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MEASUREMENT OF STUDENT ACHIEVEMENT FOR AIR INTERCEPT CONTROLLER PROTOTYPE TRAINING SYSTEM

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This report discusses the Measurement of Student Achievement which, utilized in the experimental prototype Air Intercept Controller Training System, presents formats for automated measurement reporting.

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MEASUREMENT OF STUDENT ACHIEVEMENT

INTRODUCTION

The purpose of this report is to present the achievement outcomes of student involvement with the Prototype Air Intercept Controller Training System (hereafter referred to as ACE). The report will present a brief introduction to the ACE system's instructional approach, will delineate the methodology by which the achievement data was collected, will present the available results, and will discuss areas in which criterion achievement was not achieved.

The ACE system was designed to provide a research tool for exercising the use of several new "risk" technologies in a military training environment. These technologies (automated speech, automated instructor, and videodisc) are all being implemented at a "state-of-the-art" level and are being carefully perused to determine potential benefits of their use in military training systems. The ACE system design included visible criterion measures of student achievement within the curriculum to allow a judgment of student achievement levels. ACE utilizes a mastery approach to instruction. That is to say, the student is not allowed to proceed in the curriculum until he has mastered the current topic at the criterion level.

Student achievement on the system is tested in three ways. Initially, the learner is given a pretest to determine whether he has all the required skills and knowledges which make him eligible to be a candidate student in the AIC school. When he has passed the pretest or has been given remediative instruction to enable him to develop the skills tested on the pretest, the student enters the curriculum. From that point on the student is constantly encountering progress tests.

Progress tests on ACE take four forms: (1) knowledge tests, (2) simple skill tests, (3) commented practices, and (4) free practices. The ACE system uses knowledge tests and skill checks to confirm initial acquisition of the knowledges and skills required for the AIC job. Once the learner acquires the "know how" in an instructional environment, he is given the chance to practice this competence in a simulated job environment. There the abilities are tested using specified behaviors as indicators of success. During practices the ACE system uses 84 performance measurement variables (PMVs) to measure the learner's achievement on these behaviors.

A failing score on the knowledge and skills tests can, on critical skills, require that the student review some of the instruction previously encountered or can, on less important skills or knowledge, simply result in feedback giving the correct answer.

On the commented and free practices, a failing score means that the learner will have to repeat the practice. A certain, predefined number of failures will cause the learner to be automatically sent to remediative instruction or, in more extreme cases, be referred to the human instructor for further instruction.

The last time the student is asked to perform each of the measured behaviors in a free practice segment his behavior is considered to be the posttest on that skill. The segments in which these posttests occur are called mastery segments (see Appendix A, "Mastery Segments"). Passing these segments constitutes successful learner achievement within this system.

METHODOLOGY

The major measure of achievement to be monitored was how well the learner did on each of the 84 PMVs. Also to be monitored was how long it took each learner to go through the curriculum and what sorts of specific problems he had. Specific free practice segments were designated as mastery segments for each of the PMVs. The designated segments were generally those that tested the PMV for the final time in the curriculum.

Five students completed the curriculum during the test period. Each of the students was monitored concerning how well they did on each of the PMVs during the free practice segments as a measure of their achievement. The name of the student, the date the test was administered, the identification of the particular test, and the student's deficiencies are all available for inspection and were used in preparation of the results reported below.

TEST RESULTS

The overall results of the PMV use by the first five students are presented in Appendix B. What these overall results show is a very limited success for the students on the 84 system PMVs, although there is some suggestion from instructor comments and system observation that student scores have improved as the system has been updated and as the instructors have become used to working with ACE.

ACHIEVEMENT OF CRITERIA STANDARDS. During the demonstration test period only one practice (CP 2.04) was passed by any of the five students. Therefore, a further discussion of learner achievement on criteria standards appears irrelevant.

The students have, however, passed individual PMVs during these practice sessions, and a look at groups of these PMVs suggests how well the training is working in different areas of instruction. For purposes of this report, the PMV data have been scrutinized and the following results are presented as observations.

ANALYSIS OF PERFORMANCE ERRORS. The training curriculum for ACE can be first divided into tactical and aircrew setup training environments. The tactical environment can be further divided into stationing, bogey engagement and runout, bogey jinks, bogey splits, strangers, rendezvous, fades, Naval Tactical Data System (NTDS) program failures, emergencies, and general skills. The aircrew setup training can also be subdivided. These areas are stationing, separation, state, intercept, and general skills. Observations are presented for the tactical area first and then for the aircrew setup training area.

