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NAS OT&E/INTEGRATION OF ARSR-3 RMS

LETTER OF FINDINGS

Richard Van Suetendael
Ed Nuzman
Lynn Armstrong
Thomas Depsky
Ed Szydlowski

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Engineering, Test, and Evaluation Service
Communications/Navigation/Surveillance Division, ACN-200
Weather & Remote Maintenance Monitoring Systems Branch, ACN-250
FAA Technical Center
Atlantic City International Airport, N.J. 08405

EXECUTIVE SUMMARY

The National Airspace System (NAS) Operational Test and Evaluation (OT&E)/Integration of Air Route Surveillance Radar, Model 3 (ARSR-3), Remote Monitoring Subsystem (RMS) testing was performed from January 14, 1991 through January 25, 1991. The testing used the Kenai, Alaska, ARSR-3 site and the Anchorage, Alaska, Air Route Traffic Control Center (ARTCC) Maintenance Processor Subsystem (MPS) running the married version of IMCS PCB0701 and MMS PIB0300. The LM1 Protocol Analyzer, version 7.0, was used as a test tool.

The Purpose of the NAS OT&E/Integration of the ARSR-3 RMS Testing is to verify that the system will perform properly as an integrated component of the Remote Maintenance Monitoring System (RMMS) and that all functional requirements have been fulfilled.

The NAS OT&E/Integration of ARSR-3 RMS testing identified several problems with the ARSR-3 RMS. These are stated briefly below and are detailed in this report.

a. The ARSR-3 RMS Environmental logical unit is not connected to the Kenai ARSR-3 system.

b. The ARSR-3 RMS sent site data reports for three logical units which are not specified in the Full ARSR-3 Interface Control Document for the Interim Monitor and Control Software (IMCS).

c. The ARSR-3 RMS sends numerous return to normal messages for data points which are not in an alarm condition.

d. Data points $20 - $5B and $60 - $9B of the site data report for the Full ARSR3 Reportable Counts logical unit contain incorrect condition status codes.

e. The ARSR-3 RMS reports minor fluctuations in analog values, which results in the generation of more state change messages than allowed by NAS-SS-1000. These excessive messages also result in extremely large IMCS database history files.

f. The ARSR STATUS command polls an invalid logical unit.

g. The MPS gives no indication to the user that a command error message had been received.

h. The SMART RADAR CONTROL - ENABLE command does not enable the Smart Radar. An incorrect command parameter value is contained in the command message from the MPS.

i. IMCS does not clear the command buffer after every command, which could result in the MPS sending invalid command parameters.

The Kenai ARSR-3 RMS did not successfully pass NAS OT&E/Integration Testing. NAS OT&E/Integration testing must be conducted again after items a, c, and e above are corrected in the ARSR-3 RMS and items f and h are corrected in the MPS/IMCS. Items a, c, and e must be corrected before releasing the ARSR-3 RMS to the field. Items f and h must be corrected before the Full ARSR-3 IMCS modules are released to the field. Items g and i may be corrected in future versions of IMCS.

1. INTRODUCTION.

This Letter of Findings details the results of the NAS OT&E/Integration Testing of the Air Route Surveillance Radar, Model 3 (ARSR-3).

1.1 PURPOSE.

The Purpose of the NAS OT&E/Integration Testing of the ARSR-3 RMS is to verify that the system will perform properly as an integrated component of the Remote Maintenance Monitoring System (RMMS) and that all functional requirements have been fulfilled.

1.2 TEST DATE AND LOCATION.

The NAS OT&E/Integration Testing of the ARSR-3 Testing was conducted from January 14, 1991 through January 25, 1991 using the Kenai, Alaska, ARSR-3 site and the Anchorage, Alaska, Air Route Traffic Control Center (ARTCC) Maintenance Processor Subsystem (MPS). The MPS ran the married version of IMCS PCB0701 and MMS PIB0300. The LM1 Protocol Analyzer, version 7.0, was used as a test tool.

1.3 TEST PARTICIPANTS.

The participants in the NAS OT&E/Integration Testing of the ARSR-3 Testing were as follows:

Name	Function
Steve Lynd	ZAN Tandem System Administrator/FAA
John Dietrich	ARSR-3 RMS Engineer/FAA
Ed Nuzman	SEI/ARINC
Richard Van Suetendael	ACN-250 Test Lead/FAA
Lynn Armstrong	ACN-250 Test Engineer/CTA Inc
Thomas Depsky	ACN-250 Test Engineer/CTA Inc
Ed Szydlowski	ACN-250 Test Engineer/CTA Inc

1.4 FUTURE EVENTS.

The ARSR-3 RMS will require retesting. Another NAS OT&E/Integration Test must be scheduled and a test report generated detailing the results of that test.

