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MCCP/MMC

FAA Technical Center Site Integration Testing

Letter of Findings

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EXECUTIVE SUMMARY

Federal Aviation Administration Technical Center (FAATC) Site Integration Testing (SIT) for the Maintenance Control Center Processor (MCCP)/Maintenance Monitoring Console (MMC) was conducted from 7/31/90 through 9/8/90.

ACN-230 monitored SIT as the MCCP/MMC FAA Test Director. SIT was conducted by Systems Management American (SMA), Corp., the primary MCCP/MMC contractor. Other FAA representatives who witnessed testing included the FAA Quality-Reliability Officer (QRO), ASM-450, and ANA-120. ACN-230's assessment of this testing is presented in this Letter of Findings.

Test requirements are a key area of concern. There is significant risk the system is currently operationally unacceptable. The MCCP/MMC NAS operational requirements have not been adequately defined. The Master Test Plan presents MCCP/MMC Engineering Requirements (ER), and does not reference any NAS operational requirements. Therefore, it cannot be determined if the MCCP/MMC can support the NAS effectively. Before any further testing is conducted, NAS operational requirements must be identified and incorporated into test plans and procedures with user approval. ANA-120 should prepare and implement a plan to assure user, and all other requirements are met before proceeding with the program.

Error logs were generated when problems occurred during SIT. Some error logs had a description of resolution or corrective action. None of the error log resolutions were approved or accepted by ACN-230 or ASM-450. Error logs generally lacked sufficient detailed information necessary to be understood. A lengthy review and evaluation was performed to prepare this Letter of Findings.

The SIT procedures are unacceptable. They are not traceable to the ER, and 53% of 236 SIT error logs identify procedural deficiencies. All major and minor error log problems should be corrected, and operational issues should be closed prior to revising the test procedures. FAA SIT must be completely retested with acceptable test procedures.

The MCCP/MMC system is unacceptable. 27% of the error logs identify major software and hardware problems. Correcting these problems will require in depth investigation, and may require significant changes to software and/or hardware. System hardware quality must also be improved and demonstrated. After correcting the major problems, FAATC SIT will need to be repeated.

Minor problems were identified by 18% of the error logs. These problems should need little or no investigation, and only require corrections to data bases, or graphic displays.

1.0 INTRODUCTION

Federal Aviation Administration Technical Center (FAATC) Site Integration Testing (SIT) for the Maintenance Control Center Processor (MCCP)/Maintenance Monitoring Console (MMC) was conducted from 7/31/90 through 9/8/90.

ACN-230 monitored SIT as the MCCP/MMC FAA Test Director. SIT was conducted by Systems Management American (SMA), Corp., the primary MCCP/MMC contractor. Other FAA representatives who witnessed testing included the FAA Quality-Reliability Officer (QRO), ASM-450, and ANA-120. ACN-230's assessment of this testing is presented in this Letter of Findings.

Test procedures for SIT were conditionally approved by ANA-120. The SMA test team performed the test procedures, and error logs were generated whenever a procedure could not be successfully executed.

The attached evaluation sheets present ACN-230 and ASM-450 comments which resulted from our error log review. These sheets should be reviewed with the corresponding SIT error logs to understand comments. This information, our observations during testing, and our review of requirements are the basis of our assessment.

1.1 Background

The MCCP/MMC is a commercially developed digital system, which is intended to replace the System Maintenance Monitor Console (SMMC) in the FAA Air Route Traffic Control Center (ARTCC). The System Engineer (SE) will use this computer-controlled, color graphic equipment to monitor status, respond to alarms, and exercise command and control of National Airspace System (NAS) facilities and services.

Information provided by the MCCP/MMC is considered to be flight critical. Being the only interface the SE has to monitor some ARTCC enroute systems, the MCCP/MMC must meet all SE mission requirements. Therefore, the dependability, reliability, and quality of the hardware, the terminal emulation, and the software, must equal if not exceed the capabilities of the SMMC.

