

CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: TBA-8
 NAME / QUANTITY: See Table A-2
 DRAWING REFERENCE: See Table A-2

PROJECT: 1091
 LRU NAME / QUANTITY: TOOL MOUNTS
 LRU PART NUMBER: See Table A-2

PAGE 1 OF 5
 SUBSYSTEM: TOOL BOX
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER HST-TBA-5-1	CRITICALITY 2/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The tool mounts restrain the tools in a location for launch, landing, and EVA operations. The tool mounts allow the tool to be removed and installed easily by a suited crewmember.		END ITEM Cannot remove the tool from the stowage location. MISSION Cannot perform some mission objectives since no redundancy exists. CREW / VEHICLE None INTERFACE None	DESIGN I. Design Feature to Minimize the Chance of the Failure Mode A. Design All tool box components were designed to a structural safety factor of 2.0 B. Tolerances Sufficient tolerances will be used in the tool mounts and McTether stub designs to prevent jamming by expansion and contraction of material due to temperature extremes or on-orbit use. C. Materials - Major Components 1. Tool Mounts: Acetal, 8061-T651, 15-5 PH 1050, CRES 304- Cond A. 2. McTether stud: CRES 15-5 PH 1050 H. Testing and Analysis A. Acceptance Testing 1. PDA A full pre delivery acceptance (PDA) test will be performed on the tool box assembly before it is delivered to JSC for the beginning of the certification process. The PDA will verify that the tool mounts and McTether stubs are operating correctly and that the assembly is clean. 2. Vibration The flight tool box will be exposed to acceptance vibration loads while it is in flight configuration. The test will verify that the tool mounts and McTether stub assemblies will withstand the vibration loads.
FAILURE MODE AND CAUSE MODE Cannot remove the tool from its stowage location. CAUSE(S) 1.) Tool mount lock(s) (i.e. slider, quarter turn) is stuck in the locked position. 2.) Tool stub is jammed. 3.) Contamination. 4.) Galling.			
REUNDANCY SCREENS A - N/A B - N/A C - N/A	REMARKS PATHS None		
MISSION PHASE		CORRECTIVE ACTION TIMES	
		TIME TO EFFECT	TIME TO CORRECT
EVA	Minutes	N/A	

PREPARED BY: J.F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 06/93

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CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: TBA-1
 NAME / QUANTITY: See Table A-2
 DRAWING REFERENCE: See Table A-2

PROJECT: HST
 LRU NAME / QUANTITY: TOOL MOUNTS
 LRU PART NUMBER: See Table A-2

PAGE 2 OF 5
 SUBSYSTEM: TOOL BOX
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER	CRITICALITY	FAILURE EFFECT	RETENTION RATIONALE																									
HST-TBA-5-1	2/2																											
FUNCTION The tool mounts restrain the tool in a location for launch, landing, and EVA operations. The tool mounts allow the tool to be removed and installed easily by a suited crewmember.		END ITEM Cannot remove the tool from the stowage location.	MISSION A. <u>Acceptance Testing (continued)</u> The following vibration levels are per SMD memo ES42-92-134: <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th>Frequency (Hz)</th> <th>Slope (dB/oct.)</th> <th>Constant Level G²/Hz</th> <th>Overall G_{rms}</th> </tr> </thead> <tbody> <tr> <td>20-80</td> <td>+3.0</td> <td rowspan="3" style="text-align: center;">.04</td> <td rowspan="3" style="text-align: center;">8.1</td> </tr> <tr> <td>80-350</td> <td rowspan="2" style="text-align: center;">-3.0</td> </tr> <tr> <td>350-2000</td> </tr> <tr> <td>20-45</td> <td>+10.0</td> <td rowspan="3" style="text-align: center;">.08</td> <td rowspan="3" style="text-align: center;">7.7</td> </tr> <tr> <td>45-600</td> <td rowspan="2" style="text-align: center;">-6.0</td> </tr> <tr> <td>600-2000</td> </tr> <tr> <td>20-70</td> <td>+4.0</td> <td rowspan="3" style="text-align: center;">.05</td> <td rowspan="3" style="text-align: center;">7.0</td> </tr> <tr> <td>70-600</td> <td rowspan="2" style="text-align: center;">-6.0</td> </tr> <tr> <td>600-2000</td> </tr> </tbody> </table>	Frequency (Hz)	Slope (dB/oct.)	Constant Level G ² /Hz	Overall G _{rms}	20-80	+3.0	.04	8.1	80-350	-3.0	350-2000	20-45	+10.0	.08	7.7	45-600	-6.0	600-2000	20-70	+4.0	.05	7.0	70-600	-6.0	600-2000
Frequency (Hz)	Slope (dB/oct.)	Constant Level G ² /Hz		Overall G _{rms}																								
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REDUNDANT SCREENS A - N/A B - N/A C - N/A		CREW / VEHICLE None																										
REMAINING PARTS None		INTERFACE None	B. <u>Certification Testing</u> 1. <u>Thermal Vacuum</u> The Tool Box will be exposed to the following thermal vacuum environment. Fresh button actuation, tool lock operation, and McTeer functioning will be a part of the test plan. a. <u>Temperature</u> - Cold Side Only (amb. to -90°F) b. <u>Pressure</u> - ATM to 1x10 ⁻⁵ Torr																									
MISSION PHASE																												
CORRECTIVE ACTION TIMES <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>TIME TO EFFECT</th> <th>TIME TO CORRECT</th> </tr> </thead> <tbody> <tr> <td>EVA</td> <td>Minutes</td> <td>N/A</td> </tr> </tbody> </table>					TIME TO EFFECT	TIME TO CORRECT	EVA	Minutes	N/A																			
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EVA	Minutes	N/A																										