2. TEST RESULTS.

The findings described herein are based on observations, the consolidation of Problem Trouble Reports (Appendix A), and a complete review of the data collected during testing. The Kenai ARSR-3 site had been experiencing operational problems prior to the commencement of testing. Due to these problems, it was necessary to consolidate the testing to eliminate any possibility of causing outages with the radar. As a result, many of the tests outlined in the NAS OT&E/Integration of the ARSR-3 RMS Test Plan could not be performed as written. In spite of these constraints, sufficient data was gathered to evaluate the operational ability of the ARSR-3 RMS.

2.1 IT1 - LINK LEVEL INTERFACE TEST.

2.1.1 Test Purpose.

The Link Level Interface Test verifies that basic communication between the RMS and the MPS can be established, that the RMS can respond to basic status request commands and that the MPS can recognize when the interface is not functional.

Due to operational constraints of the system, the RMS/MPS communication alarm portion of the test could not be verified. This function has been successfully tested during previous testing and will be reverified during future NAS OT&E/Integration Testing of the ARSR-3 RMS.

2.1.2 Test Results.

The ARSR-3 RMS did not pass all Link Level Interface Test sequences due to the following:

a. In response to an ALL STATUS command (Scheduled Poll), the ARSR-3 RMS sent Site Data Reports (SDRs) for Logical Units (LU) $20, $22, $23, $24, $25, $30, $31, $32, $33, $34, $35, $36, $38, and $39. LUs $23, $35, and $36 are not contained in the Full ARSR-3 Interface Control Document For The IMCS (ICD).

b. The ARSR STATUS command resulted in the MPS sending a Specific Poll to LU $3A. This is a command LU, not a status LU.

c. The ARSR-3 RMS responded to an invalid command with a Command Error message, but the portion of the message which should contain the invalid message contained unrecognizable data.

d. IMCS gives no indication to the user that a command error message has been received. The only indication given is that the link level command has or has not been received by the site.

e. Numerous Return To Normal (RTN) messages were sent from the ARSR-3 RMS to the MPS for Data Points (DP) which were not in an alarm condition. Further data analysis has revealed that these RTN message are being used to report a change of state of a DP from a non-alarm value to another non-alarm value. These RTN messages were recorded in every test sequence.

2.1.3 Recommendations.

a. LUs $23, $35, and $36 and their associated DP information should be added to the Full ARSR-3 ICD. This problem was previously reported in the ARSR-3 RMS Dial-Up Test Results, dated October 3, 1990. This change can be implemented during later revisions of the Full ARSR-3 ICD.

b. The IMCS module for the Full ARSR-3 should be modified to send a Specific Poll to LU $30 (ARSR Status LU) when an ARSR STATUS command has been selected. This problem was previously reported in the Validation of NAS OT&E/Integration of ARSR-3 RMS Test Procedures Letter of Findings, March 1990. This change should be implemented before the Full ARSR-3 IMCS modules are released to the field.

c. The ARSR-3 RMS should be modified to supply the correct response to an invalid command as defined in NAS-MD-790. This problem was previously reported in the Validation of NAS OT&E/Integration of ARSR-3 RMS Test Procedures Letter of Findings, March 1990. In that instance, the RMS command error message contained a text message, which was also invalid. Now, the command error message contains an unrecognizable message. This change should be implemented before the ARSR-3 RMS is released to the field.

d. IMCS should be modified to report to the operator that a command error message has been received. Without this, the operator has no way to determine that the command has been sent correctly. If the link level command is correct, but the contents of that command are invalid, the site should return a command error message and the operator should be notified that the command has been rejected. This problem was previously reported in the NAS OT&E/Integration of Interim Monitor and Control Software Test Report, July, 1990. This change should be implemented before IMCS is released to the field.

e. The ARSR-3 RMS needs to be modified to eliminate these invalid RTNs. The change of state of a DP from a non-alarm value to another non-alarm value should be reported in the form of a state change message, not a RTN. This change should be implemented before the ARSR-3 RMS is released to the field.

2.2 IT2 - DATA MONITORING TEST.

2.2.1 Test Purpose.

The Data Monitoring Test verifies the ability of the RMS to report, and the ability of the MPS to interpret, monitored data accurately when compared to the data presented at the Local PC.

