

Minimum Equipment List – A Training Aid

One of the more challenging items to teach, at least for me, is the minimum equipment list (MEL).

The FAA private pilot license will allow you to fly many single engine aircraft for which a Master MEL has been established and maintained by the FAA. However, most of the airplanes that we use to train do not have a MMEL that is maintained by the FAA. Therefore, determination of required minimum equipment for the airplane to be airworthy becomes a bit more complex.

The below flowchart will help you make a determination of what equipment is required. You will usually start at the first step and work your way thru the flow chart.

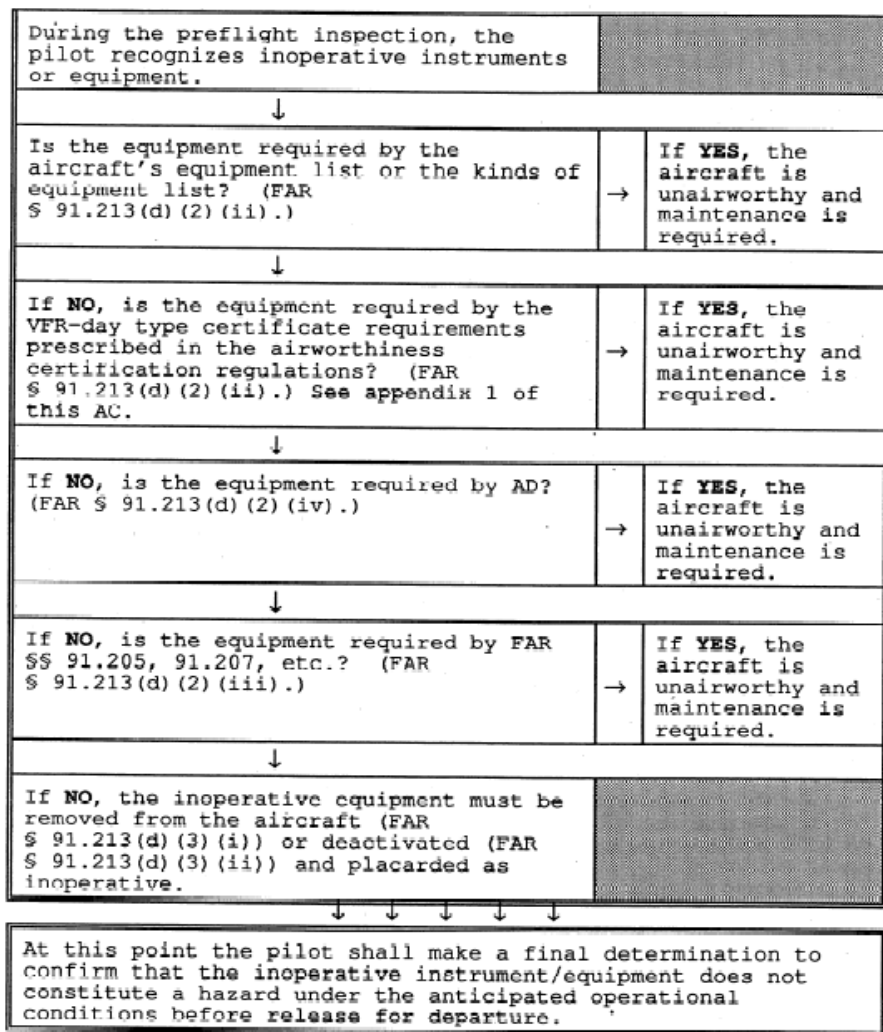


Figure 2. Pilot Decision Sequence When Operating Without An MEL.

If there is an Airworthiness Directive (AD) that specifies an specific piece of equipment, then that must be in place. For example, many of the older Cessna aircraft had rail locks added on the seat rails as an AD. These are required pieces of equipment.

Flow Chart Steps 1 and 2:

The best place to start this review is at the FAR that specifies the use of the MEL, which for our operations, is under part 91, specifically FAR 91.213 – which is reproduced at the end of this training aid.

