OPERATION INSTALLATION MAINTENANCE MANUAL
FOR HALE SAM

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TABLE OF CONTENTS

Section	Title	Page
1.	SAFETY	1
1.1	Safety Headings	1
1.2	Safety Summary	1
2.	GENERAL INSTRUCTIONS	7
2.1	SAM Numbering and Specifications References	8
3.	TRANSPORTATION AND STORAGE	9
3.1	EAR99 Restrictions	9
3.2	Shipping, Movement, And Installation Preparations	9
3.3	Pump Gearbox Shipped Without Fluid	9
3.4	Storage	9
3.4.1	UV1100 And UV800 Storage	9
4.	SYSTEM OVERVIEW	11
4.1	SAM Touchscreens Navigation And Icon Definitions	13
4.1.1	Icon Groups	15
4.1.1.1	Set Pressure Icon Group	15
4.1.1.2	Password Icon Group	16
4.1.1.3	Governor Icon Groups	16
4.1.1.4	Valve Close/Open Icon Groups	18
4.1.1.5	Engine Data Icon Group	19
4.1.2	Buttons/Targets (Drag And Drop Navigation)	20
4.2	SAM Touchscreens	21
4.2.1	SAM Control Center Screens	22
4.2.1.1	System Options Button	23
4.2.1.1.1	SAM Control Center Menu Tabs	24
4.2.1.1.1.1	Display Tab	24
4.2.1.1.1.2	Security Tab	25
4.2.1.1.2	HOME Button	25
4.2.1.2	Intake Control Area/Section	25
4.2.1.3	Discharge Control Area/Section	26
4.2.1.4	Onboard Levels Area/Section	26
4.2.1.5	Mode Control Area/Section	27

TABLE OF CONTENTS–CONTINUED

Section	Title	Page
4.2.1.6	SAM Information Center Area/Section	27
4.2.1.7	User Assignable Quicksets Area/Section	27
4.2.2	SAM Control Center Customizable/Configurable Items	27
4.2.2.1	Discharge Valve Preset Pressure	28
4.2.2.2	Discharge Valve Quickset Pressure	28
4.3	Pump Controller	28
4.3.1	Pump Controller Screens	28
4.3.1.1	Pressure Governor	29
4.3.1.1.1	PSI Mode	30
4.3.1.1.2	Low Intake Pressure Control Mode	32
4.3.1.2	RPM Mode	33
4.3.1.2.1	Twister Electronic Throttle (In SAM Manual Mode)	34
4.3.1.3	Tank Screen	34
4.3.1.4	Pump Info Screens	35
4.3.1.5	Engine Data Screen	37
4.3.1.6	Optional Video Screens	37
4.3.1.7	Pump Controller System Options Menu	38
4.4	Optional Remote Capability	38
4.4.1	Auxiliary SAM Control Center Screens	38
4.4.2	Secure WI-FI (Router/Antenna)	38
4.4.3	Ruggedized Tablet	38
4.5	SAM Automated Pump Cooling	39
4.6	Pump Priming	40
4.6.1	SAM Auto Prime	40
4.6.2	Manual Prime	41
4.7	Establishing A Pressurized Water Source (Hydrant) With SAM	41
4.7.1	Master Intake Valve	41
4.7.2	Auxiliary Intake	41
4.8	SAM Water Tank Auto Fill	41
4.9	SAM And Foam Systems	42
4.9.1	SmartFOAM	42
4.9.2	SmartCAFS	42

TABLE OF CONTENTS–CONTINUED

Section	Title	Page
5.	INSTALLATION	43
5.1	Drive Line Requirements	44
5.2	Power Requirements	45
5.3	Compressed Air Requirements	47
5.4	CAN Bus Requirements	47
5.5	Valve Mechanical Override Access Requirements	48
5.6	OEM Connections To SAM	48
5.7	SAM Software And Configuration Passwords	50
6.	COMMISSIONING, STARTUP, OPERATION, AND SHUTDOWN	53
6.1	Commissioning	54
6.1.1	SAM Power On And Default Verifications	55
6.1.2	Mode Selection Verifications	56
6.1.2.1	SAM Auto Mode	56
6.1.2.2	Switching To SAM Manual Mode	56
6.2	Startup	57
6.2.1	Changing End User Customizable/Configurable Items	57
6.2.1.1	Assigning Quicksets To The Home Screen	58
6.2.1.2	How To Change The Order Of (Or Delete) Quicksets On The Home Screen	58
6.2.1.3	Change User/Dealer Password	59
6.2.1.4	How To Assign/Change Low Tank Water Alarm Trigger Level	60
6.2.2	How To Configure Pump Controller Parameters	60
6.2.2.1	Set The Volume For SAM Speaks (Spoken Alerts)	61
6.2.2.2	Set Camera Names	62
6.2.2.3	ITL-40 Calibration	63
6.2.2.4	Show/Hide VIDEO Tab (Cameras 1 Thru 3)	63
6.2.2.5	Tank Level Off/On	64
6.2.3	SELECT DEVICE Screen Displayed–Reboot To GUI Required	64
6.3	SAM Operation	65
6.3.1	Auto Mode	66
6.3.1.1	Selecting The Desired Pumping Method	67
6.3.1.2	Pumping From Hydrant (Or Any Positive Pressure Source)	67

TABLE OF CONTENTS–CONTINUED

Section	Title	Page
6.3.1.2.1	Bypass Venting	70
6.3.1.2.2	Bypass Opening	71
6.3.1.3	Using Discharge Quicksets, Presets, And The SET PRESSURE Icon Group	71
6.3.1.3.1	Activating A Quickset	71
6.3.1.3.2	Using The ADD LINE Button/Target	71
6.3.1.3.3	Changing A Discharges Pressure/Closing The Valve	73
6.3.1.3.4	Low Intake Pressure Control Mode	74
6.3.1.4	Pumping From Draft	74
6.3.1.5	Twister Operations (In SAM Auto Mode)	76
6.3.1.5.1	Emergency IDLE Button	76
6.3.1.6	Mobile Operations–From Tablet	77
6.3.1.6.1	Emergency IDLE Activation (From A Locked Screen)	78
6.3.1.6.2	Unlocking The Tablet Display	79
6.3.1.6.3	Additional Tablet Indicators (% Battery And Signal Strength)	80
6.3.1.6.4	Loosing Wi-Fi Signal	81
6.3.1.6.5	Manual Operation (NOT Available From The SAM Tablet)	81
6.3.1.7	Navigator Pro Operations (In SAM Auto Mode)	81
6.3.2	Manual Mode	82
6.3.2.1	Opening An Intake	83
6.3.2.1.1	MIV Manual/Physical Procedures	83
6.3.2.1.1.1	MIV SAM Manual Mode Procedures	83
6.3.2.1.2	Auxiliary (Pony) Intake (Akron Brass Valve) Manual Procedures	84
6.3.2.2	Opening A Discharge	85
6.3.2.3	Closing A Discharge	85
6.3.2.4	Closing An Intake	86
6.3.2.5	Return To SAM Auto Mode	87
6.3.3	Miscellaneous Tasks	88
6.3.3.1	Tank Fill And Tank-To-Pump Valve Controls	88
6.3.3.2	Using An Optional Navigator To Manually Control A Discharge	88
6.3.3.3	Using SmartFOAM With SAM	88
6.3.3.3.1	Activating A SmartFOAM Quickset	89
6.3.3.3.2	Activating A SmartFOAM Preset	90

TABLE OF CONTENTS–CONTINUED

Section	Title	Page
6.3.3.3.3	Close A Foam Discharge (With SAM)	90
6.3.3.3.4	Turn Off SmartFOAM (With SAM)	92
6.3.3.4	Using SmartCAFS With SAM	93
6.3.3.4.1	Activating A SmartCAFS Quickset	93
6.3.3.4.2	Activating A SmartCAFS Preset	94
6.3.3.4.3	Changing A CAFS Discharge To FOAM ONLY	95
6.3.3.4.4	Turning A CAFS FOAM ONLY Discharge Off	96
6.3.3.4.5	Turning Off CAFS (When Activated With SAM)	98
6.3.3.5	Exporting The Datalogger File	98
6.3.3.5.1	Exporting The SAM Control Center Datalogger File	98
6.3.3.5.2	Exporting The Pump Controller Datalogger File	99
6.3.4	Governor Operations From The Pump Controller	100
6.3.4.1	Changing Governor Modes	100
6.3.4.2	Activating A Preset	100
6.3.4.2.1	Using PSI Mode	101
6.3.4.2.2	Using RPM Mode	102
6.3.5	Twister Operations (In SAM Manual Mode)	102
6.3.5.1	PSI Mode Operations.	102
6.3.5.2	RPM Mode Operations	103
6.3.6	Using Physical Overrides	103
6.3.6.1	Hale MIV Physical Override	103
6.3.6.2	Akron Brass Swing-Out Valve Physical Override	104
6.3.7	Operator Responses To SAM Alarms	106
6.4	Shutdown	114
6.4.1	SAM Tablet Shutdown	114
6.4.2	SAM At The Apparatus Shutdown	115
7.	PREVENTIVE MAINTENANCE	117
7.1	Preventive Maintenance Plan And Schedule	117
7.1.1	After Each Use	119
7.1.1.1	SAM Display Cleaning	119
7.1.1.2	Flush Pump	120

TABLE OF CONTENTS–CONTINUED

Section	Title	Page
7.1.2	Annually	120
7.1.2.1	NFPA 1901/1911 Testing Tips And Hints For The SAM System	120
7.1.2.2	Akron Brass Swing-Out™ Valve Motor Operating Current Check	121
8.	ADJUSTMENTS	123
8.1	ITL–40 Calibration Using SAM Pump Controller	123
APPENDIX A.	MANUFACTURERS INFORMATION	A-1
A.1.	Manufacturers Information	A-1
A.2.	Warranty	A-1

LIST OF FIGURES

Number	Title	Page
Figure 1.	Hale ID Tag With Sample Markings	8
Figure 2.	SAM Network Diagram (CAN Buses)	13
Figure 3.	Set Pressure Icon Group	15
Figure 4.	Discharge Setup Confirmation Screen	16
Figure 5.	Password Icon Group	16
Figure 6.	RPM Mode Governor Icon Group	17
Figure 7.	PSI Mode Governor Icon Group	17
Figure 8.	Low intake pressure governing Governor Screens (Auto Mode/Manual Mode)	18
Figure 9.	Tank Fill Icon Group	18
Figure 10.	Tank-To-Pump Icon Group	18
Figure 11.	Manual Discharge Valve Control Icon Group	19
Figure 12.	Manual Intake Valve Control Icon Group	19
Figure 13.	Engine Data Icon Group	19
Figure 14.	Buttons/Targets	20
Figure 15.	Intake State Popup Examples	20
Figure 16.	Force INTAKE X Open? Popup	21
Figure 17.	SAM Control Center Splash (Boot) Screen	22
Figure 18.	SAM Control Center Landing Screen (Pump NOT Engaged)	22
Figure 19.	SAM Control Center Auto Mode Main Screen	22
Figure 20.	SAM Control Center Touchscreen Areas/Sections	23
Figure 21.	System Options Button And Loading Icon	23
Figure 22.	SAM Control Center Password Screen	24
Figure 23.	SAM User/Dealer Menu Tabs	24
Figure 24.	Display Tab	24
Figure 25.	Security Tab	25
Figure 26.	Select Discharge Screen	26
Figure 27.	Discharge Valve Control Screen	26
Figure 28.	Manual Mode Confirmation Popup	27
Figure 29.	DM1 Message Pass Thru Example	28
Figure 30.	Pump Controller Boot Screen	29
Figure 31.	Pump Controller During SAM Auto Mode	29
Figure 32.	Pump Controller PSI Mode (SAM Manual Mode Only)	30
Figure 33.	Intake PSI Components	31
Figure 34.	Discharge PSI Components	31
Figure 35.	PSI Set Point Icon Group Components	32
Figure 36.	Pump Capacity Icon Group	32
Figure 37.	Low Intake Pressure Control Mode Screen	33
Figure 38.	Low intake pressure control Mode Popup Alert	33

LIST OF FIGURES–CONTINUED

Number	Title	Page
Figure 39.	Pump Controller RPM Mode (SAM Manual Mode Only)	33
Figure 40.	Hale Twister	34
Figure 41.	Pump Controller Tank Info Screens	34
Figure 42.	Pump Controller Pump Info Screen–No Action Required	35
Figure 43.	Pump Controller Pump Info Screen–Action Required	35
Figure 44.	Pump Controller Pump Info Details Screen	36
Figure 45.	Pump Controller Pump Info History Screen	36
Figure 46.	Pump Controller Pump Info History Factory Test Data Screen	36
Figure 47.	Pump Controller Pump Info History Field Test Data Screen	37
Figure 48.	Pump Controller Engine Data Screen	37
Figure 49.	Pump Controller Optional Video Screens	37
Figure 50.	Pump Controller System Options Menu	38
Figure 51.	SAM Tablet	39
Figure 52.	Connect System Power Tag	46
Figure 53.	Connect To Truck Air Tag	47
Figure 54.	Mechanical Valve Override Shaft(s)	48
Figure 55.	SAM Connections Labels (And/Or Tags)	48
Figure 56.	Entering Manual Mode (From Landing or Home Screen)	56
Figure 57.	Popup Confirm/Deny (Yes/No) Buttons	56
Figure 58.	Discharge Settings Screen	58
Figure 59.	Security Tab - Password Saved	60
Figure 60.	Pump Controller System Options Button And Loading Icon	61
Figure 61.	Pump Controller System Options Password Entry Screen	61
Figure 62.	Set The Volume For SAM Speaks	62
Figure 63.	Set Camera Names	62
Figure 64.	Set Camera Names Keyboard Screen	63
Figure 65.	Camera Names Saved Acknowledgment	63
Figure 66.	Tank Level Set To Graphical (On)	64
Figure 67.	SELECT DEVICE MENU Screen	64
Figure 68.	(HOME ICON) MENU Screen	65
Figure 69.	SAM Control Center (Transition Landing To Auto Mode Home Screen)	66
Figure 70.	Pump Controller (Transition Splash To Auto Mode Home Screen)	66
Figure 71.	Toggle To Desired Pumping Method	67
Figure 72.	Activating An Intake	68
Figure 73.	Activating A Hydrant Intake Sequence (Air Bleed)	68
Figure 74.	Activating A Hydrant Intake Sequence (MIV Disc Opening)	69
Figure 75.	Activating A Hydrant Intake Sequence (Hydrant Established)	69
Figure 76.	Activating A Hydrant Intake Sequence (Complete)	70

LIST OF FIGURES–CONTINUED

Number	Title	Page
Figure 77.	Active Force Intake X Open Popup	70
Figure 78.	Activating Quickset Discharges (Touch–Drag–Drop)	71
Figure 79.	Activating Additional Discharges	72
Figure 80.	Change A Discharge Pressure	73
Figure 81.	Closing A Discharge (Using Stop Button)	73
Figure 82.	Stop Button Popup Confirmation Window	74
Figure 83.	Initiating A Draft (Transition Shown Top-Left To Bottom-Right)	75
Figure 84.	Emergency Idle Button Panel	76
Figure 85.	Governor MODE OFF Screen	76
Figure 86.	Press And Hold Power Button (To Power On Tablet)	77
Figure 87.	Tablet Touch Screen (Left) SAM Control Center (Right)	77
Figure 88.	Emergency IDLE Activation (From A Locked Screen)	78
Figure 89.	Emergency IDLE Activation (Popup Confirmation)	78
Figure 90.	Emergency IDLE Activated Screen	79
Figure 91.	Press + Button To Unlock The Tablet	79
Figure 92.	Unlock Screen Popup	79
Figure 93.	Unlock Screen Popup Button And Target	80
Figure 94.	% Battery And Wi-Fi Signal Strength Indicators	80
Figure 95.	Wi-Fi Signal Strength Warning Example	81
Figure 96.	Navigator Pro Controllers (9323, 9335, 9327)	81
Figure 97.	Manual Valve Control Screen	82
Figure 98.	Intake Close/Open Icon Group (Open)	83
Figure 99.	Intake Close/Open Icon Group (Close)	86
Figure 100.	Return To SAM Auto Mode	87
Figure 101.	Exit Manual Mode Confirmation	87
Figure 102.	SAM Auto Mode After Manual Mode Indications	87
Figure 103.	Activating A Foam Quickset	89
Figure 104.	SmartFOAM With SAM Quickset Activated	89
Figure 105.	Selecting A Foam Capable Discharge	90
Figure 106.	Activating A Foam Preset	90
Figure 107.	Closing A Foam Discharge Sequence	91
Figure 108.	Close Line Popup Confirmation	91
Figure 109.	SmartFOAM Display With No FOAM Discharges Active	92
Figure 110.	Foam Off Popup Confirmation	92
Figure 111.	Activating A CAFS Quickset	94
Figure 112.	Selecting A CAFS Capable Discharge	95
Figure 113.	Activating A CAFS Preset	95
Figure 114.	FOAM OFF Button (Transitions CAFS To Foam Only)	96

LIST OF FIGURES–CONTINUED

Number	Title	Page
Figure 115.	Closing A CAFS Discharge Sequence	97
Figure 116.	SmartCAFS Display	97
Figure 117.	Foam Off Popup Confirmation	98
Figure 118.	SAM Control Center USB Dongle	99
Figure 119.	Pump Controller USB Dongle	99
Figure 120.	Preset Popup Confirmation	101
Figure 121.	MIV Manual Override Placard (Handwheel NOT Shown)	104
Figure 122.	Akron Brass Valve Power Connector	105
Figure 123.	System Options Buttons	114
Figure 124.	Shutdown Screens	114
Figure 125.	Shutdown Confirmation	115
Figure 126.	SAM Home Screen (With Active Quickset Shown)	116
Figure 127.	ITL-40 Display	123
Figure 128.	ITL-40 Calibration Screen	123
Figure 129.	ITL-40 Calibration Screen	124
Figure 130.	ITL-40 Calibration Screen	124

LIST OF TABLES

Number	Title	Page
Table 1.	SAM Control Center Icons	13
Table 2.	SAM Water Supply Icons	14
Table 3.	Touchscreen Icon Definitions	14
Table 4.	Maximum Recommended Drive Line Lengths	45
Table 5.	SAM To OEM Connection Point Cross Reference Listing	49
Table 6.	SAM Control Center Password List	50
Table 7.	SAM Pump Controller User/Dealer Password List	51
Table 8.	SAM Operator Troubleshooting	106
Table 9.	Recommended Preventive Maintenance	117
Table 10.	Recommended Preventive Maintenance–Ancillary Equipment	118

Abbreviations And Acronyms

The abbreviations used in this manual are limited to standard (commonly used and accepted) scientific units of measure and therefore are NOT defined or listed. The acronyms used in this manual are defined in this listing (in numerical-alphabetical order) and are NOT defined within the text.

Addr	Address
ADT	Automatic Dual Tank
AHJ	Authority Having Jurisdiction
BAM	Broadcast Announce Message
CAFS	Compressed Air Foam System
CAN	Controller Area Network
CCW	Counter Clockwise
COM	Communication
CW	Clockwise
DECR	Decrease
DM1	Diagnostic Message (from node 1 - ECU)
ECU	Engine Control Unit
EMI	Electromagnetic Interference
ESD	Electrostatic Discharge
ESP	Environmentally Safe Priming
EZ	Easy
FAST	Factory Authorized Service Team
FNPT	Female National Pipe Thread
GND	Ground
GPM	Gallons Per Minute
GUI	Graphical User Interface
ID	Identification
INCR	Increase
INTK	Intake
ITL	Indicator Tank Level (ITL–40 a Hale product)
LDH	Large Diameter Hose
MED	Medium
MFG	Manufacture
MIV	Master Intake Valve (A Hale Product)
MST	Manual Single Tank

Abbreviations And Acronyms – CONTINUED

N	Negative
N/C	No Connection
NFPA	National Fire Protection Act
OEM	Original Equipment Manufacturer
OIM	Operation Installation Maintenance
P	Positive
P/N	Part Number
PTO	Power Take Off
SAE	Society of Automotive Engineers
SOG	Standard Operating Guidelines
SPN	Suspect Parameter Number
TEMP	Temperature
UID	Unit ID
USB	Universal Serial Bus
WI-FI	Local Area Wireless Technology

1. SAFETY

This section provides definitions for DANGERS, WARNINGS, CAUTIONS and NOTES contained herein, precautions to be taken for pump repair as well as an alphabetical summary listing of the WARNINGS and CAUTIONS used in this manual.

1.1 Safety Headings

DANGERS, WARNINGS, CAUTIONS, or NOTICES that immediately precede a step apply directly to that step and all sub steps. DANGERS, WARNINGS, CAUTIONS, or NOTICES that precede an entire procedure apply to the entire procedure. DANGERS, WARNINGS, CAUTIONS, and NOTICES consist of two parts: A heading (that identifies possible result if disregarded) and a statement of the hazard (that provides the minimum precautions). NOTES are used to highlight operating or maintenance procedures, practices, conditions or statements that are not essential to protection of personnel or equipment. NOTES may precede or follow the step or procedure, depending upon the information and how it pertains to the procedure/step. The headings used and their definitions are.

ATTENTION ⚠ DANGER

INDICATES A HAZARDOUS SITUATION, WHICH IF NOT AVOIDED WILL RESULT IN SERIOUS INJURY OR DEATH.

ATTENTION ⚠ WARNING

INDICATES A HAZARDOUS SITUATION, WHICH IF NOT AVOIDED COULD RESULT IN SERIOUS INJURY OR DEATH.

ATTENTION ⚠ CAUTION

INDICATES A POTENTIALLY HAZARDOUS SITUATION, WHICH IF NOT AVOIDED MAY RESULT IN MINOR OR MODERATE INJURY.

IMPORTANT ⚠ NOTICE

ADDRESSES PRACTICES NOT RELATED TO PERSONAL INJURY.

NOTE

Highlights an essential aspect of an operating or maintenance procedure, condition, or statement and/or provides pertinent ancillary information.

1.2 Safety Summary

The following warnings and cautions are used throughout the Hale SAM manuals (and/or the items they reference) and are provided here as a safety summary.

ATTENTION ⚠ DANGER

ALL ELECTRICAL SYSTEMS HAVE THE POTENTIAL TO CAUSE SPARKS DURING SERVICE. TAKE CARE TO ELIMINATE EXPLOSIVE OR HAZARDOUS ENVIRONMENTS DURING SERVICE AND/OR REPAIR.

ATTENTION ⚠ DANGER

CHECK THE BILL OF LADING FOR THE WEIGHT BEFORE LIFTING. ONLY USE APPROPRIATE LIFT METHODS AND EQUIPMENT TO MOVE OR HANDLE SAM PUMP KIT OR MODULE. (TYPICAL PUMP KIT WEIGHT IS APPROXIMATELY 1200 LBS. (545 KG) TYPICAL MODULE WEIGHT IS 2800 LBS. (1270 KG)

ATTENTION ⚠ DANGER

ELECTRICAL POWER TO THE VALVE MOTOR SHOULD BE DISCONNECTED BEFORE OPERATING THE VALVE PHYSICALLY USING THE MANUAL OVERRIDE HANDWHEEL.

ATTENTION ⚠ DANGER

ELECTRICAL POWER TO THE VALVE MOTOR SHOULD BE DISCONNECTED BEFORE PHYSICALLY OVERRIDING ANY VALVE.

ATTENTION ⚠ DANGER

OPERATORS SHOULD FIRST BE TRAINED TO OPERATE THE FIRE PUMP MANUALLY (USING PUSH BUTTONS, CONTROL RODS, AND MANUAL [NOT ELECTRICAL] VALVE OVERRIDES.)

- AUTOMATION ONLY MITIGATES PROBLEMS AROUND THE PUMP AND VALVES
    - OPERATORS NEED TO UNDERSTAND HOW TO DIAGNOSE PROBLEMS
    - SAM MANAGES PROBLEMS BY HELPING TO KEEP THE PUMP SAFE BUT IF AN INADEQUATE WATER SUPPLY OR PUMP CAVITATION OCCURS THE OPERATOR MUST UNDERSTAND WHAT IS HAPPENING AND CORRECT THE PROBLEM
- SAM DOES NOT ADJUST FOR FRICTION LOSS ON HOSE LINES OR PUMPING AT ELEVATION
    - SAM MAINTAINS PRESSURE SETTINGS BASED ON SENSORS MEASURING PRESSURE NEAR THE DISCHARGE VALVE
    - THE SYSTEM CAN NOT ALLEVIATE STATIC PRESSURES
        - RESIDUAL PRESSURE IN THE SYSTEM MAY BUILD IN THE DISCHARGE LINES WHEN THAT PARTICULAR LINE IS NOT FLOWING WATER OR NOT FLOWING ENOUGH WATER TO BE GATED
        - THE OPERATOR MUST BE AWARE THAT THIS PRESSURE MAY PRESENT A DANGER TO LARGER DISCHARGES. (THEREFORE, SETTING A SMALLER DISCHARGE LINE AT A PRESSURE HIGHER THAN YOU WOULD EXPOSE A LARGER HOSE [OR LARGER DISCHARGE] TO IS NOT RECOMMENDED)

ATTENTION ⚠ WARNING

A PRESSURE HAZARD MAY EXIST EVEN WHEN THE PUMP IS NOT RUNNING. PRIOR TO REMOVING HOSES OR CAPS FROM PUMP CONNECTIONS, RELIEVE PRESSURE BY OPENING DRAINS. BLEEDER VALVES SHOULD ALSO BE USED WHEN CONNECTING TO AN INTAKE FROM A PRESSURIZED SOURCE.

ATTENTION ⚠ WARNING

ALWAYS FOLLOW LOCAL GUIDELINES FROM THE AHJ AND THE APPARATUS MANUFACTURER.

ATTENTION ⚠ WARNING

ALWAYS FOLLOW PROPER OPERATING PROCEDURES. THE PUMP OPERATOR MUST BE FAMILIAR WITH THE PUMP AND SAM OPERATING INSTRUCTIONS AS WELL AS OTHER OPERATING GUIDELINES FOR THE APPARATUS AND ACCESSORIES.

ATTENTION ⚠ WARNING

ALWAYS STOP THE ENGINE, SET THE PARKING BRAKE, AND CHOCK THE WHEELS BEFORE GOING UNDER THE TRUCK FOR ANY REASON.

ATTENTION ⚠ WARNING

AVOID CONTACT WITH HOT SURFACES. THE PACKING GLAND AND PUMP BODY MAY PRESENT A TEMPERATURE HAZARD. OVERHEATING MAY RESULT IN A SCALDING WATER HAZARD.

ATTENTION ⚠ WARNING

DO NOT EXCEED OPERATING PRESSURE LIMITS OF PUMP, INSTALLED PLUMBING, HOSE(S), OR EQUIPMENT IN USE.

HOSE FAILURE CAN RESULT IF A HOSE IS EXPOSED TO EXCESSIVE PRESSURE.

ATTENTION ⚠ WARNING

OPERATORS, INSTALLERS, AND MAINTENANCE PERSONNEL MUST BE TRAINED AND QUALIFIED FOR ALL THE ACTIVITIES THEY PERFORM.

ATTENTION ⚠ WARNING

NOT ALL GLOVES ALLOW THE SAM TOUCHSCREENS TO FUNCTION. TEST GLOVES ON ALL OF THE SAM TOUCHSCREENS PRIOR TO OPERATING SAM. DO NOT WEAR GLOVES THAT PREVENT THE TOUCHSCREENS FROM OPERATING.

ATTENTION ⚠ WARNING

SAM TOUCHSCREENS DO NOT FUNCTION IF COMPLETELY COVERED AND/OR IMMERSED IN WATER. DO NOT ALLOW THE TOUCHSCREENS TO BE COMPLETELY COVERED/IMMERSED WITH WATER (OR ANY LIQUID). DRY THE SCREEN TO RESTORE FUNCTIONALITY.

ATTENTION ⚠ WARNING

THE PROCEDURES IN THIS SECTION PROVIDE ONLY GENERAL AND MINIMAL INSTRUCTION. DO NOT REPLACE LOCAL PROCEDURES OR POLICIES OR RECOMMENDATIONS AND PROCEDURES PROVIDED IN THE APPARATUS/TRUCK/UNIT MANUAL WITH THESE PROCEDURES.