PREPARED BY: J.F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 8/99

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CRITICAL ITEMS LIST

REFERENCE DESIGNATOR: TBA-1
 NAME / QUANTITY: See Table A-1
 DRAWING REFERENCE: See Table A-1

PROJECT: HST
 LRU NAME / QUANTITY: TOOL MOUNTS
 LRU PART NUMBER: See Table A-1

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 SUBSYSTEM: TOOL BOX
 EFFECTIVITY: ALL ORBITERS

FAILURE MODE NUMBER HST-TBA-5-1	CRITICALITY 2/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The tool mounts restrain the tools in a location for launch, landing, and EVA operations. The tool mounts allow the tool to be removed and installed easily by a suited crewmember.		END ITEM Cannot remove the tool from the stowage location. MISSION Cannot perform some mission objectives since no redundancy exists. CREW / VEHICLE None	DESIGN B. <u>Certification Testing (continued)</u> 2. Functionals The tool box components like the tool mounts and McTether stubs will be functionally operated prior to and immediately after all certification test to verify that the test environment does not degrade the hardware performance. C. <u>Certification Analysis</u> The tool mounts and McTether stubs will be analyzed to the following induced environments to verify that the assembly can withstand the environment levels: 1. Requirements Source a. <u>Shock</u> - Functional NSTS-07700 VOL. XIV b. <u>Vibration (Fl. Levels)</u> - Acoustics NSTS-07700 VOL. XIV - Modal JSC-14048 c. <u>Structures</u> - UEL (n = 2.0) NSTS-07700 VOL. XIV - Fracture NSTS-07700 VOL. XIV d. <u>Acceleration</u> - Flight MF004-0140 - Crash ML-STD-810, Method 610, Procedure 1 e. <u>Temperature</u> - Hot (+250°F) HST S/AD (10181-10081A)
FAILURE MODE AND CAUSE MODE Cannot remove the tool from its stowage location. CAUSE(S) 1.) Tool mount lock(s) (i.e. slider, quarter turn) is stuck in the locked position. 2.) Tool stub is jammed. 3.) Contamination. 4.) Galling.			
REDDUNDACY SCREENS A - N/A B - N/A C - N/A	REPAIRING PATHS None		
MISSION PHASE	CORRECTIVE ACTION TIMES		
	TIME TO EFFECT	TIME TO CORRECT	
EVA	Minutes	N/A	
INTERFACE		None	

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEDING DATE: NONE

DATE: 2/88

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CRITICAL ITEMS LIST

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SUBSYSTEM: TOOL BOX
EFFECTIVITY: ALL ORBITERS

REFERENCE DESIGNATOR: TBA-4
NAME / QUANTITY: See Table A-3
DRAWING REFERENCE: See Table A-3

PROJECT: HST
LRU NAME / QUANTITY: TOOL MOUNTS
LRU PART NUMBER: See Table A-3

FAILURE MODE NUMBER HST-TBA-5-1	CRITICALITY 2/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The tool mounts restrain the tools in a location for launch, landing, and EVA operations. The tool mounts allow the tool to be removed and installed easily by a suited crewmember.		END ITEM Cannot remove the tool from the stowage location. MISSION Cannot perform some mission objectives since no redundancy exists. CREW / VEHICLE None INTERFACE None	DESIGN III. Inspection A. Manufacturing 1. The tool mounts and McTether stubs will be inspected prior to build-up for conformance to their applicable drawings. 2. All fracture critical piece parts will be inspected as described on their applicable drawings. B. Assembly 1. Internal assemblies will be cleaned and inspected to the levels described in section 3.53.5 of the HST SRAD (10101-10001A). Once cleaned, the tool box will be completely bagged to prevent any contamination from entering the box. C. Testing 1. The assembly will be fully inspected and functionally operated during PDAs and PIAs. 2. The hardware will be fully inspected for any signs of galling as a part of the pre/post functional tests performed prior to and immediately after all major certification and acceptance testing.
FAILURE MODE AND CAUSE MODE Cannot remove the tool from its stowage location. CAUSE(S) 1.) Tool mount lock(s) (i.e. slider, quarter turn) is stuck in the locked position. 2.) Tool stub is jammed. 3.) Contamination. 4.) Galling.			
REUNDANCY SCREENS A - N/A B - N/A C - N/A	REMAINING PATHS None		
MISSION PHASE EVA		CORRECTIVE ACTION TIMES TIME TO EFFECT: Minutes TIME TO CORRECT: N/A	

PREPARED BY: J. F. PARK

REVISION: BASIC

SUPERSEEDING DATE: NONE

DATE: 12/23/92

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CRITICAL ITEMS LIST

PAGE 5 OF 8
SUBSYSTEM TOOL BOX
EFFECTIVITY: ALL ORBITERS

REFERENCE DESIGNATOR: TBA-2
NAME / QUANTITY: DOOR LATCH ASSEMBLY (4)
DRAWING REFERENCE: 10181-30258

PROJECT: HBT
LRU NAME / QUANTITY: BOX DOOR ASSEMBLY (2)
LRU PART NUMBER: 10181-28281-01(LT)30302-81(RT)

FAILURE MODE NUMBER HST-TBA-5-1	CRITICALITY 2/2	FAILURE EFFECT	RETENTION RATIONALE
FUNCTION The tool mounts restrain the tools in a location for launch, landing, and EVA operations. The tool mounts allow the tool to be removed and installed easily by a suited crewmember.		END ITEM Cannot remove the tool from the stowage location.	DESIGN IV. Failure History A. There have been no failures associated with the tool mounts and McTulcher stubs. V. Operations A. <u>Effects of Failure</u> Cannot remove the tools from the stowage locations. B. <u>Crew Actions</u> Crew will be trained to use alternate tools (ie crow bars, probes) to remove the tools from their mounts. C. <u>Training</u> None D. <u>Mission Constraints</u> May be more difficult or impossible to perform some mission operations without these tools E. <u>Initial Check Outs</u> None
FAILURE MODE AND CAUSE MODE Cannot remove the tool from its stowage location.		MISSION Cannot perform some mission objectives since no redundancy exists.	
CAUSE(S) 1.) Tool mount lock(s) (i.e. slider, quarter turn) is stuck in the locked position. 2.) Tool stub is jammed. 3.) Contamination. 4.) Galling.		CREW / VEHICLE None	
REUNDANCY SCREENS A - N/A B - N/A C - N/A	REMAINING PATHS None	INTERFACE None	
MISSION PHASE	CORRECTIVE ACTION TIMES		
	TIME TO EFFECT	TIME TO CORRECT	
EVA	Minutes	N/A	