The MCCP/MMC is currently being developed in two phases. Most of the Phase I interfaces were evaluated at the FAATC SIT. The NAS interfaces tested include: Host Keyboard Video Display Terminal (KVDT); Host Keyboard Printer (KPR); Peripheral Adapter Module (PAM) General Purpose Output (GPO); Enhanced Direct Access Radar Channel (EDARC) Data Entry Keyboard (DEK); Tandem Maintenance Processor Subsystem (MPS); and digital interfaces to the Remote Terminal Unit (RTU). The remaining Phase I interfaces are planned to be tested at the Atlanta ARTCC.

1.2 SIT Evaluation Participants

The following FAATC personnel participated in the evaluation of SIT:

1. Daniel C. Penrith, ACN-230 TPM and Test Director
2. Richard VanSuetendael, ACN-230
3. Robert Reyers, ACN-230/UAL
4. Lynn Armstrong, ACN-230/CTA
6. Frank Buck, ASM-450

2.0 DISCUSSION

2.1 Test Readiness

The decision to proceed with the FAATC SIT was made at the Test Readiness Review (TRR), which was held on 7/25/90. FAA program office representatives, FAATC personnel, and the development contractors attended the TRR. At the TRR, SMA stated that the test procedures and the system were ready for SIT.

In an FAA meeting prior to the TRR, ANA-120 expressed an urgency to begin SIT on schedule. ACN-230 and ASM-450 argued that the test procedures had not been properly reviewed, and there were major, unresolved system problems. With ANA-120's insistence to begin, ACN-230 and ASM-450 reluctantly agreed to proceed with SIT.

ACN-230 and ASM-450 reviewed more than 400 pages of SIT test procedures in the first week of testing, during the system inventory and test setup period. The review time did not allow for checking procedures against requirements, nor was there time for verification. As agreed in the TRR, SMA incorporated comments from the review as green-lines to the procedures prior to testing, and red-lines would be incorporated during testing.

Requirements are a key area of concern. The Master Test Plan presents MCCP/MMC Engineering Requirements (ER), but does not reference any NAS operational requirements. Therefore, the MCCP/MMC cannot be tested for operational suitability. NAS operational requirements need to be generated and approved by the users. SIT, and any other testing, is incomplete without proper consideration of NAS operational requirements.

The contractor prepared SIT procedures are poorly traced to the ER. Even if NAS operational requirements are proven to be covered by the ER, an extensive analysis of the test procedures will be needed. Each ER paragraph should reference specific test sequences in the SIT Test Plan and Procedures Verification Requirements Traceability Matrix (VRTM).

2.2 Testing

Using the SIT Test Procedures, Tests were performed by the SMA test team. Error logs were generated when problems occurred during testing. They generally identify MCCP/MMC hardware and/or software deficiencies. Many error logs resulted when an expected response was not received, or when a procedure was changed to achieve the expected response. Some error logs had a description of resolution or corrective action. None of the error log resolutions were approved or accepted by ACN-230 or ASM-450.

Initially, test procedures were red-lined during testing, and error log entries were made, indicating that red-lines occurred. As testing progressed, red-lining procedures became too time consuming, and ANA-120 approved discontinuing with red-lining. Instead, procedure changes were recorded as error log entries.

2.3 Test Results

MCCP/MMC FAATC SIT resulted in the generation of 236 error log entries (3 of these error logs were void or not applicable). A listing of all recorded error logs is presented on the attached MCCP/MMC Error Log Review and Evaluation sheets. Error logs were categorized by ACN-230 and ASM-450 as procedural, major problem, or minor problem. The review methodology is presented at the beginning of the attached sheets.

Most error logs were very difficult to evaluate. Many of them lacked adequate detailed information to determine if an expected system response was actually incorrect, or if the test procedures were incorrect. In many cases, there are test procedures which needed pre-determined system configurations in order to predict a response.

Of the 236 total, 126 (53%) error logs were due to inaccurate, or incomplete test procedures. Many of these procedural error logs will require investigation on the system to establish the correct procedure or response. MCCP/MMC design documents were apparently not used in the contractor's development of the test procedures. Expected responses identified in test procedures were not consistent with design documentation.

There were 64 (27%) error logs considered to be major problems. These problems require investigation, and will require software and/or hardware modification.

Several of the major problems were hardware quality problems. This is another key area of concern. If the contractor cannot provide good quality equipment during government witnessed testing, it is unlikely that the quality will be acceptable when the system is fielded. Quality and reliability (Q&R) requirements should be reviewed, and additional testing should be planned for Q&R.

