Противваздушне Одбране Федерације Југославије (П.О.Ф.Ј.)

Anti-Airdefense of the Federation of Yugoslavia

Оперативна Књига
Модел: ЕЛ145-6

Operational Manual
Model: EL145-6 Missile Defense System

(ENGLISH LANGUAGE VERSION)

Table of Contents:

1 - Device Guide

The Model EL145-6 is a Yugoslavian developed and designed state of the art missile defense controller. It features capabilities to take down any model of missile coming from both threats from the WEST (NATO & AMERICAN ALLIES) and the EAST (WARSAW PACT & USSR ALLIES).

The manual is used to show any first time user how to configure all missile parameters to take down any missile. The screen shows radar data of incoming missiles using state of the art technology developed in the home country.

Glory to our people - may you save us all.

2 - Device Description

Below shown is the layout of the device - all configurable dials, switches, warhead configurations and success readout.

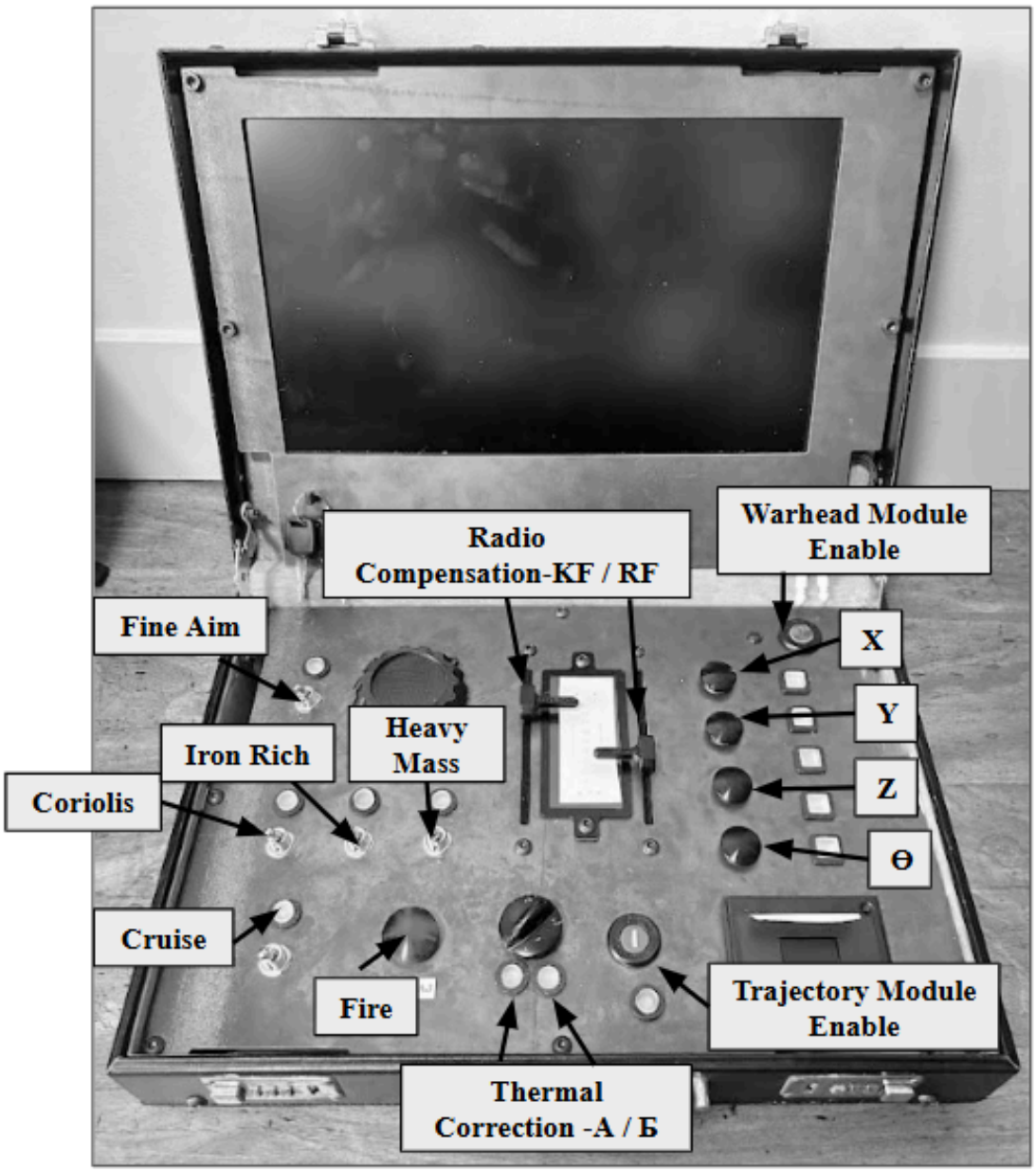


Figure 1 - Device Schematic

3 - Missile Defense Operator Guide

Follow the chart to identify incoming threats scanned by the missile defense radar. Displayed information is shown on the EL145-6 screen on the right, use this information to parse and configure the correct missile system.

