

FFG Combat System Learners Guide
ANNEX B –Primary Reference Structures

1. Primary Reference Structures

- 1.1 There are many references referred to in the FFG Combat Systems Courses, however there are four primary references:
- a. ABR 6511 - RAN FFG Combat System Operators Manual (CSOM)
 - b. ABR 6509 – RAN FFG Combat Systems Manual (CSM)
 - c. ADACS Human Machine Interface Document (HMID)
 - d. Mk92 Mod12 Computer Program Operators Manual (CPOM)
- 1.2 Some of these references span several volumes, and understanding their structures can be a daunting task. This Annex provides a brief description of each reference and a first-level structural breakdown of each document. The intended process for finding desired information is as follows:
- a. Determine the most appropriate reference using the document descriptions.
 - b. Search the first-level structural breakdown to determine where the desired information is most likely to reside (Section / Chapter etc).
 - c. Find the desired section and chapter in the specific reference's Contents Pages, and scan the contents to determine whether this is indeed the place to find that information. If so, go to the information, if not, go back to the first-level structural breakdown to see where else the information might be.
- 1.3 Note that the ABRs contain much of the same information that the HMID and the CPOM contain, however the HMID and CPOM are updated more regularly than the ABRs.

FFG Combat System Learners Guide ANNEX B –Primary Reference Structures

1.4 ABR 6511 - RAN FFG Combat System Operators Manual (CSOM)

1.4.1 Document Description

- 1.4.1.1 The CSOM provides a system level overview of the capabilities of the combat system equipment. Section 1 contains physical and functional descriptions, of equipment, sorted into chapters by capability. The rest of the sections provide a system level control and operation description for the RAN FFG Combat System. The majority of the CSOM is classified CONFIDENTIAL, but there are some UNCLASSIFIED sections.

1.4.2 ABR 6511 Structural Breakdown

Section / Chapter	Folder & Classification
Section 1: Introduction and overview of the Combat System including physical and functional descriptions of equipment sorted into chapters by capability: Ch 1 Introduction Ch 2 Safety Ch 3 Command & Control Ch 4 Navigation Support Ch 5 Communications Systems Ch 6 Air and Surface Surveillance Ch 7 Underwater Warfare Systems Ch 8 Electronic Warfare Ch 9 Fire Control Group Ch 10 Effector Group Ch 11 Training Systems Ch 12 Organic Aircraft	1 (CONFIDENTIAL)
Section 2: Personnel positions, roles and responsibilities. Ch 1 Command & Decision Ch 2 Underwater Warfare Systems Ch 3 Fire Control Ch 4 Training Systems Ch 5 WE Causality Control Organisation	1 (CONFIDENTIAL)
Section 3: States and Modes of the Combat System Ch 1 Combat System Ch 2 Command & Control	1 (CONFIDENTIAL)
Section 4: Controls for Operation of Sensors & Associated Equipment Ch 1 Introduction Ch 2 Air and Surface Surveillance Ch 3 Underwater Warfare Systems Ch 4 Electronic Warfare	1 (CONFIDENTIAL)
Section 5: Threat Evaluation & Weapon Assignment (TEWA). Operation of Fire Control and Effector equipment. Ch 1 Introduction Ch 2 TEWA Ch 3 Fire Control Group Ch 4 Effector Group	1 (CONFIDENTIAL)

FFG Combat System Learners Guide

ANNEX B –Primary Reference Structures

Section 6: Communications Systems & Comms Training (OBCTS) Ch 1 External Comms Ch 2 Internal Comms Ch 3 Training System			1 (CONFIDENTIAL)
Section 7: Operating Instructions for ADACS, Tactical Data LINKs & OBTS Ch 1 Introduction (Missions & Capability) Ch 2 Command & Control Annex A VAB Descriptions Annex B VAB Descriptions (base build 2) Annex C VAB Descriptions (base build 3) Annex D Symbology Descriptions Annex E Alert Descriptions } NOTE: The ADACS HMID has the most up- to-date ADACS operating instructions. Ch 3 TDL Group Ch 4 Training Systems			1 (CONFIDENTIAL) 2 (UNCLAS) 3 (UNCLAS) 4&5 (UNCLAS) 5 (UNCLAS) 5 (UNCLAS) 1 (CONFIDENTIAL)
Section 8: Functional Flow Diagrams Ch 1 Functional Flow Diagrams	Explanatory Text Para: 1-6 1-7 1-8 1-9 1-10 1-11 1-12 1-13 1-14 1-15 1-16 1-17 1-18 1-19 Missing Missing	Flowchart Figure: 1-1 1-2 1-3 1-4 1-5 1-6 1-7 & 8 1-9 1-10 1-11 1-12 1-13 1-14 1-15 1-16 1-17	1 (CONFIDENTIAL)
List of Abbreviations			1 (CONFIDENTIAL)