Since we don't typically have a MMEL, part (d) applies, highlighted in yellow in 91.213.

- VFR-day type certification: The first exception that catches our eye is whether or not the equipment is required for VFR day flight. For each airplane, one would search the Airplane Flight Manual (AFM) or Pilot's Operating Handbook (POH). Following is an example from the AFM for a Diamond DA20-C1. <http://w5gw.com//images/mel.pdf> Note that a turn coordinator and other equipment is not required for day operations. Looking at the regulation further, we see if it is inoperative, it must be removed or deactivated and the control panel placarded. But wait, there is more:

Flow Chart Steps 3:

Note that 91.213 also discusses equipment specified by an AD. If there is an Airworthiness Directive (AD) that specifies an specific piece of equipment, then that must be in place and operable for the aircraft to be deemed airworthy. For example, many of the older Cessna aircraft had rail locks added on the seat rails as an AD. These are required pieces of equipment.

Flow Chart Step 4:

- FAR 91.205 This specifies the equipment that is necessary for Day and Night VFR. A handy mnemonic is:

VFR Day: TOMATOE A FLAMES

- **T**achometer (for each engine)
- **O**il Pressure Gauge
- **M**agnetic Direction Indicator (magnetic compass)
- **A**irspeed Indicator
- **T**emperature Gauge for each liquid cooled engine
- **O**il Temperature Gauge
- **E**mergency equipment (beyond power off gliding distance over water) pyrotechnic signaling device, flotation device
- **A**nti-collision Lights
- **F**uel Gauge for each tank
- **L**anding gear position indicator
- **A**litmeter
- **M**anifold Pressure Gauge for each engine
- **E**mergency Locator Transmitter
- **S**afety Belts and Shoulder Harnesses

VFR Night: FLAPS

- Fuses
- Landing light, if operated for hire
- Anti-collision light (beacon and/or strobes)
- Position Lights – Nav Lights (Red on the left, Green on the Right, White facing aft)
- Source of electricity (battery, generator, alternator)

In reading FAR 91.205 further you will find some disclaimers, such as a manifold gauge is only required if you have an altitude engine, i.e., an engine capable of producing takeoff power to a certain altitude.

- Lighting: If the airplane is certificated under Part 23 after March 11, 1996 then it must have an anti-collision light for both day and night VFR. This means either a red rotating beacon or a white strobe light. In the case of the Diamond the strobe functions as the anti-collision light during the day. At night, the red, green and white position lights (sometimes called navigation lights) must also be operating. Finally, refer to the FAR 91.209 as to use of lighting. The one exception to use of strobes or any any anti-collision lighting is covered in the very last entry (highlighted in yellow).
- FAR 91.207 Specifies use and operation of an emergency location transmitter. This FAR has been replicated for your reference as well. Some training schools use aircraft for local flights only and are not required to place one in the aircraft if they are used for that operation and remain within 50 nm. See highlighted text.

Flow Chart Step 5:

This specifies that the equipment must either be removed or made inoperable and in all cases, the aircraft must be placarded to ensure the operator is knowledgeable that piece of equipment is inoperable.

To summarize: The MMEL is very efficient since it summarizes all equipment for a specific aircraft in one document. Typically we don't have that luxury and must integrate from multiple sources. Familiarize yourself with the AFM or POH, FAR 91.205, 91.209, and 91.213. If you have any questions about the required equipment don't feel bad, ask your CFI

Code of Federal Regulations

▼ Sec. 91.213

Part 91 GENERAL OPERATING AND FLIGHT RULES	
Subpart C--Equipment, Instrument, and Certificate Requirements	

Sec. 91.213

Inoperative instruments and equipment.

(a) Except as provided in paragraph (d) of this section, no person may take off an aircraft with inoperative instruments or equipment installed unless the following conditions are met:

(1) An approved Minimum Equipment List exists for that aircraft.

(2) The aircraft has within it a letter of authorization, issued by the FAA Flight Standards district office having jurisdiction over the area in which the operator is located, authorizing operation of the aircraft under the Minimum Equipment List. The letter of authorization may be obtained by written request of the airworthiness certificate holder. The Minimum Equipment List and the letter of authorization constitute a supplemental type certificate for the aircraft.

