TMS, DMS and CMS Usage Guide for Falcon BMS 4.38.1

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Contents

0.1   DMS Down: Toggle SOI Between Displays

The **DMS Down command** toggles the Sensor of Interest (SOI) among displays. The exact behavior depends on which master mode is active and whether the HUD is a valid SOI candidate in that mode (see Section **??**).

In master modes where the HUD is a valid SOI (NAV and A-G), repeated presses of DMS Down cycle through a repeating sequence: HUD → MFD → MFD → HUD → . . . This allows the pilot to move SOI among all three displays.

In AA master mode, where the HUD is not a valid SOI candidate, DMS Down toggles SOI only between the two MFDs (MFD ↔ MFD), and the HUD remains a passive display regardless of SOI status. This allows the pilot to choose which MFD sensor receives hands-on HOTAS commands.

Toggle vs. Cycle Clarification: The distinction between "toggle" and "cycle" is a consequence of the avionics architecture's constraints on which displays can be SOI in each mode (detailed in Section **??**).

The DMS Down mechanism itself is uniform across all modes: it simply advances SOI to the next valid candidate in the system's SOI set for that master mode. Note that Section 0.1 describes DMS Left/Right format cycling, which is distinct from SOI toggling.

0.1.1   DMS Down Effectiveness in All Master Modes

It's dependant on the possibility of the HUD being designated as SOI.

Modes Where HUD Is a Valid SOI Candidate (NAV and A-G):

NAV (Navigation) Master Mode: DMS Down cycles through all valid SOI candidates in NAV: HUD, FCR, TGP, HSD, WPN, HAD. In practice, the physical layout (HUD + Left/Right MFDs) creates a repeating 3-step cycle: HUD → MFD → MFD → HUD → . . .

This allows the pilot to move hands-on command focus among the HUD (for heading/altitude/situational awareness) and the two MFD sensor pages (for detailed navigation sensor management).

A-G PRE (Preplanned Air-to-Ground) Mode: In A-G PRE, valid SOI candidates are HUD, FCR, TGP, WPN, HAD, HSD. DMS Down cycles through the same pattern as NAV. DMS Down moves SOI among the MFDs without changing which format is displayed.

A-G VIS (Visual Air-to-Ground: CCIP, DTOS, AGM-65 VIS, IAM-VIS, HUD/HMCS MARK): In A-G VIS modes, valid SOI candidates are HUD, FCR, TGP, WPN. DMS Down again cycles through the 3-step pattern as presented in NAV.

However, in A-G VIS, DMS Down is **operationally critical**, not merely convenient. This is because A-G VIS designations are HUD — centric: the pilot aims using the HUD pipper (CCIP), target designator (AGM-65 VIS, IAM-VIS), or HUD/HMCS MARK symbology. These visual cues are controlled by CURSOR/ENABLE and TMS inputs routed through HUD SOI. If SOI migrates to an MFD (TGP, WPN, FCR, HSD), TMS and CURSOR commands are routed to that MFD display instead, and the HUD visual cueing no longer responds as expected.

Therefore, DMS Down is the critical complement to DMS Up in A-G VIS flows:

- **DMS Up** re-establishes HUD SOI when SOI has "drifted" to an MFD during sensor management or configuration.

- **DMS Down** allows the pilot to temporarily move SOI *off* the HUD and onto an MFD (TGP for refining sensor search, WPN for weapon status, FCR/HSD for situational awareness outside the HUD field of view), then alternate back to HUD to resume visual designation.

In A-G VIS, this Up/Down alternation is a fundamental part of the delivery flow and cannot be omitted without losing command flow efficiency or situational awareness.

Master Modes Where HUD Is NOT a Valid SOI Candidate: In air-to-air employment (A-A, DGFT, and MSL OVRD) modes, the avionics architecture restricts SOI to sensor formats on the MFDs: FCR, HSD, and TGP. The HUD cannot be SOI in these modes (see Section **??** for the architectural rationale).

Consequently, DMS Down is restricted to toggling SOI **between the two MFDs only**: MFD SOI $\leftrightarrow$ MFD SOI . . . .

This 2-way toggle allows the pilot to choose which MFD sensor page receives hands-on command priority. In A-A contexts, this is *operationally primary*: the pilot uses DMS Down to alternate SOI focus between, for example, FCR (for track/lock/missile control) and HSD (for picture/sorting/threat assessment), or between FCR and TGP (when using the targeting pod for situational awareness or supplemental tracking).