The Data Monitoring Test, as written, could not be performed due to operational constraints of the system. Performance of these tests would have consumed more system time than was acceptable to flight operations. As a substitute test, the SDRs sent from the RMS were analyzed for contents (the correct number of data points and proper condition status codes for each data point). The Data Monitoring Test will be verified during future NAS OT&E/Integration Testing of the ARSR-3 RMS.

2.2.2 Test Results.

Analysis of the SDRs revealed the following:

a. DPs $20 - $5B and $60 - $9B of LU $39 contain a condition status code of $41 (normal). The Full ARSR-3 ICD indicates that these DPs are not used, in which case they should have a condition status code of $42 (not monitored).

2.2.3 Recommendations.

ACN-250 recommends the following:

a. DPs $20 - $5B and $60 - $9B of LU $39 should be changed to indicate a condition status code of "B" (not monitored). This problem was previously reported in the ARSR-3 RMS Dial-Up Test Results, dated October 3, 1990. This change can be implemented during later revisions of the ARSR-3 RMS.

2.3 IT3 - ALARM TEST.

2.3.1 Test Purpose.

The Alarm Test verifies the ability of the RMS to report, and the ability of the MPS to interpret, alarm messages.

Due to operational constraints of the system, an abbreviated version of the Alarm Test was performed. This test consisted of only the alarms which could be generated by changing the alarm threshold or offset at the Local PC. These alarms are listed in Appendix B. The complete Alarm Test will be performed during future NAS OT&E/ Integration Testing of the ARSR-3 RMS.

2.3.2 Test Results.

The ARSR-3 RMS passed all Alarm Test sequences.

2.4 IT4 - COMMAND TEST.

2.4.1 Test Purpose.

The Command Test verifies the ability of the MPS to send, and the RMS to receive and execute commands.

Due to operational constraints of the system, an abbreviated version of the Command Test was performed. This test consisted of only the commands which were supplied to us by the Anchorage ARTCC personnel as being "safe" to send. These commands are listed in Appendix C. The complete Command Test will be performed during future NAS OT&E/ Integration Testing of the ARSR-3 RMS.

2.4.2 Test Results.

Analysis of the data collected during the Command Test revealed the following:

a. For all commands which do not have selectable parameters, no values are included in the MPS command messages. For all of these commands, the Full ARSR-3 ICD indicates that these commands should have a value of 1. Except for individual problems encountered, the ARSR-3 RMS responded normally to these commands.

b. After sending a SET RMS CLOCK command, the ARSR-3 RMS sent a Database Download Request to the MPS. The MPS responded with a Database Download message. It was not possible to verify or validate the contents of the Database Download message because the Full ARSR-3 ICD does not address the database download message.

c. The SMART RADAR CONTROL - DISABLE command from the MPS contained a parameter value of 0. The Full ARSR-3 ICD indicates that the correct value to disable the Smart Radar is 1 and the value to enable it is 0. The ARSR-3 RMS disabled the Smart Radar.

d. The SMART RADAR CONTROL - ENABLE command contained a value of 0. The Full ARSR-3 ICD indicates that the correct value to disable the Smart Radar is 1 and the value to enable it is 0. The RMS did not enable the Smart Radar.

e. The CH A TRANSMITTER FAULT RESET command from the MPS contained a parameter value of 2. The Full ARSR-3 ICD indicates that the correct value is 1. This parameter is not user selectable through IMCS.

f. The CH B TRANSMITTER FAULT RESET command from the MPS contained a parameter value of 2. The Full ARSR-3 ICD indicates that the correct value is 1. This parameter is not user selectable through IMCS. This is the same type of problem as given in 2.4.2.e.

2.4.3 Recommendations.

ACN-250 recommends the following:

a. Since the RMS responded normally without the indicated values, the Full ARSR-3 ICD should be changed to remove the value parameters from these commands. This change can be implemented during later revisions of the Full ARSR-3 ICD.

b. The Full ARSR-3 ICD should describe the expected contents of the database download message. This change can be implemented during later revisions of the Full ARSR-3 ICD.

c. It appears that the correct parameter value to disable the Smart Radar is 0. the Full ARSR-3 ICD should be changed to reflect the proper value. This change should be implemented in conjunction as those in 2.4.3.d below.

