FLIGHT EVALUATION OF SIERRA FLIGHT SYSTEMS EFIS-2000

FAA WJH Technical Center
00092400

FLIGHT TEST PLAN
FAA William J. Hughes Technical Center
Voice Switching Branch
ACT-340

March 28, 2000
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Flightp2.doc

Thomas A. Syggets ACT-370 3/29/00

Laurel Tortell 4/6/00

Ralph Yost

BACKGROUND

The project utilizes a three year Cooperative Agreement, (Number 97-G-022) between the FAA and the Experimental Aircraft Association (EAA) in which the EAA has provided an experimental aircraft for use by the FAA's William J. Hughes (WJH) Technical Center near Atlantic City, New Jersey.

The test bed aircraft is a Stoddard-Hamilton GlaStar capable of being manually flown by a single pilot. The aircraft utilized by this project is a kit aircraft provided by the EAA. The aircraft was built for the EAA Young Eagles in 1996. It was built at the EAA Weeks facility by EAA volunteers with help from Stoddard Hamilton, the kit's manufacturer.

The instrument panel of the GlaStar is configured to provide standard avionics flight instrumentation for the safety pilot in the right seat. The left seat pilot position is set up to accommodate subject pilots who will be used in the avionics evaluations.

PURPOSE

The purpose of this Test Plan is to describe flight requirements and planned airplane usage in performing evaluations of the Sierra Flight Systems EFIS-2000 general aviation primary flight display (PFD) avionics. The specific flight profiles are found in the Appendices.

USE OF THE DATA

The evaluation results will provide feedback to the developer of the PFD, Sierra Flight Systems. Feedback will also be provided to the General Aviation community to help foster new product development and advancement that will increase small aircraft general aviation flight safety. In cooperation with the EAA, the evaluation results are planned to be published in one of the many regular publications that EAA produces. Previous results using the GlaStar have been published by EAA in "Sport Aviation".

TEST SCENARIO

Pre Test Briefing

The subject pilot will be given an initial Pre Test briefing (Appendix A and B) describing the flight test scenario, avionics interface requirements and aircraft instrumentation. The project manager and/or project pilot will provide the briefing. The briefing will include the purpose of the test and a discussion of the test conditions the subject pilot will be exposed to. Pre Test Questionnaires (Appendix C and D) will be administered prior to the Pre Test briefing. The subject pilot will be permitted to ask any questions concerning the testing.

SAFETY PILOTS, ACT-370

Safety pilots can find the flight profile for the subject pilot familiarization flight in Appendix H and the data collection flight profile in Appendix I. The safety pilot needs to rely primarily on APPENDIX H or APPENDIX I as appropriate. Safety Pilots should keep a copy of the completed APPENDIX E and APPENDIX F, forward the original completed APPENDIX E and APPENDIX F to Ralph Yost, ACT-340. Complete APPENDIX G, and forward a copy of APPENDIX G to Ralph

Flight Scenario
In general, the flight evaluations will require the subject pilot to fly the aircraft through the same maneuvers and procedures as is normally done for a biennual flight review (BFR). In the conduct of a BFR, the CFI subjectively determines the proficiency of the pilot through his observation during flight. During flight, if a weakness is identified, the CFI (safety pilot) may have the pilots repeat maneuvers. Data will be collected at the conclusion of each segment of flight (except for familiarization flights).

The subject pilot will perform taxi, take off, and landing (if safe directional control Is maintained). Data collection will begin at approximately 500 feet AGL and conclude at 500 feet AGL on descent.

The basic flight conditions that will be used are day visual flight rules (VFR). wind no greater than 15 knots, visibility at least 5 miles and cloud ceiling of at least 3000 feet.

Basic Flight: Basic flight maneuvers will be used to evaluate the EFIS-2000 in PFD mode. The subject pilot will be asked to perform basic flight maneuvers. These include straight and level flight; altitude holding, constant speed, shallow and steep turns, slow flight at constant altitude, heading and altitude changes, and responds to simulated air traffic control vectors at the direction of the safety pilot. Unusual attitudes may also be utilized. The following functions of the EFIS-2000 are intended to be evaluated with these basic flight maneuvers: the airspeed, altitude, vertical speed, heading, and an horizontal situation indicator (HSI).

