Federal Aviation Agency

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CATEGORY II OPERATIONS - GENERAL AVIATION AIRPLANES

Federal Aviation Agency

ADVISORY CIRCULAR

AC NO: 91-16 GENERAL OPERATING AND FLIGHT RULES	
EFFECTIVE:	8/7/67

SUBJECT: CATEGORY II OPERATIONS - GENERAL AVIATION AIRPLANES

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1. PURPOSE. This advisory circular sets forth acceptable means by which Category II operations may be approved in accordance with FAR Parts 23, 25, 61, 91, 97 and 135. Consideration will be given to any other means the applicant may present.

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James F. Rudolph
Director
Flight Standards Service

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1. INTRODUCTION. This advisory circular sets forth acceptable means by which Category II operations may be approved in accordance with FAR Parts 23, 25, 61, 91, 97 and 135. Consideration will be given to any other means the applicant may present.

2. APPLICABILITY. This circular applies to airplanes to be used in Category II operations under Part 91. However, it does not apply to air carriers or commercial operators certificated under Part 121.

3. DEFINITIONS. As used herein, the following definitions apply.

   a. Category II Pilot Authorization: A part of the holder's instrument rating or airline transport pilot certificate (but separately issued) that authorizes the holder to conduct Category II operations as pilot in command of specified types of airplanes.

   b. Evaluation Program: An operational program based on a series of demonstration flights to establish the capability of the flight control guidance system to perform satisfactorily in Category II operations.

   c. Category II ILS System: An Instrument Landing System (ILS) which provides usable guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the glide path at a height of 50 feet or less above the horizontal plane containing the ILS runway.

   d. Inspection and Test Program: An engineering inspection and test program to determine compliance with: (1) Applicable airworthiness standards set forth in regulations, technical standard orders, or other pertinent specifications approved by the Federal Aviation Administrator; or (2) military standards or a foreign government's validation found to be compatible with the appropriate Federal Aviation Regulations (FARs).

4. GENERAL. Approval for Category II operations will require regulatory compliance in three major areas. These areas are airborne equipment and systems approval, crew qualification, and the approval of a Category II manual which includes a maintenance program. Airborne equipment and system approval may be accomplished by the airplane manufacturer or through later modifications by persons or organizations who perform this service. In some of these cases, the owner will acquire an airplane which has equipment and systems that meet the performance standards but which does not have the required Category II manual. While it is the operator's responsibility to submit the required Category II manual for approval, the actual preparation of the Category II manual may be accomplished by the airplane manufacturer, an organization or person engaged in airborne equipment and systems modifications to Category II standards, or a manufacturer of airborne equipment and systems. Category II manuals which originate from these or other suitable sources may be submitted by the airplane operator for approval under the same conditions as a manual prepared by the operator. A pilot in command holding a current and appropriate letter of authorization must also be utilized. The responsibility to meet the experience, proficiency, recency of experience, and renewal requirements for a letter of authorization rests primarily with the pilot seeking or holding such a letter. It is the responsibility of the operator (pilot in command) to utilize the services of a qualified second in command in the conduct of a Category II approach. Use of the second in command pilot is predicated on a prior determination by the pilot in command that the individual, in addition to meeting the requirements of FAR 61.3(g)(2), is also familiar with and capable of performing the second in command duties set forth in the approved Category II manual.

a. Airborne Equipment and System Approval.

(1) The primary airborne equipment and system to be approved is the flight control guidance system and, at the option of the individual or organization seeking such approval, may be accomplished by:

(a) Type certification or supplemental type certification in accordance with the procedures and criteria set forth in Attachment 2 to this advisory circular; or

(b) Completion of a satisfactory operational evaluation program described in Appendix A to FAR 91, discussed in more detail in paragraph 5 of this advisory circular.

(2) The other instruments and equipment required by Appendix A, Section 2 of FAR 91, may be determined to be capable of performing as necessary for Category II operations during either of the programs referred to in paragraphs 4a(1)(a) or (b), above.

(3) When a radio altimeter is installed for use as the primary means to establish the 100-foot decision height, it must meet the performance criteria set forth in Appendix A, Section 3(c) of FAR 91 based on engineering assistance to verify compliance.

b. Category II Approach Procedures. Category II ILS instrument approach procedures will be issued by the Federal Aviation Administration, and

(1) Will be published in accordance with FAR Part 97, and

(2) Will be made available to the public in the same manner as other published instrument approach procedures.

Category II approach procedures may also be prescribed by other appropriate authority including the Armed Forces of the United States and foreign governments.

5. EVALUATION PROGRAM. The equipment to be evaluated for approval will be the flight control guidance system. This program provides a method of approval for those airplane owners or operators having airplanes equipped with a flight control guidance system not approved under an appropriate type or supplemental type certificate. Satisfactory completion will demonstrate that the equipment performs to the standards and with the reliability necessary for Category II operations.

a. The procedures and requirements for conducting an evaluation program are prescribed in FAR Part 91, Appendix A, Section 3(e). In this regard, the following should be considered:

(1) When inner marker receiving equipment is to be used as the primary means for identification of the 100-foot decision height, its use for evaluation approaches on a Category II ILS will pose no problem when the ground equipment is installed and operable. However, in the absence of operable inner marker ground equipment, it will be necessary to rely on barometric altimeters required by FAR 91, Appendix A, Section 2(a)(5). These altimeters will be acceptable under that section if:

(a) The altimeters and their static systems meet the requirements of FAR 91.170 within the past 12 months, and

(b) Altimeter correction data is available to the pilot in command, which considers both scale error and main landing gear wheel height of the airplane. Scale error is determined by an altimeter test and inspection under FAR Part 43 Appendix E, and the wheel height correction is necessary only if the wheel to instrument height is in excess of 10 feet presently allowed for in U.S. Weather Bureau altimeter settings provided for aircraft. For instance, a large aircraft which has a 19-foot wheel to instrument height would require a 9-foot correction under this rule.

Barometric altimeters meeting (a) and (b) above are acceptable for Category II operations to establish decision heights down to 150 feet.

(2) If a success rate of 90 percent is not achieved during the first 50 approaches, additional demonstration approaches may be conducted until this rate has been reached. The demonstration approaches should be recorded on a suitable form developed by the operator in order to facilitate evaluation. (See Attachment 3 for example.)

(3) Should an applicant find at any time that the evaluation program is not producing the desired degree of success, it is suggested that a careful analysis of the problem be made in coordination with the General Aviation District Office (GADO). Although the regulations applicable to the evaluation program do not require observation of any of the approaches by an FAA inspector, experience with other evaluation programs indicates that at least 50 percent of the approaches required by the rule should be observed.

(4) The regulations do not require a pilot in command conducting an evaluation program to be a qualified applicant for a Category II pilot authorization, although many pilots participating in evaluation programs will be those ultimately issued authorizations. However, it is recommended that only pilots meeting the experience requirements for that authorization be utilized.

(5) Although it is desirable that at least one of the three ILS facilities referred to in FAR Part 91 Appendix A, Section 3(e)(2), meet Category II criteria, it is not a regulatory requirement.

(6) **All evaluation approaches must be conducted under simulated IFR conditions and prior approval must be obtained from the controlling air traffic control (ATC) facility. In requesting approval, identify the approach as an "evaluation approach."**

(7) The evaluation program should be utilized to help develop and establish appropriate operational procedures and techniques for inclusion in the Category II manual.

(8) Displays associated with normal and abnormal functioning of the flight control guidance system should be evaluated to determine if they provide the crew with information suitable for Category II operation.

(9) Other system or equipment revisions should be made where needed to remove limitations which are not compatible with Category II operations. Operators now possessing airplanes equipped with autopilot installations should be aware that altitude loss data in the approach configuration now contained in the approved airplane flight manual may preclude operations to a 100-foot decision height. Advisory Circular No. 23.1329-1, Automatic Pilot Systems Approval (Non-Transport), and Advisory Circular No. 25.1329-1, Automatic Pilot Systems Approval (Transport), set forth an acceptable means by which automatic pilot installations may meet the requirements of FARs 23 and 25 respectively.

b. Airplanes will be approved to engage in Category II operations when:

(1) A satisfactory evaluation program has been completed, and

(2) A suitable Category II manual, including a maintenance program, has been submitted and approved.

6. CATEGORY II MANUAL.

a. Category II operations involve the airplane owner or operator, the maintenance personnel and facilities, and the flight crews. Each has certain responsibilities to others involved as well as his own individual responsibility. FAR 91.34(a) specifies that no person may operate without an approved Category II manual for the aircraft.

b. The purpose of the Category II manual is to set forth in a single document basic responsibilities, limitations, operational procedures, maintenance programs and related instructions. To assist applicants in the preparation of a Category II manual, Attachment 1 has been prepared as a guide in format and content subject to revision by the applicant as appropriate to the specific equipment and procedures intended to be employed in Category II operations.

c. To receive formal approval, the Category II manual must contain that information specified in FAR 91, Appendix A, Section 1(b), and must be submitted in accordance with the instructions provided in Section 1(a) of Appendix A of FAR 91. Operators of turbojet aircraft should provide in the operating instruction portion of the approved Category II manual minimum runway length for use at the destination airport. The agency has issued Advisory Circular No. 91-10, Suggestions for use of ILS Minima by General Aviation Operators of Turbojet Aircraft. This Circular may be used as reference for preparation of the manual material, or, if the operator desires, be incorporated as Category II manual material in the operating instruction section of the manual.

d. The regulations under which Category II airborne equipment and systems are approved and authorized for use are silent on the transfer of ownership of the airplane in which the equipment is installed. The authorization to conduct Category II operations by the new owner does not require reapplication or reapproval of the airborne equipment or systems and is only contingent upon compliance with the applicable regulations and the procedures, limitations and maintenance program set forth in the approved Category II manual for the airplane involved. It follows that the airplane purchaser should arrange for transfer of the approved Category II manual with the airplane. Prior to engaging in Category II operations, the new owner should review the approved Category II manual to determine if the content of the manual, including the maintenance program, is compatible with his capabilities and operational requirements. In the event the Category II manual requires revision, those which are necessary or desirable should be submitted for approval to the General Aviation District Office in whose area the airplane is based.

