TCO to develop combat service support overlays is a necessary requirement for logistics command and control. During the FDS-1 field evaluation the BSSG was able to develop a CSS overlay. Transmission of the CSS overlay to the MEB Logistics Operations Center (LOC) was attempted but unsuccessful. However, the G-6 and G-3 were able to provide friendly and enemy situation overlays to the G-4 over the TCO local area network (LAN). The BSSG was transmitting the CSS overlay through a modem to the LOC. The large file size necessary for developing a CSS overlay was not effectively transmitted over modem.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: For logistics command and control, transmission of large data files and graphics is a requirement. Increased modem performance or inclusion of the CSS element on the same LAN as the MEB G-4 is required to ensure timely transmission and handling of logistics information.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-26931 (00012), submitted by PC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by C2 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, C2 (COMMAND AND CONTROL), COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, HARDWARE, LOGISTICS, SUPPLY.

4. (U) TITLE: DATA INFORMATION BACK-UP AND UNINTERRUPTIBLE POWER

5. (U) OBSERVATION: Data Information Back-up and Uninterruptible Power

6. (U) DISCUSSION: Loss of data from power outage and TCO system lock-ups were routine occurrences during FDS-1. TCO does not have an automatic back-up capability to save current work in the event of power flux or system crash. Additionally, TCO will automatically delete messages if they are not read promptly. Most commercial programs on the market provide automated back-up of all data in the event of a power outage or system crash. Further, a tactical command and control system should never delete information without the deliberate intent by an operator to do so. From a hardware perspective, uninterruptible power supplies or emergency battery back-up to cover unforeseen loss of power would have been a significant enhancement to the system.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Future command and control systems should be designed with auto-save programming features and uninterruptable power supplies or emergency battery back-up.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-49088 (00013), submitted by AC/S G-4 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: 7TH MEB (7TH MAR EX BDE), ACQUISITION, ADP/COMPUTERS, AUTOMATED SYSTEMS, C2 (COMMAND AND CONTROL), CE (COMMAND ELEMENT), COMMUNICATIONS, CPX (COMMAND POST EXER), CSSCS, DEVELOPMENT, EQUIPMENT, FDS-1, HARDWARE, INFORMATION MANAGEMENT, LFADS, LOGISTICS, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), MILOGS(MAR INTEG LOG SYS), MTACCS, NETWORKS, SOFTWARE, TRAINING, TRANSMISSION SYSTEMS, USMC (US MARINE CORPS).

4. (U) TITLE: AUTOMATION OF THE LOGISTICS OPERATION CENTER

5. (U) OBSERVATION: Automation of the Logistics Operations Center

6. (U) DISCUSSION: From experience gained in SWA, a local area network (LAN) with work stations for all logistic commodity areas was a necessary requirement. For the FDS-1 evaluation the MEB G-4 had only one TCO terminal for processing of all message traffic, journal keeping, creating overlays, and processing reports/requests. Having only one TCO terminal in the LOC for all information to be funneled through was inefficient and would not have been effective operationally. Many functions in the LOC, such as journal keeping, status board update on equipment and shipping, and plotting on map overlays were done manually because a single TCO terminal was unable to handle the work load. FDS-1 only evaluated three of twelve MILOGS component system programs under development to automate logistic functions for the Marine Corps. With this in mind, FDS-1 automation of the logistics operations center was far from what is envisioned for the future. The evaluation was focused on tactical operations command and control and treated logistics automation as an afterthought. As all logistics commodity areas were not on the TCO net for FDS-1, as was the standard in SWA, we appear to have taken a step backwards in automation and analysis of information flow requirements for command and control of logistics.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Establish a separate concept development program, perhaps under the cognizance of the Marine Corps techbase, to focus specifically on logistics automation for command and control. A separate advanced technology development (ATD) program and demonstration could easily be justified and would provide the proper vehicle for definition of concept and requirements for automation of logistics command and control. Additionally, such as ATD would reduce acquisition momentum for immature software products with claim to logistics

command and control capabilities, ready for FMF introduction.

2. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21178-66159 (00014), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, COMMUNICATIONS, COMMUNICATIONS EQUIP, CPX (COMMAND POST EXER), CSI (CMD SYS INCORP), FDS-1, HARDWARE, INTEROPERABILITY, MCRDAC, MODEM, RADIOS, SOFTWARE, TRANSMISSION SYSTEMS, USMC (US MARINE CORPS), VHF (VERY HIGH FREQ).

4. (U) TITLE: TCO TEST USING WIRE AND RADIO PATHS

5. (U) OBSERVATION: Tactical Combat Operations (TCO) tests using wire and radio paths

6. (U) DISCUSSION: The FDS-1 Evaluation was to be conducted in three phases. Phase I had the MSE CPs in relatively close proximity (within 1 KM of each other). All TCO communications paths were wire. Phase II was to be a deliberate, systematic transition from wire to single channel radio (VHF only). Locations of the MSE CPs were not to change. Phase III would highlight an administrative displacement of the RCT CP. The purpose of this move was to provide a more realistic distance between CPs for the evaluation in order to more fully test the communications system. Communications during Phase III would remain single channel radio.

During the initial part of Phase I, it was evident that the configuration of AN/GRA-39 remotes and the use of a Command System Incorporated (CSI) Y cable was not successful in linking simulated radio nets by wire lines. Once the Y cables and AN/GRA-39Bs were removed from the configuration, the TCOs communicated. This configuration did not allow voice communications over the simulated radio net.

A test was conducted to evaluate various TCO wire and radio configurations. MCRDAC, MCTSSA, CSI and the FMF viewed the test.

1. The first test configuration was TCO, Microcomputer Tactical Communications Modem (MTCM) and AN/GRA-39Bs (the MTCM and AN/GRA-39Bs were interconnected with a Y cable fabricated by CSI). Although voice connectivity was established, the TCOs could not transmit and receive data messages.

2. The second test configuration was TCO, MTCM and AN/GRA-39Bs spliced into the binding posts of the MTCMs. AN/H-250 handset was connected directly into the AN/GRA-39Bs remote. This configuration was successful in passing TCO data and voice messages.

3. The third test configuration was TCO, MTCM and AN/GRA-39Bs over single channel radio (VHF) using the fabricated Y cable. This configuration proved unreliable for data communications among TCO terminals.

Several possibilities were addressed as to why the single

channel radio path did not work. The TCO software is believed to be a point-to-point communications software (vice multi-point), the designed of the fabricated Y cable is suspect, and the antiquated AN/PRC-77 was never primarily designed to pass data traffic. Of note, all the AN/GRA-39B modifications were checked and the AN/PRC-77 specifications were bench tested in the field by Ninth Communications Battalion immediately prior to the test.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That realistic communications interoperability testing be conducted prior to FDS-2.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-70344 (00015), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, COMMUNICATIONS, COMMUNICATIONS EQUIP, CPX (COMMAND POST EXER), FDS-1, HARDWARE, INTEROPERABILITY, MODEM, RADIOS, TRANSMISSION SYSTEMS, USMC (US MARINE CORPS).

4. (U) TITLE: TACTICAL MODEM OPS DURING FDS-1

5. (U) OBSERVATION: Tactical Modem Operations During FDS-1

6. (U) DISCUSSION: FDS-1 evaluations used the MCTM to transmit data at a 1200 Baud rate over Marine Corps Tactical Radio Systems unsuccessfully. The primary cause of failure was suspected to be the MCTM and the AN/GRA-39 Radio Control Unit. The MCTM is an unshielded unit and constantly picked up superfluous emanations from radio and wire equipment. The 1200 Baud rate of transfer was slower than any field equipment was designed to pass and should have processed easily. The primary Radio equipment used (AN/PRC-77) readily passes digital signals of 8 or 16 KBS when connected to the TSEC/KY-57. An interoperability test would possibly cure two problems at one time by creating a known good and an operationally tested system for the passing of data and creating a secure path for the transmission. In the Digital Data Mode the TSEC/KY-57 would poll the TCO with its own Digital Data Clock and push the data out at the selected rate. The use of the HYX-57/TSEC to replace the AN/GRA-39 would provide a digital interface and a remote capability. If this equipment configuration proves successful in passing secure data traffic, it must be recognized that the FMF holds only limited quantities of the HYX-57/TSEC.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That an interoperability test be conducted with the TSEC/KY-57 and HYX-57/TSEC in place of the MCTM and the AN/GRA-39.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-73061 (00016), submitted by AC/S G-E 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, C2 (COMMAND AND CONTROL), COMMEX (COMM EXERCISE), COMMUNICATIONS, CPX (COMMAND POST EXER), EXERCISE ISSUE, FDS-1, RADIOS, SOFTWARE, STAFF FUNCTIONS, TRANSMISSION SYSTEMS.

4. (U) TITLE: FDS-1 COMMEX

5. (U) OBSERVATION: FDS-1 Communications Exercise (COMMEX)

6. (U) DISCUSSION: Early in the planning for FDS-1 it was recognized that a COMMEX was essential for the overall success of the exercise. The COMMEX was executed in two phases. Phase one verified all wire paths and phase two verified the radio paths. While the COMMEX was a success in the traditional sense, it failed by not providing a means to evaluate the capabilities and limitations of the terminal equipment and application software. A Data Exercise (DATAEX) immediately following a COMMEX would have operationally checked complete systems vice only the communications path. A DATAEX will require that all operators (non-communicators) use the MTACCS system.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That during FDS-2 a DATAEX be conducted immediately following a COMMEX.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21172-02071 (00017), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: CPX (COMMAND POST EXER), FDS-1, INTEROPERABILITY, JCS (JOINT CHIEFS OF STF), UNITED STATES.

4. (U) TITLE: CAPABILITY TO GENERATE USMTF MESSAGES

5. (U) OBSERVATION: TCO Requires the Capability to Generate USMTF Messages

6. (U) DISCUSSION: To enhance joint interoperability, JCS has mandated the use of United States Message Text Formatted Messages (USMTF). TCO did not give the user the capability to create USMTF messages. This is a requirement for the future TCO.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That TCO give the user the capability to create USMTF messages.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-17025 (00018), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, C2 (COMMAND AND CONTROL), COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, SOFTWARE.

4. (U) TITLE: SEPARATION OF TCO C2 AND COMM MANAGEMENT MODULES

5. (U) OBSERVATION: Need For Separation of TCO C2 and Comm Management Modules

6. (U) DISCUSSION: Some TCO work stations were emplaced only to provide comm connectivity rather than for use as C2 nodes. If TCO had been divided into separate modules for C2 information processing and comm management, this could have been avoided. The comm management module could also be changed to interface with other systems without having to change the C2 module.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That MTACCS be composed of functional modules, enabling "swap-out" style software upgrades and modifications.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-23226 (00019), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: AIS (AUTOMATED INFO SYS), C2 (COMMAND AND CONTROL), COIC (CBT OPS INTL CTR), CPX (COMMAND POST EXER), FDS-1.

4. (U) TITLE: ENCRYPTION/SECURITY IN TCO AND RELATED AIS'S

5. (U) OBSERVATION: Encryption/Security In TCO and Related AISs was not addressed in FDS-1.

6. (U) DISCUSSION: Users of TCO could not pass data with a classification level or access beyond that of any other user on the LAN, because all messages to and from that LAN were available to all users through the OVERHEARD function.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That MTACCS include "filters" for data classification and access so that only addressees receive messages classified above UNCLAS, or that the entire COIC LAN and all its users be raised to the TS level.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-37727 (00020), submitted by AC/S G-6 7TH MEB, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, SOFTWARE.

4. (U) TITLE: FREQUENT TCO SOFTWARE "CRASHES"

5. (U) OBSERVATION: Frequent TCO Software "Crashes"

6. (U) DISCUSSION: Users of TCO experienced unexplained "crashes" several times per day on the average. The work in progress disappeared and the log-on screen appeared, so that the user had to log on and configure his work station as if he had just turned it on. The only common factors appeared to be: the crashes took place when the work station experienced a high volume of input activity, either incoming messages or operator actions; or the workstations crashed when the operator sent a message and then tried to perform another function before receiving acknowledgments from all addressees.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: That MTACCS generate diagnostic messages telling users when software problems occur and, if possible, warning them before the system locks up and needs to be reinitialized; and that MTACCS be a true multi-tasking system allowing operators to perform other tasks while messages are being transmitted.

9. (U) COMMENTS:

---- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-75016 (00021), submitted by AC/S G-3 7TH MEB, 3D MAW G-3, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: 3D MAW (MAR ACT WING), ACE (AVN COMBAT ELM), ADP/COMPUTERS, AIR WARFARE, ATACC, C2 (COMMAND AND CONTROL), COMMUNICATIONS, COMPUTERS, CPX (COMMAND POST EXER), FDS-1, OPERATIONS, TACC (TAC AIR CNTL CTR).

4. (U) TITLE: ATACC OVERVIEW AND RELATIONSHIP WITHIN MTACCS

5. (U) OBSERVATION: The ATACC demonstrated great potential during FDS-1, but very little ability to interface with TCO. This problem must be corrected prior to FDS-2.

6. (U) DISCUSSION: The Advanced Tactical Air Command Central (ATACC) is designed to provide the Marine Tactical Air Commander (TAC) a compact mobile, advance version of the Tactical Air Command Center (TACC). The ATACC provides the TAC with an upgraded capability for planning, directing, and coordinating all MAGTF air operations in a tactical environment. It also provides the TAC with the means to organize, direct, and coordinate organic aviation elements with those of other services. Automated exchange of tactical information, a shared data base, and a computer generated Air Tasking Order (ATO) are the key differences between the ATACC and the existing TACC. Both the plans and the operations staff of the ATACC have access to a data base containing information received automatically from TADIL-A, TADIL-B, NATO Link-1, AUTODIN, and MTS communications networks.

The problem within FDS-1 was that the ATACC was not able to generate the ATO and disseminate it via MTS or AUTODIN to subsidiary ACE command elements (including the MAGs or squadrons and the DASC) and the MEB COC. The ATACC workstation provides extensive mapping and overlay creation and display capabilities, but lacks the means to share these overlays with the higher HQ, which was utilizing TCO and ASDS. As is the case with many of the ancillary systems provided for evaluation as part of FDS-1, more than a "swivel chair" interface is required between TCO and the ATACC. Many reports received on TCO will be manually entered into ATACC and vice versa.

Additionally, a disturbing pattern developed as the operation began to speed up: the more information that was displayed on the screen, the slower the ATACC system got. With the slowing down, even the most basic functions took a lot longer than they should have. Two systems are working from one database, which may have slowed the ATACC system down. It is our concern that as we load other systems to use the common database, that things will get even slower.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION:

a. If all MTACCS systems have MTS capability, use that for TCO.

b. Construct ATACC software so that multiple systems can use the same software with minimal degradation to processing time.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-78624 (00022), submitted by 3D MAW, G-3, MAJ DONNELLY, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, IAS (INTEL ANALYSIS SYS), SOFTWARE, UNIX.

4. (U) TITLE: IAS SYSTEMS

5. (U) OBSERVATION: IAS System uses "UNIX" O/S, which is too fragile for FMF field use.

6. (U) DISCUSSION: As fielded, the IAS is a fragile UNIX based system. It is extremely sensitive/susceptible to power surges and outages. The software, when interrupted, "eats itself" and then requires on inordinate amount of time to repair or reboot. This weakness makes the system useless in the field as it is incompatible with field power generation systems.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Obtain either a stable power generation system or seek an alternative "IAS type" program based on a language other than UNIX. Other options may be for Crane to "ruggedize" their software to decrease downtime, possibly make boot up procedures faster, add a self contained (battery powered) memory that will aid in this process. Power generation in the field will always be subject to fluctuations.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-93723 (00023), submitted by 3D MAW, G-3, MACG-38, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: AIR WARFARE, C2 (COMMAND AND CONTROL), CAS (CLOSE AIR SPT), COMMUNICATIONS, CPX (COMMAND POST EXER), DASC (DIR AIR SPT CTR), EQUIPMENT, FDS-1, FIRE SUPPORT, HMMWV (HI MOB MP WL VEH), LAND WARFARE, LOGISTICS, MACCS (MAR AIR C2 SYS), MACG-38, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), OPERATIONS, TENT, TRANSPORTATION, USMC (US MARINE CORPS), VEHICULAR.

4. (U) TITLE: IDASC S-250 SHELTERS

5. (U) OBSERVATION: IDASC S-250 Shelters shows much promise but needs continued development.

6. (U) DISCUSSION: The downsized IDASC for the FDS-1 evaluation used a configuration of two S-250 shelters in HMMWVs connected by a DRASH 3T shelter. The S-250 shelters were constructed at NAVELEX Vallejo and contained Communications Control Panels from the original IDASC (TSQ-155) project. The S-250s have ample room for four operators and are preferable to the homemade HMMWV packages currently being constructed by individual units out of locally procured parts. Some modifications need to be made after consulting with all three MASS and human factors engineering experts. However, the S-250 downsized IDASC shelter was one of the best items to come out of FDS-1.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Continue to develop the S-250 shelters for use by the DASC during MEB level exercises. Two of these shelters, back to back, connected by a small DRASH shelter would give the DASC a vastly improved working environment over what it uses now (i.e., the UYQ-3A or CP tents and AN/GRA-39 remote units). However, the UYQ-3A needs to be retained in the inventory for Airborne DASC applications.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21173-99002 (00024), submitted by 3D MAW, G-3, MACG-38, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/15/91.

3. (U) KEYWORDS: ADP/COMPUTERS, AIR WARFARE, C2 (COMMAND AND CONTROL), CAS (CLOSE AIR SPT), COMMUNICATIONS, CPX (COMMAND POST EXER), DASC (DIR AIR SPT CTR), FDS-1, FIRE SUPPORT, HARDWARE, INFORMATION MANAGEMENT, LAND WARFARE, MACCS (MAR AIR C2 SYS), MACG-38, MAGTF (MAR AIR GND TF), MEB (MAR EXPED BDE), OPERATIONS, SOFTWARE, USMC (US MARINE CORPS).

4. (U) TITLE: INFORMATION FLOW OVER AUTOMATED C2 SYSTEMS

5. (U) OBSERVATION: During FDS-1, information flow to the DASC over the automated C2 systems was not timely.