d. It is not known what the correct value is to enable the Smart Radar. The correct parameter value to enable the Smart Radar must be determined, the IMCS command module for the Full ARSR-3 be modified to send the correct parameter values, and the Full ARSR-3 ICD should be changed to reflect the proper value. This change should be implemented before the Full ARSR-3 IMCS modules are released to the field.

e. The parameter value of 2 was left in the command buffer from the previous command sent during the test (CH A TRANSMITTER SELECT - RADIATE). This buffer is not cleared after each command, only after exiting the command list screen. This problem was previously reported in the Validation of NAS OT&E/Integration of ARSR-3 RMS Test Procedures Letter of Findings, March 1990, and the NAS OT&E/Integration of Interim Monitor and Control Software Test Report, July, 1990. The IMCS command module for the Full ARSR-3 should be changed to clear the command buffer after each command is sent. This change should be implemented before the Full ARSR-3 IMCS modules are released to the field.

f. Same recommendation as given in 2.4.3.e.

2.5 IT5 - DIAGNOSTICS TEST.

2.5.1 Test Purpose.

At present, there are no automated local or remote diagnostic commands for the ARSR-3 RMS. Therefore, IT5 is not applicable.

2.6 IT6 - CERTIFICATION TEST.

2.6.1 Test Purpose.

At present, there are no automated local or remote certification commands for the ARSR-3 RMS. Therefore, IT6 is not applicable.

2.7 IT7 - LOCAL PC TEST.

2.7.1 Test Purpose.

The Local PC Test verifies the capability of the ARSR-3 RMS for local input, display of data, and commands/control via the MDT interface.

Due to operational constraints of the system, it was necessary to change the specific alarms generated during this test. These changes had no functional affect on the tests.

2.7.2 Test Results.

The ARSR-3 RMS passed all Local PC Test sequences.

3. OTHER RESULTS AND RECOMMENDATIONS.

3.1 Excessive Loading of IMCS Database History File.

During testing, the Anchorage ARTCC personnel expressed concern that the IMCS database history file was filling up at an alarming rate (approximately 2 Megabytes per day) when the Kenai ARSR site was being monitored and asked if ACN-250 could look into the problem.

3.1.1 Test Results.

Data analysis has revealed that the majority of the messages sent to the MPS are RTN messages (these would be state change messages if the invalid RTN problem was corrected). These messages are being sent at a rate of approximately 15 messages per minute or 900 messages per hour.

Table 3.2.1.1.2.2.3-1 of NAS-SS-1000, Volume V, indicates that the peak hour number of transactions at an ACF node (MPS) for change of state messages is 96 transactions. It is clear that the ARSR-3 RMS has greatly exceeded this number. Paragraph 3.2.1.1.4.2.2 of NAS-SS-1000, Volume V, states that the RMS shall "... filter extraneous fluctuations ...". The ARSR-3 RMS is not performing this task and will generate a state change message every time a small fluctuation of an analog measurement occurs.

According to NAS-SS-1000, there are 83 proposed ARSR-3 sites and 23 ARTCCs. If evenly divided, there would be at least 3 ARSR-3 RMSs reporting to each MPS. This would total 64,800 state change messages during a 24 hour period, which does not include alarm messages, RTN messages, SDRs, other miscellaneous messages, or any messages from any other RMSs reporting to that MPS.

3.1.2 Recommendations.

The ARSR-3 RMS should be modified to filter minor fluctuations of analog measurements. The amount of filtering will vary with each measurement, since some measurements are more critical than others. It would be beneficial to allow the MPS operator to tailor the filtering to suit individual needs.

Additionally, the possibility of limiting the reporting frequency of state changes from the ARSR-3 RMS should be explored. One solution would be to have the RMS request a Scheduled Poll at a predefined time interval (every hour, or every 2 hours, etc.) and not report any state changes unless they caused an alarm or a RTN. The MPS would then have current values that are only as old as the time interval, but would immediately be notified of any soft or hard alarms or RTNs.

4. CONCLUSIONS.

The Kenai ARSR-3 RMS did not successfully pass NAS OT&E/Integration Testing. The following items must be corrected prior to fielding:

a. The ARSR-3 RMS Environmental logical unit must be connected to the Kenai ARSR-3 system.

b. The ARSR-3 RMS must not send return to normal messages for data points which are not in an alarm condition.

c. The ARSR-3 RMS must filter minor fluctuations in analog values.

d. The ARSR STATUS command must poll LU $30, not LU $3A.

e. The SMART RADAR CONTROL command parameters must be redefined and corrected.

