SECTION 2. AIRBORNE INSTRUMENT INSPECTOR

3025. PURPOSE. This section provides guidance to regional and field personnel in the assignment of duties and functions for, and the utilization of, airborne instrument inspectors.

3026. INSPECTOR LOCATION. Regions should consider the utilization, workload, travel, and convenience (in order that he/she may serve both regional and field demands) when locating the airborne instrument inspector.

3027. RESPONSIBILITIES. Avionics inspectors will retain primary responsibility for airworthiness program functions involving instruments and instrument systems. These functions are listed under the air carrier and general aviation avionics activities in the Order 1800.12D, Flight Standards Program Guidelines, An airborne instrument inspector will have secondary program responsibility to perform program functions in the course of normal activities. The reporting of these functions will contribute in the search for instrument problems and will supplement regular inspector assignments by delving into problems which are too time consuming or beyond the capabilities of assigned inspectors. He/she will provide advice and counsel to assigned inspectors and will participate with them in the accomplishment of program functions. He/she will also be subject to request for assistance from operations, engineering, and other offices and services.

3028. DUTIES.

a. The instrument inspector will work across the board performing the following air carrier and general aviation avionics functions and will be notified by the field inspectors in enough time to actively participate in their performance:

(1) Certification of repair stations.
(2) Inspection of maintenance facilities.
(3) Approval of programs associated with lower landing minimums.
(4) Certification of all U.S. operators.
(5) Approval of reliability programs.

b. In performing the above functions, the instrument inspector, where applicable, will inspect shops, equipment, and aircraft installations. He/she will review maintenance inspection programs, procedures and manuals, and participate in equipment flight checks and proving flights. The following equipment is involved in the performance of these functions:

(1) Flight attitude instrumentation systems.
(2) Altimetry systems.
(3) Autopilot systems.
(4) Mach/pitch trim systems.
(5) Air data systems.
(6) Automatic throttle systems.
(7) Speed control approach and takeoff systems.

(8) Inertial navigation systems.
(9) Electronic compass systems.
(10) Speed warning devices.
(11) All weather landing systems.
(12) Recorders.

c. Upon completion of these functions, the instrument inspector will provide the assigned inspector with a written report which briefly summarizes his/her participation and contains either a recommendation for approval or suggested changes to be made before approval is granted.

d. In addition to the above, the airborne inspector will perform the following duties:

(1) Participate, upon request, in the investigation of major accidents or incidents the cause of which may be related to instrument systems or components.

(2) Recommend standards and procedures to govern the inspection, repair, and alteration of aircraft electronic, electrical, and mechanical instruments and instrument systems.

(3) Recommend performance standards for facilities which inspect, repair, and alter airborne electronic, electrical, and mechanical instrument systems and components.

3029. SCHEDULING. A schedule should be developed for airborne instrument inspectors to make regular periodic visits to district offices to perform other avionics work functions and to provide consultation and guidance to field inspectors. The schedule should be published and distributed to the offices concerned at least 2 weeks prior to its effective date. During these visits, the airborne instrument inspector will inspect repair facilities, review repairs and alterations, make spot inspections, perform en route inspections, and perform any other program work functions that are necessary. In order to obtain maximum benefit from these visits, assigned inspectors will keep the instrument inspector advised of problem areas and request that he/she inspect certain facilities or perform other specific work functions during his/her visit. Close coordination between specialties will enable the instrument inspector to utilize his/her time in areas which produce the greatest results.

3030. UTILIZATION. In view of the increasing sophistication and complexity of modern aircraft instruments and instrument systems, it is important that regional and field personnel utilize the specialized knowledge and skill of the airborne instrument inspector to the fullest advantage in the accomplishment of the basic mission of Aviation Standards. The instrument inspector may actually perform all the aforementioned functions or he/she may provide technical

assistance to the assigned inspectors, depending on the nature of the programs, problem, incident or accident which requires his/her participation. The dictates of manpower utilization, the complexity of the problem, and the capability of the assigned inspector should determine who performs the required follow-up action, if any. The instrument inspector may assist only in the initial phase of the action, or he/she may complete the entire action himself/herself. Close coordination with inspectors having primary responsibility will determine these activities.

3031.-3040. RESERVED.

SECTION 3. PERSONNEL UTILIZATION/EFFECTIVENESS AND CONDUCT

3041. PURPOSE. This section identifies the aircraft systems and the areas of responsibilities for the avionics inspector.

