

Installation Center

GARMIN GNC 300XL
Communication / Navigation System

Repair Station # G43R643N

Name: Avionics Installations

Address: 1200 Flightline Ste 4

Deland, Fl. 32724

**FAA APPROVED FLIGHT MANUAL SUPPLEMENT
GARMIN GNC 300XL COMMUNICATION / NAVIGATION SYSTEM**

AIRCRAFT MAKE: Cessna

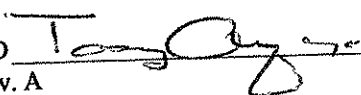
AIRCRAFT MODEL: 172P

AIRCRAFT SERIAL NO.: 17274572

This document must be carried in the aircraft at all times. It describes the operating procedures for the GARMIN GNC 300XL navigation system when it has been installed in accordance with GARMIN Installation Manual 190-00067-22 Rev. E (Rev. A or later) and FAA Form 337 dated 8-31-02.

For aircraft with an FAA Approved Airplane Flight Manual, this document serves as the FAA Approved Flight Manual Supplement for the GARMIN GNC 300XL. For aircraft that do not have an approved flight manual, this document serves as the FAA Approved Supplemental Flight Manual for the GARMIN GNC 300XL.

The Information contained herein supplements or supersedes the basic Airplane Flight Manual only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic Airplane Flight Manual.

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190-00067-34 Rev. A

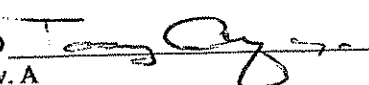
DATE: FEB 15 2005 PAGE 1 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

Table of Contents

SECTION	PAGE
GENERAL	3
LIMITATIONS	3
EMERGENCY PROCEDURES	5
NORMAL PROCEDURES	6
PERFORMANCE.....	12
WEIGHT AND BALANCE	12
AIRPLANE & SYSTEM DESCRIPTIONS.....	12

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 2 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number::N52633

GARMIN GNC 300XL
Communication / Navigation System

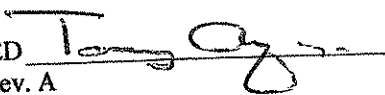
SECTION I GENERAL

1. The GNC 300XL System is a fully integrated, panel mounted instrument, which contains a 760 channel VHF Communications Transceiver and a Global Positioning System (GPS) Navigation computer. The system consists of a GPS antenna, a GPS Receiver, 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 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.
2. Provided the GARMIN GNC 300XL navigation system 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.
 - North Atlantic Minimum Navigation Performance Specification (MNPS) Airspace in accordance with AC 91-49 and AC 120-33.

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 GNC 300XL Pilot's Guide, P/N 190-00067-30, Rev. A, dated February, 1998, must be immediately available to the flight crew whenever navigation is predicated on the use of the system.
2. The GNC 300XL must utilize software version 2.03 or later FAA approved revision. The software version is displayed on the GNC 300XL self test page immediately after turn-on for 5 seconds.

FAA APPROVED 
190-00067-34 Rev. A

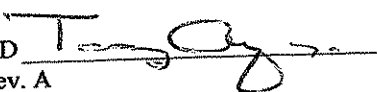
DATE: FEB 15 2005 PAGE 3 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

3. IFR enroute and terminal navigation 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 approaches must be accomplished in accordance with approved instrument approach procedures that are retrieved from the GPS equipment data base. The GPS equipment data base must incorporate the current update cycle.
 - (a) Instrument approaches 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, and MLS approaches are not authorized.
 - (c) Coupling of the autopilot/flight director to GPS deviation data on the arc segment of approaches incorporating an arc transition is not authorized.
 - (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. The aircraft must have other approved navigation equipment installed and operating appropriate to the route of flight.
6. If not previously defined, the following default settings must be made in the "SET" menu of the GNC 300XL prior to operation (refer to Pilot's Guide for procedure if necessary):
 - (a) nav $\frac{n}{m}$ $\frac{k}{t}$ (sets navigation units to "nautical miles" and "knots")
 - (b) alt $\frac{ft}{fpm}$ (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 GNC 300XL is authorized for use by the appropriate Airworthiness

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005

PAGE 4 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number::N52633

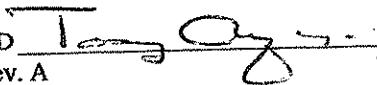
GARMIN GNC 300XL
Communication / Navigation System

authority, the required geodetic datum must be set in the GNC 300XL prior to its use for navigation.