6. (U) DISCUSSION: The DASC is a flexible C2 agency which relies on timely information flow to accomplish its mission. The use of automated and digital burst systems did enhance the DASC's ability to pass and receive tactical information, however the TCO system in the DASC was not connected to all agencies required to communicate with the DASC. Additionally, the DCT did not have a print capability which required the operator to manually transcribe all incoming requests and reports. The DASC normally requires 3 crews of 8 operator positions to run a MEB level exercise/operation. During FDS-1, the DASC had only one TCO terminal, one DCT, and one ATACC terminal to pass and receive information from the entire MEB. The TCO terminal was slow and only allowed one function to be performed at a time. . This caused delays in passing and receiving critical information.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: For FDS-2, equip the DASC with a minimum of two TCO terminals, two DCTs, and an ATACC interface to TCO. Enhance the TCO software to allow agencies to filter out unwanted information, thus speeding up the computer processing time. Prior to FDS-2, provide a set of software "tools" for TCO, customized for tactical air operations.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21174-05889 (00025), submitted by 1ST MAR, G-3, 7MEB G-2/G-4, -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ACE (AVN COMBAT ELM), ADP/COMPUTERS, AIR WARFARE, C2 (COMMAND AND CONTROL), COC (CBT OPERS CTR), COMMUNICATIONS, CPX (COMMAND POST EXER), EQUIPMENT, FDS-1, HARDWARE, HMMWV (HI MOB MP WL VEH), IMINT (IMAGERY INTEL), INTELLIGENCE, LOGISTICS, MACCS (MAR AIR C2 SYS), MAG (MAR AIRCFT GRP), MC&G (MAPPING, CHARTING), MCAS (MAR COR AIR STAT), MCAS YUMA, OPERATIONS, SENSORS, TAMPS (TAC AIR MSN PLN SY, TRANSPORTATION, VDT (VIDEO DISP TERM), VEHICULAR.

4. (U) TITLE: ELECTRONIC SCREEN DISPLAY

5. (U) OBSERVATION: Deficiencies of Electronic Screen Display

6. (U) DISCUSSION:

A.The large screen display has many features that are missing in order to make it functional and enhance Staff actions and Command and Control. At the Regimental level, the following requirements are necessary:

1. Screen size needs to be at least the size of the current model (borax 24" X 30"). The commander needs to see a large enough area on a 1:50,000 scale to get a good coherent picture of the battlefield in his area of interest.

2. Related to point (a) above is the need to be able to easily scroll the map both horizontally and vertically.

3. The most important feature that is required is the ability to display terrain electronically. Placing map sheets behind the display is quite cumbersome. The ability to see terrain on the display without referring to a map would speed decision making and usefulness considerably.

4. The capacity of using a light pen instead of the digitized pad would significantly enhance our mapping capability in the COC. Being able to draw directly on the screen objects such as routes, engagement areas, NAIs, TAIs, boundaries, etc., would make staff actions much more efficient. The ability to pick up objects from TCO such as symbols and labels would still be required.

5. The screen itself would have to be expeditionary in nature. The screen would have to be capable of withstanding shock when bolted down in a HMMWV and be versatile as to vehicle or other area mounting.

6. With the adoption of the IPB process, a capability to

automate IPB overlays would be desirable. Overlays such as SLOW GO/NO GO, enemy templating, and weather would be useful and expedite a process that takes many hours.

B. During this exercise, we primarily worked off the map in order to analyze terrain, the enemy situation, and future operations. We utilized the Large Screen Display primarily to see how our graphics looked that we were about to send to subordinate and higher units and to get a general picture of the battlefield.

C. The current Video Display Terminal (VDT) size does not allow more than 2 to 3 people to observe a function being performed or to read a message. The use of the large Sun processors still will not provide an ability to show imagery, briefs, messages, etc., to a large number of people.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION:

A. Develop capabilities listed in the above section. Suggest looking into the system used in the Wing called TAMPS which has a tremendous capability in mapping and terrain analysis. The WTI school at MAWTS-1, MCAS Yuma, teaches this system to students. Every unit in the Air Wing down to a MAG should have a TAMPS computer.

B. Review the use of VDT rear projection. The VDT can project its screen through the rear of the terminal onto a wall, projector screen, bedsheet, etc. This would preclude the need for large, expensive plasma screens, 44 inch monitors, etc.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

1. (U) MCLLS NUMBER: 21174-30644 (00026), submitted by 1ST MAR, G-3, -, ( ) -.

2. (U) CPX FDS-1 conducted by 2E 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADP/COMPUTERS, C2 (COMMAND AND CONTROL), COMMUNICATIONS, CPX (COMMAND POST EXER), FDS-1, HARDWARE, INTELLIGENCE, NETWORKS, ORDERS/GUIDANCE, RADIOS, REPORTING, TRANSMISSION SYSTEMS.

4. (U) TITLE: LACK OF VOICE COMMUNICATIONS

5. (U) OBSERVATION: Lack of adequate voice communications as a backup to TCO/MTACCS hindered the conduct of FDS-1, and will present problems when MTACCS is fielded.

6. (U) DISCUSSION: There will always be a requirement for commanders to talk to each other over a radio. There is information more easily conveyed by voice communications than over a strictly digital automated command and control system. For example, a commander may have questions after receiving a SPOT report or a Frag Order which would require some sort of dialogue. This fast exchange of information can not be duplicated by automation. In addition, the auditory qualities of communication such as inflection and tone can not be duplicated by a computer screen. Hard wired phones were used as a work around solution.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: Incorporate voice nets that are either compatible with automation or separate voice nets that create needed redundancy in the system.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

1. (U) MCLLS NUMBER: A1174-32440 (00087), submitted by 1ST MAR, S-3. -, ( ) -.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: C2 (COMMAND AND CONTROL), COC (CBT OPERS CTR), COMMUNICATIONS, CPX (COMMAND POST EXER), EQUIPMENT, FDS-1, HELICOPTER, HMMWV (HI MOB MP WL VEH), LOGISTICS, MTACCS, OPERATIONS, RADIOS, TCO, TRANSMISSION SYSTEMS, TRANSPORTATION, VEHICULAR.

4. (U) TITLE: EQUIPMENT FIELDING REQUIREMENTS

5. (U) OBSERVATION: Equipment Fielding Requirements

6. (U) DISCUSSION: The equipment to be fielded should be flexible and compatible to many configurations of COCs (HMMWV, AH-1 C2 configured helicopter, AAVC7, etc.). The equipment should provide for ease of transferring from one mode to the next, such as from a HMMWV to an AAVC7 or to a static location. A significant effort was devoted just to set-up. In the fast moving environment of combat operations, COCs will be moved often and the equipment will have to be transferred from one configuration to the next. We realize that the present system was communications intensive in the set-up stage partially due to hard wiring requirements; however, the amount of equipment at the Regimental COC is significantly increased with the present setup. Without having to worry about radio communications problems, the extra equipment significantly increased the trouble shooting efforts of the communications platoon.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION:

a. Scaling down of the equipment at the Regimental level.

b. Simplify the interfaces between equipment for fast hook up.

c. Allow for ease of transporting the system from one type of COC setup to the next.

9. (U) COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 21175-23534 (00038), submitted by AC/S G-1 7TH MEB, 3D MAW G-3, --, ( ) -.

2. ( ) CPX FDS-1 conducted by CO 7TH MEB on 11/16/91.

3. (U) KEYWORDS: ADMINISTRATION, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), DEVELOPMENT, EXERCISE ISSUE, FDS-1, INFORMATION MANAGEMENT, MIPS, OPERATIONS, PERSONNEL, REPORTING, STRENGTH.

4. (U) TITLE: MARINE INTEGRATED PERSONNEL SYSTEMS (MIPS) OVERVIEW

5. (U) OBSERVATION: The MIPS worked well during FDS-1; however, more work is needed to improve MIPS/TCO compatibility for FDS-2.

6. (U) DISCUSSION: The Marine Integrated Personnel System (MIPS) worked well while exercising the FDS-1. The program is user friendly and extraction of information is readily available. While exercising FDS-1, MSEL items were projected daily for strength and status report updates to interface and be transmitted to higher headquarters through the TCO. In addition to transmittal through the TCO an additional hardcopy and diskette was taken to higher headquarters. However, one major problem arose regarding MIPS/TCO compatibility. Currently, reports created by MIPS can be read into TCO, but reports can not be read from TCO back into MIPS. It was necessary to make a copy of files to diskette to transfer them from MIPS to TCO. The ability to trade the information between the systems would allow the majority of admin type processing to be accomplished in MIPS, while TCO could provide its true function of communication of that information to others.

7. (U) LESSON LEARNED:

8. (U) RECOMMENDED ACTION: The TCO should be programmed along with the unit diary system and the Marine Integrated Personnel System for use by one operator. Personnel information should be readily and easily available for the individual and other interested parties. To solve the TCO/MIPS compatibility problem, include a function allowing reports to be read into TCO from MIPS and then back out of TCO to MIPS.

9. (U) COMMENTS: All programs worked well: however, the need for all to work together as one needs improvement.

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

---- (U) Lesson distributed by: MCCDC (WF).

MCLLS LONG REPORT

1. (U) MCLLS NUMBER: 11072-85614 (00029), submitted by MAJ THEEUWEN, 7TH MEB G-3 OPS, 957-7044. (619)368-7044.

2. (U) CPX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3. (U) KEYWORDS: CE (COMMAND ELEMENT), CPX, HQ (HEADQUARTERS), LSD (LG SCREEN DISPLAY), TCO, TE (TABLE OF EQUIP).

4. (U) TITLE: MAGTF CE CONFIGURATION FOR TCO

5. (U) OBSERVATION: The recommended number of TCOs for a MAGTF HQ is insufficient.

6. (U) DISCUSSION: The Table of Equipment for TCO as exercised in FDS-1 is inadequate. The lack of TCO terminals created doubling up on TCO terminals in different functional areas causing delays. The T/E for TCO needs to be increased.

7. (U) LESSON LEARNED: None

8. (U) RECOMMENDED ACTION: Increase the T/E for TCO as outlined below for each functional area:

Command Section
- 1 TCO/LSD for CG's use; located in command center when established.
- 1 TCO/LSD for Forward/Jump CP.
- 1 TCO for C/S use; to remain with main CP.

G-1
- 1 TCO/LSD, located in Personnel section.

G-2
- COC
  -- 1 TCO/LSD for Watch Officer.
  -- 2 TCOs for analyst/clerk use.

- MAFC
  -- 1 TCO/LSD for Watch Officer.
  -- 1 TCO/LSD for Current Situation section.

G-3
- Ops Section/COC
  -- 1 TCO/LSD for use of Current Ops (Journal).
  -- 1 TCO for use of Watch Officer.

- SASS/COC (assumes no FSCC at MAGTF CE level)
  -- 1 TCO for fire support Officer (could also be improved FIREFLEX).

- Plans Section
  -- 1 TCO/LSD Future Ops cell.

-- 1 TCO/LSD for Targeting cell (could also be improved FIREFLEX).

G-4
- 1 TCO/LSD for Log Ops section.
- 1 TCO for Log Plans section.

G-6
- 1 TCO for TechCon.
- 1 TCO for SysCon.
- 1 TCO for Ops section.
- 1 TCO for Plans section.
- 1 TCO for ISMO.

9. (U) COMMENTS: None.

--- (U) SUBJECT: OPERATIONS

--- (U) INTEROPERABILITY: NONE

--- (U) Lesson distributed by: MCCDC (WF).

UNITED STATES MARINE CORPS
1st Marines
1st Marine Division (Rein), FMF
Camp Pendleton, California 92055-5503

3000
DRH/REPORT
26 Nov 91

From: Commanding Officer
To: Commanding General, 7th Marine Expeditionary Brigade
(ATTN: AC/S G-3)

Subj: AFTER-ACTION COMMENTS FOR FIELD DEVELOPMENT SYSTEM PHASE ONE (FDS-1)

Encl: (1) FDS-1 After-Action Report

1. As directed, issues that inpacted on the conduct of the evaluation and the operating of the FDS system are submitted as after action comments.

2. Commander's Assessment: FDS-1 was of marginal utility at the regimental and lower level. The myriad of critical design deficiencies, as documented in the enclosure, indicate that the program needs to be refocused if it is intended to provide significant enhancements at this level.

3. Point of Contact is Major Heinz, Air Off, Ph. (Comm) 619-725-7692, (DSN) 365-7692/7585.

R. W. HODORY

AFTER ACTION REPORT OF THE EVALUATION OF THE FIELD DEVELOPMENT SYSTEM PHASE ONE (FDS-1)

BACKGROUND

1. Field Development System Phase One (FDS-1) was a proof of concept demonstration to provide FMF input into the requirements definition and system specification for development of the Marine Corps Tactical Command and Control System (MTACCS). The 1st Marine Regiment was tasked to provide the Ground Combat Element (GCE) Combat Operations Centers (COCs) for the tactical exercise in support of the FDS-1 evaluation.

SCOPE

2. The FDS-1 evaluation was conducted as part of a freeplay tactical Command Post Exercise (CPX) during four days of Pilot Evaluation (16-19 November) and three days of evaluation (20-22 November) within the 29 Palms Marine Corps Air Ground Combat Center (MCAGCC) training complex. The focus of the evaluation was to capture qualitative comments on its capabilities. No additional instrumentation was used and no attempt was made to collect any technical data on system performance. COC tents were established for the 7th Marine Expeditionary Brigade (7th MEB), Aviation Combat Element (ACE), and four COCs for the GCE--1st Marines Regimental Combat Team One (RCT-1) Headquarters and Battalion COC's for 3/1, 3/7, and 1/11. Additionally, a fourth battalion COC (1/25) was established within the East Gym using a single FDS-1 Tactical Combat Operations (TCO) terminal. Only Phase 1 of the evaluation which established communications over wire was completed. Initial tests to determine communications capability over radio failed and Phase 2 of the evaluation was never implemented.

RESULTS AND DISCUSSION

3. <u>VOICE AND DIGITAL COMMUNICATIONS ON THE SAME NET</u>. The initial configuration, which had an AN/GRA-39 box connected on each digital net to allow alternating voice and digital communications, failed and the AN/GRA-39s had to be removed. During high-tempo operations, the TCO communications method became too slow for a variety of reasons--time required to type and send messages, large message queues, system crashes, etc. In order to compensate, separate voice means were established which required additional communications assets. Had those additional assets (DSN telephone and wire nets) not been available, the commander would have been unable to capture time-critial information and influence the battle

ENCLOSURE (3)

accordingly. The inability to alternate voice and digital communications over the same net is a critical design deficiency which must be corrected prior to FDS-2.

4. POWER FLUCTUATION SUSCEPTIBILITY. The FDS-1 system was powered by a variety of standard Marine Corps generators which were connected in pairs in case of a single generator failure. However, fluctuations in voltage caused numerous system interruptions and failures which required the system to be re-initialized. Without some form of an Uninterruptable Power Source (UPS) which suppresses transient power fluctuations and allows graceful shutdown in the event of a failure, the operator risks the loss of critical data and possible equipment damage. The lack of a UPS is a critical design deficiency which must be corrected prior to FDS-2.

5. SYSTEM CRASHES. Throughout the evaluation, numerous system crashes unrelated to power occurred on all the TCO terminals but particularly the S-3 Operations terminal in all of the COCs and the S-4 terminal at RCT-1. Typical recovery time was from 22 seconds to 9 minutes. If the crash occurred with any text or graphics window open, then the contents were lost. Additionally, the message journal was also lost. Frequent crashes caused critical system delays, lost messages and graphics, and a rapid loss of situational awareness, especially during high tempo operations. The commander, by necessity, had to maintain a manual backup which negated any enhancements provided by the FDS. The excessive system crashes and data loss are critical design deficiencies which must be corrected prior to FDS-2.

6. TERRAIN DEPICTION. The only provision for displaying terrain was to insert maps into the Medium and Large screen displays which proved cumbersome and inadequate when working with 1:50,000 scale maps. Terrain depiction was not present on the individual TCO computer terminals. Without adequate terrain depiction, the S-2 situation board became the primary means to track and evaluate enemy and friendly positions and develop courses of action. Without terrain depiction in a variety of scales, the commander will be unable to determine possible enemy courses of action resulting in a loss of situational awareness and imminent defeat. The lack of terrain depiction within the Tactical Combat Operations Computer is a critical design deficiency which must be corrected prior to FDS-2.

7. COMMUNICATIONS RELIABILITY. Frequent communications connectivity problems even while over wire interface prevented the timely dissemination of messages and graphics which eventually required operators to revert to alternate communications methods to prevent loss of situational awareness. Numerous causes of the poor reliability were found and continually corrected, however the system remained

intermittent. Attempts to transmit large messages and graphics (in excess of 5 fragments) would tie up the computer and communications net for excessively long times (frequently greater than 20 minutes and up to 1 hour) with a low probability of success. Additionally, there was no provision for aborting a transmission when it was obvious that the retry attempts were failing. The poor communications reliability and excessively long transmission times without the ability to abort are critical design deficiencies which must be corrected prior to FDS-2.

8. MOBILITY AND JUMP CAPABILITY. The hardware configuration of the COC, as implemented in FDS-1, could not be transported with the assets currently assigned to a regimental headquarters, required considerable time to setup, and did not support a jump command post. Additional mobility assets, including personnel, would be required which would jeopardize the expeditionary nature of the regiment and unduly restrict its movement on a fluid battlefield. The restricted mobility, lack of jump CP capability, and heavy requirements for transportation and setup are critical design deficiencies which must be corrected prior to FDS-2.

9. SYSTEM SPEED. The system response time to individual tasks such as activating a menu item, button or scroll bar was very slow which significantly reduced the productivity of the operator and caused more rapid loss of situational awareness during high-tempo operations. Simple button actuations to open a menu tray took from .4 to 2 seconds to complete. The result was that the operator was always waiting for the computer or typing keys without seeing the input on the screen. The cumulative effect was obvious; when the tempo got high, the system couldn't keep up. The slow response system time to user inputs and commands is a critical design deficiency which must be corrected prior to FDS-2.

