DENEL LAND SYSTEMS

Factory ATP for Hoefyster Badger Turret Hatches

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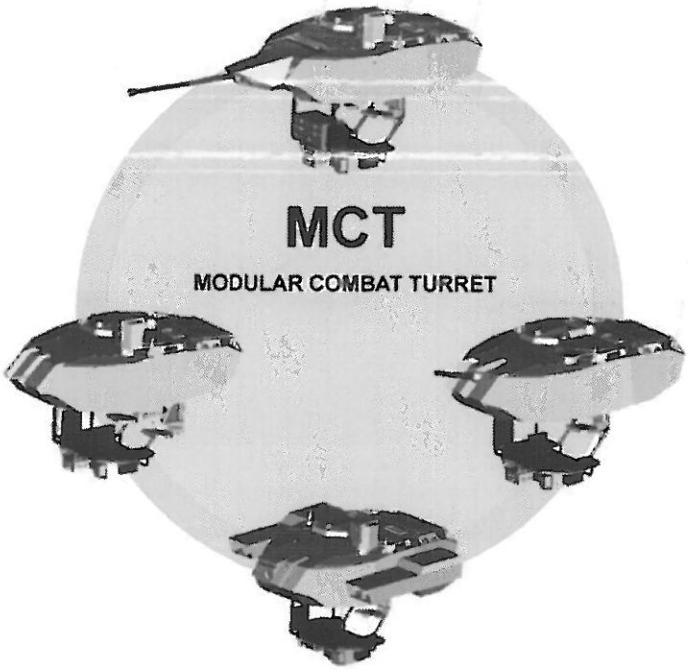

KEY WORDS:

ATP, Hatch Installation, Lock Installation, Sealing, AV8, Hoefyster, Factory Acceptance Test Procedure.

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Supporting documentation

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1 Definitions

1. **"Slamming and Catching" position**
   This is the position in which the striker is protruding slightly outwards of the lid. In this position the hatch will slam shut when pulled down with sufficient force and will stay in the horizontal position, the striker is simple forced backwards against a spring to allow the closing action and is quickly pushed forward by the spring to catch in some provided slot of the FCM to keep the hatch closed. To alter the striker's position from the "slamming and catching" position, one needs to press a provided button.

2. **"Positive locking" position**
   This position is realized when the striker is protruding fully out of the lid. This is achieved by pressing some provided button and swivelling the lock handle forward. To alter the striker's position from the "positive locking" position, one needs to press a provided button.

2 Scope:

This document stipulates the necessary steps required to assembly and evaluate the performance of the hatch as a unit. This document shall serve as **Factory Acceptance Test Procedure** and shall not be confused with higher level Structures and Mechanism ATP's that are meant for integration and evaluation of the hatch onto the turret. This document shall be adopted and used for Hoefyster Hatches ATP's efforts.

2.1 Identification

Hatch Installation 9252090350xx

Previous generation hatches can also adopt this ATP for performance evaluations of existing hatches' hardware especially in the events where retrofitting of new, modified and/or improved components or subassemblies takes place.

Table 1: Hatch Major Subassemblies/Components.

Hatch Major Subassemblies/Components	
Item Description	**Part Number**
1. Plate Fastener Assy	9252089250xx
2. Hatch Assy	9252090250xx
3. Base Plate Assy	9252407750xx
4. Lid Assy	9252089650xx
5. Spring Torsion	9252411650xx
6. Bush Support	9252407450xx
7. Spindle	9410237350xx
8. Hatch Position Loom Inst	9410323450xx
9. Packing Rubber	9410274450xx

2.2 Description

The hatch, for all its intended usage and purposes, is a door that provides an escape/entrance through the cupola or the roof top of the turret (see cover page). The hatch also provides protection against danger or attack to a certain desired extent. The "DEVELOPMENT SPECIFICATION FOR THE MODULAR COMBAT TURRET MECHANISMS& STRUCTURES SUB-SYTEM" stipulates the high level requirements that the hatch shall meet. See [1].

