

MOONEY AIRCRAFT CORPORATION

LOUIS SCHREINER FIELD
KERRVILLE, TEXAS 78028

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MOONEY M20M

WITH

R-134a AIR CONDITIONER SYSTEM

Model No. _____

Reg. No. _____

S/N _____

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the R-134a Air Conditioner System is installed in accordance with Mooney Aircraft Corporation drawing number 770044. The information contained herein supplements or supersedes the information of the basic Airplane Flight Manual only in those areas listed herein. For Limitations, Procedures and Performance information not contained in this Supplement, consult the basic Airplane Flight Manual.

FAA APPROVED Michele M Owsley

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SECTION I - GENERAL

The R-134a Air Conditioner System is designed to cool the aircraft cabin to desired temperature settings during all phases of flight operations. The air conditioner system may be used during any phase of the flight. The system offers a choice of: 1) Recirculation, HI or LO speeds, or 2) Cabin cooling air, LO or MAX operation. The system can be used on the ground without running the engine to precool the aircraft. See **Section IV- NORMAL PROCEDURES**.

Accessories

Alternator (2).....28 Volt DC Left: 70 Amp
Right: 100 Amp (Limited)

SECTION II - LIMITATIONS

PLACARDS REQUIRED:

Located in full view of the pilot.

AIR CONDITIONER SYSTEM MUST
BE OFF DURING ENGINE
OPERATION BELOW 1000 RPM AND AT
ALTITUDES ABOVE 18,000 ft. MSL.

Located in full view of the pilot on instrument panel.

MAG COMPASS
DEVIATION
MAY BE EXCESSIVE WITH
AIR COND OR BLOWER ON

SECTION III - EMERGENCY PROCEDURES

ELECTRICAL

Alternator Failure

(Alternator warning light (1) illuminated steady or (2) flashing with an accompanying tripped ALT SENSE breaker. Depending on the nature of failure, the ALT FLD, ALT SENSE, or ALT circuit breaker or breakers may trip on affected alternator).

Air Conditioner Switch.....OFF
Tripped Circuit Breaker.....RESET

If circuit breaker will not reset, the following procedures are required:

1. Monitor ammeter for discharge.
2. Reduce electrical load, as required, to maintain a positive ammeter indication and operate within the load capacity of remaining alternator.
3. Continue flight on remaining alternator and LAND, when PRACTICABLE, to correct malfunction.

NOTE: In flight, the air conditioner will tend to decouple from aircraft electrical power in cases of low voltage (less than @ 26.5 volts DC) or current limiting caused by demands of other aircraft electrical systems or the failure of 1 or both alternators. This is an effect of the GPU

Power Control Module. If either of these conditions occur in flight, the compressor can cease to operate or may cycle ON and OFF as primary systems requirements change. While this is a beneficial effect of the Power Control Module, it should not be relied on as an "automatic" load shed device. A cycling air conditioning compressor in flight is a sign that bus voltage is low or that the batteries are demanding a high rate of charge from the alternators. During this cycling, the condenser and evaporator blowers will continue to run, and even though the compressor drive motor has ceased to draw high current, these blowers will maintain a current drain to the electrical system of approximately 20 amps.

In the event of this condition:

- A/C Switch..... Select Off
- A/C Circuit Breaker..... PULL

Do not reset circuit breaker or turn air conditioning control switch to LO or MAX until the aircraft voltmeter displays at least 28 volts DC and the ammeter displays less than 20 amps charge rate to the battery.

SECTION IV - NORMAL PROCEDURES

R-134a Air Conditioner System Operation

GROUND OPERATING PROCEDURES ("PRECOOL")

1. Air Conditioner.....SELECT—OFF
2. Plug in GPU (Minimum 100 Amp @ 28 Volt DC Rated).
3. Air Conditioner.....ON (LO or MAX)
4. CLOSE Baggage and Cabin doors for most efficient cooling.

ENGINE START

1. Air Conditioner SELECT – OFF
2. MASTER SWITCH ON.....(Both Alternator lamps will illuminate steady until engine is started and ALT FIELD switches are selected ON)

BEFORE TAXI

1. Battery Select Switch.....#1 BATTERY
NOTE: If BATTERY SELECT switch is in # 2 BATTERY position, the Air Conditioner blowers will operate but the compressor will be inoperative. The cabin will be ventilated but not cooled.
2. Air Conditioner Fan Switch.....SELECT - HI or LO speed (fan only)
or
3. Air Conditioner Cooling SwitchSELECT - LO or MAX
4. Overhead Cabin Air butterfly control CLOSED
5. Air Conditioner Switch..... SELECT OFF or RECIRC when desired temp is reached

TAKEOFF

Air-conditioning System ON or OFF, AS DESIRED

CLIMB

CLIMB (CRUISE) (SEE SECTION 5.0)
No change to this procedure.

CLIMB (BEST RATE Vy)
No change to this procedure.

CLIMB (BEST ANGLE V_x)
No change to this procedure.

CAUTION

During higher than standard temperatures, it may be necessary to turn the Air Conditioning System OFF during climbs if engine operational temperatures can not be maintained

LANDING
No change to this procedure.

SECTION V - PERFORMANCE

TAKE OFF
The pilot is responsible for computation of Weight & Balance conditions, density altitude, wind conditions and runway conditions prior to departure. Brake HP reduction, with the Air Conditioning System ON, during takeoff has been determined to be 4 horsepower (HP) or 2% of total HP. If runway conditions are: short, soft or grass and if pressure altitude or temperature or humidity are high, it is recommended that the Air Conditioner System be turned OFF during the takeoff portion of the flight.

