



U.S. Department of
Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: **MINIMUM EQUIPMENT REQUIREMENTS
FOR GENERAL AVIATION OPERATIONS
UNDER FAR PART 91**

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1. PURPOSE. This advisory circular (AC) describes acceptable methods for the operation of aircraft under Federal Aviation Regulations (FAR) Part 91 with certain inoperative instruments and equipment which are not essential for safe flight.

a. These acceptable methods of operation are:

(1) Operation of aircraft with a Minimum Equipment List (MEL), as authorized by FAR § 91.213(a).

(2) Operation of aircraft without an MEL under FAR § 91.213(d).

b. This AC also explains the process for obtaining Federal Aviation Administration (FAA) approval of an MEL.

2. RELATED FAR SECTIONS. The following FAR provide additional information on operations with or without a FAR Part 91 MEL:

a. FAR § 43.9: Content, form, and disposition of maintenance, preventive maintenance, rebuilding, alterations, and alteration records (except inspections performed

in accordance with FAR Parts 91, 123, and 125 and FAR §§ 135.411(a)(1) and 135.419).

b. FAR § 43.11: Content, form, and disposition of the records for inspections conducted under FAR Parts 91 and 125 and FAR §§ 135.411(a)(1) and 135.419.

c. FAR § 91.205: Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.

d. FAR § 91.405: Maintenance required.

3. FORMS AND REPORTS. The FAA Flight Standards District Office (FSDO) contacted by an MEL applicant provides the applicant a Master Minimum Equipment List (MMEL) for the applicant's particular aircraft.

4. RELATED READING MATERIAL. Users of this AC will find detailed background and indepth information in the Federal Register, Vol. 53, No. 239, December 13, 1988. The public may obtain copies of this issue of the Federal Register from the FAA, Office of Public Affairs, Public Inquiry Center, APA-230, 800 Independence Ave., SW., Washington, DC 20591.

5. BACKGROUND. Except as provided in FAR § 91.213, all instruments and equipment installed on an aircraft must be operative in order for the operator to operate it. However, the FAA recognized that safe flight can be conducted under the MEL concept and under specific conditions with inoperative instruments and equipment.

a. Regulatory History. Until the most recent change to FAR § 91.213, the MEL concept applied only to air carrier and commercial operations and general aviation operators of multiengine aircraft for which FAA had developed an MMEL. Operators of aircraft for which FAA had not developed an MMEL had to comply with FAR § 91.405. This section required that all aircraft discrepancies occurring between required inspections had to be repaired in accordance with FAR Part 43 before the aircraft could be operated. This meant that all the aircraft's instruments and equipment, regardless of whether they were essential or not to the flight operation conducted, had to be operative. This requirement often placed a burden on operators.

b. Amendments to FAR Part 91. Over the past decade, the FAA initiated several rulemaking projects to alleviate the regulatory burden of FAR § 91.405. Before the issuance of a final rule change, FAA encouraged public and industry participation, accepted and reviewed public comments, and conducted public hearings which were attended by other Government agencies and the industry.

(1) The FAA briefly suspended FAR § 91.213 and allowed issuance of MEL's by exemption. During this period, the FAA gained valuable information on the usefulness and safety aspects of using MEL's in general aviation.

(2) Further, general aviation operators have a history of safe operations using FAR § 91.205 as the sole reference for determining the instrument and equipment requirements for a particular flight.

(3) However, operators indicated the need for relief from FAR § 91.405, and the FAA agreed that the FAR should reflect current operational practices. Consequently, the FAA amended FAR Parts 43 and 91 in December 1988.

c. New Regulatory Requirements. The amendment to FAR Parts 43 and 91 provides a regulatory basis for the operation of aircraft with inoperative instruments and equipment. Operators conduct these operations within a framework of a controlled program of maintenance inspections, repairs, and parts replacement. However, operators must exercise good judgement and have, at each required inspection, any inoperative instrument or equipment repaired or inspected or the maintenance deferred, as appropriate.

