F-16 Countermeasures Management Switch (CMS)

Section 5.3: CMS Block and Variant Notes

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5.3   CMS Block and Variant Notes

The operational behavior of the CMS varies depending on the F-16 variant, ECM pod configuration, and geographic region of deployment. This section clarifies the critical differences between external ECM pods (ALQ-131 / ALQ-184) and internal ECM systems (IDIAS: Improved Defensive Internal Avionic System), and provides a matrix of F-16 blocks and operators to guide pilots and maintainers in understanding which procedures apply to their aircraft.

Understanding these distinctions is *essential for flight safety.* A CMS procedure correct for a Block 52 with external ECM pod will produce unexpected or dangerous results on a Block 52+ with IDIAS, and conversely. Pilots transitioning between aircraft variants must carefully review the applicable procedures before conducting combat operations.

5.3.1   External ECM Pod Variants (ALQ-131 / ALQ-184)

The ALQ-131 and ALQ-184 are active jamming pods mounted on external hardpoints (typically on the fuselage or wing stations). Both pods provide multi-band frequency jamming and operate under identical CMS control logic: pilot grants transmit consent via CMS Aft, and selects jamming mode via the XMIT knob on the ECM control panel (modes 1, 2, or 3).

Operational Characteristics

- **Transmit Authority**: CMS Aft (short or long hold) enables ECM transmission. ECM Enable light on miscellaneous panel illuminates when consent is active.

- **Mode Selection**: XMIT knob on ECM control panel selects mode (1 = AUTO Avionics Priority, 2 = AUTO ECM Priority, 3 = Continuous Jam).

- **Frequency Bands**: Both ALQ-131 and ALQ-184 cover five frequency bands, automatically selected during continuous transmission.

- **Interaction with RF Switch**: RF switch on throttle overrides CMS Aft. Moving RF to QUIET or SILENT disables pod transmission even if CMS Aft is held. Upon return to NORM, CMS Aft must be re-issued.

- **Landing Gear Constraint**: When landing gear is extended (down), ECM pod is held in Standby regardless of CMS Aft state. Retracting gear and re-issuing CMS Aft restores transmission capability.

- **Ground Safety**: On the ground, ECM pods must remain in Standby. Do not hold CMS Aft in the vicinity of personnel, as pod radiation poses a hazard.

F-16 Blocks and Operators with External ECM

The following F-16 variants are equipped with external ECM pods and follow the CMS procedures defined in Section 5.2 (CMS Actuation with ECM):

1. **USAF Air Combat Command (ACC) and Air Education and Training Command (AETC)**:

- Blocks 40, 42, 50, 52 (all variants, including MLU variants)
- Standard configuration: ALQ-131 or ALQ-184 on Station 1 (left fuselage) or Station 7 (right fuselage)
- Dash-34 reference: Dash-34, section 2.7.4.2.1

2. **NATO Allied Air Forces**:

- **Belgium**: F-16 Block 15, 25, 30/32 variants
- **Denmark**: F-16 Block 20, 25, 30/32 variants
- **Netherlands**: F-16 Block 15, 20, 25, 30/32 variants
- **Norway**: F-16 Block 15, 20, 25, 30/32 variants
- All NATO variants use ALQ-131 or ALQ-184 with identical CMS procedures

3. **International Partners**:

- **Egypt**: F-16 Blocks 32, 40, 52 with ALQ-131 or ALQ-184
- **Pakistan**: F-16 Block 40, 42, 52 with ALQ-131 or ALQ-184
- **Chile**: F-16 Block 32, 40, 50 with ALQ-131 or ALQ-184
- **Turkey**: F-16 Block 40, 50, 52 with ALQ-131 or ALQ-184
- **Japan**: F-16 (F-2 licensed production) with ALQ-131 equivalent
- All international variants with external pods follow Dash-34 procedures

5.3.2   Integrated ECM Variants (IDIAS)

The Improved Defensive Internal Avionic System (IDIAS) is an internal ECM system integrated into the F-16's avionics suite. Unlike external pods, IDIAS operates under fundamentally different CMS control logic: CMS Left (not CMS Aft) cycles through operational modes (Standby, Avionics Priority, ECM Priority), and the XMTR switch on the ECM panel is binary (Standby / Operate), not a three-position mode selector.

Operational Characteristics

- **Transmit Authority**: CMS Left (repeated short presses) cycles through modes. XMTR switch (binary STBY/OPER) gates all modes. Unlike external pods, CMS Aft does *not* control IDIAS transmission.