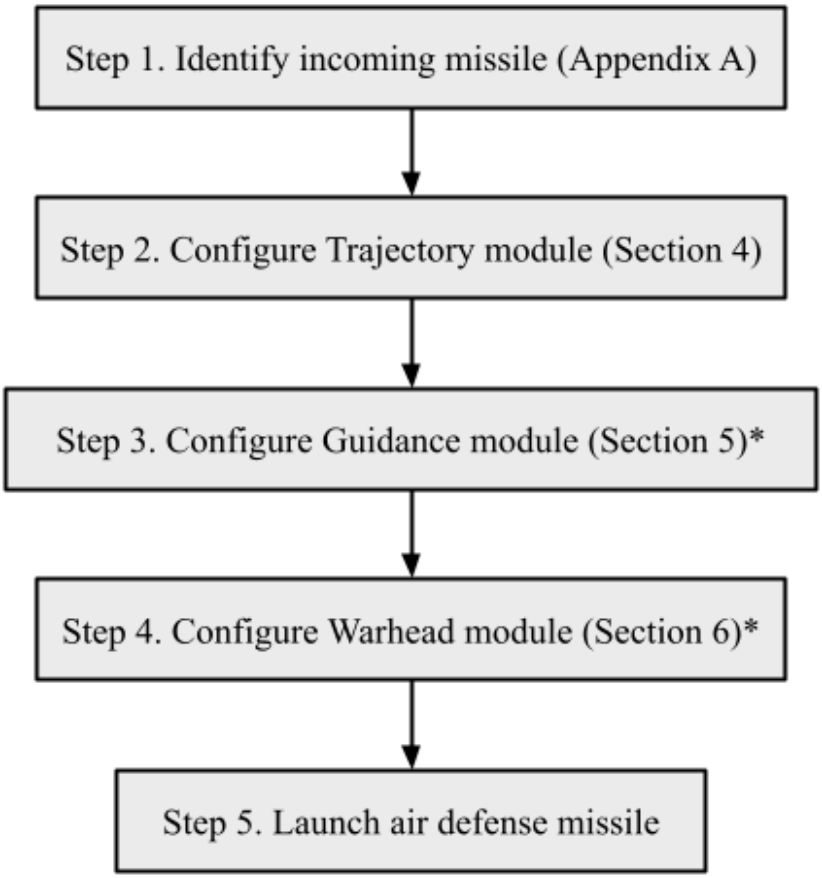


Figure 2 - Operation Flow Chart

Guidance and Warhead modules should be switched off when the incoming missile does not need their capabilities.

4 - Trajectory Module

Following the identification flow chart in *Figure 2*, configure the trajectory module correctly to properly aim and shoot down the missile.

The trajectory module is equipped for versatile operation. Users must set proper correction factors on the device.

- Coriolis effect compensation from WEST fired threats
- Iron rich magnetic correction to compensate for the installed missile defense systems magnetic gyroscope
- Heavy mass missile compensation
- CRUISE or BALLISTIC aiming trajectory - different batteries are aimed to shoot down the differently aimed trajectories

Along with configuring all necessary parameters, it is key to accurately aim and shoot down the missile. For this, the user has FINE and COARSE aiming capabilities to accurately aim air defense systems to within 1% tolerance.

To ensure optimal performance and precision during missile interception, operators must adhere strictly to the trajectory module settings described. The module’s settings directly influence the accuracy of the system's defensive response and its ability to neutralize airborne threats effectively.

The trajectory module is a highly sensitive and advanced component, integrating environmental, gyroscopic, and missile-specific parameters. Neglecting any step or failing to verify the configuration can result in misfires or system inefficiencies, compromising defense integrity.

Operators should also routinely verify calibration of all trajectory module sensors, particularly the gyroscopic and magnetic compensators, as deviations in these systems can severely affect the accuracy of targeting. Moreover, regular maintenance checks and test simulations are recommended to validate the module's operational readiness.

Finally, coordination with intelligence and radar units is critical for the correct identification and classification of missile threats. Proper data relay ensures that the trajectory module receives accurate input for optimal targeting, allowing for successful interception within the defined tolerances.

All incoming missile threats need to have TRAJECTORY MODULE configured - do not skip these steps.

To configure the TRAJECTORY MODULE, consult the following steps:

1. Identify missile direction:
    a. If: missile coming from EASTERN borders, then disable CORIOLIS (КОРИОЛИС) compensation
    b. If: missile coming from WESTERN borders, then enable CORIOLIS (КОРИОЛИС) compensation

2. Identify iron rich missile (consult APPENDIX A for identification):
    a. If: missile has ferro-magentic coefficient LESS than 100 Fe/kg, then disable IRON RICH (ГВОЖЂОБИТО) correction
    b. If: missile has ferro-magentic coefficient GREATER than 100 Fe/kg, then enable IRON RICH (ГВОЖЂОБИТО) correction

3. Correct for missile mass (consult APPENDIX A for threat mass):
    a. If: missile has kinetic weight LESS than 1750 kg, then disable heavy mass correction (ТЕШКА МАСА) correction
    b. If: missile has kinetic weight GREATER than 1750 kg, then enable heavy mass correction (ТЕШКА МАСА) correction

4. Configure ballistic/cruise trajectory of missile (consult APPENDIX A for missile trajectories)
    a. If missile is shown as cruise, then enable cruise trajectory (КРСТАРЕЊЕ)
    b. If missile is shown as ballistic, then disable cruise trajectory (БАЛИСТИЧКИ)

5. Aim the defense system - the user can use the rotational wheel to turn the firing direction. The aiming direction will update on the radar screen.
    a. User can enable fine (ФИНО) or coarse (ГРУБО) adjustment to fine tune the aimed direction

6. Trajectory module has now been correctly configured - ENSURE ALL OTHER MODULES ARE CORRECTLY CONFIGURED BEFORE FIRING

5 - Guidance Module

The EL145-6 is equipped with an advanced guidance module. This module allows for the defense against many sophisticated attacks. The guidance module can successfully track and destroy missiles equipped with various thermal shielding mechanisms or radar guidance jamming. Users must set proper correction factors on the device.

The EL145-6 missile defense system represents a cornerstone of modern air defense, designed specifically to counter sophisticated threats from adversaries. Equipped with an advanced guidance module, it ensures the system's capability to neutralize even the most technologically advanced enemy missiles. This module is particularly effective against missiles employing thermal shielding mechanisms, such as warhead cooling systems or cold thrust mechanisms, as well as those relying on radar guidance jamming.

The integration of features like THERMAL CORRECTION ensures that no missile can escape undetected, regardless of its heat signature or propulsion system. When these corrections are properly enabled, as indicated by the corresponding amber or red lights, the EL145-6 can lock onto and destroy even the most elusive targets.