Test Data Collection
The pre-flight subject pilot questionnaire will be utilized to tabulate and group the subject pilot population into experience bands to better enable flight data analysis at the conclusion of this effort.
Subject pilot data collection will be in two basic forms: subject pilot questionnaires completed at the end of each flight segment and the safety pilot comment sheet about the same flight segment just flown by the subject pilot.

The subject pilot data collection will be initiated with the aircraft in level flight or landed, whichever the safety pilot deems appropriate.

The flight scenario consists of 3 flights. Each subject pilot will fly the complete scenario once, but segments may be need to be repeated as conditions dictate.

Flight	Subject Pilot Position	Type	Flight Time
#1	Right Seat using std gauges	Familiarization	1.5 hours
#2	Left Seat using EFIS-2000	Data Collection	2 hours
#3	Left Seat using EFIS-2000	Data Collection	1-2 hours

Post Test Debriefing
The safety pilot or project manager will provide the subject pilot with the Post Test Questionnaire (Appendix F) requesting as much detail as possible. The safety pilot will solicit any general comments as to the conduct of the flights and overall program comments.

DATA RECORDING

The test runs will require data recording. The data will consist of three types. The first is the preflight data collected from each subject pilot. The second will be the written questionnaires administered to the subject pilot by the safety pilot during key points of the flight. The third is the Project Pilot Flight Test Mission Debriefing Form. This standard form is a brief synopsis of the flight by the project pilot and is shown in Appendix G.

Data Reduction

Subject pilot responses will be gathered and grouped. Responses will be plotted as appropriate. Summaries of the data will be written and conclusions will be presented as appropriate.

Questionnaires

The FAA has developed three different questionnaires. The first questionnaire is the written Pre Test Questionnaire. This questionnaire is designed to collect subject pilot experience and measure understanding of test goals prior to the initiation of the test. The second questionnaire is a Flight Segment Questionnaire. This questionnaire, in written form and administered by the FAA safety pilot following each flight data segment is designed to collect immediate subject pilot perceptions of the test conditions he just experienced. The final questionnaire, the Post Test Questionnaire, is designed to collect, through written response, the subject pilot's overall perceptions after testing has been completed. A modified form of the Cooper Harper rating scale will be used to quantify responses on the Post Procedure and Post Test Questionnaires.

APPENDIX A
Pre-Flight Mission Briefing to Subject Pilots

Good morning. You have volunteered to fly as a subject pilot in the Low Cost General Aviation Flight Research Project. The main objective of this project is to conduct pilot evaluations of new avionics concepts and products for the general aviation community. This project will help developers, pilots, and customers of general aviation to learn about how well these new concepts work in the general aviation flight environment.

The project is the result of a Cooperative Agreement between the FAA and the Experimental Aircraft Association (EAA) in which the EAA has provided an experimental aircraft for use by the Technical Center. The flight test bed is a Stoddard-Hamilton GlaStar capable of being manually flown by a single pilot. The flight test bed utilized by this project is a kit aircraft provided by the EAA. The aircraft was built by the EAA in 1996. It was built at the EAA Weeks facility by EAA volunteers with help from Stoddard Hamilton, the kit's manufacturer. The 160-horsepower GlaStar has a composite body and aluminum wings, fixed tricycle gear and a cabin for pilot and passenger. The rear luggage compartment has been converted to accommodate the installation of avionics related equipment.

Flight Scenario

In general, the flight evaluations will require the subject pilot to fly the aircraft through the same maneuvers and procedures as is normally done for a biennual flight review (BFR). A BFR is required every two years for pilots and must be conducted in the presence of a FAA Certified Flight Instructor (CFI). In the conduct of a BFR, the CFI subjectively determines the proficiency of the pilot through his observation during flight. During flight, if a weakness is identified, the CFI (safety pilot) may have the pilots repeat maneuvers. Data will be collected at the conclusion of each segment of flight.