HUMAN FACTORS IMPLEMENTATION

10. Numerous human factors implementation (man/machine interface) deficiencies were identified with the net effect being that tasks generally took longer to complete on the TCO than by previous methods. Deficienciee include:

a. Cumbersome graphics drawing/editing tools
b. Heavy scrolling requirements
c. Excessively slow windows and objects actuation
d. Poor mouse cursor readability and positioning
e. Inconsistent implementation of icons and buttons
f. Inadequate text editing features
g. Inflexible report/request templates
h. Crude file management facilities
i. Ineffective use of color and audio cues
j. Clumsy situation map updating which frequently resulted in double symbols
k. Absence of data entry error traps

ENCLOSURE (3)

l. Lack of automatic updating for data fields such as Date/Time group and Map sheet

m. No ability to tailor screens to individual needs

Although operators had few complaints, most had no previous experience with a "user friendly" interface and therefore were unable to make a valid comparison. The entire interface would be considered woefully inadequate and obsolete by current industry standards. The faulty human factors implementation is a critical system design deficiency which must be corrected prior to FDS-2.

11. SITUATION MAP OVERLAYS. The situation map overlays were evaluated for utility throughout the evaluation. Only one overlay per category (Maneuver Control Measures, Fire Support Measures, CSS Symbols, Air Operations Control Measures, Engineering Symbols, and Intel Symbols) was supported. There was no provision to develop multiple overlays and selectively display them as the situation dictated. The limit of one overlay per category provided almost no utility and while it demonstrated the overlay capability, it negated any improvement provided by the automation of the situation map. The extremely limited overlay support is a critical design deficiency which must be corrected prior to FDS-2.

12. MESSAGE TRANSMISSION SUPPORT. There was no provision for automated distribution of messages/graphics including tracking of receipt/message-opened within FDS-1. The user was unable to have messages automatically transmitted to destination and info addressees or to know when a recipient had opened and read a message. As such, the operator was required to manually track message transmissions and status and occasionally query addressees to confirm receipt. This cumbersome, time-consuming process negated any gains made from the application of automation. The lack of an automated distribution of messages/graphics to include the tracking of message receipt and opening is a critical design deficiency which must be corrected prior to FDS-2.

13. WATCH OFFICER SITUATIONAL AWARENESS. Messages transmitted to a COC would go directly to the functional area TCO terminal without being logged in a central journal or being read by the watch officer. As such, the watch officer had to continually query functional areas to maintain any situational awareness. Frequently, the watch officer was the last person to be informed of a critical event and was unable to brief oncoming watch standers on the current situation. The current implementation which decentalizes the journal and bypasses the COC watch officer is a critical design deficiency which must be corrected prior to FDS-2.

14. INTELLIGENCE COLLECTION AND ANALYSIS. Any station on the local or wide area net could pass intelligence information to any other station without having it first be confirmed,

analyzed and correlated by the S-2/G-2 section. This decentralized collection and dissemination of intelligence caused an overall degradation in situational awareness because each functional area would have its own "version" of the current situation. The workaround was to have all intelligence passed to the S-2 who would update a manual situation map (because of the lack of terrain) and all other functional areas would work off the S-2 board. The current implementation which decentralizes intelligence collection and analysis is a critical design deficiency which must be corrected prior to FDS-2.

15. DECISION SUPPORT TOOLS. There was no provision for the system to aid the commander in making a decision, either by providing tools to automate the Intelligence Preparation of the Battlefield (IPB) process or to analyze possible courses of action. Without any analysis or decision support tools, FDS becomes nothing more than an expensive electronic mail and data base system. The lack of decision support tools to assist the commander in the IPB process and to aid in developing courses of action is a critical design deficiency which must be corrected prior to FDS-2.

16. INTEGRATION TO OTHER SYSTEMS. FDS-1 demonstrated only limited capability to interact with FIREFLEX, ATACC, IDASC, PLRS, IAS, ASDS, MIPS and LFADS. In several cases, the interface only allowed the user to read and write a disk written by the other system. Several tasks had to be duplicated on both systems for the information to remain current. Additionally, interoperability with other services communications, command and control systems was not tested and at this phase, does not appear to be a design criterium. The lack of fully automated interfaces to other Marine Corps systems is a critical design deficiency which must be corrected prior to FDS-2. Additionally, recommend that FDS-2 evaluate interservice system operability.

17. FDS ACQUISITION PROCESS. The concept of the "evolutionary acquisition" cycle is fundamentally sound because it allows the fleet users early input into the process. However, for FDS-1 it was poorly implemented. Part of the problem is the general vagueness of the MTACCS concept. FDS needs to focus on providing the commander processed information and automated functions which assist him and his staff in making sound and timely decisions. It is recognized that there was no intent to do much hardware development and that FDS-1 was implemented on Government Furnished Equipment (GFE) computers which are slow by industry standards. However, even the software showed antiquated human factors interfaces, inconsistent implementations, instability, fragile communications capabilities, and absolutely no robustness. Additionally, the software was not developed according to Military Standard 2167 which is required for most

ENCLOSURE (1)

software acquisitions. The entire implementation was a rehash of old technology and software which provided no new enhancements that can't already be accomplished with currently fielded computers, software, modems and FAX. Government laboratories such as the U. S. Army Harry Diamond Laboratories (also funded by MCRDCC) have already developed and demonstrated implementations significantly closer to the FMF requirements. However, the majority of participants in FDS-1 are unaware of these or other technological capabilities. Without a significant technology infusion, evaluations will continue to be made and requirements developed for a system which will be obsolete before it is delivered. In this regard, the scope of FDS-1 was too large and the system capabilities too scarce. Without focus, without the advanced technology people teaming up with the requirements people and quickly interceding for FDS-2, the entire program is doomed to fail.

SUMMARY

18. The goal of FDS is a well designed, integrated, technically advanced system which provides significant productivity improvements and supports the decision making processes of the commander. At the regimental and lower levels, the commander needs a system that integrates four core requirements: 1) reliable, long range, secure communications; 2) centralized intelligence planning, collection, correlation, analysis and dissemination; 3) planning and coordination of all mortar, artillary, naval gunfire, and air fire support; and 4) decision support tools to assist in operations planning. The system must provide timely information in a manner which facilitates the ability of the commander and his staff to remain situationally aware, thereby fostering rapidity of decision-making, planning and execution. Such a system will allow the commander to generate a higher tempo of operations relative to the enemy, and to rapidly adapt to the constantly changing battlefield environment. Said another way, the system must facilitate a maneuver style of warfare. The system demonstrated in FDS-1 did not display any of these capabilities. Without significant improvements in both performance and capability, the system and the overall acquisition strategy as demonstrated in FDS-1, has limited potential.

ADMINISTRATIVE REMARKS

1. Several issues were submitted that were indirectly related to FDS-1 but warrant consideration for future evaluations. Issues such as technical support and tactical exercise control measures are not FDS-1 specific but are included for use in the overall concept of an FDS approach to acquisition.

2. Participants in FDS-1 contributed several comments. Those comments were collected by both contractor data collectors and included in this report. Those that were directly related to FDS-1 are contained in the MCLLS format in enclosure (2). Those that are not FDS-1 specific are contained in this enclosure.

ITEM: INTELLIGENCE ANALYSIS SYSTEM (IAS) TECH SUPPORT DURING FDS-1

DISCUSSION: IAS-Tech Support during FDS-1 was exemplary, but too few reps caused a lack of responsiveness. While the tech rep support Crane provided during FDS-1 was exemplary, there was a identified shortage of actual personnel to assist the four sites on a continual basis. For example, while the IAS group was assisting at the MEB HQ, personnel were needed at the ACE HQ simultaneously, as well as the BSSG and RCT HQ. This also required the tech personnel to correct an item at one location, and then go to another location to confirm the previous fix was repeated.

RECOMMENDATION: For FDS-2 at least one IAS tech rep should be permanently assigned to each location, with another set of personnel designated to float between locations to assist primary location tasks. This would also allow specific repairs to be simultaneously performed at all locations.

ITEM: MAGTF II OVERVIEW

DISCUSSION: The MAGTF II program was incompatible with both TCO and MILOGS, to the point that it could play no meaningful part in FDS-1. Additionally, much of the logistical data (concerning ammunition in particular) was obsolete/outdated. The attempted use of MAGTF II in FDS-1 was a mistake. Ammunition quantities were unrealistic and did not reflect 30 days of ammunition (DOA). Examples were numerous; 40mm grenades for quantity of one (1); quantity of 9 for 81mm mortars. Additionally, older DODICs of ammunition were listed; i.e., 60mm and 81mm were listed under the old DODIC. Some DODICs were omitted; i.e., 81mm and 120mm had to be manually inputted, HAWK (PC07), TOW (PE96), STINGER (PL95) and DRAGON (PM80) ammunition not included.

RECOMMENDATION: Adjust MAGTF II software for compatibility with MILOGS and TCO. Research the source of the outdated data in MAGTF II and change how MAGTF II sources its input data.

ITEM: TCO INCOMPATIBILITY WITH USMC STANDARD ADP HARDWARE

DISCUSSION: TCO is incompatible with USMC-Standard ADP hardware. TCO cannot run on the most common PC configuration throughout the USMC (80286/80386 processor, 640K-1MB RAM, 40MB HD.)

RECOMMENDATION: That MTACCS be written so that it can run on the PC configuration described above.

ITEM: RELIABILITY OF ADP EQUIPMENT

DISCUSSION: Reliability of ADP equipment in field conditions was good, but only because extraordinary PM measures were taken. The ADP equipment used in FDS-1 withstood adverse conditions (primarily dust and power fluctuations) extremely well, averaging less than one ADP hardware failure per day with over 70 computer systems in use. ISMO, comm personnel, and the operators performed frequent preventive maintenance consisting of removing dust and cleaning air filters. ISMO personnel issued approximately 70 cans of compressed air and 50 PM brushes between 11 and 22 November and toured all FDS C2 nodes to instruct user personnel on PM three times during the exercise. Most of the ADP hardware failures that did occur were dust related keyboard failures.

RECOMMENDATIONS: That a similar PM system be made SOP for MTACCS during FDS-2, with the addition of weatherproofing MTACCS gear using methods similar to those commonly practiced with field radios.

ITEM: INTEGRATION OF SUPPORT TEAMS

DISCUSSION: Integration of FMF, MCRDAC, and Contractor Support Teams was important to insure the success of FDS-1. ISMO, ELMACO, MCRDAC, and contractor personnel cooperated closely on ADP maintenance for FDS-1 and conducted their efforts from same locations as much as possible. This minimized delays and confusion about which component of a system was malfunctioning and got gear back in service quickly.

RECOMMENDATION: That a similar approach be used in future FDS Evaluations.

ITEM: MOBILE ELECTRIC POWER

DISCUSSION: Mobile Electric Power (MEP) sources for the MTACCS must be planned for and purchased prior to system fielding. MTACCS requires stable, uninterrupted power down to the battalion level. The present T/E's and T/O's of the infantry regiment and its battalions do not include MEP equipment nor operators. During FDS-1 the Ground Combat Element (GCE) temporarily loaned MEP 3's and 5's for power, but had only one LCpl from 1/11 to install, operate and maintain the field power system.

Recommendation: That prior to FDS-2, power requirements be identified, and sufficient numbers and types of equipment and operators be provided down to the infantry battalion level.

ITEM: SYSCON CONTROL OF CONTRACTORS

DISCUSSION: In order for a SYSCON to be effective, it must exercise total control over all communications/ADPE equipment and personnel. During FDS-1 there were numerous times when contractors and Marine communicators attempted to restore the same system without the others knowledge. This resulted not only in wasted effort, but also caused system outages of longer duration.

RECOMMENDATION: That for FDS-2 the MCRDAC communications planner share SYSCON watch, and all contractors be directed from SYSCON.

ITEM: LACK OF COMMUNICATIONS INTEROPERABILITY TESTING

DISCUSSION: Sufficient communications interoperability testing was not conducted prior to the evaluation. Numerous component systems of MTACCS were tested under realistic conditions for the first time during the FDS-1 evaluation. These systems were reportedly tested by contractors. CG I MEF 191331Z SEP 91 requested that MCRDAC conduct integrated tests to validate the capability of MTACCS equipment over current USMC tactical communications systems. A comprehensive equipment interoperability test would have identified many of the problems experienced during FDS-1. MCRDAC and FMF personnel should observe interoperability testing to ensure the test is conducted in realistic conditions.

RECOMMENDATION: That realistic interoperability testing using USMC tactical communications systems be conducted prior to the FDS-2 Evaluation.

ITEM: TECG KEY PERSONNEL DEFICIENCIES

DISCUSSION: CG SEVENTH MEB 080250Z OCT 91 provided the final scru. for the personnel list in support of FDS-1. The Deputy G-7/TEC section lacked a Logistics Controller, an Air Controller, and a Personnel Controller. The logistics planner shortfall was satisfied by assigning the Senior CSS Controller from the Combat Service Support Cell to assist the TEC during planning stages. A similar concept was employed in the Air Cell. The Personnel Controller requirement was not filled, thus requiring the exercise force G-1 to create MSEL items to be submitted by TECG personnel who possessed a limited personnel background.

RECOMMENDATION: Recommend that future personnel lists to support further FDS evaluations include a Logistics Controller, Air Controller, Fire Support Coordination Controller and a Personnel Controller in the TEC section. These are essential key billets which may offer the TEC critical input necessary to support planning efforts and adjudicate problems in a TWSEAS base scenario.

ITEM: PREPARATION OF MANUAL MSELS

DISCUSSION: Preparation of manual MSELs prior to the exercise would have enhanced the TECG capability to assist in the scenario development. The TCO will not accept files prepared on a non-TCO terminal. This precludes the TECG from preparing MSELs on another personal computer without a TCO. Many of the manually inserted MSELs (as opposed to the free play on TWSEAS) could have been typed in advance if the TECG was aware of this information and had a TCO prior to beginning the exercise.

RECOMMENDATION: For FDS-2, the TECG should determine if any word processing programs are yet compatible with TCO. If not, the TECG should obtain a TCO in order to prepare MSELs that will be inserted via the TCO during the exercise.

ITEM: SCENARIO EVENTS INPUT

DISCUSSION: The MCRDAC FDS-1 Evaluation Implementation Plan, dated 6 September 1991, directed the system Assistant Program Managers (APM) to provide the FDS Coordinator with a complete description of specific scenario and master scenario event list (MSEL). The scenario would have been enhanced by this type of input, which would convey to the controllers the type of exercise activity that is desired too fully test the systems. Because the APM's input was not received by the Tactical Exercise Control Group (TECG) for FDS-1, the TECG built scenario to support general evaluation objectives, therefore allowing the possibility the systems would not receive a comprehensive test.

RECOMMENDATION: The APMs provide the FDS-2 TECG specific scenario events from the outset and then conduct occasional liaison with the TECG to monitor the development of the scenario and the MSEL.

ITEM: COMMUNICATION/DATA PROCESSING OFFICER FOR TECG

DISCUSSION: The assignment of Communications/Data Processing Officer to TECG Planning Staff would have greatly assisted the TECG in its mission. Due to the complexity and detailed integration of multiple communication and data processing equipment both required to support the evaluation and that actual equipment being evaluated, the assignment of a Communication/Data Processing Officer to the TECG planning cell is paramount. The assignment of this officer should be well in advance of the actual forming of the TECG planning cell so that the officer can participate in all aspects of planning and training for the evaluation. The in depth knowledge of the integration of systems is required at the TECG to ensure proper interface and optimize the flow of data and other reports generated by scenario play. The presence of a well versed "technical advisor" at FDS-1 would have greatly facilitated an integrated understanding of the total system and its idiosyncrasies. As it was during the pilot test at the East Gym, the TECO experienced difficulties with communications connectivity between terminals within the TECG in the East Gym and terminals in the field. The TECG does not possess the expertise necessary to troubleshoot systems nor full understanding of the interface of data processing and communication equipment.

RECOMMEND: For FDS-2, a Communication/Data Processing Officer be assigned to the TECG prior to the initial planning meetings.

APPENDIX C

MCTSSA AFTER ACTION REPORT

FDS-1 AFTER ACTION ITEMS

CATEGORY ONE

FDS PROGRAMMATIC ITEMS

ITEM: Overview of FDS Process.

DISCUSSION: The FDS process was planned to be conducted in three phases: 1) Systems Integration and Testing; 2) Training of FMF Marines; and 3) Field Evaluation. Due to contractual difficulties between the government and the prime contractor, phase 1 testing was inadequate and incomplete resulting in limited systems and communications interoperability. Training was successfully conducted at MCTSSA and proved to be the highlight of the entire FDS process. Mr Jeff Lobaugh and the individual systems instructors deserve much credit for a job well done. The Evaluation in itself was successful in better defining our requirements and specifications for further development. However, we were unable to validate the MTACCS concept due to limited interoperability. The inability to establish reliable communications via single channel radio was particularly disconcerting.

RECOMMENDATION: We cannot afford to short change systems integration and testing efforts for FDS-2. These activities must be adequately defined in the contractor's statement of work and emphasized. Thorough testing must be conducted and completed at least one month prior to the training phase in order to establish a solid software baseline. We must ensure that critical technical issues are successfully resolved before heavily committing scarce FMF assets in the FDS process.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: MCRDAC Staffing for FDS.

DISCUSSION: The billet of FDS Coordinator is a full time job in itself; a double-hatted arrangement of duties is clearly inadequate. The FDS Coordinator must also have the rank or authority to tell other DPMs what to do. Someone must be in charge, and the officer must have an adequate staff to address issues as they arise. This was not the case for FDS-1 and lack of coordination was the result.

RECOMMENDATION: That PM MAGTF C2 should be the FDS Coordinator for FDS-2. An Assistant FDS Coordinator of the rank of Colonel should be assigned with appropriate staff at least nine months prior to the start of an FDS iteration; this is a full-time job. The staff will require communications, operations, logistics and engineering expertise. The officers serving on the FDS staff must report only;y to the Assistant FDS Coordinator. If adequate staffing is not possible due to conflicting priorities, then we should not attempt to conduct an endeavor as large and complex as FDS.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

Item: MCRDAC Restructuring to Support MTACCS and FDS.

