

Garmin AT  
2345 Turner Rd. SE  
Salem, OR 97302

**Airplane Flight Manual Supplement**  
Apollo CNX80 GPS/WAAS Nav Com

October 28, 2003  
Part #:560-0985-00 Rev E

**FAA APPROVED**  
**AIRPLANE FLIGHT MANUAL SUPPLEMENT**  
**or**  
**SUPPLEMENTAL AIRPLANE FLIGHT MANUAL**  
**for**  
**Apollo CNX80 SYSTEM INSTALLATION**  
**as installed in**

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**Make and Model Airplane**

**Registration Number** \_\_\_\_\_

**Serial Number** \_\_\_\_\_

This document serves as an Airplane Flight Manual Supplement or as a Supplemental Airplane Flight Manual when the aircraft is equipped with the Apollo CNX80. This document must be carried in the airplane at all times when the Apollo CNX80 is installed in accordance with Supplemental Type Certificate No. ST01229SE.

The information contained in this document supplements or supersedes the information made available to the operator by the manufacturer in the form of clearly stated placards, markings, or manuals or in the form of an FAA approved Airplane Flight Manual, only in those areas listed herein. For limitations, procedures, and performance information not contained in this document, consult the basic placards, markings, or manuals or the basic FAA approved Airplane Flight Manual.

FAA approved: Donald D. Wilson  
Date: 26 Nov 03

FAA Approved  
Date:

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Revision Log						
Rev	Rev. Date	Description	EN	By	FAA Approval	Date Approved
--	4/23/03	Original Release	7625	dfs	none	
A	5/30/03	Added clarification note of oceanic operations in paragraph 1.2, added Navigation subparagraph to Limitations.	7654	dfs	none	
B	6/5/03	Corrected typo of DR in paragraph 3.2.	7659	dfs	none	
C	6/25/03	Remove reference to CAR in cover statement, change GPS Approach statement (3.2.b). Add requirement for external annunciation check (2.5). Correct datacard part number (2.3). Correct typos.	7662	dfs pad mak	none	
D	6/26/03	Added limitation for backup CNX used to originate a flight plan	7662	pad	Steve O'Neal	6/27/03
E	10/27/03	Changed company name to Garmin AT, update mission planning tool (1.2.1), generalize sensors (1.2.1a), clarify Part 91 (1.2.1b), update for software version 1.2 (2.1, 2.2), clarify IFR installation status (2.1), clarify pilot action (2.5a), specify location of DR and LOI annunciations (3.2a, 3.2b), remove "transport aircraft" as FMS descriptor (4.).	7729	mak, pad	<i>Donald B. Wilson</i>	<i>26 Nov 03</i>

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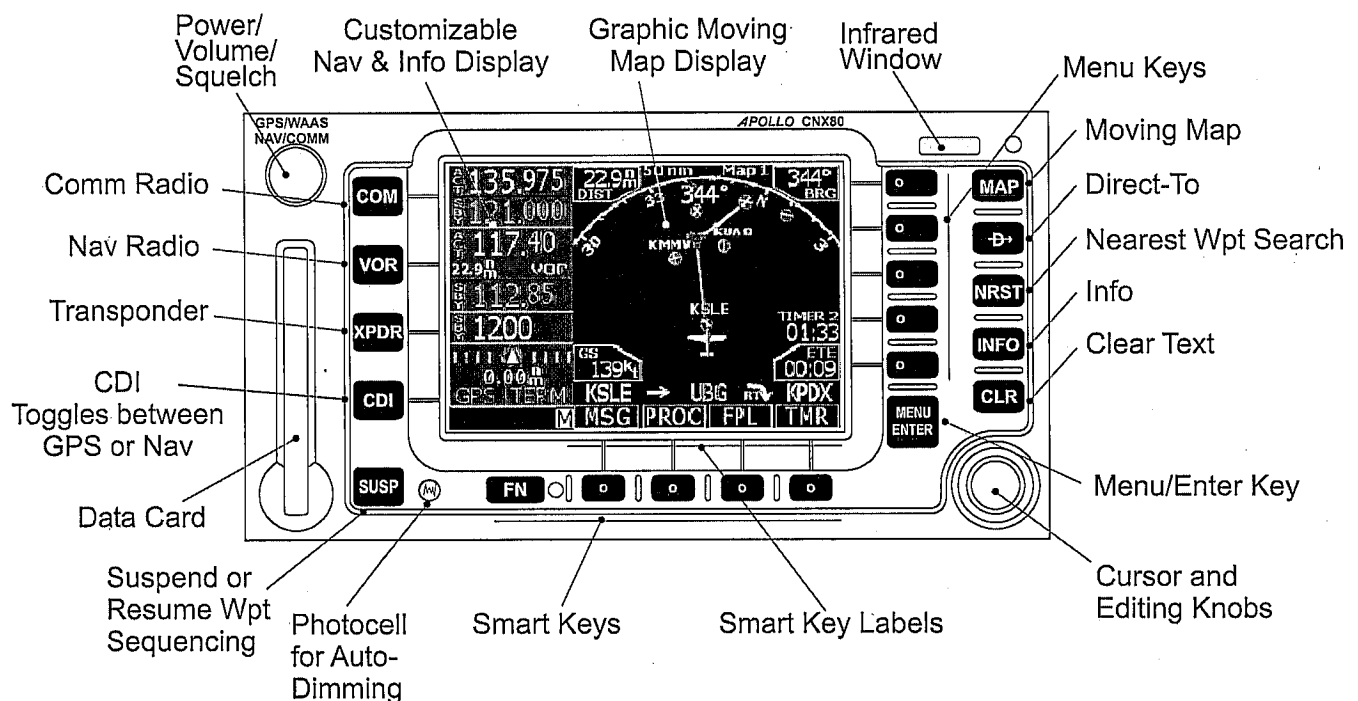
## 1. GENERAL