SECTION III EMERGENCY PROCEDURES

ABNORMAL PROCEDURES

1. If GARMIN GNC 300XL navigation information is not available or invalid, utilize remaining operational navigation equipment as required.
2. If "RAIM POSITION WARN" message is displayed the system will flag and no longer provide navigational guidance. The crew should revert to an alternate means of navigation.
3. If "RAIM 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 appropriate to the route and phase of flight. When continuing to use GPS navigation, position must be verified every 15 minutes using another IFR-approved navigation system.
4. If "RAIM NOT AVAILABLE" message is displayed while on the final approach segment, 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 operation described in Section IV paragraph 2(f) of this Airplane Flight Manual Supplement.
5. If the optional remote battery pack is installed and external power to the GNC 300XL is lost, the system will automatically revert to its remote battery, and navigation will continue. VHF Communications will be available at reduced transmitter power output. A message will be presented to the pilot that the unit will turn off in XX seconds unless a key is pressed to continue navigation (XX is a countdown from 30). If external power is lost, the pilot's HSI display will automatically revert to NAV1 data. When the GNC 300XL is operating on its remote battery, the display will automatically blank to conserve power after the time interval setting on the SETUP menu. Activating any control on the GNC 300XL automatically re-enables the display for the set time-out period.
6. 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.

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 5 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

SECTION IV NORMAL PROCEDURES

1. DETAILED OPERATING PROCEDURES

Normal operating procedures are described in the GARMIN GNC 300XL Pilot's Guide, P/N 190-00067-30, Rev. A, dated February, 1998, or later appropriate revision.

2. APPROACH MODE / RAIM PREDICTION

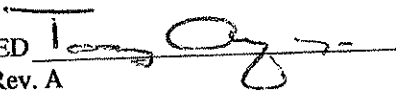
General Approach Mode Procedures

The information contained in this section is vital for successful operation of the GNC 300XL during approach mode. The following is a summary of the approach navigation features provided by the GNC 300XL:

- (a) The pilot may, at any time, select an approach that is available for the destination airport (see Pilot's Guide for more information on selecting approaches). The destination airport is defined to be the last waypoint in the active route or the current direct-to airport.

NOTE: If the destination airport is the active waypoint when an approach is selected, the active waypoint will automatically change to the IAF of the selected approach. If it is desired to NOT automatically change to the IAF, the pilot should select **HOLD** mode with the "GPS SEQ" switch on the annunciator unit prior to selecting the approach.

- (b) Once an approach has been selected, the GNC 300XL will automatically arm the approach mode when the aircraft is within 30 nautical miles of the approach airport.

FAA APPROVED 
190-00067-34 Rev. A

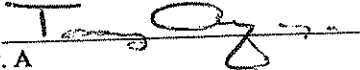
DATE: FEB 15 2005 PAGE 6 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number::N52633