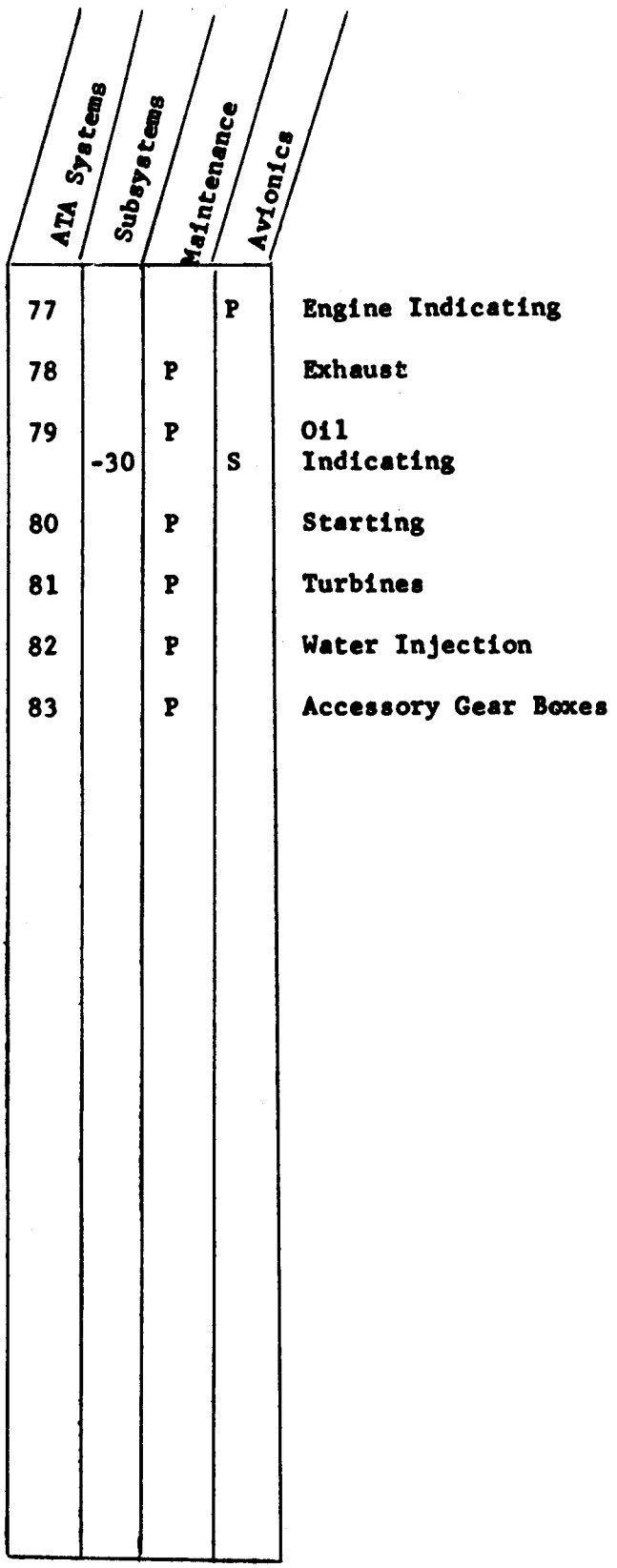
3042. PERSONNEL UTILIZATION/EFFECTIVENESS AND CONDUCT. Chapter 8, Section 1, outlines the applicable policies and functions for the avionics inspectors. Figure 8-1 of this section identifies the avionics inspectors' primary and secondary responsibilities for aircraft systems.

3043.-3050. RESERVED.

FIGURE 8-1. DELINEATION OF TECHNICAL RESPONSIBILITIES

ATA Systems	Subsystems	Maintenance	Avionics	
21		P		Air Conditioning
22			P	Autopilots
23			P	Communications
24			P	Electrical Power
25		P		Equipment/Furnishings
26		P		Fire Protection
	-10		S	Detection
27		P		Flight Control
			S	Logic Systems - indicating
28		P		Fuel
	-40		S	Fuel System - indicating
29		P		Hydraulic Power
30		P		Ice and Rain Protection
	-30		S	Pitot - Static
	-50		S	Antennas - Radome
	-80		S	Detection
31			P	Instruments
32		P		Landing Gear
	-60		S	Position and Warning
			S	Anti-skid - electronics
33			P	Lights
34			P	Navigation
35		P		Oxygen
36		P		Pneumatic
37		P		Vacuum

ATA Systems	Subsystems	Maintenance	Avionics	
38		P		Water/Waste
49		P		Airborne Aux. Power
	-70		S	Indicating
51		P		Structures
52		P		Doors
	-70		S	Door Warnings
53		P		Fuselage
54		P		Nacelle/Pylons
55		P		Stablizers
56		P		Windows
57		P		Wings
61		P		Propellers
65		P		Rotors
	-60		S	Indicating
71		P		Powerplants
	-50		S	Electrical Harness
72		P		Engine Turbine/Engine Reciprocating
73		P		Engine Fuel and Control
	-30		S	Indicating
74		P		Ignition
	-10		S	Electrical Power Supply
75		P		Air
	-40		S	Indicating
76		P		Engine Control



ATA Systems	Subsystems	Maintenance	Avionics	
77			P	Engine Indicating
78		P		Exhaust
79		P		Oil
	-30		S	Indicating
80		P		Starting
81		P		Turbines
82		P		Water Injection
83		P		Accessory Gear Boxes

SECTION 4. AVIONICS EQUIPMENT APPROVAL

3051. AUTHORITY. The regulatory basis for approved avionics equipment is contained in FAR Parts 21, 23, 25, 27, 43, 91, 121, 123, and 127.

3052. PURPOSE. This section provides guidance to avionics inspectors concerning the surveillance of appliances and equipment used by aircraft operators which are required for approval by the regulations.

3053. BACKGROUND. The FAR require that certain equipment used by operators be approved by the Administrator. Historically, it has been found that in a number of instances avionics equipment is installed for which FAA approval cannot be substantiated. This may be due to the loss of records as a result of aircraft sales, the interchange of equipment between different types of aircraft, or that the approval was exclusive to a set of conditions.

