

BELL 429

ROTORCRAFT FLIGHT MANUAL

SUPPLEMENT

ASTRONAUTICS CORPORATION OF AMERICA DISPLAY UNIT/COURSE HEADING FLIGHT DIRECTOR PANEL

429-704-023

429-706-090

**OR S/N 57402, 57403, 57404, 57425, 57430 AND
SUBSEQUENT**

**CERTIFIED
12 APRIL 2019**

This supplement shall be attached to the Bell Helicopter Model 429 Flight Manual when the Astronautics Corporation of America Display Unit/Course Heading Flight Director Panel is installed.

Information contained herein supplements information in the basic Flight Manual. For Limitations, Procedures, and Performance Data not contained in this supplement, refer to the basic Flight Manual.

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NOTE


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Andreas Hartono

**CHIEF, FLIGHT TEST
FOR
DIRECTOR — NATIONAL AIRCRAFT CERTIFICATION
TRANSPORT CANADA**

GENERAL INFORMATION

The Astronautics Corporation of America (ACA) Display Unit (DU)/ Course Heading Flight Director (CHFD) panel kit (429-704-023) replaces existing Rogerson Kratos 2 DU and 3 DU installations as well as the CHFD. Optional kit (429-706-090), provides installation of a 3rd ACA DU if not previously installed.

Section 1

LIMITATIONS

1-1. INTRODUCTION

The 429-FMS-19 limitation regarding the use of MAP mode during a DME Arc approach and the limitation regarding the number of search pattern legs is not applicable with the ACA Display Unit installation.

1-3. TYPES OF OPERATION

Track (TRK) mode is approved for VFR operations only.

Coupling to HDG is prohibited when in TRK mode.

1-5. CONFIGURATION

Garmin GTN 750/650 main software shall be version 6.21 (or later) with GPS software 5.2 (or later).

Polar True Nav mode shall be DISABLED.

1-5-A-4. GPS APPROACHES

GPS advisory vertical guidance deviation information (LNAV+V, LP+V) is only an aid to comply with altitude restrictions. The pilot must use the primary barometric altimeter to ensure compliance with all altitude restrictions.

1-6. WEIGHT AND CENTER OF GRAVITY

Actual weight change will be determined after kit installation. Ballast will then be adjusted, as required, to return empty weight CG to within allowable limits.

Section 2

NORMAL PROCEDURES

2-4. INTERIOR AND PRESTART CHECK

NOTE

When electrical power is applied, force TRIM defaults to ON.

2-9-D. FLIGHT DIRECTOR OPERATIONS

NOTE

The pilot is responsible to monitor and adjust the helicopter attitude, if required, following engagement of the auto-couple feature.

Selection of CPL on the CHFD or selection of GA, with airspeeds at 65 KIAS and above, automatically activates the TRIM ON and ATT for auto-coupling of the FD. If CPL is selected, the default modes of HDG/VS (VS/HDG/ASPD, 4 axis only, if installed) will be automatically engaged. If GA is selected, GA/GA is initially presented and then automatically reverts to GA/VS (GA/GA/GA reverts to VS/GA/ASPD, 4 axis only, if installed).

2-9-E. FMS (GPS) OPERATIONS

During a missed approach sequence, the mode in the FMS status area (above the airspeed indicator) will remain green until the missed approach has been activated/unsuspended. Once activated, the FMS navigation source flag may appear in white letters inside a gray box until the next sequence or leg has been intercepted. Then it will turn green to show the mode is active.

NOTE

When a missed approach requires that a heading leg be flown, a white "HDG" annunciation in the FMS status area and loss of the EHSI lateral deviation bar indicate that the heading leg is active.

NOTE

With bearing pointer number 1 selected to FMS 1 or FMS 2, the STA / APRT / WPT map symbol is overlaid by a VORTAC symbol (issue with S/W V017).

2-9-I. SEARCH AND RESCUE SEARCH PATTERNS

The use of the bearing pointer is prohibited during the orbit search pattern.