GARMIN GNC 300XL
Communication / Navigation System

- (c) When approach mode is available and the aircraft is within 30 nm of the destination airport, the GPS APR (GPS Approach) annunciator will indicate ARM, and the GNC 300XL will provide a smooth CDI scaling transition from 5.0 nautical miles full scale to 1.0 nautical mile full scale. In addition, the GNC 300XL will perform receiver autonomous integrity monitoring with a protection limit of 1.0 nautical mile. When approach mode is available and armed, the pilot may at any time deactivate the approach mode by pressing the GPS APR (GPS Approach) Switch on the annunciator unit. Pressing the GPS APR switch a second time will re-arm approach mode.
- (d) If the aircraft is within 3.0 nautical miles inbound to the FAF and the pilot has deactivated the approach mode with the GPS APR Switch, the message "Arm Approach Mode" will be displayed. Pressing the GPS APR switch will re-arm the approach mode.
- (e) When the GNC 300XL approach mode has been armed (ARM annunciator illuminated), the GPS SEQ switch has been set to AUTO, and the aircraft is within 2.0 nautical miles of the FAF, the ACTV (Active) annunciator will be illuminated and the CDI scale sensitivity will start to change from 1.0 nautical mile full scale to 0.3 nautical mile full scale. In addition, the GNC 300XL will perform receiver autonomous integrity monitoring with a protection limit of 0.3 nautical mile.
- (f) When flying the final approach leg of an active approach, the pilot may activate the missed approach by pressing the GPS APR switch to deactivate the approach mode. The GNC 300XL will then continue to provide course guidance along the final approach path to the MAP (Missed Approach Point), change the CDI sensitivity to 1.0 nautical mile full scale, and extinguish the ACTV (active) annunciation.

After crossing the MAP (Missed Approach Point), the pilot may activate the missed approach holding waypoint by simply pressing the direct-to key (the GNC 300XL will display the waypoint coordinates of the missed approach holding point or the first waypoint in the missed approach procedure if more than one) followed by the ENT key. If an intercept course other than the direct-to navigation course is desired (which is often the case) the pilot should press the GPS SEQ (GPS Sequence) switch so that the HOLD annunciator illuminates.

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 7 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

NOTE: It is the pilot's responsibility to assure that the missed approach procedure is accomplished in protected airspace. The missed approach procedure must be flown as depicted on the approach chart and normally should not be started until the aircraft has arrived at the MAP.

Approach Waypoint Sequencing

If the GNC 300XL is being used to navigate directly to an Airport (no route active), selecting an approach automatically loads the waypoints of the selected approach into the active route, and selects the Initial Approach Fix (IAF) as the active waypoint. If a route is active when the approach is selected, the approach waypoints beginning with the IAF are automatically added to the end of the route. Upon arrival at each waypoint, if the GPS SEQ switch is set to AUTO, the GNC 300XL will automatically sequence to the next waypoint in the route. When the missed approach point (MAP) is passed, the GNC 300XL will stop sequencing and continue to provide course guidance along an extension of the final approach path.

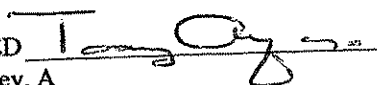
Course Reversals (Procedure Turn)

If a course reversal is required, the pilot must set the required outbound course on the HSI and select HOLD mode with the GPS SEQ switch prior to crossing the FAF outbound. The GNC 300XL will then provide the appropriate course guidance outbound from the fix. Upon starting the course reversal (procedure turn outbound), the pilot must set the charted inbound approach course on the HSI. When intercepting the approach course inbound, the pilot must set the GPS SEQ switch to AUTO. The GNC 300XL will provide guidance inbound to the FAF on the course which was set on the HSI at the time the GPS SEQ switch was changed from HOLD to AUTO.

NOTE: It is important that the GPS SEQ switch be changed from HOLD to AUTO after the HSI course pointer is set to the inbound approach course. For GPS approach activation to occur, the GPS SEQ switch must be set to AUTO prior to crossing the FAF inbound.

Approach Vectoring

The approach route loaded when an approach is selected includes all of the normal approach segments. Normally, the first approach waypoint encountered is the IAF. If ATC is providing vectoring on the approach, any waypoint on the approach may be manually selected as the first waypoint of use. If, for example, ATC provides vectors to the final approach course, the FAF should be selected as the first approach waypoint to use. When informed by ATC that you are being provided vectors to the final approach course, select the FAF by placing the cursor over

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 8 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number::N52633

GARMIN GNC 300XL
Communication / Navigation System

that waypoint on the RTE page, and pressing the DIRECT-TO key followed by the ENT key. The GPS SEQ switch must be placed in the HOLD position, and the HSI course pointer used to select the inbound final approach course. Upon intercepting the inbound final approach course, place the GPS SEQ switch in the AUTO position.