3054. AVIONICS INSPECTOR'S RESPONSIBILITY AND ACTION. The extent or potential has not been determined; however, the importance of immediate action by field inspectors toward solving avionics problems and subsequent surveillance cannot be overemphasized. Avionics inspectors should spot check spare equipment and equipment undergoing maintenance at the operator's maintenance base, subcontractor maintenance facilities or certified repair stations. If the nameplate for the equipment checked does not indicate the appropriate approval status, the inspector should ascertain that the operator's records show the method by which the equipment received approval and is used only on aircraft for which it is approved. In the event the approval status cannot be determined, appropriate remedial action should be taken. Avionics inspectors should also ascertain that their assigned operators have established an effective procedure to control the substitution of approved equipment.

3055. MAINTENANCE CERTIFICATION PROCEDURES. These procedures state that: "Major components of ATA Systems 22, 23, 24, 31, 33, 34, and 77 or autopilot systems, communication systems, electrical systems, instrument systems, lighting systems, navigational systems, and engine instruments, respectively, are identified by name, manufacturer, and model number. If the operator chooses not to identify the components on the maintenance Operations Specifications, FAA Form 1014, such components shall be identified in an approved document which is referenced and identified on the specification page. (Future revision should comply with these guidelines.)

3056. ALTERNATE INITIAL ACTION. The surveillance procedure may not be adequate for initial action in some cases and the method and the initial approach to the problem may vary between regions and operators. In these cases a stronger, more concentrated initial effort may be required.

3057.-3070. RESERVED.

SECTION 5. TEST EQUIPMENT APPROVAL

3071. PURPOSE. This section serves as guidance to the inspector in evaluating test equipment to be used during the calibration and repair of airborne avionics equipment.

3072. GENERAL. A repair facility, certificated to maintain airborne avionics equipment, must have test equipment suitable to perform that maintenance. Generally, the test equipment recommended by the appliance manufacturer is acceptable.

3073. TEST EQUIPMENT EQUIVALENCY. Normally, test equiment which is equivalent to that recommended by the appliance manufacturer will be accepted. Before acceptance, a comparison should be made between the specifications of the test equipment recommended by the manufacturer and that of the repair facility. The test equipment should be capable of performing all normal tests and checking all parameters of the equipment under test. The level of accuracy should be equal to or better than that recommended by the appliance manufacturer.

3074. TEST EQUIPMENT UPDATING. As the state-of-the-art advances, new modes and parameters are added to avionics equipment. Previously accepted test equipment may need to be modified to assure compatibility with the equipment to be tested. Surplus military test equipment is frequently purchased by repair facilities to be used as a primary test unit or as a backup in case of failure of the primary test unit. Modification of this equipment is sometimes necessary to update the current standards.

3075. ACCEPTABILITY. There is a wide variety of test equipment which an inspector may be required to evaluate. The quality of this equipment also varies. Regardless of the price, quality, utility, ease of maintenance or operation, the minimum test equipment necessary to properly perform the maintenance should be accepted.

3076. RADIATED VOR MAINTENANCE TEST SIGNALS. The following guidelines should be used during routine surveillance of repair facilities which exercise the privilege of radiating VOR test signals (FAR Section 91.25(b)(1)).

a. Field inspectors should assure that:

(1) The repair facility has secured a radio land test station authorization from the Federal Communications Commission (see AC 170-6C, Use of Radio Navigation Land Test Station and Signal Generators) and,

(2) That the repair facility possesses a copy of the operating and servicing data for the test set, and has established an appropriate inspection and calibration program.

b. The inspector should ascertain that the repair facility has determined that no undesirable bearing errors are generated in the test signal due to the effects of phase shift caused by transmission line or antenna mismatch, or reflections from nearby objects.

c. If areas of poor or inaccurate receptions are detected, these areas should be noted in the repair station inspection procedures manual and adequate precautions or restrictions placed upon their use.

d. The repair station inspection procedures manual should provide instructions to its personnel on the form and content of the entry which must be recorded in the aircraft logbook or permanent maintenance records. The aforementioned entry should specify:

(1) The bearing transmitted by the repair station.

(2) The date of transmission.

(3) The signature of the representative of the repair station certifying the entry. The owner/operator of the aircraft or representative of the repair station may conduct the accuracy check of the VOR receivers and enter the results of such checks in the aircraft logbook or maintenance records.

3077.-3097. RESERVED.

SECTION 6. AUTOMATIC TEST EQUIPMENT (ATE) BUILT-IN TEST EQUIPMENT (BITE)

3098. PURPOSE. This section provides guidance which should be used to determine the adequacy of maintenance procedures and programs predicated on the use of automatic test equipment. This criteria is intended for the application of ATE/BITE to the specific performance evaluation of line replacement units (LRU) only, as tested and inspected by ATE/BITE. It also outlines the responsibilities of the avionics inspector in regard to the acceptance of built-in test equipment when used in lieu of specified conventional manual techniques.

3099. AUTHORITY. The regulatory basis for approval of such test and inspection equipment is contained in FAR Parts 43, 91, 121, 123, 127, 135, and 145, as applicable.