NAS OT&E/Integration Testing must be conducted again after these corrections are made.

The following items should be corrected in future ARSR-3 RMS, ARSR-3 ICD, and/or IMCS revisions:

a. Logical units $23, $35, and $36 should be defined in the Full ARSR-3 Interface Control Document for the Interim Monitor and Control Software (IMCS).

b. Data points $20 - $5B and $60 - $9B of logical unit $39 should contain proper condition status codes.

c. The MPS should indicate to the user that a command error message has been received.

d. IMCS should clear the command buffer after every command.

These changes can be verified during regression testing.

APPENDIX A

NAS OT&E/INTEGRATION TESTING OF ARSR-3 RMS

PROBLEM TROUBLE REPORTS (PTR)

Report No.	Project	Subsystem	Test Date	Create Date
001	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	IT1 - Link Level Interface Test

Test Step Description: Send an ALL STATUS command (Scheduled Poll) from the MPS and analyze contents of the SDRs.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Undefined Logical Units

Detailed Description: In response to a Scheduled Poll, the ARSR-3 RMS sent SDRs for LUs $20, $22 - $25, $30 - $36, and $38 - $39. LUs $23, $35, and $36 are not contained in the Full ARSR-3 ICD.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__

2. _____. __/__/__

Closure Description:

_____

_____. __/__/__

Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
002	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	IT1 - Link Level Interface Test

Test Step Description: Send an ARSR STATUS command from the MPS.

Category of Failure (circle one)	I	II	III	IV	V
	critical	major	minor	annoyance	other

Brief Description: (50 character max)
IMCS ARSR STATUS command polls invalid LU

Detailed Description: The ARSR STATUS command resulted in the MPS sending a Specific Poll to LU $3A. LU $3A is a command LU, not a status LU.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

_____

_____. __/__/__

Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
003	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	IT1 - Link Level Interface Test

Test Step Description: Send an ALL STATUS command from the MPS.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Incorrect command error message

Detailed Description: The ARSR-3 RMS responded to an invalid command with a command error message, but the portion of the message which should contain the invalid message contained unrecognizable data.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

_____

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
004	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Link Level Interface Test

Test Step Description: Various

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Invalid RTN Messages

Detailed Description: Numerous RTN messages were sent from the ARSR-3 RMS for DPs which were not in an alarm state. Data analysis revealed that these RTNs are being used to report a change of state from a non-alarm state to another non-alarm state.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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_____. __/__/__

Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
005	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Data Monitoring Test

Test Step Description: Compare contents of SDRs with those given in the Full ARSR-3 ICD.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Incorrect Cond. Status codes for unused DPs

Detailed Description: DPs $20 - $5B and $60 - $9B of LU $39 contain a cond. status code of "A" (normal). The Full ARSR-3 ICD indicates that these DPs are not used, in which case they should have a cond. status code of "B" (not used).

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
006	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Command Test

Test Step Description: Various

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Missing command parameters

Detailed Description: For all commands which do not have selectable parameters, no values are contained in the MPS command messages. For all of these commands, the Full ARSR-3 ICD indicates that these commands should have a value of 1. The ARSR-3 responded normally to these commands.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__

2. _____. __/__/__

Closure Description:

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
007	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Command Test

Test Step Description: Send a SET RMS CLOCK command.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Undefined Database Download message

Detailed Description: In response to a SET RMS CLOCK command, the ARSR-3 RMS sent a Database Download request message to the MPS. The MPS responded with a Database Download message. This message is not defined in the Full ARSR-3 ICD, so it was not possible to analyze the contents of the message.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
008	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Command Test

Test Step Description: Send a SMART RADAR CONTROL - DISABLE command from the MPS.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Invalid cmd param for Smrt Rdr Cntl cmd

Detailed Description: The SMART RADAR CONTROL - DISABLE command from the MPS contained a parameter value of 0. The Full ARSR-3 ICD indicates that the correct value to disable the Smart Radar is 1 and the value to enable it is 0. The ARSR-3 RMS disabled the Smart Radar.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
009	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Command Test

Test Step Description: Send a SMART RADAR CONTROL - ENABLE command from the MPS.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
Invalid cmd param for Smrt Rdr Cntl cmd

Detailed Description: The SMART RADAR CONTROL - ENABLE command from the MPS contained a parameter value of 0. The Full ARSR-3 ICD indicates that the correct value to enable the Smart Radar is 1 and to disable it is 0. The RMS did not enable the Smart Radar.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
010	ARSR-3	RMS	18 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Command Test

Test Step Description: Send a CH A TRANSMITTER FAULT RESET command from the MPS.