Basic Flight:

Basic flight maneuvers will be used to evaluate the Sierra Flight Systems EFIS-2000 in PFD mode. The subject pilot will be asked to perform basic flight maneuvers at normal airspeeds. These include straight and level flight; altitude holding, constant speed, shallow and steep turns, slow flight at constant altitude, heading and altitude changes, and responds to simulated air traffic control vectors at the direction of the safety pilot. Unusual attitudes may be utilized. The following functions of the EFIS-2000 are intended to be evaluated with these basic flight maneuvers: the airspeed, altitude, vertical speed, heading, and horizontal situation indicator (HSI).

Test Data Collection

We will provide you with a pre-flight subject pilot questionnaire that will be utilized to tabulate and group the subject pilot population into experience bands to better enable flight data analysis at the conclusion of this effort. Subject pilot data collection will be in two basic forms: subject pilot questionnaires and the safety pilot comment sheet about the same flight just flown by the subject pilot.

The flight scenario consists of up to 3 flights. Each subject pilot will fly the complete scenario once, but segments may be need to be repeated as conditions dictate.

Flight	Subject Pilot Position	Type	Flight Time
#1	Right Seat using std gauges	Familiarization	1.5 hours
#2	Left Seat using EFIS-2000	Data Collection	2 hours
#3	Left Seat using EFIS-2000	Data Collection	1-2 hours

Post Test Debriefing
The safety pilot or project manager will provide the subject pilot with the Post Test Questionnaire requesting as much detail as possible. The safety pilot will solicit any general comments as to the conduct of the flights and overall program comments.

DATA RECORDING
The test runs will require data recording. The data will consist of three types. The first is the preflight data collected from each subject pilot. The second will be the written questionnaires administered to the subject pilot by the safety pilot during key points of the flight. The third is the Project Pilot Flight Test Mission Debriefing Form. This standard form is a brief synopsis of the flight by the project pilot and is shown in Appendix G.

Data Reduction
Subject pilot responses will be gathered and grouped. Responses will be plotted as appropriate. Summaries of the data will be written and conclusions will be presented as appropriate.

Questionnaires
The FAA has developed three different questionnaires. The first questionnaire is the written Pre Test Questionnaire. This questionnaire is designed to collect subject pilot experience and measure understanding of test goals prior to the initiation of the test. The second questionnaire is a Flight Segment Questionnaire. This questionnaire, in written form and administered by the FAA safety pilot following each flight data segment is designed to collect immediate subject pilot perceptions of the test conditions he just experienced. The final questionnaire, the Post Test Questionnaire, is designed to collect, through written response, the subject pilot's overall perceptions after testing has been completed. A modified form of the Cooper Harper rating scale will be used to quantify responses on the Post Procedure and Post Test Questionnaires. The modified rating scale is shown in Appendix B, and the subject pilot in flight questionnaire is included in Appendix E.

The project basic weather guidelines for subject pilot flights are: Day VFR, 15kts max surface winds, 5nm visibility, 3000' ceiling minimum

What you can expect:
□.Subject pilot does taxi, take off and landing. (No data on fam. flight).
□.Safety pilot does radio communications
□.Questionnaires will be handled in flight.
□.Explain the Cooper Harper Scale
□.Subject Pilot names will not appear on the data sheets. Always use your subject pilot number.

□.Feel free to ask questions.

APPENDIX B
RATING SCALE

The following rating scale, derived from the Cooper Harper Rating Scale, will be used during the test scenario. It will be administered following each procedure, and in the post-test debrief. Each rating is described below.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiencies	Moderate Deficiencies	Objectionable Deficiencies	Major Deficiencies

Pilot Rating	General Characteristics	Safety Margins	Demands on the Pilot
1	Excellent Highly Desirable	Clearly Adequate	Pilot compensation not a factor for desired performance
2	Good Negligible Deficiencies	Clearly Adequate	Pilot compensation not a factor for desired performance
3	Fair - Some mildly unpleasant deficiencies	Clearly Adequate	Minimal pilot compensation required for desired performance
4	Minor but annoying deficiencies	Clearly Adequate	Desired performance requires considerable pilot compensation
5	Moderately objectionable deficiencies	Adequate	Adequate performance requires considerable pilot compensation
6	Very objectionable but tolerable deficiencies	Marginal	Adequate performance requires extensive pilot compensation
7	Major deficiencies	Inadequate	Adequate performance not attainable with maximum tolerable pilot compensation. Controllability not in question.