2.3 Declaration:

This ATP is generic for both Commander and Gunner hatches. This document is applicable to all variants on the Hoefyster program.

2.4 General Safety Procedures

The responsibilities of all personnel with respect to safety during the execution of all tasks stipulated in this ATP document are defined in [3], the stipulated regulations in [3] are especially applicable in the event where the tasks are carried within DLS premises/jurisdictions. The supplier's own safety policies and measures may take precedence on supplier's premises.

3 Applicable and Referenced documents

3.1 Applicable documents

3.1.1 Standards

[2] MIL-STD-810F: Department of Defence Test Methods Standards for Environmental Engineering Considerations and Laboratory Tests.

[6] ISO 9001: 2008: Quality Management Systems - Requirements.

3.1.2 Specification

[1] 925007610200 10: DEVELOPMENT SPECIFICATION FOR THE MODULAR COMBAT TURRET MECHANISMS& STRUCTURES SUB-SYTEM.

[4] 223000895000 09: Hoefyster Paint Specification.

[5] 223000015000 08: Solid Film Lubricant Surface Finish Specification.

3.1.3 Other

[3] 1000360- Procedure For Safety Health And Environmental (SHE) Resources, Roles, Responsibility, Accountability And Authority.

3.2 Referenced documents

[1] 925007610200 10: DEVELOPMENT SPECIFICATION FOR THE MODULAR COMBAT TURRET MECHANISMS& STRUCTURES SUB-SYTEM.

4 Test Facilities:

No special test facilities are required.

5 Required tools and jigs:

Table 2: Test Tools and Jigs

Tool Description	Part Number
1. General Tools	N/A
2. Hatch Test Stand	9251905550xx
3. C Section Seal	9252090550xx
4. Multimeter (or any means of detecting electrical current) and suitable cables and pins	N/A

6 Test Specification and preparation:

The Hatch Installation shall be installed to the Hatch Test Stand in and incremental fashion. All components of the Hatch Installation as described by the BOM Table of 9252090350xx, sheet 1 of 2 shall be required to complete the assembly. The Plate Fastener Assy secures the Hatch Assy from the underneath the Hatch Test Stand as it would be in the real case "hatch onto turret" assembly. The following assembly method may be adopted to ease the process;

- Align packing rubber (6mm thick) to the Hatch Test Stand with respect to holes.
- Assemble the Base Plate Assy to the stand by putting it on top of the rubber and also aligning the holes. **The initial compression of the packing rubber by the Base Plate Assy shall be between 2mm to 3mm before any further assembly steps. This is due to the fact that on the 3D models, such configuration is ideal for proper compression of the D section seal.**
- Bolt down the Base Plate Assy to the Plate Fastener Assy to secure it to stand. Also ensure that the Jack Bolts are not protruding through to the bottom of the Base Plate at this stage. The Jack Bolts are only there to assist with alignment of the Lid to the Ring of the test stand thus the adjustment of compression on the seal as desired.
- Assemble the Lid Assy to the Base Plate Assy with the Torsion Spring and the Bush Support. (***Note that the Lock Installation is assembled separately and assessed for its full functionality before being assembled into the Lid Assy, the Lock bush adjustments to control the protrusion length of the Striker can unfortunately only be achieved by trial and error which sometimes requires the Lock Installation to be retrieved from the Lid Assy so that the Lock Bush can be adjusted to provide the required Striker length protrusion. The protrusion length of the Striker controls both the "slamming and catching", and the "positive locking" of the hatch***).

7 Acceptance

Hatch shall be delivered according to the any latest hatch data pack registered in Configuration as specified on the purchase order. The hatch shall be tested and accepted according to tables 4 and 5.

Table 3: Verification and Acceptance of Hatch lower level subassemblies and components.