THE PROCEDURES IN THIS SECTION ARE GENERAL OPERATING PROCEDURES BASED ONLY ON HALE EQUIPMENT. NOT ALL PROCEDURES IN THIS SECTION MAY APPLY TO YOUR SPECIFIC OPERATIONAL REQUIREMENTS OR APPARATUS CONFIGURATION. REFER TO ONLY THE INFORMATION/PROCEDURES WHICH APPLY TO YOUR OPERATIONAL REQUIREMENTS AND ONLY WHEN LOCAL PROCEDURES, POLICIES, OR GUIDELINES ESTABLISHED BY THE AHJ DO NOT EXIST.

ALWAYS REFER TO THE PROCEDURES PROVIDED BY THE AHJ FOR SETTING WHEEL CHOCKS AS WELL AS LAYOUT AND CONNECTION OF HOSES, VALVES AND DRAINS.

ATTENTION ⚠ WARNING

THE TABLET COMMUNICATES THROUGH THE SAM CONTROL CENTER LOCATED IN THE OPERATORS PANEL, IF THAT SCREEN FAILS, THE TABLET WILL NOT CONTROL THE APPARATUS.

ATTENTION ⚠ CAUTION

SHIPPING CONTAINERS WEIGHS VARY WIDELY FOR SAM COMPONENTS. ALWAYS CHECK THE SHIPPING INFORMATION FOR EACH CONTAINERS WEIGHT AND USE THE APPROPRIATE LIFTING METHOD AND/OR WEIGHT RATED EQUIPMENT.

ATTENTION ⚠ CAUTION

REMOVE SYSTEM PRESSURE BEFORE PERFORMING CALIBRATION. OPEN ALL DRAINS AND AIR BLEED VALVES TO ENSURE THE SYSTEM IS NOT PRESSURIZED AND THE VALVE(S) CAN BE OPENED AND CLOSED SAFELY BEFORE PROCEEDING WITH VALVE CALIBRATION.

ATTENTION ⚠ CAUTION

VALVES OPERATE AUTOMATICALLY. REMOVE POWER BEFORE OVERRIDE

IMPORTANT ⚠ NOTICE

ACTIVATING FOAM OFF FROM THE SAM CONTROL CENTER TURNS OFF THE SMART-FOAM SYSTEM, TURNING OFF FOAM TO ALL FOAM CAPABLE DISCHARGES, HOWEVER, THE DISCHARGE(S) ARE NOT CLOSED AND CONTINUE TO FLOW WATER ONLY.

IMPORTANT ⚠ NOTICE

AHJ MUST INSURE PROPER TRAINING IS IN PLACE FOR ALL OPERATORS. THIS QUICK START GUIDE DOES NOT REPLACE OR SUPERSEDE THE OPERATION INSTALLATION MAINTENANCE MANUAL OR PROPER TRAINING.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS ARE WATER RESISTANT.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS FUNCTION BETTER IF TOUCHED USING THE PAD PORTION OF THE FINGER WHILE WEARING GLOVES. THE TOUCHSCREENS OFTEN DO NOT FUNC-TION WHEN TOUCHED USING THE SEAM PORTION OF A GLOVE.

IMPORTANT ⚠ NOTICE

ALTHOUGH SMARTFOAM AND SMARTCAFS BOTH UTILIZE THE FOAM LABEL, A FOAM LABELED DISCHARGE BUTTON DOES NOT OPERATE THE SAME WAY ON SAM FOR BOTH SYSTEMS.

IMPORTANT ⚠ NOTICE

ALWAYS DISCONNECT THE POWER CABLE, GROUND STRAPS, ELECTRICAL WIRES AND CABLES FROM THE CONTROL UNIT OR OTHER HALE SAM EQUIPMENT BEFORE ELEC-TRIC ARC WELDING AT ANY POINT ON THE APPARATUS.

IMPORTANT ⚠ NOTICE

ALWAYS TURN OFF CAFS FROM THE SMARTCAFS CONTROL DISPLAY.

IMPORTANT ⚠ NOTICE

AN ACCURATE FLOW MEASURING DEVICE MUST BE USED TO MEASURE THE WATER FLOW WHEN CALIBRATING THE FLOW SENSOR. USE A SUITABLE SIZE, SMOOTH BORE NOZZLE AND AN ACCURATE AND CALIBRATED PITOT GAUGE INSTRUMENT OR MASTER FLOW METER. HAND HELD PITOT GAUGES ARE USUALLY NOT VERY ACCURATE. MAKE SURE THE SYSTEM IS CALIBRATED WITH AN ACCURATE FLOW MEASURING DEVICE.

IMPORTANT ⚠ NOTICE

DISCONNECT ELECTRICAL POWER TO THE VALVE MOTOR WHEN USING THE OVERRIDE TO OPERATE THE VALVE DIRECTLY.

IMPORTANT ⚠ NOTICE

DO NOT ALTER THE CAN NETWORK COMMUNICATIONS (SAE J1939 CAN BUS) OR CONNECT OTHER DEVICES TO ANY OF THE CAFS, CAPTIUM, FOAM, OR SAM CAN BUS BACKBONE(S).

IMPORTANT ⚠ NOTICE

DO NOT HARD SHUTDOWN THE TABLET (POWER OFF BY HOLDING THE POWER BUTTON FOR LONGER THAN 5 SECONDS). A HARD SHUTDOWN MAY CORRUPT THE OPERATING SYSTEM, MAKING THE TABLET UNUSABLE.

IMPORTANT ⚠ NOTICE

DO NOT RUN THE PRIMER FOR MORE THAN 45 SECONDS. IF PRIME IS NOT ACHIEVED IN 30 - 45 SECONDS, STOP AND LOOK FOR AIR LEAKS OR BLOCKED SUCTION HOSE.

IMPORTANT ⚠ NOTICE

EXCESSIVE PRESSURE LOSS MAY OCCUR IF THE DRIP RATE IS GREATER THAN AN INDIVIDUAL DRIP (A STEADY STREAM OF WATER) OR DRIP RATE EXCEEDS ONE DRIP EVERY 0.6 SECOND. THIS CONDITION DEGRADES PUMP PERFORMANCE.

IMPORTANT ⚠ NOTICE

HALE MIDSHIP PUMPS ARE SHIPPED WITHOUT GEAR OIL. FILL THE GEARBOX WITH GEAR OIL SPECIFIED IN PARAGRAPH 7.4.2, RECOMMENDED GEARBOX LUBRICANTS, OF FSG-MNL–00199, OIM MANUAL FOR HALE MIDSHIP PUMPS, BEFORE OPERATING.

IMPORTANT ⚠ NOTICE

IF THE DISCHARGE DOES NOT ACTIVATE VERIFY THE CAFS SYSTEM PRESETS (PRESET 1 FOR CAFS, PRESET 7 FOR FOAM ONLY ON THE SMARTCAFS DISPLAY) CONFIGURATION MATCHES THE SAM CONFIGURATION. (SAM WILL ONLY ACTIVATE MATCHING CONFIGURATIONS–WET, MED, OR DRY.) IF THE CONFIGURATIONS DO NOT MATCH, OPERATE SAM MANUALLY TO OPEN THE VALVE USING THE SAM CONTROL CENTER. THEN OPERATE THE CAFS SYSTEM FROM THE SMARTCAFS DISPLAY.

IMPORTANT ⚠ NOTICE

IF THE TABLET-TO-SAM WI-FI CONNECTION IS LOST, RETURN TO A SAM CONTROL CENTER ON THE APPARATUS TO RESUME CONTROL FROM A SAM CONTROL CENTER ON THE APPARATUS.

IMPORTANT ⚠ NOTICE

KEEP ALL I/O PORT COVERS IN PLACE DURING USE TO PREVENT WATER DAMAGE.

IMPORTANT ⚠ NOTICE

OTHER ELECTRICAL COMPONENTS MUST NOT BE SUPPLIED FROM THE SAM SYSTEM SUPPLY. DO NOT CONNECT THE PRIMER AND HALE SAM TO THE SAME POWER WIRE.

IMPORTANT ⚠ NOTICE

ONLY TOUCH THE SCREEN IN ONE PLACE AT A TIME. THE TOUCHSCREENS DO NOT SUPPORT MULTI-TOUCH.

IMPORTANT ⚠ NOTICE

PERFORMING THIS PROCEDURE CAUSES SAM TO EXIT AUTO MODE.

IMPORTANT ⚠ NOTICE

PUMP SEAL/PUMP SHAFT DAMAGE MAY OCCUR IF DRIP RATE IS LESS THAN ONCE EVERY 6 SECONDS. THIS CONDITION DEGRADES PUMP PERFORMANCE.

IMPORTANT ⚠ NOTICE

SOME WATER ONLY OPERATIONS MAY DAMAGE THE CAFS SYSTEM IF THE CLUTCH IS ENGAGED. REFERENCE CAFS QUICKSTART GUIDE, DISENGAGING THE COMPRESSOR CLUTCH (PAGE 10 OF FSG-MNL-00176) TO ENSURE PROPER CAFS TURN OFF WHEN SAM INCLUDES A CAFS SYSTEM.

IMPORTANT ⚠ NOTICE

THE CONTROLLER UNIT DEUTSCH CONNECTORS ARE KEYED TO PREVENT INTERCHANGE OR REVERSE DIRECTION INSERTION. DO NOT FORCE A CONNECTOR WITHOUT FIRST VERIFYING THE CONNECTORS ORIENTATION AND PLACEMENT.

IMPORTANT ⚠ NOTICE

THE SAM CONTROL CENTER WILL NOT FUNCTION PROPERLY WITHOUT ONE OF THE DISPLAYS CONFIGURED AS THE MASTER.

IMPORTANT ⚠ NOTICE

THE STYLE 9327 NAVIGATOR MINI VALVE CONTROLLER DOES NOT SUPPORT PRESSURE INDICATION. DO NOT USE A STYLE 9327 NAVIGATOR MINI VALVE CONTROLLER FOR DISCHARGE VALVE PURPOSES OR CALIBRATIONS.

IMPORTANT ⚠ NOTICE

TOUCH ONLY THE SPECIFIED BUTTON(S). FAILURE TO PERFORM THIS PROCEDURE CORRECTLY MAY CAUSE SAM TO BECOME INOPERATIVE.

IMPORTANT ⚠ NOTICE

WHEN CLOSING AN INTAKE IN MANUAL MODE, ENSURE THE PUMP HAS AN ADEQUATE WATER SUPPLY TO PREVENT OVERHEATING.

IMPORTANT ⚠ NOTICE

WHILE SAM CAN REDUCE PUMP OPERATOR WORKLOAD, IT DOES NOT TAKE THE PLACE OF THE PUMP OPERATOR. THE PUMP OPERATOR STILL NEEDS TO CALCULATE THE REQUIRED LINE PRESSURE TO SUPPORT THE HOSE LAY AND NOZZLE IN USE. SAM WILL MAINTAIN THE SET PRESSURE IN AUTO MODE.

2. GENERAL INSTRUCTIONS

This manual covers the SAM system when local procedures do NOT exist. Basics of SAM and SAM operation, installation verification, preventive maintenance, and operator-based trouble-shooting are covered herein. Refer to the Technical Manual (FSG-MNL-00211) or the Parts Manual (FSG-MNL-00212) for additional information.

In addition to the SAM manuals, the manuals for the associated Hale pump will be required to operate and maintain the entire system. Additional information such as Q Series midship pump specifications, ratings, and Hale Bulletin 650, Hale Foam Proportioning System Foam Concentrate Compatibility, can be found on the flash drive provided with the system or on the Hale website (www.haleproducts.com).

When SAM includes an optional SmartFOAM or SmartCAFS the manuals for the applicable system will also be required to operate and maintain the entire system

ATTENTION ⚠ DANGER

OPERATORS SHOULD FIRST BE TRAINED TO OPERATE THE FIRE PUMP MANUALLY (USING PUSH BUTTONS, CONTROL RODS, AND MANUAL [NOT ELECTRICAL] VALVE OVERRIDES.)

- AUTOMATION ONLY MITIGATES PROBLEMS AROUND THE PUMP AND VALVES
  - OPERATORS NEED TO UNDERSTAND HOW TO DIAGNOSE PROBLEMS
  - SAM MANAGES PROBLEMS BY KEEPING THE PUMP SAFE BUT IF AN INADEQUATE WATER SUPPLY OR PUMP CAVITATION OCCURS THE OPERATOR MUST UNDERSTAND WHAT IS HAPPENING AND CORRECT THE PROBLEM
- SAM DOES NOT ADJUST FOR FRICTION LOSS ON HOSE LINES OR PUMPING AT ELEVATION
  - THE SAM MAINTAINS PRESSURE SETTINGS BASED ON SENSORS MEASURING PRESSURE NEAR THE DISCHARGE VALVE
  - THE SYSTEM CAN NOT ALLEVIATE STATIC PRESSURES
    - RESIDUAL PRESSURE IN THE SYSTEM MAY BUILD IN THE DISCHARGE LINES WHEN THAT PARTICULAR LINE IS NOT FLOWING WATER OR NOT FLOWING ENOUGH WATER TO BE GATED
    - THE SYSTEM NOTIFIES YOU THAT THE DISCHARGE IS IN THIS STATE
    - THE OPERATOR MUST BE AWARE THAT IS PRESSURE MAY PRESENT A DANGER TO LARGER DISCHARGES. (THEREFORE, SETTING A SMALLER DISCHARGE LINE AT A PRESSURE HIGHER THAN YOU WOULD EXPOSE A LARGER HOSE [OR LARGER DISCHARGE] TO IS NOT RECOMMENDED)

2.1 SAM Numbering and Specifications References

SAM system only comes as part of a Hale pump kit or a Hale module and is therefore identified by the associated pump ID plate. Figure 1 shows the typical ID plate used on the Hale SAM.

Figure 1. Hale ID Tag With Sample Markings

The ID plate is stamped with the appropriate model, capacity (NFPA rated) code, drive unit code, and serial number at the factory during manufacturing/testing. (Refer to the Pump Identification paragraph in the OIM Manual for the applicable Hale pump.) The pump ID plate is permanently attached to the associated Hale built pump module if the pump was ordered as part of a Hale built module, otherwise it is shipped loose with the SAM pump kit.

NOTE

Using your pumps serial number and the Hale website (or calling Customer Service) is the best way to ensure you receive/utilize the correct replacement parts for your pump and SAM system.

3. TRANSPORTATION AND STORAGE

This section covers shipping, movement, installation preparations, and storage for the Hale SAM.

3.1 EAR99 Restrictions

SAM is designated EAR99. Always follow all US Government regulations for export or reexport.

3.2 Shipping, Movement, And Installation Preparations

ATTENTION ⚠ DANGER

CHECK THE BILL OF LADING FOR THE WEIGHT BEFORE LIFTING. ONLY USE APPROPRIATE LIFT METHODS AND EQUIPMENT TO MOVE OR HANDLE SAM PUMP KIT OR MODULE. (TYPICAL PUMP KIT WEIGHT IS APPROXIMATELY 1200 LBS. (545 KG) TYPICAL MODULE WEIGHT IS 2800 LBS. (1270 KG)

ATTENTION ⚠ CAUTION

SHIPPING CONTAINERS WEIGHS VARY WIDELY FOR SAM COMPONENTS. ALWAYS CHECK THE SHIPPING INFORMATION FOR EACH CONTAINERS WEIGHT AND USE THE APPROPRIATE LIFTING METHOD AND/OR WEIGHT RATED EQUIPMENT.

Hale ships the SAM components using packaging that protects the components during the transit process and for typical periods of indoor storage.

Upon receipt, perform a full inspection of the packaging and the SAM components, if any damage has occurred, take clear detailed pictures, and immediately file a claim with the carrier. Also, contact Hale Customer Support (800–533–3569) and provide a copy of the claim via email at halecustomerservice@idexcorp.com.

3.3 Pump Gearbox Shipped Without Fluid

IMPORTANT ⚠ NOTICE

HALE MIDSHIP PUMPS ARE SHIPPED WITHOUT GEAR OIL. FILL THE GEARBOX WITH GEAR OIL SPECIFIED IN PARAGRAPH 7.4.2, RECOMMENDED GEARBOX LUBRICANTS, OF FSG-MNL–00199, OIM MANUAL FOR HALE MIDSHIP PUMPS, BEFORE OPERATING.

Using the Manual For Hale Midship Pumps, fill the gearbox to the proper level with the gear oil listed in Recommended Gearbox Lubricants paragraph. See the oil change paragraph for instructions to fill the gearbox with gear oil.

3.4 Storage

Hale SAM systems should be stored indoors in a protected environment. Packaging is suitable to protect the system for typical storage times associated with vehicle production runs.

If the pump needs to be stored for more than six months, see Hale Service Bulletin SB150 on the Hale website (www.haleproducts.com).

3.4.1 UV1100 And UV800 Storage

In cold environments, protect all SAM system components from ambient temperatures. Never allow a SAM system display temperature to exceed–40 °C or +85 °C (–40 °F or +185 °F).

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4. SYSTEM OVERVIEW

SAM is designed to automate the pump operation by simplifying the man machine interface and speeding up the pumping process. SAMs purpose is to get water available to the fire ground faster and to allow the pump operator the freedom to control the pump from multiple locations and provides the advantage of a better (more direct) view of the fire scene and other company personnel.

The SAM system uses automation to open the tank-to-pump and purges air from the pump when the apparatus is placed in pump gear. As soon as the pump is placed in gear (if there is onboard water) SAM opens the tank-to-pump valve is ready to flow water. At this point, SAM is ready to open a discharge with a single touch on the SAM Control Center (via Quicksets) or by using a short series of touches. SAM similarly supports selecting an external water source (the default is a pressurized source) with a single touch on the SAM Control Center. When the external water source is established, SAM automatically refills the onboard water tank and circulates water to help cool the pump if appropriate. SAM can also estimate flow and pump capacity for the current parameters if installed on selected pumps.

SAM provides two ways for the operator to control the system from other locations: Additional SAM Control Center touchscreens and/or a fully mobile (secure wireless) tablet. These optional features allow the operator to be more mobile and flexible on the fireground and potentially avoid traffic and other hazards while possibly allowing better interaction with the crew.

SAM functions in two distinct modes: Auto and Manual. To take advantage of system automation operate SAM in Auto Mode.

SAM in Auto Mode displays and controls (with automation) a maximum of 10 valves. The valves may consist of any combination of:

- up to six discharge valves (Akron Brass valves)
- up to four intakes (The four valves with the lowest index numbers to include Hale master intake valves or Akron Brass valves [configured as an auxiliary intake–Pony].)

SAM in Manual Mode displays and controls (without automation) a maximum of 18 valves. The valves may consist of any combination of:

- up to 12 discharge valves (Akron Brass valves)
- up to six intakes (any mix of the following NOT to exceed a maximum of six intakes)
  - as few as two and as many as four maser intake valves (Hale)
  - up to two auxiliary intakes (Akron Brass valve used for an intake–Pony)

NOTES

Master intakes take precedence (Index Numbering) over Pony intakes, therefore displayed as the first intakes (up to four). This allows up to two Pony intakes to be added for display.

Hale allows one additional Pony intake that must be ordered loose and that Pony requires a Navigator for electronic control. It is important to understand; the additional valve is NOT part of and can NOT be controlled by the SAM system.

All Navigators are an added expense.

Additionally, SAM helps protect the firefighting equipment. SAM detects and alerts the operator to conditions such as low intake pressure, low flow (for discharges), water starvation (cavitation), onboard water tank level, selected equipment temperatures, and water intrusion.

Finally, SAM is customizable (configurable) for your department operations regarding the following:

- Valve names and colors
- Up to four Quicksets (discharge valve at a preset pressure) may be selected for display on and controlled (with automation) from the SAM Auto Mode screen (which allows one touch control from that screen).
  - In other words, you pick up to four of your most frequently used discharges and display/control them on the home screen.
  - Quicksets (in SAM Auto Mode) can be activated before an external water source is established.
- Up to six active discharges may be displayed and controlled (with automation) at one time on the SAM Auto Mode screen.
  - One individual discharge pressure (PSI) can be preset per discharge valve.
    - Presets allow two touch activation. (The first touch displays the SELECT DISCHARGE screen and the second touch actives the preset pressure for that discharge.)
    - Preset an individual discharges pressure based on your departmental guidelines.
    - Use this to ensure every pre-connect gets set to the proper pressure.
- Up to twelve discharges may be displayed and controlled (without automation) at one time on the SAM Manual Valve Control screen.
- A maximum operating pressure is set for each individual discharge.
- Up to four Intakes may be selected for display on the SAM Auto Mode screen (which allows one touch control from that screen).
  - In other words, you pick up to four of your most frequently used Intakes and display them on the home screen which allows control (with automation) from that top level screen.
  - Up to six Intakes may be controlled (without automation) at one time on the SAM Manual Valve Control screen.
- Low tank level warning (for the onboard water tank) indicated on multiple displays.
  - The level when the system alerts the operator the tank is low is user selectable.

SAM uses three CAN networks (bus) to control the parts of the system that utilize automation. Each CAN bus uses a separate loom color (blue, green, and red) to identify the back bone and most nodes. (However, some nodes and most stubs use black loom.) Each bus utilizes and complies with J1939 protocol See Figure 2 for the SAM network diagram and paragraph 5.4, CAN Bus Requirements, for the bus physical layer requirements.

The following paragraphs provide a general overview of the major SAM components for the purposes of operation and installation verification.

NOTE 1: 24 VDC DEVICE, USE DC-TO-DC CONVERTER FOR 12 VDC SYSTEMS.
NOTE 2: OPTIONALLY, MULTIPLE SAM CONTROL SCREENS ARE AVAILABLE
NOTE 3: MAXIMUM OF 6 INTAKES (MIV #5 OR AUX #2 NEVER BOTH)
NOTES: ---------- INDICATES VEHICLE OR OEM/BUILDER PROVIDED ITEM.
— — — INDICATES SAM OPTIONAL ITEM.

BUS KEY (NOTE: CAN 2.0B ACCORDING TO ISO-11898-2, J1939 AND PROPRIETARY MESSAGING)
- BLUE CAN BUS (INTERLOCK/GOVERNOR BUS) [UV800 CONNECTOR A CAN 1]
- GREEN CAN BUS (WATER SUPPLY BUS) [UV1100 CONNECTOR A CAN 1] [UV800 CONNECTOR A CAN 2]
- RED CAN BUS (DISCHARGE VALVE BUS) [UV1100 CONNECTOR A CAN 2]
- POWER AND GROUND BUSS (+12 VDC) INCLUDES CIRCUIT BREAKER PROTECTION
- SECURE WIFI (SLAVE SCREENS ARE NOT WIFI CAPABLE)

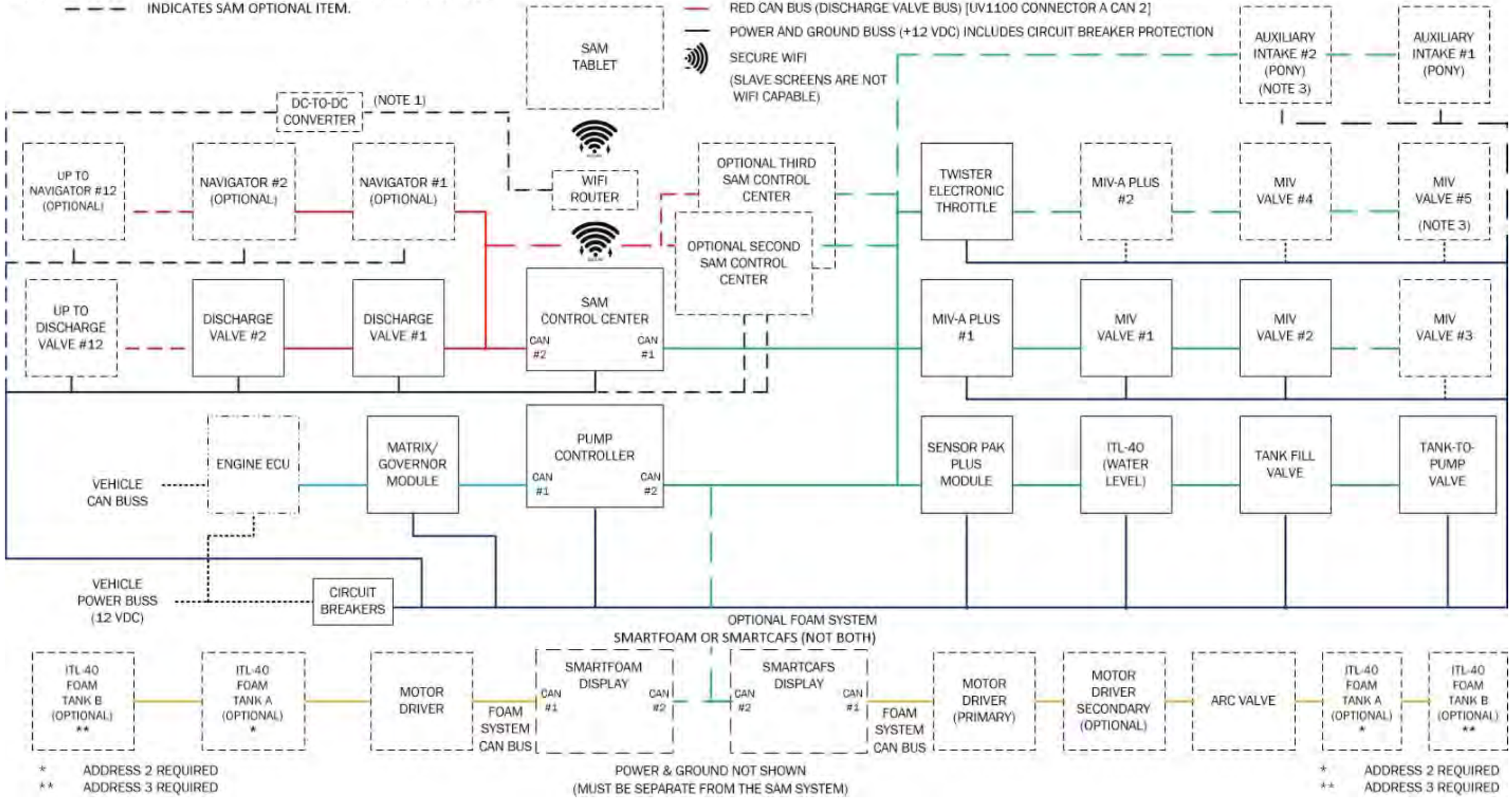


Figure 2. SAM Network Diagram (CAN Buses)

4.1 SAM Touchscreens Navigation And Icon Definitions

The SAM system utilizes two (2) touchscreens: The SAM Control Center and the Pump Controller touchscreen (hereafter called the Pump Controller). Navigation for both screens is similar as they both share the same user interface and are touch navigated.

ATTENTION ⚠ WARNING

NOT ALL GLOVES ALLOW THE SAM TOUCHSCREENS TO FUNCTION. TEST GLOVES ON ALL OF THE SAM TOUCHSCREENS PRIOR TO OPERATING SAM. DO NOT WEAR GLOVES THAT PREVENT THE TOUCHSCREENS FROM OPERATING.

ATTENTION ⚠ WARNING

SAM TOUCHSCREENS DO NOT FUNCTION IF COMPLETELY COVERED AND/OR IMMERSED IN WATER. DO NOT ALLOW THE TOUCHSCREENS TO BE COMPLETELY COVERED/IMMERSED WITH WATER (OR ANY LIQUID). DRY THE SCREEN TO RESTORE FUNCTIONALITY.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS FUNCTION BETTER IF TOUCHED USING THE PAD PORTION OF THE FINGER WHILE WEARING GLOVES. THE TOUCHSCREENS OFTEN DO NOT FUNCTION WHEN TOUCHED USING THE SEAM PORTION OF A GLOVE.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS ARE DESIGNED TO FUNCTION WITH WATER DROPLETS PRESENT.

IMPORTANT ⚠ NOTICE

ONLY TOUCH THE SCREEN IN ONE PLACE AT A TIME. THE TOUCHSCREENS DO NOT SUPPORT MULTI-TOUCH.

Table 1 and Table 2 provide a list of the icons the SAM Control Center displays and their definitions.