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APPENDIX C
Pre Test Questionnaire

Pilot Number_____

The purpose of this questionnaire is to collect information concerning your aeronautical experience, and this information will be used only for test purposes. For all questions concerning flight hours, answer *airplane/helicopter* if you are qualified in both.

1. Subject pilot Number _____. 2. List all pilot certificates, ratings, and type ratings: _____
_____.

3. Total flight hours: _____/_____. 4. Flt. hrs. last 6 months: _____/____.

5. Total IMC flt. hrs: _____/_____. 6. IMC flt. hrs. last 6 months: ____/____.

7.Test aircraft: GlaStar N231YE. 8. Total flt. hrs./date of last flt. in this make and model aircraft: _____/_____.

9.Last date instrument instruction received (aircraft or simulator): _____ .

10.Date of last biennual flight review: _____.

11. What aircraft do you most often fly pilot check rides in: _____.

12. For each aircraft that you fly, list the aircraft and the average cruise airspeed in knots that you normally use for longer distance flight: _____.

13. How many ILS approaches have you flown in the last year with/without an autopilot: _____/_____.

14. How often do you fly ILS approaches without being vectored to the final approach course:
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

15. Total flight hours in "Experimental" classified aircraft: _____

16. Circle all GPS equipment that you have used: Cars, Boats, Non-aviation hand held on the ground, Non-aviation hand held in the air, Aviation hand held in the air, Certified IFR GPS, Certified VFR GPS.

17. Reference question 16, which GPS equipment have you used the most: _____.

18. Number of hrs. navigating IFR with GPS avionics: _____.

19. List all multifunction display (MFD)avionics you have flown with:
_____.

20. Which MFD avionics have you used the most: _____.

21. How often do you use GPS for enroute/terminal operations: _____/_____.

22.Rate your personal proficiency at using moving map displays:
Never Used ; Seldom Used; Occasionally Use; Frequently Use

23.In your opinion, rate the moving map display system you have the most experience with

1	2	3	4	5	6	7	8
Excellent	Good	Fair	Minor Deficiencies	Moderate Deficiencies	Objectionable Deficiencies	Major Deficiencies	Not Applic.

_____.

APPENDIX D
QUESTIONNAIRE

Subject pilot File Preflight Questionnaire

1. Subject pilot Number:_____. 2. Name: _____.___

3. Daytime phone: _____.

4. Address: _____

5. Name, phone number, and address of person to notify in the event of an accident (work supervisor):

_____
_

APPENDIX E
SUBJECT PILOT IN FLIGHT QUESTIONNAIRE

Questions for Subject Pilots: Primary Flight Display **Pilot Number**_____

All questions pertain to your ability to fly the aircraft with the PFD as compared to standard, analog gauges

DEP: ACY Page 1 of 3 **FLIGHT SEGMENT 1**
TO: Ocean City
Flight Parameters: straight and level flight; altitude holding, constant speed

1. Referring to your use of the PFD during flight, rate how well you were able to maintain a heading and fly a straight course.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

2. Referring to your use of the PFD during flight, rate how well you were able to climb to and level off at the specified altitude.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

3. Referring to your use of the PFD during flight, rate how well you were able to maintain altitude and level flight.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

4. Using the PFD as a reference, rate how you were able to maintain the aircraft at the desired speed with the digital readouts of the PFD.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

5. Did you notice a difference in speed indicator markings, as compared to what you are used to reading? YES NO

5. Do you prefer dual airspeed indications on the PFD (Kts and MPH)? YES N

DEP: Ocean City Page 2 of 3 **FLIGHT SEGMENT 2** **Pilot Number**_____
TO: Woodbine
Flight Parameters: shallow and steep turns, slow flight at constant altitude, heading and altitude changes, and responds to simulated air traffic control vectors at the direction of the safety pilot. Unusual attitudes may also be utilized.