Approach with DME arc segments

Approach procedures which utilize a DME arc transition may be flown using the GNC 300XL.

For course guidance along the DME ARC, the pilot must select the NAV Position Page on the GNC 300XL and assure that the reference waypoint displayed is the approved reference facility for the DME ARC. The distance to the reference facility is depicted on the right of the screen and may be used in the same way that a DME presentation would be used to fly the arc.

Once established on the DME ARC, the pilot must select HOLD mode using the GPS SEQ switch. (Ensure HOLD is accomplished on the intermediate fix located at the intersection of the arc and the course which completes the arc.) Set the HSI to the published intermediate or final approach course. The HSI will then display course deviation relative to that course. When the intermediate or final approach course has been intercepted, the pilot must select AUTO mode using the GPS SEQ switch.

Note: AUTO mode must be selected at least 2 nm prior to the next waypoint.

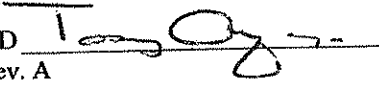
If an autopilot/flight director is used, the pilot must select HDG mode on the autopilot/flight director and manually adjust heading as necessary to maintain the required path along the DME ARC. Once the final approach course has been intercepted, NAV or APR mode may be selected on the autopilot/flight director if desired.

Holding at a fix

The GNC 300XL may be used to hold at any waypoint by simply selecting that waypoint and placing the GPS SEQ switch in the HOLD mode. The HSI course pointer may then be used to select the holding or non-holding course as appropriate.

RAIM Prediction

As indicated in Section 2, GPS approaches are not authorized unless RAIM is available at the FAF. RAIM availability at the destination may be predicted using the GNC 300XL. To display predicted RAIM availability for the current destination, select "RAIM Prd?" from the NAV-TIME menu. When the ENT key is depressed with the cursor on the "Compute RAIM?"

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 9 OF 12

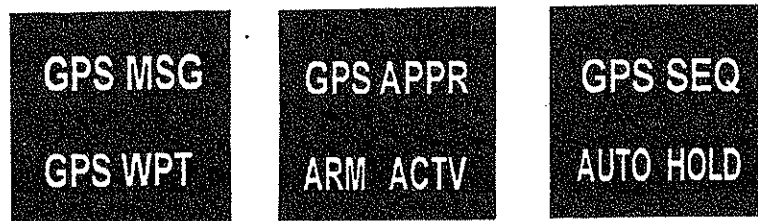
Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

prompt, the GNC 300XL calculates the predicted availability of RAIM at the displayed waypoint for a time interval of 15 minutes before, to 15 minutes after the displayed ETA. Actual availability of RAIM may vary depending upon satellite conditions existing upon arrival at the destination.

3. SYSTEM SWITCHES / ANNUNCIATORS

An integrated switching and annunciation unit is used with the GNC 300XL system. This unit is located on the instrument panel in the pilot's primary field of view as illustrated below.



- (a) NAV / GPS switch and annunciators - By depressing this switch, the GNC 300XL data and the NAV (VOR/ILS) data will be alternately displayed on the pilot's HSI and selected for the autopilot / flight director input. The source of data being displayed will be annunciated on the face of the annunciator unit with either a white NAV legend or a green GPS legend as appropriate.
- (b) GPS Message (MSG annunciator) - When the GNC 300XL has a new message, the amber MSG annunciator will flash. When this occurs, press the MSG key on the GNC 300XL to view the message. Continue to press the MSG key on the GNC 300XL until the page you were viewing prior to pressing the MSG key is re-displayed. As long as the condition which created the message continues to exist, the Message annunciator will remain illuminated.