6. DEFINITIONS.

a. Aircraft Evaluation Group (AEG). The AEG is the FAA office responsible for the development and publication of an approved MMEL for those aircraft within its area of responsibility.

b. Aircraft Flight Manual (AFM). The AFM is the source document for operational limitations and performance for an aircraft. The term AFM can apply to either an airplane flight manual or a rotorcraft flight manual. FAA requires an AFM for type certification. The responsible FAA Aircraft Certification Office (ACO) approves an AFM.

c. Aircraft Maintenance Manual (AMM). The AMM is the source document for maintenance procedures for an aircraft. The term AMM can apply to either an airplane maintenance manual or a rotorcraft maintenance manual. FAA requires the AMM for type certification.

d. Airworthiness Directive (AD). An AD is a mandatory airworthiness requirement for a particular make and model aircraft or installed equipment. An AD is supplementary to the aircraft original airworthiness approval.

e. Air Transportation Association (ATA) Numbering System. The standard ATA numbering system refers to systems on different aircraft in a standardized manner. MMEL's use the ATA numbering system.

f. Calendar Days include all days, with no exclusion for weekends and holidays.

g. Deactivation means to make a piece of equipment or an instrument unusable to the pilot/crew by preventing its operation.

h. Deferred Maintenance is the postponement of the repair or replacement of an item of equipment or an instrument.

i. Equipment List is an inventory of equipment installed by the manufacturer or operator on a particular aircraft.

j. Flight Operations Evaluation Board (FOEB). The FOEB is composed of FAA personnel who are operations, avionics, airworthiness, and aircraft certification specialists. The FOEB develops an MMEL for a particular aircraft type under the direction of the AEG.

k. Inoperative means that a system and/or component has malfunctioned to the extent that it does not accomplish its intended purpose and/or is not consistently functioning normally within its approved operating limits or tolerances.

l. Kinds of Operations List (KOL). The KOL specifies the kinds of operations (e.g., visual flight rules (VFR), instrument flight rules (IFR), day, or night) in which the aircraft can be operated. The KOL also indicates the installed equipment that may affect any operating limitation. Although the certification rules require this information, there is no standard format; consequently, the manufacturer may furnish it in various ways.

m. Letter of Authorization (LOA). The FSDO issues an LOA to the operator when the FSDO authorizes the operator to operate under the provisions of an MEL. Together, the LOA, the procedures document (paragraph v. following), and the MMEL constitute a Supplemental Type Certificate (STC). The operator must carry the STC in the aircraft during its operation.

n. Maintenance is the inspection, overhaul, repair, preservation, or replacement of parts. This definition excludes preventive maintenance (see paragraph u. following). After a mechanic performs maintenance, other than preventive maintenance, a properly certificated maintenance person must approve the aircraft for return to service.

o. MMEL. An MMEL contains a list of items of equipment and instruments that may be inoperative on a specific type of aircraft (e.g., BE-200, Beechcraft model 200). It is also the basis for the development of an individual operator's MEL.

p. MEL. The MEL is the specific inoperative equipment document for a particular make and model aircraft by serial and registration numbers; e.g., BE-200, N12345. A FAR Part 91 MEL consists of the MMEL for a particular type aircraft, the MMEL's preamble, the procedures document, and a LOA. The FAA considers the MEL as an STC. As such, the MEL permits operation of the aircraft under specified conditions with certain equipment inoperative.

q. Next Required Inspection is the one required under either an FAA-approved inspection program, a 100-hour inspection, or an annual inspection, as appropriate.

r. Operations (O) and Maintenance (M) procedures in the MMEL refer to the specific maintenance procedures the operator uses to disable or render items of equipment inoperative and to specific operating conditions and limitations, as appropriate.

(1) An O symbol in column 4 of the MMEL indicates that a specific operations procedure must be accomplished before or during operation with the listed item of equipment inoperative. Normally, the flightcrew accomplishes these procedures; however, other personnel, such as maintenance personnel, may be qualified and authorized to perform the procedure.