All but one of the stationing skills PMVs are based on speech understanding. The learners have passed these PMVs (2, 3, 4, 14, 15, 19, 20, 28, 29) an average of half the time. Only PMV 19 (AIC "roger"s airborne for control message) has never been passed. There does not appear to be a real improvement correlated with training time on these skills.

The highest level of pass on any of the bogey intercept skills PMVs (5, 6, 7, 8, 9, 22, 23, 24, 25, 26, 27, 30) is about 50 percent with most of the PMVs showing a 0 to 25 percent passing occurrence. The level of passing seems to remain fairly constant over the course of the curriculum. The PMV measuring the bearing and range call to the bogey shows a definite degradation as additional skills are added.

Jinks skills PMVs (31, 32, 33) have shown a combination of problems. Only one of these have been passed and that one only once. The cause of at least some of this seems to be in the PMVs rather than the students' skills.

Splits skills PMVs (34, 35, 82, 83, 84, 85, 86, 87) have been passed very few times. Part of the reason for this may be that it is a very complicated area and that, in fact, the learners have not mastered the skills. A contributing factor may be that the computer simulation presentation of information to the student has been incorrect. These two factors, combined with at least one PMV with a measurement error, probably have contributed to the low scores in this area.

Stranger associated skills are somewhat of an anomaly. None of these skills have ever been passed. It has been suggested that this is a combination of incorrect measurement by the PMVs, slightly confusing scenario setups, and a digit recognition problem discussed later in this report.

The success of the learners on the rendezvous skill PMVs (40, 41, 42, 43, 44, 45, 46) has been very low. These results, however, do not match the instructors' opinion of how well the learners are mastering these skills. Their impression has been that the learners master these skills fairly well. The problem is with the PMVs and digit recognition.

The two PMVs (47, 48) which measure the learner's ability to detect and call radar fades have been passed an average 25-50 percent of the time. No reason has been suggested for this low achievement level.

Student response to NTDS program failure is measured using three PMVs (49, 50, 51). Student scores on these PMVs have been unusually high for speech related tasks. PMVs 49 and 51 were passed 67 percent of the time and PMV 50 was passed 33 percent of the time.

Three PMVs (52, 53, 54) are used to measure student response to aircrew emergencies. None of these PMVs has ever been triggered, due to an apparent problem in scenario setup, and there is no data on this instructional area.

The general area is comprised of PMVs (1, 10, 11, 12, 13, 16, 17, 18) that are measured during more than one part of the AIC's tasks. Most of these are console action tasks and show high scores. PMV 1 (tracking the

Combat Air Patrol (CAP) symbol) shows a uniform high passing occurrence through Level 7. Then, in Level 8 when the learner is asked to track two symbols at the same time, the scores drop. As Level 8 goes on, the scores recover to a high level.

The PMV (78) measuring the AIC student's ability to get the aircrews to the operational area was never triggered. Therefore, there is no achievement data.

The skills associated with separating aircraft for intercept in the training environment are measured by seven PMVs (57, 58, 59, 68, 79, 80, 81). The scores on these PMVs are uniformly medium to high. The exceptions are 57 and 79 which were never triggered and 81 which was never passed.

Obtaining and updating NTDS fuel states is covered by three PMVs (70, 71, 72). The scores for this area are fairly high. They appear to be higher than for the same skills in the tactical environment. It has been suggested that this is because the AIC students are not as busy in the training environment when they get the state reports as they are when they ask for fuel states in the tactical environment.

The intercept skills peculiar to the aircrew setup environment are measured by six PMVs (62, 63, 64, 65, 66, 67). The results of this area are confusing with similar skills showing a range of 0 to 80 percent passing. The low scores have been attributed to PMV problems and the instructors have suggested that the indicated ability of the learners is about medium high on these skills.

The last area in aircrew training behavior measurement is the general category. The PMVs (55, 56, 73, 74, 75, 76, 77) show, as with the general PMVs in the tactical environment, a fairly high passing level. The exceptions to this are PMV 55 which was never triggered and PMVs 69 and 75 which were never passed. These 3 PMVs are presently assumed to have design problems.

INTERPRETATION OF TEST RESULTS

The lack of achievement data provided by the ACE system during the training effectiveness evaluation period appears to be primarily the result of the research and development approach required for implementing the several "risk" technologies which ACE encompasses, rather than the ability of the system to train.