Table 1. SAM Control Center Icons

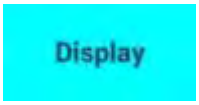
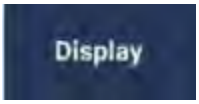
Icon	Definition	Icon	Definition
	System Options		Home
	Loading Icon		Digits 0 Thru 9
	Tab Button (Selected)		Tab Button (Selectable)
	Discharge Quicksets Button		Enter Password (Old or New)
	Clears Text Box		Saves Text Box Content

Table 2. SAM Water Supply Icons

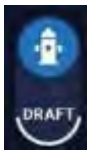
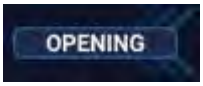
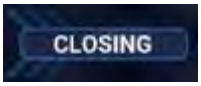
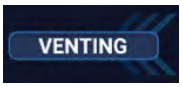
Icon	Definition	Icon	Definition
	Tank Water Open		Tank Water Closed (Button)
	Draft/Hydrant (Touch and Drag to Toggle)		Active Intake (TANK, PSI, inHG) (PSI Shown)
	Intake Button (Pressure Mode)		Intake Button (Draft Mode)
	Deactivate Intake Target		Activate Intake Target
	Opening Indicator		Closing Indicator
	Venting Indicator		Priming Indicator

Table 3 provides a list of the icons the Pump Controller displays and their definitions.

Table 3. Touchscreen Icon Definitions

Icon	Definition	Icon	Definition
	System Options		Home
	INCR Selection		DECR Selection
	Back To Previous Screen		Close (X Out)
	Digits 0 Thru 9		Valve Auto
	Valve Closed		Valve Open
	Partial Open		
	Decrease Close Valve Button		Increase Open Valve Button
	Manual Close Valve Button		Manual Open Valve Button
	Settings/Tools Button		Information/Status

Table 3. Touchscreen Icon Definitions–CONTINUED

Icon	Definition	Icon	Definition
	OK to Pump		Pump OK
	Pump Details Button		Pump History Button
	MODE RPM Button		MODE PSI Button
	Increase Arrowhead		Decrease Arrowhead
	Password Entry Button		Opens Governor Menu
	Save Button		Back Button
	Accept New Value		Delete New Value
	Configuration Mode Button		Pump Test Data Sheet
	Select Device Menu		Housekeeping Menu
	Export Data Log To USB Drive		Send Broadcast Area Message
	Clear Select Device List		Start Software And Display SAM Home And/Or Landing Screen
	Clear Data Log		Populate Select Device List
	Save Select Device List		Start Software To Allow Change/Update
	Access Second Page Of Options		Send Broadcast Area Message And Display SAM Home And/Or Landing Screen

4.1.1 Icon Groups

In addition to individual icons, the SAM Control Center screens utilize icon groups as described below.

4.1.1.1 Set Pressure Icon Group

Figure 3 shows the set pressure icon group which is used to set the pressure for an associated discharge or as a target for a preset button depending on the context.

Figure 3. Set Pressure Icon Group

If the icon group is being used to change/set a pressure the icon group center provides a digital readout, the surrounding gauge portion contains a needle that moves along the dial face providing an analog readout while touching the + or–button within the icon group raises or lowers (respectively) the pressure setting. The change/setting does NOT take effect until acknowledged by touching the popup confirmation button (YES). Touching the popup cancel button (NO) clears the new setting and refreshes/resets the icon group to the initial state. See Figure 4.

Figure 4. Discharge Setup Confirmation Screen

If the icon group is being used to activate a previously saved value (a preset) the center of the icon group becomes a target. Additionally, an adjacent button is displayed (containing the preset pressure value) and the target area strobes a green circle to indicate it will accept the preset button. To activate the preset, drag the button into the strobing ring and lift your finger off the button (the preset actives immediately).

4.1.1.2 Password Icon Group

Figure 5 shows the password icon group which is used to enter a password verifying/granting access to the requested screen or process. Refer to Table 6 and/or Table 7 for a description and list of SAM passwords.

Figure 5. Password Icon Group

4.1.1.3 Governor Icon Groups

Figure 6 shows the governors RPM Mode icon group. The RPM Mode icon group is only displayed when SAM is in Manual Mode and provides three (3) buttons and one (1) target, used to control the apparatus engine speed or to change the governors mode. Touch (or touch and hold for larger increases) the + button to increase the apparatus engine speed. Touch (or touch and hold for larger changes) the—button to decrease the apparatus engine speed. Touch the MODE RPM button to toggle to PSI Mode.

Drag a PRESET RPM button to the ENGINE SPEED target to change the speed of the apparatus engine directly to the desired (preset) engine speed.

Figure 6. RPM Mode Governor Icon Group

Figure 7 shows the governors PSI Mode icon group. The PSI Mode icon group is also only displayed when SAM is in Manual Mode and provides three (3) buttons and one (1) target, used to control the apparatus engine speed to maintain the set discharge pressure or to change the governors mode. Touch (or touch and hold for larger increases) the + button to increase the desired pump pressure. Touch (or touch and hold for larger changes) the—button to decrease the desired pump pressure. Touch the MODE RPM button to toggle to PSI Mode.

Drag a PRESET RPM button to the DISCHARGE PSI gauge target (or the ENGINE SPEED target) to change the desired discharge pressure directly to the desired (preset)pressure.

Figure 7. PSI Mode Governor Icon Group

Figure 8 shows the governors mode screens when in the low intake pressure governing mode, the left-hand graphic shows the screen in SAM Auto Mode while the right-hand graphic shows the screen in SAM Manual Mode. Low intake pressure governing is a special mode used to protect the water supply when the intake side of the pumps pressure falls to a user selectable level. The low intake pressure governing mode is a subset of the PSI Mode used to control the apparatus engine speed ONLY when SAM is in Auto Mode and the intake pressure requires special attention to prevent pump and/or water supply damage.

Figure 8. Low intake pressure governing Governor Screens (Auto Mode/Manual Mode)

4.1.1.4 Valve Close/Open Icon Groups

Figure 9 thru Figure 12 show the four (4) close/open valve icon groups. The icon groups look and function similar except each icon group controls a different valve (or type of valve) for a specific purpose. Touch (or touch and hold) the—button to close (or further/completely close) the valve. Touch (or touch and hold) the + button to open (or further/completely open) the valve.

Figure 9. Tank Fill Icon Group

The tank fill icon group provides manual control of the tank fill valve, which controls the flow of water from the pump to the onboard water tank. With SAM in Auto Mode, this valves function is automated to provide an autofill function and to provide pump cooling circulation.

Figure 10. Tank-To-Pump Icon Group

The tank-to-pump icon group provides manual control of the tank-to-pump valve, which controls the flow of water from the onboard water tank to the pump. With SAM in Auto Mode, this valve is controlled by the SAM system to prime the pump and provide an initial water supply for pumping operations.

Figure 11. Manual Discharge Valve Control Icon Group

The SAM system provides one manual discharge valve control icon group for each discharge valve. Each icon group manually controls the opening and/or closing of the valve for that discharge. With SAM in Auto Mode, this valves function is automated to provide a consistent supply of water including pressure regulation for pumping operations and this icon group is not visible.

Figure 12. Manual Intake Valve Control Icon Group

The SAM system provides one manual intake valve control icon group for each master intake valve and Pony. Each icon group manually controls the opening and/or closing of that intake to the pump. With SAM in Auto Mode, this valves function is automated to provide a smooth transition from the onboard water supply to an external water supply including automated air bleed (or priming) for pumping operations and this icon group is not visible.

4.1.1.5 Engine Data Icon Group

The engine data screen displays multiple engine data icon groups (Figure 13) each identified by a title and unit of measure text.

Figure 13. Engine Data Icon Group

4.1.2 Buttons/Targets (Drag And Drop Navigation)

The SAM user interface utilizes drag and drop technics and items in the form of buttons and targets. (See Figure 14.) Buttons typically appear around the perimeter of (or adjacent to) the target and some buttons incorporate chevrons to enhance the intuitiveness of how to drag the button to the target. Targets utilize a strobe effect to call attention to the drop location on the screen.

Figure 14. Buttons/Targets

The terms drag and drop, and swipe are used interchangeably throughout all SAM documentation. Additionally, buttons, icons, and buttons are also used interchangeably, along with drop and release (with either meaning to lift your finger off the touchscreen).

During the master intake valve transitions, the MIVs state is displayed (see Figure 15). master intake valve states include PRIMING, OPENING, or CLOSING for drafting operations; VENTING, OPENING, or CLOSING for hydrant (pressurized source) operations. Pony (auxiliary intake) states include OPENING, or CLOSING.

Figure 15. Intake State Popup Examples

Additional navigation is available during the transitions. If immediate opening of a master intake valve is required, touch the PRIMING or VENTING button (popup text). Then acknowledge the Force INTAKE X Open? confirmation popup that appears by touching the YES button. (NOTE: Using this feature will override the priming function and could allow air from the supply hose into the pump.) See Figure 16.

Figure 16. Force INTAKE X Open? Popup

NOTE: The master intake valve continues to transition to the open state, even if the Force INTAKE X Open? popup is displayed. So even if the popup is not acknowledged the valve transitions in the normal time.

4.2 SAM Touchscreens

The SAM Control Center is a full-color display that integrates SAM and SAM controls and indicators into an easy-to-read and easy to command operator interface. The touchscreen is a 10.6-inch landscape model and a high-speed processor to boot quickly as well as seamlessly display graphics and respond to touch commands. The display is easily viewed in full sunlight and is glove-friendly and rugged.

It is IMPORTANT to note that the SAM touchscreen does NOT support multi-touch, if multiple simultaneous touches accidently occur, the screen responds as if touched in the middle of the multiple touch points.

SAM supports up to three (3) SAM Control Center displays, however, one (and ONLY one) must be configured as the master. The SAM Control Centers are typically mounted as follows: Driver side operators panel, passenger side officer panel, or as an aerial pedestal.

4.2.1 SAM Control Center Screens

When power is first applied to the system the SAM splash screen (Figure 17) is displayed until the system boots into the user interface. If SAM completes the boot sequence and all of the Auto Mode conditions have NOT been met the SAM Control Center displays the landing screen (Figure 18) until all of the Auto Mode conditions are met and then transitions to the Auto Mode Home screen (Figure 19).

Figure 17. SAM Control Center Splash (Boot) Screen

Figure 18. SAM Control Center Landing Screen (Pump NOT Engaged)

Figure 19. SAM Control Center Auto Mode Main Screen

Figure 20 shows the seven (7) areas/sections the SAM Control Center touchscreen is divided into: System options, intake control, discharge control, onboard levels, mode control, information center, and user assignable quicksets.

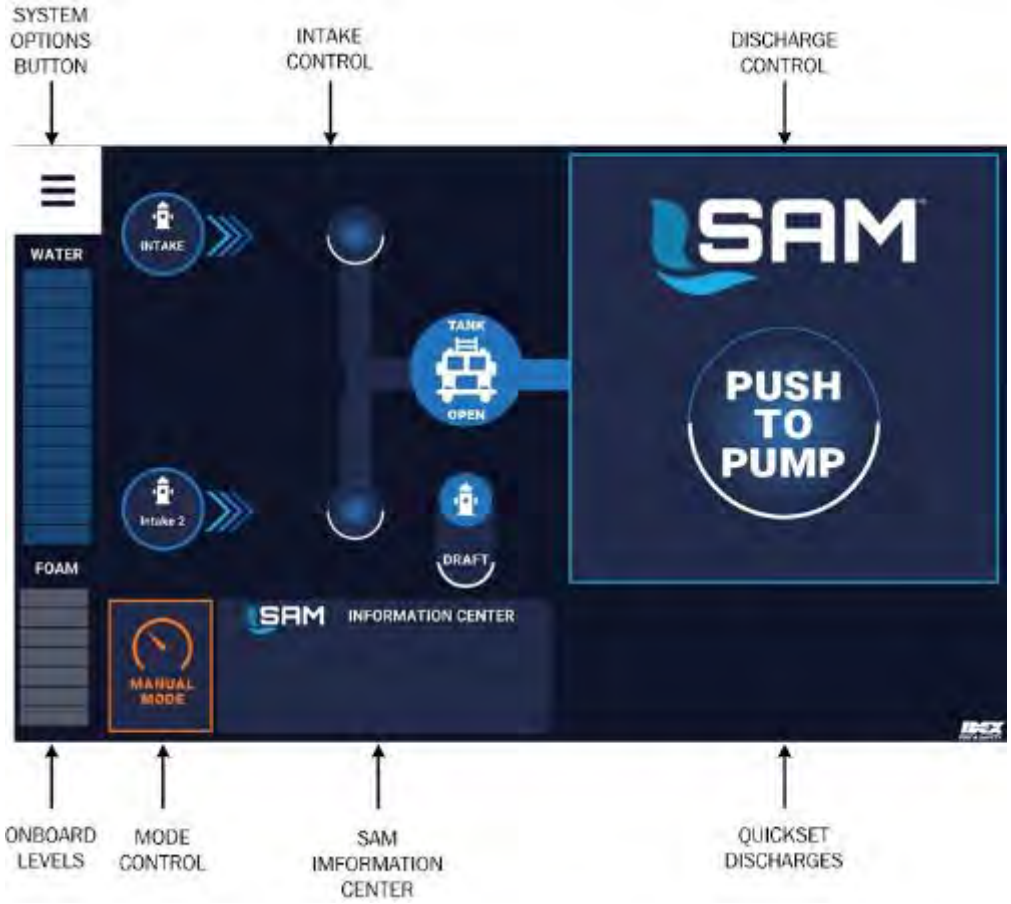


Figure 20. SAM Control Center Touchscreen Areas/Sections

4.2.1.1 System Options Button

Touch and hold the system options button until the loading icon completes the circle (Figure 21) and the password screen is displayed (see Figure 22). Enter the appropriate SAM Control Center password (see Table 6, page 50).

Figure 21. System Options Button And Loading Icon

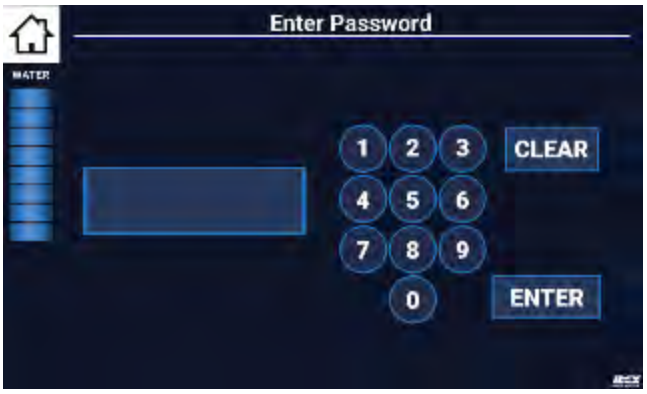


Figure 22. SAM Control Center Password Screen

4.2.1.1.1 SAM Control Center Menu Tabs

The password entered determines which menu tabs are displayed. Entering a user/dealer password displays the tabs shown on Figure 23.

Figure 23. SAM User/Dealer Menu Tabs

Additionally, there are OEM/technician passwords which require a USB key to access. Refer to the Technical Manual (FSG-MNL-00211) for OEM/technician password and USB key information.

Touch the desired tab to enter the associated screen.

4.2.1.1.1.1 Display Tab

The Display tab is the default tab displayed after any password is entered. The Display Menu (Figure 24) appears on the screen with the Display tab selected.

Figure 24. Display Tab

Touch the DISCHARGE QUICKSETS button to display the DISCHARGE SETTINGS screen. See paragraph 6.2.2.1, Assigning Quicksets To The Home Screen (page 58).

Once the four [4] Quicksets have been populated, no other changes/selections can be made on this screen without a reset.

To delete (reset) the Quicksets displayed on the SAM Auto Mode Home screen or to change the order of the Quicksets that are displayed on the SAM Auto Mode Home screen see paragraph 6.2.2.2, How To Change The Order Of (Or Delete) Quicksets On The Home Screen (page 58).

4.2.1.1.1.2 Security Tab

Touch the Security tab (see Figure 23, page 24) to display the Change Password screen. See Figure 27. See paragraph 6.2.2.7, Change User/Dealer Password (page 59) for instructions to change the password.

Figure 25. Security Tab

4.2.1.1.2 HOME Button

Touch the home button (see upper left corner of Figure 20, page 23) to return the Auto Mode main screen.

4.2.1.2 Intake Control Area/Section

The intake control (see Figure 20, page 23), graphically displays the pumps current and alternately available water sources (intakes). SAMs default/initial water source is the onboard tank water which is initially shown as if it had been already drag and dropped on the INTAKE PSI target.

Immediately adjacent to the INTAKE PSI target/TANK OPEN indicator, is displayed up to four intake targets which graphically appear as extensions connected to the INTAKE PSI target/TANK OPEN indicator.

Immediately below the INTAKE PSI target/TANK OPEN indicator, is the  or  (DRAFT or PRESSURE) slide to toggle icon group, with the latter being the default position of the icon group. This icon group is used by the pump operator to select draft or pressurized source mode for the intakes.

The left-hand side of the intake control area/section displays the up to four intake buttons that graphically represent the available external intakes that the operator can activate when the source is ready for use. Simply touch a button and drag and drop it on the corresponding graphical extension (connected to the INTAKE PSI target/TANK OPEN indicator). When one of the external water source buttons is activated the TANK OPEN indicator transitions to the INTAKE PSI target and the WATER TANK button is positioned directly above it (indicating the onboard water tank is available as an alternative water source).

Note that selecting the onboard water tank automatically deactivates all external water supplies. Conversely, closing all the intakes (external water supplies) automatically selects the onboard water tank, allowing the operator to switch back to the onboard water tank easily.

This area/section does NOT provide navigation to any other screens.

4.2.1.3 Discharge Control Area/Section

The discharge control (see Figure 20, page 23), of the Auto Mode main screen allows the pump operator to select a Quickset, select any discharge, add line (another discharge), and/or change the pressure a discharge is set to or stop the line (discharge).

To activate a Quickset simply touch the desired Quickset (see paragraph 6.3.1.3, page 71) and drag it to the discharge target icon (PUSH TO PUMP or ADD LINE).

To select a discharge NOT assigned as a Quickset touch the PUSH TO PUMP (or ADD LINE) icon to navigate to the SELECT DISCHARGE screen (Figure 26). From the SELECT DISCHARGE screen, touch the desired discharge button to navigate to that valves control screen (Figure 27).

Figure 26. Select Discharge Screen

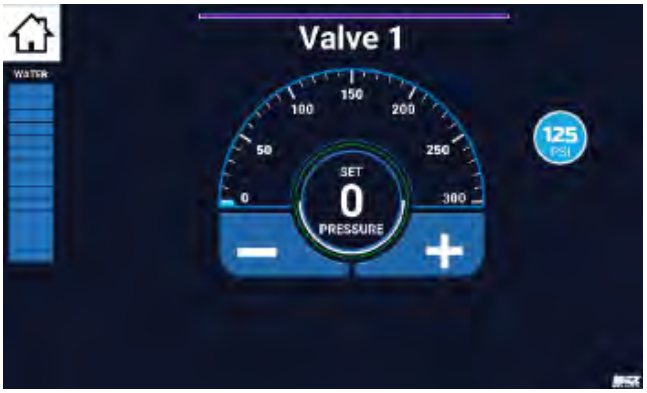


Figure 27. Discharge Valve Control Screen

On the discharge valve control screen, to choose the preset pressure (button in the right-hand side of the screen) simply touch the button and drag it to the target area (SET PRESSURE 0). The preset is automatically activated, and the Auto Mode main screen is displayed. To set any other pressure, use the set pressure icon group (refer to paragraph 4.1.1.1, Set Pressure Icon Group) and confirmation popup buttons (see Figure 4). Touch the NO confirmation popup button to reset the screen or touch the home button to return to the Auto Mode main screen.

4.2.1.4 Onboard Levels Area/Section

The onboard tank level (or levels if a foam option is installed) is (are) displayed to provide constant visibility for the pump operator. (See Figure 20, page 23). SAM defaults to the onboard water tank as the initial water supply and begins pumping from the tank as soon as a discharge is

activated/selected. However, the onboard tank can only supply a finite amount of water so the pump operator must transition to a pressured (or draft) supply as soon as possible.

The display is the result of the ITL–40 message traffic via the Green CAN bus. When a communication (or other) error exists the onboard tank level display turns Red.

4.2.1.5 Mode Control Area/Section

Touch the Manual Mode button (see Figure 20, page 23) to exit Auto Mode. When the button is touched a popup confirmation screen appears to prevent inadvertent deactivation of Auto Mode. Figure 28 shows the Manual Mode confirmation popup.

To continue SAM Auto Mode, touch the NO button or touch the YES button to exit Auto Mode and navigate to the MANUAL VALVE CONTROL screen which also activates PSI MODE on the Pump Controller. See Section 6.3.2, Manual Mode (page 82).

To return to SAM Auto Mode, on the MANUAL VALVE CONTROL screen, touch the ACTIVATE SAM AUTOFLOW button. To continue touch the YES button or touch the NO button to remain in the MANUAL VALVE CONTROL screen. See paragraph 6.3.2.5, Return To SAM Auto Mode, page 87.

Note if changes were activated in Manual Mode the discharge control area/section perimeter retains the orange color (from Manual Mode) to indicate the last setting was set in Manual Mode until an Auto Mode change is active for the valve.

Figure 28. Manual Mode Confirmation Popup

4.2.1.6 SAM Information Center Area/Section

The SAM information center (see Figure 20, page 23) is a read only field that displays the current message(s), active alerts, or active warnings.

4.2.1.7 User Assignable Quicksets Area/Section

The user assignable quicksets area/section displays up to four buttons, each provides instant activation of the labeled line (discharge) at the preset pressure displayed in the button. To quickly activate the desired Quickset simply touch that button and drag it to the discharge target icon (PUSH TO PUMP) (See paragraph 6.2.2.1 or 6.2.2.2 [page 58] for setting up Quicksets, or paragraph 6.3.1.3 [page 71] for operating using Quicksets.)

4.2.2 SAM Control Center Customizable/Configurable Items

The SAM system utilizes passwords to control access to the SAM Control Center customizable/configurable items. Selected customizable/configurable items are accessible via passwords enabled by a USB key. These customizable/configurable items are typically for use by an OEM, apparatus builders, or a Hale FAST center. For details, reference the Technical Manual for SAM (FSG-MNL–00211). Other customizable/configurable items require end user access (AHJ and/or

Fire Company) so the passwords for these customizable/configurable items do NOT require a USB key for activation. The following customizable/configurable items are end user accessible:

- Discharge valve preset pressure
- Discharge valve Quickset pressure

4.2.2.1 Discharge Valve Preset Pressure

Individual presets can be set for every discharge. Each preset can be a different value based on your department's guidelines. This way you can make sure every pre-connect gets set to the proper pressure on every fire.

4.2.2.2 Discharge Valve Quickset Pressure

Quicksets for select discharges can be sent to the home screen to appear as Quickset buttons (shortcuts). Pick up to four of your most frequently used discharges to be displayed on the home screen user assignable Quickset (see Figure 20, page 23) for super easy access.

4.3 Pump Controller

The Pump Controller display provides governor controls, tank valve controls, pump information and engine data for the operator. The touchscreen is a 7-inch landscape display with a high-speed processor to boot quickly as well as seamlessly display graphics and respond to touch commands. The display is easily viewed in full sunlight and is glove-friendly and rugged.

It is IMPORTANT to note that the touchscreen does NOT support multi-touch, if multiple simultaneous touches accidently occur, the screen responds as if touched in the middle of the multiple touch points.

4.3.1 Pump Controller Screens

The Pump Controller provides six (6) types of screens: A splash screen (Figure 30 displays during bootup), a default read only (SAM IS ACTIVE) screen (Figure 31), multiple Manual Mode screens that include (but are not limited to):

- Governor controls, indicators, and/or information (apparatus power train DM1 message pass thru, and multiple SPN messages. See Figure 29 for an example of a DM1 message pass thru on the Pump Controller.

Figure 29. DM1 Message Pass Thru Example

- Message(s), active alert(s), or active warning(s) and information
- Onboard water tank associated information (valve position and circulation info)
- Optional video (if enabled) input from up to three (3) cameras

Figure 30. Pump Controller Boot Screen

Figure 31. Pump Controller During SAM Auto Mode

The SAM IS ACTIVE screen (Figure 31) is displayed while SAM is in Auto Mode and the screen provides read only status for apparatus interlocks, master intake and discharge pressures, engine RPM, tank fill and tank-to-pump position information, auxiliary circulation status, and pump capacity (only available in hydrant and on select pumps that pump above 600 GPM).

Three (optionally four) additional screens are available from touching any of the tabs at the left of the screen. The screens are described in subparagraphs that follow with the same title as the tab.

4.3.1.1 Pressure Governor

The SAM system includes a pressure governor.

NOTE

Contact Hale Customer Service (800-533-3569) if your apparatus engine utilizes a control system other than CFPG (e.g. PGN0, TSC1, etc.)

The governor also monitors specific apparatus parameters (primarily engine) (see paragraph 4.3.1.5, Engine Data Screen, page 37 for more details) and interacts with the interlock [up to 3] and throttle circuits via CAN messaging. Governor control and indications are provided by the Pump Controller, Twister Throttle Controller, and in an emergency with the emergency idle pushbutton (ONLY provided with an optional auxiliary SAM Control Center).

For SAM to control in Auto Mode, the following conditions MUST exist:

- The interlocks must indicate the apparatus is in the correct state to engage the pump.
- The pump must be engaged.
- The vehicle transmission must be in high gear lock up and ready to pump.

The pressure governor does NOT accept control/user interface input from the touchscreen (or the knob portion of the Twister) while SAM is in Auto Mode. The default governor screen depends on what the SAM settings were when Auto Mode was exited (Manual Mode was enabled). See paragraph 4.3.1.1.1, PSI Mode (page 30) or 4.3.1.2, RPM Mode for the default screen/mode SAM enters upon exiting Auto Mode. A confirmation is required to exit SAM Auto Mode.

4.3.1.1.1 PSI Mode

Pressure mode is available ONLY with SAM in Manual Mode. Figure 32 shows the active MODE PSI screen. This mode is the default governor mode when SAM exits Auto Mode from flowing water or foam.

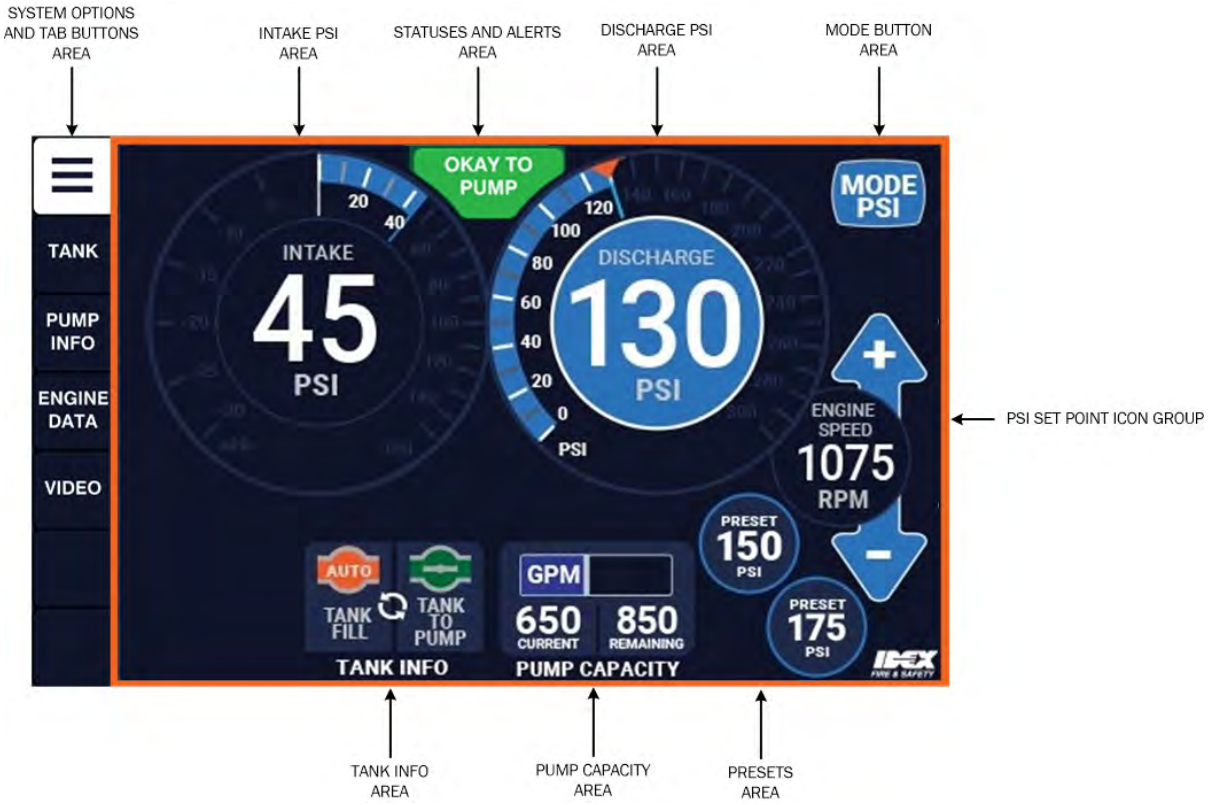


Figure 32. Pump Controller PSI Mode (SAM Manual Mode Only)

If a discharge pressure (or multiple discharges) were set while SAM was in Auto Mode, the governor initializes to the master discharge pressure SAM was using to maintain the individual discharge pressure (or pressures) until a new command is entered.

