**N811TW**

**GDC31 GPS STEERING**

**INTRODUCTION**

*NOTE: The following is a general description of the operation of the GDC31 GPS steering interface. Please refer to the POH supplement for official instructions.*

The GDC31 is a GPS Steering (GPSS) converter that will allow the KAP 140 autopilot to follow GPS flight plans and approach procedures up to the FAF, including course changes, holding patterns, procedure turns, DME arcs as well as missed approach procedures. The GPSS converter essentially follows the “magenta line” shown on the GNS 530W.

In order for the GPS Steering to be active, the autopilot must be in **HDG** mode and the GDC31 switched to **GPS** mode using the two position toggle switch left of the autopilot.

However, with the GDC31 in **HDG** mode, all operations of the autopilot and GNS 530W, including vertical and lateral guidance e.g. coupled ILS approaches or GPS approaches with vertical guidance, function as before since this takes the GDC31 out of the circuit.

The steering signal from the GNS 530W is processed through the GPSS converter, and sent directly to the autopilot. The GPSS converter does not steer in the vertical (pitch) direction so all vertical guidance procedures of the GNS 530W/autopilot remain as before

 **HDG Mode**

When the **HDG** mode illuminated, the GDC31 module is taken out of the circuit and the GNS 530W and the autopilot behaves as before with no change.

**GPS Mode**

Push the switch and it toggles to the **GPS** mode. The steering signal then comes from the GNS 530W and is fed to the autopilot. To receive the signal, the autopilot must be in **HDG** mode – **not NAV** mode.

**Lateral guidance**

Lateral guidance from the GNS530W for non-precision approaches, such as VOR and localizer approaches, is provided when the GDC31 unit is in ***GPS*** mode and when the CDI displays course information from the navaid. See *“Caution”* note under non-precision approaches in following section.

GNS 530W GPS approaches with vertical guidance, including LNAV, L/VNAV, LNAV+V, and LPV approaches, as well as ILS approaches, are flown as previously.

**GENERAL OPERATION**

**GPS steering**

GPS steering will only work if you have previously loaded an approach, e.g., KMYF ILS, GPS approach, defined waypoint, e.g. Julian VOR, or an airport that results in guidance (“Magenta Line”) on the face of the GNS 530W. If there is no course guidance line shown on the GNS 530W then it can’t couple and steer. Once you have programmed the GNS 530W, select **GPS** on the **GPS/HDG** switch. Observe that the GPS is illuminated and not blinking and engage the autopilot in **HDG** mode.

 ***CAUTION:***

***The autopilot will immediately command up to a standard rate turn to enter a 45° intercept to the GPS active leg (Magenta Line). Note that before toggling back to the HDG mode on the selector switch, make sure that the heading bug on the HSI is close to your current heading since when the GPS steering switch is set back to HDG, the autopilot will read the heading bug and will turn to that heading.***

**Coupled ILS or GPS Approaches with vertical guidance**

Whether approaching the final approach course with the selector switch in **HDG** mode (vectors to final) or **GPS** mode, switch the KAP 140 to **APR** mode when you’re near or on the final approach course, just as before.

**APR** mode on the autopilot will be armed, the localizer or GPS final approach course will be captured, and the glideslope or glide-path will be captured.

Note that the GPSS converter is out of the loop when the autopilot is in **APR** mode. You will have to switch the autopilot back to **HDG** mode when you’re ready to re-engage GPSS.

**Non-precision Approaches**

GPS or RNAV approaches without vertical guidance (LNAV) can be flown in GPSS mode. To fly a localizer or VOR approach in GPSS mode:

* + - Load the localizer or VOR approach e.g., Gillespie field LOC-D or OCN VOR-A in the GNS 530W with localizer or VOR frequency in NAV1.
		- Push the CDI button on the GNS 530W to select VLOC mode – as before
		- Select **GPS** mode on the GPSS selector switch
		- Select **HDG** mode on the autopilot*.*

In this configuration, the GNS 530W sends steering commands to the autopilot to follow the localizer or VOR, but you will be displaying “raw localizer data” on the HSI as required by the AIM. Note that no vertical guidance is provided.

 ***CAUTION***

***The AIM prohibits use of a GPS for lateral navigation on a localizer or VOR approach “without reference to raw localizer [or VOR] data.” Under one interpretation, this would allow a localizer or VOR approach to be flown in GPSS mode, as long as deviation from the localizer or VOR course is displayed on the HSI to provide “raw localizer [or VOR] data”.***

**Holding**

When approaching a published hold:

* + Select **GPS** on the **GPS/HDG** switch. Observe that **GPS** is illuminated and not blinking.
	+ Engage the autopilot in the **HDG** mode. The autopilot will intercept the current leg on the GNS 530W. When you arrive at the holding fix, the autopilot will enter the holding pattern, using the correct entry.
	+ If you wish to stay in the holding pattern for one or more turns, push the OBS button on the GNS 530W to **SUSP**end waypoint sequencing after entering the holding pattern but before returning back to the holding fix. As long as **SUSP** appears above the OBS button, the autopilot will stay in the heading pattern. Once you’re ready to leave the holding pattern and fly the approach, push the OBS button again to extinguish the SUSP indication and the autopilot will proceed to the approach.

**Missed Approach**

To have the GPSS fly the missed approach when you arrive at the MAP, DH or DA: establish a climb on the KAP 140; push the OBS button on the GNS 530W to re-enable waypoint sequencing; put (or leave) the GPSS in **GPS** mode; and push the **HDG** button on the KAP 140. Based on input from the GPSS, the KAP 140 will climb to the altitude set and armed in the KAP 140; fly the missed approach course and waypoints from the GNS 530W, all the way to the missed approach holding point; and enter the missed approach holding pattern as described under “Holding”, above.

If you need to stay in the holding pattern awaiting further clearance, either confirm that SUSP shows above the OBS button on the GNS 530W, or push the OBS button to SUSPend waypoint sequencing.

**OPERATING LIMITATIONS**

Do not use the GDC31 below the published MDA during an approach.

The GDC31 does not reduce or otherwise alter any existing safety features of the autopilot such as bank limiting, rate limiting and protection from a hard over. The GDC31 provides lateral (roll) data only (no pitch data is supplied to the GDC31).

Refer to the KAP 140 autopilot POH for autopilot limitations.

Failure of the GDC31 will affect the lateral axis only of the autopilot and only if the GPS/HDG switch is in the **GPS** mode. **HDG** hold mode is not affected by the GDC31 when the **GPS**/**HDG** switch is in the **HDG** mode.

 ***EMERGENCY PROCEDURES***

**In the event of a failure of the GDC31 exhibited, for example by a blinking GPS annunciator:**

* 1. **Maintain pitch and yaw control**
	2. **Disengage autopilot immediately**
	3. **Regain control of the aircraft**
	4. **Select HDG on GPS/HDG mode switch**
	5. **Do not attempt to use in GPS mode**