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
IMCS doesn't clear the cmd buffer after each cmd

Detailed Description: In IMCS, if a command with selectable parameters is sent, and then a command which does not have selectable parameters is sent, the parameter values from the first command message will be contained in the second command message. This is due to the fact that IMCS does not clear the command buffer after each command, only when the command screen is exited and re-entered.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

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_____. __/__/__

Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
011	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Various

Test Step Description: Various

Category of Failure (circle one)

I	II	III	IV	V
critical	major	minor	annoyance	other

Brief Description: (50 character max)
Excessive RMS to MPS messages

Detailed Description: The ARSR-3 RMS is sending state change messages to the MPS at a rate of approximately 900 messages per hour. These are in response to minor fluctuations if analog measurements (power supplies, fuel levels, etc.). NAS-SS-1000 specifies that the peak hour number of state change transactions shall be 96.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

_____

_____. __/__/__

Approved:

Test Director _____

Report No.	Project	Subsystem	Test Date	Create Date
012	ARSR-3	RMS	17 Jan 91	12 Feb 91

Report By:	Test Sequence ID
Lynn Armstrong	Various

Test Step Description: Various

Category of Failure (circle one)	I critical	II major	III minor	IV annoyance	V other

Brief Description: (50 character max)
ARSR-3 RMS not filtering minor changes

Detailed Description: NAS-SS-1000 states that an RMS shall filter extraneous fluctuations in changes of state of a monitored value. The ARSR-3 RMS is not performing this task. any minor fluctuation in an analog measurement will cause the RMS to generate a state change message.

Attachments _____

Test Engineer Lynn Armstrong

Disposition Instructions:

Follow-up Status

Date:

1. _____. __/__/__
2. _____. __/__/__

Closure Description:

_____

_____. __/__/__

Approved:

Test Director _____

APPENDIX B

ALARMS GENERATED DURING

NAS OT&E/INTEGRATION TESTING OF ARSR-3 RMS

JANUARY, 1991

Alarm Name	LU DP
Fuel Tank #1 Level	22 32
EG1 Battery Voltage	22 33
EG1 Coolant Temperature	22 34
EG Building Temperature	22 3C
Comm Voltage Ph A	22 3D
Comm Voltage Ph B	22 3E
Comm Voltage Ph C	22 3F
Facility Load Current Ph A	22 40
Facility Load Current Ph B	22 41
Facility Load Current Ph C	22 42
Power Conditioner Voltage Ph A	22 44
Power Conditioner Voltage Ph B	22 45
Power Conditioner Voltage Ph C	22 46
Power Conditioner Current Ph A	22 47
Power Conditioner Current Ph B	22 48
Power Conditioner Current Ph C	22 49
ARSR Equip Room Humidity	22 52
ARSR Equip Room Temperature	22 53
ARSR XMTR Room Temperature	22 54
Outside Temperature	22 55
Fuel Tank #2 Level	22 56
ATCBI-5 Ch 1 +5 Vdc Power Supply	24 26
ATCBI-5 Ch 1 +12 Vdc Power Supply	24 27
ATCBI-5 Ch 1 +30 Vdc Power Supply	24 28
ATCBI-5 Ch 1 +24 Vdc Power Supply	24 29
ATCBI-5 Ch 1 -6 Vdc Power Supply	24 2A
ATCBI-5 Ch 1 -70 Vdc Power Supply	24 2B
ATCBI-5 Ch 1 Tx HV Power Supply	24 2C
ATCBI-5 Ch 1 TX Bias Voltage	24 2D
ATCBI-5 Ch 1 P1 Directional Power	24 2E
ATCBI-5 Ch 1 P3 Directional Power	24 2F
ATCBI-5 Ch 1 Quantizer Threshold	24 30
ATCBI-5 Ch 1 P1 Omni-Directional Power	24 31
ATCBI-5 Ch 1 P2 Omni-Directional Power	24 32
ATCBI-5 Ch 1 P1 Pulse Width Directional	24 33
ATCBI-5 Ch 1 P2 Pulse Width Omni-Directional	24 34
ATCBI-5 Ch 1 P3 Pulse Width Directional	24 35
ATCBI-5 Ch 1 P1 Pulse Width Omni-Directional	24 36
ATCBI-5 Ch 1 STC 1	24 37
ATCBI-5 Ch 1 STC 2	24 38
ATCBI-5 Ch 1 STC 3	24 39
ATCBI-5 Ch 1 Quantized Video	24 3A
ATCBI-5 Ch 1 VSWR Directional	24 3B
ATCBI-5 Ch 1 VSWR Omni-Directional	24 3C
ATCBI-5 Ch 1 RSM Azimuth	24 3D
ATCBI-5 Ch 1 RSM Replies	24 3F