FFG Combat System Learners Guide ANNEX B –Primary Reference Structures

1.5 ABR 6509 - RAN FFG Combat System Manual (CSM)

1.5.1 Document Description

1.5.1.1 The CSM provides a technical description the FFG Combat Systems and equipment. Section 1 provides a technical overview. Sections 2 through 6 contain technical descriptions of systems and equipment including performance, casualty modes and Physical / Functional / Interface descriptions. These sections sort the systems and equipment by the type capability they provide the Combat System. Section 7 covers System Maintenance, Section 8 covers Functional Flow Diagrams (Similar but not identical to ABR 6511). Section 9 contains Signal Flow Diagrams, and Section 10 covers Interfaces between systems and equipment. The majority of the CSM is CONFIDENTIAL with some UNCLASSIFIED sections.

1.5.2 ABR 6509 Structural Breakdown

Section / Chapter	Folder No. & Classification
Section 1: Combat System Overview Ch 1 Ship Functions and Roles Ch 2 Combat System Overview Ch 3 Combat System Manning Requirements Ch 4 Combat System Functional Description Ch 5 Combat System Parameters Ch 6 Combat System Equipment Location Ch 7 Safety Precautions	1 (CONFIDENTIAL)
Section 2: Sensors, NAVAIDS & Fire Control: Performance, Casualty Modes, Physical / Functional / Interface Descriptions Ch 1 Combat System Sensors Ch 2 Navigation ¹ and Support Group Ch 3 Air and Surface Surveillance Subsystem Ch 4 Underwater System Ch 5 Electronic Warfare Group Ch 6 Fire Control Group	1 (CONFIDENTIAL)
List of Abréviations	1 (CONFIDENTIAL)
Section 3: Platform Subsystems: Casualty Modes, Physical / Functional / Interface Descriptions Ch 1 Platform Subsystems Overview Ch 2 Dry Air and Nitrogen Ch 3 Liquid Cooling Ch 4 Ship Power and Distribution Ch 5 Alarm Systems Ch 6 Air Conditioning and Heating Ch 7 Magazine Safety Systems Ch 8 Helicopter Platform Support Systems Ch 9 Active Shaft Grounding System Ch 10 Prairie Masker / Fin Stabiliser Air List of Abréviations	2 (UNCLASSIFIED)

¹ Navigation Data System (NDS) and Automatic Identification System (AIS) are not contained in ABR 6509

FFG Combat System Learners Guide

ANNEX B –Primary Reference Structures

Section 4: Effectors: Performance, Casualty Modes, Physical / Functional / Interface Descriptions. (Note: ‘Effectors’ includes Helo systems) - Ch 1 Effector Group Introduction - Ch 2 Countermeasures Group - Ch 3 Underwater Weapons Subsystem - Ch 4 Close In Weapons System (CIWS) - Ch 5 Mk 75 Gun Subsystem - Ch 6 Guided Missile launch System - Ch 7 Harpoon Weapon System - Ch 8 Vertical Launching System - Ch 9 Helicopter System	3 (CONFIDENTIAL)
Section 5: Communications Sub-Systems: Performance, Casualty Modes, Physical / Functional / Interface Descriptions. - Ch 1 Communications Sub-Systems Introduction - Ch 2 External Communications Sub-System² - Ch 3 Internal Communications Sub-System	3 (CONFIDENTIAL)
Section 6: Command & Control System: Performance, Casualty Modes, Physical / Functional / Interface Descriptions. (Includes OBTS) - Ch 1 Command and Control System - Ch 2 Command and Decision Group - ADS - ADACS - CIS - Data Loader/Recorder System - Ch 3 Tactical Data Link Communication Group - CDLMS - JTIDS - LINK 11 Secure Equipment - HDL - Ch 4 Beacon Video Processor - Ch 5 Ancillary Equipment Group - CSSB - RSDS - RADAR Conversion & Selection - SDC - EOTS Video Amp - Ch 6 Command Support System³ - Ch 7 Onboard Training System	3 (CONFIDENTIAL)
Section 7: System Maintenance (includes Casualty / Alternate modes) - Ch 1 System Maintenance - Integrated Maintenance Concepts - Readiness Assessment - Training and Maintenance Support - Ch 2 Performance Tests & Alignment - Ch 3 Fault Diagnostics - Subsystem Equipment Manuals - Ch 4 Configuration Alternatives (Casualty Modes & trouble shooting) - Ch 5 Start Up and Shut Down Procedures (including equipment initialization order)	3 (CONFIDENTIAL)

² MASTIS and MTWAN not in ABR6509

³ OTCIXS and GCCS-M are no longer supported in the RAN.