(3) The approved Minimum Equipment List must--

(i) Be prepared in accordance with the limitations specified in paragraph (b) of this section; and
(ii) Provide for the operation of the aircraft with the instruments and equipment in an inoperable condition.

(4) The aircraft records available to the pilot must include an entry describing the inoperable instruments and equipment.

(5) The aircraft is operated under all applicable conditions and limitations contained in the Minimum Equipment List and the letter authorizing the use of the list.

(b) The following instruments and equipment may not be included in a Minimum Equipment List:

(1) Instruments and equipment that are either specifically or otherwise required by the airworthiness requirements under which the aircraft is type certificated and which are essential for safe operations under all operating conditions.

(2) Instruments and equipment required by an airworthiness directive to be in operable condition unless the airworthiness directive provides otherwise.

(3) Instruments and equipment required for specific operations by this part.

(c) A person authorized to use an approved Minimum Equipment List issued for a specific aircraft under subpart K of this part, part 121, 125, or 135 of this chapter must use that Minimum Equipment List to comply with the requirements in this section.

(d) Except for operations conducted in accordance with paragraph (a) or (c) of this section, a person may takeoff an aircraft in operations conducted under this part with inoperative instruments and equipment without an approved Minimum Equipment List provided--

(1) The flight operation is conducted in a--

[(i) Rotorcraft, nonturbine-powered airplane, glider, or lighter-than-air aircraft, powered parachute, or weight-shift-control aircraft, for which a master minimum equipment list has not been developed; or]

(ii) Small rotorcraft, nonturbine-powered small airplane, glider, or lighter-than-air aircraft for which a Master Minimum Equipment List has been developed; and

(2) The inoperative instruments and equipment are not--

(i) Part of the VFR-day type certification instruments and equipment prescribed in the applicable airworthiness regulations under which the aircraft was type certificated;

(ii) Indicated as required on the aircraft's equipment list, or on the Kinds of Operations Equipment List for the kind of flight operation being conducted;

(iii) Required by Sec. 91.205 or any other rule of this part for the specific kind of flight operation being conducted; or

(iv) Required to be operational by an airworthiness directive; and

(3) The inoperative instruments and equipment are--

- (i) Removed from the aircraft, the cockpit control placarded, and the maintenance recorded in accordance with Sec. 43.9 of this chapter; or
 - (ii) Deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with part 43 of this chapter; and
- (4) A determination is made by a pilot, who is certificated and appropriately rated under part 61 of this chapter, or by a person, who is certificated and appropriately rated to perform maintenance on the aircraft, that the inoperative instrument or equipment does not constitute a hazard to the aircraft. An aircraft with inoperative instruments or equipment as provided in paragraph (d) of this section is considered to be in a properly altered condition acceptable to the Administrator.
- (e) Notwithstanding any other provision of this section, an aircraft with inoperable instruments or equipment may be operated under a special flight permit issued in accordance with Secs. 21.197 and 21.199 of this chapter.

Sec. 91.209 — Aircraft lights.

No person may:

- (a) During the period from sunset to sunrise (or, in Alaska, during the period a prominent unlighted object cannot be seen from a distance of 3 statute miles or the sun is more than 6 degrees below the horizon)—
 - (1) Operate an aircraft unless it has lighted position lights;
 - (2) Park or move an aircraft in, or in dangerous proximity to, a night flight operations area of an airport unless the aircraft—
 - (i) Is clearly illuminated;
 - (ii) Has lighted position lights; or
 - (iii) is in an area that is marked by obstruction lights;
 - (3) Anchor an aircraft unless the aircraft—
 - (i) Has lighted anchor lights; or
 - (ii) Is in an area where anchor lights are not required on vessels; or
- (b) Operate an aircraft that is equipped with an anticollision light system, unless it has lighted anticollision lights. However, the anticollision lights need not be lighted when the pilot-in-command determines that, because of operating conditions, it would be in the interest of safety to turn the lights off.