PREPARED BY J.P. PARK

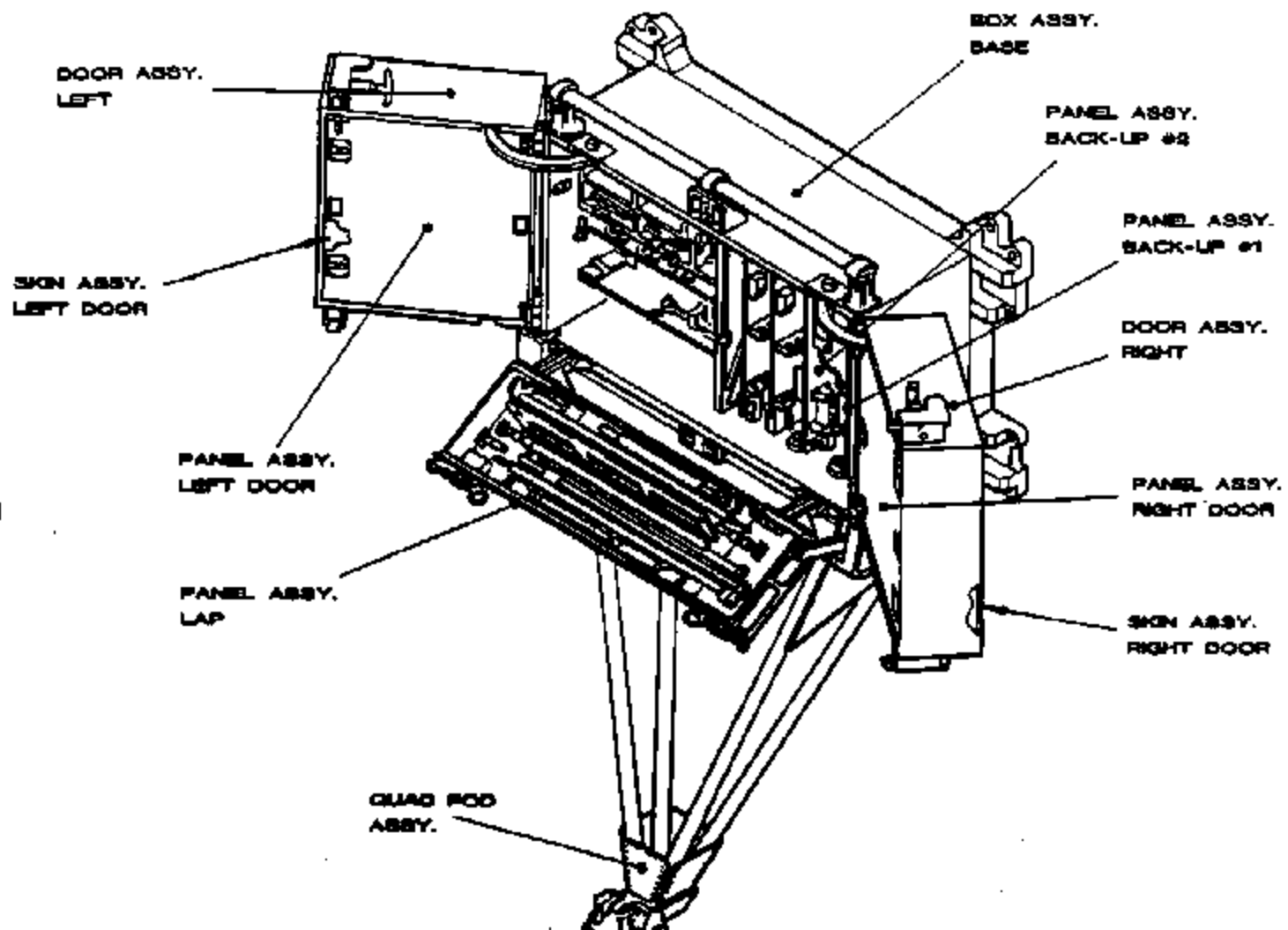
REVISION: BASIC

SUPERSEDING DATE NONE

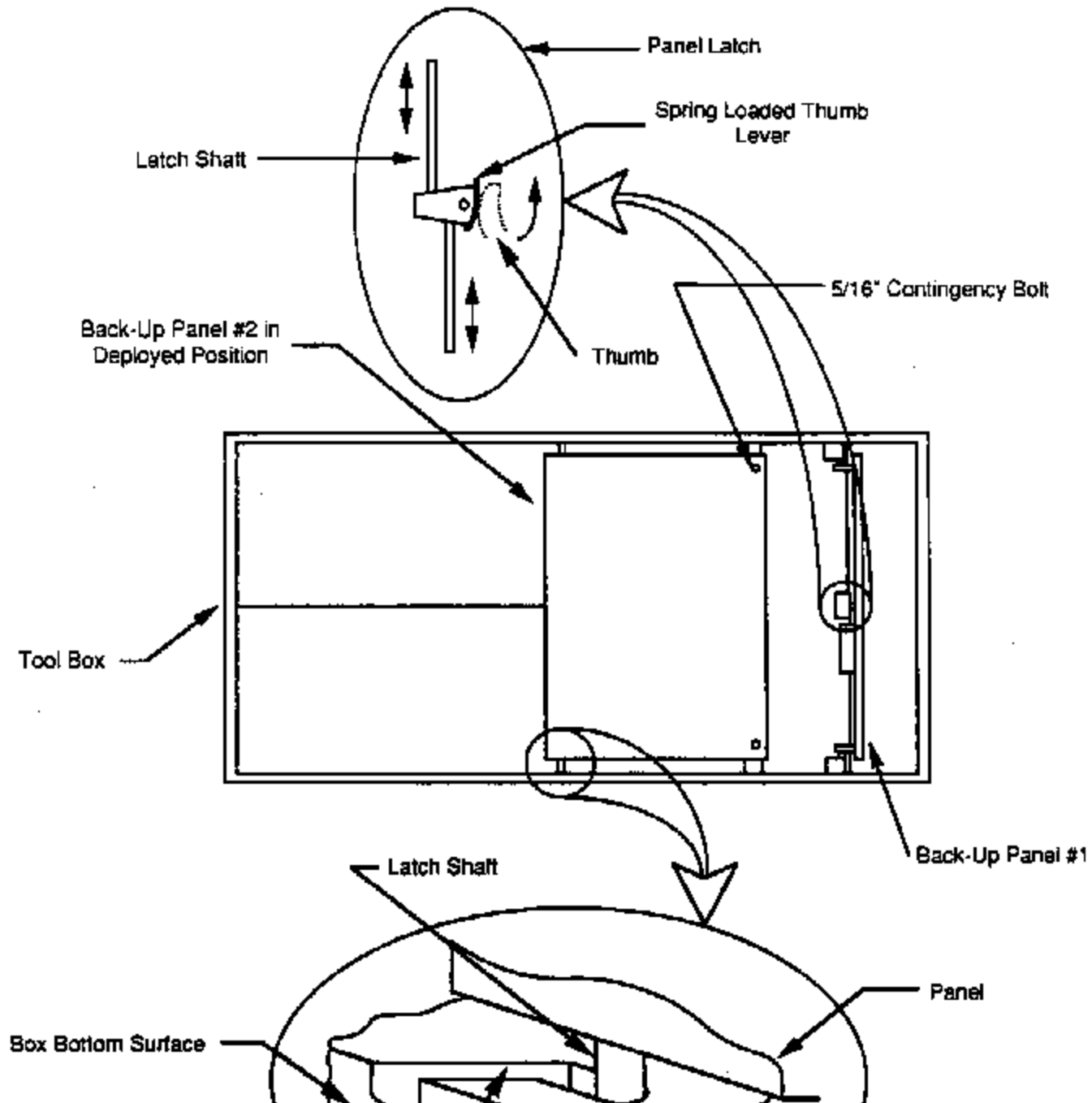
DATE 12/23/92