7. PILOTS.

a. Pilots complying with the experience and skill requirements of Federal Aviation Regulations 61.36 and 61.37A respectively will be authorized to conduct Category II operations. Since they will not receive a new certificate or rating, applicants for a Category II pilot authorization are not required to comply with FAR 61.21 which establishes prerequisites for certain examinations and tests.

b. Category II Pilot Authorizations - Application.

(1) FAA Form 342, or FAA Form 8460-1 if available, will be used for pilot applications and submitted to the General Aviation District Office appropriate to the pilot's base of operation or convenient to the location of the airplane to be utilized for the oral operational test and practical test.

(2) It will be necessary to present at the time of application a pilot logbook to establish compliance with the experience requirements of FAR 61.36.

c. Category II Pilot Authorizations - Skill Requirements.

(1) At the time of the oral and practical tests, it will be necessary to have available for use an airplane for which a Category II manual has been approved, and which otherwise meets the operating requirements of FAR Part 91 for Category II operations.

(2) The approved Category II manual for the airplane to be flown will be used in conducting both the oral and practical tests.

(3) As a part of the practical test, the applicant will be asked to demonstrate his ability to determine that the duties assigned to the second in command are satisfactorily performed. For necessary reasons associated with testing the applicant's ability to perform the maneuvers required for the flight test, the applicant of course, must perform the maneuvers. This procedure may be contrary to the duties assigned to the second in command in the Category II manual. For this reason, we wish to make it clear that the manner in which the flight test must be conducted does not in any way indicate a position by the FAA as to the proper allocation of duties that are otherwise assigned to the second in command. It should be understood that the pilot serving as second in command during the practical test for the pilot in command must hold an appropriate class rating and, in the case of a large airplane or a small turbojet airplane, a type rating for that airplane.

(4) During Phase I, Oral Operational Test, the pilot in command will be expected to demonstrate a satisfactory level of knowledge with respect to those items specified in FAR 61.37A(c)(1). Particular emphasis will be placed on a knowledge of the procedures, instructions and limitations set forth in the approved Category II manual required by FAR 91.34(a)(1).

(5) The flight maneuvers and the manner in which they are to be performed are described in FAR 61.37 A and (c)(2). Applicants may employ any suitable hooded device that will effectively prevent outside visual reference during the flight test maneuvers.

d. Category II Pilot Authorization - Issuance, Limitations and Renewal.

(1) Issuance. A Category II pilot authorization will identify the following:

(a) The airplane, by type, for which the authorization is valid. (Large airplanes by type are listed in Advisory Circular No. 61-1 (current issue). Small airplanes manufactured under the same type certificate issued the airplane manufacturer may be considered as being the same basic type for purposes of issuance or renewal.) and

(b) The holder by name, type of certificate, and date of issue.

NOTE: See Attachment 4, Example of Category II Pilot Authorization.

(2) Limitations. Upon original issue, the authorization will contain a limitation for Category II operations of 1600 feet RVR and a 150-foot decision height. This may be removed when the holder shows that he has made three Category II ILS approaches to a landing under actual or simulated instrument conditions with a 150-foot decision height since the beginning of the 6th preceding calendar month.

(3) Renewal. Renewal of a Category II pilot authorization may be accomplished by passing the practical test prescribed in FAR 61.37 A at any time, in accordance with the renewal provisions of FAR 61.10. To retain semi-annual continuity, it may be renewed during the calender month in which it would expire or during the preceding calendar month.

NOTE: The regulations, specifically those relating to the maintenance program set forth in the approved Category II manual, allow substitution for each alternate inspection of a functional flight check conducted by a pilot holding Category II authorization for the type airplane being checked. When this procedure is employed, the pilot should be familiar with that portion of the maintenance program to the extent that the functional flight check is conducted in accordance with the instructions and procedures contained in the approved Category II manual, and the results entered in the maintenance records. The regulations also require any discontinued Category II approach resulting from a malfunction of any Category II instrument or item of equipment to be entered in the maintenance records.

8. MAINTENANCE PROGRAM. Each applicant for Category II authorization submits for approval a maintenance program for installed Category II instruments and items of equipment which is to be included in the Category II manual of each airplane to be maintained under that program. The overall objective of a Category II maintenance program is to assure that the operator has considered all special maintenance requirements imposed by the operations to lower minimums, has geared his organization or operation to cope with them, and has documented them in his application. An acceptable program should contain a means of assuring that the required instruments and items of equipment can reasonably be expected to continue to operate at the level of performance upon which Category II approval is based. Attachment 1, Sections IV through VIII, contain general guidance material which may be used to develop the maintenance program portion of a Category II manual. The material should not be considered a complete program, but only a means of assistance in the preparation of a program. Reference will be made to various pages of Attachment 1 in the following paragraphs. The notes on those pages are additional information and not a part of the examples shown. Where typical examples of equipment lists, records of bench checks prior to application, inspections, flight checks, bench check schedules, etc., are shown in Attachment 1, Sections IV through VIII, they are to be considered only as guidance in preparing the maintenance program.

a. Aircraft Electrical Capacity. In developing a Category II equipment and maintenance program, consideration should be given to the capacity of the airplane's electrical generating system. The system should be capable of supplying electrical power to all required instruments and items of equipment during Category II operations without limits on the applied electrical load.

b. Instruments and Equipment Approval. Before presenting an airplane for approval of the instruments and equipment, it must be shown that, since the beginning of the 12th calendar month before the date of submission, the equipment required in FAR 91, Appendix A, Section 2(a), has been bench checked, tested, or inspected according to the standards and methods contained in FAR 91, Appendix A, Section 3. A list of installed Category II instruments and items of equipment, including make and model of those specified in FAR 91, Appendix A, Section 2(a), must be included in the Category II manual. A means of submitting this information is shown in Attachment 1, Section IV, pages 24 and 25. These pages also show that the static pressure system was tested and inspected since the beginning of the 12th calendar month before the airplane is presented for approval of instruments and items of equipment.

c. Maintenance Schedule. Category II instruments and items of equipment are divided into Groups I and II (FAR 91, Appendix A, Section 2) according to maintenance requirements. Those listed in Group I require bench checks within 12 calendar months after the date of the previous bench check. Group II instruments and equipment with the exception of the static system do not require special maintenance procedures other than those necessary to retain the original approval condition. A typical schedule for inspections, flight checks, and bench checks is shown in Attachment 1, Section V, page 31.

d. Inspections. An inspection is to be performed on each Group I item of equipment within three calendar months of the previous inspection using procedures contained in the approved maintenance program. Inspection procedures should be shown adequate to determine that the equipment as installed will perform as approved for Category II operations. Self-test features may be submitted for approval. Instructions for their use and interpretation of self-test indications should be contained in the maintenance program. Inspections are performed by a person authorized by FAR Part 43, except that a functional flight check may be substituted for each alternate inspection and is performed by a pilot holding a current Category II pilot authorization for the type airplane being checked. In addition to performing the functional flight checks of Group I equipment, the pilot should check any other equipment capable of being tested in flight. Typical inspections and functional flight check procedures are shown in Attachment 1, Sections VI and VII.

e. Bench Checks. Maintenance standards, practices, and limitations established in obtaining original equipment approval may be used for initial bench check and inspection standards. If it is determined later that these standards and practices will not maintain the equipment to Category II approval performance standards, the operator should establish additional tests, inspections and checks, more rigid calibration procedures and tolerances, etc., in order to retain these performance standards. All such changes which alter the approved maintenance program must be approved by the Federal Aviation Administrator. Typical bench check procedures are shown in Attachment 1, Section VIII. The equipment manufacturer's maintenance procedures may be incorporated in the bench check portion of the program by reference to the manufacturer's manual title and number if those procedures are found adequate to maintain the ability of the equipment to perform as approved for Category II operations. If exceptions to the manufacturer's maintenance procedures are required to meet Category II performance standards, they should be indicated as such in the maintenance program. An example is shown in the bench check procedure for the Ajax Model 22-G glide slope receiver in Attachment 1, Section VIII, page 55.

f. Altimeter and Static System. If the 12-month altimeter bench check and static system test and inspection is entered in the airplane maintenance records, the requirements of FAR 91.170 will be met.

g. VOR Receivers. If the VOR receiving system(s) are included in the approved maintenance program, the requirements of FAR 91.25(a)(1) will be met.

h. Repairs. The Category II manual should contain a procedure for assuring that repairs performed on listed instruments and items of equipment will return the equipment to at least its original Category II approval condition before the airplane is used for Category II operations. The procedure should include a positive means to notify the pilot in command when a listed instrument or item of equipment has not been so repaired. Examples of such forms and procedures have not been included in Attachment 1, Section V, because such procedures will have to conform to particular company organization.

i. Replacement. The Category II manual should contain a procedure to assure that equipment replaced with the same make, model, and design will provide system performance at least equal to Category II approval condition.

j. Alterations. All alterations to equipment that is required by FAR 91, Appendix A, Section 2, are approved by the FAA under the provisions of Section 3(b), (c), and (d) of that Appendix.

k. Records. All tests, inspections, and bench checks performed on required equipment should be entered in the maintenance records required by FAR 43.9. Functional flight checks, although performed by pilots, must also be entered in the maintenance records in accordance with FAR 91, Appendix A, Section 4(a)(5). A separate record form for each item of equipment may be used if desired. Maintenance performed on this equipment at other than scheduled intervals must also be entered in the airplane maintenance records. In addition, an entry in the maintenance records is required showing the date, airport and reason for each discontinued Category II approach because of a malfunction of a listed instrument or item of equipment. Such forms could also be used to record instrument and equipment malfunctions and failures occurring at times other than Category II operations if a means is provided to identify malfunctions occurring during Category II approaches. A method of recording scheduled inspections and bench checks, and discontinued Category II approaches is shown on pages 32 and 33 of Attachment 1, Section V. Space has been provided to identify the malfunctioning equipment and a description of the malfunction.

l. Maintenance Period Extensions. Operators may apply for extension of check, test and inspection periods after one 12-calendar-month maintenance cycle has been completed. In order to justify the extension, equipment performance and service history should show that the extension will not adversely affect the required level of performance of the Category II instruments and equipment. Application for extensions should be made by letter to the General Aviation District Office having jurisdiction of the area in which the operator is located. The following data should be made available:

(1) The currently approved maintenance program.