DMS Down is the standard HOTAS mechanism for managing SOI in air-to-air employment modes, and its use is essential to efficient radar employment and tactical decision-making.

0.1.2   DMS Down Usage Table

Table 1: DMS Down Usage Across NAV, A-A, and A-G Master Modes

State	Dir	Act	Function	Effect / Nuance	Dash34	Train
NAV	Down	Short	Toggle SOI cycle through displays	DMS Down cycles SOI through HUD $\rightarrow$ right MFD $\rightarrow$ left MFD $\rightarrow$ HUD. With HUD SOI, hands-on commands (CURSOR/ENABLE, TMS) manage HUD navigation symbology. Pressing DMS Down transfers SOI to the next MFD; pilots can rotate through all three displays.	2.1.1.2.3, 2.1.6.3	—

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State	Dir	Act	Function	Effect / Nuance	Dash34	Train
A-A	Down	Short	Toggle SOI between MFDs only	DMS Down toggles SOI only between right and left MFD (FCR, HSD, TGP only). HUD cannot be SOI in A-A and remains a passive display. This is the primary HOTAS method for choosing which MFD sensor page receives hands-on command priority for track management, picture evaluation, and weapons employment.	2.1.1.2.3, 2.1.6.3	TRN 18 BAR-CAP, TRN 17B IFF Intercept
A-G	Down	Short	Toggle SOI between HUD and MFD sensor pages	DMS Down cycles SOI through HUD → right MFD → left MFD → HUD. In A-G PRE, this is a convenience tool for moving hands-on focus between HUD and MFD sensor management. **In A-G VIS (CCIP, DTOS, AGM-65 VIS, IAM-VIS, HUD/HMCS MARK), DMS Down is operationally critical**: HUD is the primary visual designation interface; DMS Down allows alternation between HUD visual cueing (TMS/CURSOR steering, pipper control, TD box positioning) and MFD sensor work (TGP search/refine, WPN status, FCR A-G ranging). Loss of HUD SOI in A-G VIS prevents proper visual designation and must be recovered with DMS Up.	2.1.1.2.3, 2.1.6.3	TRN 10 GP Bombs, TRN 11 LGB, TRN 13 Maverick, TRN 14 Maverick Adv, TRN 15 IAM

4.2.2.3 DMS Down Exception States

In certain special states and submodes, DMS Down may be temporarily ineffective even in master modes where SOI toggling normally works:

- **Snowplow (SP) PRE State (Unstabilised)**

  When the pilot enters Snowplow mode (a specialised A-G ground-stabilisation mode for slewing to arbitrary ground positions) and the SP position has not yet been stabilised with TMS Up, the SOI is effectively "nowhere." Both the A-G radar and TGP MFD displays show `NOT SOI`, and neither display is designated as SOI. As a result, **DMS Down has no effect** in this state: the toggle mechanism has nowhere to advance SOI to.

  Once the SP position is stabilised with TMS Up (pressing TMS Up on the HUD), SOI returns to its previous designated display, and DMS Down resumes normal toggling behaviour.

- **MARK/OFLY Submode**

In the MARK/OFLY submode (a specialised target-acquisition context documented in Dash-34 § 2.1.1.2.3), the SOI cannot be designated or changed at all. Consequently, **DMS Down has no effect** in MARK/OFLY: you cannot toggle SOI when SOI designation itself is locked. This submode is rare in normal operations but is important to recognise if you encounter it during unusual procedures or system states.

Cross-References and Integration Notes

- **Section 4.1.1**: Defines valid SOI candidates by master mode (referenced throughout Section 4.2.2.1).

- **Section 4.1.3**: Explains the architectural rationale for HUD SOI restrictions in A-A/DGFT/MSL OVRD (referenced in the A-A/DGFT/MSL OVRD subsection of Section 4.2.2.1).

- **Section 4.2.1**: DMS Up (complementary section; Section 4.2.2.3 exception states mirror those in Section 4.2.1.3).

- **Section 4.2.3** (future): DMS Left/Right (format cycling, distinct from SOI toggling; mentioned in intro as a separate mechanism).

End of Section 4.2.2. Ready for integration review.
WIP Status Summary:

- Narrative: 95% (all core concepts written; minor terminology consistency pass recommended)

- Table: 100% (all 3 rows complete with A-A training missions added)

- Exception states: 100% (Snowplow PRE and MARK/OFLY documented)

- Cross-references: Verified and formatted

- Next: Human review, approval, then integration into main guide-v.tex