Discussion: The TCO evaluation ended up being an MTACCS evaluation. The two cannot be tested separately in the field. Unfortunately, the job of organizing this 'MTACCS' evaluation fell upon the C2G PM. C2G is inadequately staffed to handle the complexity of planning and liaison necessary to make FDS run smooth. The C2G PM did not have authority over the other MCRDAC personnel and their systems. The FMF viewed MCRDAC as a disjointed collection of cats and dogs. Interoperability quickly became a problem.

Recommendation: Developing MTACCS should be one of the few core responsibilities of MCRDAC. In light of this, the organization of MCRDAC needs to be modified to be support MTACCS and the FDS process. First, there needs to be a 'super PM' who has responsibility for all of the MTACCS systems. SE&I should be the driving force behind interoperability, MCHS, and MCASS within this organization. This super PM needs a staff that is technically proficient and experienced in MAGTF operations. They must be senior enough in rank to effectively liaison with the FMF and subordinate PMs at the required level. The staff should be of sufficient size to allow them to be able to handle the planning for FDS-2 as a coordinated MCRDAC effort. (This argument could be expanded to include MCTSSA's structure.)

Submitted by: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: MTACCS Common Application Support Software (MCASS).

DISCUSSION: For FDS-1, TCO software really consisted of two parts: 1) the TCO application to serve as the Commander/S-3 tool, and 2) the Command Automated Support Network (CASN) modules consisting of communications server, LAN manager, message handler, device drivers, etc. Unfortunately both products were inextricably linked and were not required to be separate contract deliverables. As a result TCO terminals proliferated throughout the FDS laydown just to provide connectivity. The FDS-1 configuration did not support the concept of MCASS; the CASN software which was produced should have provided the interface to all MTACCS systems, not just TCO.

RECOMMENDATION: Providing essential MCASS software should be the number one priority for FDS-2. If implemented properly, MCASS will vastly improve interoperability across MTACCS and reduce unnecessary equipment requirements (i.e. TCO terminals for G/S -1, -2, and -4s). At the same time, MCASS will increase the portability of tactical applications while reducing life cycle costs. MCASS is critical to the development of MTACCS and should be supported as such.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Focus of Analysis on FDS-1.

DISCUSSION: The stated ultimate purpose of MTACCS is to achieve a situation in which all elements of the MAGTF are passing information around quickly and easily while operating on common hardware and using common software. FDS-1 is supposed to be a manifestation of this philosophy/goal so that we can see where we are in this effort.

A major obstacle to this ultimate goal is the fact that there exist many dissimilar developing systems in the Marine Corps, which cannot communicate with each other, which use various kinds of software, various kinds of hardware platforms, and have only half-hearted plans (if any) to conform to some standard. This is to be expected.

The problem is that FDS-1, advertised as an evaluation, was set up only to evaluate the TCO software. While TCO is potentially a major ingredient to an MTACCS-compliant system, it alone will not meet the goals that the MTACCS office is tasked with meeting.

The FDS evolutions represent an opportunity to evaluate the various emerging tactical systems from the standpoint of compliance with MTACCS standards. Some systems are new enough (IDASC) that they can become MTACCS-compliant relatively easily NOW given the proper guidance, while others will require some time to meet MTACCS standards, during which an MTACCS compliance plan would be established and followed.

RECOMMENDATION: Use FDS to determine the extent to which Marine Corps systems will have to be modified to achieve MTACCS compliance. Designate those systems which will make changes now and have project officers of the other systems submit MTACCS compliance plans to outline how (and when) their systems will achieve this goal. MTACCS and FDS is much more than just TCO. Let's not put all our hopes in this one system, but diversify our avenues of approach to our interoperability goals.

SUBMITTED BY: CAPT J. J. KANE, IDASC Project Officer, ACCSD, MCTSSA, AUTOVON 365 2132/3.

ITEM: Emphasis on MTACCS Rather Than TCO.

DISCUSSION: During FDS-1, the role of TCO was continually emphasized. It was the only system which PNL was hired to evaluate from the start, while all other systems were ignored in the formal evaluation. All major decisions were deferred to the developer of TCO regardless of its effects on the system as a whole. The interfaces between systems were not adequately defined nor tested prior to FDS training. FDS-1 became a software showcase for TCO rather than an evaluation for MTACCS.

RECOMMENDATION: The focus of effort for FDS must be MTACCS as a whole rather than any of the component parts.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: MTACCS/FDS Systems Brief.

DISCUSSION: Despite the large number of FMF officers involved in planning for FDS-1, it was surprising how little the young Marines knew about FDS, MTACCS, and the role of automation in C2. Leaders of Marines have a responsibility for answering the "whys" and "hows" so that their Marines have a clear understanding of the mission and their function in its execution. MCRDAC/MCTSSA personnel fielded a broad range of questions but only scratched the surface.

RECOMMENDATION: The training syllabus for FDS-2 should include an MTACCS/FDS systems brief. This could be done in a single two hour period. The brief should cover the goals, configuration, and employment of MTACCS. Strong emphasis should be placed on the advantages and limitations of automation on the battlefield. An overview of each of the MTACCS component systems and its interfaces to other systems would help Marines understand how the Marine Corps intends to fight more effectively and efficiently in future conflicts. FDS, the process, should also be explained .

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Standards for Software Development.

DISCUSSION: TCO was an advanced prototype for FDS-1. We all knew it would have some bugs, but it did demonstrate solid capabilities as an automated command and control tool. Unfortunately, it was written in "C" instead of Ada and no design documentation was included in the list of contract deliverables. Other than CSI, no one really knows how the program operates and CSI is not about to tell us for free either! What the government is soon to receive for TCO software will very likely be of little enduring value despite the potential demonstrated at FDS-1. Without interface and software design documents, the code is neither maintainable nor reusable. The full gamut of 2167A documents are not needed; however IDD and SDDs should be required in some form or another.

RECOMMENDATION: All tactical systems should be written in Ada in compliance with DoD directive. In addition, design documentation must be included as contract deliverables. We do not need any more undocumented prototypes written in "C" - we are just wasting the taxpayers money on throw-away code of little worth.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Configuration Management (CM) of Software.

DISCUSSION: TCO software was revised on an average twice daily during training at MCTSSA and once a day during the field evaluation at 29 Palms. No controls or procedures were established to manage software changes. Configuration management was left totally in the hands of the individual systems contractors; most Project Officers and Program Managers had no idea that changes were even being made. This "every man for himself" approach to CM had ruinous effects during FDS-1. Operators Manuals became hopelessly outdated, techniques taught during training would not work in later versions of the programs, changes arbitrarily made in one system often disabled the interface with another, software running in one node was not identical to software running in another for the same system, etc.

RECOMMENDATION: For FDS-2, we must strive to establish a solid software baseline following integration activities and testing; this is a prerequisite before training can begin. Once established, changes to the baseline must be controlled. Systems contractors must inform their respective PO/PM of the proposed changes. The consequences of the change must be examined both internal and external to the individual system. Once the training and evaluation phases begin, only the FDS Coordinator should have the authority to alter the configuration of software due to the effects such changes have on systems interoperability and the validity of the evaluation itself. We cannot conduct a meaningful evaluation on vapor-ware.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: TCO Software Configuration Control.

DISCUSSION: TCO Software Configuration Control was non-existent. Throughout the Integration and Training phase of the evaluation daily and in some cases twice daily software updates were made to the TCO software. In the confines of the integration facility configuration control was apparently controllable. In the field though all semblance of software configuration control and management evaporated. A software update was implemented 911115 with the arrival of CSI programmers. On 911116 starting at 0700 another software update was installed. That afternoon additional code was loaded supporting the PPB interface. It was announced that a new software load would be installed the evening of 911120. It was determined that that load was based on old software from 14 November and that software updates for the PPB made on 911116 were eliminated or failed to migrate to the new load. This is regressive programming at it's finest.

RECOMMENDATION: That a software baseline date, as a milestone, be established through the IPR process for all MTACCS systems and interfaces. (This will necessitate interoperability/interface validation.) That the government exercise configuration control for the evaluation phase of the FDS.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Lack of Effective Software Configuration Management.

DISCUSSION: Software problems were being fixed during training and in the field during FDS-1. There was a lack of communication between all those involved in the software modification and updating effort. In one case, the latest version was updated with outdated version of the software.

RECOMMENDATION: During integration these software variation problems may be solved by closely controlled integration efforts, thus making updates in the field unnecessary. This does not waive the requirement for centralized control over what gets put on the hard drives.

SUBMITTED BY: Steve LeRoy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 260.

ITEM: Software Version Control.

DISCUSSION: During integration testing between TACFEP and TCO in August 1991, changes had been made to the TCO software. When November training with TCO began in the FDS trailer at MCTSSA, communications between TCO and TACFEP could not be established because these changes had not been incorporated into the training version. There was a delay of 24 hours in the use of the TACFEP and AN/GYC-7 network until is was resolved. This could have been avoided with better version control and an adequate integration period before training.

RECOMMENDATION: A freezing of the baseline after the integration so everyone knows what is supported and what is not.

SUBMITTED BY: William Haworth, GS-13, ULCS Project Office, CISD, MCTSSA, AUTOVON 365-2484.

ITEM: Coordination Between MCRDAC and MCTSSA.

DISCUSSION: An efficient system was set up at MCTSSA by the FDS working group for the purpose of preparing to conduct FDS-1 integration and training at Camp Pendleton. Much information needed to be gathered regarding the support and training requirements of all the individual projects.

Divisional representatives were designated and tasked with the responsibility for funneling information regarding support and training requirements from the various projects in the division to the working group as well as acting as a point of contact for those projects when they had questions about FDS-1.

Unless the individual project's leadership at the MCRDAC level kept the MCTSSA project officers informed about their plans for FDS-1, however, the MCTSSA project officer couldn't provide the MCTSSA divisional representatives with the required information. This resulted in much unnecessary anxiety and guesswork on the part of both the divisional rep and the FDS working group.

RECOMMENDATION: MCRDAC must ensure that MCTSSA is kept informed about the overall project plan at the individual project level. This communication must take place between the MCRDAC and MCTSSA project officers.

SUBMITTED BY: CAPT J. J. KANE, IDASC Project Officer, ACCSD, MCTSSA, AUTOVON 365 2132/3.

ITEM: GFE Provided to TCO Developer.

DISCUSSION: The government failed to provide GFE to CSI on schedule. Much of this problem was attributed to C3 production line quality assurance difficulties. However, lack of unity of control was also a contributing factor - it was never clear exactly who was in charge for delivering GFE (C2G, SEI, MAGTF C2, ???). This coupled with inadequate record keeping both at MCRDAC and at MCTSSA turned the whole GFE issue into a crisis. The effect of this snafu was to virtually eliminate critical interoperability testing as well as to create an equipment shortage at the onset of TCO and FIREFLEX training. Rather than minimizing the impact of the shortage, CSI played it for all it was worth.

RECOMMENDATION: Assign one person at MCRDAC responsibility for delivering GFE for FDS-2. Implement improved record keeping procedures. Send GFE directly to the appropriate contractor to simplify the matter; MCTSSA was never intended to be a warehouse for HW/SW.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Return of GFE.

DISCUSSION: On 8 November all of the FDS-1 equipment was shipped to 29 Palms to conduct the evaluation. At the time, there was no coordinated and agreed upon plan for the return of GFE from the contractor back to the government. Confusion ensued. Finally a hasty decision was reached to ship all equipment back to the contractor for cleaning and repair. It is unfortunate that the government and contractor did not formally come to terms (i.e. cost and schedule) before embarking on this course. We are now confronted by a dilemma - the contractor controls all of the critically scarce computer assets needed for further development efforts and the government has little recourse to effect the swift return of GFE.

RECOMMENDATION: Ensure that the procedures, place, and schedule for return of GFE is always included in the contractor's statement of work prior to embarking on a project.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: FEDEX Shipments in Support of FDS-1.

DISCUSSION: As the UYK-83/85s and associated software were purchased for FDS-1, much of it was shipped to MCTSSA even though CSI was doing the development. As a result, during the 2 months prior to FDS-1, MCTSSA had to expend a large sum of money to FEDEX equipment and software to CSI.

RECOMMENDATION: MCTSSA should not be used for a holding facility. Developmental equipment and software should be sent to its intended user.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Mobility Issues and Command Post Configurations.

DISCUSSION: Early in the planning for FDS-1, it was decided that the evaluation would be a static exercise. As a result, mobility issues were not addressed in FDS-1, and all unit CP's were housed in tents. Though unrealistic, this turned out to be a good decision since TCO was an advanced prototype and lacked the robustness and interoperability of a fully developed system. However, this leaves mobile operations and CP displacement as major issues yet to be explored for FDS-2. Can an MTACCS equipped staff operate in a AAVC-7 or LAV configured CP? Do we have sufficient lift organic in our units to haul around such a high density of ADP equipment? How much gear is too much? How do we mount and integrate MTACCS equipment in our command vehicles? What procedures do we need to displace a CP or to pass control with automated C2 systems? Capt Stewart's HMMWV configured Jump CP was a step in the right direction, but this was an excursion - no staff actually set up to do business in it.

RECOMMENDATIONS: We must ensure to address mobility issues to include configuring CPs in AAVC-7s, HMMWVs, and LAVs with MTACCS suites. We must keep in mind that systems will never be considered fieldable if they aren't transportable.

SUBMITTED BY: Maj Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365-2148.

ITEM: Communications Via Single Channel Radio.

DISCUSSION: The INTEL Link I and DAS nets were the only digital SCR circuits used extensively during FDS-1. Both nets were configured using a standard AN/UYK-83A hosting both the TCO and PPB concurrently. The circuits were covered using KY-57 and HYX-57 remote to accommodate the crypto interface designed for the PPB. HYX-57s were employed as remote because AN/GRA-39 was not compatible with the 16KB data rate coming from the KY-57. Communications on these nets proved intermittent and unreliable throughout the FDS-1 evaluation. The PPB was "blamed" for this problem. It was obvious that 8MB of memory was insufficient to host both applications as the systems became sluggish after two hours of operation.

Testing was conducted by the 7th MEB after hours. A TCO terminal was connected via an MTCM modem to a AN/GRA-39 remote and then to a AN/PRC-77 radio. The net remained uncovered throughout the test. All equipment had been thoroughly tested and aligned to specifications prior to the test. Once again comm was intermittent and unreliable. TCO never established radio comm between all nodes during FDS-1 either through the PPB or the MTCM as had been advertised. Most communications between nodes was effected via wire. As a result, the gradual transition from wire to radio which had been planned was never effected. This contributed to the early conclusion to the FDS-1 Evaluation.

RECOMMENDATION: Extensive interoperability testing is required with FMF communication equipment. Reliable comm via SCR is critical for FDS; reliance on wire is unrealistic. Fielding of improved radio equipment (i.e. SINCGARS) needs to become a priority for the Marine Corps, hopefully in time for FDS-2. Our current family of radios and remote were not designed to handle the demands of digital communications.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: ULTDS Network.

DISCUSSION: The FDS-1 ULTDS network used the AN/GYC-7 switch with interswitch trunks between all four switch nodes located at the CE, GCE, ACE and CSSE. Each switch terminated a TCO interface. The ACE also terminated interfaces to the ATACC and SAAWC, and the GCE terminated an interface to IDASC. The network was engineered for flexibility and redundancy. There were trunk outages during the evaluation which went undetected by the user because of the redundancy. When other TCO digital interfaces were not established or sustained an outage, the TCO user services were alternately routed over the ULTDS system. The ULTDS system was never stressed with the amount or volume of traffic placed on it. The FDS-1 ULTDS network and systems could have processed and managed all the TCO digital communications traffic, to include the subordinate units had connectivity been established, for this evaluation. This alone validates the MTS Switch protocol and the need for ULTDS networks for the modern battlefield.

RECOMMENDATION: That the fielding of the ULTDS enhancements to the AN/TTC-42 and SB-3865 ULCS systems be vigorously implemented to meet present FMF requirements and the emerging MTACCS systems and technologies.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: MTACCS Interoperability, Interface/Integration and System Load Testing.

DISCUSSION: Throughout the FDS development process frequent and detailed interoperability and interface testing of the many and varied MTACCS systems is essential. The goal is to focus the development path, design and objectives of the C2 systems to enhance integration and interaction. Concurrent, but on a less frequent basis, load testing of the MTACCS system will assist identifying stress points, communication bottlenecks and faulty software that may test (one-on-one) well in a laboratory but fail in a field stressed environment.

RECOMMENDATION: That MTACCS integration test milestone dates be scheduled through the IPR process on a system by system basis. That an MTACCS system loading test/demonstration be scheduled sixty days before an FDS-_ evaluation.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Field Testing of FDS-X.

DISCUSSION: Combining integration, field testing, and fleet evaluation into one expensive high visibility event was ill conceived. Additionally, committing to a high visibility evaluation with significant resources required from the fleet put MCRDAC in a position to be held hostage by the contractor. With no follow-on contract to hope for, the contractor was in a position to obtain concession after concession from MCRDAC (pre-evaluation delivery of source code, integration time etc).

RECOMMENDATION: First allow for thorough integration. Then test the system in the lab. Then test it in the field. Then find a CPX. Then train the participants. Then do the field evaluation.

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Offucer, GNSD, MCTSSA, AUTOVON 365-2397.

ITEM: Lack of Integration Time.

DISCUSSION: The absence of any dedicated integration impacted significantly. There were two PLRS Server related problems that showed up at 29 Palms that could have been detected and solved easily in an integration environment (extension cable configuration and MILID definition). Most significantly, the integration time is essential for developers to learn about the other systems that they are interfacing with. MCTSSA engineer's lack of knowledge of CSI's product inhibited trouble shooting in the field (a bad place to be doing it); CSI's lack of knowledge about PLRS lead them to minimize training for it, with the subsequent difficulties in the field. In fact, CSI and the people CSI trained all thought PLRS was working when it was not.

Note: This was preventable. Integration time was planned for in light of the integration difficulties experienced at the February '91. THIS INDICATES THAT THE MARINE CORPS DOES NOT LEARN FROM ITS EXPERIENCES. SCARY THOUGHT FOR FDS-2.

RECOMMENDATION: A minimum of three weeks dedicated integration time should be scheduled, with all key technical personnel present.

SUBMITTED BY: Captain J. A. Moffett, MCASS/GNSD, AUTOVON 365-2397.

ITEM: Interoperability Testing.