NOTES

SAM controls multiple things (master pressures, engine RPM, discharge valve position, and/or the water source) to maintain a specific discharge pressure (or pressures when multiple are active) while the governor controls ONLY the MASTER PRESSURES (via the engine RPM.

The governor can NOT governor pressure below the AT IDLE master discharge pressure.

The PSI Mode governor screen is divided into nine separate areas: System Options and Tab buttons, Intake (master) PSI, Statuses and Alerts, Discharge (master) PSI, Mode button, PSI Set Point icon group, Preset buttons, Pump Capacity, and the Tank Info area. See Figure 32.

The system options button provides access to the data logger controls, Revision Status information, and the Password Entry button. (See paragraph 4.3.1.7, page 38.) The Pump Controller tab buttons: TANK (see paragraph 4.3.1.3, page 34), PUMP INFO (see paragraph 4.3.1.4, page 35), ENGINE DATA (see paragraph 4.3.1.5, page 37), and VIDEO (if optionally equipped, see paragraph 4.3.1.6, page 37) are described later in this manual.

The INTAKE PSI icon group (Figure 33) provides a dual format read only indication of the pressure at the pumps intake (master). The center of the icon group provides a digital readout of the master intake pressure while the outer ring of the icon group provides an analog gauge presentation of the same pressure.

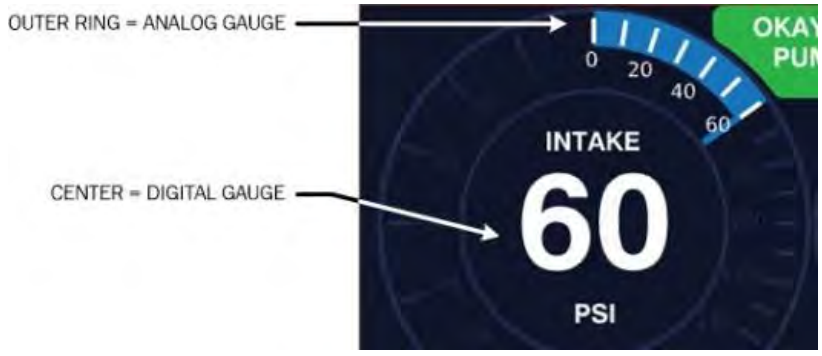


Figure 33. Intake PSI Components

The screen provides cautions and warnings that in some cases the operator can correct which are described/listed in section 6.3.7, Operator Responses To SAM Alarms. (See page 106.)

The DISCHARGE PSI icon group (Figure 34) provides both controls and indicators.

Figure 34. Discharge PSI Components

The outer ring provides an analog gauge presentation of the pumps (master) discharge pressure and an analog presentation of the current set point. The center of the icon group provides a digital readout (gauge) of the master discharge pressure and is also the target area (drop zone) for the preset buttons. Directly below the digital gauge is a digital presentation of the current set point.

The mode buttons are described in paragraph 6.3.4.2.1, Using PSI Mode, page 101 and 6.3.4.2.2, Using RPM Mode, page 102.

The PSI set point icon group (Figure 35) consists of an increase (+) button, a decrease (–) button, with a digital readout of the engines RPM in the center. The engines RPM digital readout also serves as an alternative target area (drop zone) for the preset PSI buttons.

The PSI preset button area (see Figure 32, page 30) supports up to two preset buttons.

Figure 35. PSI Set Point Icon Group Components

The pump capacity (Figure 36) is only displayed when pumping from hydrant (pressurized water source selected) and a flow rate of 600 GPM or more than is available.

Figure 36. Pump Capacity Icon Group

4.3.1.1.2 Low Intake Pressure Control Mode

Intake mode (hereafter called low intake pressure control mode, see Figure 37) is a sub mode of PSI Mode specially designed to deal with low pressure at intake(s) when SAM is in Auto Mode pumping from hydrant (pressurized water source selected) and the selected intakes pressure falls below the pressure required to maintain discharge pressure. SAM alerts the operator of the condition and enables low intake pressure control mode in an attempt to protect the water source (hydrant pipes, supply houses, etc.) from being exposed to a vacuum and the pump from cavitation.

Figure 37. Low Intake Pressure Control Mode Screen

In low intake pressure control mode the governor switches from controlling the engine to maintain the set master discharge pressure to maintaining a minimum master intake pressure. A WARNING is periodically displayed until the condition is corrected (see Figure 38). Each time the WARNING is displayed the operator can acknowledge the popup WARNING by touching the CONFIRM button.

Figure 38. Low intake pressure control Mode Popup Alert

4.3.1.2 RPM Mode

RPM Mode is available ONLY with SAM in Manual Mode. Figure 39 shows the active MODE RPM screen. This mode is the default governor mode when SAM exits Auto Mode from CAFS.

Figure 39. Pump Controller RPM Mode (SAM Manual Mode Only)

See paragraph 6.3.4.2.2, Using RPM Mode (page 102) for instruction to use the governor screens in RPM Mode. See paragraph 4.3.1.2.1, Twister Operations (In SAM Manual Mode) (page 34), for Twister operation.

4.3.1.2.1 Twister Electronic Throttle (In SAM Manual Mode)

The Twister (Figure 40) is configured to operate in the SAM system by setting the baud rate and mode (refer to Technical Manual [FSG–MNL-00211], Twister Electronic Throttle). The Twister electronic throttle is not intended for use in Auto Mode. In Manual Mode the Twister functions as it would in any governor controlled apparatus.

Figure 40. Hale Twister

4.3.1.3 Tank Screen

The tank screen (Figure 41) while SAM is in Auto Mode provides control of the tank fill valve. To provide additional cooling for the pump or to fill the onboard water tank faster, open the valve (touch the + button. To close the valve, touch the button.

The tank screen provides control of the tank fill or tank-to-pump valve when SAM is in Manual Mode. To open a valve, touch the + or the OPEN button. To close a valve, touch the–or the CLOSE button.

Additionally, the screen displays the status of the onboard water tank (OK, < 1/3, EMPTY). See FSG-MNL-00211 (Technical Manual For Hale SAM) for instructions to turn the Tank Level on to display a gauge icon group graphically showing the level in the tank.

Figure 41. Pump Controller Tank Info Screens

The tank info portion of the screen (bottom left) shows tank fill as open (green), auto (orange) or closed (no color shown). Additionally, if the auxiliary cooling solenoid is open the auxiliary cooling icon (rotating orange and green arrows) is displayed on the Pump Controller (superimposed over the TANK FILL and TANK-TO-PUMP valve position icons).

4.3.1.4 Pump Info Screens

The Pump Info screen (Figure 42) provides anode status (for up to three [3] anodes) as Good, Replace, Error, or Not Available. The Pump Info screen provides temperature read out for the pump water and the gearbox oil.

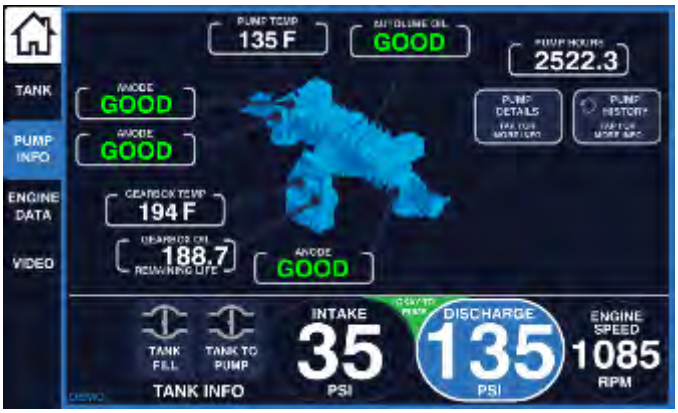


Figure 42. Pump Controller Pump Info Screen–No Action Required

If action is required, the tab turns Red to indicate a trouble (see Figure 43).

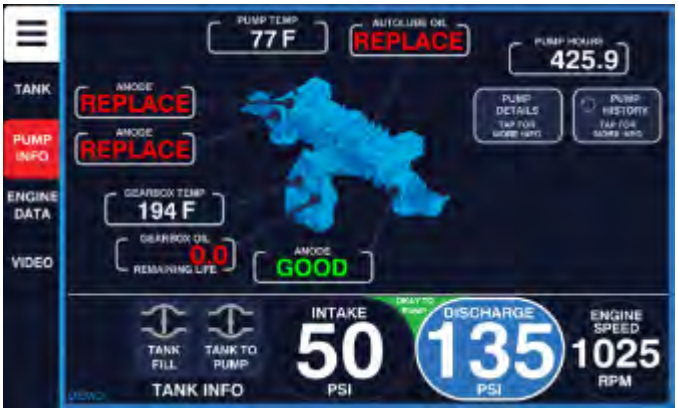


Figure 43. Pump Controller Pump Info Screen–Action Required

The gearbox gear oil life remaining is displayed in hours and the autolube oil status is also provided as Good, Replace, Error, or Not Available.

Error indicates a loss of communications or a sensor out of range condition. Not Available is displayed if the pump does not utilize anodes (or have autolube).

Figure 44 shows the Pump Details screens read only information listed for the pump.

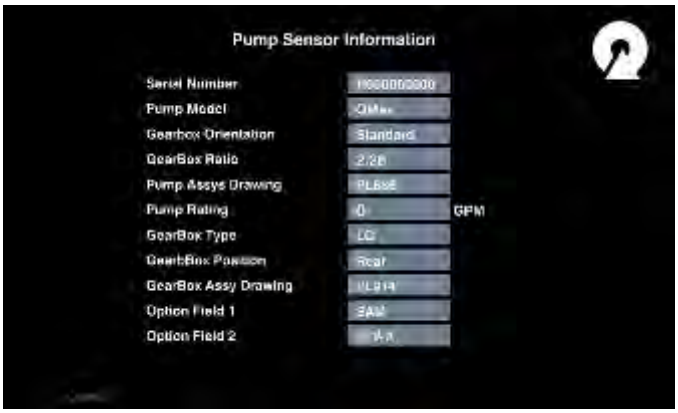


Figure 44. Pump Controller Pump Info Details Screen

Figure 45 shows the Pump History screens read only information listed for the pump. Refer to FSG-MNL-00211 for the screen when SAM is in Manual Mode (annual testing).

Figure 45. Pump Controller Pump Info History Screen

Figure 46 shows the Pump Test Data screens listed for the pump as recorded the first time a pump test was conducted (factory test).

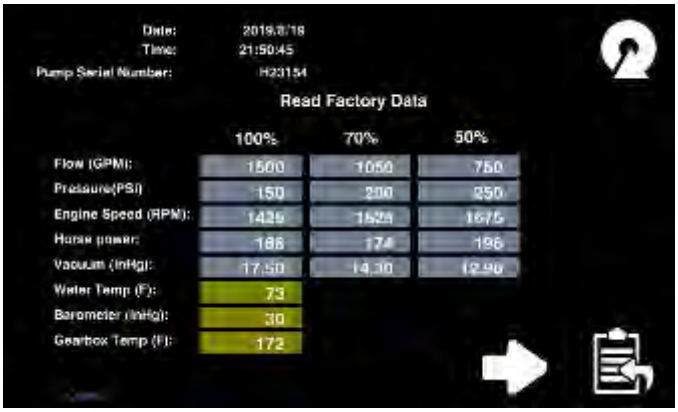


Figure 46. Pump Controller Pump Info History Factory Test Data Screen

Figure 47 shows the Pump Test Data screens listed for the pump as recorded each time a pump test was conducted in the field (required yearly or after a major repair). Refer to FSG-MNL-00211 for the screen when SAM is in Manual Mode (annual testing).

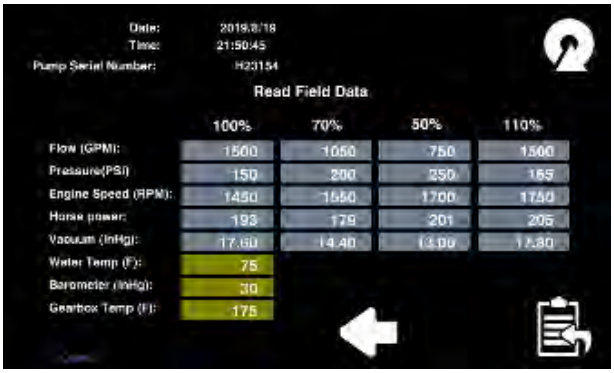


Figure 47. Pump Controller Pump Info History Field Test Data Screen

4.3.1.5 Engine Data Screen

Figure 48 shows the engine data groups. This screen provides read only data for: Battery voltage, coolant temperature, oil pressure, transmission temperature, transmission gear, fuel consumption rate, and engine hours.

Figure 48. Pump Controller Engine Data Screen

4.3.1.6 Optional Video Screens

The SAM Pump Controller VIDEO tab supports video presentation from up to three (3) cameras (Camera 1, Camera 2, Camera 3). (See Figure 49.)

If the option is NOT purchased, the entire tab is hidden.

Figure 49. Pump Controller Optional Video Screens

4.3.1.7 Pump Controller System Options Menu

Touch the systems options button (touch and hold the button if the loading icon appears) to display the system options Menu screen (Figure 50). The screen displays four (4) separate areas on the screen: The datalogger export control, the Back To Previous Menu button, the Revision Status information and the Password Entry button. See paragraph 6.3.3.5, Exporting The Datalogger File, page 98, to utilize the Export Datalogger controls.

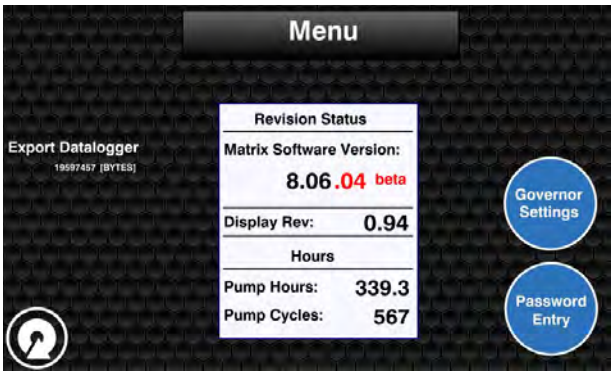


Figure 50. Pump Controller System Options Menu

Touch the Back To Previous Menu button (see Table 3) to return to the default Pump Controller screen. The screen displayed varies depending on the SAM mode (Auto or Manual) and then the current state of the governor.

4.4 Optional Remote Capability

The SAM system provides two remote control options. The first option utilizes optional SAM Control Centers (auxiliary screens) which are located away from the standard SAM Control Center (master screen) which is always located in the pump panel. See paragraph 4.4.1 (page 38) for optional SAM Control Centers (auxiliary screens) details.

The second option utilizes the SAM tablet connected via secure wi-fi. See paragraph 4.4.3 (page 38) for the details concerning the optional SAM tablet (a portable/free roaming SAM Control Center) and paragraph 4.4.2 (page 38) for secure wi-fi information.

4.4.1 Auxiliary SAM Control Center Screens

Up to two optional SAM Control Centers (auxiliary screens) can be installed on the apparatus, Typical locations for remotely located SAM Control Centers are; the panel opposite the pump panel (passengers side of apparatus), the rear of the apparatus, or at an aerial location.

4.4.2 Secure WI-FI (Router/Antenna)

The SAM Control Center (master) transmits via secure wi-fi to the SAM tablet. The wi-fi connection is more secure than typical wi-fi connections because the router/antenna ensures that ONLY the tablet paired with that SAM Control Center can communicate with that SAM system and the SAM wi-fi transmission is hidden from all other wi-fi devices.

4.4.3 Ruggedized Tablet

The SAM ruggedized tablet (Figure 51) allows pump control/operation from anywhere in close proximity to the apparatus where the tablet can maintain wi-fi connectivity with the master SAM Control Center. The tablet provides an 8-in diagonal screen, weighs approximately 2 lbs, is IP 65, and utilizes 10-point projection capacitive touch (supporting use in rain and with thin gloves). The tablet utilizes a standard battery (provides up to 9 hrs) and supports Wi—Fi (wireless 802.11 a/b/g/n/ac).

The tablet utilized a secured wi-fi connection to ONLY communicate with the paired SAM Control Center and only one tablet can be paired to the associated SAM Control Center (apparatus). This allows multiple apparatuses to operate on the same fire scene without undesired tablet interactions and prevents other devices from being connected to the tablet.

Figure 51. SAM Tablet

The tablet is essentially a duplicate of the SAM Control Center in Auto Mode. The operator can control the active intakes, discharges and tank valves from the tablet (including receiving Warnings or Errors). The tablet is designed to allow freedom of movement around the apparatus (truck) and allow operator positioning to be the most effective and safe. The tablet is intended to provide close proximity remote control of the SAM system and is not intended to place the operator far away from the apparatus (where manual intervention would take additional time).

However, SAM manual control (Manual Mode) is not available from the tablet. If Manual Mode is needed the operator must return to the apparatus and the SAM Control Center.

4.5 SAM Automated Pump Cooling

SAM automatically attempts to prevent the pump from overheating using the auxiliary cooling solenoid and if required the tank fill valve.

The auxiliary cooling solenoid (located on top of the pump in one of the pressure taps) opens when the onboard water tank is selected. This condition is indicated by the aux cooling icon (rotating orange and green arrows) being displayed on the Pump Controller (superimposed over the TANK FILL and TANK-TO-PUMP valve position icons) and causes water to be circulated thru the onboard water tank.

If the pump temperature reaches or exceeds 105 ° F (40° C), SAM automatically opens the TANK FILL valve to the 30% open position (indicated by the AUTO icon being displayed for the valve) to further attempt to automatically prevent the pump from overheating. The HIGH PUMP TEMPERATURE WARNING (see Section 6.3.7, Operator Responses To SAM Alarms, page 106) is activated.

NOTES

A small onboard water tank circulating water for an extended period may allow the tank water temperature to rise.

COOLANT TEMPERATURE is used to indicate pump water temperature.

If the water temperature reaches (or exceeds) 122° F (50° C) the COOLANT TEMPERATURE HIGH CRITICAL WARNING (see Section 6.3.7, Operator Responses To SAM Alarms, page 106) is activated.

When the onboard tank water temperature becomes too high the ONLY alternative is to flow water to atmosphere (ground) by ensuring an external water source is active and then slightly opening a discharge (or discharges).

4.6 Pump Priming

SAM system utilizes a Hale ESP priming pump. The primers suction port is however effectively routed to multiple points within the system and is much more automated than a conventional primer.

NOTES

Due to the small size of an auxiliary (Pony) intakes and the resultant losses, they are not recommended for draft operation.

Priming of (or DRAFT for) an auxiliary intake (Pony) is NOT supported in SAM Auto Mode. (Pony intakes are NOT displayed on the SAM Control Center while DRAFT is selected.) However, the Pony may be used for drafting (if desired) by operating it in Manual Mode and priming it using the ESP primers manual control (PRIME pushbutton located on the pump panel).

4.6.1 SAM Auto Prime

SAM is designed to provide both quick-prime and pre-prime. As part of the process, the tank-to-pump valve is opened to flood the pump with water allowing pumping from the onboard water tank while suction hose(s) and a strainer are being attached. Quick-prime provides water to the ESP primer faster than on non-SAM configurations by routing water from the bottom of the pump body to the ESP primer (via a solenoid) when priming is activated, which helps extend the life of the primer.

Pre-prime allows the air in only the selected suction hose to be evacuated up to the master intake valve rather than evacuating the air from the pump side to allow the pump to work from tank water while the suction hose is connected and primed. When the intake is activated (swiped on the SAM Control Center touchscreen or by pressing the MIV-Auto button, located at the intake) air is evacuated from the suction hose(s) up to the master intake valves butterfly disc. Apparatus air pressure is routed via four-way valves (electrically operated) to control air cylinders that provide vacuum routing from the primer to the selected master intake valves water source side of the valves butterfly disc and/or (if required) to the pumps main priming port.

The primer is turned off when a continuous presence of water is detected at the ESP primer. When water is detected continuously for 5 seconds at the ESP primer, the master intake valves butterfly disc is commanded to open, the automation ignores transient pressure changes until the valve reports fully open, and SAM transitions from tank water operations to drafting without operator action. If prime can NOT be established, the primer simply times out. The primer times out (stops) after 45 seconds to prevent primer pump damage and a warning pops up on the SAM Control Center. Additionally, if after being established, prime is lost SAM will automatically prime the system again.

SAM Auto prime can also be activated at each intake by pressing the MIV-AUTO button (electronic redundancy is provided by the MIV-AUTO placard). The MIV-AUTO button operates the primer and opens the master intake valve using the same automation as the SAM Control Center (as if swiping an intake on the SAM Control Center).

To stop priming prior to the timeout, simply touch the intake button and drag it off the target (swipe it back to where it was).

If the SAM Auto prime does not operate as anticipated, simply use the manual prime (see paragraph 4.6.2, below).

4.6.2 Manual Prime

Should SAM fail to establish a prime, manual electronic redundancy is provided by the PRIME and MIV Open/Close placards. The PRIME button operates the primer in the historical way and the MIV Open/Close switch operates the master intake valve as historical controls. Additionally, the master intake valve 2.0 placard houses an air bleed valve that also operates as a conventional air bleed.

NOTE

Manual prime only primes the pump body.

4.7 Establishing A Pressurized Water Source (Hydrant) With SAM

SAM provides two types of external pressured water intakes: Master intake valve controlled intakes (typically 5- or 6-inches) and Akron Brass valve controlled auxiliary intakes (typically 2.5- or 3-inches, also called a Pony). Even though both are pressurized intakes each is automated slightly differently.

4.7.1 Master Intake Valve

Each master intake valve houses an air bleed solenoid (electrically operated) mounted on the water source side of the valves butterfly disc. When the intake is activated (swiped on the SAM Control Center touchscreen or the MIV–A pushbutton is pressed) the solenoid is opened allowing air to be routed away from the pump (the air bleed tubing terminates in the onboard water tank fill tower above the water level). When the butterfly disc reports fully open the solenoid is closed and the SAM Control Center touchscreen indicates the intake is active and SAM announces/displays HYDRANT ESTABLISHED as the pump pressure passes through the low intake pressure governor set point (configurable, typically 15 psi).

4.7.2 Auxiliary Intake

Auxiliary intakes utilize an Akron Brass valve without air bleed or pressure sensing. When the intake is activated (swiped on the SAM Control Center touchscreen) the valve is opened (the valve is programed to open slower than a typical valve which are used for discharges) allowing air (if present) to be routed through the pump. When the valve reports fully open the SAM Control Center touchscreen indicates the intake is active and SAM announces/displays HYDRANT ESTABLISHED as the pump pressure passes through the low intake pressure governor set point (configurable, typically 15 psi).

4.8 SAM Water Tank Auto Fill

SAM indicates the onboard water tank is being automatically filled by displaying the valve auto icon (see Table 3, page 14) for the TANK FILL in the tank info area on the Pump Controller. SAM automatically begins filling the onboard water tank when an external water source (draft or pressure) is established. The valve is automated to partially open, however the valves position can be manually controlled from the Pump Controllers TANK screen if desired. If the valves position is manually changed from the Pump Controllers TANK screen and then Auto Mode is deactivated when SAM is returned to Auto Mode, the valve returns to automated control.

4.9 SAM And Foam Systems

Hale Foam systems on a SAM equipped apparatus is always an option. One of the following foam systems may optionally be added to a SAM equipped apparatus: SmartFOAM or SmartCAFS. The SAM provided gateway to each foam system is described below.

4.9.1 SmartFOAM

SAM utilizes the Green CAN bus to interface with the SmartFOAM system. SAM initiated operations provide foam capable Quickset(s)/preset(s) only. (Reference FSG-MNL-00211, the SAM Technical Manual, for Quickset/preset configuration information.) When a foam Quickset (or preset) is activated on the SAM Control Center the foam display is enabled and the SmartFOAM preset 1 is activated.

Reference SmartFOAM Electronic Foam Proportioning Systems Models: Class A only–1.7AHP, 2.1A Class A/B–3.3, 5.0, 6.5 Description, Installation, and Operation Manual (FSG-MNL-00158) for all other foam descriptions, installation, or operation, including preset setup instructions and general foam operations (operating from other than preset 1).

4.9.2 SmartCAFS

SAM utilizes the Green CAN bus to interface with the SmartCAFS system. SAM initiated operations provide CAFS or FOAM ONLY capable Quickset(s)/preset(s). (Reference FSG-MNL-00211, the SAM Technical Manual, for Quickset/preset configuration information.) When a FOAM Quickset (or preset) is activated on the SAM Control Center the CAFS display is enabled and the SmartCAFS preset 7 is activated. When a CAFS Quickset (or preset) is activated on the SAM Control Center the CAFS display is also enabled and the SmartCAFS preset 1 is activated.

Reference UV SmartCAFS Installation and Operation Manual (FSG-MNL-00157) for all other CAFS installation or operation,

5. INSTALLATION

The following guidelines assist the installer with system installation. Carefully review the procedures provided in the SAM TM (FSG-MNL-00211) to ensure proper installation of the system.

Hale provides SAM systems in three forms: As a pump kit with loose valves, as a pump kit with installed valves, and as a Hale built module.

Hale realizes that welding may be required during the apparatus build process, however Hale does NOT design SAM or pump components to be exposed to the heat, debris, or electric currents/voltages that can result from welding therefore exposing SAM or pump components to the excessive heat, debris, or electrical effects resulting from welding voids the warranty. If plumbing and/or brackets must be fabricated/welded ensure the associated SAM components are NOT exposed to the heat, debris, or electrical effects from the welds. Always weld brackets, framing, plumbing, etc. as a separate assembly and never with an electronic module(s), the pump, or the valve(s) attached.

If welding adjacent to the pump or a valve is unavoidable provide proper heat sinking to protect all Hale supplied components. Never weld (electric) on the chassis, framing, or plumbing with the SAM electronic wiring connected (NOT even ONLY ground connected) as electronic damage may occur. Welding can generate large amounts of static electricity that may become stored and damage ESD sensitive components when a discharge occurs, which can happen long after the welding is compete. Additionally, utilize welding blankets to protect all Hale components from sparks, molten metal, slag, etc. when welding in the vicinity. Clean all welds thoroughly to prevent welding debris from entering or traveling thru the SAM system including the pump.

Hale recognizes the importance of drive line design when installing a midship pump. Always utilize a minimum of Grade 8 (SAE) or class 10.9 (metric) for all flange and/or drive line mounting fasteners. Always utilize proper drive line angles and gearbox mounting that protects against vibration, and stresses from frame movement and/or twisting. Refer to paragraph 5.1, Drive Line Requirements (page 44), for more details.

Pump Kit With Loose Valves

Hale currently provides a SAM pump kit with loose valves only with the sale of specific pump models. The kit includes components Hale would have provided if a Hale built module had been ordered except for the brackets, frames, hardware (plumbing, bolts, nuts, washers, screws, etc.), and panels. The purchaser simply selects the desired intake and discharge configuration along with any SAM options (ruggedized tablet, Navigator valve controllers, foam capability, master intake valve type, etc.).

The OEM/apparatus builder must install the SAM system following all guidelines provided in this section in its entirety.

Pump Kit With Installed Valves

Hale also provides a SAM pump kit with the valves installed with the sale of specific pump models. The kit includes most of the components Hale would have provided if a Hale built module had been ordered except for the post valve plumbing or enclosure/panel. As with the loose valve kit, the purchaser simply selects the desired intake and discharge configuration along with any SAM options (listed in paragraph above).

The OEM/apparatus builder again must install the SAM system following all guidelines provided in this section in its entirety.

Hale Built Module

As with a pump kit, the OEM/apparatus builder must install the Hale built SAM module following all guidelines provided in sections 5.1 (Drive Line Requirements, see page 44), 5.2 (Power Requirements, see page 45), 5.3 (Compressed Air Requirements, see page 47), and 5.4 (CAN Bus Requirements, see page 47) below. Installation for a module verses a pump kit is much simpler including but not limited to simply mounting the module, connecting the drive line, power, compressed air, Blue CAN bus, and the apparatus interlocks.