There were 43 (18%) error logs considered to be minor problems. These problems do not require investigation, and would probably be a data base change, or a simple display modification. Some minor problems may be hardware quality problems of minor components.

Configuration management problems were experienced during FAA SIT. Different versions of software were noted on each MCCP/MMC workstation during the test. Some minor FAA equipment problems also occurred. Tandem terminals were found to be defective during the emulation tests. These terminals were replaced and testing continued.

3.0 CONCLUSIONS

The MCCP/MMC NAS operational requirements have not been adequately defined. There is significant risk the system is currently operationally unacceptable.

The SIT procedures are unacceptable. They are not traceable to the ER, and 53% of the error logs identify procedural deficiencies. It was apparent that many test procedures were not verified and validated by the contractor. FAA SIT must be completely retested with approved and verified test procedures.

The MCCP/MMC system is unacceptable. 27% of the error logs identify major software and hardware problems. System hardware quality must also be improved and demonstrated.

Many error log entries were inadequate to assess the problems. More detail in the error description is needed. Many error log entries identify system responses without indicating the correct expected system responses. These error logs are inconclusive.

During testing, problems were experienced with MCCP/MMC configuration management and some FAA test support equipment. Software versions should not differ between workstations, and FAA equipment should be checked prior to testing.

4.0 RECOMMENDATIONS

1. Before conducting any future testing, NAS operational requirements must be incorporated into appropriate test plans and procedures with user approval. ANA-120 should prepare and implement a plan to assure user, and all other requirements are fully defined before proceeding with the program.

2. All major and minor error log problems should be corrected, and operational issues should be closed prior to revising the test procedures.

3. Test procedures should be rewritten, and sufficient time allocated for government review. Procedures should indicate system configuration information and have correct expected responses, per design documents for each procedure.

4. The contractor should be directed to conduct verification and validation of all SIT procedures prior to delivery. ACN-230 and ASM-450 must have adequate time to review and check test procedures prior to government acceptance.

5. The contractor should be directed to correct hardware quality problems, and officially demonstrate that the problems have been corrected.

6. For future testing, test participants should be directed to write error logs with detailed information so that error logs are conclusive.

7. The contractor should be directed to apply better configuration management of their software.

MCCP/MMC ERROR LOG REVIEW AND EVALUATION

Participants: R. VanSuetendael, ACN-230
R. Reyers, ACN-230/UAL
F. Buck, ASM-450

Methodology: **Major** - A problem which requires investigation. The system software or hardware will need modification. Could also be a hardware quality problem of a major component. Closure of major problems will require official retesting.

Minor - A problem which does not require investigation. A data base or minor display change will correct the error. Could also be a hardware quality problem of a minor component. Some minor problems may require official retesting.

Procedure - An error attributed to incorrect procedures, incorrect expected response, or incorrect or undefined pretest conditions. Errors requiring red-lining procedures will require validation and verification (V&V), and will require official retesting.

NOTE: These evaluation sheets should be reviewed with the corresponding SIT error logs to understand comments.

ERROR LOG NO.	COMMENTS
Initialization: SIT 002	
001	**Major** - It cannot be determined why VAX A has this problem and VAX B does not. Is this a software or hardware problem ?
002	**Procedure** - Red-line
003	**Minor** - When installed properly, is the anti-glare screen acceptable ? Quality problem ?
004	**Procedure** - Red-line
005	**Major** - Hardware quality problem with WS #2 AP. Other WS APs worked. Must determine the extent of this quality problem with further investigation. See 094, 098, & 108.
006	**Major** - Could the truncated data be corrected with monitor adjustments ? Were adjustments attempted during test ?