Section 3

EMERGENCY AND MALFUNCTION PROCEDURES

3-9-A. SINGLE MAGNETOMETER FAILURE

- INDICATIONS:

L FD and AP 1 DEGRADED or R FD and AP 2 DEGRADED message illuminated.

HSI displays (affected side) — Dashes.

Automatic reversion to TRK mode on DU(s), if > 10 KTS GS airborne.

FD flag — Red unfilled arrowhead pointing to affected side.

- PROCEDURE:

1. HDG softkey (affected DU) — Select valid heading source and then press TRK on bottom heading control tab to deselect TRACK mode.

2. FD — As required.



DO NOT UTILIZE FD CUES OR MODES THAT ARE SHOWN TO BE ACTIVE ON A FD FLAGGED AS FAILED.

3-9-B. DUAL MAGNETOMETER FAILURE

- INDICATIONS:

L FD and R FD messages illuminated.

AP 1 DEGRADED and AP 2 DEGRADED messages illuminated.

HSI displays — Dashes.

Automatic reversion to TRK mode on DU(s), if > 10 KTS GS airborne.

FD flag — Red.

- PROCEDURE:

1. Utilize standby compass or GPS for heading reference.

2. If TCAS Kit installed with Garmin GTN 750/650 Kit, cycle TCAS PBA to power system OFF/ON for correct GTN MAP orientation.

Table 3-1. Electrical Distribution

| EMERG BUS 1 | ESS BUS 1 | N ESS BUS | ESS BUS 2 | EMERG BUS 2 |
|---------------------------------|-----------------------------|-------------------------|--------------------------|---------------------------------|
| ADAHRS (Left) | AFCS 1 | Light, Cabin | ADF | ADAHRS (Right) |
| ADIU Channel A | Aux Power | OEI Training Switch | Auto RPM | ADIU Channel B |
| Bus Interconnect Relay | Avionics Fan DU (Center) | TCAS | ECS – Radio Heat | AFCS 2 |
| CVFDR | DU (Left) | Weather Radar | ELT | Cargo Hook Power |
| DU (Center) Emergency Power | ECS – Cabin Vent | Windshield Wiper (Left) | Hoist Controller | DU (Right) |
| ECS – Cabin Heat | Fuel Balance Pump | | Instrument Panel Fan | ECS – Defog/Blower |
| Engine 1 ECU | Fuel Transfer Pump | | Lights, Instrument | Engine 2 ECU |
| Engine 1 FIRE Light & Discharge | LH CHFD Light, Search | | Lights, Position | Engine 2 Fire Light & Discharge |
| Engine 1 FMM | Lights, Anti-collision | | Nav/Com 2 | Engine 2 FMM |
| Engine 1 Ignitor | | | RAD ALT | Engine 2 Intake Bypass |
| Engine 1 Intake Bypass | Non-essential Controller | | Transponder | |
| Engine 1 Starter | Pitot/Static Heater (Left) | | Windshield Wiper (Right) | Engine 2 Starter |
| FDR | | | | Fuel Interconnect Valve |
| Floats | | | | Fuel Shut-off Valve, Engine 1 |
| Force Trim Release | | | | Generator 1 Control/Reset |
| Fuel Shut-off Valve, Engine 2 | | | | Hoist Power |

Table 3-1. Electrical Distribution (Cont)

| EMERG BUS 1 | ESS BUS 1 | N ESS BUS | ESS BUS 2 | EMERG BUS 2 |
|----------------------------|-----------|-----------|-----------|-----------------------------|
| Fuel Transfer Valve | | | | Hydraulic Shut-off Switch |
| Generator 2 Control/Reset | | | | ICS |
| Hoist Cable Cut | | | | Light, Landing |
| Lighting Annunciator | | | | Pitot/Static Heater (Right) |
| Lighting, Emergency | | | | RH CHFD |
| | | | | Standby Attitude Indicator |
| Nav/Com 1 | | | | |
| Pedal Stop | | | | |
| Standby Altimeter | | | | |
| Standby Attitude Indicator | | | | |