7. Referring to your use of the PFD during flight, rate how well you were able to perform shallow and steep turns.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

8. Referring to your use of the PFD during flight, rate how well you were able to perform slow flight while maintaining the specified altitude.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

9. Referring to your use of the PFD during flight, rate how well you were able to perform heading and altitude changes.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

10. Referring to your use of the PFD during flight, rate how well you were able to respond to simulated air traffic control vectors at the direction of the safety pilot.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

11. Rate your ability to efficiently and accurately turn correctly on course when directed to do so by the safety pilot.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

12. Rate your ability to perform stalls using the PFD.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

DEP: Woodbine Page 3 of 3 **FLIGHT SEGMENT 3** **Pilot Number**_____
TO: ACY
Flight Parameters: Preparation for landing, departure

13. When entering the landing pattern and preparing for landing, rate how well you were able to fly the airplane as prescribed.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

14. Did you notice that the PFD does not have a course heading "bug" to set as some directional gyros have? YES NO

15. When entering the landing pattern and preparing for landing, rate how you were able to fly the airplane as prescribed without a heading "bug."

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

16. Do you normally fly an aircraft with a heading "bug"? YES NO

17. If your aircraft has a heading bug, do you normally use it? YES NO

18. Do you want/need a heading bug? YES NO

19. Rate how well you were able to fly the airplane with vectors from ATC.

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiency	Moderate Deficiency	Objectionable Deficiency	Major Deficiency

COMMENTS:
Please provide any additional comments. If the comments applies to a question, please specify the question it applies to.

APPENDIX F
QUESTIONNAIRE

Post Test Questionnaire for Airplanes

Date: _____ Subject pilot #: _____

The following ratings and questions pertain to your ***overall perception*** of the flight maneuvers you just flew using the EFIS-2000, for design and information presented on the EFIS-2000, your ability to maintain orientation to the desired flight path, and the general usability of the EFIS-2000 during flight. The first 12 ratings consist of a statement with the following seven points from the Cooper/Harper scale:

1	2	3	4	5	6	7
Excellent	Good	Fair	Minor Deficiencies	Moderate Deficiencies	Objectionable Deficiencies	Major Deficiencies

A rating of "1" will always indicate excellent general characteristics, clearly adequate safety margins, and pilot compensation not a factor for desired performance. A rating of "7" will always indicate major deficiencies in the general characteristics, inadequate safety margins, and adequate performance not attainable with maximum tolerable pilot compensation.

1. Rate your ***initial*** ability to use the EFIS-2000 MFD for maintaining the basic flight maneuvers you just flew.
   1 2 3 4 5 6 7

2. Rate the ***display presentation of flight information*** ease of recognizing the flight data you needed att the time you needed it.
   1 2 3 4 5 6 7

3. Rate your ***ability to change functions*** of the EFIS-2000 to accommodate the need to fly the basic flight maneuvers you just flew.
   1 2 3 4 5 6 7

4. Rate your ***ability to use the flight information*** displayed on the EFIS-2000.
   1 2 3 4 5 6 7

5. Compared to standard instrument gauges, rate the ***pilot workload*** of flying the aircraft for the maneuvers you just flew.
   1 2 3 4 5 6 7

6. Compared to standard instrument gauges, rate the ***flyability*** of the basic flight maneuvers you just flew using the EFIS-2000.
   1 2 3 4 5 6 7

7. Compared to standard instrument gauges, rate the overall ***safety aspects*** of the basic flight maneuvers you just flew using the EFIS-2000.
   1 2 3 4 5 6 7

Comments:

APPENDIX G
PROJECT PILOT FLIGHT TEST MISSION DEBRIEF

Pilot Number_____

Project Title: Low GA Cost Avionics Date:

PIC: SIC: FE:

