

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

<b>Program Name</b>	<b>Revision Date</b>	<b>Revision Name</b>	<b>Rev.</b>	<b>User Manual</b>	<b>Verification Manual</b>	<b>Description</b>
MIDAS	06/01/2001 11:52:20	2001.152	0	TTS-CC-117	TTS-CC-117.1	Original Issue
MIDAS	10/28/2002 08:10:08 Build 5.0	2002.301	1	TTS-CC-117	TTS-CC-117.1	Added BWROG DC Methodology Module Added EPRI Butterfly Methodology Module Added radial buttons to Output Panel to display descriptions or field data Added print preview capability for reports Removed Excel interface for printing reports Changed Print / Inputs to Print / Data Sheet which includes inputs, outputs, and references Revised printed report formats and contents
MIDAS	10/02/2003 16:56:56 Build 6.0	2003.275	2	TTS-CC-117	TTS-CC-117.1	Added the following new Valve input parameters: HELB Related Valve Factor Butterfly DSE Excluded Butterfly Seat Torque Excluded Stem COF for Handwheel Analysis Stem Material Yield Strength Stem Unsupported Length StemTorque Correction Factor Added the following new Operator input parameters: Spring Pack Curve Source HBC Efficiency Multiplier HBC Torque Multiplier Custom Spring Pack Filename Custom Spring Pack Test Date Custom Spring Pack Test Number Custom Spring Pack Minimum TSS Custom Spring Pack Maximum TSS Custom Spring Pack Minimum Torque Custom Spring Pack Maximum Torque OEM Recommended TSS OEM Valve Maximum TSS OEM Actuator Maximum TSS Installed Limiter Plate Added the following new Motor input parameters:

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						Cable Resistance Calculated or Input Input Cable Resistance Added the following new System input parameters: Maximum HELB D-P Maximum HELB Line Pressure Extended Interval Factor Removed radio buttons to display descriptions or field data from Output Panel Added parameter group drop down menu to Output Panel to display specifically grouped output parameters Added Plant and Category fields to applicable reference data panels and tables Added the following new output parameters: Minimum Design Stem Root Diameter Minimum Stem Diameter for Buckling Design Stem Dia / Buckling Stem Dia SMB Handwheel Ratio SMB Handwheel Efficiency SMB Handwheel Torque Rating HBC Extended Torque Rating HBC Extended Efficiency NSR Min Required Torque HELB Related Min Required Thrust HELB Thrust due to DP Effect HELB Thrust due to Piston Effect Min Design Torque @Design SF Min Design Torque @SF=0.2 Stem Factor for Handwheel Analysis Butterfly Valve Dynamic Seating Effect Open Stem Factor Criteria Liquid Pressure Recovery Factor (squared) Pressure Drop Ratio Factor Expansion Factor Expected Torque Variability @VLV Expected Torque Variability @ACT Valve Factor Capability (close) Valve Factor Capability (open) EPRI Gate Valve Seating Margin (close)