(2) Records of Category II approaches discontinued due to malfunctioning equipment.

(3) Number of actual and simulated Category II approaches completed during the past maintenance cycle, if available.

(4) Maintenance records of Category II equipment failures.

(5) Service history of known trends toward malfunctioning.

(6) Unit mean flight time between failures.

(7) Records of functional flight checks.

m. Time Increase. Equipment performance and reliability, as determined by evaluation of the data submitted with the application for extension, will be major factors in determining the amount of maintenance period extension to be granted. Extension periods in most cases would be one calendar month for inspections and functional flight checks and four calendar months for bench checks.

Attachments 4

A B C AIRWAYS

CATEGORY II MANUAL

FOREWORD

This Category II manual outline has been prepared as guidance material to assist in the preparation of the Category II manual required by FAR 91.34. This manual, when approved by the FAA, completes one condition for the conduct of Category II operations. Compliance with its contents as approved is also required in order to conduct such operations.

Sections I through III provide for a statement of the applicability of the manual, the procedures and instructions for use of the CAT II airborne equipment and a description of the airborne systems and equipment.*

Sections IV through VIII provide a partial example of a maintenance program designed to set forth the methods and procedures for maintaining and checking the Category II airborne equipment.

The guidance material contained herein does not preclude the development of Category II manuals by aircraft manufacturers, equipment manufacturers or those engaged in the installation and/or modifications of airborne equipment and systems intended for use in Category II operations.

*NOTE: Although not a manual requirement, operators may, if they desire, provide for copies of pilots' Category II letters of authorization as an item of content in the Category II manual.

Section I

APPLICABILITY

Section I - Applicability

The Category II manual is required for the operation and maintenance of the listed Category II airplane and its instruments and equipment identified below. It must be available in the airplane at all times for use by the crew and to all persons performing maintenance on the listed Category II equipment. An additional copy must be kept at the principal operations base and each copy must be kept current. Each page has been separately identified and approved by the Administrator.* No changes shall be made without the approval of the FAA Administrator except that additional copies of currently approved forms may be added.

The airplane to which this manual applies may be used to conduct Category II operations provided the instruments and items of equipment listed herein that are required for a particular Category II operation are:

1. Approved under Section 3 of Appendix A to FAR 91, and

2. Inspected and maintained in accordance with the approved maintenance program contained herein.

Aircraft N1234 Beech B-55 S/N 4255

* Date : _____
Inspector's Signature: _____
GADO (Identification): _____

Section II

OPERATING INSTRUCTIONS

Section II - Operating Instructions

1. GENERAL. Statement concerning basic flight control guidance system or systems to be employed during Category II operation, such as a flight director system only or approach coupler system only or both systems when installed and approved for use.

2. CATEGORY II AIRBORNE EQUIPMENT - DESCRIPTION. Describe in this section of the Category II manual the operational characteristics, capabilities and limitations appropriate to the airborne Category II installed equipment:

   a. The flight director system,

   b. The automatic approach coupler (if applicable),

   c. The approved system used to identify the decision height,

   d. The instrumentation and display systems,

   e. Automatic throttle control systems (if applicable),

   f. Other systems and/or devices peculiar to the particular installation; i.e., computed go-around guidance equipment.

3. OPERATIONAL PROCEDURES AND INSTRUCTIONS - GENERAL. Set forth procedures and instructions developed by the operator to be used and adhered to by the crews which should include the following:

   a. A procedure for determining the minimum runway length for use at destination airports (turbojet aircraft only).

   b. Approach monitoring. Crewmember duties during a Category II approach should be clearly delineated.

   c. Functional testing of the radar (radio) altimeter.

   d. Resolution of the decision height. If operation is predicated on the use of barometric altimeters, the errors determined to exist in the altimeter system, including correction for wheel height, are to be applied to the indicated altitude.

   e. Use of RVR information.

   f. Decision region. The region between the middle marker and the 100-foot point where the pilot must decide to either continue his approach or execute a go-around. Instructions to pilots should include the maximum raw ILS deviation which will permit a safe landing.

g. Missed approach procedure. Crewmember duties during a missed approach should be clearly delineated in the Category II manual.

h. Use of airborne low approach equipment including cross-over switching system, if provided for.

i. Instrument failure warning system

4. PROCEDURES FOR MANUAL APPROACH - FLIGHT DIRECTOR. Describe the procedures to be employed in the use of this equipment with respect to:

a. Mode selector (pilot and second in command).

b. Tuning of navigational receivers.

c. Course indicator check.

d. Course selection.

e. Pitch attitude setting.

f. Altitude hold.

g. Radio altimeter self-test (if appropriate).

h. Radio altimeter minimum altitude warning light and use of minimum decision altitude index (if appropriate).

5. PROCEDURES WHEN CLEARED FOR AN APPROACH WITH RESPECT TO:

a. Pilot-in-command's mode selector (heading to approach).

b. Second-in-command's mode selector (when appropriate).

c. Capture of localizer.

d. Capture of glide path.

e. Response of glide slope pointer approaching outer marker.

f. Glide slope capture indication and, if appropriate, appearance of runway symbol and status of pitch commands and V-bar commands.

g. Selection of missed approach heading and go-around pitch command.

h. Pilot-in-command and second-in-command flight director indicators, cross check for steering command and navigation displacement agreement.

i. Pilot-in-command and second-in-command duties and procedures as they relate to:

(1) Approach configuration of the airplane from outer marker to touchdown.

(2) Altitude and airspeed callout.

(3) Check for visual contact (specific phraseology).

(4) Indicating ground or lights.

j. Glide slope extension (if applicable).

k. Visual contact at 100 feet (second in command).

6. AUTOPILOT APPROACH. The same basic stabilized approach procedures should be established for the use of a coupled Category II approach as those employed for a manual approach. NOTE: If the performance of the auto-coupler dictates a lesser flap setting, the pilot should not be required to upset the stabilized approach by making a configuration change to landing flaps during the approach.

7. MISSED APPROACH. Procedures and instruction regarding the use of the airborne equipment during the execution of a missed approach.

8. EMERGENCY OPERATION - WARNING FLAGS. A brief description of the purpose and function of the following warning flags:

a. Glide slope flag.

b. VOR/LOC flag.

c. Compass flag.

d. Computer flag.

e. Radio altimeter flag.

Section III

FLIGHT CONTROL SYSTEM DESCRIPTION

Section III - Flight Control Guidance System Description

1. GENERAL DESCRIPTION. This section is intended to provide for the flight crew a description of the flight control guidance system and the purpose it serves, first, as a total system with respect to both crewmembers, and second, as a partial or separate system to be utilized by each pilot flight control system. This section of the manual should, for example, describe the pilot-in-command's flight control system and that of the second in command explaining:

   a. Similarity and/or differences of systems.

   b. Integration of autopilot and flight director systems (when appropriate).

   c. Mode selection for each or both systems.

   d. Data source for each system.

2. EQUIPMENT COMPONENT DESCRIPTION. Automatic flight control systems usually provide their services through the interconnection of various equipment. Such a system may contain several or all of the following units which should be briefly described as to basic function:

   a. Emergency disconnect.

   b. Rate gyro.

   c. Primary servo.

   d. Trim coupler.

   e. Sensing unit.

   f. Autopilot amplifier.

   g. Altitude controller.

   h. Airspeed sensor.

   i. Pedestal controller.

   j. Flight computer.

   k. Instrument amplifier.

3. WARNING SYSTEMS. The detection and warning system, its purpose and limitations associated with the flight control system, should be described and may include:

   a. Objective of the display and monitor warning system.

   b. Location.

   c. Comparison warning monitor (if provided).

   d. Basic data source displays.

   e. Data source comparison displays.

   f. Warning flags and data source comparison.

   g. Crew cross-check comparisons.

   h. Specific failures which may activate the warning flags for a particular system or equipment should be listed. As a typical example, in the case of some flight director systems, the steering computer flag monitors the following:

      (1) Flight director AC power.

      (2) Flight director DC power.

      In the case of a slightly different basic flight director system, the steering computer flag monitors:

      (1) Gyro mode, voltage and attitude power.

      (2) Heading mode, power and attitude.

      (3) NAV/LOC mode, attitude, heading power and VOR/LOC flag voltage.

      (4) Approach mode (low) attitude and heading power, LOC and GS flag voltage.

      It is highly desirable that this section of the manual contain functional block diagrams of the warning displays available to the crew and the warning data source. Data available from the equipment manufacturers appropriate for use in this or any other section of the Category II manual may be utilized.

4. LIST OF APPROVED CATEGORY II EQUIPMENT. This list of approved equipment is required as a part of the contents of the maintenance program portion of the Category II manual and, for the purpose of manual approval, need not be listed elsewhere unless the operator wishes to do so. However, if a list is provided in the operations portion, the required list contained in the maintenance program will be the controlling document in the event of any discrepancies between the two lists.

Section IV

MAINTENANCE PROGRAM - GENERAL

MAINTENANCE TERMINOLOGY

The term "inspection" as used in this program means inspection conducted by a qualified certificated mechanic or a repair station, using the manufacturer's recommended test equipment, or the equivalent, to check Category II instruments and items of equipment as installed in the airplane.

The term "functional flight check" means a check conducted by a pilot holding a current Category II pilot authorization for the type airplane being checked.

The term "bench check" means removal of an instrument or item of equipment from the airplane for:

a. A visual inspection for cleanliness, impending failure, need for lubrication, repair or replacement of parts,

b. Correction of deficiencies found, and

c. Calibration to at least the specifications and standards contained in the "Schedule of Inspections and Bench Checks" in this manual.