Technical Crew:

Aircraft: GlaStar N231YE Altitude: Speed:

Weather:

Objectives:

Test Comments:

APPENDIX H
INITIAL SUBJECT PILOT FAMILIARIZATION FLIGHT

- Sierra Primary Flight Display circuit breaker pulled to turn unit "OFF".
- Subject pilot right seat.
- Safety pilot left seat.
- Weather minimum as reported on KACY ATIS X54444, Day VFR, 15kts max. surface wind. 5 miles visibility, 3000 ft. ceiling.
- Subject pilot does the taxi "if safe control is maintained".
- Subject pilot does the takeoff "if safe control is maintained".
- Safety pilot will run the cockpit check-list and work all radio communication.
- Subject pilot is expected to perform as if they would if they were flying their own aircraft. Keep a good look-out for other aircraft, fly the Glastar, and listen to radio communication as the safety pilot communicates with ATC.
- Safety pilot is the PIC for all flights.
- Depart active runway, climb to 2500 ft. (or there abouts).
- Practice area for fam. flight is at the discretion of the safety pilot.
- Shallow turns 20 degrees bank 90 degrees heading change left & right.
- Steep turns 45 degrees bank 180 degrees heading change left & right.
- Slow flight: 60kts. 1/2 flap then 2 or 3 small heading changes, 60kts. full flap then 2 or 3 heading changes.
- Clean up aircraft to normal cruise, perform clearing turns, then a power-off stall straight ahead with power recovery. Do 2 or 3 if necessary.
- Put on 1/2 flap, do the same type of stall.
- Put on full flap, do the same type of stall.
- Approach turn stall: 1000 RPM, 1/2 flap, 20 degree left bank, leave power set, raise nose until stall.
- If desired, perform a departure stall: 1500 RPM to slow aircraft to 60kts. while doing clearing turns for airspace. After aircraft has slowed to 60kts. add full power, enter climb attitude, 20 degrees left or right bank until stall. On the departure stall the high wing/outside wing will stall first. If this stall is accomplished in a right bank the left wing will stall and the engine torque will also pull the aircraft to the left. This is OK but keep in mind this may put the GlaStar in a 90 degree left bank if the subject pilot is not real proficient. A left departure stall is not as dramatic.

These maneuvers are setup to help the subject pilot develop a feel for the Glastar. There are no "hard" limits for pilot performance - just that the subject pilot has a comfortable / smooth operation with the aircraft, somewhere close to solo level qualification. Keep in mind that some subject pilots have never flown an aircraft with a stick and some have never flown from the right seat.

Subject pilots are placed in the right seat for the initial fam. since the Sierra Flight Display circuit breaker has been pulled and there are no other instruments on the left side to fly by. During the fam. flight we want the subject pilot to feel the aircraft and not see the

Sierra Flight Display in operation. No "DATA" will be taken during this flight. We are not here to give the subject pilots lots of free flight time, just to be comfortable to the point we can collect data on subsequent flights. If the subject pilot's flying ability is acceptable but there are problems with takeoff or landings, the safety pilot may perform this function when within 500 ft. AGL with no impact on project flight test data.

Data flights are addressed in APPENDIX I at which time the subject pilot will be in the left seat with the Sierra Flight Display operational.

APPENDIX I
SAMPLE DATA COLLECTON FLIGHT PROFILE

Basic weather guidelines for subject pilot flights:
Day VFR, 15kts max surface winds, 5nm visibility, 3000' ceiling minimum