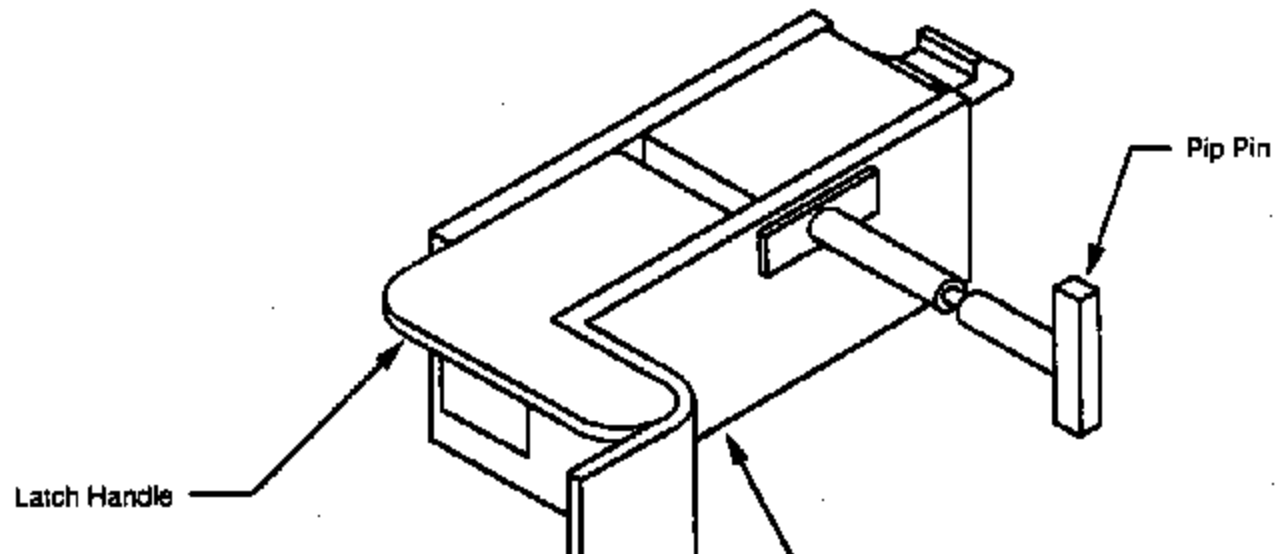
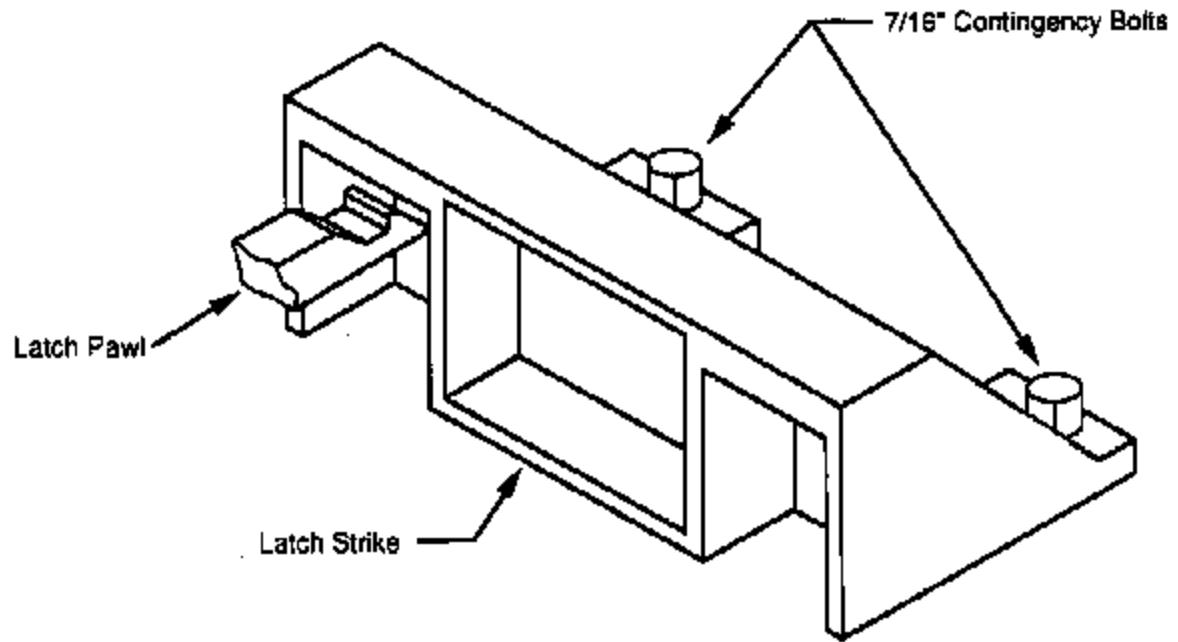
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FMEA/CIL for the HST Tool Box, JSC-37676