Alarm Name	LU DP
ATCBI-5 Ch 2 +5 Vdc Power Supply	25 25

ATCBI-5 Ch 2 +12 Vdc Power Supply	25	26
ATCBI-5 Ch 2 +30 Vdc Power Supply	25	27
ATCBI-5 Ch 2 +24 Vdc Power Supply	25	28
ATCBI-5 Ch 2 -6 Vdc Power Supply	25	29
ATCBI-5 Ch 2 -70 Vdc Power Supply	25	2A
ATCBI-5 Ch 2 Tx HV Power Supply	25	2B
ATCBI-5 Ch 2 Tx Bias Voltage	25	2C
ATCBI-5 Ch 2 P1 Directional Power	25	2D
ATCBI-5 Ch 2 P3 Directional Power	25	2E
ATCBI-5 Ch 2 Quantizer Threshold	25	2F
ATCBI-5 Ch 2 P1 Omni-Directional Power	25	30
ATCBI-5 Ch 2 P2 Omni-Directional Power	25	31
ATCBI-5 Ch 2 P1 Pulse Width Directional	25	32
ATCBI-5 Ch 2 P2 Pulse Width Omni-Directional	25	33
ATCBI-5 Ch 2 P3 Pulse Width Directional	25	34
ATCBI-5 Ch 2 P1 Pulse Width Omni-Directional	25	35
ATCBI-5 Ch 2 STC 1	25	36
ATCBI-5 Ch 2 STC 2	25	37
ATCBI-5 Ch 2 STC 3	25	38
ATCBI-5 Ch 2 Quantized Video	25	39
ATCBI-5 Ch 2 VSWR Directional	25	3A
ATCBI-5 Ch 2 VSWR Omni-Directional	25	3B
ATCBI-5 Ch 2 RSM Azimuth	25	3C
ATCBI-5 Ch 2 RSM Replies	25	3E
Ch A FPA Focus Coil Current	31	5D
Ch A FPA Beam Current	31	5E
Ch A FPA Vacuum Pump Current	31	5F
Ch A FPA Filament Voltage	31	60
Ch A FPA Filament Current	31	61
Ch A FPA Modulator PFN Voltage	31	62
Ch A FPA Coolant Temperature	31	64
Ch A FPA Coolant Pressure	31	65
Ch A Waveguide Pressure	31	66
Ch A FPA +28 Vdc Power Supply	31	6E
Ch A FPA -30 Vdc Power Supply	31	6F
Ch A FPA +35 Vdc Power Supply	31	70
Ch A FPA +150 Vdc Power Supply	31	71
Ch A FPA +300 Vdc Power Supply	31	72
Ch A FPA +3 KVdc Power Supply	31	73
Ch A FPA +28 Vdc UPS Power Supply	31	74
Ch A Processor +28 Vdc Power Supply	31	75
Ch A Processor -28 Vdc Power Supply	31	76
Ch A Processor +15 Vdc Power Supply	31	77
Ch A Processor -15 Vdc Power Supply	31	78
Ch A Processor +5 Vdc Power Supply	31	79
Ch A DTE +12 Vdc Power Supply	31	7A
Alarm Name	LU	DP
Ch A DTE -12 Vdc Power Supply	31	7B
Ch A DTE +5 Vdc Power Supply	31	7C
Ch A Freq Generator +15q Vdc Power Supply	31	7D
Ch A Freq Generator +15n Vdc Power Supply	31	7E

