

MOONEY AIRCRAFT CORPORATION
LOUIS SCHREINER FIELD
KERRVILLE, TEXAS 78028

FAA APPROVED

AIRPLANE FLIGHT MANUAL SUPPLEMENT

FOR

MOONEY AIRCRAFT MODELS
M20M, M20R, M20S

WITH

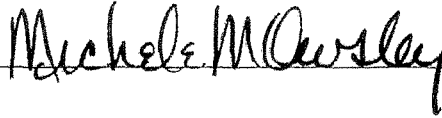
WX-500 STORMSCOPE® SENSOR SYSTEM
INSTALLED IN CONJUNCTION WITH
THE GARMIN GNS-430 and/or GNS-530 SYSTEM

MODEL NO. _____

REG. NO. _____

This Supplement must be inserted in the applicable FAA Approved Pilot's Operating Handbook and Airplane Flight Manual (POH/AFM) when the Stormscope® WX-500 Series II, Weather Mapping Sensor System is installed with the GARMIN GNS 430 and/or GNS-530 VHF Communication Transceiver / VOR/ILS Receiver / Global Positioning System in accordance with Mooney Aircraft Corporation Drawing No. 810447. The information contained herein supplements or supersedes the basic manual only in those areas listed herein. For limitations, procedures and performance information not contained in the supplement, consult the basic POH/AFM. The pilot should become thoroughly familiar with this Supplement as well as the Pilot Handbook for this equipment, if applicable, issued by the manufacturer of the equipment covered by this Supplement.

FAA APPROVED: _____



Michele M. Owsley
Manager, Airplane Certification Office
FEDERAL AVIATION ADMINISTRATION
2601 Meacham Boulevard
Fort Worth, Texas 76137-0150

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LOG OF REVISIONS



REV NO.	REVISED PAGES	DESCRIPTION OF REVISIONS	FAA APPROVED	DATE
A	1 OF 9 THRU 7 OF 9	Addition of info for dual GNS 430 or 530 and GNS 530/430 configurations; minor formatting changes		
	3 OF 9	Added clarification of the WX 500 circuit breaker amperage		
	4 OF 9	Clarified location of C/B panel		
	5 OF 9	Clarification of required publications		
<p>The revised portions of affected pages are indicated by vertical black lines in the margin.</p>				

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SECTION I - GENERAL

1. The GNS 430, GNS 530 and/or GNS 530/430 System is a fully integrated, panel mounted instrument, which contains a VHF Communications Transceiver, a VOR/ILS receiver, and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, GPS Receiver, VHF VOR/LOC/GS antenna, VOR/ILS receiver, VHF COMM antenna and a VHF Communications Transceiver. The primary function of the VHF Communication portion of the equipment is to facilitate communication with Air Traffic Control. The primary function of the VOR/ILS Receiver portion of the equipment is to receive and demodulate VOR, Localizer, and Glide Slope signals. The primary function of the GPS portion of the system is to acquire signals from the GPS system satellites, recover orbital data, make range and Doppler measurements, and process this information in real-time to obtain the user's position, velocity, and time.

Electrical power for the GNS 430 or 530 system is supplied through two circuit breakers (C/B's) for each installed GNS 430 or 530. A 5 amp C/B, labeled **GPS1** (**GPS2** for #2 system), located on the C/B panel (RH side of instrument panel), supplies power to the GPS and display system. Another 5 amp C/B, labeled **COM1/NAV1** (**COM2/NAV2** for #2 system) also located on the C/B panel (RH side of the instrument panel), supplies power to the communications and navigation portion of the system. These C/B's protect the GNS 430 and/or 530 wiring. In the event of a failure of a system or subsystem which causes either C/B to trip, remaining system capabilities, redundant systems and standardized procedures (i.e., Lost Comm procedures, etc.) should be used and flight planning should be re-evaluated.