Code of Federal Regulations

▼ Sec. 91.207

Part 91 GENERAL OPERATING AND FLIGHT RULES	
Subpart C--Equipment, Instrument, and Certificate	

Sec. 91.207

Emergency locator transmitters.

(a) Except as provided in paragraphs (e) and (f) of this section, no person may operate a U.S.-registered civil airplane unless--

(1) There is attached to the airplane an approved automatic type emergency locator transmitter that is in operable condition for the following operations, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations:

(i) Those operations governed by the supplemental air carrier and commercial operator rules of parts 121 and 125;

(ii) Charter flights governed by the domestic and flag air carrier rules of part 121 of this chapter; and

(iii) Operations governed by part 135 of this chapter; or

(2) For operations other than those specified in paragraph (a)(1) of this section, there must be attached to the airplane an approved personal type or an approved automatic type emergency locator transmitter that is in operable condition, except that after June 21, 1995, an emergency locator transmitter that meets the requirements of TSO-C91 may not be used for new installations.

(b) Each emergency locator transmitter required by paragraph (a) of this section must be attached to the airplane in such a manner that the probability of damage to the transmitter in the event of crash impact is minimized. Fixed and deployable automatic type transmitters must be attached to the airplane as far aft as practicable.

(c) Batteries used in the emergency locator transmitters required by paragraphs (a) and (b) of this section must be replaced (or recharged, if the batteries are rechargeable)--

(1) When the transmitter has been in use for more than 1 cumulative hour; or

(2) When 50 percent of their useful life (or, for rechargeable batteries, 50 percent of their useful life of charge) has expired, as established by the transmitter manufacturer under its approval.

The new expiration date for replacing (or recharging) the battery must be legibly marked on the outside of the transmitter and entered in the aircraft maintenance record. Paragraph (c)(2) of this section does not apply to batteries (such as water-activated batteries) that are essentially unaffected during probable storage intervals.

(d) Each emergency locator transmitter required by paragraph (a) of this section must be inspected within 12 calendar months after the last inspection for--

(1) Proper installation;

(2) Battery corrosion;

(3) Operation of the controls and crash sensor; and

(4) The presence of a sufficient signal radiated from its antenna.

(e) Notwithstanding paragraph (a) of this section, a person may--

(1) Ferry a newly acquired airplane from the place where possession of it was taken to a place where the emergency locator transmitter is to be installed; and

(2) Ferry an airplane with an inoperative emergency locator transmitter from a place where repairs or replacements cannot be made to a place where they can be made.

No person other than required crewmembers may be carried aboard an airplane being ferried under paragraph (e) of this section.

(f) Paragraph (a) of this section does not apply to--

[(1) Before January 1, 2004, turbojet-powered aircraft;]

(2) Aircraft while engaged in scheduled flights by scheduled air carriers;

- 3) Aircraft while engaged in training operations conducted entirely within a 50-nautical mile radius of the airport from which such local flight operations began;
- (4) Aircraft while engaged in flight operations incident to design and testing;
- (5) New aircraft while engaged in flight operations incident to their manufacture, preparation, and delivery;
- (6) Aircraft while engaged in flight operations incident to the aerial application of chemicals and other substances for agricultural purposes;
- (7) Aircraft certificated by the Administrator for research and development purposes;
- (8) Aircraft while used for showing compliance with regulations, crew training, exhibition, air racing, or market surveys;
- (9) Aircraft equipped to carry not more than one person; and
- (10) An aircraft during any period for which the transmitter has been temporarily removed for inspection, repair, modification, or replacement, subject to the following:
 - (i) No person may operate the aircraft unless the aircraft records contain an entry which includes the date of initial removal, the make, model, serial number, and reason for removing the transmitter, and a placard located in view of the pilot to show "ELT not installed."
 - (ii) No person may operate the aircraft more than 90 days after the ELT is initially removed from the aircraft; and
- [(11) On and after January 1, 2004, aircraft with a maximum payload capacity of more than 18,000 pounds when used in air transportation.]