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						<p>EPRI Open Unseating Margin                      Added Reliance Motor Data to BWROG DC Methodology Module                      Revised Spring Pack Lookup panel to include "Use Generic Data" and "Use Custom Data" radio button selections                      Added Custom Spring Pack Data input panel                      Added Status Table                      Revised Gearbox Lookup panel to include additional input parameter torque and efficiency multipliers                      Revised Motor Curve Lookup panel to select data based on motor start torque and motor curve number, also added voltage pull-down                      Revised Overall Resistance Calculation panel to include Cable Resistance options, "Calculate" or "Input", radio buttons for DC motors only                      Revised BWROG-DC, Valve Information Panel to display additional valve input parameters                      Revised EPRI Butterfly, Coefficients Panel to display additional input parameter options using radio button selections                      Revised Export to Excel Panel to include Test Data as an available Database Field options                      Revised printed report formats and contents                      Revised Main – Help menu to include: "Contents and Index" and "About MIDAS" options                      Added Help Topics (F1) Function Capability                      Included the following four site specific pull down tables with the MidasQA pull down table data in Attachment 4                      allMOTOR_TOL (from site specific database)                      allOPER_MFG (from site specific database)                      allVLV_MATERIAL (from site specific database)                      allVLV_VENDORS (from site specific database)                      Removal of revision 1 Attachments 7 through 14, comparison of previous Midas calculation reports to the latest revision calculation reports. No longer required, minimal changes to report formats are discussed in Section 6.3.                      Relabeled revision 1 Attachments 15 through 18 as revision</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						2 Attachments 7 through 10.
MIDAS	02/13/2005 18:08:12 Build 7.0	2005.44	3	TTS-CC-117	TTS-CC-117.1	Added JOG Status box to main MIDAS Calculations panel. Added the following Motor input parameters: Cable Reactance (AC Only) Added the following System input parameters: PVT Frequency Type (text) Candidate for Motor power Testing (Y/N) Removed the following BWROG DC Methodology input parameters: DC Load Profile Checksum (open) DC Load Profile Checksum (close) Added the following BWROG DC Methodology input parameters: DC Additional Stroke Time (open) DC Additional Stroke Time (close) Added the following EPRI Butterfly Methodology input parameters: Stem In-Plane with Upstream Elbow (Y/N) Added the following JOG PV Methodology input parameters: JOG Required Thrust/Torque Basis (text) JOG Subject to DP Stroking (text) JOG Max DP during DP Stroke JOG Gate Disk Style (text) JOG Gate Disk-to-Seat Material (text) JOG Gate Disk-to-Body Guide Material (text) JOG Gate Fluid Type (text) JOG Globe Type (text) JOG Globe Disk-to-Body Guide Material (text) JOG Globe Fluid Type (text) JOG Globe Flowrate JOG BF Bearing Material (text) JOG BF Shaft Material (text) JOG BF Fluid Type (text) JOG BF Hub Seal (Y/N) JOG Qualifying Basis Screen Satisfied (Y/N)

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						JOG Qualifying Basis Condition (text) JOG Qualifying Basis Description (memo) JOG Implementation/Evaluation Details (memo) JOG Class D Plan Description (memo) JOG Class D Plan Justification (memo) Added the following output parameters: JOG Class JOG CAI Rating JOG Gate Valve COF Threshold JOG Butterfly Valve COF Threshold JOG Gate Valve COF Allowance (close) JOG Gate Valve COF Allowance (open) COF based on Design Valve Factor (close) COF based on Design Valve Factor (open) COF based on Valve Factor Capability (close) COF based on Valve Factor Capability (open) Valve Factor based on COF Threshold (close) Valve Factor based on COF Threshold (open) Valve Factor based on COF Allowance (close) Valve Factor based on COF Allowance (open) SMB Worm Gear Set Ratio Min Design Thrust Criteria (close) Motor Torque Derate / °C Motor Current Loss / °C Cable Resistance / 1000 ft (ohms) Cable Reactance / 1000 ft (ohms) Cable Reference Temperature (°C) Cable Reactance (ohms) Motor Reactance (ohms) Total Reactance (ohms) Motor Impedance, close (ohms) Motor Impedance, open (ohms) Motor Resistance, close (ohms) Motor Resistance, open (ohms) Total Resistance, close (ohms) Total Resistance, open (ohms) Degraded Voltage At Motor (close) Degraded Voltage At Motor (open)

