

F-16 Countermeasures Management Switch (CMS)

Section 5.2: CMS Switch Actuation

Falcon BMS 4.38.1 — WIP File section-C5-S2-cms-actuation-hotas-tables

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5.2 CMS Switch Actuation

The Countermeasures Management Switch (CMS) is a four-direction hat switch located at the flight stick that provides pilots with rapid, direct control over the F-16's defensive systems during demanding tactical situations. This section tabulates all CMS button combinations, organized by operational layer: Counter Measures (CMDS manual/automatic/semi modes) and Defensive Avionics integration (jamming) with both external ECM pods (ALQ-131/ALQ-184) and internal avionics (IDIAS). CMS actuation is independent of the Master Mode currently selected.

Each table entry specifies:

- **State:** The operational context (master mode, CMDS mode, sensor state).
- **Direction:** The physical direction for pressing the CMS hat (Up, Down, Left, Right).
- **Action:** The press type (Short, Long, Long Hold).
- **Function:** What the CMS command activates or controls.
- **Effect / Nuance:** The resulting system behavior, including tactics and constraints.
- **Dash34:** Reference section in the Dash-34 manual.
- **Training:** Recommended BMS training missions for hands-on practice.

5.2.1 CMS Actuation with CMDS

The ALE-47 CMDS (Automatic Chaff and Flare Dispensing System) provides three operational modes: Manual (MAN), Automatic (AUTO), and Semi-Automatic (SEMI). Each mode grants the pilot different levels of control and autonomy over chaff and flare dispensing. The CMS is the primary interface for program execution and consent authority across all three modes.

Manual Mode

The CMDS Manual (MAN) mode grants the pilot direct, program-by-program control over countermeasure expenditure. Each CMS direction selects or executes a specific program. This mode is recommended when threat types are well-known or when chaff/flare inventory must be conserved, or by pilot choice.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
CMDS MAN	Up	Short	Execute Program 1–4	Runs the program selected via the CMDS panel PRGM knob once per press. No threat sensing; purely pilot-commanded. Overrides any AUTO dispensing, if running.	Dash-34, sec- tion 2.7.2.2	TBD

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Table 5.1: CMS Actuation with CMDS Manual Mode

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
CMDS MAN	Left	Short	Execute Program 6	Flare-only program. Often pre-configured for close-range air-to-air engagements or MANPAD defense. No dependency on PRGM knob.	Dash-34, sec-	TBD tion 2.7.2.2

Automatic Mode

The CMDS Automatic (AUTO) mode enables the ALE-47 CMDS to dispense chaff/flare programs continuously in response to RWR-detected threats, without requiring pilot consent for each event. Pilot consent is given once by pressing CMS Aft; dispensing continues until CMS Right is pressed or expendables are exhausted.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
CMDS AUTO	Up	Short	Execute Program 1–4	Manual override: runs the selected program once, interrupting any ongoing AUTO dispensing. After the manual program completes, AUTO resumes if threat persists. Useful for pilot override in high-threat scenarios.	Dash-34, sec-	TBD tion 2.7.2.2
CMDS AUTO	Left	Short	Execute Program 6	Manual flare-only program, overrides AUTO. After execution, AUTO resumes.	Dash-34, sec-	TBD tion 2.7.2.2
CMDS AUTO	Aft	Short	Give Consent; Enable AUTO Dispensing	CMS Aft grants consent for AUTO CMDS. RWR-detected threats trigger automatic program dispensing (selected via PRGM knob). Dispensing continues until threat clears or CMS Right is pressed. Consent state persists even if pilot switches to MAN mode; re-engaging AUTO will resume auto-dispense.	Dash-34, sec-	TBD tion 2.7.2.1
CMDS AUTO	Right	Short	Cancel Consent; Disable AUTO	CMS Right removes CMDS consent and places the ALE-47 in Standby. Automatic dispensing halts immediately. Pilot must re-issue CMS Aft to resume AUTO operation or use the system manually.	Dash-34, sec-	TBD tion 2.7.2.1

Semi-Automatic Mode

Semi-Automatic (SEMI) mode allows the ALE-47 to prompt the pilot for consent on a per-threat basis. When the RWR detects a threat requiring countermeasures, the CMDS displays “DISPENSE RDY” on the control unit and sounds a “COUNTER” voice message, requesting pilot consent via CMS Aft.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
CMDS SEMI	Up	Short	Execute Program 1–4	Manual override: runs the selected program once, independent of RWR threat state. After execution, CMDS returns to monitoring for threats and issuing “COUNTER” prompts.	Dash-34, section 2.7.2.2	TBD
CMDS SEMI	Left	Short	Execute Program 6	Manual flare-only program, independent of SEMI threat detection. After execution, CMDS resumes SEMI monitoring.	Dash-34, section 2.7.2.2	TBD
CMDS SEMI	Aft	Short	Give Consent; Dispense One Program	When CMDS issues “COUNTER” (threat detected), pilot presses CMS Aft to execute one instance of the selected program. If threat persists or a new threat appears, CMDS will issue “COUNTER” again. Consent state is tracked; switching to AUTO while consent active will trigger immediate AUTO dispensing on next threat.	Dash-34, section 2.7.2.1	TBD
CMDS SEMI	Right	Short	Cancel Consent; Return to Standby	CMS Right removes SEMI consent. CMDS halts monitoring and returns to Standby. “COUNTER” messages cease.	Dash-34, section 2.7.2.1	TBD

5.2.2 CMS Actuation with ECM

External ECM pods (ALQ-131, ALQ-184) and internal IDIAS (Improved Defensive Internal Avionic System) provide pilot-controlled jamming across frequency bands. The CMS Aft position controls transmit authority for external pods; CMS Left cycles modes for internal IDIAS. Both systems interact with the RF switch and respect landing gear constraints.