LIST OF INSTALLED CATEGORY II EQUIPMENT

Aircraft N1234 - B-55, Beech Baron, S/N 4255

EQUIPMENT ITEM	MAKE	MODEL	APPROVAL METHOD USED
Group I			
Localizer receivers	AJAX	16L	T.C.
Glide slope receiver	AJAX	22G	T.C.
Glide slope receiver	ARCO	GS33	T.C.
Marker receiver	VOLE	AV-21	Evaluation
Barometric altimeters	OLSMAN	399-B2	Evaluation
Flight director	GAINS	263-B	S.T.C.
Airspeed indicators	ZIPCO	16283	T.C.
(Add additional required Group I items.)			
Group II			
Failure warning systems	---	---	Evaluation
Rain removal equipment	---	---	Evaluation
(Add additional required Group II items.)			

NOTE: Where more than one instrument or item of equipment is required by FAR 91, Appendix A, Section 2, and different makes and models are installed in the pilot and second-in-command positions, each make and model should be listed.

RECORD OF PRIOR 12 MONTHS BENCH CHECKS, TESTS, AND INSPECTIONS

ITEM	MAKE	MODEL	CHECKED BY	STANDARDS	DATE
Localizer Receivers	AJAX	16L	Air Services Co. Cert. No. 6283 Columbus, Ohio	RTCA Paper 23-63/DO-117	10/6/66
Glide Slope Receiver	AJAX	22G	"	RTCA Paper 23-63/DO-117	10/6/66
Glide Slope Receiver	ARCO	GS-33	"	"	"
Baro. Altimeters	OLSMAN	399-B2	"	FAR 43, Appendix E	9/3/66
Comm. Transceiver	ARCO	KM12	"	Mfrs. Maint. Manual #863-25N1	10/6/66
Flight Director	GAINS	263-B	"	Mfrs. Maint. Manual #FD-263-B	11/10/66
Marker Receiver	VOLE	AV-21	"	Mfrs. Maint. Manual #334-21	10/6/66
Static Pressure System(s)	---	---	"	FAR 43 Appendix E	9/3/66

Copies of work orders and maintenance releases are available.

Section IV

MAINTENANCE PROGRAM - GENERAL

1. The specifications and procedures contained herein are intended to assure that the condition of the listed Category II equipment on which maintenance is performed is at least equal to its Category II approval condition before it is returned to service for Category II operations.

2. All defects and malfunctions of listed Category II equipment will be entered in the airplane maintenance records. Prior to conducting Category II operations, the pilot will determine, by review of these records, that all defects and malfunctions have been corrected and all required equipment has been returned to its Category II approval condition.

3. All tests, inspections, and bench checks will be performed at the intervals specified in the Category II maintenance schedule shown on page 31. Any change to that schedule must be approved by the FAA.

4. Bench checks of Category II instruments and items of equipment will be performed only by appropriately rated repair stations in accordance with the procedures and instructions contained in the bench check procedure section of this manual.

5. A work checksheet will be completed for all bench checks to assure that all required inspections, tests, and calibrations have been made. This worksheet will be filed in the permanent maintenance records of the airplane. Such a worksheet is shown on page 53 of this manual.

6. Inspections will be conducted using the procedures on the appropriate inspection sheet (see pages 37 - 42 of this manual) to test instruments and items of equipment while installed in the airplane. Where special test equipment is not specified for the performance of the inspection (communications equipment, etc.), manufacturers' instructions or accepted industry practices for operational testing will be used to determine that the equipment will perform as approved for Category II operation. Defective, out of tolerance, or malfunctioning equipment will be removed from the airplane for bench check, repair, and calibration and returned to Category II approval condition.

7. A functional flight check by a pilot holding a current Category II pilot authorization for this type airplane may be substituted for each alternate inspection.

8. The altimeter will be removed from the airplane and taken to a Class 1 instrument or a limited class instrument repair station appropriate to the altimeter make and model for bench check and calibration within 12 calendar months of the previous bench check.

9. An entry will be made on the Equipment Inspection and Bench Check Record, Form ABC-102, page 32 of this manual, for each inspection and bench check of an item of equipment. Functional flight checks performed by a pilot will be entered on this same form. All data spaces on the form will be completed. Individual Forms ABC-102 will be used for each listed item of equipment.

10. Entries will be made on Form ABC-101, page 33 of this manual, showing the date, airport, and reason for each discontinued Category II operation because of malfunction of a listed instrument or item of equipment. The entry will identify the instrument or item of equipment that malfunctioned and include a description of the malfunction.

11. All alterations to required instruments and items of equipment listed on page 24 must be approved by the FAA before the equipment is used in Category II operations.

12. When equipment listed on page 24 is replaced with the same make, model and design, the replacement equipment will be inspected and bench checked using the standards and procedures contained in this program to assure performance at least equal to Category II approval standards.

13. Changes to make, model or design of any components of the flight control guidance system must be approved as installed under applicable type or supplemental type certification procedures or by an FAA evaluation program.

Section V

MAINTENANCE - SCHEDULE AND RECORDS

SCHEDULE OF INSPECTION AND BENCH CHECKS

Aircraft N1234 - Category II Instruments and Items of Equipment

ITEM	MAKE	MODEL	INSPECTION	BENCH CHECK	CALIBRATION SPECS.
Group I					
Localizer Receivers	AJAX	16L	Qtrly	12 mo.	RTCA Paper 23-63/DO-117
Glide Slope Receiver	AJAX	22G	Qtrly	12 mo.	See page 55 of this manual
Glide Slope Receiver	ARCO	GS33	Qtrly	12 mo.	RTCA Paper 23-63/DO-117
Marker Receiver	VOLE	AV-21	Qtrly	12 mo.	Mfr. Manual 334-21
Barometric Altimeters	OLSMAN	399-B2	Qtrly	12 mo.	FAR 43, Appendix E
Flight Director	GAINS	263-B	Qtrly	12 mo.	Mfr. Manual FD-263-B
Airspeed Indicators	ZIPCO	16283	Qtrly	12 mo.	Mfr. Manual A-283
(Add additional required Group I items)					
Group II					
Static Systems	Test and inspect each 12 months to FAR 43, Appendix E standards.				

NOTE: Where more than one instrument or item of equipment is required by FAR 91, Appendix A, Section 2, and different makes or models are installed in the pilot and second-in-command positions, each make and model should be listed in the above schedule.

FORM ABC-104

CATEGORY II EQUIPMENT INSPECTION AND BENCH CHECK RECORD

A/C reg. no. N1234 MFR. & MODEL Beech B-55 S/N 5678Y
ITEM Marker Receiver MFR. & MODEL VOLE AV-21 S/N 2A-436
INSPECTION PERIOD 3 months BENCH CHECK PERIOD 12 months
INSPECTION & MAINTENANCE SPECIFICATIONS USED VOLE AV-21 Maint. Manual #334-21

INSPECTIONS

DATE PERFORMED	AGENCY OR PERSON PERFORMING	LOCATION	TECHNICIAN OR PILOT
6/6/66	Aero Services, Inc.	Cincinnati, O.	Technician
9/6/66	Q. O. Smith	Cleveland, O.	Pilot in Comm.

BENCH CHECKS

DATE PERFORMED	REPAIR STATION OR FACILITY PERFORMING	TECHNICIAN
12/4/66	Aero Service, Inc., Cincinnati, Ohio #237	Robt. Jones

FORM ABC-102

DISCONTINUED CATEGORY II APPROACHES AND EQUIPMENT MALFUNCTION RECORD

Position Legend:
Pilot - #1
Second in command - #2

DATE	AIRPORT	A/C REG. NO.	MALFUNCTION ITEM	DESCRIPTION OF MALFUNCTION
9/2/65	JFK	N1234	Glide Slope recvr. #1	Showed flag at OM.
9/10/65	JFK	N1234	Barometric altimeters	Readings did not agree.
1/10/66	ORD	N1234	Flight director	No LOC command.

Form ABC-101

Section VI

TECHNICIAN-CONDUCTED INSPECTIONS

GLIDE SLOPE RECEIVER SYSTEM INSPECTION
AJAX MODEL 22-G

The following inspection will be conducted on both glide slope receiving systems at the intervals specified in the "Schedule of Inspection and Bench Checks" contained in this manual. The inspection will be accomplished by a qualified certificated mechanic or a repair station, using ramp test equipment which will perform the tests listed in Paragraphs 1, 2 and 3. The flight director system must be turned on and set to GS MAN while performing these tests, because glide slope information is displayed on the flight director course indicator.

Following the test equipment manufacturer's instructions, perform the following sequence of tests:

1. Position the ramp test equipment at the proper distance from the airplane and radiate a standard glide slope test signal on the desired frequency of a sufficient strength to move the glide slope indicator flag alarm to the "out of sight" position.

2. Test for correct glide slope indicator deflection, full scale up and down and centering.

3. Test for correct flag alarm sensing and deflection and confirm that the alarm indicator is displayed during loss of either the 90 or 150 cps modulation, or reduction of both signals to one-half the normal 40 percent.

4. If possible, determine if any noise or interference is present which would cause erratic indications by running the engine(s) to check for ignition, electrical motor, or generator noise, and channel other receivers and transmitters to determine that interaction is not taking place.

5. Make a thorough visual inspection of both receiving installations for physical security, electrical cable connections, condition of antenna, etc.

6. Enter the date, name of the agency or person conducting the inspection, indicate satisfactory or unsatisfactory performance in the maintenance record of the glide slope receivers.

The above inspection will also be made after the repair or replacement of any component of the glide slope receiving systems.

LOCALIZER RECEIVER SYSTEM INSPECTION
AJAX MODEL 16L

The following inspection will be conducted on both localizer receiving systems at the intervals specified in the "Schedule of Inspection and Bench Checks" contained in this manual. The inspection will be accomplished by a qualified certificated mechanic or a repair station, using ramp test equipment which will perform the tests listed in paragraphs 1, 2 and 3. The flight director system must be turned on and set to GS MAN while performing these tests, because localizer deflection is displayed on the flight director course indicator.

Following the test equipment manufacturer's instructions, perform the following sequence of tests:

1. Position the ramp test equipment in the proper location from the airplane and radiate a standard localizer test signal on the desired frequency of a sufficient strength to move the localizer flag alarm to the "out of sight" position.

