

Mobile Robot – Operating Instructions for Border Guard Officers

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Chapter 1. 1. Purpose and Scope

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Audience: Border Guard Command, Poland and Lithuania

1. Purpose and Scope

This document provides operational guidance for border guard officers deploying the robot in airport and border zone security operations. The robot supports:

- Pyrotechnic threat neutralization
- Suspicious object reconnaissance
- Chemical hazard identification
- Rescue and negotiation support

Chapter 2. 2. System Overview

Table 1. Sytem of the robot

Component	Description
Mobile Platform	6-wheel drive, max speed 10 km/h, terrain-adaptive suspension
Manipulator Arm	Telescopic reach up to 3.3 m, max payload 50 kg
Control Console	Wireless range up to 1000 m (open terrain), ergonomic interface
Power Supply	Rechargeable battery, ~4 hours runtime, hot-swappable
Optional Attachments	X-ray holder, pyrotechnic launcher, gripper jaws, negotiation set

Chapter 3. 3. Pre-operation Check List

3. Pre-Operation Checklist

Before deployment, verify the following:

- ✓ Battery fully charged and spare unit available
- ✓ Manipulator arm calibrated and joints tested
- ✓ Wireless connection established with control console
- ✓ Environmental conditions suitable for robot mobility
- ✓ Attachments securely mounted and functional
- ✓ Emergency stop and override systems tested

Chapter 4. 4.Basic Operation

4.1 Startup Sequence

1. Power on the robot via rear panel switch.
2. Launch control console software and connect to IBIS®.
3. Confirm telemetry data (battery, signal, motor status).

4.2 Navigation

- Use joystick or touch controls to maneuver.
- Monitor terrain via onboard cameras.
- Adjust speed based on surface and threat proximity.

4.3 Manipulator Use

- Select object handling mode.
- Extend arm using telescopic controls.
- Grip object with appropriate jaw type.
- Retract and reposition as needed.

Chapter 5. 5. Mission Scenarios

Situations and procedures

Table 2.

Scenario	Recommended Configuration
Suspicious Package Inspection	X-ray holder + manipulator arm
Explosive Neutralization	Pyrotechnic launcher + remote detonation protocol
Chemical Threat Detection	Sensor module + sealed transport container

Chapter 6. 6.Emergency Protocols

6. Emergency Protocols

- **Signal Loss:** Robot enters safe mode; manual override required.
- **Obstacle Collision:** Auto-stop triggers; inspect for damage.
- **Manipulator Overload:** System alerts; reduce payload immediately.
- **Battery Depletion:** Return to base or swap battery module.

Chapter 7. 7. Post-Operation Procedures

7. Post-Operation Procedures

- Power down and disconnect control console.
- Clean robot surfaces and inspect for wear.
- Log mission data and maintenance notes.
- Recharge battery and store in secure location.

Chapter 8. 8. Maintenance Schedule

Table 3. Maintenance and Schedule Table

Task	Frequency
Battery health check	Weekly
Joint lubrication	Monthly
Software updates	As released
Sensor calibration	Before each mission
Attachment inspection	After each use

Chapter 9. 9. Robot Operation Protocol: Relocation of Unsupervised Suitcase in Airport Zone

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Audience: Border Guard Officers, Poland and Latvia

1.Objective

1. 🎯 Objective

To safely relocate an unsupervised suitcase from a public airport zone to a designated containment area using the robot, minimizing risk to personnel and civilians.

2. Safety Precautions

2. ● Safety Precautions

Before initiating the operation:

- 🚫 Evacuate civilians within a 30-meter radius
- 📡 Establish secure communication with command center
- # Confirm readiness of emergency response units
- # Assume potential presence of explosives or hazardous materials
- ✂# Verify robot functionality and attachment integrity

3.Equipment Configuration

3. # Equipment Configuration

Table 4. Component and Configuration Notes

Component	Configuration Notes
Manipulator Arm	Telescopic mode, gripper jaws with soft contact pads
X-ray Holder (Optional)	Mounted if preliminary scan is required
Control Console	Wireless mode, operator positioned in secure zone
Sensor Module	Activated for chemical/explosive trace detection

4. Operation Steps

4.1 Deployment

1. Transport the robot to perimeter of incident zone.
2. Power on and establish console connection.
3. Activate onboard cameras and sensors.

4.2 Approach

1. Navigate slowly toward suitcase using joystick or touch controls.
2. Maintain visual feed and telemetry monitoring.
3. Halt at 1 meter distance for preliminary scan (if equipped).