ERROR LOG NO.	COMMENTS
007	**Procedure** - Red-line printer setup.
Host: SIT 003	
008	**Major** - Host not responding, had to reboot WS. This problem has been identified before, and SMA has not corrected it.
009	**Major** - Vax would not sync to Host prior to midnight. What will the S.E. do when this occurs in the field ?
010	**Major** - The host terminal does not beep continuously, therefore it does not emulate. There are other methods to clear the continuous beep besides power-on reset.
011	**Major** - Although error log closed, why wasn't the KPR emulator running ? This could be a software logic problem and error log should not be closed.
Initialization: SIT 002	
012	**Procedure** - Need to red-line pg. 32 procedure to check battery.
013	**Major** - LSD does not have text mode. Fails to meet ER and could be a show stopper. See 102.
014	**Major** - Had to recycle LSD power-on.
015	**Minor** - S-3 software version number inconsistencies. Configuration problem.
016	**Minor** - Could be procedure problem setting up the printer. Error log indicated more than one printer ("printers"). What was result of other printer(s) ?
017	**Major** - Printer hardware quality problem.
Host: SIT 003	
018	**Procedure** - The CDC must be disabled in a consistent (procedure and configuration) manner to get predictable results.
019	**Procedure** - Same as 018
020	**Procedure** - Red-line.

ERROR LOG NO.	COMMENTS
021	**Major** - Cause of PAMGPO emulation problem can not be determined and requires investigation.
RTU: SIT 006	
022	**Minor** - Radar data base change.
023	**Minor** - Radar data base change.
024	**Minor** - Radar data base change.
025	**Procedure** - Error log voltage is incorrect. DRGM input voltage should be 3.5 - 4.0 VDC. This applies to pg. 175 of procedures.
Host: SIT 003	
026	**Minor** - This is not a data base error. It requires a graphic display software change.
027	**Procedure** - Red-line alarm report.
028	**Procedure** - Red-line DCC. Do not agree with "do nothing" assessment.
029	**Minor** - Same as 026.
030	**Procedure** - Red-line
031	**Procedure** - Red-line alarm responses.
032	**Procedure** - Needs investigation. If not procedure it is a major problem. Did the INTCLRD message appear ? What interface ?
033	**Procedure** - Red-line EDARC
034	**Minor** - Could be data base alarm display problem. It must be investigated and the proper response be determined.
035	**Major** - KVDT mode intermittent problem which requires software change.
RTU: SIT 006	
036	**Minor** - Incorrect AP/PCS indication requiring data base change.
037	**Procedure** - Red-line
038	**Minor** - Parameters data base change.

ERROR LOG NO.	COMMENTS
Host: SIT 003	
039	**Major** - Insufficient SEKVDT error log information. How was the port changed ? This could be a logic problem, and it needs investigation.
040	**Minor** - Error log needs to identify interface number and error condition. Will probably require software change to fix.
Tandem: SIT 005	
041	**Procedure** - Red-line
042	**N/A** - Double width character function is Phase II requirement.
043	**Major** - Compared results with a bad Tandem terminal. MCCP Tandem emulation requires investigation and retest.
044	**Major** - Same as 043. This is not a procedure red-line.
045	**Major** - Same as 043. Part 2 of the error log is a phase II requirement.
046	**Major** - Same as 043.
047	**Major** - Same as 043. Note that 043 - 047 MCCP responses were compared to a defective Tandem terminal. The error log does not indicate what the correct emulation should be, therefore retesting will be required.
Host: SIT 003	
048	**Major** - Investigation of the Host Reject Alarm requirement by FAA is needed.
EDARC: SIT 004	
049	**Procedure** - Red-line expected alarm to be Minor. This was verified by Frank Buck.
050	**Procedure** - Red-line
051	**Procedure** - EDARC DEK flashing is correct.

ERROR LOG NO.	COMMENTS
Tandem: SIT 005	
052	**Major** - Not emulating Tandem.
053	**Major** - Insufficient error log Information.
054	**Major** - 3 correct responses out for 8 tries is an intermittent error. 8 out of 8 correct responses is required to be acceptable.
055	**Major** - Insufficient error log information.
056	**Major** - Insufficient error log information.
057	**Procedure** - Red-line
058	**Major** - Intermittent display problem.
059	**Major** - AP Hardware quality problem. Procedures should also indicate a 25th line alarm for this condition. See 084.
060	**Major** - Software problem switching in and out of Tandem emulation.
061	**Major** - Software Problem when printing Tandem screen.
062	**Major** - Software problem. MCCP not emulating Tandem key stroke.
063	**Procedure** - Red-line
064	**Minor** - Need to investigate. Error log is unclear.
065	**Minor** - Need to investigate. Error log does not indicate which response is correct.
066	**Major** - MCCP did not emulate Tandem.
067	**Procedure** - Red-line
EDARC: SIT 004	
068	**Procedure** - Clarify use of simulation environment and investigate. This will require extensive V&V.
069	**Procedure** - Investigate appropriate RSSC response. This is similar to step 6 which worked.