2. Test for correct localizer indicator deflection, full scale to left and right and centering.

3. Test for correct flag alarm sensing and deflection and confirm that the alarm indicator is displayed during loss of either the 90 or 150 cps modulation, or reduction of both signals to one-half the normal 20 percent.

4. Channel the receiver to all navigational facilities which may be received at the test location, and confirm that the selector dial indicates the correct frequency.

5. Test the receiver audio outputs for satisfactory level, proper rotation and absence of noise in level control and selector switches when operated.

6. If possible, determine if any noise or interference is present by running the engine(s) to check for ignition, electrical motors, or generator noise, and channel other receivers and transmitters to determine that interaction is not taking place.

7. Make a thorough visual inspection of both receiving installations for physical security, electrical cable connections, condition of antenna, etc.

8. Enter the date, name of the agency or person conducting the inspection, indicate satisfactory or unsatisfactory performance in the maintenance record of the localizer receivers.

The above inspection will also be made after the repair or replacement of any component of the localizer receiving systems.

MARKER BEACON RECEIVER SYSTEM INSPECTION
VOLE MODEL AV-21

The following inspection will be conducted on the marker beacon receiving system at the intervals specified in the "Schedule or Inspection and Bench Checks" contained in this manual. The inspection will be performed by a qualified certificated mechanic or a repair station, using ramp test equipment which will perform the tests listed in paragraphs 1, 2 and 3.

Following the test equipment manufacturer's instructions:

1. Position the ramp test equipment directly beneath the marker beacon antenna and set the test generator for 20,000 microvolts output with 90 percent modulation at 3000 cps.

2. Turn on the airplane marker receiver and set the "High-Low" switch for "High" (maximum) sensitivity and determine that a 3000 cps tone is clearly audible in the airplane speaker and headset. The inner marker (white) indicator light should be brightly lighted at this time.

3. Repeat the above procedure using the 1300 and 400 cps tones, and make the same determinations. The amber indicator light (middle marker) should be brightly lighted when 1300 cps is applied, and the blue indicator light (outer marker) should be lighted when 400 cps is applied.

4. Repeat steps 2 and 3 with the "High-Low" switch in the "Low" position and determine at least that each audio tone is audible.

5. Make a thorough visual inspection of the receiving installations for physical security, electrical cable connections, condition of antenna, etc.

6. Enter the date, name of the agency or person conducting the inspection, indicate satisfactory or unsatisfactory performance, in the maintenance record of the marker receiver.

The above inspection will also be made after the repair or replacement of any component of the marker receiving systems.

FLIGHT DIRECTOR INSPECTION
GAINS MODEL 263-B

The following inspection will be performed on the flight director system at the intervals specified in the "Schedule of Inspection and Bench Checks" contained in this manual. The inspection will be performed by a qualified certificated mechanic or a repair station, using ramp test equipment to radiate the necessary test signals. Although not required in the Category II maintenance program, the VOR functions of the flight director system will also be tested, following the sequence of tests below.

Ramp test equipment capable of radiating standard VOR/ILS test signals, and marker beacon test signals will be used to perform the tests.

1. Preparation

   a. Determine that all power to the flight director system is OFF.

   b. Determine that the flight director control MODE SELECTOR switch is in the OFF position.

   c. Connect external power supply to aircraft and apply power.

2. Functional Test

   a. Turn on power to all units of the flight director system.

   b. Allow five minutes for equipment warmup, and then check erection of the vertical gyro. When the gyro is erected, the horizon bar will be centered, provided the airplane is level, and the GYRO flag will be retracted.

   c. Determine that the gyro-stabilized magnetic compass is slaved by observing the azimuth card on the Course Indicator for correct airplane magnetic heading. Determine that the COMPASS, COMPUTER and GYRO flag alarms, and V-bar command indicator are in the "out of sight" position.

   d. Turn on VOR/LOC and glide slope receivers and tune the VOR receiver to the VOR test signal frequency.

   e. Turn the flight director control MODE SELECTOR to SC (speed control) position and determine that the V-bar command indicator comes into view and that SC appears in the right annunciator window of the flight director indicator.

   f. Turn the MODE SELECTOR control to HDG position. The GYRO COMPUTER and COMPASS warning flags should remain "out of sight." The course indicator azimuth card should indicate the airplane magnetic heading. The annunciator windows should be blank.

g. If the heading marker has been left set in another position, turn the HDG knob on the course indicator until the heading marker is under the lubber line. The V-bar should center (wings level).

h. Rotate the PITCH COMMAND (on control unit) control knob clockwise, and determine that the V-bar command indicator in the flight indicator moves upward. The V-bar should move downward for a counter-clockwise rotation. Return PITCH COMMAND control knob to zero (V-bar aligned with airplane symbol).

i. Vary the heading marker 10 degrees both sides of the lubber line. The V-bar should call for a bank toward the new headings. Return the heading marker to the lubber line. The V-bar should center (wings level).

j. Turn the ALTITUDE HOLD toggle switch (on control unit) ON. Rotate the PITCH COMMAND control throughout its range and determine that the V-bar does not move, and that ALT appears in the left annunciator window of the director indicator. Turn ALTITUDE HOLD to OFF.

k. Rotate the COURSE knob on the course indicator until the course arrow is 15 degrees to either side of the course to the test signal, and set the MODE SELECTOR to VOR/LOC. Determine that HDG/VL appears in the right annunciator window of the director indicator, and the V-bar follows the heading marker for bank commands. The VOR/LOC flag alarm should be "out of sight."

l. Rotate the COURSE knob until the course arrow is on the inbound course to the test signal. The lateral deviation bar should center and the TO-FROM arrow should point to the head of the course arrow. When the system has captured the course, the right annunciator window should be blank.

m. Move the course arrow ten degrees both sides of the inbound course to the test signal. The V-bar should call for banks toward the new courses, and center (wings level) when the new courses are reached.

n. Tune the pilot's navigation receivers (one at a time) to the test set localizer signal frequency and set the MODE SELECTOR to GS MAN. GS should appear in the left annunciator window. Set course arrow to the inbound localizer course. The lateral deviation bar should show the localizer path in relation to the miniature airplane symbol. The ALTITUDE HOLD switch should return to OFF. The glide slope scale and pointer should become visible, and the localizer deviation display should become visible and operate.

o. Press the SC switch on the pilot's wheel. Determine that the MODE SELECTOR returns to SC mode and that SC appears in the right annunciator window. Determine that the V-bar calls for sufficient pitch-up indication to effect a safe go-around.

p. After approximately three seconds, set the MODE SELECTOR to GS MAN. The V-bar should be centered until the system again captures the localizer and glide slope course.

q. Turn the MODE SELECTOR to GS AUTO and determine that GS remains displayed in the left annunciator but that the right annunciator remains blank. Turn the marker test set on and set it to radiate a standard marker test signal with 1300 cps modulation. When the amber (middle) marker lamp (in the cockpit) is lighted, EXT should appear in the right annunciator window.

r. Press the SC switch on the pilot's control wheel. The MODE SELECTOR should revert to SC mode and SC should appear in the right annunciator window. The V-bar should call for fly-up.

During the above tests determine that the second in command's course indicator and flight director indicator display the same annunciator signals, alarm action, position and command signals as the pilot's display.

s. Upon completion of the tests, turn MODE SELECTOR to OFF, radio and power switches OFF, and disconnect external power supply to the airplane.

t. Make a thorough visual inspection of the flight director system for physical security of mounting in racks and instrument panel, electrical cable connection security, condition of dust covers and cases, inoperative instrument lights, etc.

u. Enter the date, name of the agency or person conducting the check, indicate satisfactory or unsatisfactory performance in the maintenance record of the flight director system.

The above check will also be made after the repair or replacement of any component of the flight director system.

Section VII

PILOT-CONDUCTED FUNCTIONAL FLIGHT CHECKS

Section VII
PILOT-CONDUCTED FLIGHT CHECK FOR LOCALIZER, GLIDE SLOPE, AND MARKER RECEIVERS: AND, BAROMETRIC AND RADIO ALTIMETER PERFORMANCE TESTS

This functional flight check will be made to check the operation of the localizer, glide slope, and marker receiving systems; and, the barometric and radio altimeter systems. It must be performed by a pilot holding Category II pilot authorization for the type airplane in which the instruments and equipment are installed. To minimize potential traffic conflict, pilots should contact the controlling air traffic control (ATC) facility, describe the planned maneuver, and obtain clearance to conduct the flight check. To eliminate radio frequency congestion,whenever possible such coordination should be effected in person or by telephone prior to the flight.

1. The flight check will be conducted in two stages designated as Stage 1 and Stage 2. Stage 1 will consist of a check of the proper sensing and indication of the radio and electronic instrumentation systems. Stage 2 will consist of a check during a simulated Category II ILS approach and landing (or go-around).

   Either Category I or Category II ground facilities may be used, providing that there are no outstanding NOTAMs restricting the use of the facility. The sequence of checks is optional. However, the sequence outlined below is intended to accomplish all required tests with minimum flight time. For convenience, see plan view, sketch attached.

2. Stage 1 - Flag alarm and deviation sensitivity check; first, of the localizer receiving systems on all headings; and, then of the glide slope receiving systems by intercepting the localizer inbound heading at an angle.

   a. With the airplane at least 15 miles from the ground facility, and at an altitude of 2000 feet above the terrain and positioned so that the localizer deviation indicator reads full scale deflection from the front course line of the localizer ground station, fly the airplane in the appropriate right-hand or left-hand 360 degree circle to cross the localizer center line, holding a ten degree bank in the turn. Under all of these conditions, the flag alarm indicator should be out of sight at all times. The localizer deviation indicator should move from full scale deflection to on-course to full scale opposite deflection. Be sure to observe that the indicator moves in the proper direction.

   b. Determine the altitude at which the glide slope intercepts the outer marker. While flying at that altitude, establish an inbound course to pass through the localizer course in the vicinity of the outer marker at approximately a 45 degree angle to the localizer centerline. The fly-through of the localizer course should begin at a point far enough beyond the outer marker to give full scale fly-up deflection of the glide slope indicator. Determine that:

(1) Normal glide slope indicator action is from full fly-up to full fly-down while passing through the glide slope path.

