

Objective 1c. Given TOs 1F-16C-2-94GS-00-1, 1F-16C-34-1-1, and 1F-16CG-2-34GS-00-1, identify system operation of the EGI / INS with at least 80% accuracy.

Objective 1c. Given TOs 1F-16C-2-94GS-00-1, 1F-16C-34-1-1, and 1F-16CG-2-34GS-00-1, identify system operation of the EGI / INS with at least 80% accuracy.

- Reading Assignment: TO 1F-16C-2-94GS-00-1 paragraphs 5-30 and 5-75.
- TO 1F-16C-34-1-1 page 1-136 paragraph 1.9 through page 1-141 paragraph 1.9.6, 1-152 through page 1-153 paragraph 1.11.3.1.7, page 1-154 paragraph 1.11.3.1.11 and 1.11.3.1.12, page 1-154 paragraph 1.11.3.1.13 through page 1-155, page 1-166 paragraph 1.12.1.6, page 1-168, page 2-254 paragraph 2.23.6.3 and 2.23.6.4, page 1-156 paragraph 1.11.4 through page 1-165 fig 1-96, page 1-446 paragraph 1.29.7 through 1-448, page 1-450 and 1-451 paragraph 1.29.12, page 1-453, and page 1-455 paragraph 1.29.17 through 1-456 paragraph 1.29.19
- TO 1F-16CG-2-34GS-00-1 paragraphs 3-8 through 3-12, 3-17 through 3-19, 3-25, 3-26, 3-29 through 3-33, Tables 3-1 through 3-4.

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- Overview of System Operation EGI/INS
 - Features of EGI
 - Modes of Alignment
 - Modes of Operation
 - Indicating Displays
 - System Operation

Objective 1c. Given TOs 1F-16C-2-94GS-00-1, 1F-16C-34-1-1, and 1F-16CG-2-34GS-00-1, identify system operation of the EGI / INS with at least 80% accuracy.

- Features of EGI

- Provides independent INS, GPS and blended navigation solutions

- Features 99 steerpoints
- 5000 point navigation database
- Have Quick radio TOD signal

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- Modes of Alignment

- Orient the platform level to the Earth's gravity so that all inertial measurements will be accurate
- Accomplished before each flight
- DED, HUD, ADI, HSI provide information about status of alignment
- DED automatically displays the EGI status page when Align switch depressed and rotated



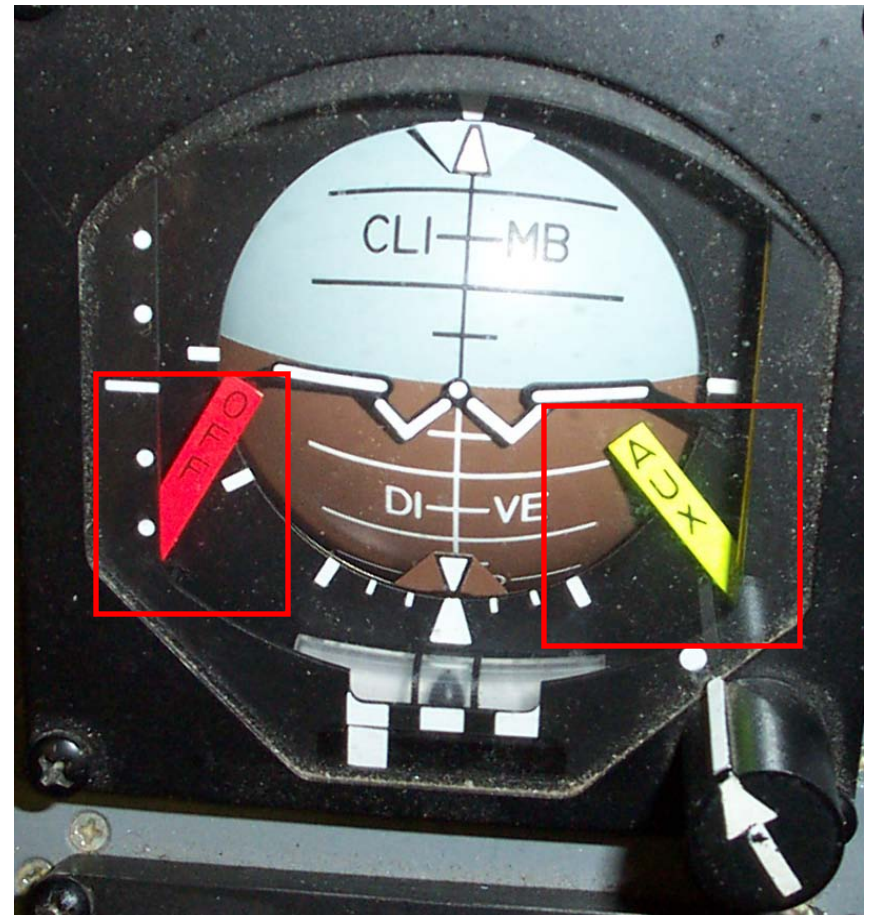
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- Normal (Norm)
 - Primary alignment mode used
 - Heading is automatically computed
 - Lat/Long entry required within 2 minutes of power-on
 - DED displays align time and status
 - Status starts at 99
 - Progresses to .8



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- “Attitude good” is achieved at approximately 0.2 minutes from start (ADI OFF flag out of view)
- 1 minute into alignment
 - ADI AUX flag out of view
 - RDY appears on DED
 - Align appears on HUD



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- Full performance alignment is complete at approximately 4 minutes
 - RDY flashes on DED
 - ALIGN flashes on HUD
 - Status 0.8