FFG Combat System Learners Guide

ANNEX B –Primary Reference Structures

Section 8: Functional Flow Diagrams Ch 1 Functional Flow Diagrams TEWA QR Auto TWEA QR Semi Auto TEWA QR Manual Manual IFF Challenge Surface to Air Missile Engagement SM-1 Launch ESSM Launch Harpoon Engagement Harpoon Launch 76mm Engagement 76mm Gun Firing Aircraft Investigation Ordered by PWO Aircraft Investigation Ordered by AWO Aircraft Engagement Ordered by PWO Aircraft Engagement Ordered by AWO Torpedo Detection CIWS Remote Designation ⁴	Explanator y Text Para: Missing 1-6 1-7 1-8 1-9 1-10 1-11 Missing 1-12 1-13 1-14 1-15 1-16 1-17 1-18 1-19 1-20	Flowcha rt Figure: 1-9 1-8 1-7 1-11 1-10 1-4 1-6 1-12 1-5 1-18 1-1 1-13 1-14 1-15 1-16 1-18 1-3 1-2	3 (CONFIDENTIAL)
List of Abbreviations			3 (CONFIDENTIAL)
Section 9: Signal Flow Diagrams Ch 1 Signal Flow Diagrams 1–1 System Signal Flow Diagram 167 1–2 Fire Control System Signal Flow Diagram 179 1–3 CSSB Interconnection Signal Flow Diagram 185 1–4 Support System Signal Flow Diagram 203 1–5 Electronic Support Signal Flow Diagram 225 1–6 CDLMS Signal Flow Diagram 227 1–7 UWS Interconnection Signal Flow Diagram 235 1–8 SPS-55 Signal Flow Diagram 237 1–9 SPS-49A(V)1 Signal Flow Diagram 239 1–10 RIADT Signal Flow Diagram 241 1–11 AIMS Mk XII IFF Signal Flow Diagram 243 1–12 CSSB & AN/UYK-43 Interconnection Signal Diagram 251 1–13 CSSB & C2 Interconnection Signal Diagram 255 1–14 BCO 1, 3, 6 Interconnection Diagram 261 1–15 BCO 5, 7, 8, 9 Interconnection Diagram 263 1–16 Mk 92 Junction Box Signal Flow Diagram 265 1–17 Combat System Junction Box Signal Flow Diagram 267 1–18 OBTS Signal Flow Diagram 269 1–19 OBCTS Signal Flow Diagram 287 1–20 CTE Signal Flow Diagram 291 1–21 Mk 75 & Mk 13 Interconnection Signal Flow Diagram 295 1–22 Computer Ground System Signal Flow Diagram 299			4 (UNCLASSIFIED)
Section 10: Combat System Interfaces Ch 1 Combat System Interfaces 1–1 Combat System Interfaces (Tactical) 7 1–2 Combat System Interfaces (Training) 9 Ch 2 Command and Control System interfaces 2–1 Interface 2 ADACS_EOTS 3 2–2 Interface 3 ADACS_UWS 5 2–3 Interface 6 ADACS_ES 8 2–4 Interface 9 (52) ADACS_CDLMS (HMI) 12 2–5 Interface 10 ADACS_BVP49AV1 15			5 (UNCLASSIFIED)