5.1 Drive Line Requirements

Due to the increasing sophistication of fire apparatus and truck design, there is potential for an increase in the number of drive line problems. These problems include: Drive shaft failure, loosened drive ends on pump gearboxes, broken mounting brackets, drive line joint or slider wear, bearing wear on pumps or rear axles, and vibration at specific road speeds. While the incidence of these problems is low, they are expensive to fix yet easy to avoid.

Refer to Hale SB90 (Service Bulletin) and Form F-72 available from the Hale website (www.hale-products.com) for detailed drive line information.

It is critical to use computer drive line analysis software, such as Dana® The Expert® during drive line layout. Dana software is available free on the internet at:
http://www2.dana.com/expert/

Use the software to perform a minimum of the following three separate drive line analyses:

- Front Drive Shaft Assembly
- Rear Drive Shaft Assembly
- Total System

Ensure individual shaft cancellation and correct phasing.

When performing the calculations, strive to achieve the lowest drive line torsional and inertial vibrations and avoid severe drive line angles. Be conservative and always error on the side of Safety. Always measure the drive shaft after construction to ensure it matches the computer design.

Remember the following points while designing a drive line.

- Problems can occur with or without noticeable vibration.
- Suspension travel and torque wrap-up can change a marginal drive line into one that is unacceptable. Always consider the full movement of the drive line.
- Center your drive line sliders and ensure they have enough travel to allow for the entire movement of the suspension.
- Do not measure drive line angles using a bubble protractor. Instead, use a digital inclinometer. Remember to zero the inclinometer on the truck frame, not the ground.
- Split shaft drive lines inherently have yoke phasing that can change with every shift. This is one reason to design the other aspects of the drive line more conservatively than a non-split shaft truck drive line. Long drive lines can lead to component vibration or failure, see Table 4. As the drive line approaches half critical speed, a vibration can occur that could damage drive line components. This is much more critical in fire apparatus with split shaft pumps. The phasing between the front and rear shafts changes every time the pump is used.

- Although wall thickness does not have a significant effect on drive shaft length for this calculation, it does have some effect. Contact drive line supplier for additional information.
- Extremely short drive lengths between the pump and the rear axle can also cause problems from excessive operating angles when the suspension articulates. Use caution and conservative design values when utilizing air ride suspension and short rear drive lines.
- For application assistance and approval, contact your drive line equipment manufacturer, or industry respected experts such as Spicer/Dana or Meritor.

Table 4. Maximum Recommended Drive Line Lengths

Shaft RPM	Shaft Diameter					
	2.0 (51)	2.5 (64)	3.0 (76)	3.5 (89)	4.0 (102	4.5 (114)
2,400	47 (1,194)	53 (1,346)	58 (1,473)	63 (1,600)	76 (1,702)	71 (1,803)
2,600	45 (1,143)	51 (1,295)	55 (1,397)	60 (1,524)	64 (1,626)	68 (1,727)
2,800	44 (1,118)	49 (1,245)	53 (1,346)	58 (1,473)	62 (1,575)	65 (1,651)
3,000	42 (1,067)	47 (1,194)	52 (1,321)	56 (1,422)	60 (1,524)	63 (1,600)
3,200	41 (1,041)	46 (1,168)	50 (1,270)	54 (1,372)	58 (1,473)	61 (1,549)
3,400	39 (991)	44 (1,118)	48 (1,219)	53 (1,346)	56 (1,422)	59 (1,499)
3,600	38 (965)	43 (1,092)	47 (1,194)	51 (1,295)	55 (1,397)	58 (1,473)
3,800	37 (940)	42 (1,067)	46 (1,168)	50 (1,270)	53 (1,346)	56 (1,422)
4,000	36 (914)	41 (1,041)	45 (1,143)	48 (1,219)	52 (1,321)	55 (1,397)

NOTE: The table is based on a 0.134-in (3.4 mm) shaft wall thickness.

5.2 Power Requirements

The OEM/apparatus builder shall supply two separate sources of +12 VDC power (ignition), one capable of 85 Amps and one capable of 300 Amps (one for SAM and one for the ESP primer system respectively).

IMPORTANT ⚠ NOTICE

OTHER ELECTRICAL COMPONENTS MUST NOT BE SUPPLIED FROM THE SAM SYSTEM SUPPLY. DO NOT CONNECT THE PRIMER AND HALE SAM TO THE SAME POWER WIRE.

When an optional SmartFOAM system is selected a third +12 VDC power source capable of 40 Amps (for a 1.7 AHP or 2.1 A foam pump), 60 Amps (for a 3.3 or 5.0 foam pump), or 80 Amps (for a 6.5 foam system) is also required.

IMPORTANT ⚠ NOTICE

DO NOT CONNECT THE SAM, ESP, OR FOAM SYSTEM TO A LOAD SHEDDING CIRCUIT.

When an optional SmartCAFS system is selected a third +12 VDC power source capable of 60 Amps for a 3.3 or 5.0 foam proportioning system is also required. Do NOT connect the SAM, ESP, or CAFS system to a load shedding circuit.

The entire system operates from +12 VDC. The SAM +12 VDC power maximum current (stated above) verses typical operating current (approximately 10 Amp unless valves are moving against high pressure) is significantly different. This large difference is due primarily to the current required to deadhead a valve drive motor which, occurs when the valves are calibrated (and may occur when the valves are fully opened/closed). Hale recommends the use of an ignition switched main battery circuit for the SAM main power circuit breaker bus, identified by the SYSTEM POWER tag (see Figure 52).

NOTE

When required (on legacy systems), an additional 30 Amp circuit breaker was wired into the harness.

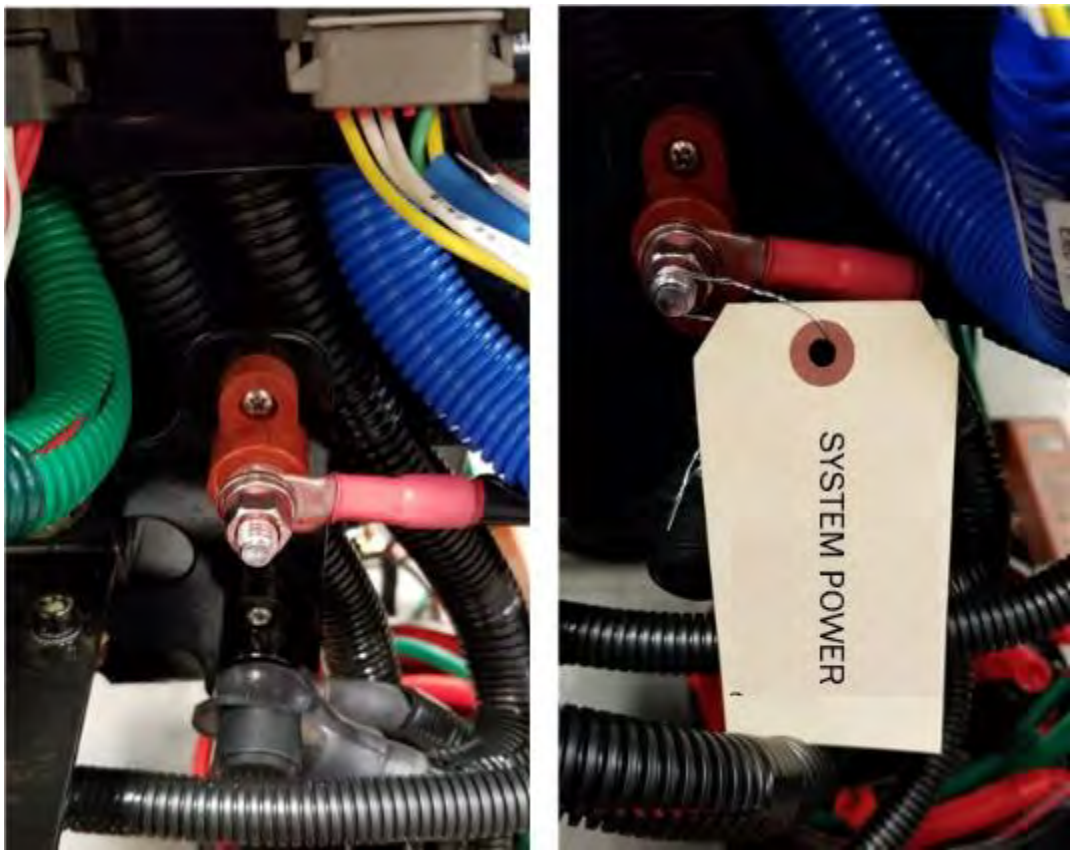


Figure 52. Connect System Power Tag

The 30 Amp circuit breakers in the power distribution box protect primarily the Akron Brass valves (typically two [2] valves are powered from a single circuit breaker). If more breakers are required for a SAM system a second power box is installed. The Hale master intake valves have internal circuit breaker protection (20 Amps at 12 VDC) and provide a pigtail connection for each valve which are to be wired directly to OEM provided power source(s) (NOT thru a circuit breaker or the bus bar in the power box).

In later production the junction box was updated to provide all the breakers required for the system in one location. Additionally, the newer junction box provides multiple sized, socketed, individual circuit protection breakers and connectorized interconnection with the wiring harness.

5.3 Compressed Air Requirements

The OEM/apparatus builder shall supply dry compressed air with a minimum of 75 psi, a maximum of 150 psi. (Typically, from the vehicle air brake system which is typically capable of the 90 psi to 150 psi at approximately 13 cfm at 1250 rpm.) The pump kit or module provides a loose coil of hose to connect the OEM/apparatus builder supplied air. See Figure 53. The air supply should include a protection valve as required by DOT standards.

Figure 53. Connect To Truck Air Tag

5.4 CAN Bus Requirements

The SAM system utilizes three (3) separate CAN buses (see Figure 2, page 13): Blue (engine ECU), Green (intake valves), and Red (discharge valves). The Blue bus connects the apparatus (ECU) and the SAM control modules and is labeled for connection by the OEM/builder. All CAN bus wiring is provided by Hale for SAM system components.

Each buses backbone (Blue, Green, Red) can be up to 131 ft (40 m) consisting of shielded twisted pair and using two 120 Ω termination resistors (one at each end). Each backbone supports up to 30 nodes (touchscreens, ITL-40, Twister, Navigator(s), Akron Brass valves, modules, foam controller/display); each branch can be up to 39 inches long using 3-pin connectors.

When SAM includes an optional SmartFOAM system the SmartFOAM display CAN bus 2 (Connector C; pin 2, CAN Hi and pin 3, CAN Lo) must be connected as a node on the SAM Green CAN bus using the included harness. All SmartFOAM options connect to the foam system bus. (Called the orange bus.)

When SAM includes an optional SmartCAFS system the SmartCAFS display CAN bus 2 (Black connector; pin 19, CAN Hi and pin 18, CAN Lo) must be connected as a node to the SAM Green CAN bus using the included harness. All SmartCAFS options connect to the foam system bus. (Called the orange bus.)

IMPORTANT ⚠ NOTICE

DO NOT ALTER THE CAN NETWORK COMMUNICATIONS (SAE J1939 CAN BUS) OR CONNECT OTHER DEVICES TO ANY OF THE CAFS, CAPTIUM, FOAM, OR SAM CAN BUS BACKBONE(S).

5.5 Valve Mechanical Override Access Requirements

Position/orient all valves to provide access to the mechanical override shaft (Figure 54). The shaft accepts a 7/16-in (11 mm) socket (or wrench). As much as possible position all valves to provide valve override using the socket (with or without an extension) and a driver.

Figure 54. Mechanical Valve Override Shaft(s)

5.6 OEM Connections To SAM

Hale labels (and/or tags) SAM connection points (for OEM/apparatus builders) to aide in proper installation. The SAM installation on an apparatus should be verified prior to delivery of the apparatus per section (see paragraph 6.1, Commissioning, page 54) as a minimum. See Figure 55 for an example of the Hale labels (and/or tags) identifying OEM/apparatus builder connection points for a SAM system.

Typical labeled/tagged OEM/apparatus builder connection points are provided on 101-00341-000. The drawing is located on the flash drive provided with the pump or available from the Hale Products website.

Figure 55. SAM Connections Labels (And/Or Tags)

See Table 5 for a label and a SAM to OEM connection point cross reference listing.

Table 5. SAM To OEM Connection Point Cross Reference Listing

Label (NOTE 1/)	SAM Component/Item	OEM Component/Item
TRUCK AIR	Red Air Hose (Coiled near top of pump)	Apparatus Compressed Air Supply (Also see paragraph 5.3, page. 47)
CONTROL CENTER (UV1100) MASTER	SAM Wiring Harness	SAM Control Center (UV1100) located on the main pump panel NOTE 2/
CONTROL CENTER (UV1100) SLAVE	SAM Wiring Harness	SAM Control Center (UV1100) located other than on the main pump panel NOTES 2/, 3/
PUMP CONTROLLER (UV800)	SAM Wiring Harness	SAM Pump Controller (UV800) located on the main pump panel NOTE 2/
WATER ITL40	SAM Wiring Harness	Onboard water tank ITL-40 (Typically located on, or just above, the main pump panel) NOTES 2/, 4/
FOAM A ITL40	SAM Wiring Harness	Foam ITL-40(Typically located on, or just above, the main pump panel) NOTES 2/, 3/, 4/
FOAM B ITL40	SAM Wiring Harness	Foam ITL-40 (Typically located on, or just above, the main pump panel) NOTES 2/, 3/, 4/
PLUMB TO TOP OF TANK	Coil of 3/4-in tubing (loose or pre-connected at SAM end) SAM end connects to fitting on the SAM Drain Manifold Assy.	Plumb to top of onboard water tank fill tower (above the overflow level–in atmosphere) NOTE 5/
INTERLOCK	SAM Wiring Harness	OEM pump engaged, and OK to Pump interlock outputs (an auxiliary interlock may be provided)
SYSTEM POWER	Main power stud (+) (Red) Located on pump body (see Figure 52, pg 46)	Connect to apparatus power per paragraph 5.2 (pg 45)
SYSTEM GROUND	Main power stud (–) (Black) Located on pump body (see Figure 52, pg 46)	Connect to apparatus power per paragraph 5.2 (pg 45)
TWISTER	SAM Wiring Harness	Manual governor controller (Typically located on the main pump panel.) NOTE 2/
AMP POWER	SAM Wiring Harness	OEM to select audio amplifier location (Typically within pump house in area protected from water, road spay, etc.)
MIV OEM POWER	SAM Wiring Harness (One for each Hale master intake valve)	Connect to apparatus power (+ and–) (Red and Black respectively) per paragraph 5.2 (pg 45) (If not included in the SAM harnesses.)

See notes at end of Table 5.

Table 5. SAM To OEM Connection Point Cross Reference Listing - CONTINUED

Label (NOTE 1/)	SAM Component/Item	OEM Component/Item
TO ATMOSPHERE	Plumbing Fitting(s) Consists of a fitting on the SAM Drain Manifold Assy	No connection required.
CONNECT TO MASTER DRAIN	Multiple Plumbing Fittings	Connect to master drain
NOTE 6/	Discharge valve drain port (Next to the pressure sensor.)	Connect to individual isolated drain (Do NOT group or connect to master drain assy.)
CALIBRATED PRESSURE SENSOR, ADJUST AT FITTING	Discharge Valve Pressure Sensor Fitting (between senor and valve body)	Rotate fitting if sensor orientation change is required (Additional changes may require preforming a calibration.)

NOTE 1/ When multiple connections are required multiple labels/tags will be provided.
NOTE 2/ N/A for a Hale built module. (Hale makes the connection at the factory.)
NOTE 3/ N/A if option is not purchased.
NOTE 4/ The attached pressure sensor must be mounted to provide the detected level for that tanks content.
Note 5/ At the onboard water tank access/fill tower, route the 3/4-in flex line to prevent (to maximum extent possible) incidental items (bags of oil dry, spare supply containers, etc.) from being placed on the tubing and damaging/breaking it.
Note 6/ Each discharge valve drain requires an individual isolated drain.

5.7 SAM Software And Configuration Passwords

SAM utilizes two levels of password entry; OEM/Technical and user/dealer. The OEM/Technical level requires the use of a USB key in addition to entering the password. The user/dealer level ONLY requires a password entry. See Table 6 for a list of the SAM Control Center passwords and Table 7 for the SAM Pump Controller passwords.

Table 6. SAM Control Center Password List

Password	Level	Description Of Access
12345	User/Dealer	Discharge Quickset Menu
23456	User/Dealer	Color(s) assigned to valve(s) (discharge and Intake), Friendly Name (Discharge and Intake), Preset, Quicksets, and user/dealer password
23364	User/Dealer	Configuration Mode
Only Available To Verified OEM/ Apparatus Builders/Select Technicians	OEM/Technician (Requires USB key)	Individual Valve Stop, Master pressure sensor zero, Master pressure sensor span, user password reset, revert to IDEX Permanent Valve Configuration, Error Code List (Not clearable), CAN Data Logger (Downloadable to USB), Low intake pressure control trigger value, Language

Table 7. SAM Pump Controller User/Dealer Password List

Password	Menu	Description	Reference
43275	Pump Info Tab	Reset Gearbox Oil Life	Resets sensor module oil life counter to 500 hrs.
6161	Volume	Allows user/dealer to set SAM Speaks audio volume	See paragraph 6.2.2.1 on page 61
6363	Camera Names	Allows user/dealer to set camera names	See paragraph 6.2.2.2 on page 62
7474	ITL-40 Calibration	Allows user/dealer to calibrate the onboard water tank ITL-40 (full to empty)	See paragraph 8.1 on page 123
7773	Onboard Water Tank Low Level Warning Set Point	Sets Warning active at 5/8 full point on the ITL-40	See paragraph 6.2.1.4 on page 60
7774		Sets Warning active at 4/8 full point on the ITL-40	
7775		Sets Warning active at 3/8 full point on the ITL-40	
82650	Tank Tab (Text Box Tank Level)	Allows user/dealer to select tank level off (displays only the status text boxes) on the SAM Pump Controller Home screen TANK tab	See paragraph 4.3.1.3 on page 34 and Figure 41
82651	Tank Tab (Graphical Tank Level)	Allows user/dealer to select tank level on (graphically displays the tank level on the SAM Pump Controller Home screen TANK tab(Appears similar to the SAM Control Center ONBOARD LEVELS	See paragraph 6.2.2.5 on page 64 and Figure 66
84330	Do NOT show VIDEO tab	Allows user/dealer to hide the VIDEO tab (0 video inputs) on the SAM Pump Controller Home screen	See paragraph 4.3.1.6 on page 37
84331	Show VIDEO Tab (With 1 Video Input)	Allows user/dealer to hide the VIDEO tab (with only one [1] video input displayed) on the SAM Pump Controller Home screen	
84332	Show VIDEO Tab (With 2 Video Inputs)	Allows user/dealer to hide the VIDEO tab (with two [2] video inputs displayed) on the SAM Pump Controller Home screen	
84333	Show VIDEO Tab (With 3 Video Inputs)	Allows user/dealer to hide the VIDEO tab (with three [3] video inputs displayed) on the SAM Pump Controller Home screen	
86820	Total Water Flow Card	Hide Pump Capacity Area on Pump Controller	See Figure 32 and Figure 36
86821		Show Pump Capacity Area on Pump Controller	

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6. COMMISSIONING, STARTUP, OPERATION, AND SHUTDOWN

ATTENTION ⚠ DANGER

OPERATORS SHOULD FIRST BE TRAINED TO OPERATE THE FIRE PUMP MANUALLY (USING PUSH BUTTONS, CONTROL RODS, AND PHYSICAL [NOT ELECTRICAL] VALVE OVERRIDES.)

- AUTOMATION ONLY MITIGATES PROBLEMS AROUND THE PUMP AND VALVES
    - OPERATORS NEED TO UNDERSTAND HOW TO DIAGNOSE PROBLEMS
    - SAM MANAGES PROBLEMS BY HELPING TO KEEP THE PUMP SAFE BUT IF AN INADEQUATE WATER SUPPLY OR PUMP CAVITATION OCCURS THE OPERATOR MUST UNDERSTAND WHAT IS HAPPENING AND CORRECT THE PROBLEM
- SAM DOES NOT ADJUST FOR FRICTION LOSS ON HOSE LINES OR PUMPING AT ELEVATION
    - SAM MAINTAINS PRESSURE SETTINGS BASED ON SENSORS MEASURING PRESSURE NEAR THE DISCHARGE VALVE
    - THE SYSTEM CAN NOT ALLEVIATE STATIC PRESSURES
        - RESIDUAL PRESSURE IN THE SYSTEM MAY BUILD IN THE DISCHARGE LINES WHEN THAT PARTICULAR LINE IS NOT FLOWING WATER OR NOT FLOWING ENOUGH WATER TO BE GATED
        - THE OPERATOR MUST BE AWARE THAT THIS PRESSURE MAY PRESENT A DANGER TO LARGER DISCHARGES. (THEREFORE, SETTING A SMALLER DISCHARGE LINE AT A PRESSURE HIGHER THAN YOU WOULD EXPOSE A LARGER HOSE [OR LARGER DISCHARGE] TO IS NOT RECOMMENDED)

ATTENTION ⚠ WARNING

ALWAYS FOLLOW LOCAL GUIDELINES FROM THE AHJ AND THE APPARATUS MANUFACTURER.

ATTENTION ⚠ WARNING

ALWAYS FOLLOW PROPER OPERATING PROCEDURES. THE PUMP OPERATOR MUST BE FAMILIAR WITH THE PUMP AND SAM OPERATING INSTRUCTIONS AS WELL AS OTHER OPERATING GUIDELINES FOR THE APPARATUS AND ACCESSORIES.

ATTENTION ⚠ WARNING

DO NOT EXCEED OPERATING PRESSURE LIMITS OF PUMP, INSTALLED PLUMBING, HOSE(S), OR EQUIPMENT IN USE. HOSE FAILURE CAN RESULT IF A HOSE IS EXPOSED TO EXCESSIVE PRESSURE.

ATTENTION ⚠ WARNING

OPERATORS, INSTALLERS, AND MAINTENANCE PERSONNEL MUST BE TRAINED AND QUALIFIED FOR ALL THE ACTIVITIES THEY PERFORM.

ATTENTION ⚠ WARNING

THE PROCEDURES IN THIS SECTION PROVIDE ONLY GENERAL AND MINIMAL INSTRUCTION. DO NOT REPLACE LOCAL PROCEDURES OR POLICIES OR RECOMMENDATIONS AND PROCEDURES PROVIDED IN THE APPARATUS/TRUCK/UNIT MANUAL WITH THESE PROCEDURES.

THE PROCEDURES IN THIS SECTION ARE GENERAL OPERATING PROCEDURES BASED ONLY ON HALE EQUIPMENT. NOT ALL PROCEDURES IN THIS SECTION MAY APPLY TO YOUR SPECIFIC OPERATIONAL REQUIREMENTS OR APPARATUS CONFIGURATION. REFER TO ONLY THE INFORMATION/PROCEDURES WHICH APPLY TO YOUR OPERATIONAL REQUIREMENTS AND ONLY WHEN LOCAL PROCEDURES, POLICIES, OR GUIDELINES ESTABLISHED BY THE AHJ DO NOT EXIST.

ALWAYS REFER TO THE PROCEDURES PROVIDED BY THE AHJ FOR SETTING WHEEL CHOCKS AS WELL AS LAYOUT AND CONNECTION OF HOSES, VALVES AND DRAINS.

IMPORTANT ⚠ NOTICE

AHJ MUST INSURE PROPER TRAINING IS IN PLACE FOR ALL OPERATORS. THIS QUICK START GUIDE DOES NOT REPLACE OR SUPERSEDE THE OPERATION INSTALLATION MAINTENANCE MANUAL OR PROPER TRAINING.

IMPORTANT ⚠ NOTICE

WHILE SAM CAN REDUCE PUMP OPERATOR WORKLOAD, IT DOES NOT TAKE THE PLACE OF THE PUMP OPERATOR. THE PUMP OPERATOR STILL NEEDS TO CALCULATE THE REQUIRED LINE PRESSURE TO SUPPORT THE HOSE LAY AND NOZZLE IN USE. SAM WILL MAINTAIN THE SET PRESSURE IN AUTO MODE.

The following checklists/guidelines/instructions assist the end user with acceptance and/or operation of a new apparatus. Commissioning assists with selected preservice aspects of commissioning and helps ensure the new apparatus meets regulatory requirements (NFPA, EN1028, etc.); while startup, operation, and shutdown assist the end user with the operation of the SAM system when OEM instruction/procedures and/or SOGs do NOT exist.

6.1 Commissioning

ATTENTION ⚠ WARNING

ALWAYS STOP THE ENGINE, SET THE PARKING BRAKE, AND CHOCK THE WHEELS BEFORE GOING UNDER THE TRUCK FOR ANY REASON.

Verify required SAM equipment is present and correctly interconnected.

- ❑ Verify required intake valve(s) are present, plugged into the Green CAN network, and listed on the SAM Control Center, MANUAL VALVE CONTROL screen.
- ❑ Verify required discharge valve(s) are present, plugged into the Red CAN network, and listed on the SAM Control Center, MANUAL VALVE CONTROL screen.
- ❑ Verify required tank valves (tank fill and tank-to-pump) are present, plugged into the Green CAN network, and operate from the SAM Pump Controller, TANK screen (SAM in Manual Mode).
- ❑ Verify the MIV–A Plus #1 module is present, labeled, connected to the Green CAN network, and the COM indicator (green LED) is illuminated.
- ❑ Verify specified master intake valve (typically left-side intake, right-side intake, and front intake) are present and plugged into the Green CAN network.

- ❑ Verify required Governor module is present, plugged into the Blue and the vehicle CAN networks, and the COM indicator (green LED) is illuminated.
- ❑ Verify required Twister electronic throttle is present and connected to the Green CAN network. Verify no COMM LOSS messages are displayed (or popped up) on the SAM Pump Controller or SAM Control Center SAM INFORMATION CENTER.
- ❑ Verify required ITL-40 (water tank level indicator) is present, connected to the Green CAN network, and indicating the correct water tank water level.
- ❑ Verify SAM Pump Controller is present and plugged into the Green and the Blue CAN networks.
- ❑ Verify required SAM Control Center is present and plugged into the Green and Red CAN networks.
- ❑ Verify SAM system (red tubing) is connected to vehicle air per paragraph 5.3. (See page 47.)
- ❑ Verify SAM system water column sensor hose (10 feet of 3/4-in flex tubing provided) is connected to vehicle (Refer to Technical Manual [FSG–MNL-00211].)
- ❑ Verify SAM system interlock wiring is connected to vehicle.
- ❑ Verify no SIGNAL LOST/COMM LOSS messages are displayed (or popped up) on the SAM Control Center.

Verify optional SAM equipment, if specified, is present and correctly interconnected.

- ❑ Verify that if optional Navigator Pro(s) are specified, that they are present, labeled, are plugged into the Green CAN network, and operate the associated valve.
- ❑ Verify that if optional master intake valve(s) (master intake valve #3 thru #5) are specified that they are present, labeled, and plugged into the Green CAN network.
- ❑ Verify that if more than three MIVs are specified, that master intake valve–A Plus #2 module is present, labeled, connected to the Green CAN network, and the COM indicator (green LED) is illuminated.
- ❑ Verify that if the optional wireless range extender and DC-to-DC converter (converts 12 VDC to 24 VDC) is specified, that they are present and connected to a 12 VDC SAM power source.
- ❑ Verify that if the optional ruggedized tablet is specified, that it is present and configured with a secured wi-fi connection.

6.1.1 SAM Power On And Default Verifications

Power on the primer and SAM system as follows.

A. Turn on chassis power following chassis manufacturers procedures.

B. Verify SAM Control Center and Pump Controller displays turn on and display their boot screens. (See Figure 18 for SAM Control Center boot screen and Figure 30 for Pump Controller boot screen.)

C. Verify SAM Control Center display transitions to landing screen (Figure 18) and then Auto Mode Home screen (Figure 19) when pump is placed in gear.

NOTE

If the SELECT DEVICE screen (Figure 67, page 64) is displayed, perform paragraph 6.2.2, Reboot To GUI.

D. Verify Pump Controller display transitions to Pump Controller read only screen (Figure 31).

The SAM system is powered on and ready for mode selection.