Intend	Comments		
Verification and acceptance is per Build History of the applicable (serialized) hatch.			
Hatch Serial No:			
Company	**Name**	**Date**	**Signature**
1. Richmar			

7.1 Static Assessment Test

After completion of the steps addressed under heading 6, the user shall assess the initial positioning setup to meet the requirements before proceeding to the Dynamic test. The following steps must be considered:

- The Hatch shall be in the fully opened state with the Blade, Lock engaged.
- The compressed Packing Rubber (between the Base Plate and the Hatch Test Stand surface) shall measure between 2mm and 3mm. The Jack bolts must be used to secure this position.
- The Striker shall be in the "slamming and catching" position. If the Striker is already protruding forward as it would be in the locked position, the Striker will prevent the hatch from closing and also sustain some damages.
- Both Switches of the harness and their relative mount brackets mounted correctly.
- All levers and pins shall be installed correctly before commencing with the test (see datapack).

Table 4: Test Report Format, Static Test.

Task No.	Item Description	Task Description	Pass/Fail
1.	Blade, Lock and Lid Assy	Hatch Fully opened and Blade, Lock engaged.	

	941-02391-50xx and 925-20896-50xx		
2.	Packing Rubber 925-02744-50xx	Packing Rubber Compression	
3.	Striker 941-02787-50xx	Slamming and Catching position	
4.	Hatch Position Loom 941-03234-50xx	Proper mounting	
5.	Plate Fastener 925-20892-50xx Assy	Release Lever in proper position (out of episcope view)	

7.2 Dynamic Test

After completing the setup described under heading 6 with the combination of the Static Assessment Test of 7.1, the Hatch Installation will be ready for assessment. The following table shall be used to evaluate the functional performance of the hatch and its lower subassemblies and components:

Table 5: Test Report Format, Dynamic Test.

Task No.	Item Description	Task Description	Specification	Pass/ Fail	Result (Measured if applicable)	Comment
1.	925-24116-50xx Spring Torsion	**Torsion spring pretension and plunger pushing capability (Hatch opened angle, after releasing):**	35° to 50° from the horizontal.			
2.	941-02377-50xx Lid Assy	**Concentricity alignment of the Lid Assy to the Ring of the Stand:**	No Spec.		N/A	
3.	941-02455-50xx Lock Installation	**Lock setup:**	No Spec.		N/A	
4.	941-03862-50xx Striker	**Striker Seal Proper Positioning:**	No Spec.		N/A	
5.	941-02377-50xx Lid Assy	**Hatch Locking:**	No Spec.		N/A	
6.	941-02778-50xx Rubber D Section	**Hatch Sealing Capability:**	5mm≤Final compressed height≤7mm			
7.	941-03893-50xx Spring, Helical, Compression 941-02389-50xx	**Plunger Pushing Capability:**	Plunger shall push the Lid to the desired position		N/A	

Task No.	Item Description	Task Description	Specification	Pass/ Fail	Result (Measured if applicable)	Comment
	Plunger 941-02390-50xx Nut Special		described in Task no 1.			
8.	941-03234-50xx Hatch Position Loom	**Hatch Position Loom Sensitivity Fine-tuning:**	8mm maximum travel.			
9.	941-03234-50xx Hatch Position Loom	**Signal detection during closed and locked positions.**	Detect signal		N/A	

The above tables shall be exported as ATR (Acceptance Test Report) for the Hatches at the supplier after all results have been recorded.

8 Appendix

8.1 Dynamic Test Detail Description

Table 6: Dynamic Test Detail Description

Task No.	Item Description	Task Description	Specification
1.	925-24116-50xx Spring Torsion	**Torsion spring pretension**: This is to be done first after lid has been assembled due to safety reasons. This is achieved by adjusting the Bush Support until the desired pretension is acquired. At the correct pretension, when released the Lid will rotate gently into the closed position but stops between (and including) 35° and 50° from the horizontal. Pretension the Spring and Assess the stop angle, note result.	35° to 50° from the horizontal.
2.	941-02377-50xx Lid Assy	**Concentricity alignment of the Lid Assy to the Ring of the Stand**: Assess the sealing of the D section seal on the C section seal for concentricity. If necessary,	No Spec.