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

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						Degraded/Nominal Voltage Ratio (close) Degraded/Nominal Voltage Ratio (open) Degraded Voltage Motor Torque (close) Degraded Voltage Motor Torque (open) Motor Limited Actuator TQ @DV (close) Motor Limited Actuator TQ @DV (open) Motor Limited Actuator Torque (close) Motor Limited Actuator Torque (open) Min Required Thrust @CST Max Total Thrust A/F Min Required Thrust @CST A/F Max Total Thrust Calculate DP Across Valve, psi Added Intermediate gear set data for SMB-5 lookup table Added additional Test of Record fields to As-Left Test Data Summary Table Added JOG PV Methodology Table Added JOG PV Methodology panel Added Voltage Drop AC Methodology Table Added AC Voltage Drop Calculation panel Revised Valve Filter Panel to include BOP Valve Grouping Revised motor lookup table to include a 2.5 voltage exponent for 60 ft-lbs., AC motor, 1800 RPM with a 56 frame Revised Save Edits Panel to include JOG Evaluation Complete? Yes or No radio buttons to indicate JOG Status Revised the order of the parameter group drop down menu for Output Panel to display "All Parameters" as the default Revised Motor Curve Lookup Table to include standard values of horse power (HP) Revised BWROG DC, General Information Panel to include two sub-panels: the General Information Panel and the System Design Conditions Panel Revised BWROG DC, Valve Information Panel to include Cable Resistance Formula options: "Calculate" or "Input" radio buttons

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

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						<p>Revised EPRI Butterfly Methodology Panel to include Stem In-Plane with Upstream Elbow (Yes and No radio buttons).</p> <p>Renamed Overall Resistance Calculation panel to AC/DC Cable Resistance Calculation panel and removed Cable Resistance options, "Calculate" or "Input", radio buttons.</p> <p>Revised printed report formats and contents</p> <p>Added the following JOG tables to the MidasQA lookup table data in Attachment 1</p> <p>JOG_CAI_BF                      JOG_CAI_Gate                      JOG_CAI_Globe                      JOG_Special_Gate                      JOG_Threshold_BF                      JOG_Threshold_Gate</p> <p>Included the following site specific pull down table with the MidasQA pull down table data in Attachment 4                      allMOTOR_MFG (from site specific database)</p> <p>Added the following JOG pull down tables to the MidasQA pull down table data in Attachment 4</p> <p>allJOG_Basis_Condition                      allJOG_BF_Bearing                      allJOG_BF_Fluid                      allJOG_BF_Shaft                      allJOG_DP_Stroke                      allJOG_GATE_Body                      allJOG_GATE_Fluid                      allJOG_GATE_Seat                      allJOG_GATE_Style                      allJOG_GLOBE_Body                      allJOG_GLOBE_Fluid                      allJOG_GLOBE_Style                      allJOG_Required_Basis</p> <p>Revised BWROG DC Methodology verification problems 17 and 18 in Attachment 7 to verify the open and close "Input Stem Torque" applications, respectively</p> <p>Added Attachment 11, Midas JOG PV Methodology Validation</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
MIDAS	12/21/2006 15:43:38 Version 8.0	2006.355	4	TTS-CC-117	TTS-CC-117.1	<p>Changed Motor Input Parameter from “Degraded Voltage Flag (Y/N)” to “Use Degraded Voltage for NSR direction? (Y/N)”</p> <p>Added the following Valve input parameters:            Stem Elevated Temperature Flag            Stem Nut Wear Safety Factor            Stem Nut Engagement Length (in)            Stem Nut Total Thrust (lbs)            Stem Nut Material Yield Strength (psi)            Alternate Valve Identification</p> <p>Added the following Operator input parameters:            Close TQ Switch Active Flag            Extended Close TQ Switch Active Bypass Flag            HBC Efficiency Derate Factor (1)            HBC Efficiency Derate Factor (2)            Actuator Installation Date            Actuator Strokes per year            Handwheel Torque Calculation Error</p> <p>Added the following Motor input parameters:            AC Voltage Drop Methodology</p> <p>Added the following System input parameters:            Calculation Record is Active?</p> <p>Added the following Output parameters:            Design Stem Revolutions / Stroke            Design Stem Revolutions / Year            Maximum Stem Thread Plateau Time (sec)            SMB Handwheel TQ Conversion Factor            Maximum Handwheel Torque (backseat)            Effective Valve Factor for Gate Valve, open &amp; close            COMED Voltage Drop Calculation Status            Motor Limited Actuator TQ @DV (post)            Motor Limited Actuator Torque (post)</p> <p>Added the following BWROG DCM input parameters:            Use FAC for position controlled strokes?            DC Partial Stroke Percentage, open &amp; close            DC Valve Pressure at Full Open, open &amp; close</p> <p>Added the following BWROG DCM output parameters:</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						<p>Instantaneous Actuator Torque DCM, open &amp; close</p> <p>Functional Actuator Capability DCM, open &amp; close</p> <p>Added Ess-Column to main MIDAS Calculations panel to identify essential parameters</p> <p>Added Copy To New Valve option under File</p> <p>Added Add Valve Feature Panel</p> <p>Added User Defined Valve Filter option</p> <p>Added User Defined Valve Filter Panel</p> <p>Revised Valve Filter Panel to include all Valves or Active or Retired Record Grouping</p> <p>Revised Gearbox Lookup panel to include DF1 and DF2 (Efficiency Derated Factors)</p> <p>Revised History Panel to add double-click feature to activate editable history and open issues panel</p> <p>Revised BWROG DC Methodology panel Print option to include Worksheet from Work in Progress or As-Built</p> <p>Revised BWROG DC, General Information Panel sub-panel names to: General and System</p> <p>Revised BWROG DC, General Information Panel, General sub-panel to include Use FAC for position controlled strokes? Yes or No, radio buttons</p> <p>Revised BWROG DC, General Information Panel, System sub-panel to include Partial Stroke Percentage, open &amp; close</p> <p>Revised BWROG DC, Valve Information Panel to include Valve Pressure at Full Open for open &amp; close</p> <p>Revised BWROG DC, Detailed Results Panel to include Functional Actuator Capability (FAC) at bottom of open &amp; close sub-panels</p> <p>Changed the JOG PV Methodology Table hotkey from "Ctrl+0" to "Ctrl+J"</p> <p>Revised JOG PV Methodology main panel to include Valve Family number</p> <p>Revised As-Left Test Data Summary panel to include TSS (O) terms</p> <p>Revised As-Left Test Margin Analysis - COF panel to include What-IF Calculator button</p> <p>Added What-IF Margin Analysis panel</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