Ch A Freq Generator -15q Vdc Power Supply	31	7F
Ch A Freq Generator -15n Vdc Power Supply	31	80
Ch A Freq Generator -5.2 Vdc Power Supply	31	81
Ch A Freq Generator +28 Vdc Power Supply	31	82
Ch A Freq Generator -50 Vdc Power Supply	31	83
Ch A Freq Generator +5n Vdc Power Supply	31	84
Ch A Freq Generator +5q Vdc Power Supply	31	85
Ch B FPA Focus Coil Current	32	5D
Ch B FPA Filament Voltage	32	60
Ch B FPA Filament Current	32	61
Ch B FPA Modulator PFN Voltage	32	62
Ch B FPA Coolant Temperature	32	64
Ch B FPA Coolant Pressure	32	65
Ch B Waveguide Pressure	32	66
Ch B FPA +28 Vdc Power Supply	32	6E
Ch B FPA -30 Vdc Power Supply	32	6F
Ch B FPA +35 Vdc Power Supply	32	70
Ch B FPA +150 Vdc Power Supply	32	71
Ch B FPA +300 Vdc Power Supply	32	72
Ch B FPA +3 KVdc Power Supply	32	73
Ch B FPA +28 Vdc UPS Power Supply	32	74
Ch B Processor +28 Vdc Power Supply	32	75
Ch B Processor -28 Vdc Power Supply	32	76
Ch B Processor +15 Vdc Power Supply	32	77
Ch B Processor -15 Vdc Power Supply	32	78
Ch B Processor +5 Vdc Power Supply	32	79
Ch B DTE +12 Vdc Power Supply	32	7A
Ch B DTE -12 Vdc Power Supply	32	7B
Ch B DTE +5 Vdc Power Supply	32	7C
Ch B Freq Generator +15q Vdc Power Supply	32	7D
Ch B Freq Generator +15n Vdc Power Supply	32	7E
Ch B Freq Generator -15q Vdc Power Supply	32	7F
Ch B Freq Generator -15n Vdc Power Supply	32	80
Ch B Freq Generator -5.2 Vdc Power Supply	32	81
Ch B Freq Generator +28 Vdc Power Supply	32	82
Ch B Freq Generator -50 Vdc Power Supply	32	83
Ch B Freq Generator +5n Vdc Power Supply	32	84
Ch B Freq Generator +5q Vdc Power Supply	32	85

APPENDIX C

IMCS COMMANDS ISSUED DURING

NAS OT&E/INTEGRATION TESTING OF ARSR-3 RMS

JANUARY, 1991

Commands Issued

Command	Full ARSR-3 ICD LU DP	Value
SET RMS CLOCK	20 81	1
MODEM 1 CONTROL - OFF	3A 29	F
MODEM 1 CONTROL - ON	3A 29	E
R/P RESET CH A	3B 27	1
R/P RESET CH B	3C 27	1
DTE FAULT RESET	3A 24	1
ARSR RIC FAULT RESET	3A 27	1
ANTENNA POLARIZATION - CENTRAL	3A 20	B
ANTENNA POLARIZATION - LINEAR	3A 20	F
MODEM 2 CONTROL - OFF	3A 2A	F
MODEM 2 CONTROL - ON	3A 2A	E
MODEM 3 CONTROL - OFF	3A 2B	F
MODEM 3 CONTROL - ON	3A 2B	E
INTRUSION SYSTEM CONTROL - ENABLE	22 A5	2
INTRUSION SYSTEM CONTROL - DISABLE	22 A5	1
SMART RADAR CONTROL - DISABLE	3A 36	1
SMART RADAR CONTROL - ENABLE	3A 36	0
SMART RADAR CONTROL - ENABLE	3A 36	0
PROCESSOR ONLINE CH A	3B 35	1
PROCESSOR ONLINE CH B	3C 35	1
DTE ONLINE CH A	3B 36	1
DTE ONLINE CH B	3C 36	1
BEACON REPORTING CH A - RUN LENGTH	3B 4C	C
BEACON REPORTING CH A - TAGS	3B 4C	3
BEACON REPORTING CH B - RUN LENGTH	3C 4C	C
BEACON REPORTING CH B - TAGS	3C 4C	3
CHANNEL SELECT - CH 1	24 86	1
CHANNEL SELECT - CH 2	24 86	2
ISM RESET - CH1	24 84	1
ISM RESET - CH2	24 84	2
CH A TRANSMITTER SELECT - STANDBY	3B 5F	1
CH A TRANSMITTER SELECT - RADIATE	3B 5F	2
CH A TRANSMITTER FAULT RESET	3B 61	1
CH B TRANSMITTER SELECT - STANDBY	3C 5F	1
CH B TRANSMITTER SELECT - RADIATE	3C 5F	2
CH B TRANSMITTER FAULT RESET	3C 61	1
RMS RESET	20 80	1

NOTE

The Engine Generator and Video Online commands on the command list provided were not sent at the request of John Dietrich.