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- Stored Heading (STOR HDG)
 - Rapid alignment mode
 - Uses last heading stored in computer to align platform
 - Can only be used when:
 - Aircraft has not been moved after INS shutdown
 - Shutdown occurred while in Norm align mode



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- “Attitude Good” is achieved at approximately 0.2 minute from start
- Aux flag retracts at 0.5 minutes from start
- Full alignment is achieved at approximately 1.5 minutes with a status of 0.8

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- In-flight (INFLT ALIGN)
 - Allows for in-flight alignment using GPS data
 - Can only be accomplished if accurate GPS data is available
 - If GPS satellite tracking NOT possible, do not select INFLT ALIGN
 - This alignment can be used on ground when aircraft cannot remain stationary long enough to complete a norm alignment

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- Airborne:

- Takes approximately 5 minutes to complete
- After GPS track established, present position, Groundspeed, and ground track data available
- Information on DED in 30-45 seconds after INFLT ALIGN selected

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- On the Ground:
 - Takes approximately 10 minutes to complete
 - Position information on DED in 30-45 seconds after INFLT ALIGN selected

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- Attitude (ATT)

- Used in flight to restore attitude information when RLG has dumped
- Accomplished in 10 seconds
- All computed magnetic heading and steering outputs are lost
- Information processed using gyros only:
 - Roll
 - Pitch
 - Azimuth

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- Modes of operation

- Navigation

- Primary flight mode of operation
 - Selected after an alignment is completed
 - Automatically and continually computed by the computer
 - Present Position
 - Velocity/acceleration
 - Attitude
 - Heading
 - Distance
 - Inertial altitude
 - Great circle steering to any of 99 steerpoints in EGI

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- Enables platform to begin freely measuring all aircraft movement
- EGI blends internal INS and GPS data along with inputs from the CADDC
- Steering information displayed on HSI, MFD, and HUD

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- If RLG fails:
 - All weapons delivery capability except Manual is lost
 - HUD loses FPM, Great Circle steering cue, HDG, and Steerpoint diamond
 - ADI and HUD lose all attitude information
 - HSI data lost except for TACAN/ILS

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- **Power Down mode**

- INS and GPS data stored in non-volatile memory:
 - Last computed position
 - Sensor auto-calibration terms
 - System BIT history
- Primary power to EGI is required for at least 20 seconds after power down command initiated

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- **Indicating Displays**

- Head-Up Display (HUD) – TO 1F-16C-34-1-1 page 1-152

- Primary display for navigation information
 - Symbology consists of cues, scales and text
 - Displayed in air to air, air to ground and navigation master modes

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- Symbology
 - FPM (Flight Path Marker)
 - Great circle steering cue
 - Attitude bars/ Horizon line
 - Roll Indicator
 - Steerpoint symbol
 - Magnetic Heading

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- Scales

- Velocity scale

- Left side of display
 - Each tic equals 10 knots
 - Velocity determined against fixed mark to moving scale
 - Three scales – CAS, TAS, and GS

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- Altitude scale – 1F-16C-34-1-1 page 1-168
 - Right side of display
 - Several selections based on HUD remote panel selection
 - Barometric
 - Radar
 - Automatic Radar
 - For each scale, radar altitude is displayed digitally below the scale, preceded by an R

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- **Vertical Velocity scale**
 - Next to altitude scale
 - Triangular indicator on fixed scale
 - Reference tics spaced at 500 feet per minute intervals
 - Index mark shared with altitude scale – indicates zero vertical velocity

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- IMSC

- Two positions – NAV and ILS/NAV
- Enables the EGI to control indications on ADI and HSI
- HDG control active only when EGI is operating in Attitude mode

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- ADI

- EGI provides inputs of aircraft pitch and roll and an attitude good validity signal

- Attitude Sphere

- Displays pitch and roll from EGI

- Displays through 360 degrees of both (pitch and roll)

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– Graduated scales

- Pitch

- 10 degree major

- 5 degree minor

- Roll

- 30 degree major up to 90 degree left or right roll

- 10 degree minor up to 30 degree left or right roll

– White is “climb” (gray clouds)

– Brown is “dive” (brown dirt)

– Horizon line – where the colors converge

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- Miniature aircraft – used as a reference for attitude sphere pitch
- Pitch trim control – Changes attitude sphere pitch display
- “Aux” flag
 - Out of view indicates EGI is aligned and operating normally
 - In view indicates
 - EGI is operating in attitude mode
 - Computed magnetic heading is bad

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– “OFF” flag

- Out of view indicates attitude sphere is operating normally
- In view indicates:
 - INS failure of pitch or roll or power is unavailable
 - INS attitude is not available (attitude is bad)

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- HSI

- INS provides aircraft direction indications

- Compass card (heading)

- Rotates relative to where the aircraft nose is pointing
- Card can rotate 360 degrees (0-359)
- “N” points to north

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– Relative bearing pointer

- Points to destination selected
- Rotates 360 degrees about the compass

– Miles indicator

- Indicates the number of miles remaining until reaching the selected destination
- Displays up to 999 miles

– Course deviation bar

- Indicates the angular difference between heading and bearing to destination selected
- Indicates up to 10 degrees of deviation
- Each dot to the side of the bar equals 5 degrees

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– To-From indicator

- Displays white in triangle nearest nose of miniature aircraft symbol
- Selected course is within +90 degrees of indicated relative bearing

– “OFF” flag

- Out of view – HIS is operating properly
- In view
 - Loss of external electrical power
 - Loss of internal power supply
- The following are inoperative
 - Compass Card
 - Course Arrow
 - Heading Marker
 - Relative bearing pointer

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- Summary of System Operation of EGI/INS
- Features
- Modes of Alignment
- Modes of Operation
- Indicating Displays
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