As with most projects of a research and development nature, the implementation is an evolutionary period during which the relationships between the experimental factors of the system must be iteratively revised. On the ACE system the several technologies being experimentally applied generated a larger set of tuning requirements than anticipated. Thus, time and effort originally allocated for tuning the Performance Measurement Variables (PMVs), courseware, and speech systems were expended in getting the major system components to function correctly. That left very little time to attend to PMVs, courseware, and speech system fine tuning. As a result, when the first set of learners went through the system there were still a set of unresolved issues which restricted the ability of the students to exercise the various system capabilities. Major contributors to these restrictions were the unpolished state of the PMVs, scenario setups, speech understanding, digit recognition, system stability, and the videodisc player. These constraints will be discussed in some detail later in this report.

The outcome of the restrictions, however, was that the students were not able to proceed through the system curriculum as anticipated. As a direct result, there is very little achievement data available, and that data is not useful as a valid measure of student achievement. The rest of this section will discuss the factors which contributed to the limited achievement success and will suggest system revisions which might remove those constraints.

PERFORMANCE MEASUREMENT VARIABLES AND AUTOMATED SPEECH. This probably has been the major constraint on the system in terms of achievement. There are several areas which still require test and revision before the automated performance measurement system will work as envisioned.

There are 84 PMVs. At the time the first learners went on the system, none of these had been tested in position. As a result of the PMV analysis, it was determined that there was one anticipated problem and several unanticipated problems.

It was anticipated that, with 84 PMVs, some PMVs might not work as designed. Indeed, there are problems in triggering of the PMVs and measurement of behaviors which have become evident through the recent student use. Improper PMV triggering has resulted in several of the PMVs having never been used and others continuing to measure behaviors after they should have been turned off. As they presently work, the PMVs with measurement deficiencies have led to the learner being scored incorrectly for correct behaviors.

The solution for these two problems is fairly simple. Practice scenarios will have to be run which exercise each of the PMVs. The PMVs will be studied individually, deficiencies and problems will be noted, and revisions will be made. The PMVs should then be checked again to insure that the revision has resolved all the PMV errors.

It was not anticipated that there would be problems with timing, but two such areas have been identified in the analysis.

The first timing problem was caused by the speech understanding system. By the time a phrase goes through the speech recognition procedures and then through the speech understanding processes, up to two seconds can elapse. By the time the system requests a message be sent back to the learner and that message is sent, another four seconds can go by. When giving a student a limited amount of time to do certain tasks, the additional six second delay can nearly insure failure. This problem has been partially solved by loosening of the time frames for success on the PMVs, but nothing has been done at this point about the time the student has to spend waiting for a system response. There is no obvious solution to this problem short of redesigning the system. Designing higher speed access between speech and the rest of the system might speed up the response time.

The other area where timing was a factor had to do with the amount of time it actually takes a person to perform a behavior. In an analysis of ideal AIC behavior, the AIC School staff and the Logicon training analysts defined very specific time frames for the performance of each successive behavior. These were reviewed and approved and were used as the basis for PMV design. However, software design failed to consider the Human Factor of beginning measurement at the point when the event was recognized by the trainee. The result of this is that the learners will fall behind on one task (failing it as a result) and, in a domino-like fashion, fall behind on successive task after successive task (failing them as a result).

A solution to this problem is for the AIC school staff and knowledgeable system personnel to design and implement a more realistic set of PMV start events, stop events, and time frames. This could be researched and implemented at the same time the PMVs are being redesigned.

A third unanticipated factor was that the speech understanding system might have trouble handling the digit sets involved in vector, bearing and range, track and ground speed, altitude, and state messages. Part of the problem is associated with the speech recognition unit (Nippon Electric Corporation DP-100). This unit's digit recognition was less adequate than anticipated. Another part of the problem was with the speech understanding system (SUS), which was a complicated portion of the ACE system. At times the less than perfect speech recognition data was rendered more illegible for performance measurement by the SUS processes. The result was that most of the PMVs which measured skills involving transmission of digits were rarely passed, if at all. The complicated bearing and range and track and ground speed calls suffered most from this deficiency. Since the digit related PMVs are very common, it became nearly impossible for a learner to pass any given practice segment.

Solutions have been suggested for resolving the digit recognition constraint. The most likely answer at this point is, when the learner reaches the end of a segment, to notify him that the system is having problems recognizing his digit transmissions, but to take off no points for this misrecognition. This will allow the learner to be aware of transmission problems that can cause undesirable responses from the simulated personnel models and yet not fail. The system will still deduct points for transmissions which are too early, too late, or in the wrong general direction (e.g., starboard, port).