DISCUSSION: There was an inadequate amount of time allowed by CSI for interoperability testing of the PPB/TCO interface. Also, during testing, there was a lack of direction. The TCO developers were testing a point-to-point connection with the PPB on three channels. In effect, this was allowing three pathways to the same destination or host TCO terminal. This was not a realistic configuration nor was the configuration used during FDS-1. What should have been tested was communication over one channel, with multiple, at least more than two, net members.

RECOMMENDATION: Interoperability testing should be something directed by MCRDAC, with a test plan approved, and sufficient time allocated. That the test plan and schedule be strictly enforced.

SUBMITTED BY: Steve LeRoy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 260.

ITEM: Integration Testing.

DISCUSSION: The integration testing that was scheduled at MCTSSA did not occur as a result of CSI's non-availability.

RECOMMENDATION: That MILOGS component systems undergo independent integration testing at MCTSSA prior to an FDS to include the capstone logistics decision support system. MILOGS systems must also undergo integration testing with TCO and other MTACCS systems prior to each FDS.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

ITEM: Lack of Individual Interoperability Testing.

DISCUSSION: Individual interoperability testing for PLRS was minimal. A field test using the FDS-1 evaluation cable setup and PLRS library would have saved days of support time.

RECOMMENDATION: Conduct an individual PLRS interoperability field test of TCO and the PLRS server before FDS-2 evaluation.

SUBMITTED BY: Phil Hiroshige and Eddy Chue (NSR), MCASS Project Office, GNSD, MCTSSA, AUTOVON 365-2285 ext 223.

ITEM: Digital Verses Voice Communications.

DISCUSSION: During discussions with Commanders and primary staff officers participating in the FDS-1 evaluation, I heard one comment frequently - that we had transformed too many of our doctrinal nets from voice to digital. Digital communications facilitates rapid transfer of discrete messages, written documents or quantifiable information. However, digital comm does not enable the rapid interaction necessary to have a meaningful conversation. For instance, requests for fire, rapid requests for logistical support, SITREPs, personnel strength reports, etc. are all examples of information well suited for digital nets. But we should not preclude the capability for a commander to talk to his subordinates, there will always be a role for voice communications on the battlefield just as there is a need for a telephone in the office.

RECOMMENDATION: Conduct an analysis of Marine Corps communication architecture to determine which nets ought to remain voice and which should become digital. FDS-2 should be used to validate or refute the conclusions drawn from the study which should then become the basis for Marine Corps communications doctrine.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Mobile HMMWV CP Demonstration.

DISCUSSION: The "Jump CP" designed and built by Capt Stewart was one of the true achievements of FDS-1. His use of off the shelf parts and gear was ingenious. The shelter was adequate and easy to emplace, the equipment racks were stable and functional, and his UPS/power distribution system was remarkable.

RECOMMENDATION: Capt Stewart merits commendation for his noteworthy innovation and initiative. He has provided viable means to solving our mobility and power supply problems. Support for his efforts ought to be expanded for FDS-2. His UPS/power distribution system is needed now!!!

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: HMMWV Mobile Command Post

DISCUSSION: MCRDAC demonstrated a HMMWV based mobile, self contained command post during FDS-1. The design was functional and efficient. The interior layout, communications capabilities, power supplies/sources, and expandability warranty a more thorough evaluation and validation.

RECOMMENDATION: That the HMMWV mobile CP concept and hardware suite be validated for construction and issue to the FMF.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: FMF Provided Computer Operators and Trouble Shooters.

DISCUSSION: The 1st FSSG Information Systems Management Office provided four computer programmers for use by MCTSSA and 7th MEB G-6. Their primary job was to assist the systems control and TCO developers in installation, operation and maintenance of the TCO network and terminals. They were effectively employed as installers for the integration and training phase of the evaluation. During the field evaluation they could have been more effectively utilized by 7th MEB SYSCON if a more comprehensive trouble shooting training program were presented by the system developers. The FMF experience, coupled with developer hardware/software training, would have resulted in a potent trouble shooting team. The Marine computer programmers were seldom called upon for technical assistance.

RECOMMENDATION: That FMF experienced computer programmers be trained and employed with the evaluation headquarter System Control agency for assistance in installation and maintenance of the MTACCS development systems.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: FMF Augmentation for MCTSSA.

DISCUSSION: FMF augmentation for MCTSSA during FDS-1 was essential. MCTSSA resources are limited to accommodating smaller tests. In addition, the knowledge gained by the FMF augmentees and the relationship developed with CSI, enabled CSI to setup faster in the field and to interact with MEB SYSCON and the TECHCONs more effectively.

RECOMMENDATION: Future large scale FDS integration activities at MCTSSA should include 40xx personnel from the units targeted to be included in FDS-2. The experience gained will help ensure a smooth transition from the lab to the field.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: System Training for TCO and C2 Operators.

DISCUSSION: The TCO operators were trained principally on the TCO functions that their terminal would exercise during the evaluation. This met the training objectives supporting operator knowledge and proficiency for the evaluation. The commanders and their staffs were not involved in training until the Combined and Integrated Training sessions which were two, two day blocks. Training time was insufficient to train a thoroughly proficient TCO operator supporting an MTACCS system knowledgeable staff officer.

RECOMMENDATION: That commanders and their staffs be involved in training earlier and with more of it to develop the understanding of the capabilities and limitations of the MTACCS systems.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Coordinated Restoral Actions for Digital Circuits.

DISCUSSION: The FDS-1 communications plan did not differ to any great degree from that used to support a MEB level operation. The plan was sound and supported all communication interfaces. The differences were a robust ULTDS network supporting the CE and major subordinate commands, digital device networks that resembled SCR voice networks but using wire as the transmission path, and two SCR nets that used a prototype board, KY-57 COMSEC and SCR. The participants in the evaluation had not exercised nor trained in a field environment on the hardware supporting FDS-1 prior to the evaluation. Two days were dedicated to a COMMEX prior to the Pilot Test. Digital circuit outages were difficult to identify and restoral actions difficult to coordinate. For FDS evaluations it is imperative that the unit communications elements train and develop confidence with the FDS communications systems and interfaces. One more step would be to develop or modify the system control mechanism to support the FDS evaluation.

RECOMMENDATION: That FDS evaluation participants be allowed sufficient field training time with the FDS digital systems to develop proficiency and build confidence in the FDS systems.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Last Minute Planning for FDS-1 Excursions.

DISCUSSION: On 12 November a MCRDAC test was identified that required a VHF frequency assignment. The requirement was facsimile to 7th MEB 8 November. The last cat and dog usually get a disproportional amount of the assets. The FDS-1 final planning conference was conducted on 1 and 2 October which should have established the FDS-1 Evaluation baseline. Obvious the baseline was fluid.

RECOMMENDATION: That the FDS-_ Final Planning Conference establish the evaluation baseline for MTACCS systems validated readied for evaluation, and that late comers be delayed/scheduled for the next FDS.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: MTACCS Equipment Density.

DISCUSSION: The density of MTACCS equipment for FDS-1 was excessive. For example, the laydown of gear for an INF BN included 9 AN/UYK-83A/85A computers; it is unreasonable to expect a unit to transport, employ and sustain such a burden. If it will not fit in an AAVC-7 or a pack, such equipment will be left behind and will not be a part of the battle.

RECOMMENDATION: We must strive to reduce the equipment density for FDS-2; 4 or 5 suites should be a reasonable target for a battalion size unit. Larger units will require additional capabilities to fit their needs. We must abandon the concept of fielding a collection of separate terminals each running a different system. We need the capability to run several applications concurrently on the same computer to reduce the equipment laydown while retaining full functionality. To achieve this end, we will need to produce more capable as well as lighter hardware. The LCU may not be the answer; though it is substantially lighter than the AN/UYK-85A, its memory and hard drive capacity is limited compared to the "hot" 32MB machines employed during the FDS-1. We need to revisit the hardware requirements for FDS-2 as well as the "objective" MTACCS suite.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Automation and C2 Requirements at the Battalion and Squadron Level.

DISCUSSION: The TCO developers based the C2 facility terminal population on the number of functions performed in the command post. Thus the infantry battalion had eight TCO terminals, plus a UCPS terminal, for the evaluation. This item is not intended to critique the number of terminals in a bn/sqdrn CP, but to start a thought process that the needs for C2 and automation (separate actions) at this level require definition. The infantry battalion needs are simple: give me orders, tell me where the enemy is, tell me were the friendlies are, give me intel, give me pictures/overlays/graphics of the battle field, and let me control the fires in my area or those I own. AND MAKE IT REAL TIME! Can this be done on two terminals? Possibly!

On a less than full period basis, the battalion can manage supplies and personnel on shared resources as is done today in garrison and the field. The requirements for automation at the squadron level is more sophisticated, keeping in mind they will be housed in a benign airfield environment. Their USMC requirements are similar to the battalion, but add to that the extensive Naval Aviation maintenance and supply activities.

RECOMMENDATION: That MCCDC define the operational requirements for C2 and automation at the battalion and squadron level for MTACCS.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: MTACCS Systems Control.

DISCUSSION: One of the FMF perceptions was that FDS operations would be business as usual with respect to communication operations and management. Thus systems control was decentralized for the FDS-1 evaluation. Communications was non-doctrinally engineered to support TECG operations and anticipated RCT-1 displacement. Centralized SYSCON, to include centralized database management and direction, was not established. The many and varied players, from Marine to government civilian to contractor/developer, had no incentive to respond to SYSCON direction. In the FDS environment, a dedicated and dictatorial SYSCON is essential to prioritize restoration actions, adjudicate conflicts between competing interests, and incorporate and coordinate FDS players actions that effect other segments of MTACCS. Additionally the concept of SYSCON in the MTACCS environment must be defined and evaluated along with the other systems in MTACCS.

RECOMMENDATION: That for FDS evaluations a strong system control hierarchical organization be sufficiently staffed to meet and resolve automated C2 and peripheral interface challenges. That the requirements for System Control for MTACCS be defined and evaluated in the FDS process.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Centralized Direction of the Communication Nets.

DISCUSSION: There was a need for a group to be in charge of coordinating action for the broadcast nets. This would include making sure that all units are aware of a frequency change, and managing the configuration specifications. This would have precluded problems like AN/GRA-39 equipments used vice the HYX-57s as originally engineered, and deciding to remove the HYX-57 and going directly from the KY-57 to a local PRC-77. Activation and restoral actions for the digital nets were disjointed and unorganized.

RECOMMENDATION: Part of training should be setting up the comm gear for the digital systems, and effective troubleshooting techniques.

SUBMITTED BY: Steve LeRoy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 260.

ITEM: Mobile Electric Power (MEP).

DISCUSSION: Generator power was supposed to be installed to all C2 facilities by 8 November; however reliable power was not available to all CPs until 16 November. Even then units were unable to cope with common occurrences such as power surges and generator failure. Clean, reliable power supplies are essential for running FDS.

RECOMMENDATION: For FDS-2 we must consider the following:

1. providing MEP Distribution (MEPDS) equipment to each C2 facility,
2. providing Uninterrupted Power Supply (UPS) equipment to each C2 facility,
3. emphasizing sound engineering practices from planning through execution.

Additionally, UPS and MEPDS equipment must be included in the fielding plans for MTACCS suites for all C2 facilities. The enduring lesson here is that computer based systems are of little use to the FMF without a reliable power supply.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Electrical Power Requirements for an MTACCS C2 Facility.

DISCUSSION: FMF units were frustrated and distracted with the extraordinary effort expended in providing electrical power steady enough for the TCO C2 terminals. This definitely was a negative in their evaluation. At the GCE unit level there are no organic power sources sufficient to meet TCO requirements. The infantry battalion requires, in the MTACCS environment, a simple and dependable AC and DC power source; be it a 10KW MEP 003, a 500/3500W Honda portable or a 500W thermoelectric generator (TEG).

RECOMMENDATION: That power requirements for a C2 facility at every level be addressed as a result of FDS-1. That MCCDC identify the maximum and minimum electrical power requirements for an infantry battalion for the future and the FDS series evaluations.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: CSSCS.

DISCUSSION: CSSCS was used as a feasibility study to determine if the Marine Corps would adopt it as the capstone logistic status system receiving input from stand alone functional area systems. We only had two systems to test and they were at the BSSG and the MEB G-4. This system received its updates from LFADS, the unit's supply system and MIPS, the unit's personnel system. As it was not at each C2 facility it did not have the opportunity to demonstrate its capabilities as well as we would have liked.

CSSCS only demonstrated a sliver of its planned functionality by reporting only supply status. The evaluation of planned functional requirements are equally important in our overall decision. Equally important is the evaluation being performed by Argon National Laboratory to determine if the Marine Corps could live with the algorithms and code used by the Army.

CSSCS also had difficulty in computing reports due to the large data base received by LFADS. There needs to be a filter to drop items not on the pacing items list. This would allow the system to be more responsive by not being burdened with too much data that is not critical at the commander or primary staff level.

RECOMMENDATION: If CSSCS is adapted there should be a modification to the contracts for all MILOGS component systems to require integration with CSSCS. This will ensure cooperation between contractors who currently only have a requirement to build a stand-alone system. It is also imperative that CSSCS be integrated with TCO and that CSSCS can be called up onto a TCO screen for the commander or his operations officer.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: Implementation Plan.

DISCUSSION: CSI had a CDRL to draft the implementation plan. Passing this on to a contractor negated the governments control and they lost the most important tool to insure that their position was clearly stated and in one concise document. This document should have gone further in directing both the contractors and the FMF. MCRDAC should be more bold in identifying just what it wants the FMF to do to preclude confusion and excesses.

RECOMMENDATION: That the MCRDAC FDS coordinator put together a very complete Implementation Plan. The task of drafting the implementation plan should not be delegated to a contractor who is an FDS software developer, to prevent a conflict of interest.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: Electronic Mapping Capability.

DISCUSSION: The MTACCS Technology Excursion demonstrated an electronic mapping capability in the Combat Information Processor Staff Battle Planning and Execution System (CIPSBPS). This capability should be part of MCASS and available to the MTACCS systems including MILOGS. This software system will provide a common data base and common processing tools for commanders at all echelons and their staffs. By using a DMA vector map product, the system permits graphical operations on the map such as sensor planning with fields of view, optimal movement routing, and line of sight calculations. Non-mapping features include automated overlay generation, friendly and enemy situation displays with automatic updates, and event detection and warning.

RECOMMENDATION: That an electronic mapping capability be included in MCASS available for FDS-2.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: FDS Bill of Materials (BOM).

DISCUSSION: MCRDAC expected MCTSSA to support FDS-1 without providing additional funding for supplies, maintenance, etc. By the time additional funding was provided it was difficult to secure adequate supplies.

RECOMMENDATION: Future MCRDAC budget submissions should identify the need for additional supplies to support all integration activities that may take place in support of FDS.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Use of Classified Software/Hardware During FDS.

DISCUSSION: The use of classified software during the integration/training phase of FDS-1 is risky. First, the FDS lab is not a secure facility in terms of physical security and Tempest considerations. Second, cognizant PMs did not take responsibility for providing MCTSSA with detailed security requirements for their systems. Third, cognizant Pms had to be pressured to provide on-site personnel that could be trained and authorized to subcustody COMSEC equipment is support of their systems. Fourth, when you have over 200 personnel from many different units crammed in the same lab and a variety of contractors working all hours of the night, it is very difficult to prevent accidental viewing of classified information that is displayed on the screen. The lack of space in the lab prevents compartmentalizing to accommodate security concerns.

RECOMMENDATION: All MTACCS systems should be able to run as unclassified systems. If not, the respective PMs should take full responsibility for clearly and completely defining security requirements and providing suitable personnel when necessary to take custody of classified material. No classified system should be run on a non-Tempest machine.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Software Disk, Documentation, and License Accountability.

DISCUSSION: The problem with accountability for SCO Open Desktop is not isolated. Currently, Ground C2 does not adequately track the distribution of software. This is important because of the costs involved if software is lost and because some of this software, like Open Desktop, can be integral to delivered systems. Thus they need to be baselined and subject to CM like any other software system.

RECOMMENDATION: GNSD should adopt the system in use by CISD. They have developed a software library concept around their CM personnel. All developmental software must be checked out this library. The library holds all licenses and at least one complete set of documentation and disks for the CM purposes. The RO, however, is still accountable for his/her software that is controlled by the library.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Hardware Accountability.

DISCUSSION: Both MCTSSA and CSI had difficulty getting all computer equipment returned at the conclusion of FDS-1. The equipment that was returned was missing a variety of covers, doors, etc. It did not seem feasible to have FMF units subcustody the equipment from CSI or MCTSSA especially since the FMF did not arrive until 12 November. In addition, this would have taken well over a day to complete given CSI's lack of personnel and LTI requirements. Unfortunately, since they were not responsible for the equipment, the FMF did not make a strong effort to return the equipment in good condition.

RECOMMENDATION: For FDS-2, FMF units should assume some degree of responsibility for security and completeness of developmental equipment they are using. If there is not adequate accountability, unscrupulous personnel in FMF units have a license to steal easily pilfered parts.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Airfield/Group/Squadron Logistic Requirements.

DISCUSSION: The ACE organization and units exercised the logistics functions that normally are performed by support squadrons established at an airfield. The evaluation focus was on green (USMC) sided logistics vice the blue (USN) logistics that the MAW requires and cannot function without. MTACCS is just starting to address aviation logistics information needlines. C2 needline requirements for Naval programs such as NALCOMIS and SUDAPS need to be addressed and defined for the deployed MAGTF.

RECOMMENDATION: That aviation logistic automated programs be included and evaluated in the FDS process.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

FDS-1 AFTER ACTION ITEMS

CATEGORY TWO

FDS-1 EVALUATION ITEMS

ITEM: TCO Functions.

DISCUSSION: There were several important capabilities which TCO did not demonstrate during FDS-1 such as:

- Banyan Vines interface,
- ability to transfer large data files from other systems (i.e. LFADS),
- ability to import word processor files into a TCO generated OpOrder,
- ability to establish communications via single channel radio.

None of these tasks represent high risk ventures; they should have been completed for FDS-1 as indicated in the FDS-1 Systems Concept Document.

RECOMMENDATION: We must ensure that these essential features are implemented for FDS-2.