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						Revised Voltage Drop Calculation panel to combine all inputs and outputs on one panel Revised Voltage Drop Calculation panel to include Voltage Drop Methodology selection parameter and group Voltage Divider Terminology terms Revised Help panel to include Add Valves privilege
MIDATEST	11/14/2002 19:29:00 Build 1.0	2002.318	0	TTS-CC-117.2	TTS-CC-117.3	Original Issue
MIDATEST	11/14/2002 19:29:00 Build 1.0	2002.318	1	TTS-CC-117.2	TTS-CC-117.3	Revised Attachment 5 to include comparisons to both As-Found and As-Left limits
MIDATEST	10/31/2003 08:17:52 BUILD 2.0	2003.304	2	TTS-CC-117.2	TTS-CC-117.3	Added the following new general input parameters: <u>PRE-TEST INFORMATION</u> Terms As-Found Test Exclusion Justification (memo) As-Left Close Stem Factor Applicable (Y/N) As-Left Open Stem Factor Applicable (Y/N) Maximum Running Load (value) As-Left Test Required (Y/N) New Baseline Test Required (Y/N) Valve Condition Load Evaluation Required (Y/N) <u>DATA REVIEW</u> Terms Test Date <u>LIMIT SWITCH SETTINGS</u> Terms Probe A Contact Probe A Location Probe B Contact Probe B Location Probe C Contact Probe C Location Probe D Contact Probe D Location Added MOV Test Report to Print reports. Added Trending Overdue to Print reports. Added Test of Record Datasheet to Print reports. Added Failure History to Print reports.