### 1.1 APOLLO CNX80 GPS/WAAS NAV COM

The Apollo CNX80 GPS/WAAS Nav Com is a panel-mounted product that contains a GPS/WAAS receiver, VHF Com, and VHF Nav in an integrated unit with a moving map and color display. The CNX80 can also control a remote transponder.

The CNX80 uses a high-resolution color display to provide information about the different functions. Information and “smart keys” unique for each mode of operation are displayed.

When you press the COM, VOR, or XPDR keys on the left side of the display, the display area for that function will be outlined and the information active for editing will be highlighted. The labels for the bottom row of smart keys will change for each function selected. Pressing the CDI key toggles between GPS and VOR/ILS/LOC. The operation of the smart keys across the bottom changes depending on the function selected.



**Figure 1 - CNX80 Control and Display Layout**

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### 1.2 OPERATION

GPS/WAAS TSO-C146a Class 1: The Apollo CNX80, when installed in accordance with STC ST01229SE, uses GPS and WAAS (within the coverage of a Space-Based Augmentation System complying with ICAO Annex 10) for en route, terminal area, and non-precision approach operations (including "GPS", "or GPS", and "RNAV" approaches).

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

#### 1.2.1 Class II Oceanic, Remote, and other Operation

The Apollo CNX80, as installed, has been found to comply with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace, when used in conjunction with Garmin AT Oceanic/Remote Route Planning Software, P/N 139-0370-010 (or later FAA approved Version) and Oceanic/Remote Route Planning User's Guide PN 560-0180-00 (or later FAA approved Revision). Oceanic operations are supported when CNX80 annunciates Enroute operations. This provides an alarm limit of 2nm and a mask angle of 5° (degrees). This does not constitute an operational approval.

- a) Use for oceanic navigation requires an additional approved long range oceanic and/or remote area navigation system with independent display, sensors, antenna, and power source.
- b) Use of the CNX80 for other than U.S. 14 CFR Part 91 operations requires redundant VHF Com and VHF Nav systems. Other limitations may be applicable for Canadian operations.

## 2. LIMITATIONS

### 2.1 PILOT'S GUIDE

The Apollo CNX80 Pilot's Guide, part number and revision listed below (or later FAA approved revisions), must be immediately available to the flight crew whenever navigation is predicted on the use of the Apollo CNX80.

CNX80 Airborne Software Version 1.1 or 1.2

- Pilot's Guide P/N 560-0984-00 Rev. B or later approved

This AFM supplement does not grant approval for IFR operations to aircraft limited to VFR operations. Additional aircraft systems may be required for IFR operational approval, which is beyond the scope of this installation.

If a second redundant CNX80 is installed outside the acceptable field of view, it should be utilized as a backup system and not the primary source of navigation, unless the primary unit fails. A backup system should not be utilized to originate a flight plan for navigation.

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## 2.2 SYSTEM SOFTWARE

The system must utilize the software version listed below (or later FAA approved versions). The software version can be displayed in System Mode Screen on the display. This can be accessed, once the unit is initialized, by depressing the **FN** key twice and selecting **SYS**, followed by **VERS**.

**Table 1 – Approved Software Versions**

Software Item	Approved Software Version (or later FAA approved versions)	
	SW Version	As displayed on CNX80
Airborne SW	1.1	01.10
Airborne SW	1.2	01.20

## 2.3 DATABASE

The CNX80 Database Card P/N 138-0329-050 Rev. -- (or later FAA approved version) must be installed.