SUBMITTED BY: Major Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365 2148.

ITEM: Central Point of Contact for MCRDAC at the Field Evaluation Site.

DISCUSSION: There was no central MCRDAC point of contact in the field through which to pass word or to address problems during the exercise. A duty officer was posted in the field following EndEx daily, but this served no purpose what-so-ever. As a result, information flow within the MCRDAC contingent was rather haphazard during the day (i.e. so what time is the 1600 meeting today?). Also as problems surfaced, the FMF did not have a designated official to provide much needed assistance (i.e you need to tell that to Joe but I don't know where Joe is). It was a catch as catch can affair in the field.

RECOMMENDATION: A MCRDAC duty officer should be posted in the field adjacent to the G-6/SYSCON facility during the CPX. MCRDAC personnel and contractors should be required to report in and out to this duty officer and state where they'll be located during the day. The duty should be empowered to take appropriate action as situations arise and be able to call upon key military and civilian personnel to resolve problems. The duty officer should be the central point of focus for passing word and for addressing the concerns of the FMF during the course of the evaluation.

SUBMITTED BY: Maj Al Sawyers, Ground C2 Project Officer, GNSD, MCTSSA, AUTOVON 365-2148.

ITEM: ULS Network Timing and Synchronization.

DISCUSSION: At the field site, the routing between the AN/GYC-7s at each of the nodes was through the ULCS SB-3865s and AN/TTC-42s situated at the corresponding node. The timing for each AN/GYC-7 came from its attached SB-3865. The timing synchronization failed on various links, the most serious being at the Regiment. The failure caused intermittent communication losses and links to go down. The cause of the problem: the crystal oscillator controlling the timing was out of calibration for some the ULCS equipment.

RECOMMENDATION: That the ULCS SB-3865 and AN/TTC-42 timing be calibrated on a regular basis.

SUBMITTED BY: Edith Radnoti, GS-12, ULCS Project Office, CISD, MCTSSA, AUTOVON 365-2374

ITEM: Communication Management By C2 Terminal Operator.

DISCUSSION: TCO C2 terminal operator becomes the communication manager for the net or communication interface hosted on that specific C2 terminal. The operator controls who has access to that interface, normally the communication architecture spelled out in the Marine Corps Tactical Communications Architecture (MCTCA) documents. This restricted access to communication means can slow information flow from C2 Facility to C2 Facility by the inability to access an idle communication asset. The terminal operator should not be concerned with the mechanics of getting a message to an addressee. He should need only to be concerned with the correct identification of the "TO" addresses and the receipt of an acknowledgement; the communications system should make the rest invisible to the operator.

RECOMMENDATION: That the future design of a "communication server" like device must make the selection of a communication path invisible to the drafter or C2 terminal operator.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO C2 Operator Attention and Focus.

DISCUSSION: At the lower echelons/units the TCO operator was attentive and closely focused on the TCO terminal, sacrificing his situational or sensory awareness of the goings-on in the COC. Possibly this was a result of the short TCO training period, instability of the system, and operator experimentation with a new C2 tool. The loss of operator awareness and flexibility was noted by supervisors. Familiarity with the C2 system will breed more efficient operations and use, reduce man/machine distractions, and cause the operator to be creative in his use of TCO and the MTACCS systems.

RECOMMENDATION: Submitted for informational purposes only.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO Communication Interface Management.

DISCUSSION: During the integration and training phase of the evaluation the PPB was hosted on the G-2/S-2 C2 terminals. The G-2/S-2 UYK-83A was running exceptionally slow frustrating the operators. The determined reason was that the PPB consumed processing time thus causing the slow down. Sometime between Integration and Collective Training and setup in the field it was decided to host the PPB on the G-6/CommO terminal at the CE and MSC level. Unfortunately the G-6/CommO terminal was already hosting the TACFEP interface. The slowness problem was now compounded with hosting two interfaces on one terminal. The maturity of TCO was insufficient to handle both interfaces. Operator frustration was transferred to the G-6/CommO from the G-2/S-2.

RECOMMENDATION: Submitted for informational purposes only.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: G-6/CommO Manual Communication Interface Management and Removal as a C2 Functionary on TCO.

DISCUSSION: The G-6/CommO TCO terminal was tasked to host/interface the TACFEP (ULTDS interface) and the PPB (SCR interface). The G-6/CommO operators were not specifically trained on the operation of the PPB nor the requirement for exporting the service to the G-2/S-2. The communication management requirements of the two interfaces overwhelmed the operator because of other anomalies in the TCO network. The results were the G-6 and Communication Officers at the CE and MCSs were removed from staff planning, direction, reporting and C2 functions of the command post.

RECOMMENDATION: That the communication interface and the management of the communication asset must be transparent to the TCO operator.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Exporting TCO Services and Interfaces to Other Terminals on the LAN.

DISCUSSION: The exportation of a TCO interface to another C2 terminal on the LAN became common practice for FDS-1. The problem developed that when the TCO interface host lost power or reboot the exported services were lost. The operator had to initiate all exported services from his memory. The TCO should have had a "last configuration" memory for the exported service as it has for "Own ID and Comm Config.", which reset initialization perimeters for the C2 terminal.

RECOMMENDATION: That exportation activity of a C2 terminal be recorded in memory just as initialization configuration is retained for TCO start-up.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO Training and Operator Proficiency.

DISCUSSION: The training program for the TCO operators was a well thought out, progressive training package. The flaw was that only one fourth of the required TCO terminals were available for the first week of training. Operators shared assets. More terminals were available the second week. TCO operations were the main training thrust. Restoral actions and notification for lost communications of any type (LAN, MTCM, PPB, TACFEP) was not stressed. The CSI representative apparently would solve the problem or address it to someone who would. Simulated lost comms training would have assisted the TCO operator when he faced the communication outages during the evaluation.

RECOMMENDATION: That operators be trained in what actions to take for TCO lost comms. That the training plan incorporate exercising the lost comm procedures to better prepare operators working with a developmental system.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO Net Member Tray Automatic Update.

DISCUSSION: The Net Member Tray of the TCO screen display contains the LAN and external communication configurations and connections. The "Who's There" button will poll the communication connections and present the net members to the TCO operator. This is a manual action, initiated by the TCO operator. This is a good option to reduce "Who's there" transmission/acknowledge and support EMCON. But hours may pass and the operator may think the icons in the tray represent connectivity. The icon representing the member should be refreshed on an automatic (selective period) basis. A C2 terminal with few members in the tray may poll hourly, where a C2 terminal with multiple (MTCM, PPB, TACFEP) connectivity may require polling every five minutes.

RECOMMENDATION: That for communications connectivity of a C2 terminal, the net member tray should have automatic update feature to reflect current capabilities. This should be in addition to the manual update capability.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: PLRS System Feedback to TCO User.

DISCUSSION: There was no direct way for the operator to tell if he were connected to PLRS and polling. He had to check to see if the BUU was audibly polling every three to six seconds. A remotely located BUU is difficult to check. Currently, if the user sees that tracks exist on the screen, he thinks PLRS is up.

RECOMMENDATION: That a clear warning appear on the screen to notify the user that the BUU is not polling.

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Officer, GNSD, MCTSSA, AUTOVON 365-2397.

ITEM: Time Stamp for PLRS Tracks.

DISCUSSION: The CSI product displays unit symbology on the LSD/MSD map. Double clicking brings up a time stamp. CSI's SW does not update the time stamp unless a spot report comes in, or if PLRS reports that the unit actually moves more than 200 meters. Stationary units will not be represented by a time stamp update on the screen, even though the PLRS Server is providing TCO with updated information every three to six seconds. This is confusing and causes difficulty in debugging because it can appear that no updates have been receive, when in-fact they have been. Accurate time stamps can give the commander confidence in the reliability of data on the screen. Additionally, time stamps are updated every time the system went down, adding to debugging confusion and user confidence problems.

RECOMMENDATION: The symbol time stamp should be updated every time a new report (PLRS or otherwise) comes in. It may also be useful to tag the stamp with a symbol to identify the source of PLI information to the screen (i.e. 0825-P for PLRS, 0826-S for Spot-Report, 0956-G for GPS, 1015-M for manual etc).

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Officer, GNSD, MCTSSA, AUTOVON 365-2397.

ITEM: Message Time Stamp for the TCO Interface to the PLRS Server Only Updates When a Particular Unit Moves 200 Meters.

DISCUSSION: The TCO software only updates the time stamp if a particular unit moves the minimum 200 meters. To changed the TCO software so that it will update every time a PLRS member moves, the user can get feedback as soon as each position comes in from the BUU. This will simplify the testing and trouble shooting process when each PLRS message is read and time stamped.

RECOMMENDATION: Change the message time stamp for the TCO interface to the PLRS server so that it will update every time a message is received from the BUU.

SUBMITTED BY: Phil Hiroshigo and Eddy Chue (NSR), MCASS Project Office, GNSD, MCTSSA, AUTOVON 365-2285 ext 223.

ITEM: TCO Terminal Flexibility Awaiting Message Acknowledgement.

DISCUSSION: The message on the terminal screen cannot be closed out until all acknowledgements have been received. Rapid planning and operations normally call for hurried order drafting and transmission. Waiting for acknowledgements to a multi-addressed message may waste valuable time for the TCO operator who is ready to move on to the next order of business. The TCO terminal should be flexible enough to manage message processing off screen and allow the operator access to the system for other functions.

RECOMMENDATION: That off screen message processing be built into the MTACCS message handler to provide operating flexibility to the TCO operator.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Exporting Communication Services.

DISCUSSION: The MEB CMD net experienced periodic/inconsistent communications failures. The service was restored by exporting the TACFEP/ULTDS communications to the G-1/G-4. That restoral action was correct. What compounded the problem was that as other circuits experienced problems, they were exported the TACFEP/ULTDS service as well. At this point the "Overheard" tray started piling up with messages that were not addressed to that TCO terminal. At the count of 20 messages the top message in the tray was dropped into the terminal "Message" tray. Continued editing/deleting of the "Overheard" tray was required. The "Overheard" function hindered terminal processing and distracted operators.

RECOMMENDATION: That the "Overheard" tray be equipped with an originator or message type filter to assist TCO operators in their screen and message management.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO Reports Format.

DISCUSSION: TCO software supported a limited number of reports. It was anticipated that these messages would be MTS protocol and MTS/MTF format. That was not the case. The TCO had their own format, and the TCO encapsulated that format in an MTS plain text (U075) shell. The obvious is apparent, TCO reports were only readable by other TCO terminals. Other systems implementing MTS, and TIDP compliant, could not exchange data, information or MTS/MTF reports with the TCO.

RECOMMENDATION: That the standard (MTS and MTF) be the acceptable format and protocol for future FDS developments.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Requirement to Input USMTF Messages Directly to an AUTODIN Interface.

DISCUSSION: At the May FDS briefing to I MEF, the G-6 identified a requirement to automate the record message handling capabilities of a MAGTF CE. Sighted was the way I MEF executes this function in the field with Banyan-Vines. The method is for the C2 operator to send an outgoing USMTF-ED message to the Communication Center via LAN, the message edited with the JANAP-128 header and EOM, and on diskette transmitted to a MODE I AUTODIN interface. The TCO could not generate USMTF-ED messages, and thus unable to demonstrate a desired and existing FMF capability with TCO/MTACCS.

RECOMMENDATION: That FDS-2 implement an ability to generate USMTF-ED messages that will be electronically or manually transmitted to an AUTODIN interface.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Information Security Level for TCO Terminals and Operators.

DISCUSSION: FDS-1 was an unclassified Command Post Exercise and the information transmitted throughout MTACCS was unclassified regardless of what classification was placed on the message classification line. The TCO does not allow for designating the highest level of classification a terminal can process, thus all operators must hold a security clearance equal to or higher than the highest classification processed over or interfaced to TCO. This is a programmatic issue that needs to be addressed prior to an actual CPX/FTX were classified information is processed over MTACCS. The requirement to implement multi-level security within MTACCS may be the issue.

RECOMMENDATION: That the MTACCS terminal security level and processing authority be based on either personal security clearances or a TCO switch setting.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: TCO Handling of Precedence Traffic.

DISCUSSION: The processing and transmission of TCO message traffic may not have been based on precedence. The TCO message was wrapped in an MTS free text shell and globally transmitted. After a message was transmitted further processing on that channel was suspended until an acknowledgement was received. Apparently the recognition of precedence and the processing of Flash Override before Flash before Immediate before Priority before Routine was not implemented. Granted this may translate to milliseconds in delay, but the MTS precedence field is there to insure high precedence traffic gets through ahead of all others.

RECOMMENDATION: That precedence in message handling and communication processing be strictly enforced within MTACCS. This will be best implemented within MCASS.

SUBMITTED BY: Michael Murphy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 222.

ITEM: Communications Interface Trouble Shooting.

DISCUSSION: Troubleshooting the PPB/TCO interface was severely limited since CSI controlled access to the hard drives. There was a deficiency in the amount of CSI representatives that had access to the hard drives in the field, or could work on systems software debugging.

RECOMMENDATION: An integration effort, using the same hardware configuration as in FDS-1, would have been the time to test and interface systems.

SUBMITTED BY: Steve LeRoy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 260.

ITEM: Misleading "TACFEP Abort" Message.

DISCUSSION: Whenever the TCO interface to the TACFEP failed, it displayed the "TACFEP abort" message. This caused users to think the TACFEP had failed and access to tactical digital backbone was down when in fact the interface to the TACFEP had failed. The actual cause of this message needs to be investigated but it may be related to the serial link between TCO and the TACFEP.

The present physical interface between the TCO and the TACFEP is via a 9600 baud serial connection. During the February 1991 demo, the TCO had trouble handling the data at 9600 baud. During August 1991 integration testing, the buffer size was increased and it appeared to handled messages between TCO stand-alone work-stations via TACFEPs and AN/GYC-7s.

RECOMMENDATION: At a minimum, change the message to "TACFEP Interface Abort".

SUBMITTED BY: Edith Radnoti, GS-12, ULCS Project Office, CISD, MCTSSA, AUTOVON 365-2374.

ITEM: PLRS Server Training.

DISCUSSION: Debugging procedures can be greatly enhanced if PLRS Master Station operators have some very basic instruction on what the TCO system is doing. Basic knowledge of the Master Station operation by the TCO operators would be worthwhile. The PLRS MS operators were invaluable in the tedious, cumbersome debugging procedures in the field. In a fielded system their understanding of the basics is essential.

RECOMMENDATION: Future efforts should include a basic two or three hour class for PLRS users.

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Officer, GNSD, MCTSSA AUTOVON: 365-2397.

ITEM: Lack of Training on TCO for Both the Operators of the TCO/PLRS Interface and MCTSSA Personnel.

DISCUSSION: Military personnel were not adequately trained to operate the PLRS interface to TCO. Several problems were due to operator error of the TCO interface and help was not available from TCO contractor personnel. MCTSSA personnel ended up training TCO operators on the PLRS interface. Compounding the problem was that the TCO contractors were unable to dedicate time to train MCTSSA PLRS software support personnel in the TCO/PLRS operation.

RECOMMENDATION: MCTSSA software support personnel should be trained in the TCO interface to their particular subsystem.

SUBMITTED BY: Phil Hiroshigo and Eddy Chue (NSR), MCASS Project Office, GNSD, MCTSSA, AUTOVON 365-2285 ext 223.

ITEM: PCI Cable Extension.

DISCUSSION: The PCI Cable Extensions delivered to the field would only work in one of the two possible configurations (PCI-In-Line Unit had to be directly connected to the UYK-83A/85A). Additionally, a fifty-foot extension seemed cumbersome to work with on top of the ten-foot length of the original cable. Also, the 10 foot length seemed almost always to be too short. Lastly, the PCI-In-Line Unit can be removed from the cable by removing the two screws. The Unit and/or the screw are then easily lost.

RECOMMENDATION: Recommend rebuilding the PCI cable to a 30 foot length, and using epoxy or some other method to "permanently" affix the PCI-In-Line Unit to the cable. Any cable extensions can be satisfied with a more manageable 20 foot eight-wire RS-232 extension (using pins 1, 2, 4, 5, 7, 8, 13, 25).

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Officer, GNSD, MCTSSA AUTOVON: 365-2397.

ITEM: Testing Requirements and Resources.

DISCUSSION: There was a need to formalize testing requirements and schedule resources to test the PPB on an eight member broadcast net with random net contention. As was the case, the emphasis was put on testing the PPB for simultaneous communication on four channels, in a point-to-point configuration (two AN/UYK-83A). Testing for an eight member net was achieved by using two PPB hosting AN/UYK-83As and six DCTs on the same net. During the limited interoperability testing only two AN/UYK-83As were available for use by the PPB project. Stress or SCR net saturation testing with the TCO and PPB in the FDS-1 configuration was not preformed for this reason.

RECOMMENDATION: That a detailed test plan and requirements document be drafted specifying the need for testing digital devices in a configuration that matches FDS-X as closely as possible. The requirement for realistic stress testing of digital devices and interfaces prior to FDS-2 evaluation cannot be overemphasized.

SUBMITTED BY: Steve LeRoy (NSR), Ground C2 Project Office, GNSD, MCTSSA, AUTOVON 365 2285 ext 260.

ITEM: Force List.

DISCUSSION: During the initial planning conference the 7th MEB G-3 was provided a MAGTF II Unit Type Code Menu. They were asked to identify the force list that would be loaded in the data base. They selected amphibious type units vice MPF type units. Each MSC provided feedback and took an active roll in identifying its force structure. At the onset of the evaluation the MEB staff was disappointed that the data base did not resemble an MPF brigade.

RECOMMENDATION: None. Future versions of MAGTF II will allow immediate changes to the force structure.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: MILOGS Component System Training.

DISCUSSION: The component system training went well. During this training it was important for the APM MILOGS to explain the overall MILOGS concept to the component system contractors as well as the students. In some cases the component system students did not have the requested MOS or skills, i.e. 04XXs were sent in lieu of 3043s.

RECOMMENDATION: That the APM for MILOGS continue to brief the overall MILOGS concept to both contractors and students during future component system training. FMF units should insure individuals with the appropriate MOS and skills are provided.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: COMMEX/STAFFEX.