Power for the WX-500 Processor Unit is provided through one 3 Amp C/B labeled WX, located on the C/B panel. Its purpose is to protect the WX-500 wiring. In the event of a failure of the WX-500 system which causes the WX C/B to trip, the functionality of the GNS 430, and/or GNS 530 will be unaffected, except for the loss of Stormscope® information.

NOTE

Several GNS 430 or 530 installation combinations are possible: single GNS 430 or 530, dual GNS 430, dual GNS 530, or a GNS 430 / GNS 530 combination.

When a GNS 430/530 configuration, or a dual GNS 430 or GNS 530 configuration is installed, the WX-500 is set up from the #2 system, but may be displayed on either #1 or #2 displays. When a single GNS 430 or GNS 530 configuration is installed, the WX-500 System is set up and displayed on the #1 GNS 430 or GNS 530 system.

2. Provided the GARMIN GNS 430 and/or 530 GPS receiver is receiving adequate usable signals, it has been demonstrated capable of, and has been shown to meet, the accuracy specifications for:
 - VFR/IFR enroute, terminal, and non-precision instrument approach (GPS, Loran-C, VOR, VOR-DME, TACAN, NDB, NDB-DME, RNAV) operation within the U.S. National Airspace System in accordance with AC 20-138.
 - One of the approved sensors, for a single or dual GNS 430 or 530 or GNS 430/530 installation, for North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.

The system meets RNP5 airspace (BRNAV) requirements of AC 90-96 and in accordance with AC 20-138, and JAA AMJ 20X2 Leaflet 2 Revision 1, provided it is receiving usable navigation information from the GPS receiver.

Navigation is accomplished using the WGS-84 (NAD-83) coordinate reference datum. Navigation data is based upon use of only the Global Positioning System (GPS) operated by the United States of America.

SECTION II - LIMITATIONS

1. The GARMIN GNS 430 Pilot's Guide (Rev. A, dated October, 1998, or later appropriate revision; P/N 190-00140-00) must be immediately available to the flight crew whenever navigation is predicated on the use of the system. The GARMIN GNS 400 Series Pilot's Guide Addendum, *Display Interface for Traffic and Weather Data* (Rev. A, dated October, 1999, or later appropriate revision; P/N 190-00140-10) must be immediately available to the flight crew when the WX-500 Stormscope® Series II Weather Mapping Sensor is installed with the GNS 430.

The Garmin GNS 530 Pilot's Guide (Rev. A or later appropriate revision; P/N 190-00181-00) must be immediately available to the flight crew when BFGoodrich WX-500 Stormscope® Series II Weather Mapping Sensor is installed with the GNS 530.

2. The **GNS 430** must utilize the following or later FAA approved software versions:

SUB-SYSTEM	SOFTWARE VERSION
MAIN	2.12
GPS	2.00
COMM	1.22
VOR/LOC	1.25
G/S	2.00

The **GNS 530** must utilize the following or later FAA approved software versions:

SUB-SYSTEM	SOFTWARE VERSION
MAIN	2.00
GPS	2.00
COMM	1.22
VOR/LOC	1.25
G/S	2.00

The Main software version is displayed on the GNS 430 and/or GNS 530 self test page immediately after turn-on for 5 seconds. The remaining system software versions can be verified on the AUX group sub-page 2, "SOFTWARE/DATABASE VER".

3. IFR enroute and terminal navigation predicated upon the GNS 430 and/or GNS 530 GPS Receiver is prohibited unless the pilot verifies the currency of the data base or verifies each selected waypoint for accuracy by reference to current approved data.