- a) IFR enroute and terminal navigation is prohibited, unless the pilot verifies the currency of the database or verifies each selected waypoint for accuracy by reference to current approved data.
- b) Instrument approaches using the CNX80 are prohibited, unless CNX80 approach data is verified by the pilot or crew to be current. Instrument approaches must be accomplished in accordance with approved instrument approach procedures that are loaded from the CNX80 database.

## 2.4 NAVIGATION

No navigation is authorized north of 89° (degrees) latitude or south of 89° (degrees) latitude.

## 2.5 APPROACHES

- a) During GPS approaches, the pilot must verify the CNX80 is operating in the approach mode.
- b) When conducting approaches referenced to true North, a manual magnetic variation setting of zero degrees must be used.
- c) Accomplishment of ILS, LOC, LOC-BC, LDA, SDF, MLS, VOR approach, or any other type of approach not approved for GPS overlay, is not authorized with GPS navigation guidance.
- d) Use of the CNX80 VOR/LOC/GS receiver to fly approaches not approved for GPS requires VOR/LOC/GS navigation data to be present on the external indicator.
- e) For aircraft with remote source selection annunciation installed for the CDI/HSI, conducting IFR approaches is prohibited if the remote annunciation is found inoperative during pre-flight. (This limitation does not prohibit the conduct of an IFR approach if the required remote annunciation fails during flight).
- f) Unless in emergency conditions, IFR approaches are prohibited whenever any physical or visual obstruction (such as a throw-over yoke) restricts pilot view and access to the CNX80.

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### **3. EMERGENCY / ABNORMAL PROCEDURES**

#### **3.1 EMERGENCY PROCEDURES**

No change.

#### **3.2 ABNORMAL PROCEDURES**

- a) If the Apollo CNX80 GPS navigation information is not available, or is invalid, internal VHF navigation function may be used, or utilize other remaining operational navigation equipment installed in the airplane as appropriate. If the CNX80 loses GPS position and reverts to Dead Reckoning mode (indicated by the annunciation "DR" above the groundspeed indication on the moving map display), then the moving map will continue to be displayed. Aircraft position will be based upon the last valid GPS position and estimated by Dead Reckoning methods. Changes in airspeed or winds aloft can affect the estimated position substantially. Dead Reckoning mode terminates at the first Pilot Navigation leg in the flight plan.
- b) If a "Loss of Integrity" (LOI) message is displayed (above the groundspeed indication on the moving map display) during:
  - Enroute/Terminal; continue to navigate using GPS equipment and periodically cross-check the GPS guidance to other approved means of navigation.
  - GPS Approach; GPS approaches are not authorized under LOI, revert to alternate means of navigation. This may be the internal VOR/LOC/GS or other remaining operational navigation equipment as appropriate.
- c) If loss of the VHF Navigation radio message (NAV flag) is displayed, revert to an alternate means of navigation appropriate to the route and phase of flight. GPS position and VHF Comm radio functions are not affected unless annunciated as failed.
- d) If the VHF Comm radio fails (as indicated by the display and associated message), then use another installed VHF Comm radio in the aircraft. GPS position and VHF Navigation radio functions are not affected unless annunciated as failed.
- e) If the CNX80 transponder control function fails at any time, the remote transponder will automatically revert to Mode C operation and squawk the last code assigned.

### **4. NORMAL PROCEDURES**

Refer to the CNX80 Pilot's Guide defined in paragraph 2.1 on page 4 of this document for normal operating procedures.

CNX80 functionality and user interface is very much like a Flight Management System (FMS). Although intuitive and user friendly, a reasonable degree of familiarity is required to use the CNX80 without becoming too engrossed in CNX80 operation at the expense of basic instrument flying in IMC and basic see-and-avoid in VMC. Pilot workload will be higher for pilots with limited familiarity in using the CNX80 in an IFR environment, particularly without the autopilot engaged. Garmin AT provides excellent CNX80 training tools with the Pilot's Guide, the Computer Based Training CD ROM, and the CNX80 Simulator Mode. Pilots should take full advantage of these training tools to

enhance system familiarization. Use of autopilot is strongly encouraged when using the CNX80 in IMC conditions.

## **5. PERFORMANCE**

No change.

## **6. WEIGHT AND BALANCE**

See current weight and balance data.

## **7. AIRPLANE & SYSTEM DESCRIPTIONS**

See Apollo CNX80 Pilot's Guide for a complete description of the CNX80 System.