Additionally, the GUIDANCE MODULE's ability to mitigate radar jamming through precise configuration of KF COMPENSATION (КОМПЕНСАЦИЈА - КФ) and RF COMPENSATION (КОМПЕНСАЦИЈА - РФ) is vital for maintaining operational superiority. These adjustments, guided by radio correction curves found in APPENDICES A and C, allow the EL145-6 to penetrate advanced electronic countermeasures, ensuring a successful intercept.

It is critical to remember that the EL145-6 is a defensive system of national importance, safeguarding against external threats and preserving the integrity of our borders. Proper configuration and maintenance of its GUIDANCE MODULE are essential to uphold this defensive capability. Operators must treat these procedures with the utmost diligence, ensuring that every parameter aligns with the prescribed guidelines.

Failure to configure the GUIDANCE MODULE accurately compromises the system’s efficacy and jeopardizes our ability to respond to enemy aggression. Trust in the EL145-6 and its sophisticated guidance technologies—our first line of defense against increasingly complex threats.

If the missile is not equipped with a thermal shielding or radar jammer, disable the guidance module and skip these configuration steps.

To configure the GUIDANCE MODULE, consult the following steps:

1. Identify missile thermal shielding mechanism (consult APPENDIX A)
    a. Warhead cooling system.
        i. If: missile is equipped with warhead cooling system, enable THERMAL CORRECTION A (ТЕРМАЛНА КОРЕКЦИЈА А). You should see a red light turn on.
        ii. Otherwise, disable THERMAL CORRECTION A (ТЕРМАЛНА КОРЕКЦИЈА А). You should not see a red light.
    b. Cold thrust mechanism.
        i. If: missile is equipped with cold thrust mechanism, enable THERMAL CORRECTION B (ТЕРМАЛНА КОРЕКЦИЈА Б). You should see an amber light turn on.
        ii. Otherwise, disable THERMAL CORRECTION B (ТЕРМАЛНА КОРЕКЦИЈА Б). You should not see an amber light.

2. Identify missile jamming frequency and set KF compensation (consult APPENDIX A)
    a. Use radio correction curves (consult APPENDIX C) to set KF COMPENSATION (КОМПЕНСАЦИЈА - КФ).

3. Identify missile receiver frequency and set RF compensation (consult APPENDIX A)
    a. Use radio correction curves (consult APPENDIX C) to set RF COMPENSATION (КОМПЕНСАЦИЈА - РФ).

4. Guidance module has now been correctly configured - ENSURE ALL OTHER MODULES ARE CORRECTLY CONFIGURED BEFORE FIRING

6 - Warhead Module

The warhead module is needed for missiles with complex nuclear or devastating potential. The correct warhead configuration is absolutely necessary to ensure that the missile devastation is contained and minimal damage occurs to our countrymen who are being attacked.

Threats from both sides has created potential for devastation, and as situation progress, decision for missile deployment become most critical. Missile must not launch without ensuring warhead configuration is perfect; mistake will result in unrepairable damages. Always is duty of operator to verify all steps correctly, no excuses for errors allowed.

Missiles equipped with improper warhead or incorrect state can destroy wrong target or malfunction and create disaster. Understanding warhead is ultimate priority—wrong input or negligence is catastrophe waiting. Operate machinery with focus, or be remembered as failure of defense force.

When configuring, patience and discipline are your ally. State machine is complex but simple to follow for those who read manual with focus. Failure is never equipment; it is always operator mistake. Great honor comes from responsibility, take this manual as holy scripture.

Ensure configuration as listed; wrong configuration equals devastation. Only trained personnel with full knowledge must perform this duty. No room for error or lazy shortcuts.

If the missile is not equipped with nuclear payload, disable the warhead module and skip these configuration steps.

To configure the WARHEAD MODULE, consult the following steps:

1. Identify nuclear capabilities of the missile consult APPENDIX A for nuclear payload type & deployment type:
    a. If THORIUM warhead - configure state (APPENDIX B) for STATES A (THORIUM TYPE) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.
    b. If RADIONUCLIDE TRACED warhead - configure state (APPENDIX B) for STATES B (RADIONUCLIDE TRACED TYPE) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.
    c. If PLUTONIUM MIXED warhead - configure state (APPENDIX B) for STATES C (PLUTONIUM MIXED) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.

d. If URANIUM warhead - configure state (APPENDIX B) for STATES D (URANIUM TYPE) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.
e. If PLUTONIUM warhead - configure state (APPENDIX B) for STATES E (PLUTONIUM TYPE) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.
f. If CLUSTER NUCLEAR CHARGE warhead - configure state (APPENDIX B) for STATES F (CLUSTER NUCLEAR CHARGE) - choose the correct warhead deployment type using state machine buttons as indicated in APPENDIX B.