6.1.2 Mode Selection Verifications

The SAM system defaults to Auto Mode at power on with pump engaged as described below. If Manual Mode is desired the operator must switch to it as described in paragraph 6.1.2.2, Switching To SAM Manual Mode.

6.1.2.1 SAM Auto Mode

If the apparatus is ready to pump (parking brake engaged, in pump gear, transmission in drive/fourth gear & lockup) the system displays the Auto Mode Home screen (Figure 19) and the SAM IS ACTIVE screen (Figure 31), otherwise, the system displays the SAM Control Center landing screen (Figure 18) and the Pump Controller boot screen (Figure 30) until the apparatus is made ready to pump. See Section 6.3 (page 65) for SAM operation.

6.1.2.2 Switching To SAM Manual Mode

Manual Mode can be accessed at any time. However, the default SAM Control Center is the landing screen (shown on left-side of Figure 56) until the pump is engaged or the Auto Mode Home screen (shown on right-side of Figure 56) when the pump is engaged.

Figure 56. Entering Manual Mode (From Landing or Home Screen)

No matter which screen is displayed, touch the MANUAL MODE button (orange) and then touch YES (to confirm–see Figure 57) to access SAM Manual mode. See Section 6.3 (page 65) for SAM operation.

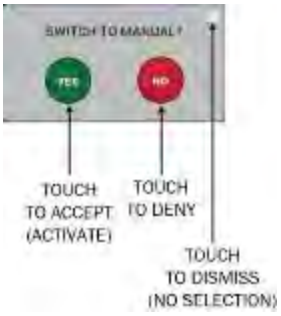

Figure 57. Popup Confirm/Deny (Yes/No) Buttons

6.2 Startup

ATTENTION ⚠ WARNING

NOT ALL GLOVES ALLOW THE SAM TOUCHSCREENS TO FUNCTION. TEST GLOVES ON ALL OF THE SAM TOUCHSCREENS PRIOR TO OPERATING SAM. DO NOT WEAR GLOVES THAT PREVENT THE TOUCHSCREENS FROM OPERATING.

ATTENTION ⚠ WARNING

SAM TOUCHSCREENS DO NOT FUNCTION IF COMPLETELY COVERED AND/OR IMMERSED IN WATER. DO NOT ALLOW THE TOUCHSCREENS TO BE COMPLETELY COVERED/IMMERSED WITH WATER (OR ANY LIQUID). DRY THE SCREEN TO RESTORE FUNCTIONALITY.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS FUNCTION BETTER IF TOUCHED USING THE PAD PORTION OF THE FINGER WHILE WEARING GLOVES. THE TOUCHSCREENS OFTEN DO NOT FUNCTION WHEN TOUCHED USING THE SEAM PORTION OF A GLOVE.

IMPORTANT ⚠ NOTICE

ONLY TOUCH THE SCREEN IN ONE PLACE AT A TIME. THE TOUCHSCREENS DO NOT SUPPORT MULTI-TOUCH.

At (or prior to) the initial SAM system startup, configure/select/setup the items described in the following subparagraphs.

6.2.1 Changing End User Customizable/Configurable Items

Use the procedure below to access the available system options tabs then see the following subparagraphs for the procedures available to customize/configure Quicksets, friendly names and/or colors of a discharge valve and intakes.

The following is the list of what can be changed by an end user (Fire Department) (no USB key required.)

- Assign Quicksets to the home screen
- Arrange the order of Quicksets displayed on home screen
- Assign/change color(s) displayed for a discharge

Perform the following to access the available system options tabs.

A. On SAM Control Center Home screen, touch System Options icon (touch and hold icon if required). See Figure 21, page 23.

B. When Enter Password screen is displayed (see Figure 22, page 24), enter applicable password as follows.

   1. Sequentially, touch password digits.
   2. Touch ENTER button.

C. When Display Menu appears, touch desired tab as follows.

   1. To create/modify Quicksets, touch Display tab, and see paragraph 6.2.1.1, Assigning Quicksets To The Home Screen or paragraph 6.2.1.2, How To Change The Order Of (Or Delete) Quicksets On The Home Screen.
   2. To change user/dealer password, touch Security tab, and see paragraph 6.2.1.3, Change User/Dealer Password (page 59).

6.2.1.1 Assigning Quicksets To The Home Screen

To initially select the Quicksets displayed on the SAM Auto Mode Home screen (when none are displayed/selected), simply touch and drag the desired discharge to the desired Quickset position. Once the four Quicksets have been populated, no other changes/selections can be made on this screen without a reset.

To delete the existing Quicksets or change their position on the SAM Auto Mode Home screen, see paragraph 6.2.2.2, How To Change The Order Of Quicksets On The Home Screen (page 58).

Perform the following to assign up to four (4) Quickset buttons to the home screen.

A. Touch and hold system options button until loading icon completes circle (Figure 22, page 23) and Enter Password icon group appears.

B. Using password icon group, touch user/dealer password (see Table 6, page 51) digits, then touch ENTER button, to enter Display Menu screen (Figure 24, page 24).

C. Touch DISCHARGE QUICKSETS button to enter DISCHARGE SETTINGS screen (see Figure 58).

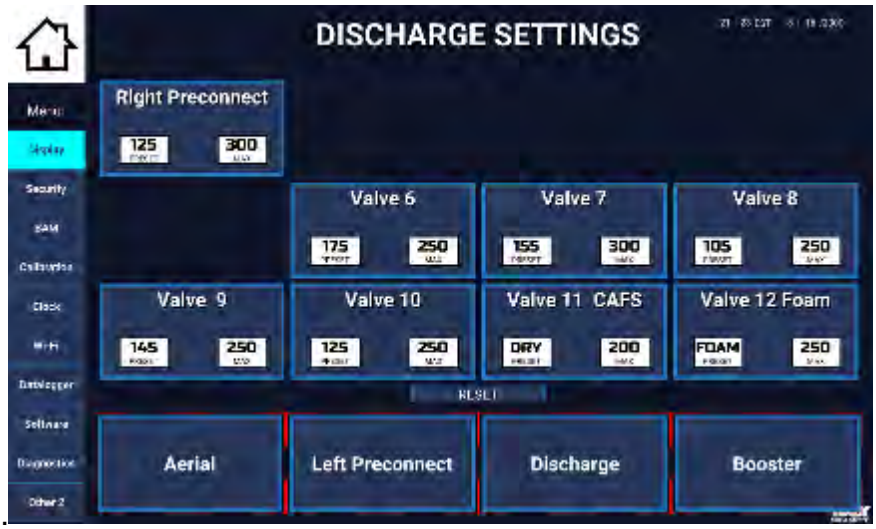

Figure 58. Discharge Settings Screen

D. Touch and drag desired discharge valve (select from 12 listed at top of screen) to desired Quickset position (listed at bottom of screen).

NOTES

HomeScreenQuickset1 thru HomeScreenQuickset4 display on the home screen from the left most position to the right most position.)

Repeat this step up to three (3) times to assign multiple Quickset buttons to the home screen.

E. Touch Home button.

6.2.1.2 How To Change The Order Of (Or Delete) Quicksets On The Home Screen

To delete the Quicksets already displayed on the SAM Auto Mode Home screen, touch the RESET button on the DISCHARGE SETTINGS screen (see Figure 58). To change the order of the Quicksets that are displayed on the SAM Auto Mode Home screen also touch the RESET button and

after the reset, touch and drag the desired discharge (select from the 12 valves displayed at top of page) to the desired Quickset position (HomeScreenQuickset1 thru 4 targets displayed at bottom of page).

Perform the following to rearrange the order of the discharge valves displayed as Quickset or to change which discharge valve displays as a Quickset on the Auto Mode Home screen.

A. Touch and hold system options button until loading icon completes circle (Figure 21, page 23) and Enter Password icon group appears.

B. Using password icon group, touch user/dealer password (see Table 6, page 51) digits, then touch ENTER button, to enter Display Menu screen (Figure 24, page 24).

C. Touch DISCHARGE QUICKSETS button to enter DISCHARGE SETTINGS screen (see Figure 58).

NOTES

Record or note current Quickset assignments. (Most useful when only rearranging Quickset position on Home screen.)

HomeScreenQuickset1 thru HomeScreenQuickset4 display on the home screen from the left most position to the right most position.)

D. Touch RESET button (center of screen near bottom).

E. Touch and drag all desired discharge valves (select from the 12 listed at top of screen) to desired Quickset position (listed at bottom of screen).

F. Touch Home button.

6.2.1.3 Change User/Dealer Password

IMPORTANT ⚠ NOTICE

PERFORMING THIS PROCEDURE CAUSES SAM TO EXIT AUTO MODE.

Perform the following to change/set the user/dealer password for the system.

A. On SAM Control Center, touch and hold system options button until loading icon completes circle (Figure 21, page 23) and Enter Password icon group appears.

B. Using password icon group, touch user/dealer password (see Table 6, page 51) digits. (See Figure 22, page 24). Then touch ENTER button.

C. Touch ENTER button, to enter Change Password screen. (See Figure 22, page 24).

NOTES

The new password must ONLY consist of five [5] numbers. (No letters or symbols.)

Record or note current password. (Most useful when system is reset to factory defaults.)

The Enter Old Password text box is the default focus for this screen, if focus has been changed to anything else, touch the Enter Old Password text box (sets focus to the box) so the current password can be entered.

D. Enter current password in Enter Old Password box.

E. Touch Enter New Password text box. (Sets focus so the new password can be entered.)

F. Using the number pad, touch the desired digits of new password.

G. Touch ENTER button.

H. Wait for PASSWORD SAVED to appear. See Figure 59.

Figure 59. Security Tab - Password Saved

I. Touch Home button.

6.2.1.4 How To Assign/Change Low Tank Water Alarm Trigger Level

Perform the following to change/set the trigger level for the low tank water alarm trigger point.

A. On Pump Controller, touch and hold system options button until loading icon completes circle and Menu screen (Figure 50, page 38) is displayed.

B. Touch Password Entry button.

C. On Pump Controller, System Options, Password Entry screen (Figure 61, page 61), sequentially touch password digits.

NOTE

See Table 7, page 51, for the applicable password to set the Warning active at 5/8, 4/8, or 3/8 full point.

D. Touch ENTER button.

E. Touch Exit button.

F. Touch Back To Previous Screen button. (See Table 3, page 14.)

6.2.2 How To Configure Pump Controller Parameters

To configure the SAM Speaks volume level, name (or rename) a camera (display for video tab), calibrate the ITL-40 (water level for the onboard water tank), or change the way the onboard water tank level is displayed on the TANK tab of the Pump Controller enter the appropriate access password listed in Table 7 (page 51).

A. On SAM Pump Controller, touch System Options icon (touch and hold icon if required). See Figure 60.

Figure 60. Pump Controller System Options Button And Loading Icon

B. When Menu screen is displayed (see Figure 50, page 38), touch Password Entry button.

Touching the Password Entry button (see Table 3), allows end users, OEMs, apparatus builders, and Hale FAST centers to enter specific passwords (see Table 7) required to configure/setup the Pump Controller parameters in the following subparagraph.

C. When Enter Password screen is displayed (see Figure 61), enter applicable password (see Table 7) as follows.

1. Sequentially, touch password digits.
2. Touch ENTER button.

Figure 61. Pump Controller System Options Password Entry Screen

6.2.2.1 Set The Volume For SAM Speaks (Spoken Alerts)

Enter the Volume password (see Table 7, page 51) to set the SAM Speaks audio level. See Figure 62. The volume indication range is displayed in percentage (%) ranging from 0 to 100 in 10% increments. Perform Step A to increase speaker volume or Step B to decrease speaker volume.

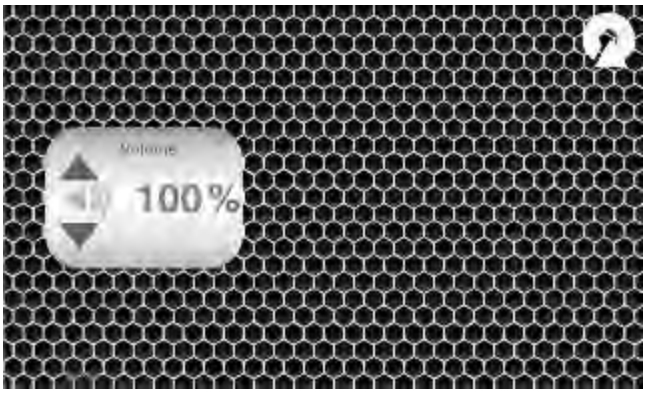

Figure 62. Set The Volume For SAM Speaks

A. To increase speaker volume, touch increase arrow ( ) once for each increase desired. (Note: Holding the button does NOT continue to increase the volume.)

B. To reduce speaker volume, touch decrease arrow ( ) once for each decrease desired. (Note: Holding the button does NOT continue to reduce the volume.)

6.2.2.2 Set Camera Names

Enter the Camera Names password (see Table 7, page 51) to rename any (or all) of the video inputs. Perform the following to change/set a cameras name.

A. On Pump Controller, touch and hold system options button until loading icon completes circle (similar to Figure 21, page 23) and Menu screen is displayed.

B. On Menu screen, touch Password Entry button. (See Figure 50, page 38.)

C. When Enter Password screen is displayed (see Figure 61, page 61), enter Camera Names password (see Table 7, page 51).

D. On Camera Names screen (Figure 63), touch desired name to change/set.

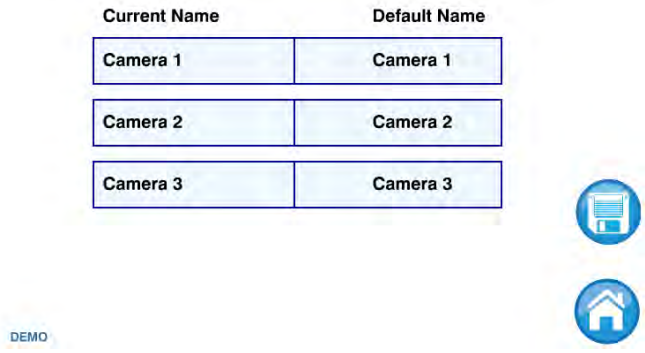

Figure 63. Set Camera Names

E. On keyboard screen (Figure 64), enter desired name as follows.

NOTES

Touch the Aa key to toggle between CAPITAL and lower case letters.

Touch Previous Screen button (see Table 3, page 14) to exit keyboard.

Names are limited to 30 characters.

1. Sequentially, touch letters and digits of desired name.
2. Touch Enter key.

Figure 64. Set Camera Names Keyboard Screen

F. Touch Save button (see Table 3, page 14).

G. Acknowledge Saving Complete. popup (Figure 65).

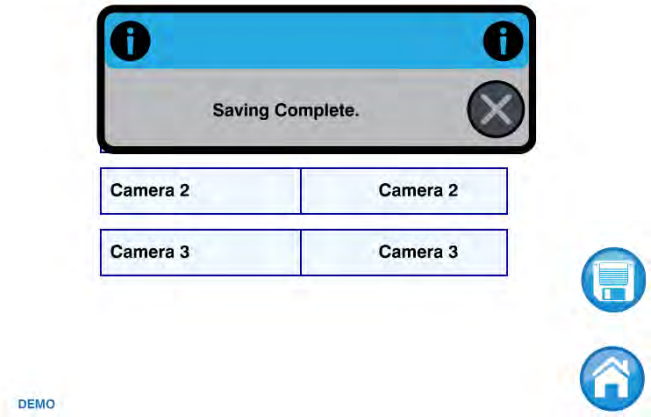

Figure 65. Camera Names Saved Acknowledgment

H. Repeat Step D thru Step G (above) until all desired assignments/changes have been made.

I. Touch Home button. (See Table 3.)

6.2.2.3 ITL-40 Calibration

Enter the ITL-40 Calibration password and perform the instructions in paragraph 8.1, ITL–40 Calibration Using SAM Pump Controller, page 123, to calibrate the ITL-40 level indications for display on the ITL-40, SAM Control Center, and the SAM Pump Controller.

6.2.2.4 Show/Hide VIDEO Tab (Cameras 1 Thru 3)

Enter the Do Not Show VIDEO Tab password to hide the entire VIDEO tab. To show the tab enter the applicable Show Video Tab (1 thru 3 inputs) listed in Table 7 (see page 51).

6.2.2.5 Tank Level Off/On

Enter the Tank Tab (Text Box Tank Level) password (see Table 7, page 51) to view the water level as one of three color/textual based icons on the TANK tab of the Pump Controller (see Figure 41, page 34).

Otherwise, enter the Tank Tab (Graphical Tank Level) password (see Table 7) to view the water level as a graphical based icon (similar to the one on the SAM Control Center) on the TANK tab of the Pump Controller (see Figure 66).

Figure 66. Tank Level Set To Graphical (On)

6.2.3 SELECT DEVICE Screen Displayed–Reboot To GUI Required

IMPORTANT ⚠ NOTICE

TOUCH ONLY THE SPECIFIED BUTTON(S). FAILURE TO PERFORM THIS PROCEDURE CORRECTLY MAY CAUSE SAM TO BECOME INOPERATIVE.

In the event the system displays the SELECT DEVICE screen (Figure 67) upon power up, perform the following to reboot the system to the SAM Auto Mode Home screen.

Figure 67. SELECT DEVICE MENU Screen

A. On SAM Control Center, on SELECT DEVICE screen, touch MENU icon (Table 3). MENU is displayed (Figure 68).

Figure 68. (HOME ICON) MENU Screen

B. Touch Reboot to GUI button. (See Figure 68.)

6.3 SAM Operation

ATTENTION ⚠ WARNING

AVOID CONTACT WITH HOT SURFACES. OVERHEATING MAY RESULT IN A SCALDING WATER HAZARD.

ATTENTION ⚠ WARNING

NOT ALL GLOVES ALLOW THE SAM TOUCHSCREENS TO FUNCTION. TEST GLOVES ON ALL OF THE SAM TOUCHSCREENS PRIOR TO OPERATING SAM. DO NOT WEAR GLOVES THAT PREVENT THE TOUCHSCREENS FROM OPERATING.

ATTENTION ⚠ WARNING

SAM TOUCHSCREENS DO NOT FUNCTION IF COMPLETELY COVERED AND/OR IMMERSED IN WATER. DO NOT ALLOW THE TOUCHSCREENS TO BE COMPLETELY COVERED/IMMERSED WITH WATER (OR ANY LIQUID). DRY THE SCREEN TO RESTORE FUNCTIONALITY.

IMPORTANT ⚠ NOTICE

ALL SAM TOUCHSCREENS FUNCTION BETTER IF TOUCHED USING THE PAD PORTION OF THE FINGER WHILE WEARING GLOVES. THE TOUCHSCREENS OFTEN DO NOT FUNCTION WHEN TOUCHED USING THE SEAM PORTION OF A GLOVE.

IMPORTANT ⚠ NOTICE

KEEP ALL I/O PORT COVERS IN PLACE DURING USE TO PREVENT WATER DAMAGE.

IMPORTANT ⚠ NOTICE

ONLY TOUCH THE SCREEN IN ONE PLACE AT A TIME. THE TOUCHSCREENS DO NOT SUPPORT MULTI-TOUCH.

SAM makes complex pump operations simple. SAM manages your discharge line pressures, so you can focus on the fireground, not the side of your truck, which helps you get water to your crew quickly.

The system automatically opens the tank-to-pump valve, so water is in the pump and the pump is ready to go. Quickly establish your water source, transitioning to a hydrant while supplying water

to the attack crew can be tricky. SAM controls the transition and controls the engine speed during the process to keep water flowing smoothly without disruption.

Then tell SAM what discharge lines to open and their set pressure with a few swipes on the screen and SAM takes care of the details. SAM presets allow the pump operator to set discharge pressures fast.

Moreover, SAM keeps water flowing, managing multiple lines at different pressures and maintains all the set pressures while monitoring intake pressure. After a water supply is established, the system automatically refills the tank, so it is always full. If there is an issue with the water supply, SAM switches back to tank and alerts the operator helping to prevent any interruptions in supply and providing time so the issue can be addressed.

6.3.1 Auto Mode

Each apparatus is different/unique regarding getting ready to pump. Follow the local SOGs and/or the OEM/apparatus builder instructions to prepare the apparatus to pump.

When SAM is powered on and the communication/interlocks (listed below) are NOT established, the SAM Control Center displays the SAM landing screen (left-side of Figure 69) and the Pump Controller displays the splash screen (left-side of Figure 70). Once the listed conditions are met the SAM Control Center transitions to the Auto Mode Home screen (right-side of Figure 69) and the Pump Controller transitions to a SAM controlled state and displays the SAM AUTO MODE ACTIVE banner (right-side of Figure 70).

- Pump Engaged (Shifted from Road to Pump)
- Throttle Ready (Truck in Drive and 4th gear lockup)
- Optional OEM Interlock (Auxiliary Interlock)
- Blue CAN Bus
  (ECM to Governor Module Communications)

Figure 69. SAM Control Center (Transition Landing To Auto Mode Home Screen)

Figure 70. Pump Controller (Transition Splash To Auto Mode Home Screen)

Getting SAM into Auto Mode requires all the applicable bulleted items (listed above the figures) to be met. Additionally, SAM requires truck supplied compressed air (from the brake system) and water in the onboard water tank.

SAM performs many functions; however, SAM does NOT adjust for friction losses or altitude. The system simply maintains pressure set points as measured near each individual discharge valve. Therefore, the system can NOT alleviate static pressures. Residual pressure in the system builds in the discharge lines when that particular line is not flowing water or not flowing enough water to be gated. The system notifies the operator that the discharge is in this state by displaying a low flow indication for each applicable discharge. The pressure can be dangerous on larger discharges, therefore, setting a smaller discharge line at a higher pressure exposes the large hose (or large discharge) to the higher pressure and is NOT recommended.

6.3.1.1 Selecting The Desired Pumping Method

When SAM initializes Auto Mode, the system floods the pump with water from the onboard water tank by opening the tank-to-pump valve and removes the air by placing the tank fill valve in auto (opens the valve to circulate water for 30 seconds) performing the equivalent of priming the pump. (So, the system always starts by pumping from tank water.)

NOTE

Table 1 thru Table 3 (page 14) shows the buttons/icons/target displayed on the SAM Control Center.

At this point the operator can begin flowing water by opening a discharge via one of two (2) ways: 1. By activating a Quickset, or 2. By touching the PUSH TO PUMP button/target. The operator must be aware of the onboard water tank capacity verses the flow rate to ensure adequate time is available to establish an offboard water supply before exhausting the onboard supply. (See paragraph 6.3.1.3; Using Discharge Quicksets, Presets, And The SET PRESSURE Icon Group; page 71.)

Equally important at this point is deciding which of the two (2) pumping methods is to be used:
1. HYDRANT (Auto Modes default–see paragraph 6.3.1.2) or
2. DRAFT (See paragraph 6.3.1.4, page 74).

To toggle between either of the two (2) pumping methods, touch the hydrant icon and drag it to the draft target or touch the draft icon and drag it to the hydrant target. See Figure 71.

Figure 71. Toggle To Desired Pumping Method

6.3.1.2 Pumping From Hydrant (Or Any Positive Pressure Source)

ATTENTION ⚠ WARNING

A PRESSURE HAZARD MAY EXIST EVEN WHEN THE PUMP IS NOT RUNNING. PRIOR TO REMOVING HOSES OR CAPS FROM PUMP CONNECTIONS, RELIEVE PRESSURE BY OPENING DRAINS. BLEEDER VALVES SHOULD ALSO BE USED WHEN CONNECTING TO AN INTAKE FROM A PRESSURIZED SOURCE.

ATTENTION ⚠ WARNING

ALWAYS FOLLOW LOCAL GUIDELINES FROM THE AHJ AND THE APPARATUS MANUFACTURER.

ATTENTION ⚠ WARNING

ALWAYS FOLLOW PROPER OPERATING PROCEDURES. THE PUMP OPERATOR MUST BE FAMILIAR WITH THE PUMP AND SAM OPERATING INSTRUCTIONS AS WELL AS OTHER OPERATING GUIDELINES FOR THE APPARATUS AND ACCESSORIES.

NOTE

Any manual activation initiated by the operator cancels auto flow operations.

If supply hose is connected and hydrant is open, transition will begin. Otherwise connect hose, open hydrant, then activate the hydrant intake by performing the following.

A. On SAM Control Center, touch and drag corresponding intake button to the associated target. See Figure 72.

Figure 72. Activating An Intake

NOTE

If intake is NOT adjacent to the SAM Control Center pressing the button on the MIV-Auto placard (located at the intake) activates the intake as if swiping on the SAM Control Center.

B. SAM Control Center displays VENTING while air bleeds from intake to onboard water tank. See Figure 73. (Bleeding the air prevents the bulk of the air from entering the pump.)

Figure 73. Activating A Hydrant Intake Sequence (Air Bleed)

C. Operator observes as SAM opens desired master intake valve using an algorithm that compensates for pressure changes that occur as a result of remaining air and/or turbulence created by opening valves disc. See Figure 74.

Figure 74. Activating A Hydrant Intake Sequence (MIV Disc Opening)

D. SAM displays (and annunciates via SAM Speaks) HYDRANT ESTABLISHED to notify operator intake pressure has exceeded Low intake pressure control threshold. See Figure 75.

Figure 75. Activating A Hydrant Intake Sequence (Hydrant Established)

NOTES

The operator may touch the DISMISS button to clear the popup.

Or the operator may allow the popup to clear via a 5 second timeout.

The low intake pressure control threshold is user settable (accessed via OEM/Technician password). Notify the AHJ if a change is required.

E. SAM Control Center continues to display OPENING until master intake valve position sensor indicates master intake valve is fully open and sequence is complete. See Figure 76.

Figure 76. Activating A Hydrant Intake Sequence (Complete)

SAM closes tank-to-pump valve and fills the water tank as the water supply permits. All this can be done while flowing water or before the discharge is opened.

6.3.1.2.1 Bypass Venting

If desired (or as a bypass, when HYDRANT DETECTION SENSOR LOST. USE OVERRIDE is displayed), the venting time may be reduced or bypassed as follows.

A. On SAM Control Center, while VENTING is displayed for an intake, touch VENTING button. (See Figure 73, page 68.)

B. On popup window, touch YES button. (See Figure 77.)

Figure 77. Active Force Intake X Open Popup

NOTE

Touching NO cancels the command and does nothing.

6.3.1.2.2 Bypass Opening

If desired (or as a bypass, when HYDRANT DETECTION SENSOR LOST. USE OVERRIDE is displayed), the opening time may be reduced or bypassed as follows.

A. On SAM Control Center, while OPENING is displayed for an intake, touch OPENING button. (See Figure 74, page 69.)

B. On popup window, touch YES button. (See Figure 77.)

NOTE

Touching NO cancels the command and does nothing.

6.3.1.3 Using Discharge Quicksets, Presets, And The SET PRESSURE Icon Group

Quicksets are discharges set up by authority of the AHJ. The Quickset discharge (including automated activation of the associated discharges preset pressure) has been pre-programed to display in the Quickset area of the Auto Mode Home screen.

6.3.1.3.1 Activating A Quickset

ATTENTION ⚠ WARNING

DO NOT EXCEED OPERATING PRESSURE LIMITS OF PUMP, INSTALLED PLUMBING, HOSE(S), OR EQUIPMENT IN USE.

After ensuring hose(s) are attached and deployed, perform the following.

A. Touch desired Quickset bubble (lower right section of the screen, see the right-side of Figure 78). Button highlights (see the left-hand side of Figure 78).

Figure 78. Activating Quickset Discharges (Touch–Drag–Drop)

B. Drag button onto Quickset target (PUSH TO PUMP) (see center of Figure 78).

C. Release button over Quickset target (PUSH TO PUMP) (see center of Figure 78 Quickset actives discharge (see the right-hand side of Figure 78).

SAM increases engine speed to provide the required pressure and the discharge valve opens to charge the line, then SAM controls as required to maintain the set line backpressure.

Once one discharge is opened, the discharge appears on the screen in the discharge area. SAM can automatically control up to six (6) discharges. To add more discharges simply: 1. Activate another Quickset. or 2. Touch the ADD LINE button.

6.3.1.3.2 Using The ADD LINE Button/Target

Touching the ADD LINE button displays the SELECT DISCHARGE screen (see left-hand side of Figure 79). The SELECT DISCHARGE screen shows all available discharges.

To activate a discharge using the ADD LINE button, perform the following.

A. Touch ADD LINE button. (See the right most side of Figure 78.)

B. On SELECT DISCHARGE, screen, touch desired discharge button. (See the left-hand side of Figure 79.)

Set the desired discharge pressure using either, the preset button (upper right of Figure 79) or the SET PRESSURE icon group (lower right of Figure 79).