SCENARIO SETUPS. The way the practice scenarios were set up caused some minor training problems. Although most of the scenarios appear to be adequate for accomplishing the designated training objectives, a few scenarios either do not allow the learner time to do all the behaviors that are required or do not supply the required interaction between the system and the student (e.g., no jink occurs when jinks responses are being tested; in some cases the PMV fails to trigger within its Mastery Segment).

The solution to the scenario setup problem is very much like the PMV measurement solution. Given a little time to exercise the system, experienced system personnel could make the required changes in a relatively short time.

SYSTEM STABILITY. The ACE system is a complicated network of programs supporting a large number of technologies. As might be expected early during the implementation period of a research and development oriented prototype system, the system can still encounter situations that cause it to hang up or crash. This has happened, with decreasing regularity, on the ACE system, causing the loss of some training time that might have enhanced learner achievement. The solution to this problem is primarily one that involves time. Historically with ACE, as each constraint appears and is diagnosed, it is remedied. It is reasonable to believe that, with sufficient resources, such corrections can continue.

A major factor in terms of system stability has been the tendency of the computer hardware to come down "hard." Early in the test period there were recurring problems in keeping the computer equipment up, which cost a great deal of training time. The solution is to contine with a high level preventive maintenance program.

VIDEODISC PLAYER. The process of producing videodisc materials is a fairly simple one. The technologies associated with videotape and film production are well known. However, the videodisc player technologies still are relatively young and rough around the edges.

The videodisc player that was used in the ACE system was a laser optical type. It uses a laser beam to "read" the videodisc encoded information. When the laser goes out of alignment, as it did frequently on the ACE system, the address and picture information are no longer available. This makes it impossible to address single frames, of which there were over 800 on the ACE system disc. As a result, the learner no longer has any of the visual materials available during training.

One short term solution is to have a backup player available for use while the primary player is being realigned. A longer range solution is to try other types of players or to wait until the technology is more advanced.

CONCLUSIONS AND RECOMMENDATIONS

The report up until this point has concentrated on the limited achievement data generated by the ACE system, the apparent reasons contributing to these limitations, and possible solutions for resolving present system restrictions. However, this picture is not totally comprehensive in terms of the ability of the ACE system to train. Indeed, the feeling at the AIC school and at Logicon is that the system holds great promise for teaching AIC skills. The AIC school staff is continuing to put additional students onto the ACE system, despite its current constraints.

There are presently restrictions on the ACE system's ability to function as conceived. Most of these problems appear to be amenable to fairly simple "fixes" (see "Problems and Solutions" earlier in this report).

In order to accumulate any reliable data on learner achievement, it is going to be necessary to revise some PMVs to provide more adequate measurement and to relieve the digit recognition problem. Although there are other constraints, these two changes should alleviate most of the major restrictions and allow the system to be exercised much more closely to its design capabilities.

APPENDIX A

MASTERY SEGMENTS

The ACT system measures student performance in practice segments through the use of 84 performance measurement variables (PMVs). Each of the skills being measured is carefully taught during the curriculum and then tested for a final time in what is termed a "Mastery Segment" for that PMV. The following list presents the 84 PMVs and the number of its mastery segment.

TABLE A1. PMV MASTERY SEGMENTS

PMV NO.	MASTERY SEGMENT	PMV NAME
01	7.20	Maintain CAP Symbol In Vicinity Of CAP Video
02	7.06	Engage CAP To Station
03	7.06	Transmit (Initial) Station Bearing And Range
04	7.06	Transmit (Continuing) Bearing and Range Of Station
05	7.20	Engage CAP To Bogey
06	7.20	Vector CAP To Bogey
07	7.20	Transmit Initial Bogey Bearing And Range
08	7.20	Transmit Initial Bogey Track And Ground Speed
09	7.20	Transmit Continuing Bogey Bearing And Range
10	8.10	Ensure TEC Communication Switches Are Correct
11	7.20	Ensure TEC Control Panel Switches Are Correct
12	7.20	Range Scale And Offset
13	7.06	Enter CAP Symbol, PIF, and Station Altitude
14	7.06	Airborne For Control
15	7.06	Ruth, This Is C/S...
16	7.06	Update CAP Symbol
17	7.06	Ask CAP For State
18	7.06	Update NTDS With CAP State (non-training environment)
19	7.06	Notify SWC Of Control
20	7.06	On Station
21		[Deleted]
22	7.20	Transmit Bogey Composition And Altitude
23	7.20	Place Bogey On Sequence List
24	7.20	Respond To Judy Or Tally Ho
25	7.20	Lost Contact
26	7.20	Contact
27	7.06	Disengage CAP From Bogey At Breakaway
28	7.06	Re-Engage CAP To Station After Breakaway
29	7.06	Vector CAP To Station After Breakaway
[illegible]	7.06	Report Results Of Engagement
31	7.20	Transmit Jink Call
32	7.20	Transmit Vector To Counter Jink