Table 3-3. Caution (Amber) Lights/Messages

| MESSAGE | FAULT CONDITION | CORRECTIVE ACTION |
|----------------------------|---|---|
| CHFD | Course heading flight director panel power failure. Course and heading functions inoperative. | Applicable maintenance required. |
| ◀ FD ▶ | Message will be displayed in the top right corner of the DU indicating a mismatched state between the flight directors. | CHFD — Select left or right FD. |
| HOT DU | Display Unit is overheating. DU HOT message will be displayed in the top left corner of the affected Display Unit. | Display unit – Reduce brightness to reduce temperature of DU. If INSTR FAN caution message is not illuminated, applicable maintenance is required. |
| STARTER (on PSI) | Respective engine starter fault. Starter not disengaging. | 1) RUN OFF switch – OFF. 2) BATT – OFF. 3) Applicable maintenance required. |

Table 3-4. Advisory (Green, White or Cyan) Lights/Messages

| MESSAGE | SYSTEM CONDITION | CORRECTIVE ACTION |
|---------------------------------|------------------------------------|-------------------|
| START (on PSI) | Respective engine starter engaged. | |
| ON GEAR (upper EICAS) | On ground with cyclic centered. | |

Section 4

PERFORMANCE

No change from basic manual.

Section 5

WEIGHT AND BALANCE

No change from basic manual.

Section 1

SYSTEMS DESCRIPTION

1-11. INTEGRATED AVIONICS SYSTEM

The Astronautics Corporation of America (ACA) Display Unit (DU) and Course Heading Flight Director (CHFD) panel system interfaces with other helicopter systems to provide Primary Flight Display (PFD) and Multi-Function Display (MFD) functionality. The CHFD is a control panel to allow pilot to input course, heading and flight director selections.

The ACA display units and CHFD panel incorporate the following:

NOTE






Advisory vertical guidance information is only an aid to help pilots comply with altitude restrictions and cannot be coupled to the autopilot. When using advisory vertical guidance, the pilot must use the primary barometric altimeter to ensure compliance with all altitude restrictions.

1. GPS advisory vertical guidance deviation (LNAV+V, LP+V) is presented with a cyan colored diamond marker versus a green diamond marker for LPV/ILS vertical guidance.

NOTE

The pilot is responsible to monitor and adjust the helicopter attitude, if required, following engagement of the auto-couple feature. Once the flight director is coupled to the autopilot, the helicopter attitude can be adjusted by pressing and holding the TRIM REL button on the cyclic, as well as pressing and holding the FORCE REL button on the bottom of the collective (4-Axis only, if installed), and repositioning the controls as required. Once the desired attitude is achieved, releasing the button(s) will reset the flight director engaged modes to the conditions present at the time of release.

2. Selection of CPL on the CHFD or selection of GA, with airspeeds at 65 KIAS and above, automatically activates the TRIM ON and ATT for auto-coupling of the FD. If CPL is selected, the default modes of HDG/VS (VS/HDG/ASPD, 4 axis only, if installed) will be automatically engaged. If GA is selected, GA/GA is initially presented and then automatically reverts to GA/VS (GA/GA/GA reverts to VS/GA/ASPD, 4 axis only, if installed).

3. Uncoupled flight director (FD) modes are colored magenta. The FD source arrow symbol is cyan with an open circle  when either TRIM ON and/or ATT have not been selected. The cyan arrow turns white  and then to a green CPL arrow  as the auto-couple feature transitions to the FD coupled state. The FD source arrow symbol is white when uncoupled with ATT selected.
4. If FD modes are active and either the TRIM ON and/or ATT are not selected, selection of CPL on the CHFD will automatically activate the TRIM ON and ATT for auto-coupling of the selected FD modes.
5. The FLT MISCAMP message is associated to a double headed yellow arrow  with the appropriate nomenclature (HDG, IAS, ALT, ATT) presented adjacent to the affected parameter.
6. ILS split mode is presented with a double headed green arrow located near the primary navigation source .
7. During starter engagement, the **START** message is displayed under the appropriate engine digital parameters.
8. The CHFD panel ([Figure 1-1](#)) utilizes individual light annunciation for selected FD mode, in addition to the FD mode annunciation on the DU.