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

External ECM pods provide pilot-controlled jamming across five frequency-band programs. The CMS Aft position grants “ECM consent,” enabling the pod to transmit at the XMIT switch setting (modes 1, 2, or 3). The ECM Enable light on the miscellaneous panel indicates consent state.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
ECM Pod	Aft	Short	Enable ECM Transmit; Grant Consent	CMS Aft illuminates the ECM Enable light and permits the external ECM pod to transmit in the mode set by the XMIT switch on the ECM control panel (XMIT 1: AUTO Avionics Priority; XMIT 2: AUTO ECM Priority; XMIT 3: Continuous Jam). Pod continues transmitting as long as ECM is not cancelled by the pilot or RF switch is moved away from NORM.	Dash-34, sec- tion 2.7.4.2.5	TBD
ECM Pod	Right	Short	Disable ECM Transmit; Remove Consent	CMS Right extinguishes the ECM Enable light and places the ECM pod in Standby, halting transmission immediately. Pod will not transmit until CMS Aft is re-issued.	Dash-34, sec- tion 2.7.4.2.5	TBD

Internal ECM (IDIAS)

Internal avionics ECM (IDIAS: Improved Defensive Internal Avionic System) automatically selects frequency bands to jam based on RWR threat priority. CMS Left cycles through operational modes (Standby, Avionics Priority, ECM Priority). CMS Aft is not used for IDIAS; mode control is via CMS Left and the XMTR button on the ECM panel.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
IDIAS ECM	Left	Short	Cycle ECM Operational Mode	Each short press of CMS Left advances the ECM mode: STBY → AVNC (Avionics Priority) → ECM (ECM Priority) → AVNC → ECM (cycles).	Dash-34, sec- tion 2.7.4.1.2	TBD
IDIAS ECM	Right	Short	Set ECM to Standby	CMS Right forces IDIAS ECM into STBY mode, halting all jamming operations. Requires CMS Left cycling to return to AVNC or ECM mode.	Dash-34, sec- tion 2.7.4.1.2	TBD

5.2.3 CMS Consent and Constraints

This subsection clarifies the relationship between CMDS consent (CMS Aft) and ECM transmit authority (CMS Aft for external pod). Understanding these interactions is critical for effective defensive posture management during high-workload combat operations.

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
CMDS AUTO/SEMI + ECM Pod	Aft	Short	Joint Consent (CMDS + ECM)	Single CMS Aft command grants consent to <i>both</i> the ALE-47 CMDS (AUTO/SEMI) and the external ECM pod. There's no distinction between the two; both systems respond to the same CMS Aft press. This unified control maximizes pilot situational awareness and frees workload during combat maneuvering.		

5.2.4 Important Operational Notes

The CMS provides rapid, tactile access to CMDS program selection and ECM transmit authority without requiring the pilot to manipulate distant panels during high-G maneuvering. Mastery of CMS actuation across all CMDS modes (MAN, SEMI, AUTO) and ECM configurations (external pod, IDIAS) is essential for effective defensive operations. Pilots must understand the consent state model, RF switch interactions, and inventory management to avoid unintended dispensing or system saturation.

Consent State Tracking

In AUTO and SEMI modes, the CMDS tracks the consent state even if the pilot temporarily switches to MAN mode. If the pilot gives CMS Aft consent in AUTO, then switches the CMDS MODE knob to MAN, the consent state is retained. Upon re-engaging AUTO without issuing CMS Aft again, the CMDS will immediately begin dispensing if a threat is detected. This behavior can be exploited for rapid mode switching during combat but may also lead to unintended dispensing if not carefully managed.

Bingo Quantity Behavior

If expendables (chaff or flare) fall to or below the bingo quantity, the CMDS will still request consent (CMS Aft) and continue dispensing. The “LOW” and “OUT” voice messages alert the pilot to low or exhausted inventory, but dispensing does not automatically stop. Pilot must monitor EWS upfront pages and manually manage inventory via CMDS MAN or by pressing CMS Right to inhibit AUTO.

RF Switch Override

The RF switch on the throttle is a master control for ECM transmission. Moving the RF switch away from NORM (e.g., to QUIET or SILENT) overrides any previous CMS Aft command and places both the external ECM pod and internal IDIAS in Standby. Returning RF to NORM does *not* automatically restore transmission; the pilot must re-issue CMS Aft.

ECM Consent vs. CMDS Consent

A single CMS Aft press grants consent to both the ALE-47 CMDS and the external ECM pod. The pilot does not issue separate commands; the CMS Aft action is unified. However, internal IDIAS

uses CMS Left for mode cycling, not CMS Aft. This distinction is critical for aircraft configured with IDIAS.

Ground Operations Safety

On the ground, ECM pods are held in Standby for safety reasons. Pilots must not hold CMS Aft while on the ground in the vicinity of personnel, as the ECM pod may radiate and pose a hazard. Ground personnel must be clear before the pilot engages ECM for pre-flight high-level BIT (Built-In Test). Once airborne, ECM consent (CMS Aft) can be issued and maintained as tactically required.