TABLE 11. PMV MASTERY SEGMENTS - continued

PMV NO.	MASTERY SEGMENT	PMV NAME
33	7.20	Transmit Updated Bogey Track
34	7.06	Transmit Bogey Splitting
35	7.06	Transmit New Bogey Composition, Altitude
36	7.06	Detect And Report Strangers
37	7.06	Call Stranger Bearing And Range
38	7.06	Transmit Stranger's Track And Angels
39	7.06	Stranger Opening
40	6.13	Transmit Vectors For Rendezvous
41	6.13	Attain Correct Lateral Separation
42	6.13	Transmit To The MAC Bearing And Range To The CAP
43	6.13	Transmit MAC's Altitude To CAP For Rendezvous
44	6.13	Measure Rendezvous Flight Path
45	6.13	Measure Rendezvous Separation
46	6.13	Transmit To The CAP Bearing And Range To The MAC
47	7.20	Fighter In The Dark
48	7.20	Bogey In The Dark
49	7.14	Transmitting NTDS Down Message
50	7.14	Initial Bearing And Range Transmit, NTDS Down
51	7.14	Contin. Bearing And Range Transmit, NTDS Down
52	7.20	Establishing Comm. After Alarm (Beeper On Guard)
53	7.20	Reporting CAP Emergency To SWC
54	7.20	Check Emergency Plot Position
55	8.10	Select 32 Mile Range Scale For Set Ups
56	8.17	Keep Aircraft In The Area
57	8.17	Breakaway
58	8.10	Disengage Pseudo Bogey From Point-In-Space (B)
59	8.17	Disengage CAP From Point-In-Space (A)
60		[Deleted]
61		[Deleted]
62	8.10	Engage Pseudo Bogey to PPOI
63	8.10	Engage CAP To PPOI
64	8.10	Disengage CAP From PPOI
65	8.17	Establish Initial And Final Intercept Condition
66	8.17	Vector CAP To Bogey In Training
67	8.17	Engage CAP To Pseudo Bogey In Training
68	8.17	Measure Setup Separation
69	8.10	Establish Lost Communications
70	8.17	Update NTDS-State
71	8.17	Request Pseudo Bogey State (Training)
72	8.17	Request CAP State (Training)
73	8.10	Enter CAP Symbols And PIF
74	8.10	Range Scale and Offset (Training Environment)
75	8.10	Update Turn Rate
76	8.17	Pseudo Bogey Symbol Update
77	8.10	Update Pseudo Bogey Symbol
78	8.10	Direct CAP To Center Of Area
79	8.17	Engage Pseudo Bogey To Point

TABLE A1. PMV MASTERY SEGMENTS - continued

PMV NO.	MASTERY SEGMENT	PMV NAME
80	8.17	Engage CAP To Point
81	8.10	Detach Wingman
82	7.06	Disengage CAP From Split At Breakaway
83	7.06	Disengage CAP From Bogey After Break Engage Alert
84	7.06	Engage CAP To Split
85	7.06	Vector CAP To Split
86	7.06	Transmit Initial Split Bearing And Range
87	7.06	Transmit Continuing Split Bearing And Range

APPENDIX B

PMV ACHIEVEMENT SUMMARY

Five students went through the ACE system curriculum during the demonstration period. The following table summarizes how well the students did on each of the 84 PMVs. The data is presented in terms of number of passes/number of attempts for each of the Free Practice (FP) exercises contained in the ACE curriculum.