C. Use preset button as follows.

1. Touch preset button (175 PSI) (upper right of Figure 79). Button highlights and target strobes.

NOTE

The preset button is always displayed in the upper right-hand side of the screen.

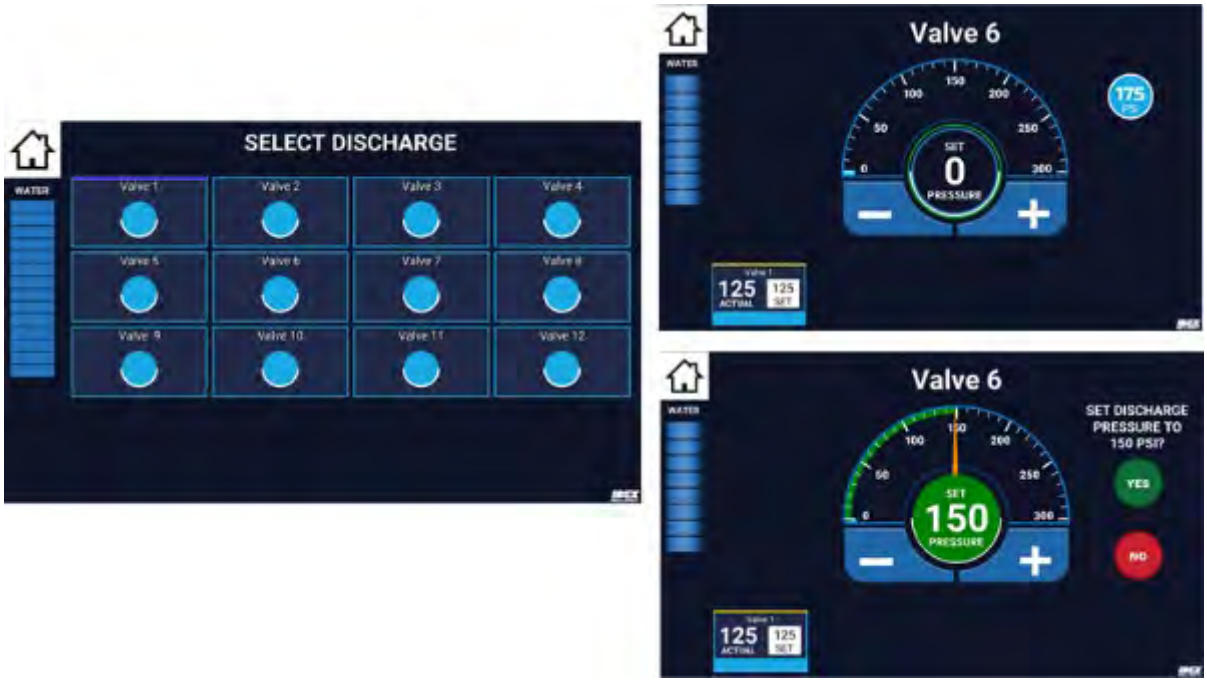

Figure 79. Activating Additional Discharges

2. Drag preset button to target (SET PRESSURE) (center of the digital pressure display). (See upper right-side of Figure 79.)

3. Release preset button over target (SET PRESSURE).

D. Or use SET PRESSURE icon group as follows.

NOTES

The pressure is also indicated digitally in the center of the icon group.

The pressure can NOT be set above the maximum pressure assigned to that discharge. (The maximum pressure is assigned/changed by the OEM/apparatus builder/dealer.)

1. Touch + button until needle indicates desired pressure. (If required, use–button to lower pressure.) When + button is released, a popup confirmation is displayed.
2. Touch YES to activate the new line or touch NO to do nothing.

6.3.1.3.3 Changing A Discharges Pressure/Closing The Valve

To change the set pressure of an open line, perform the following.

A. Touch associated Discharge Square (see right most screen on Figure 78).

B. Use VALVE x screen to change the pressure setting as follows. (See Figure 80.)

1. To increase setting touch +.

Figure 80. Change A Discharge Pressure

2. To decrease setting touch –.
3. Repeat touching appropriate button until desired pressure is displayed.
4. Touch YES to activate new setting or touch NO to do nothing.

NOTE

The icon group can be used to close a discharge. Simply set the pressure to 0 and confirm the new setting.

For automated discharge closure perform the following.

A. Touch CLOSE LINE button (see Figure 80). When touched button highlights (Figure 81–Left) and target strobes.

Figure 81. Closing A Discharge (Using Stop Button)

B. Drag button to SET PRESSURE target (Figure 81–Center).

C. Release button (remove finger from screen).

The CLOSE LINE button activates automatically (the same as a preset would). No confirmation is required.

If the operator only touches and releases the button; a confirmation popup window appears (Figure 82). Touch the YES button to close the line or the NO button to make no change.

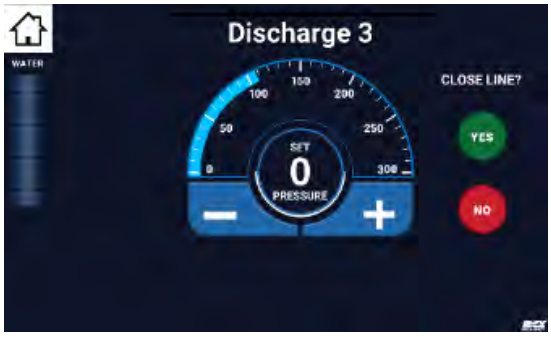

Figure 82. Stop Button Popup Confirmation Window

6.3.1.3.4 Low Intake Pressure Control Mode

While in low intake pressure mode the system continuously monitors the intake pressure. If the discharge flow causes the intake pressure to drop below a preset value (user selectable value) SAM instructs the governor to go into INTAKE mode which throttles the engine down to hold the intake pressure to protect both the pump and the water supply from damage.

The system alerts the operator when it is actively managing a low intake pressure state as follows:

- Popup WARNING messages appear on the SAM Control Center and the Pump Controller. (Touch either message to confirm.)
- On the SAM Control Center, the intake pressure displays background color turns Red.
- On the Pump Controller the intake pressure displays background color turns Orange and flashes. Additionally, an Alert icon appears and strobes continuously.
- SAM provides a dual audible alert, the buzzer sounds and an audio announcement is broadcast over the speakers.

6.3.1.4 Pumping From Draft

IMPORTANT ⚠ NOTICE

DO NOT RUN THE PRIMER FOR MORE THAN 45 SECONDS. IF PRIME IS NOT ACHIEVED IN 30–45 SECONDS, STOP AND LOOK FOR AIR LEAKS OR BLOCKED SUCTION HOSE.

The SAM system power on default is pump from a pressurized source (hydrant), to pump from draft toggle the pump method to DRAFT. See paragraph 6.3.1.1, Selecting The Desired Pumping Method (page 67). To initiate drafting:

- Select the drafting site. (Ensure adequate water depth and quality. Ensure location is accessible, stable, and on an approved surface.)
- Connect hard LDH (suction) hose (including strainer and/or siphon) to the desired master intake valve.

Then perform the following.

A. On SAM Control Center, touch and drag HYDRANT button to DRAFT. See top-left of Figure 83.

NOTES

A master intake valve may be opened multiple ways. Use the easiest method (typically determined by proximity, convenience, or local procedure). Perform instructions from paragraph 6.3.2.1, page 83.

When in Auto Mode, SAM will NOT run the primer longer than the NFPA recommended priming time, shutting it off if prime can NOT be reached.

B. Touch and drag corresponding intake button to associated target. See top-right of Figure 83.

Figure 83. Initiating A Draft (Transition Shown Top-Left To Bottom-Right)

1. SAM pre–primes suction hose up to master intake valve. (The primer can be heard running.) See top–right of Figure 83.
2. SAM opens associated priming valve routing air/water to the water column sensor. (The SAM Control Centers, DRAFT INTAKE RIGHT button, flashes during priming and until master intake valve is fully open.)
3. SAM opens master intake valve slowly and closes tank-to-pump valve (simultaneously).

NOTES

If the SAM Control Center is not in sight the MIV-Auto (houses a green indicator ring that also provides status indications) button for the master intake valve. The ring is illuminated steady green while the master intake valve is closed, flashes green while the master intake valve is opening (or closing) and extinguishes when the master intake valve is fully open.

Priming is indicated audibly by the sound of the priming pump running.

4. SAM monitors discharge pressure.

NOTE

SAM primes again if the discharge pressure falls.

5. SAM opens tank fill valve until onboard water tank is refilled.

NOTE

The SAM Control Center WATER indicator displays chevrons while the onboard water tank is refilling.

6.3.1.5 Twister Operations (In SAM Auto Mode)

The SAM system limits the action of the Twister electronic throttle knob (see Figure 40, page 34) while SAM is operating in Auto Mode. When SAM is in Auto Mode, the governor operation is in PSI Mode by default for water and/or foam and RPM Mode by default for CAFS.

The Twister is not used when in SAM Auto Mode. The Twisters response (with SAM in Auto Mode) is only intended to indicate the Twister is connected and working. The system returns to the automated set point almost immediately.

6.3.1.5.1 Emergency IDLE Button

Pressing the red IDLE button (Figure 84) ALWAYS provides EMERGENCY IDLE, causing SAM to exit Auto Mode and enter Manual Mode. At the same time, causing the engine to go to idle and the PSI/RPM Mode of the Pump Controller to no longer function. The Pump Controller displays the governor MODE OFF screen (see Figure 85).

Figure 84. Emergency Idle Button Panel

Figure 85. Governor MODE OFF Screen

To exit the off mode, touch the MODE OFF button, the governor becomes functional again in RPM Mode. Touching the MODE RPM button transitions the governor to PSI Mode.

6.3.1.6 Mobile Operations–From Tablet

ATTENTION ⚠ WARNING

THE TABLET COMMUNICATES THROUGH THE SAM CONTROL CENTER LOCATED IN THE OPERATORS PANEL, IF THAT SCREEN FAILS, THE TABLET WILL NOT CONTROL THE APPARATUS.

IMPORTANT ⚠ NOTICE

DO NOT HARD SHUTDOWN THE TABLET (POWER OFF BY HOLDING THE POWER BUTTON FOR LONGER THAN 5 SECONDS). A HARD SHUTDOWN MAY CORRUPT THE OPERATING SYSTEM, MAKING THE TABLET UNUSABLE.

IMPORTANT ⚠ NOTICE

ONLY TOUCH THE SCREEN IN ONE PLACE AT A TIME. THE TOUCHSCREENS DO NOT SUPPORT MULTI-TOUCH.

The SAM tablet is turned on by pressing and holding the power button ( ) for 10 seconds. See Figure 86.

Figure 86. Press And Hold Power Button (To Power On Tablet)

The SAM tablet (shown in docking station) user interface (Figure 87, Left) provides the operator remote control of the water supply and discharge ONLY in automatic mode. The display is similar to the SAM Control Center (Figure 87, Right) however differs in that the screen is initially locked (requiring operator action for access) and the Emergency Idle button is provided as a soft button (displayed on the screen). Use of the tablet IDLE button is available even if the screen locked. The tablet user interface can also be operated with a gloved hand.

Figure 87. Tablet Touch Screen (Left) SAM Control Center (Right)

6.3.1.6.1 Emergency IDLE Activation (From A Locked Screen)

If the tablet screen is locked and activation of an emergency IDLE is required; touch the IDLE button. Then drag the IDLE button to the target and lift finger off the screen. See Figure 88.

Figure 88. Emergency IDLE Activation (From A Locked Screen)

A popup confirmation is displayed (prevents inadvertent activation, see Figure 89). Touch the YES button.

Figure 89. Emergency IDLE Activation (Popup Confirmation)

The SAM system is placed in Manual Mode, the tablet user interface is unavailable (until SAM Auto Mode is reestablished) and the tablet screen displays a notice and instructions (see Figure 90).

Figure 90. Emergency IDLE Activated Screen

Return to the operator panel (specifically the collocated SAM Control Center and the Pump Controller Touch Screen location) immediately.

6.3.1.6.2 Unlocking The Tablet Display

To utilize the tablet to operate SAM under normal remote operating conditions (SAM Auto Mode), the screen must be unlocked. At the top of the tablet press the + button (the right most of the three buttons located side-by-side on top of the tablet). See Figure 91. The SLIDE TO UNLOCK popup will appear. See Figure 92.

Figure 91. Press + Button To Unlock The Tablet

Figure 92. Unlock Screen Popup

Touch and drag the popup button to the popup target. (See Figure 93.)

Figure 93. Unlock Screen Popup Button And Target

The tablet interface now functions the same as the SAM Control Center. For further quick start information reference the main body of the Quick Start Guide (FSG-MNL–00209).

6.3.1.6.3 Additional Tablet Indicators (% Battery And Signal Strength)

The pump operator should constantly be aware of the % battery and wi-fi signal strength indicators (Figure 94).

Figure 94. % Battery And Wi-Fi Signal Strength Indicators

6.3.1.6.4 Loosing Wi-Fi Signal

If the wi-fi signal strength falls below an acceptable level the tablet displays a warning. (See Figure 95.)

Figure 95. Wi-Fi Signal Strength Warning Example

Touch CONFIRM to dismiss the popup.

IMPORTANT ⚠ NOTICE

IF THE TABLET-TO-SAM WI-FI CONNECTION IS LOST, RETURN TO A SAM CONTROL CENTER ON THE APPARATUS IMMEDIATELY.

NOTE

If the tablet completely loses signal when moving away from the apparatus, and does not reacquire signal when returning to the apparatus, shutdown the tablet as described in paragraph 6.4.1 (page 114) and then turn it on as described in section 6.3.1.6 (page 77).

6.3.1.6.5 Manual Operation (NOT Available From The SAM Tablet)

The tablet can NOT operate the SAM system in Manual Mode. If Manual Mode is required, the operator must return to a SAM Control Center (on the pump panel), to active Manual Mode, and remain at a SAM Control Center to control the intake and discharge valves and the Pump Controller (or Twister) to control the governor directly.

6.3.1.7 Navigator Pro Operations (In SAM Auto Mode)

If equipped with Navigator Pro controllers (Figure 96), the controllers for all discharge valves are disabled in SAM Auto Mode. Therefore, if any associated Navigator Pro buttons are pressed while SAM is in Auto Mode, a Notice will appear on the SAM Control Center and the command will NOT be activated.

Figure 96. Navigator Pro Controllers (9323, 9335, 9327)

Navigator Pro controllers for auxiliary intake (Pony) valves are NOT disabled in SAM Auto Mode. However, Hale does NOT provide automation for or recommend using a Pony in SAM Auto Mode.

6.3.2 Manual Mode

ATTENTION ⚠ WARNING

A PRESSURE HAZARD MAY EXIST EVEN WHEN THE PUMP IS NOT RUNNING. PRIOR TO REMOVING HOSES OR CAPS FROM PUMP CONNECTIONS, RELIEVE PRESSURE BY OPENING DRAINS. BLEEDER VALVES SHOULD ALSO BE USED WHEN CONNECTING TO AN INTAKE FROM A PRESSURIZED SOURCE.

ATTENTION ⚠ WARNING

DO NOT EXCEED OPERATING PRESSURE LIMITS OF PUMP, INSTALLED PLUMBING, HOSE(S), OR EQUIPMENT IN USE.

Manual Mode for the SAM system is intended to support annual pump testing, or as an electronic backup incase Auto Mode fails to operate the apparatus as desired, or any other case where the operator may want to control the valves and pressures manually.

Manual Mode can be entered from the SAM Control Center; directly from the SAM landing screen or from the Auto Mode Home screen. Perform the following to enter Manual Mode.

A. Touch MANUAL MODE button. The button is located at the bottom left of both screens (see Figure 56, page 56).

B. On acknowledgment popup (see Figure 57, page 56), touch YES button.

With SAM in Manual Mode, governor operations are limited to the Pump Controller on the operator panel and are limited to PSI or RPM Mode. See Section 6.3.4, Governor Operations From The Pump Controller (page 100) for governor operating instructions.

With SAM in Manual Mode, pumping operations are limited to the SAM Control Center on the operator panel and are limited to discharge and intake source management and pump operations require the Pump Controller and/or Twister.

Priming is limited to the traditional PRIME placard button. Air bleed operations are limited to the physical air bleed valve (Blue handle) on the MIV 2.0 placard.(Reference SAM Parts Manual [FSG-MNL-0212].) Master intake valves can be operated from the soft buttons on the SAM Control Centers and/or from the CLOSE/OPEN rocker switch on the MIV 2.0 placard.

When the SAM system is in Manual Mode the MANUAL VALVE CONTROL screen (Figure 97) is displayed on the SAM Control Center, and the default governor (or selected tank, pump info, engine data, or video) screen (default = Figure 32, page 30, or Figure 39, page 33, selected = Figure 41, page 34; Figure 42, page 35; Figure 48, page 37; or Figure 49, page 37 respectively) is displayed on the Pump Controller.

Figure 97. Manual Valve Control Screen

6.3.2.1 Opening An Intake

IMPORTANT ⚠ NOTICE

DO NOT RUN THE PRIMER FOR MORE THAN 45 SECONDS. IF PRIME IS NOT ACHIEVED IN 30–45 SECONDS, STOP AND LOOK FOR AIR LEAKS OR BLOCKED SUCTION HOSE.

A SAM equipped apparatus utilizes two (2) types of intake valves: Master intake valves and auxiliary (Pony) valves. There are three (3) separate ways to manually open an intake valve (master intake valve or Pony) on a SAM equipped apparatus. Two (2) methods are electronic and one (1) method is physical.

6.3.2.1.1 MIV Manual/Physical Procedures

There are two (2) methods to electronically open/close an MIV in SAM Manual Mode. See the following subparagraphs for non-automated (manual) MIV operating procedures. For MIV physical override procedures, see paragraph 6.3.6.1 (page 103).

6.3.2.1.1.1 MIV SAM Manual Mode Procedures

Perform the following, as applicable and/or as desired, to electronically open a master intake valve. Use Step A to manually open an MIV from the SAM Control Center or Step B to open an MIV from the associated MIV-2.0 placard (located on the apparatus panel at the MIV).

A. On operator panel, using SAM Control Center, open desired intake as follows.

1. Display MANUAL VALVE CONTROL screen as follows.
   a) On SAM Control Center (from the SAM landing screen or from Auto Mode Home screen) touch MANUAL MODE button. (See Figure 56, page 56.)
   b) Touch YES button on acknowledgment popup. (See Figure 57.)
2. Touch and hold + button on valve close/open icon group (Figure 98) for desired master intake valve. (All progress bars eventually illuminate and the + button transitions to the VALVE OPEN indicator. The VALVE CLOSED indicator transitions to the—button as soon as the valve partially opens.)

Figure 98. Intake Close/Open Icon Group (Open)

B. On associated MIV 2.0 placard (reference SAM Parts Manual, FSG-MNL-0212), open desired master intake valve as follows.

NOTE

On the associated MIV 2.0 placard, if the green indicator portion of the OPEN/CLOSE rocker switch is illuminated, the valve is already fully open.

1. Push and hold OPEN portion of rocker switch.

NOTE

If the MIV is somewhere between fully open and fully closed, the OPEN/CLOSE rocker switch is alternately illuminated red and green. The MIV should NOT be left in this condition, doing so causes excessive wear to the valve.

2. Release switch when OPEN indicator illuminates steady green.

NOTE

To physically verify master intake valve position there is an indicator arrow located on the master intake valve gearbox that points to an OPEN or a CLOSE label when the master intake valve is fully in that position.

6.3.2.1.2 Auxiliary (Pony) Intake (Akron Brass Valve) Manual Procedures

Perform the following, as applicable and/or as desired, to electronically open a Pony intake (typically Step A. or Step B.). For the Pony intake physical override procedure, see paragraph 6.3.6.2 (page 104).

A. On operator panel, using SAM Control Center, open desired intake as follows.

1. Display MANUAL VALVE CONTROL screen as follows.

   a) On SAM Control Center (from the SAM landing screen or from the Auto Mode Home screen) touch MANUAL MODE button. (See Figure 56, page 56.)

   b) Touch YES button on acknowledgment popup. (See Figure 57.)

2. Touch and hold + button on valve close/open icon group (see Figure 98) for desired Pony intake. (All progress bars eventually illuminate and the + button transitions to the VALVE OPEN indicator. The VALVE CLOSED indicator transitions to the—button as soon as the valve partially opens.)

B. Optionally, ONLY on associated Navigator, open desired Akron Brass valve as follows.

NOTE

The Navigator Pro may be a model 9323, a 9327, or a 9335 and are provided ONLY as an option.

1. If using a Navigator Pro 9323, reference paragraph 8.1, Opening And Closing The Valve, in Style 9323 Navigator Pro Valve Controller Installation, Operating, And Maintenance Instructions (P/N 123251).

2. If using a Navigator Pro 9327, reference paragraph 9.1, Opening And Closing The Valve, in Style 9327 Navigator Mini Valve Controller Installation, Operating, And Maintenance Instructions (P/N 126898).

3. If using a Navigator Pro 9335, reference paragraph 8.1, Opening And Closing The Valve, in Style 9335 Navigator Pro With Pressure, Flow CAFS And Valve Control Installation, Operating, And Maintenance Instructions (P/N 126914).

6.3.2.2 Opening A Discharge

ATTENTION ⚠ WARNING

A PRESSURE HAZARD MAY EXIST EVEN WHEN THE PUMP IS NOT RUNNING. PRIOR TO REMOVING HOSES OR CAPS FROM PUMP CONNECTIONS, RELIEVE PRESSURE BY OPENING DRAINS. BLEEDER VALVES SHOULD ALSO BE USED WHEN CONNECTING TO AN INTAKE FROM A PRESSURIZED SOURCE.

Perform the following, as applicable and/or as desired, to manually (electronically) open a discharge (typically Step A. or Step B.). To physically override a discharge valves position, see paragraph 6.3.6.2 (page 104).

A. On operator panel, using SAM Control Center, open desired discharge as follows.

1. Display MANUAL VALVE CONTROL screen as follows.

   a) On SAM Control Center (from the SAM landing screen or from the Auto Mode Home screen) touch MANUAL MODE button. (See Figure 56, page 56.)

   b) Touch YES button on acknowledgment popup. (See Figure 57.)

2. Touch and hold + button on valve close/open icon group for desired discharge. (All progress bars eventually illuminate and the + button transitions to the VALVE OPEN indicator. The VALVE CLOSED indicator transitions to the— button as soon as the valve partially opens.) (Similar to Figure 98.)

B. Optionally, ONLY on associated Navigator Pro, open desired Akron Brass valve as follows.

IMPORTANT ⚠ NOTICE

PERFORMING THIS PROCEDURE CAUSES SAM TO EXIT AUTO MODE.

IMPORTANT ⚠ NOTICE

THE NAVIGATOR PRO ASSOCIATED WITH A DISCHARGE VALVE DOES NOT OPERATE THE VALVE (PRESSURE READING FUNCTIONS AS A DISPLAY ONLY) WHEN SAM IS IN AUTO MODE.

NOTE

The Navigator Pro may be a model 9323 or a model 9335 and are provided ONLY as an option.

1. If using a Navigator Pro 9323, reference paragraph 8.1, Opening and closing the valve, in Style 9323 Navigator Pro Valve Controller Installation, Operating, And Maintenance Instructions (P/N 123251).

2. If using a Navigator Pro 9335, reference paragraph 8.1, Opening and closing the valve, in Style 9335 Navigator Pro With Pressure, Flow CAFS And Valve Control Installation, Operating, And Maintenance Instructions (P/N 126914).

6.3.2.3 Closing A Discharge

ATTENTION ⚠ WARNING

A PRESSURE HAZARD MAY EXIST EVEN WHEN THE PUMP IS NOT RUNNING. PRIOR TO REMOVING HOSES OR CAPS FROM PUMP CONNECTIONS, RELIEVE PRESSURE BY OPENING DRAINS. BLEEDER VALVES SHOULD ALSO BE USED WHEN CONNECTING TO AN INTAKE FROM A PRESSURIZED SOURCE.

ATTENTION ⚠ WARNING

DO NOT EXCEED OPERATING PRESSURE LIMITS OF PUMP, INSTALLED PLUMBING, HOSE(S), OR EQUIPMENT IN USE.

The Akron Brass valve closes the same way as it opens except the valve turns in the opposite direction. See paragraph 6.3.2.2, above.

6.3.2.4 Closing An Intake

IMPORTANT ⚠ NOTICE

WHEN CLOSING AN INTAKE IN MANUAL MODE, ENSURE THE PUMP HAS AN ADEQUATE WATER SUPPLY TO PREVENT OVERHEATING.

Perform the following, as applicable and/or as desired, to manually close a master intake valve (typically Step A. or Step B.) For MIV physical override procedures, see paragraph 6.3.6.1 (page 103).

A. On operator panel, using SAM Control Center, close desired intake as follows.

1. Display MANUAL VALVE CONTROL screen as follows.
   a) On the SAM Control Center (from the SAM landing screen or from the Auto Mode Home screen) touch MANUAL MODE button. (See Figure 56, page 56.)
   b) Touch YES button on acknowledgment popup. (See Figure 57.)
2. Touch and hold—button on valve close/open icon group (Figure 99) for desired master intake valve. (All progress bars eventually extinguish and the— button transitions to the VALVE CLOSED indicator. The VALVE OPEN indicator transitions to the + button as soon as the valve partially closes.)

Figure 99. Intake Close/Open Icon Group (Close)

B. On associated MIV 2.0 placard, close desired master intake valve as follows.

NOTE

On the associated MIV 2.0 placard, if the green indicator portion of the OPEN/CLOSE rocker switch is illuminated, the valve is fully open. If the red and green lights are toggling the valve is partially open and if the red indicator remains steady red when no switch is pressed the valve is fully closed.

1. Push and hold CLOSE portion of rocker switch for approximately 15 seconds. Close indicator illuminates steady red.
2. Release switch, if close indicator remains steady red master intake valve is closed. Otherwise repeat Step 1 and Step 2.

6.3.2.5 Return To SAM Auto Mode

To exit Manual Mode and return to automated operation (SAM Auto Mode), perform the following.

A. On SAM Control Center, at bottom of MANUAL VALVE CONTROL screen, touch ACTIVATE SAM AUTOFLOW button. See Figure 100.

Figure 100. Return To SAM Auto Mode

B. On popup confirmation box, touch YES to exit Manual Mode. See Figure 101.

Figure 101. Exit Manual Mode Confirmation

The border of each valve displayed in the SAM Control Center discharge control area turns orange to notify the operator the valves have been in Manually Mode. See Figure 102.

Figure 102. SAM Auto Mode After Manual Mode Indications

The manual settings will remain in effect until the valve has be controlled in Auto Mode. Once the valve has been controlled in Auto Mode the orange border is no longer displayed.

6.3.3 Miscellaneous Tasks

While in Manual Mode the Pump Controller is used to control the tank-to-pump and tank fill valves. These valves provide the operator the ability to fill the onboard water tank (tank fill valve) or use the onboard water tank as a water source for pumping Tank-to-pump valve). When used together, the valves provide the operator the ability to prime the pump and or circulate water to keep the pump cool.

6.3.3.1 Tank Fill And Tank-To-Pump Valve Controls

The SAM system utilizes the same Akron Brass Swing-Out™ valve that a discharge (or auxiliary intake) uses except the valves are controlled from the TANK screen on the Pump Controller using an icon group similar to those displayed on the MANUAL VALVE CONTROL screen.

Controlling the tank-to-pump valve differs from the tank fill valve in that the tank-to-pump valve is ONLY controlled by SAM automation with the system in Auto Mode. (I.E. The valve automatically opens with all intakes closed; The valve automatically closes with any intakes open.)

To operate either valve, see paragraph 6.3.2.2 (page 85), Opening A Discharge, to open a valve or paragraph 6.3.2.3, Closing A Discharge, to close a valve.

To manually operate a SAM system tank fill or tank-to-pump valve, equipped with an optional Navigator Pro, utilize the applicable Akron Brass manual referenced in paragraph 6.3.3.2, below.

To physically operate a SAM system tank fill or tank-to-pump valve utilize the override connection in paragraph 6.3.6.2, Akron Brass Swing-Out Valve Physical Override (page 104).

6.3.3.2 Using An Optional Navigator To Manually Control A Discharge

NOTES

The Navigator Pro may be a model 9323, a 9327, or a 9335 and are provided ONLY as an option.

The Navigator Pro controls are locked out when SAM is in Auto Mode.