(2) The glide slope alarm indicator is out of sight at all times.

3. Stage 2 - Use a current ILS approach chart for the facility on which the check is to be conducted. Set the airplane altimeter barometric scale to the current altimeter setting for that facility.

Conduct a simulated Category II ILS approach and observe the following:

a. All warning systems indicate normal operating conditions.

b. Upon intercepting the glide slope at the outer marker, note that the barometric altimeters indicate proper altitude.

c. Test the radio altimeter for proper operation and required indications using the self-test feature of the equipment. The self-test feature of this equipment is shop adjusted to indicate a simulated 100 foot altitude when the self-test function is activated.

d. Observe proper altitude indication at the middle marker.

e. Observe proper altitude indication at the decision altitude.

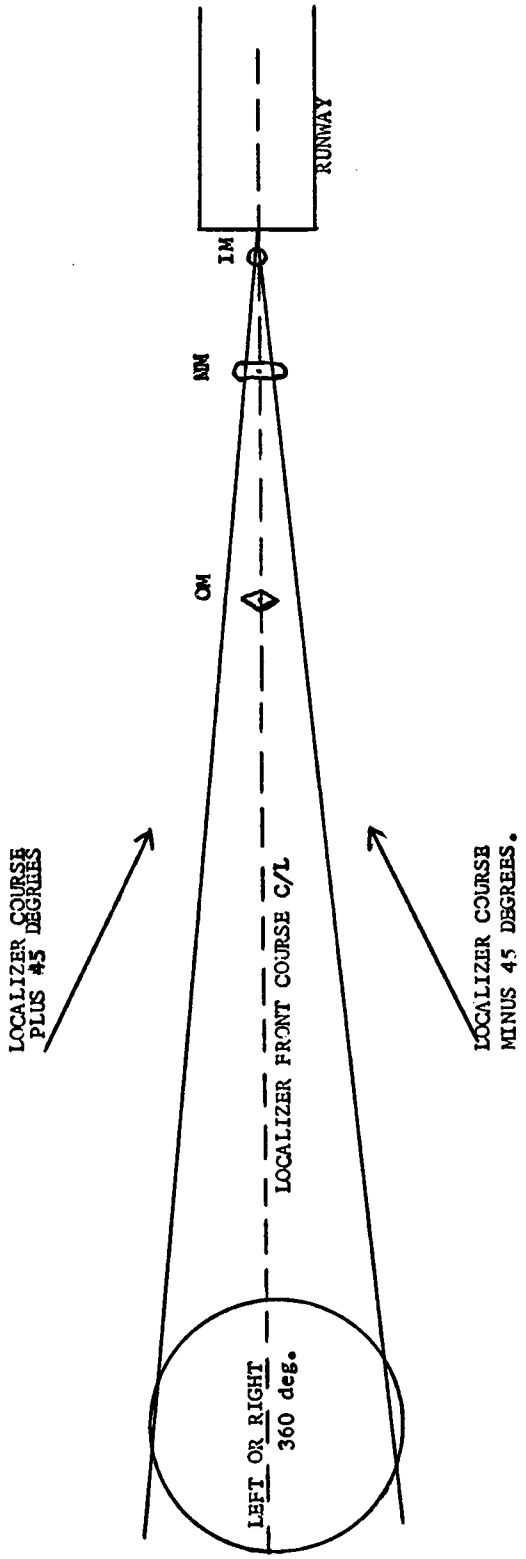
f. No unusual roughness or excessive attitude changes occur after leaving the outer marker.

g. Observe that the correct marker receiver indications are received while passing over the outer marker, middle marker, and inner marker (if installed at the facility). Observe that the marker indicator light colors are received in the following sequence:

Marker Beacon	Light Color
Outer	Blue
Middle	Amber
Inner	White

4. Upon completion of the flight check, make an entry in the inspection record for the localizer receivers, glide slope receivers, marker receiver, radio altimeter, and barometric altimeters showing the date, name of pilot, whether performance was satisfactory or unsatisfactory, and indicate that it was a pilot-conducted flight check.

PLAN VIEW OF LOCALIZER AND GLIDE SLOPE PERFORMANCE TESTS; STAGES 1a and 1b.



15 MILE AREA FOR LOCALIZER CIRCLING CHECK.

Section VIII

BENCH CHECK PROCEDURES

LOCALIZER RECEIVER BENCH CHECK
AJAX MODEL 16-L

The localizer receiver bench check will be performed by a radio repairman, or a qualified technician working under his supervision. The standards and procedures contained in RTCA Paper 23-63/DO-117, "Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers," dated March 4, 1963, will be used to perform the tests and adjustments specified in pars. 4 thru 7 below.

1. Remove the dust cover and thoroughly inspect the receiver for cleanliness, chafed wires, leaking components, bulging resistors, impending parts failure, and need for lubrication, repair, or replacement of parts.

2. Perform any cleaning operations necessary, using an air jet of clean, dry, compressed air and a small, soft-bristled brush. Use solvent and a brush where necessary to remove dirt deposits. Do not use excessive air pressure or solvents that will damage any receiver components.

3. Check cable receptacles for dirty or broken connector sockets. Repair or replace as necessary.

4. Check the deviation indicator centering by applying a 1000 microvolt standard localizer centering signal and adjusting the centering/balance control of the receiver to produce an on-course indication or zero indicator deflection.

5. Check the indicator deflection sensitivity by applying a 1000 microvolt standard localizer deviation signal and adjusting the course sensitivity control of the receiver to produce standard deflection (90 microamperes) plus/minus 5% on the deviation indicator. Any error should be balanced between the 90 cps and 150 cps sectors.

6. Check the flag alarm by alternately applying a standard localizer test signal of 3 mv (rated receiver sensitivity) and 20,000 mv, and adjust the receiver alarm circuitry to produce a flag alarm current of 375 plus/minus 5 microamperes. Determine that the alarm flag is in the "out of sight" position. The adjustments made to meet this requirement shall provide the following additional alarm performance automatically without further readjustments:

   The alarm flag shall be plainly visible:

   a. With the loss of either modulation signal from the rf test signal,

   b. With the complete loss of rf input signal,

   c. When both modulation signals are decreased by 50% of standard value.

7. Check the audio output for minimum level of 100 milliwatts into a 600 ohm load with 5 microvolts input modulated 30% with a 1000 cps audio signal.

8. Upon completion of the adjustments made in paragraphs 4 through 7, above, check the receiver performance on at least three other channels. If further adjustment is necessary due to interaction of controls or other causes, repeat the adjustment procedures as necessary to obtain the required performance on all channels checked.

9. Re-install the dust cover and touch up any damage to the finish.

10. Enter the date, name and certificate number of the repair facility that performed the bench check in the maintenance record of the localizer receiver. This completes the bench check.

11. Re-install the receiver in the airplane and perform the inspection of the localizer receiving system required in the schedule of inspections. Enter the date, name of the person performing the inspection, whether technician or pilot, indicate satisfactory or unsatisfactory performance, in the maintenance record of the localizer receiver.

WORK CHECK SHEET FOR LOCALIZER RECEIVER
AJAX MODEL 16-L

This sheet will be completed for each bench check of the localizer receiver and filed in the airplane maintenance records.

Receiver serial number _____. ☐

1. Visually inspect receiver and chassis. ☐
2. Clean, lubricate, replace parts as necessary. ☐
3. Check cable receptacles. Clean or replace as required. ☐
4. Adjust deviation indicator centering/balance. ☐
5. Adjust deflection sensitivity. ☐
6. Adjust flag alarm circuitry. ☐
7. Check audio output for a minimum level of 100 mw. ☐
8. Other channels checked _____mc, _____mc, _____mc. ☐
9. Re-install dust cover, touch-up paint. ☐
10. Make entry in localizer receiver maintenance record. ☐
11. Re-install receiver in airplane and perform inspection. ☐

Date _____

By _____

Repair Station Name & Cert. No. _____

GLIDE SLOPE RECEIVER BENCH CHECK
AJAX MODEL 22-G

The glide slope receiver check will be performed by a radio repairman or a qualified technician working under his supervision.

The standards and procedures contained in RTCA Paper 23-63/DO-117, dated March 14, 1963, "Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers," will be used to perform the tests and adjustments specified in paragraphs 3 through 6 below with the exception of item 4. It is necessary to increase receiver deflection sensitivity to meet Category II approach performance requirements.

1. Remove the dust cover and thoroughly inspect the receiver for cleanliness, chafed wires, leaking components, bulging resistors, impending parts failure, and need for lubrication, repair, or replacement of parts.

2. Perform any cleaning operations necessary, using an air jet of clean, dry, compressed air and a small, soft-bristled brush. Use solvent and a brush where necessary to remove dirt deposits. Do not use excessive air pressure or solvents that will damage any receiver components.

3. Check the deviation indicator centering by applying a 700 microvolt standard glide slope centering signal and adjusting the centering/balance control of the receiver to produce an on-course indication or zero indicator deflection.

4. Check the deviation indicator deflection sensitivity by applying a 500 microvolt standard glide slope deviation signal and adjusting the course sensitivity control of the receiver to produce standard deflection (78 microamperes) plus/minus 5% on the deviation indicator.

5. This receiver is equipped with course softening. Apply a standard glide slope deviation signal of 14,000 microvolts and adjust the course softening control on the receiver to produce standard deflection plus/minus 5% on the deviation indicator.

6. Check the flag alarm by alternately applying a standard glide slope test signal of 20 microvolts (rated receiver sensitivity) and 20,000 microvolts, and adjust the alarm circuitry to produce a flag alarm current of 375 plus/minus 5 microamperes. Determine that the flag alarm is in the "out of sight" position. The adjustments made to meet this requirement shall provide the following additional flag alarm performance automatically without further readjustments:

   The flag alarm shall be plainly visible or in the alarm condition:

   a. With the loss of either modulation signal from the rf signal,

b. With the complete loss of rf input signal,

c. When both modulation signals are decreased by 50% of standard value.