- **Mode Cycling**: Each CMS Left press advances STBY → AVNC (Avionics Priority) → ECM (ECM Priority) → AVNC → ECM (repeating cycle).

- **Frequency Band Selection**: IDIAS automatically selects frequency bands based on RWR threat priority. Pilot has no manual band selection control (automatic selection is feature, not limitation).

- **Avionics Protection**: In AVNC mode, primary avionics (FCR/TFR/HARM) receive protection; only AFT antenna transmits. In ECM mode, both FWD and AFT antennas transmit; primary avionics may be degraded.

- **Interaction with RF Switch**: RF switch on throttle affects IDIAS identically to external pods. Moving RF to QUIET or SILENT disables IDIAS transmission even if mode is ECM. Return to NORM requires mode re-selection via CMS Left.

- **Landing Gear Constraint**: When landing gear is extended (down), IDIAS is held in Standby. Retracting gear and re-selecting mode via CMS Left restores transmission capability.

- **Warm-up Period**: After power-on, IDIAS requires 5–6 minutes warm-up. During warm-up, STBY lamp flashes. Mode cycling is available but modes will not activate until warm-up completes and XMTR is set to OPER.

- **Ground Safety**: IDIAS follows same ground safety practices as external pods. Do not transmit in vicinity of personnel.

F-16 Blocks and Operators with IDIAS

The following F-16 variants are equipped with IDIAS and use the CMS Left procedures defined in Section 5.2 (CMS Actuation with ECM — Internal ECM IDIAS):

1. **Israel Defense Force / Air Force (IDFAF)**:

   - F-16I Barak I, Barak II, Sufa (legacy variants)
   - F-16C/D Blocks 30, 40 with IDIAS retrofit
   - IDFAF procured IDIAS as primary defensive system for enhanced survivability in high-threat Middle East environment
   - Dash-34 reference: Dash-34, section 2.7.4.1.1

2. **Hellenic Air Force (HAF) — Greece**:

   - F-16C Blocks 50, 52 (designated PXII, PXIII, PXIV in Greek service)
   - IDIAS equipped for NATO operations and interoperability with allied air forces
   - Dash-34 reference: Dash-34, section 2.7.4.1.1

3. **Republic of Korea Air Force (ROKAF)**:

   - KF-16C Block 52 (upgrade from Block 32 with IDIAS integration)
   - ROKAF adopted IDIAS for air defense mission against North Korean air threats
   - Dash-34 reference: Dash-34, section 2.7.4.1.1

4. **Republic of Singapore Air Force (RSAF)**:

   - F-16D Block 52 (primarily two-seat variant for training and lead flights)
   - IDIAS selected for regional air defense and interoperability with allied forces
   - Dash-34 reference: Dash-34, section 2.7.4.1.1

5. **F-16 Block 52+ with IDIAS Retrofit**:

- Any F-16 Block 52+ equipped with Improved Defensive Internal Avionic System (IDIAS)

- Retrofit programs may apply to additional operators. Check technical order and aircraft-specific configuration.

- Dash-34 reference: Dash-34, section 2.7.4.1.1

5.3.3   Critical Operational Differences

This subsection highlights the most critical distinctions between external ECM and IDIAS to prevent procedural confusion and flight safety incidents.

CMS Aft vs. CMS Left

- **External ECM Pod**:

  - CMS Aft (short or long hold) = Grant transmit consent

  - Holding CMS Aft maintains transmission

  - Releasing CMS Aft does *not* disable transmission (transmission persists until CMS Right is pressed or threat clears)

  - CMS Left is *not used* for external ECM control

- **IDIAS**:

  - CMS Left (repeated short presses) = Cycle through modes (STBY → AVNC → ECM)

  - CMS Aft does *not* control IDIAS transmission (using CMS Aft on IDIAS has *no effect* on ECM)

  - Releasing CMS Left after a press advances mode and persists in that mode

DANGER: Using CMS Aft on an IDIAS aircraft will NOT enable ECM transmission. A pilot transitioning from external ECM to IDIAS must break the habit of pressing CMS Aft and instead use CMS Left.

XMIT Knob vs. XMTR Switch

- **External ECM Pod**:

  - XMIT knob on ECM control panel = Three-position selector (1, 2, 3)

  - Position 1: AUTO Avionics Priority (FCR/TFR protected)

  - Position 2: AUTO ECM Priority (ECM protected)

  - Position 3: Continuous Jam (all bands, continuous transmission)

  - Pilot manually selects mode based on tactical situation

- **IDIAS**:

  - XMTR switch on ECM panel = Binary selector (STBY / OPER)

  - No three-position mode selection available

– Operational mode (STBY / AVNC / ECM) selected via CMS Left

– XMTR OPER gates all modes; XMTR STBY holds IDIAS in Standby

Note: IDIAS does *not* have a "Continuous Jam" mode equivalent. Frequency band selection is automatic based on RWR threats.