TABLE B1. PIV ACHIEVEMENT SUMMARY

PIV	2.09	2.18	3.13	3.19	3.25	4.06	4.13	4.19	5.11	6.13	7.06	7.14	7.20	8.10	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21
1	16/16	11/11	15/18		6/7	12/13	12/12	9/9	13/13		4/4	10/10	8/10	13/21	2/9	3/6	4/13	4/6	3/6	5/7	2/5	1/1	6/7
2	0/15	0/11			2/8				1/13		2/4												
3	14/16	3/11	4/18		3/8				4/13		0/4												
4	8/16	2/11	9/18		1/8				9/13		1/4												
5		8/9			3/8	8/11	1/12	9/9			4/4	8/9	10/10										
6		4/9			2/7	3/11	0/8	4/9			4/4	5/9	1/10					0/6	0/6	0/7	0/4	0/1	0/6
7		4/7		2/3	1/3	2/5	1/5	2/4			0/4	1/3	1/7	1/8	0/2	1/2	0/2	2/4	0/2	0/2	0/2	1/1	0/1
8		1/10		3/14	0/8	0/13	1/12	1/9			1/4	0/8	1/10	1/10	0/9	0/6	2/13	0/5	1/6	1/7	0/4	0/1	1/6
9		0/11		2/14	0/8	0/13	0/12	3/9			0/4	0/9	1/10	2/19	1/7	0/5	0/12	0/5	1/6	0/7	0/5	0/1	0/6
10	16/16	11/11	11/18		6/8		12/12	9/9	13/13		0/4	9/9	10/10										
11	16/16	9/9	4/4						13/13			1/1											
12			0/4						5/13		4/4		10/10										
13			18/18		8/8				13/13		4/4												
14			5/8		3/4				0/2														
15			14/17		7/8				0/2		3/4												
16			15/17		7/8				1/2		4/4												
17			5/19		1/8				9/13		0/3												
18			13/14		5/8				9/12		1/1												
19			0/8		0/3																		
20			0/1						11/12														
22				2/14	0/6	0/11	0/10	1/9			0/4	1/8	1/10	2/10	1/9	0/6	1/13	3/5	3/5	0/5	4/4	1/1	5/6
23				0/14	0/6	1/11		0/9			0/4	0/8	0/6										
24				9/14	7/8	6/13	5/11	7/9			2/4		3/10										
25					2/6			1/2															
26				0/5	0/3		0/6	0/7			0/3		0/8										
27					1/2		5/11	6/8			1/1												
28					1/3						0/2												
29					0/7						0/4												
30					0/5		1/5	0/3															
31						0/13		0/1					0/10										
32						1/5							0/1										

TABLE B1. PHV ACHIEVEMENT SUMMARY - (cont.)

PHV	2.09	2.18	3.13	3.19	3.25	4.06	4.13	4.19	5.11	6.13	7.06	7.14	7.20	8.10	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21
33						0/5							0/1										
34							6/12				0/4		0/1										
35							0/8				0/1												
36									0/13		0/4												
37									0/11		0/4												
38									0/13		0/4												
39									0/9		0/4												
40										4/29													
41										4/29													
42										18/24													
43										1/29													
44										0/1													
45										0/1													
46										0/10													
47											2/4	3/9											
48											0/4		3/10										
49												6/9											
50												3/9											
51												6/9											
52																							
53																							
54																							
55																							
56														21/21	10/10	6/6	13/13	6/6	6/6	7/7	5/5	1/1	2/7
57																							
58														15/20									
59														6/8									
62														15/20									
63														0/17									
64														8/10									
65														0/4	0/4	1/2	2/7	0/2	0/3	0/5	0/2		0/2
66														2/7	2/7	1/2	4/11	0/3	0/4	0/6	0/2		0/7

TABLE B1. PMV ACHIEVEMENT SUMMARY - (cont.)

PMV	2.09	2.18	3.13	3.19	3.25	4.06	4.13	4.19	5.11	6.13	7.06	7.14	7.20	8.10	8.13	8.14	8.15	8.16	8.17	8.18	8.19	8.20	8.21
67														0/7	0/7	1/2	0/11	0/3	0/4	0/6	0/2		0/7
68														4/4	4/4	2/2	6/7	1/2	1/3	2/5	2/2		0/2
69														0/18									
70														0/21	0/6	4/5	6/11	3/5	1/3	1/7	2/5	0/1	0/7
71														21/21	1/8	4/6	9/12	5/5	2/5	4/7	5/5	1/1	6/7
72														21/21	6/7	4/5	10/12	3/5	2/5	6/7	4/5	1/1	5/7
73														21/21									
74														15/21									
75														0/21									
76														14/21	3/9	2/6	6/12	3/6	4/6	5/7	0/5	0/1	6/7
77														15/15									
78																							
79																							
80														5/8									
81														0/21									
82							1/7																
83							0/1				0/4												
84							2/13	0/2			0/4												
85							4/12	0/2			0/4												
86							2/6				0/1												
87							0/9	0/7			0/4												

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