(2) An M symbol in column 4 of the MMEL indicates that a specific maintenance procedure must be accomplished before beginning operation with the listed item of equipment inoperative. Normally, maintenance personnel accomplish these procedures; however, other personnel, such as the flightcrew, may be qualified and authorized to perform certain functions. Qualified maintenance personnel must perform procedures requiring specialized

knowledge, skills, or the use of tools or test equipment.

s. Operator refers to an individual or company (corporation, entity, etc.). As used in this AC, operator applies to those who are applicants for, or holders of, authority to conduct operations under the provisions of a FAR Part 91 MEL.

t. Placard is a decal or label with letters at least 1/8-inch high. The operator or mechanic must place the placard on or near inoperative equipment or instruments so that it is visible to the pilot or flightcrew and alerts them to the inoperative equipment.

u. Preventive Maintenance. The term preventive maintenance refers to simple or minor preservation operations and/or the replacement of small standard parts not involving complex assembly. FAR Part 43, Appendix A(c), contains a list of preventive maintenance items. Qualified mechanics or certificated pilots may accomplish preventive maintenance and approve the aircraft for return to service.

v. Procedures Document as referred to in this AC pertains to a separate document containing the O and M procedures developed by the operator and any other operating information applicable to operation with an MEL, such as the "as required by the FAR" items that list the FAR by part and section or stipulate the operating conditions.

w. Proposed Master Minimum Equipment List (PMMEL). The PMMEL is the working document used as the basis for development of the MMEL. Normally, the manufacturer proposes it during the certification process. However, an operator of a unique type aircraft, for which an MMEL does not exist, may submit a PMMEL for FAA approval.

x. **Return to Service.** Return to service has two applications. An appropriately certificated person approves an aircraft for return to service after an inspection or after maintenance. A certificated pilot, in fact, returns the aircraft to service after the pilot conducts an appropriate preflight and accepts the aircraft for an intended flight.

y. **Small Aircraft** means aircraft with a maximum certificated takeoff weight of 12,500 pounds or less.

z. **STC.** An STC is a major change in type design not great enough to require a new application for a type certificate under FAR § 21.19. An example would be installation of a powerplant different from what was included in the original type certificate.


aa. **Type Certificate Data Sheets (TCDS)** and Specifications are documents issued

by the FAA which describes the aircraft's airworthiness requirements relating to a specific type, make, and model of aircraft. These documents are available at a FSDO.

7. COMMENTS INVITED. Comments regarding this publication should be directed to:

Federal Aviation Administration
Field Programs Division, AFS-500
Advisory Circular Staff
P.O. Box 20034, Gateway Building
Dulles International Airport
Washington, DC 20041-2034

Every comment will not necessarily generate a direct acknowledgement to the commenter. Comments received will be considered in the development of upcoming revisions to AC's or other related technical material.


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CHAPTER 1. GENERAL

1. APPLICABILITY. This AC provides guidance for the operation of the following aircraft under FAR Part 91:

a. Aircraft for which no MMEL has been developed by the FOEB:

- (1) Rotorcraft.
- (2) Nonturbine-powered airplanes.
- (3) Gliders.
- (4) Lighter-than-air aircraft.

b. Aircraft for which an MMEL has been developed but for which the FSDO has not authorized operation with an MEL.

- (1) Small rotorcraft.
- (2) Nonturbine-powered small single and multiengine airplanes.

c. All other aircraft which have an MEL or for which an operator seeks MEL authorization under FAR § 91.213.

d. An operator may operate an aircraft for which FAA has issued an original Experimental airworthiness certificate in accordance with FAR § 91.213 only when authorized in that certificate's operating limitations.

e. This AC does not apply to operators holding certificates issued under FAR Parts 121, 125, 129, and 135.

f. Holders of letters of full deviation authority from FAR Part 125 and operating under FAR Part 91, Subpart F, may apply for

authorization to operate with a FAR Part 91 MEL.