ERROR LOG NO.	COMMENTS
070	**Procedures** - Configuration must be pre-defined to predict RCCS report.
071	**Major** - MCCP did not report alarms associated with RCCS report.
072	**Procedure** - 1st part of error log is the way the system works. 2nd part is a red-line to CONOPS.
073	**Procedure** - Red-line the alarm line response.
074	**Procedure** - Define and incorporate pretest conditions to obtain an expected result. "May get" is not an appropriate remark in the procedures.
075	**Procedure** - Same as 074.
Tandem: SIT 005	
076	**Procedure** - Red-line IMCS responses.
077	**Major** - AP hardware quality problem and test procedure problem.
078	**Major** - Possible MCCP software problem when in MMS which requires investigation.
079	**Procedure** - Red-line invalid functions.
080	**Procedure** - Red-line extended functions.
081	**Procedure** - Red-line for MPS Denver data base.
082	**Procedure** - Red-line expected response.
083	**Procedure** - Red-line expected response.
084	**Major** - See 059
085	**Major** - Unsuccessful file save during Tandem emulation. MCCP software problem.
086	**Procedure** - No indication in error log that red-line MMS/IMCS procedure worked. Why didn't the TAB function work ?
087	**Procedure** - Red-line

ERROR LOG NO.	COMMENTS
088	**Major** - Tandem key emulation software problem. Also need the check procedures.
089	**Procedure** - Red-line expected response.
090	**Major** - Software problem halted IMCS.
091	**Procedure** - Red-line expected response.
EDARC: SIT 004	
092	**Major** - UCON report software problem.
093	**Major** - Software problem. Could be communications problem between CCM and VAX.
094	**Major** - WS #2 AP hardware quality problem. Should check communications to AP.
095	**Major** - Had to reboot to establish communications with VAX. This has happened previously.
096	**Major** - See 093
097	**Major** - Message failure software problem.
098	**Major** - See 094
099	**Procedure** - Red-line alarm type.
100	**Procedure** - Red-line alarm attribute.
Host: SIT 003 (applies to all interfaces)	
101	**Major** - Software problem. MCCP does not meet ER critical alarm requirement.
System: SIT 007	
102	**Major** - EDARC DEK emulator is not possible on LSD2 and could be a show stopper. Procedures may need change. See 013.
103	**Major** - Need to establish pre-test conditions for EDARC, DEK, and KVDT emulators. Must investigate some missing procedure steps. What is a CTRL W for ?
104	**Procedure** - Red-line expected response.
105	**Procedure** - Red-line

ERROR LOG NO.	COMMENTS
RTU: SIT 006	
106	**Procedure** - Red-line test voltages.
107	**Procedure** - Red-line all door alarm points.
108	**Major** - AP WS #2 hardware quality problem. See 094.
109	**Minor** - EPN parameter data base change. SIT procedures do not need to be changed. Error log is incorrect to recommend red-line procedures.
110	**Procedure** - All 24 volt modules should be tested via 24 volt source.
111	**Minor** - Change alarm type in data base.
112	**Procedure** - Spare points should not cause alarms. This applies to all system spare points.
System: SIT 007 (Failure Mode)	
113	**Procedure** - Red-line test support equipment.
114	**Minor** - Could be graphic software problem. Need to investigate.
115	**Minor** - Could be software problem, incorrect pretest conditions, or incorrect procedures. Need to investigate.
116	**Minor** - Possible software problem. Was APE running prior to this procedure ? Need to investigate.
117	**Minor** - See 115. Error log needs more information.
118	**Procedure** - Needs investigation of broadcast function.
119	**Procedure** - Red-line expected response.
120	**Procedure** - Investigate the actual response and the expected response.
121	**Procedure** - Possible pretest configuration problem. Needs investigation.