2. Navigate the states using the STATE MACHINE configuration buttons (X, Y, Z & Θ).

3. Warhead module has now been correctly configured - ENSURE ALL OTHER MODULES ARE CORRECTLY CONFIGURED BEFORE FIRING

Appendix A - Common Missiles

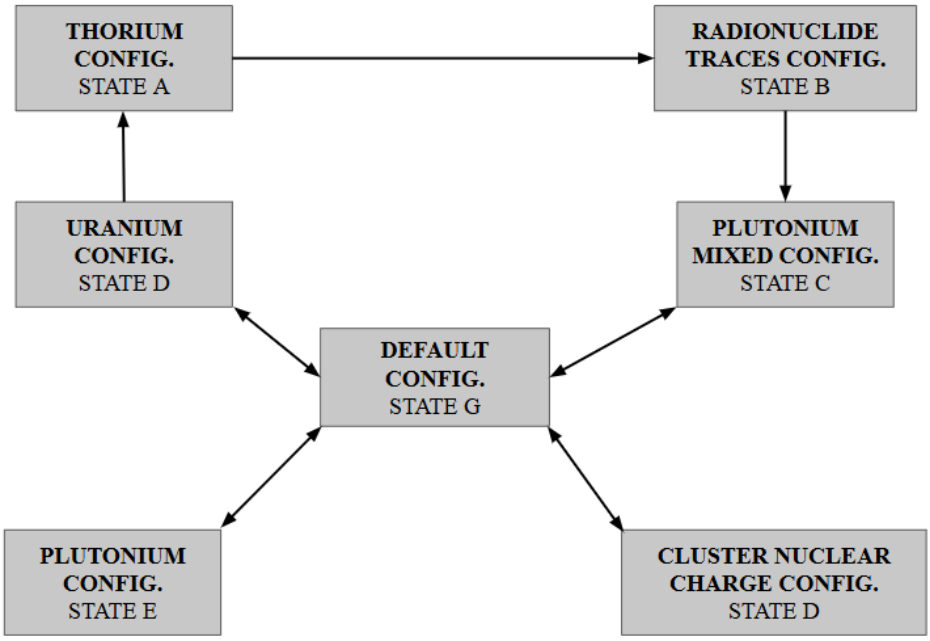
Name	Hornet	RS-24 Yars	MGM-140 ATACMS	P-500 Bazalt	SSM-N-9 Regulus II	R-36M2 Voyevoda
Country of Origin	USA	USSR	USA	USSR	USA	USSR
Radar cross sect [m2]	1310 ± 7	2471 ± 8	1421 ± 7	2474 ± 1	1350 ± 3	2509 ± 15
Emissivity	820 ± 5	615 ± 11	897 ± 9	793 ± 17	792 ± 19	696 ± 13
Kinetic weight [Kg]	1,400	3,000	4,300	4,000	1,000	2,700
Jamming freq [Hz]		384	643		812	696
Jamming booster		Yes	Yes			Yes
Trajectory class	Ballistic	Cruise	Ballistic	Ballistic	Ballistic	Ballistic
Nuclear warhead		Thorium				Radionucleide Trace
Payload deployment		Subsurface				Point
Warhead cooling system		Yes				Yes
Cold thrust mechanism			Yes	Yes		Yes
Ferro-magentic coefficient	980	60	2	10,690	85	0

Name	MGM-18 Lacrosse	PGM-11 Redstone	P-1000 Vulkan	9K720 Iskander	Trident II	3M-54 Kalibr
Country of Origin	USA	USA	USSR	USSR	USA	USSR
Radar cross sect [m2]	1344 ± 2	1255 ± 3	2510 ± 8	1300 ± 7	2448 ± 2	1406 ± 10
Emissivity	820 ± 5	897 ± 9	719 ± 4	880 ± 2	639 ± 3	754 ± 5
Kinetic weight [Kg]	1,800	1,200	1,800	800	1,700	1,300
Jamming freq [Hz]			567		609	325
Jamming booster						
Trajectory class	Cruise	Cruise	Ballistic	Ballistic	Ballistic	Ballistic
Nuclear warhead	Plutonium Mixed		Thorium		CNC	
Payload deployment	Loitering		Point		Subsurface	
Warhead cooling system			Yes		Yes	
Cold thrust mechanism					Yes	Yes
Ferro-magentic coefficient	14,460	11,950	21	22,810	0	33,000

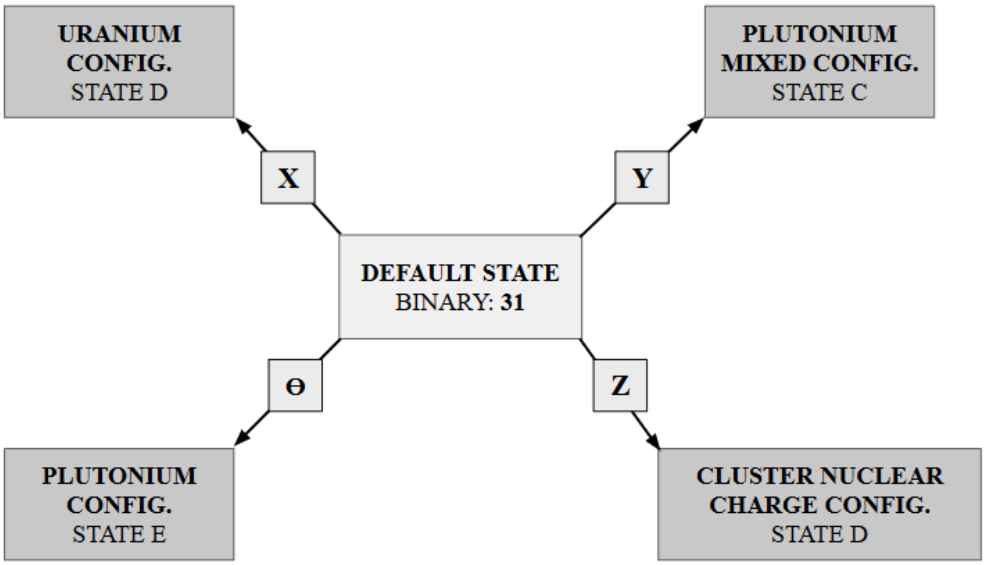
Name	Hermes	SSM-N-8 Regulus	P-5 Pyatyorka	BGM-109 Tomahawk	LGM-30G Minuteman III	MGM-52 Lance
Country of Origin	USSR	USA	USSR	USA	USA	USA
Radar cross sect [m2]	1245 ± 5	1349 ± 2	1345 ± 1	1423 ± 6	2485 ± 4	1425 ± 16
Emissivity	851 ± 17	880 ± 2	793 ± 17	719 ± 4	675 ± 5	851 ± 17
Kinetic weight [Kg]	1,400	3,200	1,500	1,900	2,300	900
Jamming freq [Hz]			858	627	340	781
Jamming booster				Yes	Yes	Yes
Trajectory class	Ballistic	Ballistic	Cruise	Ballistic	Cruise	Ballistic
Nuclear warhead					Plutonium	Uranium
Payload deployment					Airburst	Atmospheric
Warhead cooling system		Yes	Yes			Yes
Cold thrust mechanism		Yes				Yes
Ferro-magentic coefficient	94	24,620	0	12	17	94