DISCUSSION: During the COMMEX/STAFFEX only the East Gym and BSSG were manned and prepared to operate on 14 November. The "actual" de facto COMMEX did not start until the commencement of the Pilot test. This put us two days behind in our schedule.

RECOMMENDATION: It is recommended that all equipment, operators and leaders be in place for the COMMEX/STAFFEX during future FDSs.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: MAGTF II.

DISCUSSION: MAGTF II provided an invaluable data base which allowed us to test the other systems; however, there were significant problems with the data base totals. MAGTF II recently was converted from Focus to Clipper and had not undergone its Beta test. The new Clipper version would not compute "sustainability". Therefore, the Focus version produced sustainability data. The data from these two versions was run through JOPES and merged into the Clipper version. When we tried to use the clipper version to modify the data base it corrupted the existing data base. With each effort the data base became worse. The MEB G-4 was very concerned about the accuracy of the data base and the MEB staff put forth a major effort to input realistic data.

There were significant benefits in using MAGTF II. This allowed us to produce a sufficiently large data base to test the other logistical systems. We discovered that TCO, CSSCS, and the communications nets were not able to adequately handle such a large data base. The impact of this will influence the design of the MCASS communications layer as well as the MILOGS capstone system.

RECOMMENDATION: This corrupted MAGTF II data base once again brings out how critical integrated testing is prior to an FDS. Additionally, I&L is reviewing the data base factors and is correcting the sustainability algorithms.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: LFADS.

DISCUSSION: LFADS worked well during FDS-1. Unfortunately, there were only 5 machines vice the 11 which were required to support the minimum C2 facility requirements. This required us to put the using unit's supply account on the supporting CSSD's machine. The CSSD supporting the ground combat unit had 10 accounts on its machine to support the RCT headquarters, attached companies, and subordinate battalions.

The FMF was not happy that LFADS could not communicate on the LAN LFADS to LFADS. They also stressed the importance of an automated interface of MILOGS component systems into MCLOG or CSSCS.

CSSCS and MCLOG had difficulty in computing reports due to the large data base received by LFADS. There needs to be a filter to drop items not on the pacing items list. This would allow the system to be more responsive by not being burdened with too much data that is not critical at the commander or primary staff level.

RECOMMENDATION: LFADS should be at each C2 facility during FDS-2. All MILOGS components being exercised in future FDSs need to be able to communicate on the LAN/WAN using MCASS communications. These systems also need to have an automated interface with the addressee where data fields are automatically updated.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: TCO MCLOG.

DISCUSSION: CSI developed a logistics data base in TCO which provided a basic supply/readiness status delineating unit "authorized," "on hand," and "equipment status." This allowed units to provide automated Logistic Status and Dump Status reports which could be transmitted to higher headquarters. These reports could then be rolled up at the MSE level. Unfortunately, only some units were ever able to accomplish this roll-up and with great difficulty.

The TCO also keyed off the nomenclature vice the TAMCN which caused items with the same name, such as radio set, to be summed together. We had a temporary fix by changing the name to TAMCN space item nomenclature.

MCLOG had difficulty in computing reports due to the large data base received by LFADS. There needs to be a filter to drop items not on the pacing items list. This would allow the system to be more responsive by not being burdened with too much data that is not critical at the commander or primary staff level.

RECOMMENDATION: If the MCLOG module to TCO becomes the capstone logistical status system, it would need the full spectrum MILOGS component system functionality, and would have to be more robust. In the future non-pacing items need to be filtered out and deleted from the TCO data base so as not to bog it down. The maintenance management function needs to be able to summarize status by commodity area.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: MDSS II.

DISCUSSION: MDSS II was used to provide a demonstration to load one ship during VIP day. It is unfortunate that we dropped MDSS II as a player in FDS-1. They were the original system identified to be exercised; however, they were dropped in favor of MAGTF II as the latter could provide gross sustainability requirements. They both should have been used.

RECOMMENDATION: That MDSS II be available during future FDS evaluations.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: CAEMS.

DISCUSSION: CAEMS loaded one ship to demonstrate its interface with MDSS II. CAEMS is a tool for the local commander during the embarkation phase and has not been identified as a system to interface with the capstone logistic status system.

RECOMMENDATION: Provided for information only.

SUBMITTED BY: Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285.

ITEM: Power for BUUs.

DISCUSSION: BUU battery power is expensive and requires frequent (twice daily) battery replacement. BUU performance can deteriorate long before the battery indicator light functions. This adds another variable in debugging communication problems.

RECOMMENDATION: Recommend that an AC power source be provided for every BUU envisioned for use in an MTACCS environment. Every unit should have one or two A/C power adapters for BUU operations.

SUBMITTED BY: Captain J. A. Moffett, MCASS Project Officer, GNSD, MCTSSA AUTOVON: 365-2397.

ITEM: Availability of four wheel drive vehicles to MCRDAC personnel.

DISCUSSION: Since the essence of the Field Development System and MTACCS is to effect interoperability and intercommunications for the Marine MAGTF, much cross talk is required to coordinate execution of the CPX at the proper interfaces and to discuss (as well as see) what works and what doesn't. This requires flexibility on the part of the various MCRDAC/MCTSSA project officers to move from one node to another to see what's happening at multiple locations during any particular CPX scenario event.

For example, the communications between the DASC and TACC is continuous and the events being handled in the scenario don't wait for the IDASC project officer to take the 20 minutes required to walk down to the TACC when necessary.

Since the DASC was (properly) located with the Regimental COC it was accessible only by four wheel drive vehicle. Without a four wheel drive vehicle, a MCRDAC/MCTSSA project officer was dependent upon an inflexible transportation system consisting of 5-ton rides between the 12th street parking lot mainside and the 7th MEB CP (which was close to neither the ACE CP nor the Regimental CP).

This system effectively stranded key players and kept them from easily moving to locations which required their attention.

RECOMMENDATION: Take a lesson from MAWTS-1 at MCAS Yuma, AZ. During their semi-annual Weapons and Tactics Instructor (WTI) course, they contract for a fleet of 4 wheel drive vehicles to allow their staff to move about the desert to the various command and control agencies so that they can do their jobs.

SUBMITTED BY: CAPT J. J. KANE, IDASC Project Office, ACCSD, MCTSSA, AUTOVON 365-2132/3

ITEM: Contractor Transportation Requirements.

DISCUSSION: Many of the contractors involved in FDS-1 lacked vehicles capable of getting them and their equipment to, from, and around the field site as needed. 7th MEB was only able to provide a 5 ton shuttle vehicle that went between the MEB CP and the 12 Street parking lot. It seldom made its advertised 1 hour round trip time limit. This lack of mobility hindered the ability of contractors to respond rapidly to widely displaced sites when required (ie at the East Gym). 4x4 rental vehicles are only available at select sites in the US. CSI was able to obtain some by planning over setting up reservations in Palm Springs 3 months in advance. Most FDS-1 CPs were with in walking distance. FDS-2, however, will be spread out over a much wider area and will have many more CPs. The concurrent MEF level exercise will undoubtedly include regular and widely dispersed movement of command elements from amphibious ships to the objective area. Contractors can only provide a limited number of technicians and cannot be everywhere at once.

RECOMMENDATION: For FDS-2, MCRDAC PMs should plan far in advance to get appropriate transportation for their contractors. Or, the FMF units involved should establish a more predictable and widespread shuttle system. Traffic control over such a large area must be enforced to prevent tanks and other tactical vehicles from running over lost contractor personnel.

Submitted by: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: GSA Transportation for FDS-1.

DISCUSSION: MCTSSA and MCRDAC personnel required 4 wheel drive transportation to move between evaluation sites at 29 Palms. Since none were available, POVs were used. Frequent high winds and blowing sand damaged several POVs. CSI was able to obtain 4x4 rental vehicles at Palm Springs by making reservations several months in advance.

RECOMMENDATION: If the next evaluation takes place in a field environment suitable only to 4x4 transportation, S-4 should assist Ground C2 in reserving 4x4 vehicles at least 2 months in advance of the evaluation.

Submitted by: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

FDS-1 AFTER ACTION ITEMS

CATEGORY THREE

MCTSSA SITE SUPPORT ITEMS

ITEM: Electrical Power for FDS Integration Laboratory.

DISCUSSION: It was identified early on that the FDS lab in building 31335D did not have sufficient electrical power capacity to support the equipment laydown for FDS-1. With the assistance of TSSD, a plan was developed to bring outside power from large transformer, step it down to 110v, and then distribute into the lab via a portable circuit breaker panel. This approach worked but had a number of serious short comings. First, it was only a temporary solution that did not alleviate long term requirements for additional power in the lab. Second, the mass of Romex on the lab floor presented a trip hazard as well as a shock hazard. Several of the outlets shorted out due to accidentally being kicked by students. Third, the maze of romex also presented potentially serious EMI problems for the myriad of communication links. Fourth, a five inch hole had to be cut in the lab floor to allow access to the romex cabling. Fifth, the layout was unable to reliably support the laydown with sufficient power. Popped circuit breakers occurred several times and seriously impacted the training schedule. Similarly, the power distribution system did not have backup circuits (reserve capacity) that could have been used in an emergency. Sixth, the distribution system was costly in terms of man-hours and materials to install. Seventh, the organic power system is inadequate to support even moderate expansion of Ground C2. This expansion will occur soon so power needs to be in place to handle it (ref. Comm/Intel's problems in 31335E).

RECOMMENDATION: MCTSSA should contract to have the power distribution system permanently upgraded to handle any similar sized FDS integration/training activities and allow for sufficient reserve capacity. TSSD should conduct a power survey in coordination with Ground C2 to determine the appropriate approach to permanently upgrade the building. S-4 should handle contracting the actual work.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Furniture for FDS Lab.

DISCUSSION: A large quantity of chairs, tables, and other office furniture was required to support FDS integration and training. Most of this furniture was subcustody from MCB Camp Pendleton Garrison Property. This furniture cannot be loaned on a long term basis since it is used by the MCB to support a wide variety of other equally important functions. Had FDS-1 lasted the anticipated 2 months, a serious shortage of furniture would have developed.

RECOMMENDATION: MCTSSA should purchase (with some funding from Ground C2) adequate folding chairs and tables to support at least 50% of the requirement for FDS-1. These assets could also be used to support a wide variety of MCTSSA's own functions.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Climate Control for FDS Lab.

DISCUSSION: The air conditioners in the FDS lab did not adequately offset the heat generated by the students and equipment. The high temperatures caused at least 2 UYK-83s to malfunction and many of the students were unable to remain attentive. Several of the air conditioners never did produce cool air. One of the air conditioners continually iced up because it attempted to over compensate for the weaker air conditioners.

RECOMMENDATION: Prior to the next major test/integration/training activity in the FDS lab, all air conditioners should be inspected and serviced to ensure reliable operation.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: MCTSSA Embarkation Capability.

DISCUSSION: MCTSSA S-4 does not possess organic embarkation experience, supplies, or equipment. All equipment and supplies had to be borrowed from external sources. Embark personnel and supervisors were untrained. They learned as they did the embark. The potential for unsafe packing and loading was a constant problem.

RECOMMENDATION: MCTSSA S-4 should maintain at least a minimum amount of supplies, equipment, and trained personnel which can be readily upgraded when similar embarkations take place in support of the FDS process. Other projects that regularly do field testing would also benefit from this capability.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: FDS OOD Procedures.

DISCUSSION: Despite the numerous assurances from the responsible individuals, the MCTSSA OOD was poorly briefed on how to handle the problems which arouse during FDS-1. Without a clearly written SOP, the OOD cannot be expected to react appropriately to FDS unique requirements.

RECOMMENDATION: The FDS Operations Officer, in coordination with the Security Officer and Executive Officer, should write an SOP to define the OOD's duties that are unique to supporting FDS activities.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Office Space Requirements.

DISCUSSION: Adequate office space, collocated with the FDS lab, for contractors and MCRDAC personnel is essential for an operation of this size. CSI needed 5 large offices, for example. If the Orincon trailers had not become available, many of these personnel would have been widely distributed throughout the compound. In addition, restructuring the office spaces to accommodate FDS-1 was not without cost. It took 4 days, augmentation from S-4, and many man-hours to move office furniture to suit the needs of CSI and PNL.

RECOMMENDATION: GNSD should not increase the current number of personnel in 31335D nor should there be any plans to expand office space into the FDS lab until it is determined whether or not MCTSSA will host the integration and training for FDS-2. GNSD needs to continue to pursue additional office elsewhere to preserve the unique capability of the FDS lab to host a wide variety of functions.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Tactical Vehicle Support for FDS-1 Transportation.

DISCUSSION: Overall, MEF vehicle support for the embark and retrograde was excellent. Several problem areas, however, need to be addressed. First, the actual mix of vehicle types was never certain until they arrived. This impacts how the equipment is to be packed. Second, the convoy commander must be identified at least several days in advance so that MCTSSA FDS personnel can provide necessary briefing. Third, palletizing the UYK-83/85s can easily crack their cases. Fourth, as much as possible, the computer equipment had to be divided by CP and placed on separate trucks. Node integrity was essential to prevent random distribution of computers. This could significantly delay the initial site setup in the field.

RECOMMENDATION: If possible, 5 ton vehicles with M105 trailers should be used in place of LVSs, particularly those with trailers lacking sides. This allows the UYK containers to be loaded without banding them to pallets.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Storage Space Requirements.

DISCUSSION: The seatrains belonging to Ground C2 had insufficient space to house all of the computer equipment and containers used during FDS-1. In addition, since they are located across the compound from 31335D, a GSA vehicle would have been necessary to ferry equipment and containers back and forth. The fenced in area north of the GSA lot proved to be a much better solution. All weather proof containerized equipment was stored there. It was securable, large, and close to the FDS lab. This made the embarkation much easier and faster.

RECOMMENDATION: This fenced in area should be available for use in future FDS activities aboard MCTSSA.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: FDS Working Group.

DISCUSSION: The FDS Working Group should have functioned as a "fusion center" for FDS coordination. Unfortunately, the membership routinely changed and attendance was marginal. Also, the members often expressed an inability to get cooperation within their divisions for meeting site support information requirements for their systems. Most members came to listen and not to voice their division's concerns. These weaknesses were compounded by the lack of a vehicle by which to routinely circulate FDS information.

RECOMMENDATION: First, from the top down, MCTSSA needs to be solidly behind FDS. Division directors need to fully support their representatives in the FDS Working Group, providing them the latitude to address issues which cross all systems within the division. They also need to put their authority behind these representatives when they are tasked with providing time critical and accurate information for FDS planning. Second, Ground C2 should develop a monthly FDS E-mail newsgram to keep all interested parties current. This newsgram would become weekly within several months of the actual evaluation.

SUBMITTED BY: Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

ITEM: Incoming Phone Calls for FDS Participants at MCTSSA.

DISCUSSION: During FDS-1 training and integration activities at MCTSSA, phone calls poured in from units who wished to contact their Marines. Unfortunately, FMF units only had Major Sawyers and Captain Martin listed as POCs. The volume of calls diverted much needed attention away from other FDS activities. FMF Marines then routinely tied up phone lines as they communicated with their units. Also, accurate rosters were not kept for FMF personnel involved in training. Consequently, it became a time consuming ordeal to locate personnel who had received messages.

RECOMMENDATION: The FDS Operations Officer should establish a visitor control center for FDS participants. It would function similarly to the MCRDAC visitor control desk that was in 7th MEB headquarters. This office would be collocated in the FDS trailer with guard personnel and assigned a dedicated phone line (autovon access). The office should be staffed with a lance corporal or corporal knowledgeable in personnel administration procedures and MCTSSA's organization and layout.

Submitted by: Captain B. L. Martin, FDS Operations Officer

SUBMITTED BY: Trieu Vu and Captain B. L. Martin, FDS Operations Officer, GNSD, MCTSSA, AUTOVON 365 2379.

APPENDIX D

DPM INTELLIGENCE AFTER ACTION REPORT

Problems. The various MTACCS systems require clean, stable power. Although the FMF stated that this could be provided using MEPs, in practice, this did not occur. Power fluctuations, tripping breakers, unannounced generator shutdowns and poor grounds caused numerous system crashes.

Discussion: The IAS Uninterruptable Power Supplies (UPS) did not provide stable power during these outages, nor was there sufficient amperage available to power an entire suite of equipment from a single IAS UPS.

Recommendation: That the IAS program identify a more robust UPS and that all the programs in MTACCS work with the FMF on the power distribution problem in future FDS exercises.

Problem: The IAS could not utilize single channel radios to pass digital traffic between the MEF and the other MSEs.

Discussion: Many MTACCS nodes claimed that they could utilize organic tactical communications. Single channel radios were able to transfer digital data between HQs provided they had been tuned to no more than 1 Hz variance. However, when an ANGR-39 was placed next to the computer, some of the nodes dropped off the net for no discernable reason. The Protocol Processor Board developed by MCTSSA worked for some nodes but not in others. The same problem was experienced with the Tactical Communications Interface Module. No reason was discovered for these failures (although some fingers were pointed at a lack of configuration control in the CSI TCO software). The IAS had planned on incorporating this technology into the Suites for fielding in FY 92.

Recommendation: That MCTSSA continue to troubleshoot the Protocol Processor Board problem, aimed towards fielding this capability.

Problems: Many operators complained about the lack of voice radio traffic, since most messages came digitally to each system.

Discussion: The operators were used to being able to listen to a radio and know what was happening, whereas now messages were appearing on the computer screen. This is a price to be paid in the computer. The voice radio is still available for passing messages which are time sensitive.

Recommendation: None.

Problems: The operator cannot electronically screen the messages in the queue and read the ones he is most interested in, but rather must page through each one as it is arranged in the queue.

Discussion: The queue orders messages by precedence, but does not allow you to pick and choose the order for messages to be read, other than by precedence.

Recommendation: The message handler should allow the operator to call up the messages in his queue by Originator, DTG, precedence and subject, and choose messages for review.

Problem: The IAS makes full use of a windowing environment, with pull down menus and point and click selections utilizing a mouse. However, this required the operator to concentrate his attention fully on the computer screen, such that he lost contact with the other activities which were ongoing in the COIC.