ERROR LOG NO.	COMMENTS
122	**Procedure** - Red-line missing step.
123	**Procedure** - Red-line expected response.
124	**VOID**
125	**Minor** - Check graphics against CONOPS and responses at other work stations.
126	**Procedure** - Red-line expected response.
127	**Procedure** - Red-line. Note that error logs 114-127 for Failure Mode Tests all had procedure problems, and had poorly written error logs which made interpretation difficult.
System: SIT 007 (Security)	
128	**Procedure** - Red-line
129	**Major** - Software problem. Investigate proper response. Poor error log information.
130	**Procedure** - Red-line
System: SIT 007 (Positive Acknowledgement)	
131	**Procedure** - Do not eliminate steps 4 & 5 as recommended by the error log. Use an RTU point that is available for testing at the FAATC.
132	**Major** - WS #2 AP hardware quality problem caused deviation from procedures. See 005.
133	**Procedure** - Investigate correct cursor position.
134	**Procedure** - Needs investigation.
135	**Procedure** - Investigate correct cursor response.
System: SIT 007 (Maintainability)	
136	**Procedure** - Red-line for appropriate WS.
137	**Procedure** - Red-line
138	**Procedure** - Investigate correct response.

ERROR LOG NO.	COMMENTS
139	**Minor** - See 116. Not enough error log information.
140	**Procedure** - Red-line test conditions.
141	**Procedure** - Red-line operator action.
142	**Procedure** - Red-line expected response.
143	**Procedure** - Red-line expected response.
144	**Procedure** - Red-line expected response.
145	**Procedure** - Red-line operator action and response.
RTU: SIT 006	
146	**Minor** - Need to investigate bad EPNs. Error log face plate number is incorrect. It should be 92.
147	**Minor** - Need to investigate face plate discrepancies.
148	**Minor** - See 146
149	**Minor** - Software data base change for face plate.
150	**Minor** - Must investigate error log what was the face plate number observed during the test ?
151	**Minor** - Need to investigate bad EPNs.
152	**Minor** - See 149
153	**Procedure** - Red-line test conditions.
154	**Procedure** - Do not agree with error log recommendation. Step 6 should be identical to step 12.
155	**Procedure** - Red-line correct test voltage.
156	**Minor** - Data base change and red-line procedures to show correct AP alarm.
157	**Minor** - See 156
158	**Minor** - See 156

ERROR LOG NO.	COMMENTS
159	**Minor** - Graphic display software change. What is subsection of the procedure ?
160	**Procedure** - Red-line module listing.
161	**Procedure** - Missing page 352.
162	**Procedure** - Red-line. Error log needs clarification.
163	**Procedure** - Red-line test points.
164	**Procedure** - Red-line
165	**Procedure** - Red-line operator action and response.
166	**Minor** - Possible software graphic data base problem or procedure problem. Need to investigate.
167	**Procedure** - Red-line initial module.
168	**Procedure** - Red-line. What is the objective of this procedure ?
Tandem: SIT 005	
169	**Major** - Large screen display hardware Failure.
170	**Procedure** - Red-line spelling.
171	**Procedure** - Red-line operator action.
172	**Procedure** - Due to unavailable Tandem terminal. Do not red-line procedure.
173	**Procedure** - Red-line expected response.
174	**Procedure** - Red-line syntax.
175	**Procedure** - Red-line numerical format.
176	**Procedure** - Red-line spelling.
177	**Procedure** - Red-line test conditions.
178	**Procedure** - Red-line user ID.
179	**Procedure** - Red-line

ERROR LOG NO.	COMMENTS
180	**Major** - Failed to comply with ER security requirements. Problem needs Investigation.
181	**Major** - Archive cannot be printed on line.
182	**Major** - Key roll-over problem.
183	**Major** - ER to replace module not met.
TANDEM: SIT 005	
184	**Major** - Software. Tandem Emulation is not consistent
185	**Procedure** - Red-line
186	Error log missing
187	**Procedure** - Red-line
188	**Procedure** - Red-line
189	**Procedure** - Red-line
190	**Procedure** - Red-line
191	**Procedure** - Red-line
192	**Procedure** - Red-line
193	**Procedure** - Red-line
194	**Minor** - Software
195	**Procedure** - Red-line
196	**Procedure** - Red-line
197	**Procedure** - Red-line
198	**Procedure** - Red-line
199	**Procedure** - Red-line
200	**Procedure** - Red-line
201	**Procedure** - Red-line
202	**Procedure** - Red-line
203	**Procedure** - Investigate procedures; may require rewrite of entire procedure.