Appendix B - Warhead Configuration State Machine

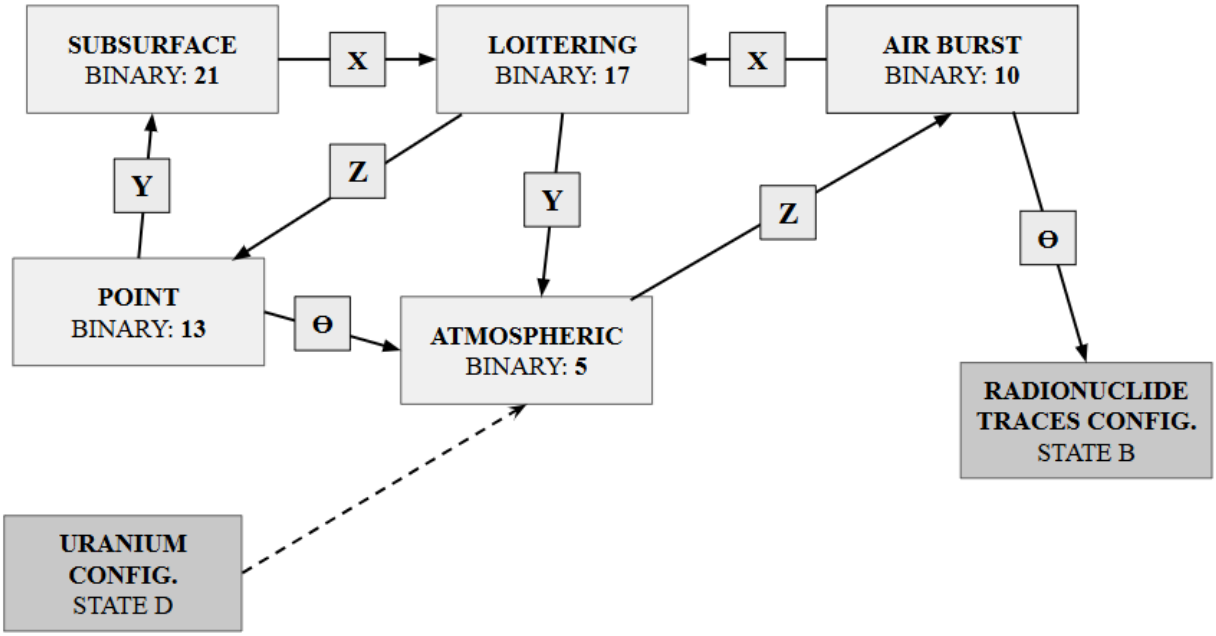
OVERALL STATE MACHINE - Consult Primary



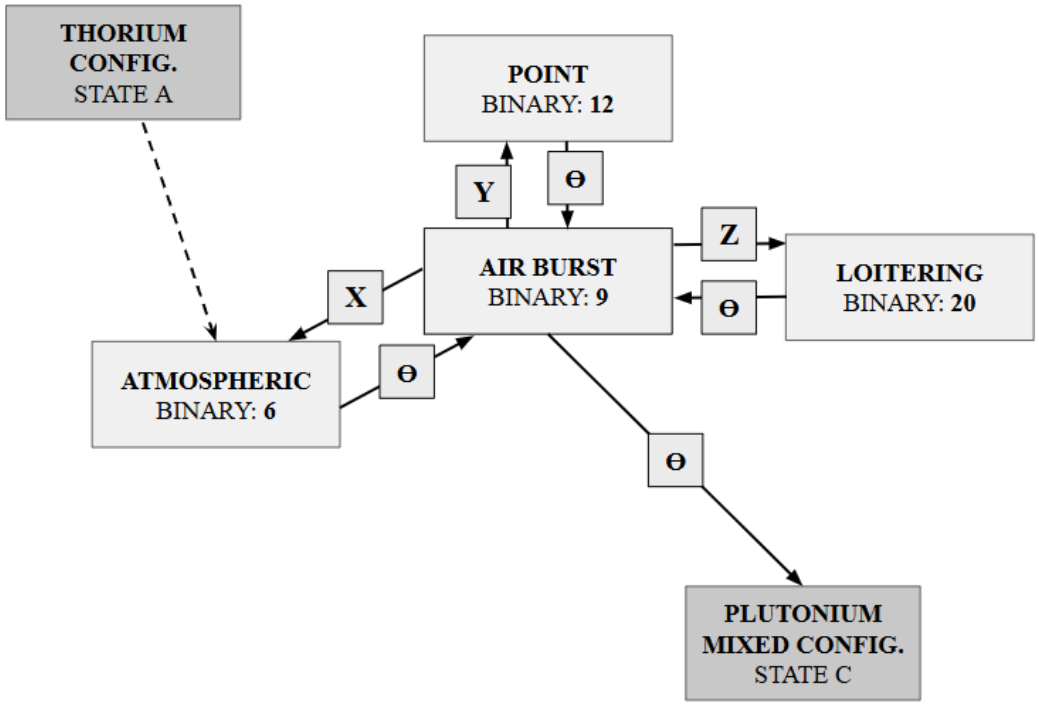
DEFAULT STATE - STATE G



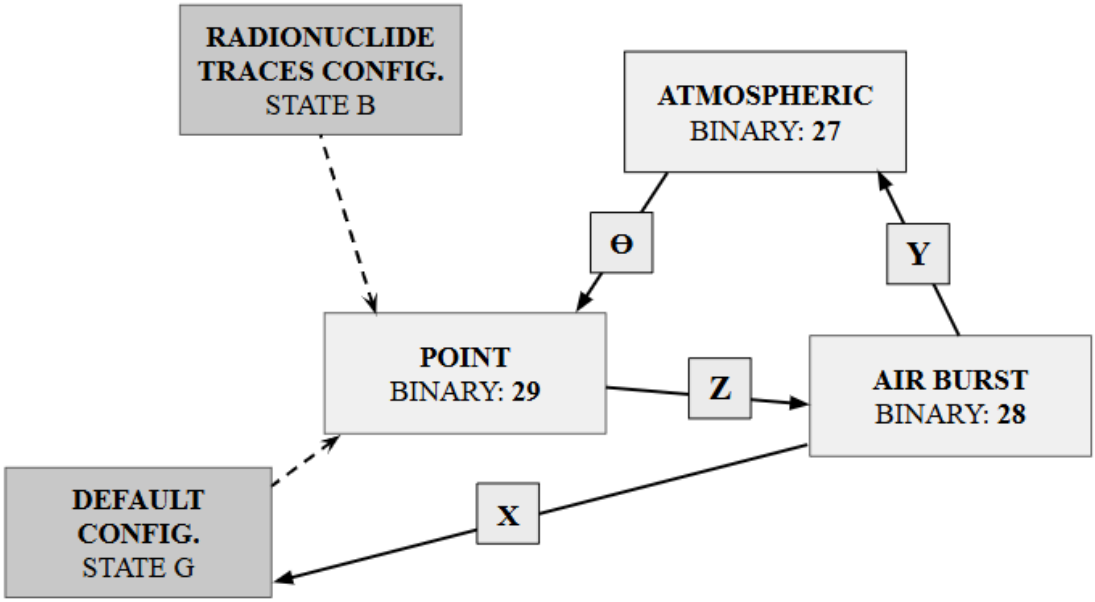
THORIUM CONFIGURATION - STATE A



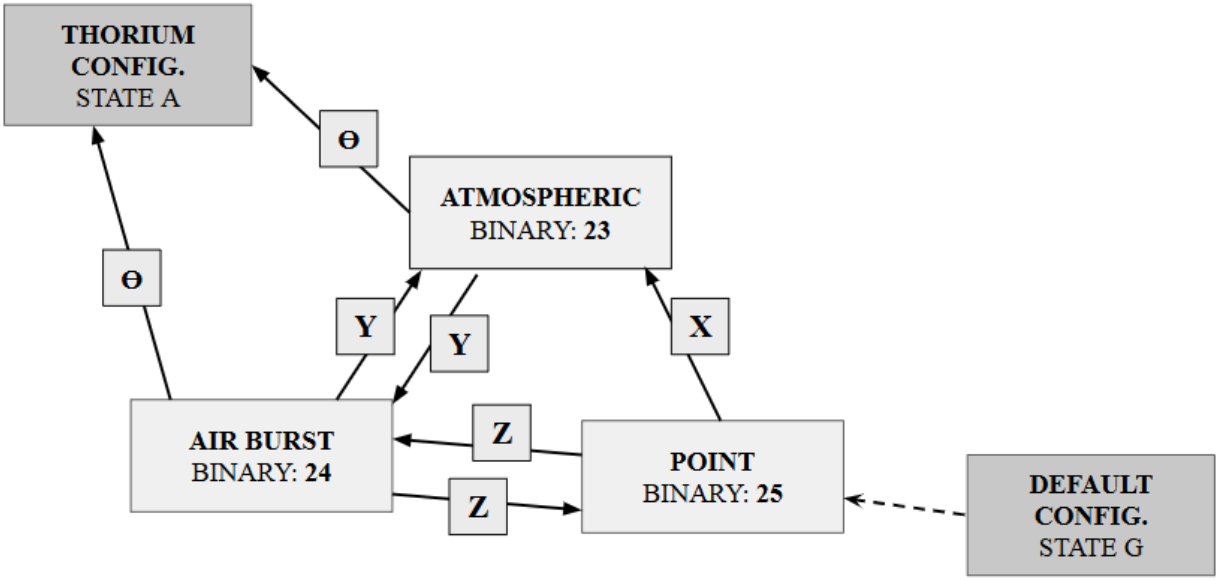
RADIONUCLIDE TRACE CONFIGURATION - STATE B



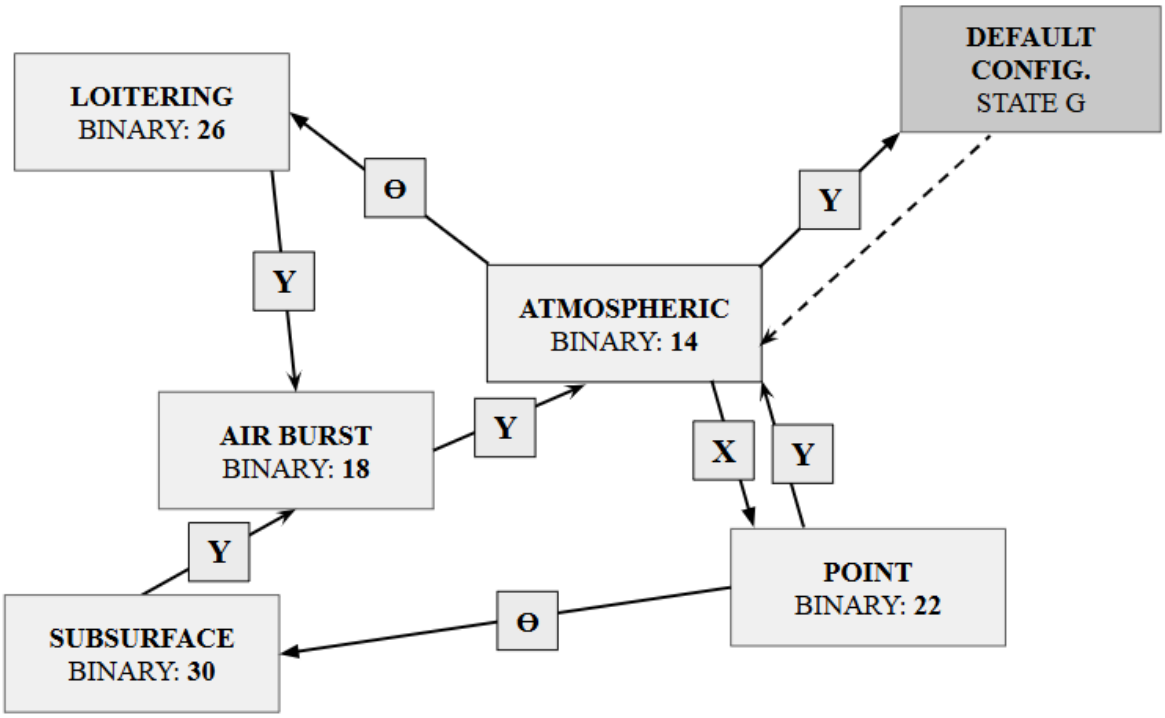
PLUTONIUM MIXED CONFIGURATION - STATE C



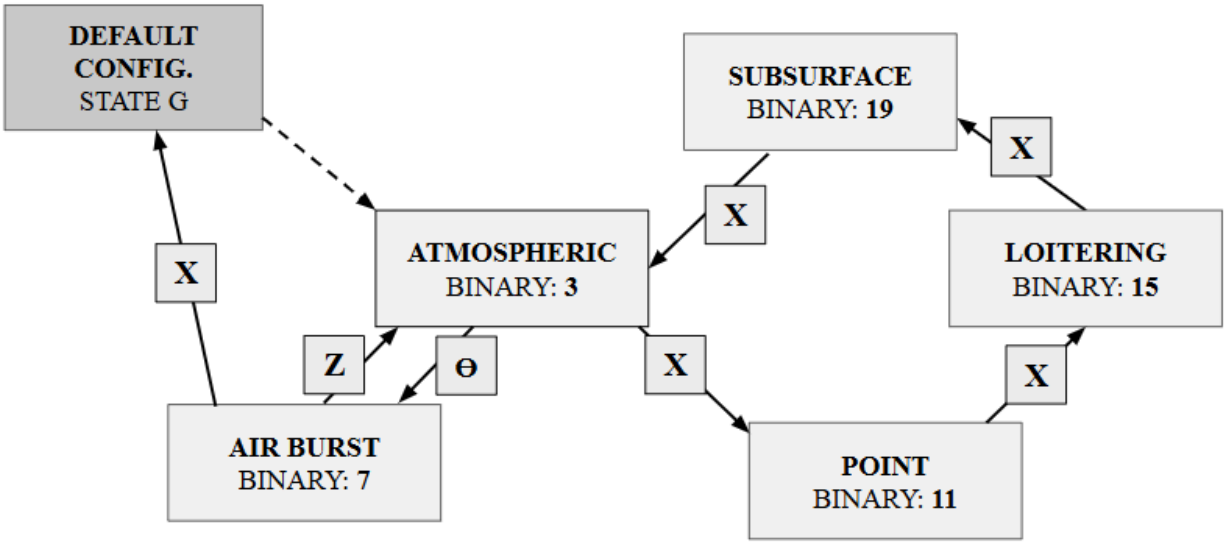
URANIUM CONFIGURATION - STATE D



PLUTONIUM CONFIGURATION - STATE E



CLUSTER NUCLEAR CHARGER (CNC) - STATE F



Appendix C - Radio Correction Curves

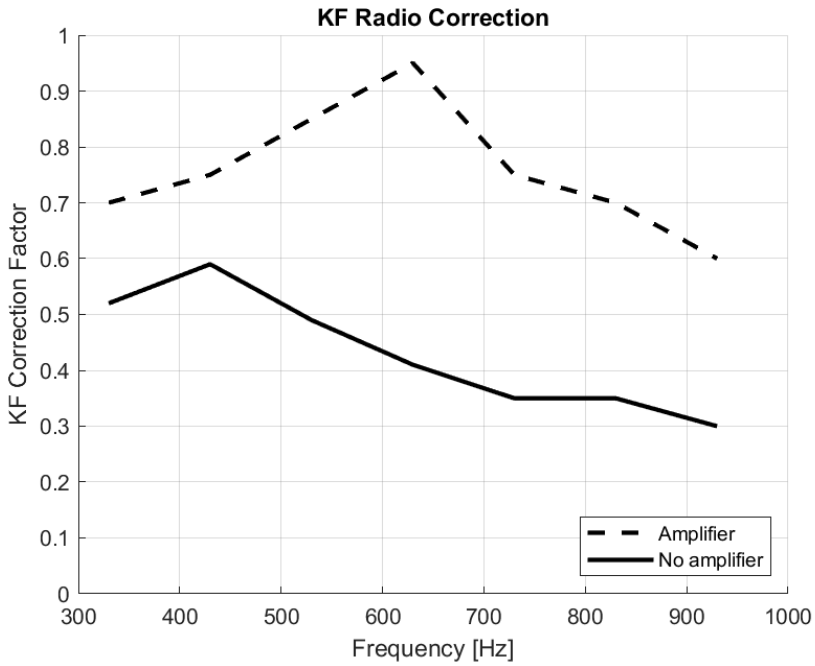


Figure C1 - KF Radio Correction Curve

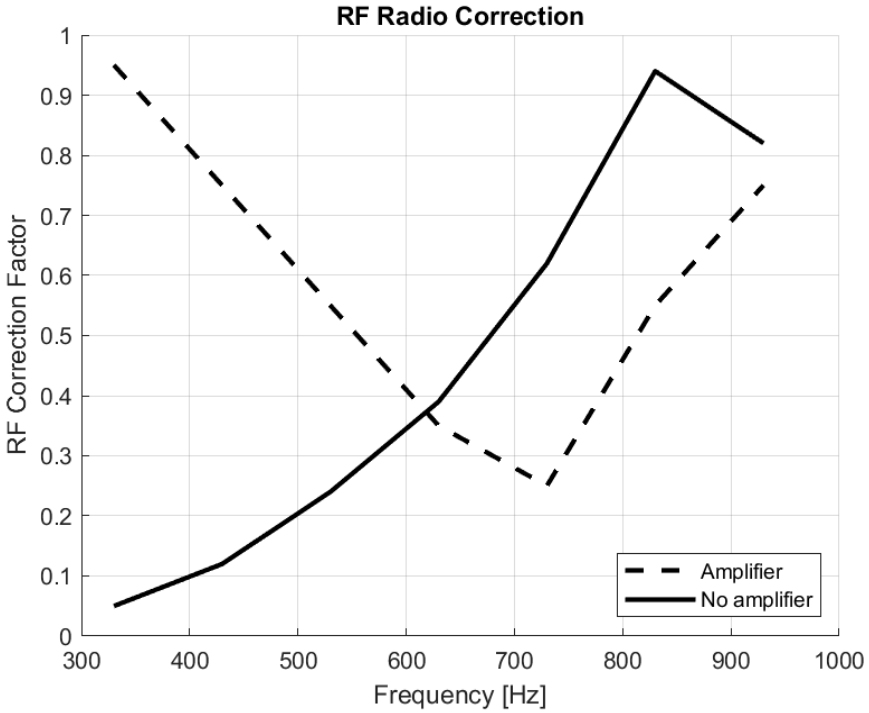


Figure C2 - RF Radio Correction Curve

Appendix D - Maintenance Guide

Proper maintenance of the EL145-6 Missile Defense System is critical to ensure its reliability, accuracy, and operational longevity. The following guide outlines routine checks, troubleshooting steps, and preventative measures for maintaining this vital defense asset.

Routine Maintenance Checklist

Perform these checks **daily**, **weekly**, and **monthly** as indicated:

Daily Checks:

- **System Power Supply:**
  - Ensure the power unit is securely connected and voltage is within 220V ± 5%.
  - Inspect for loose connections or frayed cables.
- **Radar Display Functionality:**