2. MEL VS. FAR § 91.213(d). Although FAA amended FAR Part 91 to provide relief to operators under the MEL concept, some operators may find it less burdensome or less complicated to operate under the provisions of FAR § 91.213(d). The applicant should discuss the requirements of each method with FSDO inspectors to decide which method of compliance better suits the particular operation. Appendix 3 contains a list of commonly asked questions which may assist in the decision.

a. An MEL is a precise listing of instruments, equipment, and procedures that allows an aircraft to be operated under specific conditions with inoperative equipment. The MMEL, as part of the MEL, by nature does not cover equipment installed or modified under other STC's. Any STC or other major modification may make the MMEL invalid for a particular modified aircraft.

b. The FAR require that all equipment installed on an aircraft in compliance with the airworthiness standards and operating rules be operative. The FAA-approved MMEL includes those items of equipment and other items which the FAA finds may be inoperative and yet maintain an acceptable level of safety. Obviously, the MMEL does not contain required items such as wings, flaps, rudders, etc. When a FAR Part 91 operator uses an MMEL as an MEL, all instruments and equipment not covered in the MMEL must be operative at all times regardless of the operation conducted, unless:

- (1) They are newly installed and are not instruments or equipment specifically required by the airworthiness rule under which

the aircraft is type certificated, required by AD, or required for specific operations under FAR § 91.213(b)(1)-(3), such as Traffic Alert and Collision Avoidance System (TCAS), an extra piece of navigational equipment, a windshear detection device, a ground proximity warning system, a radar altimeter, passenger convenience items, etc.;

(2) The operator has developed procedures for disabling or rendering them inoperative; and

(3) The operator has contacted the FSDO having oversight within 10 calendar days following an installation and requested that the equipment be added to the MMEL.

(i) The operator must furnish the following information:

(A) A copy of the STC or FAA Form 337, Major Repair and Alteration, that approved each equipment installation and the associated limitations listed in the AFM supplement or on the 337. The FOEB needs this information to account for installation differences as well as for maintaining MMEL relief that is consistent with the limitations.

(B) A system description that details sufficiently the interface of the equipment with the crew; i.e., location, controls, operations, how it is used, etc.

(C) A statement that describes the transfer of function when the equipment is inoperative; i.e., not required for the flight, as per crew procedures, because of alternate systems, etc.

(ii) If the FAA determines that the equipment has been previously considered by

the FOEB for inclusion in the MMEL and denied, or if the FOEB convenes and denies inclusion, the FAA will not grant relief. The equipment must be operational before aircraft can take off.

(iii) If the FOEB determines that the equipment should be added to the MMEL, the operator will receive the updated MMEL and must prepare O and M procedures for that piece of equipment.

c. If FAA has not authorized operating with an MEL for an operator's specific aircraft, the operator may apply for an MEL (Chapter 3, paragraph 20). However, the operator can always elect to operate without an MEL under the provisions of FAR § 91.213(d).

(1) FAR § 91.213(d) requires only those instruments listed in FAR § 91.213(d)(2) to be operative.

(2) The operator can operate the aircraft with those instruments and equipment not listed in FAR § 91.213(d)(2) inoperative.

3. RELATIONSHIP BETWEEN THE PMMEL, THE MMEL, AND THE MEL. When an aircraft is first manufactured, the FOEB determines the minimum operative instruments and equipment required for safe flight in that aircraft type in each authorized operating environment. During the type certification process, the manufacturer submits a PMMEL to the FOEB. Based on its determinations, the FOEB reviews the PMMEL and develops an MMEL from it. Once the FOEB approves the MMEL, a copy is available to each FSDO via an automated system that allows the FSDO to

download the MMEL onto a diskette or hard copy. The FSDO provides MMEL's to applicants to use, along with the procedures document, preamble, and LOA, as an MEL.

a. As technology changes and new equipment becomes available, the FOEB will reconvene to develop new MMEL's or to revise and update existing ones.

b. When an FOEB makes a change to an MMEL, all operators using that MMEL as their MEL will receive a postcard advising them of the revised MMEL. The FSDO provides operators copies of the revised MMEL. The operator then makes the necessary changes to the procedures document through the normal revision process (Chapter 3, paragraph 22).