4. Instrument approach navigation predicated upon the GNS 430 and/or GNS 530 GPS Receiver must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment data base. The GPS equipment database must incorporate the current update cycle.
 - (a) Instrument approaches utilizing the GPS receiver must be conducted in the approach mode and Receiver Autonomous Integrity Monitoring (RAIM) must be available at the Final Approach Fix.
 - (b) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for GPS overlay with the GNS 430 and/or GNS 530 GPS receiver is not authorized.
 - (c) Use of the GNS 430 and/or GNS 530 VOR/ILS receiver to fly approaches not approved for GPS require VOR/ILS navigation data to be present on the external indicator.
 - (d) When an alternate airport is required by the applicable operating rules, it must be served by an approach based on other than GPS or Loran-C navigation, the aircraft must have the operational equipment capable of using that navigation aid, and the required navigation aid must be operational.
 - (e) VNAV information may be utilized for advisory information only. Use of VNAV information for Instrument Approach Procedures does not guarantee Step-Down Fix altitude protection, or arrival at approach minimums in normal position to land.
5. If not previously defined, the following default settings must be made in the "SETUP 1" menu of the GNS 430 and/or GNS 530 prior to operation (refer to Pilot's Guide for procedure if necessary):
 - (a) **dis, spd** kt (sets navigation units to "nautical miles" and "knots")
 - (b) **alt, vs** ft fpm (sets altitude units to "feet" and "feet per minute")
 - (c) **map datum**WGS 84 (sets map datum to WGS-84, see note below)
 - (d) **posn**deg-min (sets navigation grid units to decimal minutes)

NOTE: In some areas outside the United States, datums other than WGS-84 or NAD-83 may be used. If the GNS 430 and/or GNS 530 is authorized for use by the appropriate Airworthiness authority, the required geodetic datum must be set in the GNS 430 and/or GNS 530 prior to its use for navigation.

6. PLACARD REQUIRED:

LIGHTNING DETECTION
EQUIPMENT NOT TO BE
USED FOR THUNDERSTORM
AREA PENETRATION

or (alternate versions)

SECTION III - EMERGENCY PROCEDURES

ABNORMAL PROCEDURES

1. If GARMIN GNS 430 and/or GNS 530 navigation information is invalid or not available, utilize remaining operational navigation equipment as required.
2. If "RAIM POSITION WARNING" message is displayed the system will flag and no longer provide GPS based navigational guidance. The crew should revert to the GNS 430 and/or GNS 530 VOR/ILS receiver or an alternate means of navigation other than the GNS 430 and/or GNS 530's GPS Receiver.
3. If "RAIM IS NOT AVAILABLE" message is displayed in the enroute, terminal, or initial approach phase of flight, continue to navigate using the GPS equipment or revert to an alternate means of navigation other than the GNS 430 and/or GNS 530 GPS receiver appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using the GNS 430 and/or GNS 530 VOR/ILS receiver or another IFR-approved navigation system.
4. If "RAIM IS NOT AVAILABLE" message is displayed while on the final approach segment, GPS based navigation will continue for up to 5 minutes with approach CDI sensitivity (0.3 nautical mile). After 5 minutes the system will flag and no longer provide course guidance with approach sensitivity. Missed approach course guidance may still be available with 1 nautical mile CDI sensitivity by executing the missed approach.
5. In an in-flight emergency, depressing and holding the Comm transfer button for 2 seconds will select the emergency frequency of 121.500 MHz into the "Active" frequency window.

SECTION IV - NORMAL PROCEDURES

1. DETAILED OPERATING PROCEDURES

Normal operating procedures are described in the GARMIN GNS 400 Series Pilot's Guide Addendum, *Display Interface for Traffic and Weather Data* (Rev. A, dated October, 1999, or later appropriate revision; P/N 190-00140-10) and/or the GNS 530 Pilot's Guide (Rev. A or later appropriate revision; P/N 190-00181-00).

2. PILOT'S DISPLAY

The number one GNS 430 or GNS 530 System data will appear on the Pilot's HSI. The source of data for the HSI is either GPS or VLOC as annunciated on the display above the CDI key on the number one GNS 430 or 530. The number two GNS 430 or 530 System (if installed) data will appear on the secondary indicator (i.e., CDI). The source of data for the secondary indicator is either GPS or VLOC as annunciated on the display above the CDI key on the number two GNS 430 or 530 System.