NOTE

If the wind data is presented in light grey, the information should be considered unreliable.

9. If active wind data (arrow vector and digital readout in green) on the DU becomes unavailable, then the most recent wind data is retained and displayed in light grey for up to 10 minutes, then suppressed.
10. In addition to the existing SET HDG softkey and MAG softkey which are made available when the HDG softkey is selected, a TRK softkey and a DRIFT softkey have been incorporated ([Figure 1-2](#)).

NOTE

POLAR TRUE NAV Mode shall be selected to DISABLED in the MAINTENANCE MENU / PILOT SETUP.

NOTE

Track (TRK) Mode is approved for VFR operations only. Do not couple to HDG when in Track mode.

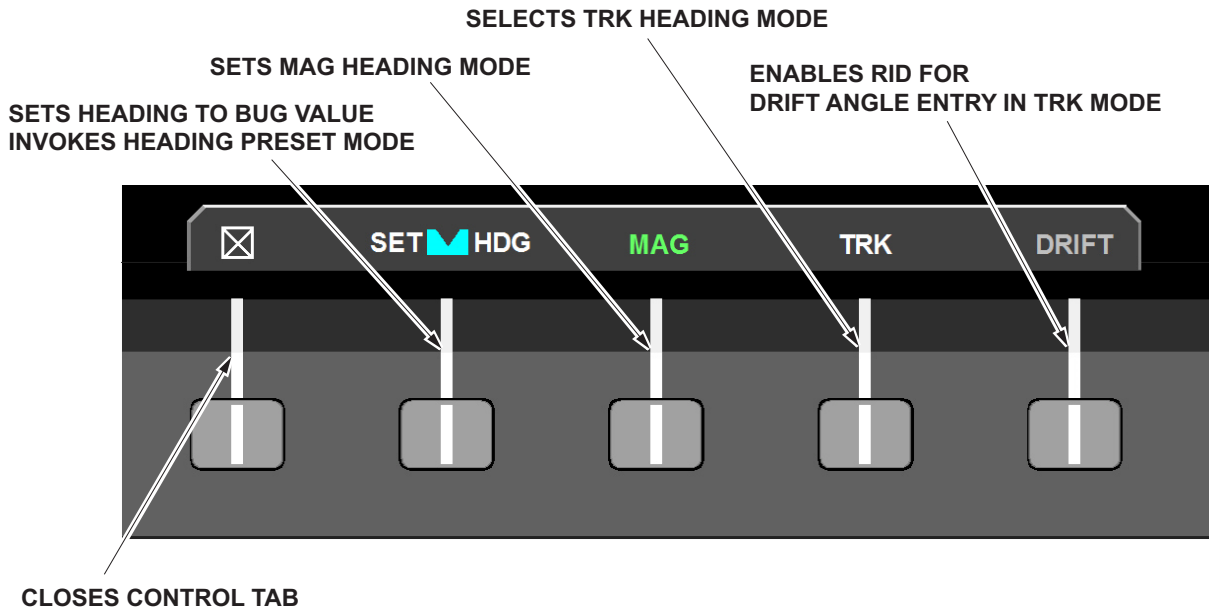
Track (TRK) Mode: This feature allows the FMS provided GPS calculated track to be displayed as the heading. The TRK softkey will be displayed in gray (suppressed) when Track Mode is not available and in white when Track Mode is available. For Track Mode to be available, all of the following conditions are required:

- the aircraft must be airborne
- the groundspeed from the selected FMS must be 10 knots or greater for more than 3 seconds
- and the FMS provided GPS track angle must be active