3100. AUTOMATIC TEST EQUIPMENT (ATE). ATE is a self-contained shop test facility made up of programmable stimulus and measurement devices, digital computer hardware, digital computer software, digital computer peripheral equipment and interface devices so configured and integrated as to make possible the rapid, accurate testing and printing of the test results of digital and analog avionics equipment with a minimum of human intervention. The more salient reasons for the use of ATE can be summarized as follows:

a. A number of avionics systems used on present day aircraft are of such complexity that no manual test gear has been designed for their testing. The manufacturers themselves employ ATE for the testing of production units when no manual test gear is available.

b. The general acceptance of ATE to a homogeneous family of avionics equipment results in a significantly lower cost for test gear than would be the case if the usual single purpose test equipment was employed for each removable component.

c. Test results are more reliable and consistent, and are not subject to human judgment or error.

d. Test sequence segments are readily repeatable.

e. Failures are more readily identified, simplifying the manual repairs.

f. ATE offers self-testing features, ensuring that the unit is operating within acceptable tolerance limits.

3101. BUILT-IN TEST EQUIPMENT (BITE). BITE can be classed as a limited form of ATE, with the self-test features built into the airborne component/system. BITE is characterized primarily as a passive fault indicator. If the functional signal flow stops or increases beyond a maximum acceptance level, a warning flag is displayed to indicate a malfunction has occurred. In certain

components/systems, such flag warnings are automatic; in others, the stimulus to activate the system is generated by manual selection of switching devices. Some of the functions or capabilities of BITE are summarized:

a. Functional evaluation identified:

(1) System status.

(2) Malfunction verification.

(a) Go-no-go alarms.

(b) Quantitative. (Capability to provide a quantitative readout, such as either the total system or a subsystem.)

(3) Degraded capabilities.

(a) Marginal circuit operation.

(b) Degree of deterioration of functional mode.

b. Continuous monitoring provides critical monitoring readout.

(1) Continuous direct/readout.

(2) Sampled, recorder/readout.

c. Maintenance provides failure isolation to module and/or subassembly.

3102. INSPECTOR'S RESPONSIBILITY. The avionics inspector has the responsibility for the approval of maintenance programs predicated on the use of ATE/BITE. In automated test systems a mere cursory examination is not sufficient to determine the effectivity of such methods and associated circuitry. Prior to the acceptance of ATE/BITE, the inspector must be assured that the limitations, parameters, and reliability of the testing system are sufficiently superior to the components and/or systems subjected to the test. If the attributes of the testing system have not been clearly defined, recognized, and directly applied to show compliance with the required maintenance actions, then it is incumbent on the inspector to either require a complete reevaluation of such programs or, when necessary, request assistance from the appropriate FAA offices. As a guide, the testing ATE/BITE program must provide:

a. The required in-depth analysis to assure that the aircraft components are functionally tested within the prescribed manufacturer's limits. ATE/BITE systems do not always give indications of malfunctions or failures. Certain parameters may not be monitored adequately, thereby, allowing undetected equipment failures.

b. That the extent and depth of the ATE/BITE testing is equivalent to that specified by the manufacturers.

c. That all required checks are, in fact, accomplished.

d. That the manufacturer shows the reliability of the ATE/BITE (including self-monitoring) is such that the probability of an unannunciated failure is less than 10^{-5} or 1 per 100,000 hours of operation.

3103. GENERAL PRACTICES - ATE. A certificated maintenance facility should be permitted to use ATE with FAA approval when it has shown that the requirements outlined below have been fulfilled.

a. The facility or operator must establish an approved manual outlining and describing the total program and related management control for the ATE unit. In summary, the manual should be sufficiently detailed to meet the requirements specified in pertinent and applicable FAA regulations, including:

(1) Limits and standards.
(2) Performance evaluation checks and tests.
(3) Maintenance programs.
(4) Source of ATE program tape, either in-house programming or purchase.

b. Each component maintenance/overhaul manual should be supplemented with a section identifying each ATE test by number and the ATE language referenced to the pertinent section of the component manual.

c. Operators purchasing maintenance service, including ATE programs, are responsible for assuring that all services are accomplished in accordance with the operator's approved maintenance program. FAR Section 145.2 specifies the repair stations' responsibilities.

d. All pertinent recordkeeping requirements must be fulfilled.

NOTE: See flow chart Figure 8-2, which may be used as a guide to evaluate a facility's ATE program and control.

3104. GENERAL PRACTICES - BITE. As a maintenance tool, all applications of BITE require a performance evaluation prior to its acceptance as a substitute for manual testing. BITE may be broadly applied and may not necessarily perform the full tasks implied by its name. It is the responsibility of the inspector to assure that, whenever a BITE test is substituted for a manual check, it performs the required qualitative and quantitative tests and analyses to substantiate the performance of the component and/or system.

a. Prior to approving BITE as a substitute for actual manual checks, the inspector should be assured that the self-check is of sufficient depth to perform the required task. Inspectors should not be misled by such statements as "confidence factor" which have no specific meaning unless defined.

b. An analysis of BITE should include its limitations and show whether it does check the component and its associated plugs, wiring and components. Some quantitative BITE may not be capable of checking a total system, such as ILS, unless a signal is introduced into the antenna.

3105.-3120. RESERVED.