  - Verify that the radar display activates without delay and shows no visual artifacts or errors.
- **Switches and Buttons:**
  - Press all buttons (X, Y, Z, Θ) to ensure smooth operation and immediate response.
- **Warhead and Guidance Indicators:**
  - Check that indicator lights (amber and red) illuminate as specified during configuration tests.

Weekly Checks:

- **Cooling System:**
  - Inspect air vents and coolant levels. Clean filters to prevent overheating.
  - Verify fan functionality by running a thermal management self-test.
- **Circuit Integrity:**
  - Open the back panel and visually inspect for burned or damaged components.
  - Use a multimeter to measure continuity in key circuits, including those for trajectory and guidance modules.
- **Mechanical Components:**
  - Ensure all dials and rotatable knobs turn smoothly without excessive resistance.

Monthly Checks:

- **Sensor Calibration:**
    - Run the internal calibration sequence for gyroscopes and magnetic compensators.
    - Compare sensor readings against reference values (see calibration table in APPENDIX E).
- **Software Updates:**
    - Install any firmware updates provided by the manufacturer to address potential vulnerabilities or add new functionality.
- **Structural Integrity:**
    - Inspect for signs of corrosion, especially around metallic joints and exposed connectors.

Preventative Maintenance Tips

Follow these measures to avoid common issues:

- **Environmental Controls:**