4. SINGLE- AND MULTIENGINE MEL'S. The FAA has developed MMEL's for most of the FAA type certificated aircraft in general service today. All multiengine airplanes have an MMEL that is specific to the type design; e.g., Beech Baron, BE-58. The FAA has developed a generic, single-engine MMEL to provide to operators of single-engine aircraft.

5. AIRCRAFT FOR WHICH NO MMEL HAS BEEN DEVELOPED.

a. If an FOEB has not developed an MMEL for a certain type of rotorcraft, nonturbine-powered airplane, glider, or lighter-than-air aircraft, that aircraft may be operated with inoperative equipment under the provisions of FAR § 91.213(d).

b. In those cases where an operator has an older or rare design aircraft that has no MMEL, the operator may submit a PMMEL to the appropriate FOEB for evaluation. Once the AEG approves the MMEL, the operator could use it as

the MEL along with the other required documents.

6. MEL RESTRICTIONS. Operators of small rotorcraft, nonturbine-powered small single- and multiengine airplanes, and other aircraft for which a MMEL has been developed, may elect to operate with a MEL or under the provisions of FAR § 91.213(d). However, the latter option does not apply if the aircraft has an MEL approved under FAR Parts 121, 125, 129, or 135. For example, an owner has leased an aircraft to an air carrier operator, and the air carrier operator has applied for and received an approved MEL for FAR Part 135 operations. Compliance with such an MEL is mandatory, even during FAR Part 91 operations. If the operator wants to operate under FAR § 91.213(d), the operator would have to surrender the MEL authorization.

7. REMOVAL OR DEACTIVATION. When an operator elects to operate without an MEL, any inoperative instrument or equipment must either be removed (FAR § 91.213(d)(3)(i)) or deactivated (FAR § 91.213(d)(3)(ii)), then placarded.

a. Removal of any item of equipment that affects the airworthiness of an aircraft requires following an approved procedure. A properly certificated maintenance person must record the removal in accordance with FAR § 43.9. A person authorized by FAR § 43.7 must make the appropriate adjustments to the aircraft's weight and balance information and the equipment list, fill out and submit FAA Form 337, and approve the aircraft for return to service.

b. The operator must evaluate any proposed deactivation to assure there is no adverse effect that could render another system less than fully capable of its intended function.

(1) A certificated pilot can accomplish deactivation involving routine pilot tasks, such as turning off a system. However, for a pilot to deactivate an item or system, that task must come under the definition of preventive maintenance in FAR Part 43, Subpart A.

(2) If the deactivation procedures do not fall under preventive maintenance, a properly certificated maintenance person must accomplish the deactivation. The maintenance person must record the deactivation in accordance with FAR § 43.9 (figure 1, Sample Maintenance Record Entries.).

c. Placarding can be as simple as writing the word "inoperative" on a piece of masking tape and attaching it to the inoperative equipment or to its cockpit control. Placarding is essential since it reminds the pilot that the equipment is inoperative. It also ensures that future flightcrews and maintenance personnel are aware of the discrepancy.

8. INOPERATIVE EQUIPMENT AND REQUIRED INSPECTIONS. An operator may defer maintenance on inoperative equipment that

has been deactivated or removed and placarded inoperative.

a. When the aircraft is due for inspection in accordance with the FAR, the operator should have all inoperative items repaired or replaced.

b. If an owner does not want specific inoperative equipment repaired, then the maintenance person must check each item to see if it conforms to the requirements of FAR § 91.213(d). The operator and maintenance personnel should also assess how permanent removal of the item could affect safe operation of the aircraft.

(1) The repair interval categories (A, B, C, D, etc.) in the MMEL do not apply to FAR Part 91 MEL's.

(2) The maintenance person must furnish the owner/operator with a signed and dated list of all discrepancies not repaired.

(3) The maintenance person must ensure that each item of inoperative equipment that is to remain inoperative is placarded appropriately.