FIGURE 8-2. FLOW CHART

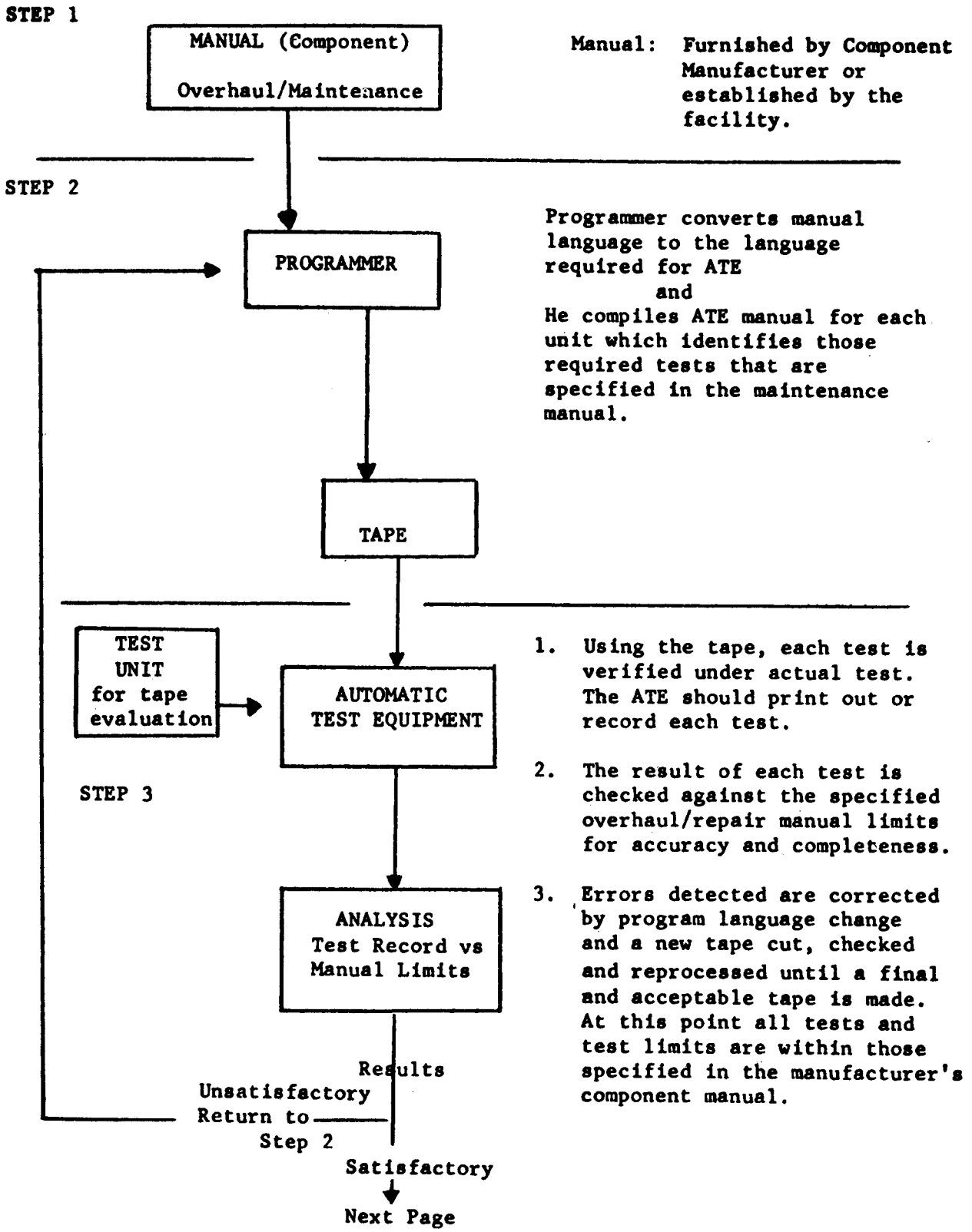


FIGURE 8-2. FLOW CHART (Continued)

