



DoubleSShot

Boilerplate Rocket Motor

Closure Installation Tool User Manual

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Introduction

This document describes how to use the Closure Installation Tool (CIT) to install (and remove) the nozzle and bulkheads. This tool is intended for use with the DSS Boilerplate rocket motor.

Installation Procedures

Mid Bulkhead

Use EP2 at Midbulkhead and EP3 at Forward Bulkhead

Install a minimum of 10 attachment screws into Midbulkhead aft attachment screw holes. Insert Midbulkhead into Forward Casing up to o-rings. Slide EP2 over Midbulkhead until it contacts screw heads. Position EP3 at forward end of casing. Place 73” connect rods into both end plates and attach nuts at both ends. Slowly and evenly tighten nuts until Midbulkhead is drawn into position with forward attachment holes lined up. Radial alignment can be adjusted by gently twisting end plate. Remove attachment screws when done.

Forward Bulkhead

Use EP2 at Midbulkhead and EP3 at Forward Bulkhead

Assemble three 5/16”x 2-1/4” bolts into EP3, with bolt heads toward Forward Bulkhead. Use two nuts per bolt and extend bolt fully. Slide EP2 over Midbulkhead until it contacts casing. Insert Forward Bulkhead up to o-rings then slide EP3 into position such that the bolt heads contact the bulkhead. Place 73” connect rods into both end plates and attach nuts at both ends. Slowly and evenly tighten nuts until Forward Bulkhead is drawn into position with attachment holes lined up. Radial alignment can be adjusted by gently twisting end plate.

Nozzle

Use EP1 at Nozzle and either EP2 or EP3 at MidBulkhead location

Assemble three 5/16”x 1-1/4” bolts into EP1, with bolt heads toward Nozzle. Use a washer under each bolt head and attach with a single nut. Slide EP1 over Nozzle until bolt heads contact Nozzle body. Hold other end plate at Midbulkhead location then place 73” connect rods into both end plates and attach nuts at both ends. Slowly and evenly tighten nuts until Nozzle is drawn into position with attachment holes lined up. Radial alignment can be adjusted by gently twisting end plate.

Jointing of motor casings

Use EP1 at Nozzle and EP3 at Forward Bulkhead location

Slide EP1 over nozzle and slip EP2 into position at Forward Bulkhead location. Connect the 73” and 53” rods together. Place the connect rods into both end plates and attach nuts at both ends. Slowly and evenly tighten nuts until Midbulkhead is drawn into position with attachment holes lined up. Radial alignment can be adjusted by gently twisting end plate.

Disassembly Procedures

Dis-jointing of motor casings

Use EP1 at Nozzle and EP3 at Forward Bulkhead location

Remove Midbulkhead aft attachment screws. Slide EP1 over nozzle then install the Nozzle Cone retention screws. Slide EP1 aft until in contact with screw heads. Slip EP2 into position at Forward Bulkhead location. Connect the 73” and 53” rods together. Install nuts at Nozzle end of rod. Place the connect rods into both end plates and attach nuts at Forward Bulkhead end. Note that at both plates, nuts are located at forward side. Slowly and evenly turn nuts at EP1 until Midbulkhead is drawn out of casing.

Nozzle

Use EP1 at Nozzle and either EP2 or EP3 at MidBulkhead location

Remove Nozzle attachment screws, Nozzle Cone and retention screws. Slide EP1 over nozzle then reinstall the Nozzle Cone retention screws. Slide EP1 aft until in contact with screw heads. Hold end plate into position at MidBulkhead location. Install nuts at Nozzle end of 73” connect rod. Place the connect rods into both end plates and attach nuts at MidBulkhead end. Note that at both plates, nuts are located at forward side. Slowly and evenly turn nuts at EP1 until Nozzle is drawn out of casing.

Forward Bulkhead

Use EP2 at Midbulkhead and EP3 at Forward Bulkhead

Remove Thrust Fitting. Remove Forward Bulkhead attachment screws. Insert single 3/8”x 2-1/2” bolt & washer through EP3 central hole and screw into Forward Bulkhead. Slide EP2 over Midbulkhead until it contacts casing. Place 73” connect rods into both end plates and attach nuts at both ends. Note that at both plates, nuts are located at aft side. Slowly and evenly turn nuts until Forward Bulkhead is drawn out of casing.

Mid Bulkhead (from Forward Casing)

Use EP2 at Midbulkhead and EP3 at Forward Bulkhead

Remove MidBulkhead attachment screws. Slide EP2 over Midbulkhead. Install a minimum of 10 attachment screws into Midbulkhead aft attachment screw holes. Slide EP2 aft until it contacts screw heads. Install nuts at Midbulkhead end of 73” connect rod. Place the connect rods into both end plates and attach nuts at Forward Bulkhead end. Note that at both plates, nuts are located at forward side. Slowly and evenly turn nuts at EP2 until Midbulkhead is drawn out of casing.