Placard (Minimum 1/8-inch high letters)

Landing Light Inoperative:

PREVENTIVE MAINTENANCE ENTRY:

(DATE) Total time _____ hours. Landing light bulb removed in accordance with (manufacturer) maintenance manual, Chapter _____, page _____. Landing light switch placarded inoperative.

Pilot's Signature

Certificate Number

Placard (Minimum 1/8-inch high letters)

Aircraft Heater Inoperative:

MAINTENANCE ENTRY (FAR §43.9):

(DATE) Total time _____ hours. Aircraft heater and control switch deactivated by capping heater fuel lines in accordance with (manufacturer) maintenance manual, Chapter _____, page _____. Heater control switch placarded inoperative.

Mechanic's Signature

Certificate Number

Figure 1. Sample Maintenance Record Entries

9.-12. RESERVED.

CHAPTER 2. CONDUCTING OPERATIONS WITHOUT AN MEL

13. APPLYING FAR § 91.213(d). This chapter provides guidance for operators who elect to conduct flight operations under the provisions of FAR § 91.213(d). Operating under FAR § 91.213(d) requires no application to or approval from FAA. An operator, after operating under FAR § 91.213(d), may elect at any time to apply for authorization to operate under an MEL (Chapter 3).

14. THE DECISION SEQUENCE. Figure 2 is a flow chart depicting the typical sequence of events a pilot or operator, operating under FAR § 91.213(d), should follow when the pilot or operator discovers inoperative equipment. For example, during a preflight inspection for a VFR-day, cross-country flight, the pilot discovers that the number 2 automatic direction finder (ADF) head is inoperative.

a. The pilot checks the aircraft's equipment list or KOL to see if the number 2 ADF is a required item (FAR § 91.213(d)(2)(ii)). If the number 2 ADF is required in the equipment list or KOL, the aircraft is not airworthy. The operator must have the number 2 ADF replaced or repaired before operating the aircraft. In this example, the number 2 ADF is not a required item on the equipment list.

b. Next, the pilot checks the airworthiness regulation under which the aircraft was certificated to determine if the number 2 ADF is part of the VFR-day type certificate (FAR § 91.213(d)(2)(i)). (These requirements are summarized in a TCDS, copies of which are available at FSDO's or from qualified maintenance personnel.) If the number 2 ADF is required as part of the VFR-day type certification, the aircraft is not airworthy. The operator must have the number 2 ADF replaced

or repaired before operating the aircraft. In this example, the number 2 ADF is not required by type certification.

c. Next, the pilot checks to see if an AD requires the number 2 ADF. The pilot can accomplish this by checking the aircraft's maintenance logs to see if the number 2 ADF was installed as a result of an AD. However, it may be necessary for the pilot to consult a qualified maintenance person to determine AD compliance. If an AD requires the number 2 ADF to be operative, the aircraft is not airworthy. The operator must have the number 2 ADF replaced or repaired before operating the aircraft. In this example, there is no AD requiring the number 2 ADF to be operative.

d. Next, the pilot checks to see if the number 2 ADF is required by FAR §§ 91.215, 91.205, or 91.207. The pilot can accomplish this by checking those sections of the FAR or by consulting with a maintenance technician or FSDO personnel. If any of those sections of the FAR require a number 2 ADF, then the aircraft would not be airworthy with the number 2 ADF inoperative. The operator must have the number 2 ADF replaced or repaired before operating the aircraft. In this example, those sections of the FAR do not require the number 2 ADF to be operative.

e. At this point the inoperative number 2 ADF must either be removed from the aircraft (FAR § 91.213(d)(3)(i)) or deactivated (FAR § 91.213(d)(3)(ii)). The person removing or deactivating the number 2 ADF must placard it inoperative in the appropriate location. (A pilot should consult maintenance personnel before deactivating or having maintenance personnel remove any item of equipment.)