Discussion: This is a potential weakness of any system, as it means that an analyst will only be able to do one job at a time, not the several that they perform when in the manual mode. As the operator becomes more familiar with the system, the amount of attention that he will have to devote towards moving the mouse will decrease, and he will be able to pay more attention to activity around him.

Recommendation: None.

Problem: There was no direct electronic connectivity between the IAS and the other MTACCS nodes.

Discussion: In order to avoid false impressions that we had solved the multilevel security problem, we incorporated a genser workstation on the TCO LAN, with an air gap between it and the IAS. Messages were dumped to a floppy disk, which was then transferred to the other workstation. This caused a slowdown in the transfer of information between IAS and TCO, and added one more potential point of failure in the network. The interfaces between TCO and IAS were valid for FDS-1 only, and may have to be redone for FDS-2.

Recommendation: The IAS should continue to focus on developing a multilevel secure system so that it will be able to electronically link with other systems will continuing to process data of various security levels.

Problem: Several bugs were identified in the message handler, message grabber, and reports software.

Discussion: Although corrected, in each case the bugs caused the system to lock up, requiring a UNIX trained individual to restore the system. This restated a requirement for us to train a UNIX system administrator for each site, as well as having as stable software as possible.

Recommendation: Train a UNIX system administrator for each IAS site. Fully test all software before fielding.

APPENDIX E

DPM GROUND COMBAT SERVICE SUPPORT AFTER ACTION REPORT

Appendix E

Item. MILOGS FDS-1 Systems:

Discussion. During FDS-1 the MILOGS components exercised were MCLOG, CSSCS, LFADS, and MAGTF II; MDSS II and CAEMS were demonstrated. During the initial MCRDAC/I&L/CSI FDS-1 MILOGS meeting in November 1990, MDSS II was identified by I&L as the only LOG AIS system sufficiently mature to be available for FDS-1. From this point on it became politically difficult to add additional systems as they matured. The FDS System Specification stated that FDS was to test the "MTACCS concept" not just TCO. When LFADS became available it replaced MDSS II as the system interfacing with TCO as it was the appropriate system to provide the supply status type of information TCO and CSSCS required. MAGTF II was also selected as it created the tables of organization and equipment as well as a sustainability data base that would populate LFADS. The MILOGS concept was hampered by limited systems that needed to act in concert to provide the logistics picture and insufficient machines at each C2 facility.

Recommendation. It is recommended that future FDSs allow any component system to participate, as determined by the APM, and that sufficient machines be made available to adequately manage logistics.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. Force List:

Discussion. During the initial planning conference on the 7th MEG G-3 was provided a MAGTF II Unit Type Code Menu. They were asked to identify the force list that would be loaded in the data base. They selected amphibious type units vice MPF type units. Each MSC provided feedback and took an active roll in identifying its force structure. At the onset of the evaluation the MEB staff was disappointed that the data base did not resemble an MPF brigade.

Recommendation. None. Future versions of MAGTF II will allow immediate changes to the force structure.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. Integration Testing:

Discussion. The integration testing that was scheduled at MCTSSA did not occur as a result of CSI's non-availability.

Recommendation. That MILOGS component systems undergo independent integration testing at MCTSSA prior to an FDS to include the capstone logistics decision support system. MILOGS systems must also undergo integration testing with TCO and other MTACCS systems prior to each FDS.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. MILOGS Component System Training:

Discussion. The component system training went well. During this training it was important for the APM MILOGS to explain the overall MILOGS concept to the component system contractors as well as the students. In some cases the component system students did not have the requested MOS or skills.

Recommendation. That the APM for MILOGS continue to brief the overall MILOGS concept to both contractors and students during future component system training. FMF units should insure individuals with the appropriate MOS and skills are provided.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. Collective and Integrated Training:

Discussion. The logistic operators did not get sufficient logistic experience during the collective training as the emphasis was operational. By the second day the APM MILOGS was able to get additional emphasis on logistics training to include passing rapid requests and modifying the MCLOG data base and conducting roll-ups. However, this was not sufficient to identify problems or to allow operators to conduct the evaluation with out coaching.

Recommendation. During future FDSs logistics operators and staff should receive collective and integrated training apart from the operational personnel. This will allow all logistics players to learn how to operate in a logistic environment. This experience will be far more valuable than having them learn operational aspects of TCO such as the fire support system.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. COMMEX/STAFFEX:

Discussion. During the COMMEX/STAFFEX only the East Gym and BSSG were maned and prepared to operate on 14 November. The "actual" de facto COMMEX did not start until the commencement of the Pilot test. This put us two days behind in our schedule.

Recommendation. It is recommended that all equipment, operators and leaders be in place for the COMMEX/STAFFEX during future FDSs.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. MAGTF II:

Discussion.

MAGTF II provided an invaluable data base which allowed us to test the other systems; however, there were significant problems with the data base totals. MAGTF II recently was converted from Focus to Clipper and had not undergone its Beta test. The new Clipper version would not run sustainability. Therefore, the Focus version was run to produce sustainability. The data from these two versions was run through JOPES and merged into the Clipper version. When we tried to use the clipper version to modify the data base it corrupted the existing data base. With each effort the data base became worse. The MEB G-4 was very concerned about the accuracy of the data base and the MEB staff put forth a major effort to input realistic data.

There were significant benefits in using MAGTF II. This allowed us to produce a sufficiently large data base to test the other logistical systems. We discovered that TCO, CSSCS, and the communications nets were not able to adequately handle such a large data base. The impact of this will influence the design of the MCASS communications layer as well as the MILOGS capstone system.

Recommendation. This corrupted MAGTF II data base once again brings out how critical integrated testing is prior to an FDS. Additionally, I&L is reviewing the data base factors and is correcting the sustainability algorithms.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. LFADS:

Discussion.

LFADS worked well during FDS-1. Unfortunately there were only 5 machines to handle 27 units. This required us to put the using unit's supply account on the supporting CSSD's machine. The CSSD supporting the ground combat unit had 10 accounts on its machine.

The FMF was upset that LFADS could not communicate on the LAN LFADS to LFADS. They also stressed the importance of an automated interface of MILOGS component systems into MCLOG/CSSCS.

Recommendation. LFADS should be at each C2 facility during FDS-2. All MILOGS components being exercised in future FDSs need to be able to communicate on the LAN/WAN using MCASS communications. These systems also need to have an automated interface with the addressee where data fields are automatically updated.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. CSSCS:

Discussion.

CSSCS was used as a feasibility study to determine if the Marine Corps would adopt it as the capstone logistic status system receiving input from stand alone functional area systems. We only had two systems to test and they were at the BSSG and the MEB G-4. This system received its updates from LFADS, the unit's supply system and MIPS, the unit's personnel system. As it was not at each C2 facility it did not have the opportunity to demonstrate its capabilities as well as we would have liked.

CSSCS only demonstrated a sliver of its planned functionality by reporting only supply status. The evaluation of planned functional requirements are equally important in our overall decision. Equally important is the evaluation being performed by Argon National Laboratory to determine if the Marine Corps could live with the algorithms and code used by the Army

CSSCS also had difficulty in computing reports due to the large data base received by LFADS. There needs to be a filter to drop items not on the pacing items list. This would allow the system to be more responsive by not being burdened with too much data that is not critical at the commander or primary staff level.

Recommendation. If CSSCS is adapted there should be a modification to contracts for all MILOGS component systems to require integration with CSSCS. This would include TCO to insure CSSCS appears as transparent as any module of TCO.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. TCO MCLOG:

Discussion.

There was no statement of work for TCO to develop a logistical system. CSI appeared to work on the Marine Combat Logistics (MCLOG) module of TCO to preclude TRW from getting a "foot in the door" with CSSCS. (TRW is developing the Army Command and Control System and had bid on TCO but was too expensive).

CSI put together a data base which provided "authorized" and "on hand" quantities. This allowed the units to provide automated Logistic Status and Dump Status reports which could be transmitted to higher headquarters. These reports could be rolled up at the MSE level. Unfortunately, only some units were ever able to accomplish this roll-up and with great difficulty. The TCO was completely overwhelmed with so much logistical data. CSI was inflexible in making changes in the interface specifications and software. They held to the original specification worked out by CSI and PRC technicians under the direction of I&L.

Recommendation. If the MCLOG module to TCO becomes the capstone logistical status system, it would need the same functionality as projected for CSSCS and would have to be more robust. In the future non pacing items need to be filtered out and deleted from the TCO data base so as not to bog it down.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. MDSS II:

Discussion. MDSS II was used to provide a demonstration to load one ship during VIP day. It is unfortunate that we dropped MDSS II as a player in FDS-1. They were the original system identified to be exercised; however, they were dropped in favor of MAGTF II as the latter could provide gross sustainability requirements. They both should have been used.

Recommendation. That MDSS II be available during future FDS evaluations.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. CAEMS:

Discussion. CAMES loaded one ship to demonstrate its interface with MDSS II. CAMES is a tool for the local commander during the embarkation phase and has not been identified as a system to interface with the capstone logistic status system.

Recommendation. None, this is provided for information only.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. Implementation Plan:

Discussion. CSI had a CDRL to draft the implementation plan. Passing this on to a contractor negated the governments control and they lost the most important tool to insure that their position was clearly stated and in one concise document. This document should have gone further in directing both the contractors and the FMF. MCRDAC should be more bold in identifying just what it wants the FMF to do to preclude confusion and excesses.

Recommendation. That the MCRDAC FDS coordinator put together a very complete Implementation Plan.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

Item. MTACCB Technology Excursions:

Discussion. The Combat Information Processor Staff Battle Planning and Execution System (CIPSBPS) should be part of MCASS and available to the MTACCS systems including MILOGS. This software system will provide a common data base and common processing tools for commanders at all echelons and their staffs. By using a DMA vector map product, the system permits graphical operations on the map such as sensor planning with fields of view, optimal movement routing, and line of sight calculations. Non-mapping features include automated overlay generation, friendly and enemy situation displays with automatic updates, and event detection and warning.

Recommendation. That the CIPSBPS should be included in MCASS available for FDS-2.

Submitted by. Bert Taylor, FDS Sect, GNSD, MCTSSA (619) 725-2285

APPENDIX F

DPM FIRE SUPPORT AFTER ACTION REPORT

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1

4.(U)USE OF FIREFLEX AT SASS LEVELS FOR PLANNING

5.(U)OBSERVATION: FIREFLEX was not well suited for use in the SASS as a fire planning tool.

6.(U)DISCUSSIONS: FIREFLEX could not be used for planning for the deep battle due to the limitation in "work space". The work space of the system was a 100 kilometer by 100 kilometer grid.

7.(U)LESSON LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the software needs to be made to allow for targeting outside of the "work space" and have the system use spheroids to represent the mapping process.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1

4.(U)USE OF FIREFLEX AT SASS LEVELS

5.(U)OBSERVATION: FIREFLEX was not well suited for use in the SASS for air planning and exchange of targeting information.

6.(U)DISCUSSION: FIREFLEX could not be used for exchanging targeting information with the air systems due to the lack of an automatic conversion between Lat/Long and UTM Grid coordinates, and the use of a map zone designator.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the software needs to be made to allow for automatic conversion between Lat/Long and UTM Grid coordinates and increase the field size for the grid coordinates to include grid zone designator.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1

4.(U)TRANSMISSION OF TARGET BLOCKS BETWEEN TCO AND FIREFLEX

5.(U)OBSERVATION: TCO and FIREFLEX were not able to cleanly exchange target lists and target blocks.

6.(U)DISCUSSION: Target lists could not be sent from TCO to FIREFLEX and back. The TCO was only able to transmit or receive one target at a time.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the TCO software needs to be made to allow for the transfer of entire target lists or blocks of targets

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1

4.(U)FIREFLEX INTERNAL SOFTWARE PROBLEMS

5.(U)OBSERVATION: There were FIREFLEX problems that were determined to be software problems and not system or doctrinal problems

6.(U)DISCUSSION: 1) Numerous error messages are surfacing that cannot be deleted from the message que. Once this que fills the box is unable to transmit or receive messages. 2) The message copies buffer is not deleting messages. This also causes the box to lose the ability to transmit. 3) All of the message ques should be in a separate file in the system and not related to the subscriber table or system setup. Currently, when the ques are full and locking out the operator the solution is to go to UNIX and delete the offending que's file. What happens is the subscriber table is also deleted causing the operator to rebuild it.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the FIREFLEX software needs to be made to fix the identified problems.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1

4.(U)FIREFLEX SOFTWARE MODIFICATIONS FOR INCREASED FUNCTIONALITY

5.(U)OBSERVATION: There were additional suggestions for FIREFLEX that would improve the system's performance.

6.(U)DISCUSSION: 1) A capability to transmit, store and manage the target precedence list or large target files is needed. This is equal to the requirement to pass the target bulletin but have it prioritized. The target precedence list should include chemical targets. 2) FIREFLEX must be able to create schedules of fires, groups and series, as well as execute them.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the FIREFLEX software needs to include the above mentioned suggestions.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1, DCT

4.(U)MODIFICATIONS TO THE DIGITAL COMMUNICATIONS TERMINAL

5.(U)OBSERVATION: There were suggestions for the improvement of the DCT.

6.(U)DISCUSSION: The DCT needs a larger mission buffer. If the limit of two missions was set due to the limitation of BCS it should be removed. The FO will be talking to the FSCC which can handle more missions.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Modification to the DCT should be considered.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1, SINCGARS

4.(U)DISTRIBUTION OF THE SINCGARS RADIOS

5.(U)OBSERVATION: Concerns were raised as to the fielding of the SINCGARS radios and its effect on digital systems.

6.(U)DISCUSSION: The T/E for radio assets needs to be revisited. The fielding of SINCGARS radios does not include a one-for-one swap. Additional radios are needed by the FMF to support the net coverage requirements.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Insure that sufficient radios are fielded to the artillery to support the use of automated command and control systems over combat net radios.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

UNCLASSIFIED

MCLLS LONG REPORT

1.(U)MCLLS NUMBER:

2.(U)PCX FDS-1 conducted by CG 7TH MEB on 11/16/91.

3.(U)KEYWORDS: FIREFLEX, C2 (COMMAND AND CONTROL), CPX (COMMAND POST EXER), FDS-1, DRASH

4.(U)USE OF THE DRASH TENTS

5.(U)OBSERVATION: There were suggestions for the use of the DRASH tent as the preferred shelter for Fire Direction Centers and Fire Support Coordination Centers.

6.(U)DISCUSSION: The Deployable Rapid Assembly Shelter (DRASH) tents used by the DASC look good for use by the Arty Bn. 1/11 would like some sort of tent with a covering (Kevlar for example) to provide shelter from indirect fire for the Marines and equipment.

7.(U)LESSONS LEARNED:

8.(U)RECOMMENDED ACTION: Use of the DRASH tent should be considered.

9.(U)COMMENTS:

--- (U) SUBJECT: COMMAND & CONTROL

--- (U) INTEROPERABILITY: NONE

APPENDIX G

DPM COM/NAV AFTER ACTION REPORT

Appendix G

FDS-1 AFTER ACTION REPORT

Subject: **ULCS Training**
Discussion:ULCS Operators expressed a dissatisfaction with the training a Keesler AFB. Apparently, some subjects are taught incorrectly while others are not taught at all.
Recommendation:Liaison with Keesler AFB is a MCCDC function. A possible solution would be to have instructors from Keesler AFB accompany a Marine Corps material fielding team to Camp Lejeune NC to observe classes and gain an understanding of those subjects considered necessary in USMC training.

Subject: **TCO Operator Training**
Discussion:The TCO Operators did not have an understanding of how they fit into the overall system. They knew how to functionally pass a message but had no understanding of their connectivity.
Recommendation:Provide more extensive information on how messages travel through the system. This will also aid the operators when trouble shooting the system.

Subject: **ULTDS/TCFEP Training**
Discussion:Allotted training time was too short. The importance of correct timing settings on the ULTDS was not emphasized enough.
Recommendation:The standard 2 week ULTDS/TCFEP training course should be given. More emphasis should be placed on understanding network timing requirements.

Subject: **ULCS Timing**
Discussion:With time, the frequency of the oscillators in the AN/TTC-32's and SB-3865's will drift. Normal preventive maintainance procedures call for adjusting the oscillators every six months. Timing drift will cause trunks to frequently drop out and come up again. Though no messages are lost, it is an unnecessary "COMM LOSS" at the switch.
Recommendation:Oscillator adjustment should occur more frequently than once every six months. The process is relatively simple and should be done prior to each exercise.

Subject: **TCO Software Man-Machine Interface**
Discussion:Currently, TCO software will display a "TCFEP ABORTED" or "PPB ABORTED" message when it experiences a problem with the interfaces to these boards. This message leads the operator to suspect the TCFEP or the PPB when there is actually a TCO software problem. This message is misleading and slows down troubleshooting of the real problem.

Recommendation:Change the message to read "TCO/TCFEP INTERFACE ABORTED" and "TCO/PPB INTERFACE ABORTED".

Subject: **TCO/TCFEP Interface**
Discussion:It appears from speaking to the TCO operators that the TCO/TCFEP interface aborts increase proportionally as the TCFEP is exported to more users.
Recommendation:Test and, if necessary, make changes to the TCO software to accomodate the high data throughput such a system must withstand. Prioritization of software interrupts may help to alleviate the problem.

Subject: **TCO Software Changes**
Discussion:Throughout the exercise changes were made to the TCO Software and put onto the computers. Several configuration management problems lead to different versions of the TCO Software on different machines. Changing the TCO Software during the exercise also added multiple variables to the evaluation of the system which made it impossible to pinpoint problem areas accurately.
Recommendation:During FDS-2, only one version of TCO Software should be used to facilitate proper evaluation of the system as a whole.

Subject: **MCRDAC Communication**
Discussion:The communication of information among various portions of MCRDAC was minimal at best. Meeting information, report requirements and exercise information were disseminated through rumors rather than by an organized distribution method.
Recommendation:C2G, C2O, C2C and C2A must make an effort to establish firm Points of Contact for all FDS matters. They will also need to have the POC's meet frequently enough with each other and with the contractor to avoid misunderstandings and misinformation. Our own organizational efforts could have made a substantial impact on the ease of operations at Twentynine Palms. MCRDAC should be functioning as a unit to provide accurate information to the FMF and to our contractors. We should be taking the lead.

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