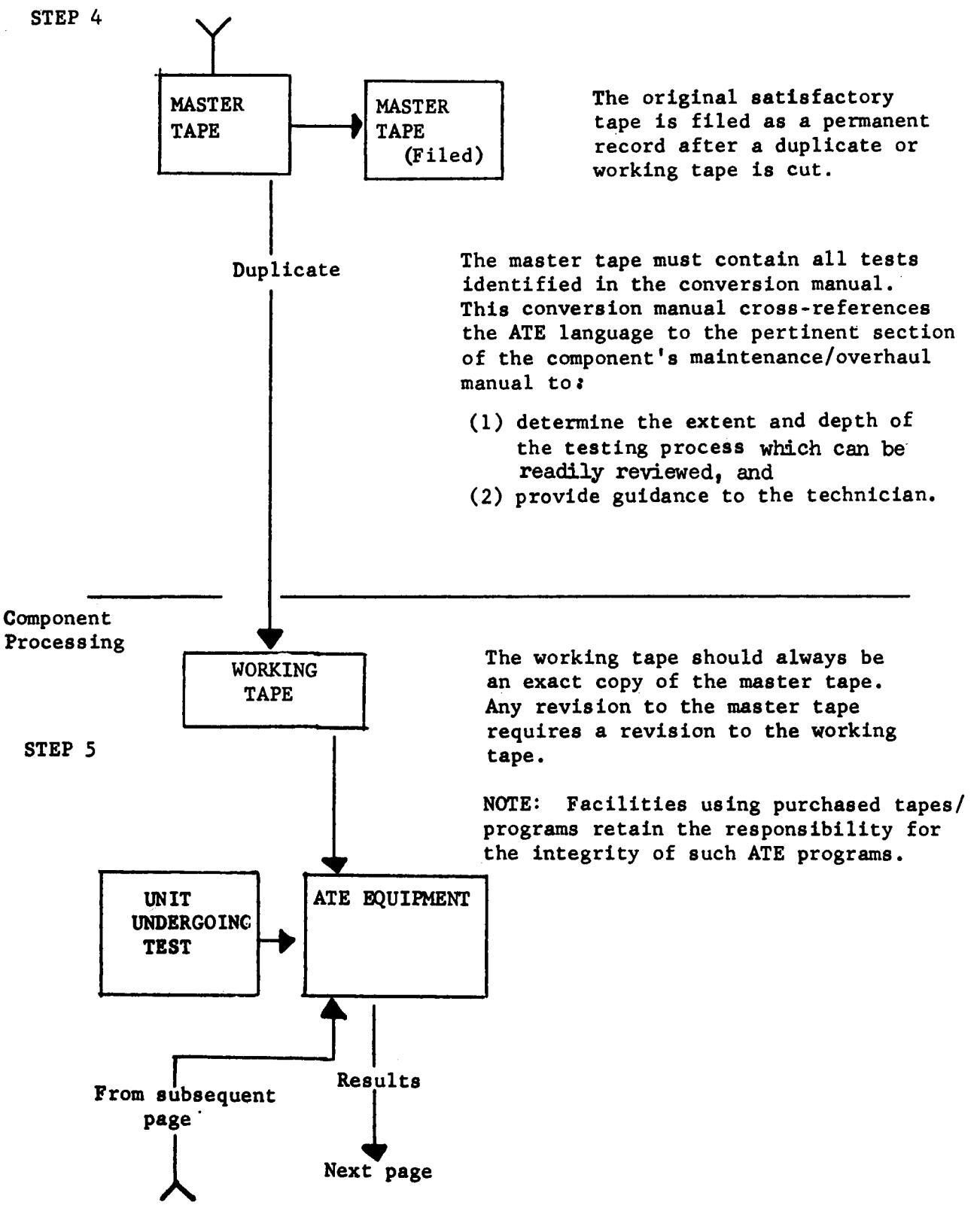
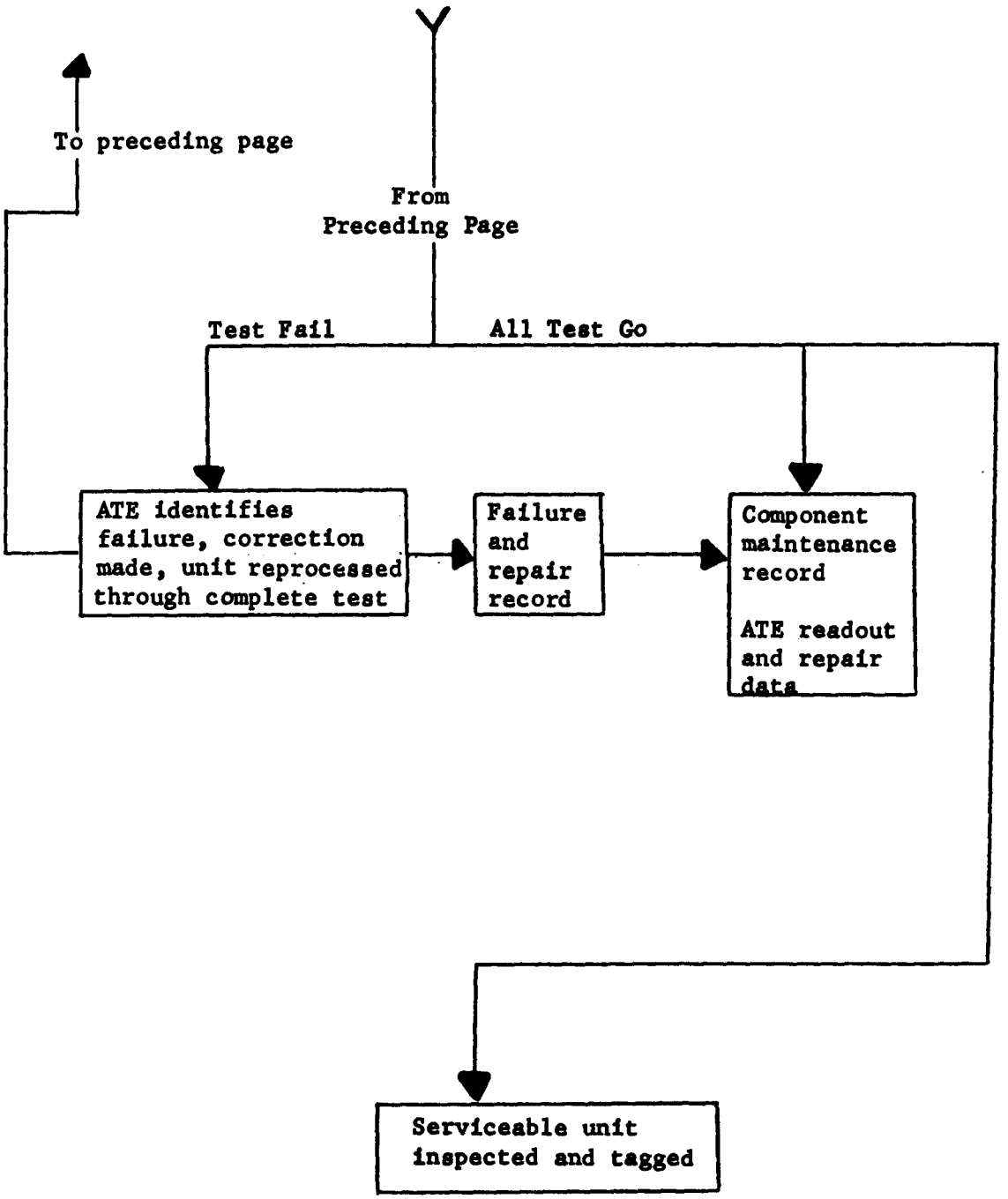


FIGURE 8-2. FLOW CHART (Continued)



SECTION 7. APPROVAL OF AREA NAVIGATION SYSTEMS

3121. PURPOSE. This section provides guidance to avionics inspectors concerning the approval of area navigation systems equipment and installation.