- Sierra Primary Flight Display circuit breaked pushed "IN". This will turn the display "ON". There is no switch.
- Subject pilot left seat.
- Safety pilot right seat.
- Weather minimum as reported on KACY ATIS x54444, Day VFR, 15kts max. surface wind, 5 miles visibility, 3000 ft. ceiling.
- Subject pilot does the taxi "if safe control is maintained".
- Subject pilot does takeoff "if safe control is maintained".
- Safety pilot will run the cockpit check-list and work all radio communication.
- Subject pilot is expected to perform as if they would if they were flying their own aircraft. Keep a good look-out for other aircraft, fly the Glastar, and listen to radio communication as the safety pilot communicates with ATC.
- Safety pilot is the PIC for all flights.
- Safety pilot will need to keep an extra vigilant look-out for other aircraft. This is the first time most subject pilots will have seen a glass cockpit display, so be ready for a lot of heads down time. Subject pilot will in most cases forget to look outside the aircraft. Safety pilot should make a note for post flight data, how much heads down time each subject pilot uses. This may become a big point in the data report.
- The initial flight for the subject pilot with the Sierra Display "ON" may require 30 - 40 minutes fam. relative to where the flight instrumentation data is located within the Sierra. Once the subject pilot is comfortable, proceed with the data portion of the flight. You do not need to come back to KACY to do a takeoff - pickup with "SEGMENT 1" below and continue.
- During the initial data flight, ground time / taxi work may be all the subject pilot needs to see instrumentation location. If this is the case, proceed directly into "SEGMENT 1" on takeoff.
- If the subject pilot needs some fam. time with the Sierra, proceed to a practice area as in the initial aircraft fam. and do some basic airwork. Note the time required for fam.
- If the subject pilot's flying ability is acceptable, but there are problems with take off and landings, the safety pilot may perform this function when within 500 foot AGL with no impact on project flight test data.

- **Segment 1**: When ATC gives cleared "on course", flight course will be 1500 ft. MSL (2300 RPM) level to Ocean City area. Safety pilot will give a minimum of 2 vector headings (but not more than 4 vectors) flying to Ocean City. Safety pilot will handle all radio communications with ATC. Subject pilot will be expected to maintain VFR lookout and separation of other aircraft, including monitoring of the radio communications.
- Over Ocean City, Questionnaire E, Segment 1 of 3 will be given to subject pilot. When completed, subject pilot is given control of aircraft again. No landing.

- **Segment 2**: Ocean City to Woodbine: Change altitude to 2000 ft. MSL at full power. After level off and 2300 RPM set, give 4 to 6 vector heading changes (one change should be 120 degrees but

don't say which direction to turn is the shortest direction to turn). Does the subject pilot know which way is the shortest direction to turn without an analog DG to look at?
□.If wind is not a problem, do a touch and go landing at Woodbine. If the wind is coming from a bad angle or strong in strength, do a go-around from 10 ft. AGL.
- Climb to 2000 ft. MSL then accomplish:
□.□Slow flight: 60kts 2000ft ½ flap then full flap with 2 or 3 heading changes
□.□Steep turns and 360 degrees, 45 degrees angle of bank, 100kts speed, 2000ft MSL, left and right
□.□Approach turn stall: 1000 RPM, 2000ft. MSL, ½ flap, 20 degree left bank

After all this, questionnaire E, Segment 2 of 3 will be given to subject pilot. When completed, subject pilot is given control of aircraft again. No landing.
□.
- **Segment 3:** Return to ACY for full stop landing. See how subject pilot flies the aircraft while following ATC instructions. Have pilot change PFD screen to Moving Map Display in order to view Class C airspace prior to entering the ACY Class C airspace. Inform pilot he can view whichever screen he wishes to at his choice. Note whether or not pilot attention is affixed on Moving Map and forgets to go back to PFD screen. Additional maneuvers may be performed at the discretion of the safety pilot. On descent, at 500 ft. MSL stop all data collection. After landing, safety pilot takes control of the aircraft while subject pilot works on Questionnaire E, segment 3 of 3. Upon return to Tech Center hanger, subject pilot is debriefed and is asked to complete the post-flight questionnaire Appendix F and safety pilot will complete Appendix G.

APPENDIX J
RELATED DOCUMNTATION

Several documents are related to the testing discussed in this plan. These documents are listed below.

1. FAA Order 4040.9D	FAA Aircraft Management Program
2. FAA Order 4040.24B	FAA Flight Program Responsibilities and Operational Standards for FAA Aircraft
3. EFIS-1000/2000	Manual written and provided by Sierra Flight Systems Guide to Use and Installation