7. Upon completion of the adjustments required in paragraphs 3 through 6, check the receiver performance on at least three other channels. If further adjustment is necessary due to interaction of controls or other causes, repeat the adjustment procedures as necessary to obtain the stated performance requirements.

8. Re-install the dust cover and touch up any damage to the finish.

9. Enter the date, name and certificate number of the repair facility that performed the bench check in the maintenance record of the glide slope receiver. This completes the bench check.

10. Re-install the receiver in the airplane and perform the inspection of the glide slope receiving system required in the schedule of inspections. Enter the date, name of the person performing the inspection, whether technician or pilot, and indicate satisfactory or unsatisfactory performance in the maintenance record of the glide slope receiver.

MARKER RECEIVER BENCH CHECK
VOLE MODEL AV-21

The marker receiver bench check will be performed by a radio repairman, or a qualified technician working under his supervision.

The inspection and bench check will be performed using the following procedures and referring to the VOLE AV-21 maintenance manual No. 334-21 where necessary:

1. Remove the dust cover and thoroughly inspect the receiver for cleanliness, chafed wires, leaking components, bulging resistors, impending parts failure, and need for lubrication, repair, or replacement of parts.

2. Perform any cleaning operations necessary, using an air jet of clean, dry, compressed air and a small, soft-bristled brush. Use solvent and a brush where necessary to remove dirt deposits. Do not use excessive air pressure or solvents that will damage any receiver components.

3. Adjust the receiver sensitivity by setting the "High-Low" switch to "Low" and applying a 2800 microvolt 75 mc test signal modulated 90% at a frequency of 1300 cps to the receiver. Measure the voltage across the amber indicators on the test panel. It should be 3.3 volts. If this value is not indicated, consult the manufacturer's maintenance manual for adjustment procedures.

4. Check the indicator lamp selectivity by applying a 200,000 microvolt 75 mc test signal modulated 90% at frequencies of 400 cps, 1300 cps, and 3000 cps, with the "High-Low" switch set to "High". Determine that the blue indicator light illuminates when 400 cps is applied; the amber light when 1300 cps is applied; and, the white light when 3000 cps is applied. The lamp that illuminates should have at least 4.5 volts applied to it, and the other two no more than 1.0 volt impressed across them as measured by an AC VTVM.

5. Perform checks to determine the following:

   a. Audio output is at least 100 milliwatts, at 400, 1300, 3000 cps modulation within a signal input range of 20,000 to 200,000 microvolts and the "High-Low" switch set to "Low".

   b. Audio noise is more than 50 db below 100 milliwatts in the absence of an rf signal and a signal-plus-noise to noise ratio of at least 20 db over an input signal level range of 200 to 20,000 microvolts with the "High-Low" switch set to "Low".

6. Re-install the dust cover and touch up any damage to the finish.

7. Enter the date, name and certificate number of the repair facility that performed the bench check in the maintenance record of the marker receiver. This completes the bench check.

8. Re-install the receiver in the airplane and perform the inspection of the marker receiving system required in the schedule of inspections. Enter the date, name of the person performing the inspection, whether technician or pilot, and indicate satisfactory or unsatisfactory performance in the maintenance record of the marker receiver.

ENGINEERING EQUIPMENT INSTALLATION APPROVAL
CRITERIA AND ACCEPTABLE MEANS OF COMPLIANCE - CATEGORY II
AIRBORNE NAVIGATION, INSTRUMENT AND FLIGHT CONTROL SYSTEMS

1. EQUIPMENT APPROVAL CRITERIA - GENERAL. Subject to a satisfactory engineering approved inspection and test program, airborne navigation instrument and/or flight control equipment may be eligible for installation approval as part of an installed system when it is:

   a. Found to comply with the requirements of an applicable technical standard order or type certificate, or

   b. Found to comply with applicable Federal Aviation Regulations and approved as part of an airplane under a type certificate or supplemental type certificate, or

   c. Found to comply with other pertinent specifications adopted by the FAA Administrator; e.g., military standards or a foreign government's validation which has been found to be compatible with the intent of the appropriate Federal Aviation Regulations.

2. INSPECTION AND TEST PROGRAM.

   a. This engineering program involves first an agreement between the applicant and the appropriate FAA Engineering and Manufacturing Regional or District Office which identifies the individual or combined systems proposed as a Category II installation. After a design and ground test evaluation, a type inspection authorization or similar document is usually issued which will specify those additional conformity, ground and flight inspections considered necessary. Also included in the program will be a determination of satisfactory installation practices, freedom from interference, performance of intended functions and compatibility with ground navigation facilities and the Air Traffic Control System.

   b. System Performance Requirement. For the combination of systems to provide the level of accuracy, reliability and compatibility needed to assure an approach capability which is considered acceptable to the FAA Administrator, each individual system should be found to perform its intended function in accordance with the following:

      (1) Data Display. All displays of information essential for the use of the flight crew in a Category II installation should incorporate such positioning, marking and lighting as will permit accurate and timely utilization of such information and recognition of malfunctions by pilots of average skill and reaction time.

(2) Control Functions. All systems which furnish signals directly to the airplane flight control system or the propulsion thrust control system should be so designed that if malfunction occurs, such malfunction does not result in an unsafe condition. Means for quick disengaging or overriding of each automatic control function should be immediately available and easily accessible to the flight crew without requiring the crew to apply excessive control forces.

c. Function and Reliability Testing. In addition to the engineering inspection and test program, a program of function and reliability testing may be required for the purpose of supplementing analytical and test data, such as fault analysis and reliability studies, with accelerated service experience. The extent of the additional tests depends upon the complexity, number, nature of (or novel) design features incorporated in system and the record of previous tests and experience. Additional tests should be predicated on:

(1) The extent of flight and ground time utilized during the developmental and type certification program and difficulties associated therewith.

(2) The service history of the device/systems when this device has been utilized on airplanes previously approved.

3. ACCEPTABLE MEANS OF COMPLIANCE FOR CATEGORY II INSTALLATION OF AIRBORNE NAVIGATION, INSTRUMENT AND FLIGHT CONTROL SYSTEMS. The minimum performance standards applicable to systems which are to be used as a part of a Category II system shall be applied to the following:

a. Localizer. The localizer system installation should comply with the following:

(1) The localizer equipment should meet or exceed minimum performance standards set forth in Federal Aviation Agency Technical Standard Order C36b, dated June 15, 1962, "Minimum Performance Standards for Airborne ILS Localizer Receiving Equipment," or applicable type certificate, or RTCA Paper 20-63/DO-115, dated February 14, 1963, "Minimum Performance Standards - Airborne ILS Localizer Receiving Equipment."

(2) The localizer system installation should meet or exceed the minimum performance standards set forth in RTCA Paper 69-60/DO-102, dated April 12, 1960, "Minimum In-Flight Performance Standards - ILS Localizer Receiving Equipment."

(3) Display to the pilot positive visual indication to show degradation of localizer system performance under the following conditions:

(a) The absence of either or both modulation signals.

(b) The reduction of either or both modulation signals to one-half the normal 20%.

(c) When a difference of depth of modulation equal to 0.093 $\pm$ 0.002 produces an output of less than one-half normal response to this standard localizer deviation signal.

(4) The localizer receiving centering error should be within 5 ua on a 95% probability basis under the following conditions, using a standard test signal:

(a) Variation of R.F. signal level from 50 to 1000 uv.

NOTE: This represents the variation of R.F. signal level expected during the final phase of an ILS approach.

(b) Variation of DC power over the range of 24 to 28 volts or AC power over the range of 105 to 120 volts.

(c) Variation of ambient temperature over the limited range expected during a normal ILS approach. The nominal ambient temperature range is defined as +10°C. to +40°C. Operation over a different temperature range in a particular airplane will require special coordination.

(5) The localizer receiving equipment should be adjusted in accordance with RTCA Paper 23-63/DO-117, dated March 14, 1963, "Standard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers."

b. Glide Slope. The glide slope system installation should comply with the following:

(1) The glide slope equipment should meet or exceed the minimum performance standards set forth in Federal Aviation Agency, Technical Standard Order C34b, dated May 9, 1963, "Minimum Performance Standards for Airborne ILS Glide Slope Receiving Equipment," or applicable type certification, or RTCA Paper 21-63/DO-116, dated February 14, 1963, "Minimum Performance Standards - Airborne ILS Glide Slope Receiving Equipment."

(2) The glide slope system installation should meet or exceed the minimum performance standards set forth in RTCA Paper 233-59/DO-101, dated December 8, 1959, "Minimum In-Flight Performance Standards ILS Glide Slope Receiving Equipment."

(3) Display of the pilot positive visual indication to show degradation of glide slope system performance under the following conditions:

(a) The absence of either or both modulation signals.

(b) The reduction of either or both modulation signals to one-half of their normal 40%.

(c) When a difference of depth of modulation equal to 0.091± .002 produces an output of less than one-half normal response to this standard glide slope deviation signal.

(4) Centering Error. The glide slope centering requirements outlined in RTCA Paper 222-58/DO-89 are applicable for Category II installation approval.

(5) The glide slope receiving equipment should be adjusted in accordance with RTCA Paper 23-63/DO-117, dated March 14, 1963, "Standdard Adjustment Criteria for Airborne Localizer and Glide Slope Receivers."

c. Automatic Pilot/Coupler. When an automatic pilot/coupler system is used as part of Category II installation, it should, in addition to complying with applicable TSO and FARs, provide the following performance under the test conditions stated:

(1) Airplane Speed - Maximum and minimum operational approach speeds.

(2) Wind Conditions - Surface downwind component of 10 knots. Wind shear of 4 knots per 100 feet altitude applied along the runway or across the runway individually, commencing at an altitude of 500 feet. The effects may be shown analytically, or correlated with some Flight Test data.

(3) Localizer Performance -

(a) The airplane should be stabilized on the localizer for the purpose of demonstration before the outer marker is intercepted on a normal inbound approach.

(b) From the outer marker to an altitude of 300 feet above runway elevation on the approach path, the automatic pilot/coupler should cause the airplane to track automatically to within ± 35 microamperes (95% probability) of the indicated localizer course. The performance should be free to sustained oscillations.