429_FMS-46_01_0001

Figure 1-1. CHFD Control Panel



429_FMS-46_01_0002

Figure 1-2. Heading Control Tab TRK Mode and DRIFT Mode

When the above conditions are met, pressing the HDG softkey followed by the TRK softkey will cause the Track Mode to become active (Figure 1-3). When active the following will occur:

- the FMS provided GPS track angle will be displayed as the heading, **TRK** (magnetic) or **TTK** (true) will be displayed in yellow beside the track angle (i.e. depending on the Nav Angle selection)
- the TRK softkey will be displayed in green
- the AHRS aircraft heading (if available) continues to be shown as a white carrot on the outer compass rose for reference
- the Track Mode setting will be synchronized and displayed on the other DUs

In addition, Track Mode will be automatically set to active and displayed on the DUs if all of the following conditions are met for more than 3 seconds:

- the aircraft is airborne
- the groundspeed from the selected FMS is 10 knots or greater
- and the AHRS HDG data from both AHRS becomes invalid, or missing, or if the selected AHRS heading source indicates non-computed data.

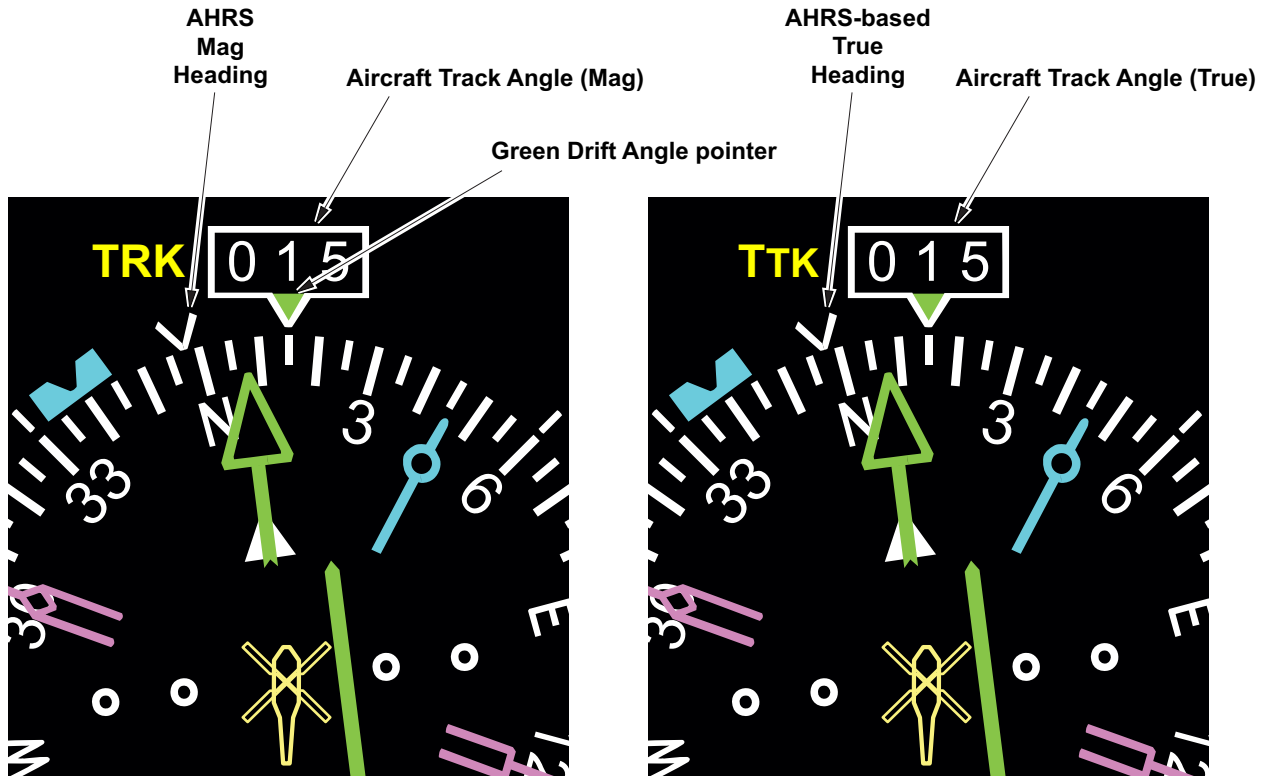
Once set by these conditions, Track Mode can be deselected manually by pressing the TRK softkey. This will allow for the use of Mag Mode (if available), or the use of Heading Preset Mode (if available) via the SET HDG softkey if Track Mode information is not desired.