ERROR LOG NO.	COMMENTS
RTU: SIT 006	
204	**Procedure** - Red-line
205	**Minor** - Investigate hardware problem with the RTU input sensor for DRG023D.
206	**Minor** - Investigate hardware problem with the RTU input sensor for DRG033T.
207	**Major** - Investigate possible design problem. The DRG sync alarm signal can be either a single short pulse or a string of short pulses (if the sync alarm exists for an appreciable time). The RTU sensor does not appear to have a fast enough response time to respond to a single pulse, but it does respond if the alarm condition exists for an extended period. Discussion and possible redesign is needed on this.
208	**Minor** - Data Base Software
209	**Procedure** - Red-line
210	**Procedure** - Red-line
211	**Major** - Investigate pages 364 - 380 which are PIDP points. Discussion should be held with FAA as to the disposition of these, since the PIDP signals are planned to be connected to Paradyne at some facilities.
212	**Minor** - Hardware in RTU
TANDEM: SIT 005	
213	**Procedure** - A complete rewrite of this procedure may be required to properly define the keyboard mapping for the TANDEM.
214	**Major** - Investigate possible design problem. The voltage for the contact closure alarm signal is not derived from the RTU as it should be, instead it is derived from the NADIN 5 volt power supply. Thus the NADIN power alarm and NADIN system alarm are not independent.
215	**Minor** - Data Base Software (see also 158)

ERROR LOG NO.	COMMENTS
216	**Procedure** - FAA equipment problem. The DRG for this test was connected to an operating radar. At the time this test was conducted, this channel appears to have been locked out at the radar site (either for test or maintenance purposes), so constant alarms were generated at the DRG for all three alarms (sync, timing and disable). This gave constant alarms to the RTU for these signals.
General:	
217	**Procedures** - VRTM compliance not demonstrated by SIT Procedures. May require a substantial rewrite of these procedures.
NAS Host/PAM GPO: SIT 003	
218	**Minor** - Data Base software
219	**Procedure** - Red-line
220	**Procedure** - Possible rewrite.
221	**Minor** - Investigate software and procedures.
222	**Procedure** - Red-line
223	**Minor** - Investigate software and procedures
224	**Procedures** - Investigate procedures.
RTU: SIT 006	
225	**Major** - Possible hardware design problem. The electrical interface to the NRKM needs to be investigated for all NRKM alarms. The FAA Interface Control Document, SPO-MD-721, defines these interfaces as differential voltage signals. Apparently the RTU is designed for absolute analog voltages at these points.
MISC:	
226	**Procedure** - Red-line
227	**Procedure** - Waiver on procedures needed.
228	Deferred - Discuss with the FAA.
229	**Procedure** - FAA approval needed for change.

ERROR LOG NO.	COMMENTS
230	**Major** - There is an E.R. requirement that the system can be moved in 4 hours. A waiver is requested not to perform this at the FAATC. However, it could be demonstrated at the contractor's plant if it is considered necessary.
231	**Procedure** - There is no spare Logicon printer available at the FAATC. (This may also be true at the various ARTCCs.) During these tests another serial printer that had characteristics similar to the Logicon was connected to the MCCP/MMC and ran successfully.
RTU: SIT 006	
232	**Major** - Possible hardware design problem (See 225). It should also be noted that the NRKM interface to the MCCP/MMC uses a "Y" cable that feeds both the SMMC and MCCP/MMC in parallel. When the NRKM is <u>totally</u> powered down, a voltage from the SMMC feeds back into this "Y" and is routed to the MCCP/MMC. This adds an erroneous signal that goes to the RTU.
233	**Procedure** - Investigate procedures.
234	**Procedure** - The NRKM configuration at the FAATC is different than it is at any ARTCC. Investigation of the procedures is required to provide meaningful deviations for use at the FAATC <u>only.</u> There is also a possible design problem. (See 225.)
235	**Major** - Must investigate. NRKM 3 does not exist at the FAATC, but there is confusion about the NRKM numbering. All NRKM input points should be tested. In addition,there is a possible design problem. (See 225.)
236	**Major** - Investigate possible procedure errors. Also possible design problem. (See 225.)