(c) From an altitude 300 feet above runway elevation on the approach path to the decision altitude (100 feet), the automatic pilot/coupler should cause the airplane to track automatically to within $\pm$ 25 microamperes (95% probability) of the indicated course. The performance should be free of sustained oscillations.

(4) Glide Slope Performance -

(a) For the purposes of the demonstration, the airplane should be stabilized on the glide slope before an altitude of 700 feet above the field level is reached.

(b) From 700 feet altitude to the decision altitude, the autopilot/coupler without manual assistance should cause the airplane to track the center of the indicated glide slope to within $\pm$ 35 microamperes or $\pm$ 12 feet, whichever is the larger, without sustained oscillations. When the pilot is in the loop providing manual assistance, $\pm$ 75 microamperes tracking tolerance may be used.

d. Flight Director Systems. When a flight director system is used as part of a Category II installation, it should provide for the following performance under the test conditions stated:

(1) Airplane Speed - Maximum and Minimum operational approach speeds.

(2) Wind Conditions - Surface crosswind component of 15 knots. Surface downwind component of 10 knots. Wind sheer of 4 knots per 100 feet altitude applied along the runway or across the runway individually, commencing at an altitude of 500 feet. The effects may be shown analytically if correlated with some flight test data.

(3) Mode selection and Indication -

(a) Manual Selection should be positive, and the selection should be clearly identified.

(b) When the mode of operation is not shown by the manual mode selector and by the command display behavior, means should be employed to clearly annunciate the existing mode.

(4) Localizer Performance -

(a) The airplane should be stabilized on the localizer for the purpose of demonstration before the outer marker is intercepted on a normal inbound approach.

(b) From the outer marker to an altitude of 300 feet above runway elevation on the approach path, the flight director should permit the pilot to track within ± 35 microamperes (95% probability) of the indicated localizer course. The performance should be free of sustained oscillations.

(c) From an altitude 300 feet above runway elevation on the approach path to the decision altitude (100 feet), the flight director should permit the pilot to track to within ± 25 microamperes (95% probability) of the indicated course. The performance should be free of sustained oscillations.

(5) Glide Slope Performance -

(a) For the purposes of the demonstration, the airplane should be stabilized on the glide slope before an altitude of 700 feet above the field level is reached.

(b) From 700 feet altitude to the decision altitude (100 feet) the flight director should permit the pilot to track the center of the indicated glide slope to within ± 75 microamperes or ± 22 feet, whichever is the larger, without sustained oscillations.

e. Automatic Throttle System.

(1) An automatic throttle system, if used, should provide safe operation under conditions which can reasonably be expected in normal service, including wind sheer, gusts and sideslips. The system should:

(a) Automatically adjust throttles to maintain airplane speed to within ± 5 knots of stabilized programmed airspeed, but not less than computed threshold airspeed under all intended flight conditions. Proper operating points such as reference speed or angle of attack may be set manually or automatically.

(b) Provide throttle application at a rate consistent with the recommendations of the appropriate engine and airframe manufacturers.

(c) Maintain stable short period and phugoid airplane modes for all intended flight situations during manual and automatic flight control.

(2) Malfunction of any part of the system should not restrict either pilot from maintaining safe control of the airplane or engines.

(a) Disconnect switch(es) readily accessible to both pilot and second in command should be provided.

(b) The throttle drive mechanism should be designed to permit manual overriding without application of excessive throttle forces.

(c) The maximum servo velocity attainable should be positively limited by design to that required for adequate performance.

(d) Appropriate indication of system engagement and disengagement should be provided.

f. Aircraft Configuration Change. The aircraft should be stabilized on the approach in the landing configuration and no late stage configuration change should be permitted.

g. Rain Removal Capability. Rain removal equipment should be provided to assure adequate visibility for transition, landing and roll-out under assumed Category II weather conditions.

h. Other Automatic Devices. Yaw dampers, rudder bias devices, and other designs that are part of the original airplane airworthiness or part of the CAT II system should not cause adverse interaction of integrated components during normal or malfunction operation of the devices. The sudden failure of the critical engine, on the approach, should be considered in this evaluation.

i. Approved Airplane Flight Manual or Markings or Placards. Upon satisfactory completion of an engineering inspection and test program, the FAA airplane flight manual or supplement thereto, or markings or placards should reflect the following:

(1) The limitations, if any.

(2) Revision to the performance section, if appropriate.

(3) A statement of CAT II approval to the effect that, "The airborne instruments and equipment meet the performance standards of Attachment 2 of this AC _____ dated _____."

NOTE: Compliance with the performance standards referenced above, does not constitute approval to conduct Category II operations.

CATEGORY II APPROACH EVALUATION

Pilot in Command_____ Second in Command _____ Date_____
Registration No._____ Airport_____ Runway_____ Weather_____ Wind_____
FAA Inspector:_____

This form will be completed whenever an approach is attempted utilizing the airborne low approach system, regardless of whether the approach is abandoned or concluded successfully.

APPROACH EVALUATION:

1. Was the approach successful? YES /_/ NO /_/

2. Flight control guidance system used

   a. Auto-coupler /_/
   b. Flight director /_/
   c. If equipped and used, did a. and b. agree? YES /_/ NO /_/

   Second in Command? YES /_/ NO /_/
   FAA Inspector? YES /_/ NO /_/

3. Airspeed at middle marker ± ____ at 100' ± _____ from programmed speed?

4. If unable to initiate /_/ or complete /_/ approach (indicate which), was reason due to:

   a. Airborne equipment /_/. Identify and describe nature of deficiency.

   b. Ground equipment /_/. Identify and describe nature of deficiency.

   c. Approach control or tower request /_/.

   d. Other /_/. State reason.

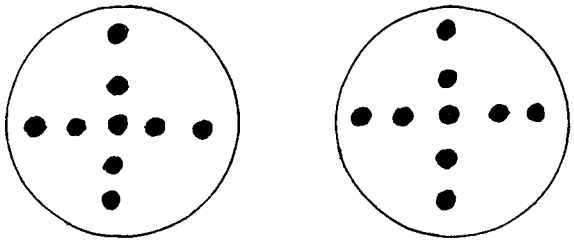
5. Was airplane in trim at 100' for continuation of flare and landings?
   YES /_/ NO /_/

6. If approach and landing abandoned, state altitude above runway:_____ feet, (State reasons)_____

7. Quality of overall performance: Good /_/ Acceptable /_/ Unacceptable /_/

_____
Pilot in Command's Signature

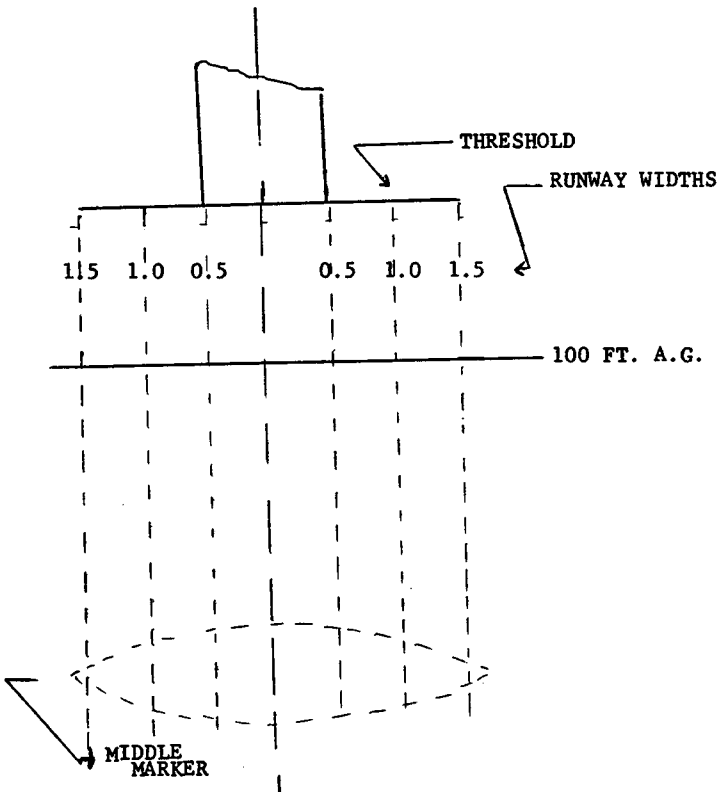
INDICATE GLIDESLOPE AND LOCALIZER DISPLACEMENT AT MIDDLE MARKER AND 100 FT. A.G. POINT.



MIDDLE MARKER

100 FT. A.G.

INDICATE AIRPLANE DISPLACEMENT & ORIENTATION WITH RESPECT TO RUNWAY CENTERLINE AT MIDDLE MARKER AND 100 FT. A.G. BY SYMBOL AT AIRPORTS AND RUNWAYS LISTED.



OF RUNWAY EXTENDED

TOUCHDOWN WAS _____ FEET FROM THRESHOLD AND

FEET LEFT ☐ RIGHT ☐ OF CENTERLINE

REMARKS:

CATEGORY II PILOT AUTHORIZATION

I UNITED STATES OF AMERICA ***
VIII DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

IV This certifies that

(Name) _____

III while holding pilot certificate

No. _____

IX is authorized to act as pilot in command of the following type aircraft during

II CATEGORY II OPERATIONS

X **Date of issue _____

(Signature) _____
FAA inspector or authorized examiner
Examiner's number _____

(Fold on dotted line)

XII (Airplane types)

_____ *Not valid after (Date)

_____ *Not valid after (Date)

XIII (If applicable) Limited to minimums of 1600' RVR, 150' DH

Expiration date _____

VIII GADO (identification)

VII _____
Signature of the holder

(Cut on dotted line)

* If more than one type is listed, add the date which is the end of the 12th calendar month after the practical test was passed in that type airplane. This will show compliance with FAR 61.10.

** If certificate is reissued to correct or delete a limitation, use the date of issue of the superseded authorization, unless the airman is retested. In the latter case, use the date of retesting, whether for renewal or to add an airplane rating.

*** Use of Roman Numerals is in accordance with ICAO Annex 1, Chapter 5.