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number::N52633

GARMIN GNC 300XL
Communication / Navigation System

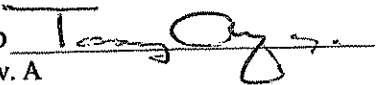
- (c) GPS Waypoint (WPT annunciator) - When the GNC 300XL detects that the aircraft is 15 seconds from the next programmed waypoint or turn anticipation point, the amber WPT annunciator will flash and the CDI depiction on the CDI Page will be replaced by a flashing "Next dtk xxx°" prompt. Approximately 2 seconds before the turn anticipation point (calculated for 15 degrees of bank) the WPT annunciator will turn on steady. This is the indication that you should start the turn to the next DTK. Upon passing the waypoint (or half way through the turn), the annunciator will automatically extinguish.
- (d) GPS SEQ switch and annunciators (HOLD/AUTO) - When AUTO sequencing mode is enabled, depressing this switch disables automatic GPS waypoint sequencing and enables course entry from the pilot's HSI course needle. The amber HOLD legend is illuminated. If depressed again, the GPS system re-enables automatic waypoint sequencing, captures the selected course from the HSI course needle, and illuminates the green AUTO legend.

NOTE: If the To / From indicator on the CDI / HSI indicates "From" when the GPS SEQ switch is pressed to re-select AUTO mode from HOLD mode, the GNC 300XL, will automatically calculate a course to the next waypoint from the aircrafts current position and automatically sequence to that waypoint.

- (e) GPS APR switch and annunciators (ARM / ACTV) - The GNC 300XL Approach ARM Mode is automatically engaged when the pilot has selected an approach and the aircraft is within 30 nm of the approach airport. When the approach mode has been armed or activated, the approach mode may be deactivated by depressing the GPS APR switch. When the approach mode has been armed, the white ARM annunciator will illuminate. When the GNC 300XL then detects that conditions are acceptable and the aircraft is within 2 nm of the FAF, the green ACTV annunciator will illuminate and the white ARM annunciator will simultaneously extinguish. If the pilot has deactivated approach mode by pressing the GPS APR switch, pressing the switch a second time will re-arm approach mode.
- (f) LAMP TEST switch. When this switch is depressed, all annunciators in the unit will illuminate until the switch is released.

4. PILOT'S DISPLAY

The GNC 300XL System data will appear on the HSI when it has been selected using the NAV / GPS switch described in paragraph 3(a) above.

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 11 OF 12

Aircraft Make: Cessna
Aircraft Model: 172P
Aircraft Serial Number:: N52633

GARMIN GNC 300XL
Communication / Navigation System

5. AUTOPILOT / FLIGHT DIRECTOR OPERATION

Coupling of the GNC 300XL System steering information to the autopilot/flight director can be accomplished by engaging the autopilot/flight director in the NAV or APR mode, with the NAV / GPS switch set to GPS.

When the autopilot/flight director system is using course information supplied by the GNC 300XL System and the course pointer is not automatically driven to the desired track, the course pointer on the HSI must be manually set to the desired track (DTK) indicated by the GNC 300XL. For detailed autopilot/flight director operational instructions, refer to the FAA Approved Flight Manual Supplement for the autopilot/flight director.

NOTE: When the autopilot/flight director is using data supplied by the GNC 300XL and the GNC 300XL is in Route mode, the course pointer must be reset to the new desired track (DTK) at each route leg change.

**SECTION V
PERFORMANCE**

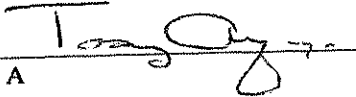
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**SECTION VI
WEIGHT AND BALANCE**

See current weight and balance data.

**SECTION VII
AIRPLANE & SYSTEM DESCRIPTIONS**

See GNC 300XL Pilot's Guide for a complete description of the GNC 300XL system.

FAA APPROVED 
190-00067-34 Rev. A

DATE: FEB 15 2005 PAGE 12 OF 12