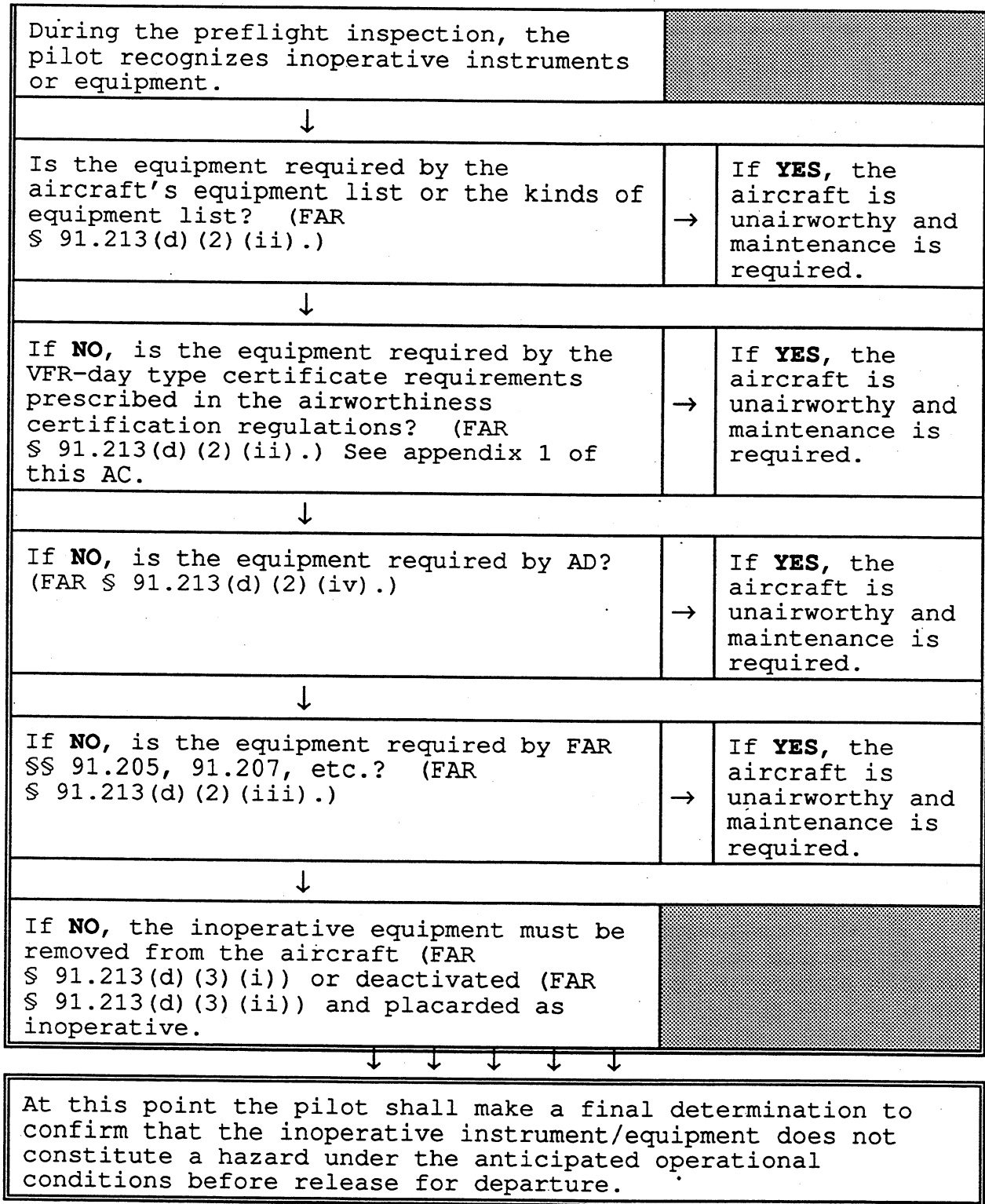


Figure 2. Pilot Decision Sequence When Operating Without An MEL

f. Finally, the pilot should decide whether the inoperative number 2 ADF creates a hazard for the anticipated conditions of the flight, e.g., VFR-day.

15.-18. RESERVED.