3122. BACKGROUND. A number of operators are installing a variety of equipment for use on area navigation RNAV routes. FAR Part 121, Appendix G, outlines the requirements for the Doppler and Inertial Navigation System (INS). Additional information is contained in Advisory Circular AC 90-45A, Approval of Area Navigation Systems for Use in the U.S. National Airspace Systems; AC 121-13, Self-Contained Navigation Systems (Long-Range); and AC 25-4, Inertial Navigation Systems.

3123. FAA APPROVALS. The requirements specified in FAR Part 121, Appendix G, for the INS and Doppler must be met prior to formal approval of such systems. These requirements make it necessary that a Supplemental Type Certificate (STC) be obtained by the applicant.

a. Installation Approvals of Other Types of Area Navigation Equipment. Approval for such operation should be obtained with an STC; however, approval can also be obtained by submission of substantiating data with either an FAA Form 337 or an air carrier engineering authorization.

b. Installation Data. The applicant should furnish all installation data necessary for determining adequacy of installation. Such data should include:

(1) Manufacturer's instructions.

(2) Electrical schematics and failure protection.

(3) Installation information and/or photographs.

(4) Substantiation of structural changes.

(5) Determination of capability of electrical system and failure protection to handle additional load.

(6) Any other data necessary for approval.

c. Special Precautions. Particular attention should be paid to:

(1) Manufacturer's instructions and limitations, including necessary modification and calibration of all units in the system and previously installed equipment.

(2) Interface with auxiliary equipment, sensor inputs, meter loading and sensitivity, etc.

(3) Any reasonable probable failure of the equipment which would cause a flight hazard or affect the normal operation of required equipment to which it is connected.

(4) Display location.

d. Conformity Inspection. A conformity inspection should be made to ensure the installation conforms to the approved data.

e. Ground Inspection. A ground operational/functional check should be performed to ensure that the system functions properly and safely. A check for radio frequency interference should be made with all normally used aircraft systems operating.

f. Inspector Participation. The approving inspector may participate in ground and conformity inspections when he/she deems it necessary. Close surveillance of ground and conformity inspections should be maintained on the first installation of each installing facility.

g. Data Approved Alternatives. Manufacturer service bulletins (FAA-approved) which list approved instructions for the installation of certain area navigation systems may be used.

h. Field Approvals. In some cases, the facility making the installation has demonstrated its ability to install this equipment on a representative number of similar type installations through field approvals. References to previous approvals on FAA Form 337 would constitute previously-approved data and may not require a separate field approval. In this case, a letter of approval from the GADO or FSDO, to the installation facility authorizing similar installations, would be appropriate.

i. Alterations using data which do not differ appreciably from a previously approved alteration may not require new or additional approval.

j. Where no prior approval has been given, an STC should be requested or a properly executed FAA Form 337 indicating field approval should be used. Each person approving the aircraft for return-to-service should comply with the provisions of FAR Section 43.9 as to the content, form, and disposition of the record.

3124. VFR APPROVAL. An installation may be approved for VFR operation after meeting the provisions of Paragraph 3123 of this section. The aircraft should be placarded to limit the use of the area navigation system to VFR operation only. (Systems do not require VFR approval prior to IFR approval.)

3125. IFR APPROVAL. The application for IFR approval should contain data substantiating that the equipment and installation meet the criteria in AC 90-45A, Appendix A. In addition to Paragraph 3123 of this section, the applicant should provide the following:

a. Bench Tests. The bench test data referred to in AC 90-45A should be submitted by the applicant. A manufacturer's certification that he/she has performed the tests and that the equipment meets the criteria will be acceptable. If the data does not contain a manufacturer's certification of accuracy, a complete analysis of bench test data must be made, unless previous approval has been obtained on identical equipment (including computer, VOR, DME, and display unit combination). The accuracy analysis, which is an engineering process that may involve computer processing, is normally accomplished by engineering. The field inspector may elect to analyze this data, but action should be taken to ensure that sensor input equipment, such as VOR and DME, meet the criteria in AC 90-45A, Appendix A, paragraph 2, which includes accuracy and environmental criteria.

b. Flight Checks.

(1) A functional flight check should be made to determine that the installation will perform operationally. Gross error checks should be made of en route and terminal accuracies. When practical, at least one checkpoint, listed in Tables 1 and 2 of AC 90-45A, should be checked by a low altitude fly over. Antenna location should be checked by maneuvering the aircraft through climb, descent, and bank angles which will be encountered during normal operation.

(2) If the equipment is to be approved for use during approach, at least one accuracy flight check should be made to ensure the equipment performs to the accuracy in Table 3 of AC 90-45A.

(3) The approving inspector may observe the flight check if necessary.

c. Operating Limitations. Information on equipment operating limitations should be provided to the pilot by placard or in conjunction with the flight manual revision.

d. Operations Specifications. After the equipment and installation are approved, air carrier operators, prior to using the area navigation equipment, will obtain operational approval by amendment to their operations specifications.