    - Keep the system in a dry, temperature-controlled environment. Avoid prolonged exposure to extreme heat or humidity.
- **Protective Covers:**
    - Use protective covers on control panels and sensitive components when the system is not in operation.
- **Training and Documentation:**
    - Ensure all operators are adequately trained in proper use and maintenance. Keep this manual accessible for quick reference.

Troubleshooting Common Issues

1. Power Failure:

- **Symptoms:** System fails to boot, or frequent power interruptions occur.
- **Solutions:**
    - Check the main power supply and replace damaged cables.
    - Test the backup battery and replace if voltage is below 12V.
    - Reset the circuit breaker if tripped.

2. Radar Display Malfunction:

- **Symptoms:** Black screen, distorted images, or unreadable data.
- **Solutions:**
    - Restart the system and run a display diagnostic test.
    - Replace the screen connector ribbon if visual errors persist.

3. Configuration Errors:

- **Symptoms:** System fails to save or execute configuration inputs.
- **Solutions:**
    - Verify firmware version compatibility with saved configurations.
    - Perform a factory reset and re-enter configuration data.

4. Guidance Module Inaccuracy:

- **Symptoms:** Missed targets or erratic trajectory adjustments.
- **Solutions:**
    - Recalibrate the gyroscope and magnetic sensors.
    - Verify correction curves are correctly applied from APPENDIX C.

5. Warhead Module Malfunction:

- **Symptoms:** Incorrect state indicators or inability to select deployment types.
- **Solutions:**
    - Inspect the state machine buttons for physical damage or wear.
    - Replace the internal logic board if buttons fail to respond consistently.

Major System Overhaul (Annually)

- **Disassemble and Clean:**
    - Carefully disassemble the device following the manufacturer's schematic. Clean all components using anti-static wipes.
- **Replace Worn Parts:**
    - Replace all wear-prone components such as dials, connectors, and buttons.
    - Inspect cables and replace any with visible wear.
- **Test Fire Drill:**
    - Perform a complete simulated test, firing dummy missiles to validate system performance under load.
- **Audit System Logs:**
    - Review log files for anomalies that may indicate hardware or software issues.

Maintenance Logs

Maintain a detailed record of all maintenance activities, including:

- **Date and Time:** Record when checks were performed.
- **Findings:** Note any abnormalities or issues detected.
- **Actions Taken:** Document repairs, replacements, or calibrations.
- **Technician Signature:** Ensure the responsible individual signs off on completed tasks.

By adhering to this maintenance guide, operators can ensure the EL145-6 remains in peak operational condition, ready to defend against all aerial threats to our federation. Neglecting these practices risks compromising the system's reliability and jeopardizing national security.