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

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						<p>Added Tables to menu bar / with Design Data, Pre-Test Information, Data Review, Trending, History and Failure History Tables.</p> <p>Added Help Topics (F1) Function Capability.</p> <p>Added Tools to menu bar / with Export to Excel feature.</p> <p>Added the Details sub-panel to Control Circuit Changes Panel</p> <p>Revised the Pre-Test Setup Panel to combine 2 radio buttons, Required Packing Gland Torque and Packing Adjustment Based on Running Load, into a single radio button, Maximum Packing Gland Torque and Running Load Range.</p> <p>Revised the Thrust2 Data Panel to include an Import Thrust2 Button.</p> <p>Added Import Thrust2 Spring Pack Data Panel.</p> <p>Revised the Pre-Test As-Left Panel to include Open &amp; Close Stem Factor Criteria Applicable radio buttons.</p> <p>Added the Switch Probes sub-panel to Limit Switch Settings Panel.</p> <p>Revised the Data Review As-Found Panel to include Hard Seat C11 applicable data.</p> <p>Revised the Data Review As-Left Panel to include Hard Seat C11 applicable data.</p> <p>Revised Trending Panel to include additional guidance labels: Current Test Data→, Previous Test Data→ (Highlight Row to Select), NOTE: Previous Test NOT Selected.</p> <p>Revised Custom Valve Filter Panel sub-panels from Custom and Margins to Maintenance and Design.</p> <p>Revised Status labels from: Legacy, Pre-Test, Review, Trending, and Complete, to: Legacy, Pre-Test, Ready for Test, Ready for Engineering, and Complete</p>
MIDATEST	02/13/2005 15:55:18 Build 3.0	2005.44	3	TTS-CC-117.2	TTS-CC-117.3	<p>Added the following new input parameters:  <u>DESIGN DATA</u> Terms                      Hub Torque (value)                      Expected Thrust Variability (value)                      Expected Thrust Variability @VLV (value)</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						<p>Expected Thrust Variability @ACT (value)  <u>PRE-TEST INFORMATION</u> Terms                      Running Load Criteria Selection Basis (text)                      Maximum Handwheel Run Torque (value)  <u>IMPORTED TEST DATA</u> Terms                      Close Handwheel Running Torque (ft-lbs) (value)                      Open Handwheel Running Torque (ft-lbs) (value)  <u>TRENDING</u> Terms                      NCC Disposition for Pullout Load High? (Y/N)                      NCC Disposition for Run Load High? (Y/N)                      NCC Disposition for Stem Factor High? (Y/N)                      NCC Disposition for VCL High? (Y/N)  <u>TEST DATA UPDATE</u> Terms                      Baseline Test Method (text)                      As-Left Running Torque (close)                      As-Left Running Torque (open)                      As-Left Running Thrust (close)                      As-Left Running Thrust (open)                      Running Load Criteria Selection Basis (text)                      Added the following new output parameters:  <u>TRENDING</u> Terms                      Thrust Change @C14 (AL-AF)                      Thrust Change @O9 (AL-AF)                      PM Thrust Change @C14 (AL-AF)                      PM Thrust Change @O9 (AL-AF)                      Run Thrust Change (AL-AF)                      PM Run Thrust Change (AL-AF)                      Torque Change @C14 (AL-AF)                      Torque Change @O9 (AL-AF)                      PM Torque Change @C14 (AL-AF)                      PM Torque Change @O9 (AL-AF)                      Run Torque Change (AL-AF)                      PM Run Torque Change (AL-AF)                      Added the Schedule Text Box to the Add New Work Order Panel                      Added the Schedule Column to the Work Order Flex Grid on Main Panel                      Revised Valve Filter Panel to include BOP Valve Grouping</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