3126. ORIGINAL VFR APPROVAL CHANGED TO IFR APPROVAL. Numerous area navigation systems have been installed in a variety of aircraft with the intent of using the equipment for VFR operations only. Subsequently, the owner/operator may desire to upgrade the system to allow for IFR operation as well. The following procedures apply to this type of approval:

a. When a request is received for IFR approval of a formerly VFR only installation, FAA Form 337 should be prepared on which the approval for IFR operations will be properly documented. Item 8 of FAA Form 337 should provide at least the following data:

(1) Reference to the FAA Form 337 which recorded the original VFR area navigation system installation.

(2) Data to confirm that the requirements of AC 90-45A, Appendix A, paragraphs 2 and 3, have been met. (Reference paragraph 3125 of this section.)

(3) If a flight test is conducted, include a statement to indicate and a statement to document the modes of IFR operation for which the system is being approved.

b. The alteration approval stamp, properly completed (reference Chapter 3, Section 3, of this Order), should be placed in Block 3 of FAA Form 337 after a conformity inspection is performed by the inspector approving the system for IFR operation.

c. If the aircraft has an FAA-approved flight manual, a supplement to the manual may be prepared and submitted for approval in accordance with regional procedures. A copy of the FAA Form 337 (see subparagraph a(1) above) giving details of the original installation must accompany the flight manual supplement approval request in addition to a copy of the FAA Form 337 prepared in accordance with this Order. The date of the flight manual supplement should be the same as the approval for return-to-service as shown on the FAA Form 337.

d. If the aircraft does not have an FAA-approved flight manual then information on equipment operating limitations and manufacturer's operating instuctions will be provided to the pilot by means of a placard.

3127. MAJOR REPAIR AND ALTERATION, FAA FORM 337. Date or certification of flight and bench tests should be made a matter of record on the FAA Form 337 before approval is given. Limitations on types of approval such as "RNAV limited to VFR only," "RNAV limited to VFR and IFR en route only," etc., and any other limitations should be clearly stated in Block 8 of the FAA Form 337 and on the approved operations specification (if required).

3128. ENGINEERING ASSISTANCE. Engineering assistance should be obtained for field approval unless the inspector has previous experience with area navigation installations and feels competent to make such approval. Engineering assistance can be obtained even though an STC is not involved in the approval.

3129. AIR CARRIER MAINTENANCE TRAINING PROGRAM. Training programs should be established on new equipment and existing programs on previously installed equipment should be reviewed. Spot checks of records and observation of actual training sessions should be made. Emphasis should be placed on training conducted on new equipment and new maintenance techniques, procedures, and standards.

3130.-3150. RESERVED.

SECTION 8. APPROVAL OF MICROWAVE LANDING SYSTEM

3151. PURPOSE. This section provides guidance to avionics inspectors relative to approval of microwave landing system (MLS).

3152. BACKGROUND. The increased usage of short take-off landing ("STOL") and air taxi commerical operator ("ATCO") service within the national airspace system has created a need for higher utilization of low density airports. This can be accomplished by installation of ILS navigation aids to allow lower landing minimums. However, frequency, congestion, siting, and fiscal problems, etc., preclude widespread use of the present generation of VHF/UHF/ILS. The need for a system to satisfactorily replace the VHF/ILS has prompted industry to develop a number of wide angle, scanning microwave landing systems (MLS). Several of these systems are being tested and evaluated by the FAA, and some operators have been granted authorization for their use as a landing aid during IFR conditions. FAR Part 171 provides standards for approval of the interim standard microwave landing system (ISMLS). However, this does not preclude the approval of other MLS equipment for private authorization through operators, provided assurance is obtained that the systems and operational requirements are met (reference Order 8260.30, IFR Approval of Microwave Landing Systems (MLS)).

3153. SYSTEM DESCRIPTION. A microwave landing system, such as tactical landing approach radar (TALAR), that provides horizontal and vertical guidance for instrument approaches, basically consists of a ground transmitter which radiates microwave (15.5 GHz) guidance signals and an airborne receiver that interprets the radiated data. These guidance signals drive standard crosspointer indicators, or other similar instruments, to provide localizer and glideslope steering signals similar to the standard ILS.

a. The TALAR ground transmitter sequentially radiates two pairs of microwave beams, and by frequency coding establishes localizer and glideslope signals. The transmitter is 25" x 25 1/2" x 10", tripod mounted, and located in the vicinity of the runway threshold. The beams are electronically switched at a rate of 134 Hz, and produce a conical scan. The center is the boresight (localizer course and glideslope path), and the apex is the transmitter.

b. The airborne system consists of an antenna-receiver unit and an amplifier unit. A control head may or may not be required depending on the model installed. Certain models operate on a single frequency; therefore, no control head is necessary. Other models are multiple channel and will require a control head. Instrumentation can be provided by any standard deviation indicator.

3154. APPROVAL. The private use of MLS may be categorized as a non-Federal navigation facility and, as such, its adoption or use would come under the provisions of FAR Part 171.

3155. GENERAL. Each MLS must be certified by the sponsor; i.e., owner of the ground station as to its operational reliability to support commercial aviation instrument operations. The avionics inspector's prime area of responsibility is approval of the sponsor's/operator's ground facility and airborne receiver