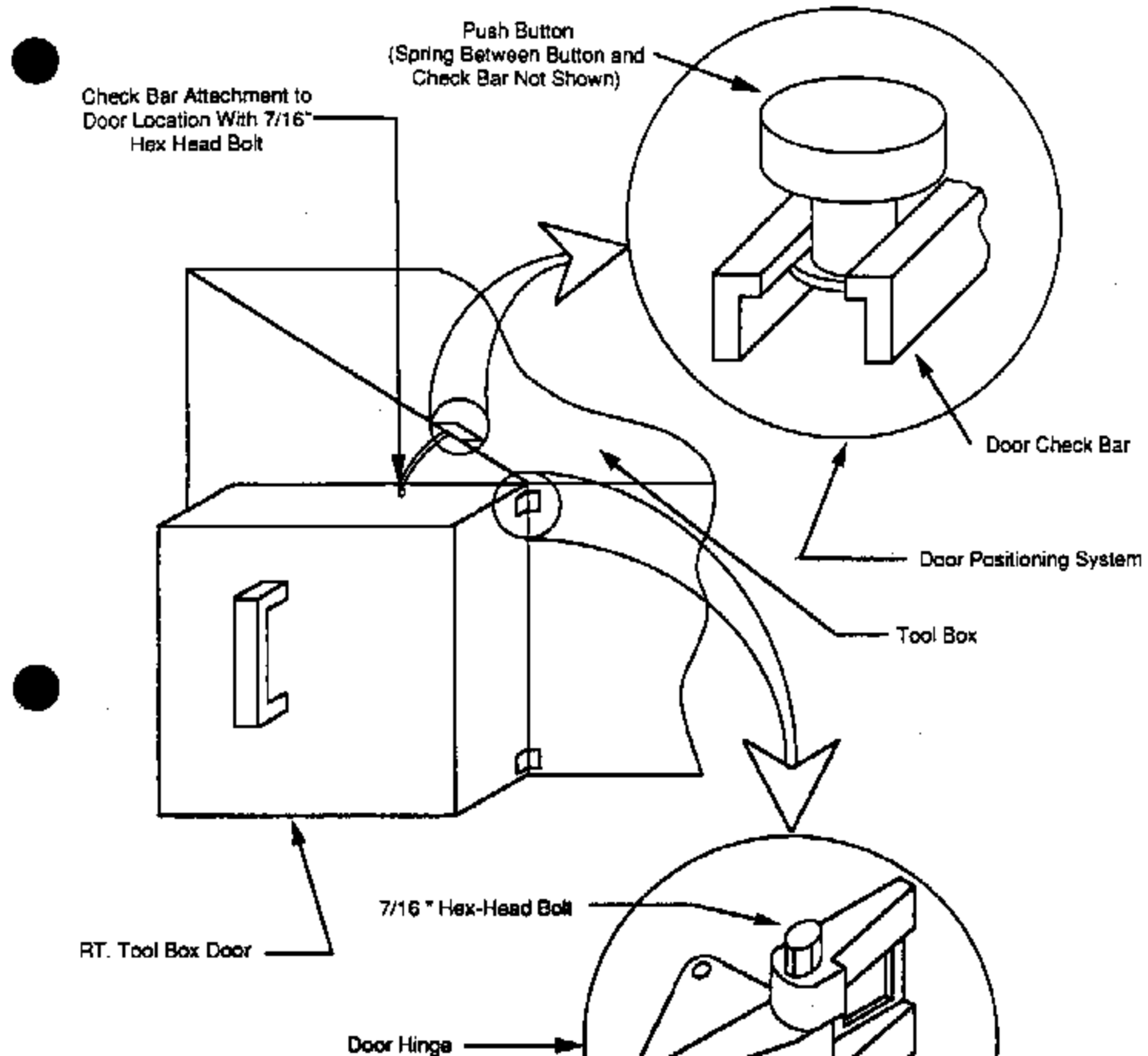


FMEA/CIL for the HST Tool Box, JSC-37676

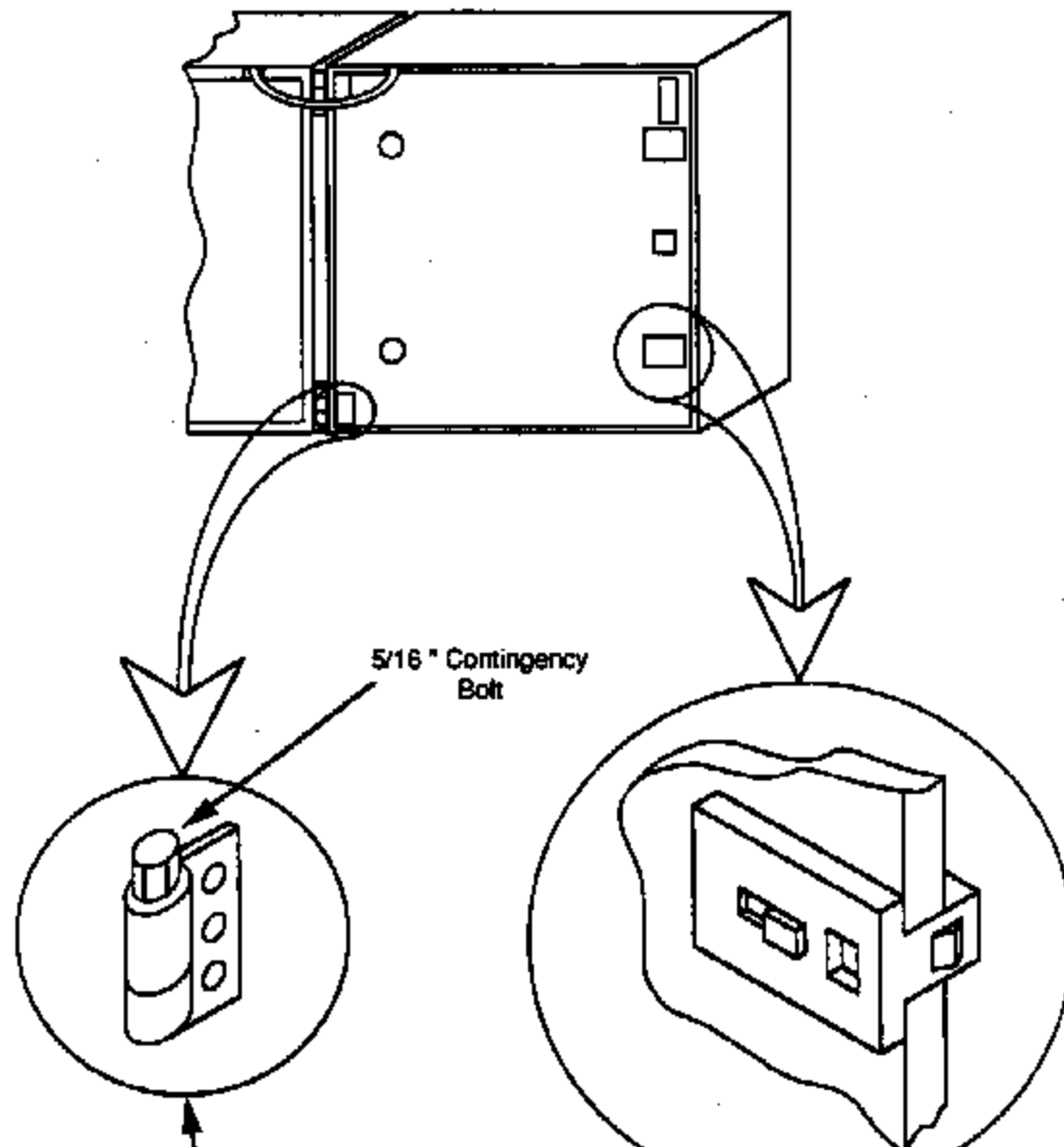


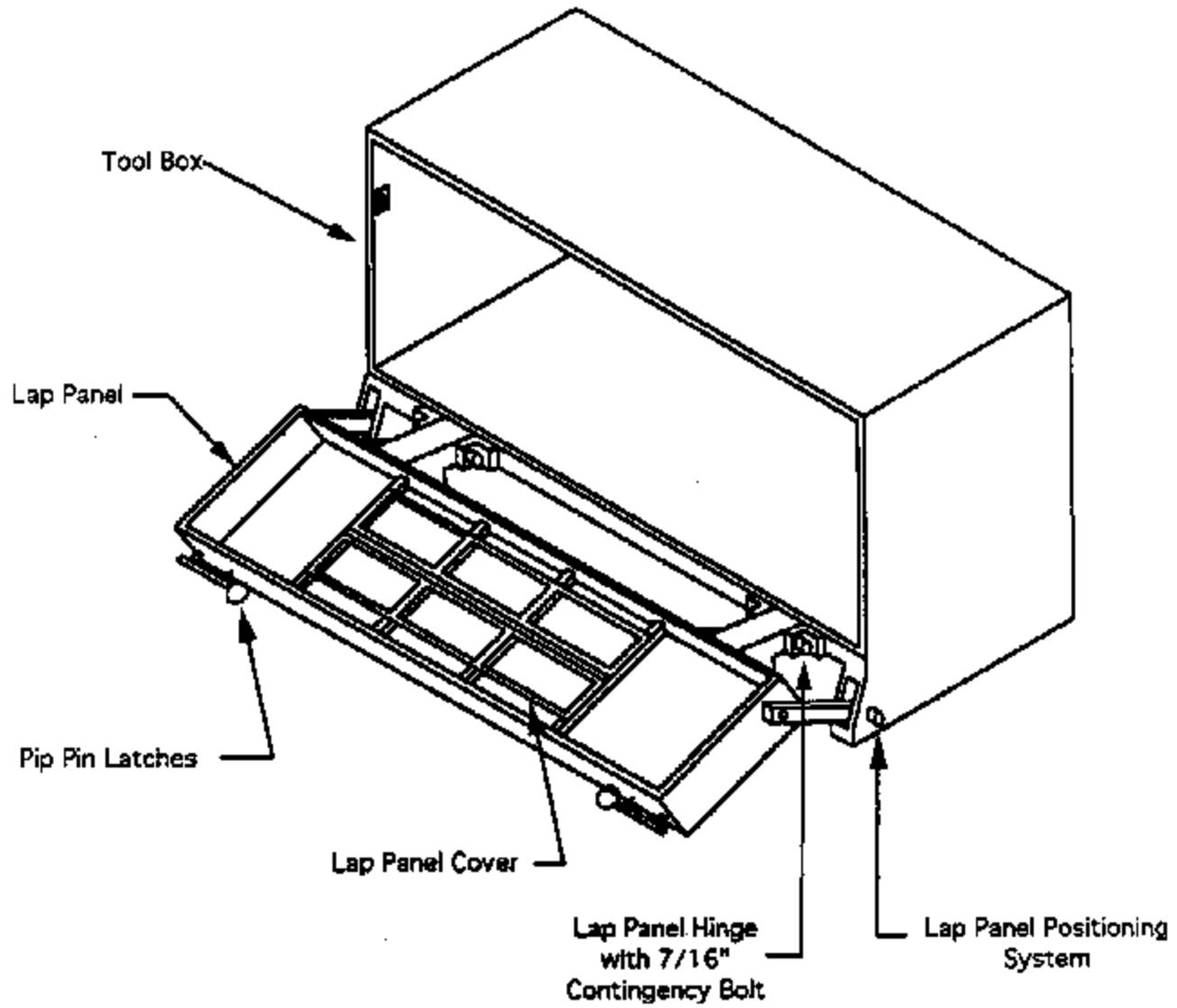


FMEA/CIL for the HST Tool Box, JSC-37676

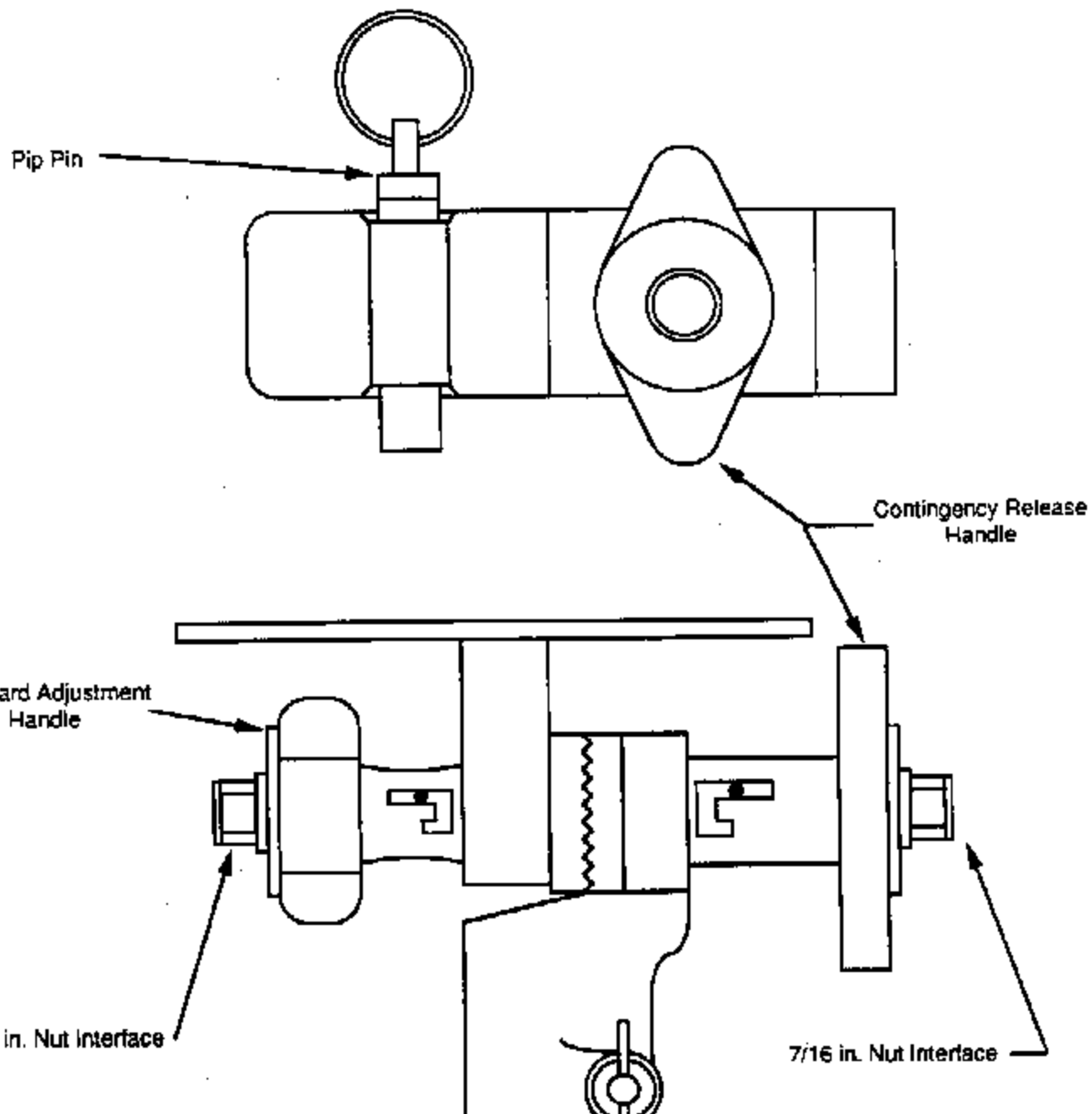


FMEA/CIL for the HST Tool Box, JSC-37676





FMEA/CIL for the HST Tool Box, JSC-37676



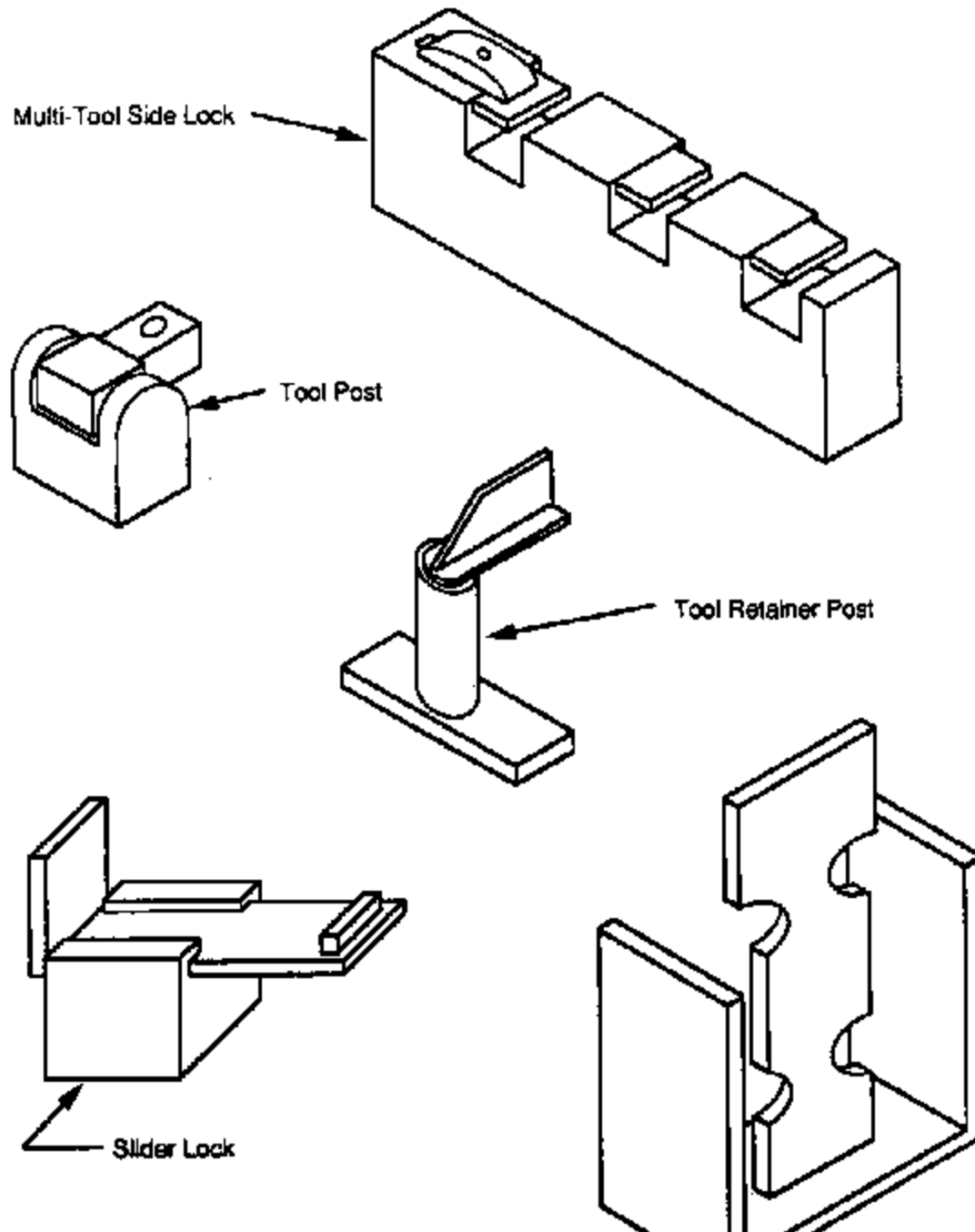


Table A-2: Tool Mount Table

Tool Retainer	Part Number
General Retainers	
Slide, Locking Tool Holder Assy.	10181-20223-01,-03 through -06
Tool Restraint Assy., Hinged	10181-20381-01, -02, -03,-05 through -08
Sm. Slide/Lock	10181-20390-01,-02
Lever, Lock Down	10181-20429-03 through -06
Lock-Down Assy.	10181-20246-01 through -5, -07 through -10