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						<p>Revised Sensitivity Calculation Panel to remove the Custom Calibrator Option</p> <p>Revised the Pre-Test Setup Panel to include Running Load Criteria Selection Basis (Thrust, Torque or Handwheel) radio buttons and Maximum Handwheel Run Torque input box (appears when Handwheel selected).</p> <p>Revised the Pre-Test printout report to include the Running Load Criteria Selection Basis and Maximum Handwheel Run Torque data, where applicable.</p> <p>Revised the Data Review As-Found Data Panel to show "Contactor to Contactor Time", "Contactor Dropout Time" and "Handwheel Run Torque" for Close and Open Strokes.</p> <p>Revised the Data Review As-Left Data Panel to show "Contactor to Contactor Time", "Contactor Dropout Time" and "Handwheel Run Torque" for Close and Open Strokes.</p> <p>Revised the Data Review As-Found Data and As-Left Data Panels to change the "Stem Torque" column heading to just "Torque".</p> <p>Revised the Data Review printout report to include the Handwheel Run Torque data for open and close strokes.</p> <p>Revised Trending Data Panel to include a comparison of Total Thrust and Total Torque at C16 (Max) for As-Found and As-Left conditions.</p> <p>Revised Trending Evaluation Panel to include "NCC Dispositions?" (Run Load High, SF High, VCL High, or Pullout High) check boxes.</p> <p>Revised the Trending printout report to include a comparison of Total Thrust and Total Torque at C16 (Max) for As-Found and As-Left conditions and "NCC Dispositions?" (Run Load High, SF High, VCL High, or Pullout High) check boxes.</p> <p>Revised the Test of Record Datasheet printout report to include the Handwheel Run Torque data for open and close strokes.</p> <p>Revised the Export-to-Excel Panel to include Pre-Test Input</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						<p>&amp; Output Data, Review Input &amp; Output Data, and Trending Input &amp; Output Data as available database fields.</p> <p>Revised the Export-to-Excel - Build SQL Statement Panel to include Pre-Test Input &amp; Output Data, Review Input &amp; Output Data, and Trending Input &amp; Output Data as available database criteria parameters.</p>
MIDATEST	12/20/2006 16:18:38 Version 4.0	2006.354	4	TTS-CC-117.2	TTS-CC-117.3	<p>Added the following new input parameters:</p> <p><u>PRE-TEST INFORMATION</u> Terms</p> <p>As-Left Stem Factor (close)</p> <p>As-Left Stem Factor (open)</p> <p>VOTES Calibrator Custom Flag</p> <p><u>TESTDATA</u> Terms</p> <p>TS Bypass Time (sec) (close)</p> <p>TS Bypass Time (sec) (open)</p> <p><u>TRENDING</u> Terms</p> <p>NCC Disposition for MSTT High?</p> <p>Added the following new output parameters:</p> <p><u>PRE-TEST INFORMATION</u> Terms</p> <p>As-Left Stem Factor (close) (value)</p> <p>As-Left Stem Factor (open) (value)</p> <p><u>REVIEW</u> Terms</p> <p>As-Found MSTT High Flag (close) (logic)</p> <p>As-Found MSTT High Flag (open) (logic)</p> <p>As-Left MSTT High Flag (close) (logic)</p> <p>As-Left MSTT High Flag (open) (logic)</p> <p>Added User Defined Valve Filter option</p> <p>Added User Defined Valve Filter Panel</p> <p>Added MOV Field Datasheet to Print reports</p> <p>Revised Sensitivity - Calibrator panel to include Threaded and Custom sub-panels</p> <p>Revised Pre-Test Setup – As-Left panel to include additional Stem Factor Criteria information for open &amp; close strokes</p> <p>Revised Limit Switch Settings – Limit Switch panel to include four sub-panels, one for each rotor, 1 through 4</p> <p>Revised Limit Switch Settings – Switch Probes panel to</p>

**PROGRAM MIDAS AND MIDATEST REVISION HISTORY**

Program Name	Revision Date	Revision Name	Rev.	User Manual	Verification Manual	Description
						include four sub-panels, one for each probe, A through D Revised Limit Switch Settings – Control Logic panel to include four sub-panels, Interlock, Auto Open, Auto Close and Special Case Revised Limit Switch Settings – Instructions panel to include five sub-panels, Special 1 to 5 Revised Data Review – As-Found Data panel to include TS Bypass Time and MSTT Time for open & close strokes Revised Data Review – As-Left Data panel to include TS Bypass Time and MSTT Time for open & close strokes Revised Data Review – Evaluations panel to include Stem T/T Time High for As-Found/As-Left, open & close strokes Revised Trending – Evaluation panel to include check box for NCC Disposition for high MSTT Revised Import Test Data panel to include additional markers, Thread Transition Start (c3a & o4a) and Thread Transition End (c3b & o4b) Revised History panel to add double-click feature to activate editable test history panel Revised User privileges to include Test History, Failure History and Failure Delete privileges