CLIMB
The Maximum Rate of Climb performance is approximately 30 ft. per minute lower with the Air Conditioning System switch ON and the system operating properly. The pilot should compute fuel burn, range and endurance data based on this reduced Rate of Climb factor.

CRUISE
Flight tests have determined that cruise performance with Air Conditioning System ON is reduced by 1.17 %. The pilot should compute fuel burn, range and endurance data based on this cruise reduction factor.

LANDING
After landing is accomplished, engine RPM should be no less than 1000 RPM for taxi while air conditioning is ON.

GENERAL CONSIDERATIONS
If the Air Conditioning System is not operating properly, all or any of the above factors may change. It is the pilots responsibility to monitor fuel burn, time in flight, and time to destination during all flight phases and make appropriate decisions to maintain a safe flight.

SECTION VI - WEIGHT AND BALANCE

The pilot should reference current weight and balance data in basic POH/AFM and compute proper aircraft weight and balance information prior to each flight.

SECTION VII - AIRPLANE & SYSTEMS DESCRIPTIONS.

GENERAL
The optional, R-134a Air Conditioning System operates on a closed vapor cycle concept. The components are light weight, designed for high altitude and extreme temperature operations. Operation is simple; select the desired operation from a single switch (see Figure A/C 7-1) located on the lower console.

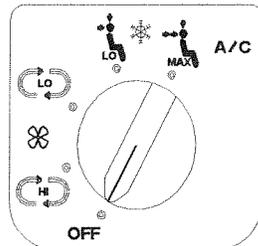
The **first position** is all systems OFF.

When the **second position**, HI fan, is selected, both evaporator fan motors are turned ON and high speed recirculated cabin air is directed through the four overhead cabin Wemacs and through the Flood Vent located in the top of baggage compartment bulkhead.

When the **third position**, LO fan, is selected, high speed cabin air is directed through the overhead Wemacs and low speed cabin air is directed through the Flood Vent.

When the **fourth position**, LO air conditioner, is selected, the compressor is engaged, and high speed cooling air from the LH evaporator is directed through the overhead Wemacs and low speed cooling air from the RH evaporator is directed through the Flood Vent.

When the **fifth position**, MAX air conditioner, is selected, the compressor is engaged, and high speed cooling air from both evaporators is directed through the overhead Wemacs and the Flood Vent. This is the maximum cooling air that can be circulated throughout the cabin



area.

FIGURE A/C 7-1

Movement of air over the condenser coil to cool the hot, high pressure R-134a compressed gas is provided through screened duct openings located on the side of the tailcone. The exit of tailcone air flow is assisted by a fairing located on the bottom of the tailcone.

The R-134a system also removes a large percentage of moisture from the cabin air as well as removing dust and pollen particles from the cabin air.

Control of the refrigeration cycle, ON & OFF, is done with a pressure cycling switch. The switch senses refrigerant pressure on the suction (low) side of the system as an indicator of evaporator temperature.

The electrical power system for air conditioned M20M models has been upgraded with a higher capacity alternator/voltage regulator system. This ensures sufficient electrical power is available to operate the air conditioner even during low RPM ground operations. The system consists of a 70 amp and a 100 amp (limited) alternator feeding the aircraft electrical bus simultaneously. Each alternator is controlled by its own solid state voltage regulator and is capable of sensing a number of faults and triggering the appropriate status lamp on the annunciator panel.

Electrical power for the Air Conditioning System is supplied through three circuit breakers (C/B's). A 20 amp C/B, located on the C/B panel in the cabin and labeled **AIR COND**, supplies power to the control switch for the evaporator blowers and compressor clutch. Another C/B, rated at 25 amps and located on the aft radio shelf in the tailcone, supplies power for the condenser blower. A third C/B, rated at 90 amps, also mounted on the Aft Radio Shelf in the tailcone, supplies high current power to the DC motor driven compressor also mounted on the aft radio shelf. These C/B's protect the air conditioning system wiring and any failure of the system which causes any of these C/B's to trip will not affect the completion of the flight, except that the air conditioning system will not operate for the remainder of the flight. The air conditioning system should be checked out by a qualified technician at the earliest convenient time.

NOTE: The air conditioner compressor and drive motor consume approximately 70 amps of current when on. The system receives its electrical power from the #1 Master Relay, which requires that the BATTERY SELECT Switch must be in the Battery # 1 position for the A/C system to operate from the aircraft electrical system. This provides the crew with an alternate means of isolating the A/C system from the aircraft electrical bus in flight simply by selecting

Battery # 2. The air conditioner compressor and drive motor are not designed to be operated during ground operations using battery power only. The air conditioner may be used to "precool" the cabin prior to ground operations using a Ground Power Unit rated at 27.75 volts DC @ 100 amps minimum. The ground operator attaches the GPU to the AUX power input plug, energizes the GPU, and selects either LO or MAX on the air conditioning control switch. There is no need to energize the BATTERY MASTER switch. During GPU operations, the BATTERY SELECT Switch may be selected to either battery. The position of this switch will not affect trickle charging either battery.

SECTION VIII - HANDLING & SERVICE

No change to this Section.

SECTION IX - SUPPLEMENTAL DATA

Add R-134a Air Conditioning System AFM Supplement to SECTION IX when system is installed.

SECTION X - SAFETY INFORMATION

No change to this Section.