Restraint Assy.	10182-20450-01,-02,-03
Double Decker Latch Assy.	10181-20301-01
Single Decker Latch Assy.	10181-20309-01
Tool Restraint Assy.	10181-20461-01 through -05
Interface Adapter, Extended	10181-20286-01
Support, Hinge Tool	10181-20280-01,-02,-03
Bracket, Pivoting	10181-20331-01,-02
Coax Connector Tool Restraint	
Insert, Latching	10181-20278-01
Support, Hinge Tool	10181-20280-01
Block, Support, Small	10181-20285-01
Pin, Stud Restraint	10181-20393-02
Screw, FH, 100 DG, #8-32 UNC x .3125L	MS24693-C47
Ball Plunger, .312-18UNC x .56L	ST20P995-19
90° Circ. Conn. Tool, Jaw End	
Insert, Latching	10181-20278-01
Support, Hinge Tool	10181-20280-02
Block, Support	10181-20281-01
Pin, Stud Restraint	10181-20393-02
Screw, FH, 100 DG, #8-32 UNC x .3125L	MS24693-C47
Ball Plunger, .312-18UNC x .56L	ST20P995-19
0° & 90° Circ. Conn. Tool, Handle End	
Base, Lock	10181-20333-01
Bar, Lock	10181-20334-01
Base, Bottom	10181-20335-01
Screw, FH, 100 DG, #8-32 UNC x .3125L	MS24693-C47

Pin Straightener	
Housing, Lock	10181-20279-01
Support, Hinge Tool	10181-20280-01
Pin, Stud Restraint	10181-20393-02
Insert, 45 Deg. Latching	10181-20330-01
Screw, FH, 100 DG, #8-32 UNC x .3125L	MS24693-C47
Ball Plunger, .312-18UNC x .56L	ST20P995-19
Adjustable Door Stay, Pivot End	
Guide, Door stay	10181-20436-01
Holder, Guide	10181-20430-01
Insert, 45 Latching	10181-20330-01
Pin, Stud Restraint	10181-20393-04
Screw, Socket HD CAP, #8-32 UNC x .750	MS16995-28
Ball Plunger, .312-18UNC x .56L	ST20P995-19
Adjustable Door Stay, Claw End	
Cradle Tether End No. 2	10181-20352-01
Pin, Compression	10181-20366-01
Washer	AN960C4
Spring, Compression	MS24585-C162
Screw, PH, #2-56 UNC x .19L	MS51957-2
OTA Door stay	
Stud, Door stay, OTA	10181-20438-01
Pin, Stud Restraint	10181-20393-03
Base, Tool Stud	10181-20394-02
Receiver, Door stay, OTA	10181-20395-01
Screw, FH, 82°, #4-40 UNC x .38L	MS51959-15
Ball Plunger, .312-18UNC x .56L	ST20P955-19
Extension Retainers	
Saddle, Inner	10181-20305-01
Saddle, Outer	10181-20306-01
Door	10181-20307-01
Isolator, Inner, RH	10181-20311-01
Isolator, Inner, LH	10181-20311-02
Hinge, LH	10181-20314-01
Hinge, RH	10181-20314-02
Isolator, Outer, RH	10181-20315-01
Isolator, Outer, LH	10181-20315-02