3. AUTOPILOT / FLIGHT DIRECTOR OPERATION

Coupling of the number one GNS 430 or GNS 530 System steering information to the autopilot can be accomplished by engaging the autopilot in the NAV or APR mode. The number two GNS 430 or 530 System (if installed) is not connected to the autopilot system and cannot be autopilot coupled.

When the autopilot system is using course information supplied by the number one GNS 430 or 530 System, the course pointer on the HSI must be manually set to the desired track (DTK) indicated by the number one GNS 430 or GNS

530 System. For detailed autopilot operational instructions, refer to the FAA Approved Flight Manual Supplement for the autopilot.

4. CROSSFILL BETWEEN NUMBER ONE AND TWO (if installed) GNS 430/530 SYSTEMS

Manual crossfill capabilities exist between the number one GNS 430 or 530 system and number two GNS 430 or 530 System. Refer to the GARMIN GNS 430 and/or GNS 530 Pilot's Guide for detailed crossfill operating instructions.

5. REMOTE DME CHANNELING

The capability exists to channel the DME system, if installed, in the aircraft with either the number one GNS 430 or GNS 530 or number two (if installed) GNS 430 or 530 Systems. The source selector switch for remote DME channeling is located on the top section of the panel in front of the copilot. The source selector switch has two positions - the up position is for the number one GNS 430 or GNS 530 System and the down position is for the number two GNS 430 or 530 System (if installed). When operating the DME in remote channeling mode, the tuned DME channel is determined by the source selector switch and the VOR/LOC frequency in the active window of the selected GNS 430 or 530 source.

6. AUTOMATIC LOCALIZER COURSE CAPTURE

By default, the GNS 430 or 530 automatic localizer course capture feature is enabled. This feature provides a method for system navigation data present on the external indicators to be switched automatically from GPS guidance to localizer / glide slope guidance at the point of course intercept on a localizer at which GPS derived course deviation equals localizer derived course deviation. If an offset from the final approach course is being flown, it is possible that the automatic switch from GPS course guidance to localizer / glide slope course guidance will not occur. It is the pilot's responsibility to ensure correct system navigation data is present on the external indicator before continuing a localizer based approach beyond the final approach fix.

7. DISPLAY OF LIGHTNING STRIKE DATA

For installations that interface the BFGoodrich WX-500 Stormscope® with the GNS 430 and/or GNS 530, lightning strike data detected by the WX-500 will appear on the GNS 430 or GNS 530 display (on #1 if a single unit is installed or on either #1 or #2 if dual GNS 430 or 530, or GNS 430/530 systems are installed).

A momentary switch is mounted on the Pilot's control wheel, labeled **WX CLR**. When depressed, this allows the pilot to unclutter the Stormscope® presentation on the GNS 430 and/or GNS 530. When the button is released, the WX-500 system will resume collecting and displaying Stormscope® data

For detailed operating instructions regarding the interface of the GNS 430 and/or GNS-530, refer to the BFGoodrich WX-500 User's Guide (Rev. A, 9/10/97, or later appropriate revision; P/N 009-11501-001), the Garmin GNS 400 Series Pilot's Guide Addendum, *Display Interface for Traffic and Weather Data* (Rev. A, dated October, 1999, or later appropriate revision; P/N 190-00140-10) and/or GNS 530 Pilot's Guide (Rev. A or later appropriate revision; P/N 190-00181-00) for the WX-500 Stormscope® interface.

SECTION V - PERFORMANCE

No change.

SECTION VI - WEIGHT AND BALANCE

See current weight and balance data.

SECTION VII - AIRPLANE & SYSTEM DESCRIPTIONS

See the GNS 430 and GNS 530 Pilot's Guides for a complete description of the GNS 430 and GNS 530 systems.

SECTION VIII THRU SECTION X

No change to these sections.