Task No.	Item Description	Task Description	Specification
		adjust the Base Plate Assy around to achieve this. Once this has been achieved, the installation bolts can be tightened slightly to ensure that the concentricity is obtained. **Make sure the Jack Bolts are still loose at this stage.**	
3.	941-02455-50xx Lock Installation	**Lock setup**: Assess that locks against the required two position namely the "slamming and catching" position and the "positive locking" position. This is done by literally manoeuvring to and fro the Lock Handle as desired while utilizing the Press Button Shaft at the bottom of the Spindle.	No Spec.
4.	941-03862-50xx Striker	**Striker Seal Proper Positioning:** Assess the effectiveness of the sealing by the Striker Seal around the Striker hole.	No Spec.
5.	941-02377-50xx Lid Assy	**Hatch Locking**: After the Lock Installation has been successfully set up. The Lid can being swung to the closed position by pulling the Lever of the Fastener Plate Assy from underneath the Hatch Test Stand. Finally slam the hatch to assess the catching capability of the Lock Installation. Assess and note the result. If the result is found not satisfactory, either step **2** or step **3** need to be redone. In other words the Lid concentricity needs to be adjusted by wiggling or the Lock Installation need to be retrieved and have its Lock Bush adjusted accordingly. Reassess and note results.	No Spec.
6.	941-02778-50xx Rubber D Section	**Hatch Sealing Capability**: The initial compression of the Packing Rubber by the Base Plate Assy should be between 2mm and 3mm. The compression can be	5mm≤Final compressed height≤7mm

Task No.	Item Description	Task Description	Specification
		increased (where the Packing Rubber will be compressed even further to be even thinner thus reducing the gap between the top plate of the Hatch Test Stand incrementally until the desire sealing state is reached). The ideal sealing of the hatch is when the D section seal is compressed for 6mm+/-1 (initial length - final length =6mm+/-1). Use the **Jack Bolts** to tilt the hatch as desired for to achieve **alignment and effective sealing**. Assess and note results.	
7.	941-03893-50xx Spring, Helical, Compression 941-02389-50xx Plunger 941-02390-50xx Nut Special	**Plunger Pushing Capability:** Assess the Plunger's capability to push the Lid to swivel to the desire angular position as described in 1. This is achieved by pulling down from underneath the Hatch Test Stand, the Lever Mach of Plate Fastener Assy thus releasing the Blade Lock Base Plate Assy out of the Lid 's locking groves. The plunger must then with the assistance of the Spring, Helical, Compression (which is compressed when the Lid is closed) kick back the Lid into the direction of closing position. If the plunger does not kick the Lid back enough as desired, **the adjustments to increase pretension in the spring can be achieved by turning the Setscrew 111-01653 that is installed in the front of the Plunger.** Assess the capability of the Plunger mechanism and note results. **(note that too much pretension in the Torsion Spring can hinder the Plunger Mechanism functionality, readjust accordingly if necessary).**	Plunger shall push the Lid to the desired position described in Task no 1.
8.	941-03234-50xx	**Hatch Position Loom Sensitivity Fine-tuning:**	

Task No.	Item Description	Task Description	Specification
	Hatch Position Loom	Set up the external and internal switches as shown in the data pack. Much focus must be paid to the internal switch of the loom. Optimise the Arm 1, Switch's angular position, Arm 2, Switch and Rod, Striker position and secure them in desired position with the provided fasteners. **This shall be sensitive enough to ensure that once the Press Button Shaft is pressed, the Lock Handle is swivelled backwards in an attempt to unlock the hatch and the striker moves 8mm maximum, the circuit will be broken thus signalling a "hatch opened" state.**	8mm maximum travel.
9.	941-03234-50xx Hatch Position Loom	**Signal detection during closed and locked positions.**	Detect signal