4.3 Object Handling

1. Extend manipulator arm toward suitcase.
2. Adjust gripper jaws to gently secure suitcase handle or frame.
3. Lift object slightly to confirm grip stability.
4. Retract arm and begin slow retreat to containment zone.

4.4 Relocation

1. Follow pre-cleared path to designated containment area.
2. Place suitcase in secure enclosure or blast-resistant container.
3. Release grip and retract arm fully.

5. Post-Operation Protocol

5. # Post-Operation Protocol

- Notify command center of successful relocation.
- Power down robot and inspect manipulator for wear.
- Log operation details, including object weight, handling time, and sensor readings.
- Submit footage and telemetry data for incident review.

6. Incident Documentation

The simulation was conducted in the premises of Border Guard Training Centre in Kętrzyn

Table 5. Documentation of the Report

Field	Entry Example
Date/Time	2015-10-11, 12:45 CET
Location	Airport, Terminal A
Object Description	Medium-sized black suitcase, untagged
Robot Operator	BG Officer Robert Kowalski
Outcome	Object relocated, no threat detected

Chapter 10. Console Operation: Relocating Unsupervised Suitcase

🤖 Console Operation: Relocating Unsupervised Suitcase

Operator Role: Border Guard Officer

Environment: Civilian Airport Terminal (located in Border Guard Training Centre)

Terminal **Objective:** Remote handling and relocation of suspicious luggage to containment zone

Console Startup

1. 🛠 Console Startup

- 1. Power on the control console.
- 2. Launch the IBIS® control interface software.
- 3. Select **Mission Mode: Recon & Relocation**.
- 4. Confirm wireless connection with robot (status: ✔ green).
- 5. Verify live camera feed and telemetry (battery, motor status, signal strength).

2. Navigation Controls

Table 6. Navigation of the Console

Function	Console Input
Forward/Reverse	Left joystick – vertical axis
Turn Left/Right	Left joystick – horizontal axis
Speed Adjustment	Speed toggle (Low/Medium/High)
Camera View Toggle	Camera selector buttons (Front/Arm/Rear)
Zoom/Focus	Zoom dial

3.Manipulator Arm Controls

Table 7.  Manipulator Arm Controls

Function	Console Input
Arm Extension/Retract	Right joystick – vertical axis
Arm Elevation	Right joystick – horizontal axis
Gripper Open/Close	Gripper toggle button
Grip Pressure Control	Touchscreen slider or preset selector
Object Lift/Lower	Arm lift dial + visual confirmation on screen

Procedure:

1. Switch to **Manipulator View** on console.
2. Extend arm toward suitcase handle or frame.
3. Use gripper toggle to secure object gently.
4. Confirm grip stability via feedback indicators.
5. Lift object slightly and retract arm.

4.Relocation Sequence

1. Switch camera to **Rear View**.
2. Navigate robot slowly to containment zone using joystick.
3. Monitor object stability via manipulator telemetry.
4. Position suitcase over containment platform.
5. Release grip and retract arm fully.
6. Confirm object placement via camera feed.

5. Emergency Console Functions

Table 8. 5. # Emergency Console Functions

Situation	Console Action
Signal Loss	Activate Safe Mode override button
Manipulator Overload	Reduce grip pressure or abort lift
Obstacle Detected	Engage Auto-Stop and reroute manually
Battery Warning	Initiate Return to Base protocol

6. Console Logging and Shutdown

6. Console Logging and Shutdown

1. Save mission log (video + telemetry).
2. Enter incident metadata (location, time, operator ID).
3. Power down robot and console.
4. Submit report to command center via secure network.

Chapter 11. Operator Experience – What Officers Say

Operator Experience – What Officers Say

1. **Easy to Learn** The controls are simple and easy to understand. Most officers get the hang of it quickly, even if they've never used a robot before.
2. **A Bit Stressful at First** Using such an expensive robot can feel stressful at the beginning. Operators often feel nervous during their first missions.
3. **Gets Easier with Practice** Once the robot is turned on and everything is working, officers usually feel more confident. The more they use it, the more natural it feels.
4. **Good Camera Views Help a Lot** The robot's cameras give a clear view of the area. This helps officers move and handle objects more safely and accurately.
5. **Mission Logs Are Useful** Watching the video and checking the data after a mission helps officers learn from each task and improve their skills.

Chapter 12. Pictures

Figure 1. The console



Figure 1. The robot