Track Mode will be automatically set to inactive if any of the following conditions are met:

- the aircraft is not airborne
- the groundspeed from the selected FMS is less than 10 knots and persists for more than 3 seconds
- the groundspeed or the FMS provided GPS track angle is missing or invalid
- if in normal heading mode (i.e. not true mode), the magnetic variation data is missing or invalid

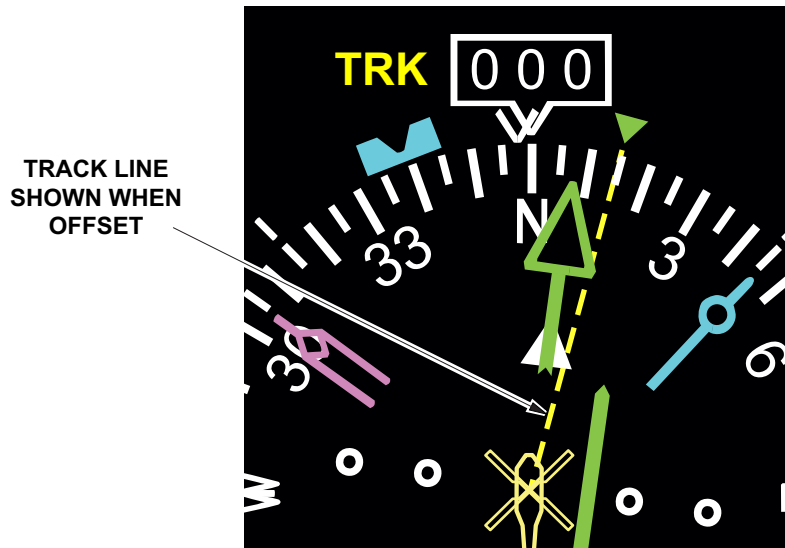
Drift (DRIFT) Mode: This feature allows the compass to display a track-based heading display which will provide correct orientation based on the assumed drift. The DRIFT softkey will be displayed in gray (suppressed) when Track Mode is inactive and in white when Track Mode is active.

When Track Mode is active, pressing the HDG softkey followed by the white DRIFT softkey will turn the DRIFT softkey green and allow selection of a drift adjustment via the DU RID. Adjustments are limited to plus or minus 30 degrees in increments of 1 degree. When the RID is rotated to enter the assumed drift, a dashed yellow line will appear from the aircraft symbol to the edge of the compass card (Figure 1-4). In addition, the DU will rotate the compass presentation as the RID is turned to enter the drift. When the desired amount of drift has been entered and the RID is pressed, the DRIFT softkey will be displayed in white and the drift value will be stored and synchronized with the other operating DUs. Follow the same procedure to change or remove the assumed drift. If the drift is being removed, rotate the RID to select a drift of 0 degrees (i.e. rotate the RID until the dashed yellow line is removed).



429_FMS-46_01_0003

Figure 1-3. Track and True Track Modes



429_FMS-46_01_0004

Figure 1-4. DRIFT Mode

The drift will also return to zero whenever Track Mode is manually or automatically deselected.

NOTE

Garmin FMS display of calculated wind speed and direction will be erroneous if the manually entered DRIFT angle value is inaccurate.

In Track Mode, when a DRIFT angle is manually entered, the apparent heading passed to the FMS will be changed and the FMS will generate a wind calculation based on this data. Under these conditions, the wind data on the DU is displayed in cyan within a cyan outlined rectangle.