Frequency Band Selection

- **External ECM Pod**:

  – Frequency bands are automatically cycled during transmission (pod cycles through all five bands continuously)

  – Pilot selects transmission mode via XMIT knob but cannot manually select specific bands

- **IDIAS**:

  – Frequency bands are automatically selected based on RWR threat priority

  – RWR provides threat bearing and frequency to IDIAS

  – IDIAS jams the highest-priority threat band, adapting in real-time to threat changes

  – Pilot has *zero manual band selection* (this is intentional: automatic selection is superior in dynamic threat environment)

Avionics Protection Differences

- **External ECM Pod**:

  – Modes 1 and 2 via XMIT knob = Avionics Priority (FCR/TFR/HARM protected from jamming)

  – Mode 3 = Continuous Jam (all antennas transmit; may degrade own avionics)

  – Pilot must select mode based on mission (if relying on radar for fire control, use Mode 1 or 2; if radar not needed, use Mode 3 for maximum coverage)

- **IDIAS**:

  – AVNC mode = Avionics Priority (FCR/TFR/HARM protected; only AFT antenna transmits)

  – ECM mode = ECM Priority (both FWD and AFT antennas transmit; onboard avionics may be degraded)

  – Pilot cycles modes via CMS Left based on mission phase (use AVNC if conducting precision strike or radar SAM defense; use ECM if in sustained air combat)

5.3.4 Variant Summary Cross-Reference

Table 5.1 provides a quick reference for determining which CMS procedures apply to a given F-16 variant:

F-16 Variant	ECM Type	CMS Transmit	CMS Mode Select	Mode Selector	Sect. Ref.
Block 40/42/50/52 (USAF)	External Pod	CMS Aft	XMIT knob	3-pos (1,2,3)	5.2
Block 15–32 (NATO)	External Pod	CMS Aft	XMIT knob	3-pos (1,2,3)	5.2
Block 32/40/52 (Intl)	External Pod	CMS Aft	XMIT knob	3-pos (1,2,3)	5.2
F-16I Barak (Israel)	IDIAS	CMS Left	CMS Left	Cycle STBY/AVNC/ECM	5.2
Block 50/52 PXII–IV (Greece)	IDIAS	CMS Left	CMS Left	Cycle STBY/AVNC/ECM	5.2
KF-16C Block 52 (Korea)	IDIAS	CMS Left	CMS Left	Cycle STBY/AVNC/ECM	5.2
F-16D Block 52 (Singapore)	IDIAS	CMS Left	CMS Left	Cycle STBY/AVNC/ECM	5.2

Table 5.1: F-16 Variant ECM Configuration Cross-Reference

5.3.5   Operational Notes and Safety Reminders

Procedure Compatibility

Procedures documented in Section 5.2 (CMS Actuation) apply to both external ECM and IDIAS variants, but the specific CMS button presses differ significantly. A pilot must *always verify* the aircraft's ECM configuration before conducting offensive or defensive operations:

- **Check the AVIONICS panel** for IDIAS label or external ECM pod indication

- **Review the ECM control panel**: Does it have a three-position XMIT knob (external pod) or binary XMTR switch (IDIAS)?

- **Consult the aircraft-specific technical order** (TO 1F-16CMAM-34-1-1 or equivalent)

- **Ask the crew chief or maintenance**: They will confirm the configuration immediately

Cross-Training Hazards

Pilots transitioning between aircraft with different ECM systems must be extremely careful not to apply old procedures to new aircraft:

- Pressing CMS Aft on IDIAS aircraft does *nothing*; ECM remains in Standby

- Pressing CMS Left on external ECM aircraft has *no effect*; ECM requires CMS Aft

- Selecting wrong XMIT mode during high-workload combat may result in unintended avionics degradation or inadequate jamming coverage

- **Solution**: Conduct systems-specific training on the new aircraft before operational employment

Mission Planning Integration

During mission planning, intelligence and mission planning staff should highlight ECM configuration as part of the threat brief:

- **Threat SAM types** may influence choice of ECM mode (Avionics Priority vs. ECM Priority)

- **Terrain and engagement geometry** may favor external ECM pod positioning over internal IDIAS

- **Fuel constraints** may favor aircraft without external ECM (reduced drag, extended range)

- **Interoperability** with allied air forces must account for ECM system differences