⁴ Not Implemented

FFG Combat System Learners Guide

ANNEX B –Primary Reference Structures

2–6 Interface 11 ADACS_BVP92 20 2–7 Interface 13 ADACS_OBTS 20 2–8 Interface 15 ADACS_RIADT 21 2–9 Interface 75 AncillaryEq ADACS 23 2–10 Interface 100/133 ADACS_HDL 24 2–11 Interface 101 ADACS_AMD 26 2–12 Interface 102 ADACS_HWS 28 2–13 Interface 104 ADACS_WCP 31 2–14 Interface 105 SDC_ADACS 33 2–15 Interface 106 ADACS_GPS 36 2–16 Interface 119 AncillaryEq(Video)_ADACS 36 2–17 Interface 131 ADACS_CCTV 37 2–18 Interface 130 ADS/CIS_SPP 38 2–19 Interface 46 CDLMS/LINK11_EXCOMM 40 2–20 Interface 151 SLA10_JTIDS 40 2–21 ES to ADACS HMI Interconnection Flow Diagram 43 Ch 3 Training Systems 3–1 Interface 13 ADACS_OBTS 6 3–2 Interface 44 OBTS_ IFF92 18 3–3 Interface 47 CDLMS_JTIDS_OBTS 19 3–4 Interface 50 OBTS_ IFF49A 22 3–5 Interface 58 OBTS_SDC/NAV 29 3–6 Interface 62 CDLMS_KG40_OBTS 31 3–7 Interface 133 ADACS_HDL 36 3–8 Interface 134 - OBTS_COMMSIM 40 3–9 Interface 153 - MK92IFF_PTU 42 3–10 Interface 154 - SPS49IFF_PTU 43 3–11 Interface 155 CSSB Training Switch_PTU 44 Ch 4 Sensors and Sensor Data Distribution 4–1 Interface 83 49AV1_AncillaryEq (RSDS) 4 4–2 Interface 84 CASS_AncillaryEq (RSDS) 5 4–3 SPS-55_AncillaryEq (RSDS) 6 4–4 Interface 90 AncillaryEq_KHCTD 8 4–5 Interface 93 AncillaryEq_WCC1 10 4–6 Interface 94 AncillaryEq_WCC2 11 4–7 Interface 155 CSSB Training Switch_PTU 12 (Nb fig 4-7 incorrectly same as fig4-15 Should be same as fig 3-11) 4–8 Interface 63 AncillaryEq_SDC 13 4–9 Interface 17 SDC_Ownship Sensors 13 4–10 Interface 51 BVP_ IFF49A 16 4–11 Interface 22 AncillaryEq_BVP49A 16 4–12 Interface 138 IFF49A_AncillaryEq (RSDS) 17 4–13 Interface 45 BVP_ IFF92 18 4–14 Interface 59 AncillaryEq_BVP92 18 4–15 Interface 139 IFF92_AncillaryEq (RSDS) 19 4–16 Interface 147 IFFDec_KHCTD 21 4–17 Interface 148 IFFDec_WCC 21 4–18 RSDS Interface Diagram 23 Ch 5 Fire Control Group interfaces 5–1 Fire Control System Power Interface Diagram 29 5–2 Fire Control System Channel Interface Diagram 49 5–3 Fire Control System Missile Gun Weapons System Interface Diagram 5–4 Fire Control System Launcher Load Interface Diagram 81 5–5 Fire Control System SM-1 Firing Interface Diagram 93 5–6 Fire Control System Missile Abort Function Interface Diagram 121 5–7 Fire Control System Harpoon Interface Diagram 125 5–8 Fire Control System GMTR Interface Diagram 145 Ch 6 Navigation and Support 6–1 Interface 136 Ownship Sensors_KHCTD 2 6–2 Interface 137 GPS_KHCTD 2 6–3 Interface 88 GPS_EOTS 3	
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FFG Combat System Learners Guide
ANNEX B –Primary Reference Structures

6–4 Interface 48 OwnshipData_RIADT 5 6–5 Interface 89 Ownship Sensors_EOTS 5 6–6 Interface 121 Ownship Sensors_SCC 6 6–7 Interface 122 Ownship Sensors_AMD 7 6–8 Interface 123 Ownship Sensors_SPS49AV1 8 6–9 Interface 124 Ownship Sensors_SPS55 8 6–10 Interface 159 Ownship Sensors_CIWS 9 6–11 Interface 158 Ownship Sensors_HSCLCS 10 6–12 Interface 58 OBTS_SDC/NAV 12 Ch 7 Local Area Networks 7–1 Subsystems of the Combat System 2 7–2 RIADT LAN 2 7–3 OBTS LAN 3 7–4 UWS LAN 5 7–5 ES LAN 7 7–6 ADS Server 8 7–7 C&Di Console 8 7–8 C2 LAN Switch 9 7–9 CDLMS HMI LAN 11	
List of Abbreviations (Missing C through T)	5 (UNCLASSIFIED)

FFG Combat System Learners Guide
ANNEX B –Primary Reference Structures

1.6 ADACS Human Machine interface Document (HMID)

1.6.1 Document Description

- 1.6.1.1 The HMID is delivered in soft copy (Microsoft Word Document) with every updated version of ADACS, and so is more up-to-date than ABR 6511 & ABR 6509. It is extensively 'hot-linked' to facilitate easy navigation and save printing hard copies. The HMID describes the design of the ADACS Human Machine Interface (HMI). This includes the console design, displays, controls, alert processing, and operator feedback. The HMID is UNCLASSIFIED Covering AUST/UK EYES ONLY with the exception of Annex G which is CONFIDENTIAL.

1.6.2 ADACS HMID Structural Breakdown

Section 1: Introduction

Section 2: Applicable Documents

Section 3: ADACS HMI Standards and Conventions

Section 4: ADACS HMI Design Description

Section 4.2: ADACS Environment

Section 4.3: ADACS Console Design

Section 4.4: ADACS Tactical Display

Section 4.5: Display Control Touch Panel

Section 4.6: Tactical Control Touch Panel

Section 4.7: Console Internal Status

Section 4.8: Display Control Touch Panel

Annex A: Tactical Arrays

Annex B: Tactical Control Panel Button Descriptions

Annex C: Display Control Panel Arrays

Annex D: Display Control Panel Button Descriptions

Annex E: Symbolology

Annex F: Alerts

Annex G: HMI Classified Data

Annex H: Glossary

FFG Combat System Learners Guide
ANNEX B –Primary Reference Structures

1.7 Mk92 Mod12 Computer Program Operators Manual (CPOM)

1.7.1 Document Description

1.7.1.1 The CPOM is delivered in soft copy (pdf) with every updated version of the Weapons Control Program (WCP), and so is more up-to-date than ABR 6511 & ABR 6509. The CPOM is provided to familiarise operators (AWOs and WCCs) with many of the Mk92 Mod12 Fire Control System (FCS) program functions. The CPOM is not classified, but does have distribution restrictions detailed on the front cover.

1.7.2 Mk92 Mod12 CPOM Structural Breakdown

1.7.2.1 The CPOM is divided into four separate volumes as follows:

- a. Volume 1 – CIC. Contains AWOWCC operator guidelines, DSOT Descriptions and operating procedures and system analysis aids.
- b. Volume 2 – RICER (Radar, IFF, CIC Equipment Room). Contains system/program setup and maintenance, Combat System Switchboard Configurations, program loading/initialization, and program maintenance information/procedures.
- c. Volume 3 – Data Extraction. Contains information and procedures for performing data extraction using the DE function of the WCP program.
- d. Volume 4 – Engineering. Contains information on program maintenance from an engineering life cycle maintenance level, e.g., program loader maps, simulated tape formats, PM module functions, etc.

1.7.2.2 Volume 1 of the CPOM is the only volume covered in the FFG Combat Systems Courses. Volume 1 is structured as follows:

1.7.2.3 CPOM Volume 1 - CIC

SECTION 1 AWO/WCC OPERATOR GUIDELINES

- 1.1 Computer Program Operator's Manual (CPOM) Introduction.
- 1.2 AAW Weapons Scheduler.
- 1.3 SM-2 Missile Mix-ups, Indications, and Override Procedures.
- 1.4 STIR (FC-2) Acq Horizon.
- 1.5 MK 92 MOD 12 Stabilisation.
- 1.6 FC-1/FC-2 Scan Patterns and Sensor Source Optimization.
- 1.7 Split Track/FC Data Reliable/Responsible FC.
- 1.8 Gun Low Elevation Aiming (Gun Dither).
- 1.9 Six Word Harpoon Interface with ADACS.
- 1.10 WCC FC-1/FC-2 DATA TOTE Missile TIME OF FLIGHT display.
- 1.11 WCC FC-1 /FC-2 TOTE Pages

FFG Combat System Learners Guide
ANNEX B –Primary Reference Structures

- 1.12 Relative Alignment Test (RAT).
- 1.13 High Speed Manoeuvring Surface Target (HSMST) Modes.
- 1.14 On Board Training (OB).
- 1.15 WCP / ADACS Interface Recovery Failover.
- 1.16 VLS CONTROLS
- 1.17 VLS FAULT PROCESSING
- 1.18 EOTS Controls
- 1.19 Digital SSCWI
- 1.20 Range Safety
- 1.21 I-band management
- 1.22 REACQ / Range Manual Modes
- 1.23 Low Target Processing

SECTION 2 - DSOT.

- 2.1 DSOT Descriptions, Operating Procedures and SGP Scenario Loading Procedures
- 2.2 Calibrate DSOT (turn test sets on).
- 2.3 Test Options Selection.
- 2.4 DSOT Performance / Training (default or SGP) / Maintenance Tests.
- 2.5 Maintenance Tests

SECTION 3 - SYSTEM ANALYSIS TOOLS.

- 3.1 System Analysis Tools.
- 3.2 Auto Test Solutions.

APPENDIX

- A List of Acronyms and Abbreviations.