The SAM system utilizes the same Akron Brass Swing-Out™ valve as an auxiliary (Pony) intake. To manually operate a SAM system discharge valve equipped with an optional Navigator Pro, utilize the applicable Akron Brass manual referenced below.

- If using a Navigator Pro 9323, reference paragraph 8.1, Opening and closing the valve, in Style 9323 Navigator Pro Valve Controller Installation, Operating, And Maintenance Instructions (P/N 123251).
- If using a Navigator Pro 9327, reference paragraph 9.1, Opening And Closing The Valve, in Style 9327 Navigator Mini Valve Controller Installation, Operating, And Maintenance Instructions (P/N 126898).
- If using a Navigator Pro 9335, reference paragraph 8.1, Opening and closing the valve, in Style 9335 Navigator Pro With Pressure, Flow CAFS And Valve Control Installation, Operating, And Maintenance Instructions (P/N 126914).

6.3.3.3 Using SmartFOAM With SAM

SAM interfaces with either a Hale SmartFOAM or a SmartCAFS system. To utilize foam with the SAM system, two [2] predecessors must be accomplished prior to activating a FOAM or CAFS system. Prior to activating a FOAM or CAFS system the appropriate foam concentrate tank must be selected and the SAM preset configurations must match the FOAM/CAFS systems preset 1 (and

7 for CAFS). (Reference FSG-MNL-00158 for SmartFOAM or FSG-MNL-00157 for SmartCAFS) Once the two predecessors have been accomplished, to utilize foam with the SAM system, activate a foam associated Quickset from the Auto Mode Home screen or foam associated preset from the Valve X screen via the Select Discharge screen.

Once the SmartFoam system is active, the SmartFoam display may be used to control the foam system as if the apparatus did not have SAM. Reference SmartFOAM Electronic Foam Proportioning Systems Models: Class A only–1.7 AHP, 2.1 A Class A/B–3.3, 5.0, 6.5 Description, Installation, and Operation Manual (P/N FSG-MNL-00157).

6.3.3.3.1 Activating A SmartFOAM Quickset

To activate a SmartFOAM Quickset, select the appropriate foam concentrate tank and verify the FOAM/CAFS systems preset 1 (and 7 for CAFS) are configured to match the SAM Quickset (or foam associated preset), and then perform the following.

A. Select appropriate foam concentrate tank. (Reference FSG-MNL-00158.)

B. Touch desired Quickset button. (All foam available discharges are labeled with the word FOAM.) See Figure 103.

Figure 103. Activating A Foam Quickset

C. Drag Quickset button to target (PUSH TO PUMP or ADD LINE).

D. Release Quickset button (remove finger from screen).

The SmartFOAM system powers on and activates preset #1. The associated concentration of foam solution is discharged. Figure 104 shows the SmartFOAM display with an example preset 1 running.

Figure 104. SmartFOAM With SAM Quickset Activated

6.3.3.3.2 Activating A SmartFOAM Preset

To activate a SmartFOAM preset, perform the following.

A. Select appropriate foam concentrate tank. (Reference FSG-MNL-00158.)

B. Touch PUSH TO PUMP (or ADD LINE) target, to display SELECT DISCHARGE screen. See Figure 103.

C. Touch desired discharge (valve) button. (All foam available discharges are labeled with the word FOAM.) Valve X screen displays (see Figure 105).

Figure 105. Selecting A Foam Capable Discharge

D. Touch desired FOAM preset button. (All foam available FOAM presets are labeled with the word FOAM and are located to the left of the icon group.) See Figure 106.

Figure 106. Activating A Foam Preset

E. Drag button to target (SET PRESSURE).

F. Release button (remove finger from screen).

The SmartFOAM system powers on and activates preset #1. The associated concentration of foam solution is discharged.

6.3.3.3.3 Close A Foam Discharge (With SAM)

SAM can control multiple FOAM capable discharges. If ONLY one FOAM discharge is active, and that discharge is closed, FOAM is also turned off when the discharge closes. However, if multiple FOAM discharges are active, FOAM stays on until the last FOAM discharge is closed.

To close a SmartFOAM discharge, perform the following.

A. On SAM Control Center Home screen, touch desired active FOAM discharge. Displays Valve X screen displays. See left-hand side of Figure 107.

B. On Valve X screen, swipe CLOSE LINE button to target (center of icon group). See right-hand side of Figure 107.

Figure 107. Closing A Foam Discharge Sequence

NOTES

The CLOSE LINE button activates automatically (the same as a preset would). No confirmation is required.

If the operator only touches and releases the button; a confirmation popup window appears (Figure 108). Touch the YES button to close the line or the NO button to make no change.

Figure 108. Close Line Popup Confirmation

Figure 109 shows the SmartFOAM display when FOAM is turned off. However, if additional FOAM discharges are active, FOAM stays on (see Figure 104) until the last FOAM discharge is closed.

Figure 109. SmartFOAM Display With No FOAM Discharges Active

6.3.3.3.4 Turn Off SmartFOAM (With SAM)

As stated above, SAM can control multiple FOAM capable discharges. No matter how many FOAM discharges are active, activating the FOAM OFF button turns off FOAM to all FOAM capable discharges and any open discharge continues flowing water ONLY.

To turn off SmartFOAM, perform the following.

IMPORTANT ⚠ NOTICE

ACTIVATING A FOAM OFF BUTTON TURNS OFF THE SMARTFOAM SYSTEM, TURNING OFF FOAM TO ALL FOAM CAPABLE DISCHARGES, HOWEVER, THE DISCHARGE(S) ARE NOT CLOSED AND CONTINUE TO FLOW WATER ONLY.

A. On SAM Control Center Home screen, touch desired active FOAM discharge. Displays Valve X screen displays.

B. On Valve X screen, swipe FOAM OFF button to target (center of icon group).

NOTES

The FOAM OFF button activates automatically (the same as a preset would). No confirmation is required.

If the operator only touches and releases the button; a confirmation popup window appears (Figure 110). Touch the YES button to close the line or the NO button to make no change.

Figure 110. Foam Off Popup Confirmation

All discharges previously providing FOAM continue to provide water ONLY, until closed individually.

6.3.3.4 Using SmartCAFS With SAM

IMPORTANT ▲ NOTICE

ALTHOUGH SMARTFOAM AND SMARTCAFS BOTH UTILIZE THE FOAM LABEL, A FOAM LABELED DISCHARGE BUTTON DOES NOT OPERATE THE SAME WAY ON SAM FOR BOTH SYSTEMS.

SAM also interfaces with a Hale SmartCAFS system. To utilize foam with the SAM system, two [2] predecessors must be accomplished prior to activating a FOAM or CAFS system. Prior to activating a FOAM or CAFS system the appropriate foam concentrate tank must be selected and the CAFS systems preset 1 and preset 7 must be configured to match the SAM presets configuration. Once the two predecessors have been accomplished, to utilize foam with the SAM system, activate a FOAM/CAFS associated Quickset from the Auto Mode Home screen or FOAM/CAFS associated preset from the Valve X screen via the Select Discharge screen. The advantage of a CAFS system is that CAFS can also provide traditional FOAM in addition to CAFS.

Once the SmartCAFS system is active, the SmartCAFS display may be used to control the CAFS system as if the apparatus did not have SAM. Reference UV SmartCAFS Installation and Operation Manual (P/N FSG-MNL-00157).

IMPORTANT ▲ NOTICE

THE SMARTCAFS COMPRESSOR CLUTCH MUST ONLY BE DISENGAGED AT SELECTED RPMS, THEREFORE SAM DOES NOT TURN THE CLUTCH OFF ONCE THE SYSTEM IS ACTIVATED. ALWAYS DISENGAGE THE CLUTCH FROM THE SMARTCAFS CONTROL DISPLAY ACCORDING TO FSG-MNL-00157.

NOTES

Any discharge plumbed into the CAFS manifold prior to the air injection point will be FOAM ONLY capable. This configuration is supported by SAM via the FOAM label.

Hale configures all CAFS discharge Quicksets (and/or presets) as WET at the factory. If a MED or DRY Quickset (and/or preset) is desired the apparatus builder/OEM must configure both the SAM and the CAFS system to match.

6.3.3.4.1 Activating A SmartCAFS Quickset

IMPORTANT ▲ NOTICE

IF THE DISCHARGE DOES NOT ACTIVATE VERIFY THE CAFS SYSTEM PRESETS (PRESET 1 FOR CAFS, PRESET 7 FOR FOAM ONLY ON THE SMARTCAFS DISPLAY) CONFIGURATION MATCHES THE SAM CONFIGURATION. (SAM WILL ONLY ACTIVATE MATCHING CONFIGURATIONS–WET, MED, OR DRY.) IF THE CONFIGURATIONS DO NOT MATCH, OPERATE SAM MANUALLY TO OPEN THE VALVE USING THE SAM CONTROL CENTER. THEN OPERATE THE CAFS SYSTEM FROM THE SMARTCAFS DISPLAY.

To activate a SmartCAFS Quickset, perform the following.

A. Select appropriate foam concentrate tank. (Reference FSG-MNL-00157.)

B. Touch desired Quickset button. (All CAFS available discharges are labeled with one of the following words: DRY, MED, WET, FOAM.) See Figure 111.

Figure 111. Activating A CAFS Quickset

C. Drag Quickset button to target (PUSH TO PUMP or ADD LINE).

D. Release Quickset button (remove finger from screen).

The SmartCAFS system powers on and activates preset #1. The associated concentration of foam solution is discharged.

Operate CAFS from the SmartCAFS Control Display from this point, reference UV SmartCAFS Installation and Operation Manual (P/N FSG-MNL-00157).

6.3.3.4.2 Activating A SmartCAFS Preset

IMPORTANT ⚠ NOTICE

IF THE DISCHARGE DOES NOT ACTIVATE VERIFY THE CAFS SYSTEM PRESETS (PRESET 1 FOR CAFS, PRESET 7 FOR FOAM ONLY ON THE SMARTCAFS DISPLAY) CONFIGURATION MATCHES THE SAM CONFIGURATION. (SAM WILL ONLY ACTIVATE MATCHING CONFIGURATIONS–WET, MED, OR DRY.) IF THE CONFIGURATIONS DO NOT MATCH, OPERATE SAM MANUALLY TO OPEN THE VALVE USING THE SAM CONTROL CENTER. THEN OPERATE THE CAFS SYSTEM FROM THE SMARTCAFS DISPLAY.

To activate a SmartCAFS preset, perform the following.

A. Select appropriate foam concentrate tank. (Reference FSG-MNL-00157.)

B. Touch PUSH TO PUMP (or ADD LINE) target, to display SELECT DISCHARGE screen. See Figure 112.

C. Touch desired discharge (valve) button. (All CAFS available discharges are labeled with one of the following words: DRY, MED, WET, or FOAM.) Valve X screen displays. See Figure 112.

Figure 112. Selecting A CAFS Capable Discharge

IMPORTANT ⚠ NOTICE

FROM THE VALVE X SCREEN, THE OPERATOR MAY SELECT WATER ONLY, FOAM ONLY, OR CAFS. TO SELECT WATER ONLY, SWIPE THE PSI PRESET (RIGHT-HAND SIDE OF THE ICON GROUP) TO THE TARGET. TO SELECT FOAM ONLY, SWIPE THE FOAM ONLY PRESET TO THE TARGET. TO SELECT CAFS, SWIPE THE (WET, MED, OR DRY) CAFS PRESET TO THE TARGET.

D. Touch desired CAFS preset button. (All CAFS available discharges are labeled with one of the following words: DRY, MED, WET, or FOAM and are located to the left of the icon group.) See Figure 113.

Figure 113. Activating A CAFS Preset

E. Drag button to target (SET PRESSURE).

F. Release button (remove finger from screen).

The SmartCAFS system powers on and activates preset #1. The associated type and concentration of foam solution is discharged.

Operate CAFS from the SmartCAFS Control Display from this point, reference UV SmartCAFS Installation and Operation Manual (P/N FSG-MNL-00157).

6.3.3.4.3 Changing A CAFS Discharge To FOAM ONLY

To change a CAFS discharge to FOAM ONLY, perform the following.

A. On SAM Control Center Home screen, touch desired active CAFS discharge. Displays Valve X screen displays. See left-hand side of Figure 114.

B. On Valve X screen, swipe FOAM ONLY button to target (center of icon group). See Figure 114.

NOTE

The next time the Valve X screen is accessed, a FOAM OFF button replaces the FOAM ONLY button. See Figure 114. See the following paragraph for instructions to use the new button.

Figure 114. FOAM OFF Button (Transitions CAFS To Foam Only)

6.3.3.4.4 Turning A CAFS FOAM ONLY Discharge Off

To turn the foam off for a CAFS discharge that has previously been transitioned to FOAM ONLY, perform the following.

A. On SAM Control Center Home screen, touch desired active CAFS discharge. Displays Valve X screen displays. See Figure 112.

B. On Valve X screen, swipe FOAM OFF button to target (center of icon group). See Figure 114.

C. Close a CAFS Discharge (With SAM).

SAM can control multiple CAFS capable discharges. If ONLY one CAFS discharge is active, and that discharge is closed, CAFS is also turned off (CLUTCH DISENGAGED) when the discharge closes. However, if multiple CAFS discharges are active, CAFS stays on until the last CAFS discharge is closed.

To close a SmartCAFS discharge, perform the following.

A. On SAM Control Center Home screen, touch desired active CAFS discharge. Displays Valve X screen displays. See left-hand side of Figure 115.

B. On Valve X screen, swipe CLOSE LINE button to target (center of icon group). See bottom portion of Figure 115.

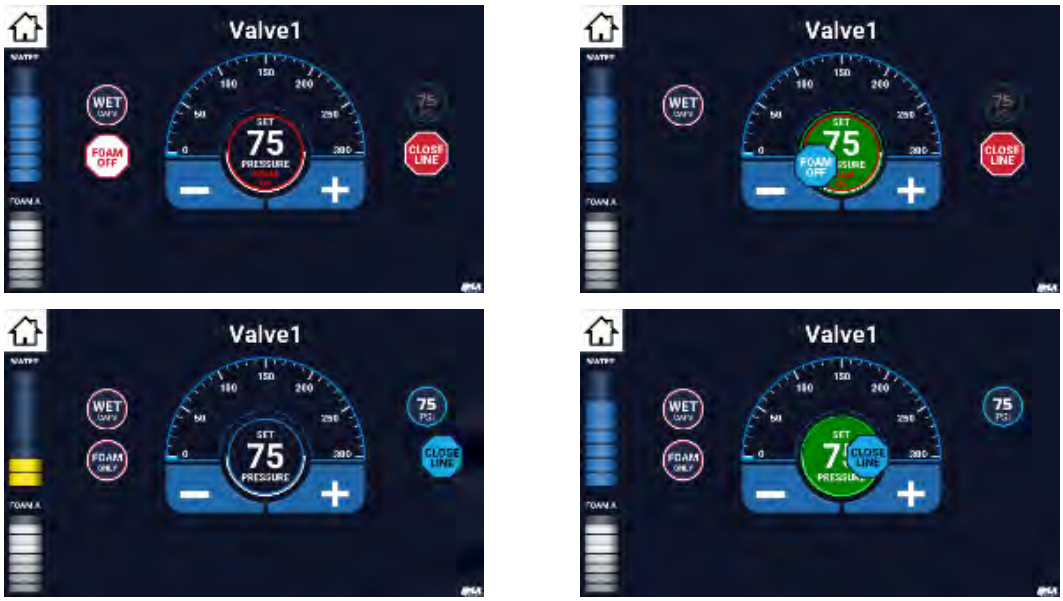

Figure 115. Closing A CAFS Discharge Sequence

NOTES

If only one CAFS discharge is open, the FOAM OFF and CLOSE LINE buttons activate automatically (the same as a preset would). No confirmation is required.

If more than one CAFS discharge is open the FOAM OFF confirmation popup window appears (See Figure 108, page 91) and then the CLOSE LINE confirmation popup window appears (See Figure 108, page 91).

If a swipe fails, times out, misses the target, or the operator only touches and releases the button; the applicable confirmation popup window appears (see FOAM OFF and CLOSE LINE reference from above). Touch the YES button to complete the action or the NO button to make no change.

On the SmartCAFS display, AIR is turned off when only the  icon on the right-hand side of the display is illuminated (see Figure 116, SmartCAFS Display With SAM FOAM ONLY Button Activated); if FOAM is also turned off the  icon on the left-hand side of the display is grayed out (see Figure 116).

Figure 116. SmartCAFS Display

If ONLY one CAFS discharge is active when that discharge is closed, FOAM is turned off (grayed out ) and AIR remains on (illuminated ).

6.3.3.4.5 Turning Off CAFS (When Activated With SAM)

When SAM activates CAFS, (via activating a Quickset or a preset) and then CAFS is turned off (via the SAM Control Center) all open lines flow water only.

IMPORTANT ▲ NOTICE

ACTIVATING A FOAM OFF BUTTON TURNS OFF THE SMARTCAFS SYSTEM, TURNING OFF FOAM TO ALL FOAM CAPABLE DISCHARGES, HOWEVER, THE DISCHARGE(S) ARE NOT CLOSED AND CONTINUE TO FLOW WATER ONLY.

NOTE

If the operator only touches and releases the button; a confirmation popup window appears (Figure 117). Touch the YES button to close the line or the NO button to make no change.

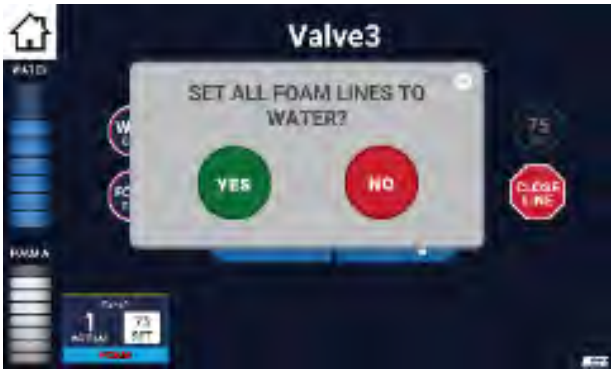

Figure 117. Foam Off Popup Confirmation

All discharges previously providing FOAM continue to provide water ONLY, until closed individually.

6.3.3.5 Exporting The Datalogger File

The SAM Control Center and the Pump Controller continuously stores data to a local data logger. When directed by Hale, the current data log file may be copied from the SAM Control Center or the Pump Controller to a USB memory stick (USB stick).

NOTE

USB memory stick requirements: USB 2.0, Formatted to FAT 32, and 16 Gigabytes recommended.

6.3.3.5.1 Exporting The SAM Control Center Datalogger File

IMPORTANT ▲ NOTICE

PERFORMING THIS PROCEDURE CAUSES SAM TO EXIT AUTO MODE.

When directed, perform the following to transfer the current data log to a USB stick.

A. SAM Control Center, touch and hold system options button until loading icon completes circle and Enter Password screen (Figure 22, page 24) is displayed.

B. Enter Configuration Mode password (see Table 6, page 50) as follows.

   1. Sequentially, touch password digits.
   2. Touch ENTER button.

C. Connect USB stick to USB dongle on rear of SAM Control Center. See Figure 118.

Figure 118. SAM Control Center USB Dongle

D. On Device Select MENU, touch Menu icon.

E. On Home MENU, touch More button.

F. Touch Export Data Log To USB button. Saving ... appears at bottom of button.

G. Wait for Save Complete! to appear at bottom of button.

NOTES

The save may take several minutes to complete. A comma separated values file named LogFile_SAM_UV1100.csv appears on the USB stick when the transfer completes.

If a data log file already exists on the USB stick it is overwritten by the new file.

If Save ERROR appears the file transfer failed. Cycle the SAM system power and repeat the entire procedure using a different USB stick.

H. Disconnect USB stick.

I. Touch Reboot to GUI button.

6.3.3.5.2 Exporting The Pump Controller Datalogger File

When directed, perform the following to transfer the current data log to a USB stick.

A. On Pump Controller, touch and hold system options button until loading icon completes circle and Menu screen (Figure 50, page 38) is displayed.

B. Connect USB stick to USB dongle on rear of Pump Controller. See Figure 119.

Figure 119. Pump Controller USB Dongle

C. On Pump Controller, touch Export Datalogger command. Saving file to the USB stick ... appears below command.

D. Wait for Data log file has been saved to the USB stick. to appear below command.

NOTES

The save may take several minutes to complete. A comma separated values file named LogFile_MatrixDisplay.csv appears on the USB stick when the transfer completes.

If a data log file already exists on the USB stick it is overwritten by the new file.

If There was a problem saving to the USB stick! appears the file transfer failed. Cycle the SAM system power and repeat the entire procedure using a different USB stick.

E. Disconnect USB stick.

F. Touch Back To Previous Screen icon (see Table 3, page 14).

6.3.4 Governor Operations From The Pump Controller

The SAM system must be in Manual Mode to use a governor screen. When the SAM system is placed in Manual Mode the default governor mode is PSI MODE. Perform Steps A and B in paragraph 6.3.2, Manual Mode (page 82), to enter SAM Manual Mode.

6.3.4.1 Changing Governor Modes

When the SAM system exits Auto Mode, the governor is placed in PSI Mode (see Figure 41, page 30). The exception to this default is if the SAM system is equipped with an optional SmartCAFS foam system. If CAFS/FOAM was active when Auto Mode was exited the governor is placed in RPM Mode (see Figure 48, page 33).

The Pump Controller home screen is the ONLY screen that a governor screen is displayed, and governor operations can ONLY be performed from a governor icon group. The current governor mode (MODE PSI or MODE RPM) is displayed on the upper most button of the displayed icon group. The governor mode can ONLY be toggled between the two modes (PSI or RPM) so it is irrelevant which governor mode is the current mode, to change modes, perform the following.

A. If Pump Controller home screen is NOT displayed, navigate to home screen as follows.

   1. In System Options and Tab Button Area (see Figure 32, page 30), touch  icon.
   2. Pump Controller home screen is displayed.

B. Touch the governor mode button ( or ).

The governor mode is toggled to the opposite mode.

6.3.4.2 Activating A Preset

Both governor mode screens provide the selection of up to two [2] presets (pressure set points for PSI Mode or engine speed set points for RPM Mode). Presets are active identically for either mode. Perform the following to activate a governors mode preset.

A. Touch desired preset button.

B. Drag button to target as follows.

1. If mode is MODE PSI, target (DISCHARGE–––PSI) strobes.
   (See paragraph 4.1.2, Buttons/Targets (Drag-N-Drop Navigation), page 20, for navigation descriptions/information.)
2. If mode is MODE RPM, target (ENGINE SPEED–––– RPM) strobes.

NOTE

No matter which governor mode is selected the (ENGINE SPEED–––– RPM) is always either the primary target (which strobes) or the alternate target (which does NOT strobe yet actives the preset buttons set point).

C. Release button (lift finger off touchscreen).

NOTE

If the operator only touches and releases the button; a confirmation popup window appears (Figure 120). Touch the YES button to activate the preset or the NO button to make no change.

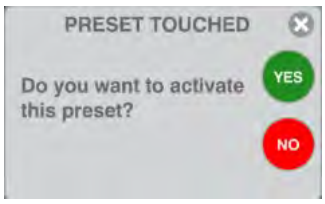

Figure 120. Preset Popup Confirmation

The governors preset set point is activated.

6.3.4.2.1 Using PSI Mode

PSI Mode governor control of the apparatus differs from Auto Mode control of the apparatus, in that, in PSI Mode the pumps discharge pressure (sensed at the PRESSURE port located in the discharge side of the pump body) is being controlled to maintain a desired/selected set point. Whereas, in Auto Mode the pump is controlled to maintain each individual discharges pressure (sensed at the hose-side of each discharge valve). PSI Mode would be used anytime traditional governor operations are desired/required (typically during annual NFPA required pump testing) or if SAM Auto Mode fails or does NOT provide the desired control of the pump.

To select the desired/required PSI, simply use a preset (see the paragraph above if the applicable preset exists). Otherwise, use the increase and/or decrease arrowhead on the PSI set point icon group (see Figure 32, page 30) to select the desired/required SET PRESSURE, indicated in the DISCHARGE PSI area of the Pump Controller home screen. To use PSI Mode, perform the following.

A. Exit SAM Auto Mode as follows.

1. Touch MANUAL MODE button ( , see Mode Control on Figure 20, page 23).
2. If Pump Controller displays MODE RPM (see Figure 39, page 33), touch MODE RPM arrowhead (directly above ENGINE SPEED icon group).

B. On Pump Controller PSI Mode screen, touch + or—arrowhead to digitally display desired/required pressure under SET PRESSURE; or move analog pointer in analog gauge portion of discharge PSI components (see Figure 34, page 31) to indicate desired/required pressure.

6.3.4.2.2 Using RPM Mode

RPM Mode governor control of the apparatus is very similar to Auto Mode control of the apparatus, in that, the engine speed is being controlled to maintain a desired/selected set point. RPM Mode would be used anytime traditional governor operations are desired/required (typically during annual NFPA required pump testing) or if SAM Auto Mode fails or does NOT provide the desired control of the pump.

To select the desired/required engine speed, simply use a preset (see the paragraph above if the applicable preset exists). Otherwise, use the increase and/or decrease arrowhead on the RPM set point icon group to select the desired/required engine speed (which is indicated in the ENGINE SPEED---- RPM area of the Pump Controller home screen). To use RPM Mode, perform the following.

A. Exit SAM Auto Mode as follows.

   1. Touch MANUAL MODE button ( , see Mode Control on Figure 20, page 23).
   2. If Pump Controller displays MODE PSI (see Figure 32, page 30), touch MODE PSI arrowhead (directly above ENGINE SPEED icon group).

B. On Pump Controller RPM Mode screen, touch + or—arrowhead to digitally display desired/required engine speed.

6.3.5 Twister Operations (In SAM Manual Mode)

The Twister electronic throttle knob is active while SAM is operating in Manual Mode. Turning the knob raises or lowers the engine RPM to achieve the resulting Master PSI setpoint (if the governor is operating in PSI Mode) or directly sets the engine RPM if the governor is operating in RPM Mode. Note that the Master discharge pressure is being controlled, NOT individual discharge(s), therefore, any change affects the pressure of all active discharges.

Pressing the red IDLE button ALWAYS provides EMERGENCY IDLE causing the engine to go to idle and the governor to go into OFF mode.

For more detailed Twister electronic throttle information reference Class 1 Technical Product Datasheet, Sentry Pressure Governor (P/N 3045-101-00-CL1 3045-102-00-CL1).

6.3.5.1 PSI Mode Operations.

The THROTTLE READY indicator (Green LED, left-hand side of housing) and the ACTIVE (Blue LED right-hand-side of housing) must be illuminated for the Twister control knob to control the engine RPMs. With SAM in Manual Mode, perform the following to change the governor PSI set point.

NOTE

The direction the Twister control knob must be turned to increase/decrease the Pressure/RPM set point is configurable to CW equals increase and CCW equals decrease OR CW equals decrease and CCW equals increase. [Reference Class 1 Technical Product Datasheet, Sentry Pressure Governor (P/N 3045-101-00-CL1 3045-102-00-CL1) for configuration instructions.]

A. At Twister, turn control knob (according to configured direction, see note above) to increase/decrease Master discharge pressure set point. (Typically, CW = increase.)

B. On Pump Controller, observe set point pointer movement.

C. Repeat Step A until desired set point is displayed.

D. On Pump Controller, observe DISCHARGE PSI indication agrees with set point.

6.3.5.2 RPM Mode Operations

The Twister control knob controls the engine the same way in RPM Mode as in PSI Mode except the SET ENGINE SPEED directly indicates the engines RPM (speed). With SAM in Manual Mode, perform the following to change the governor RPM set point.

A. At Twister, turn control knob (according to configured direction, see note above) to increase/decrease SET ENGINE SPEED to adjust desired Master discharge pressure. (Typically, CW = increase.)

B. On Pump Controller, observe DISCHARGE PSI indication changes.

C. Repeat Step A until desired DISCHARGE PSI indication is displayed (or to maintain it).

6.3.6 Using Physical Overrides

All Akron Brass Swing-Out valves and all Hale MIVs provide physical override on the end of the motor shaft.

ATTENTION ⚠ DANGER

ELECTRICAL POWER TO THE VALVE MOTOR SHOULD BE DISCONNECTED BEFORE PHYSICALLY OVERRIDING ANY VALVE.

6.3.6.1 Hale MIV Physical Override

All Hale MIVs can be opened (or closed) by rotating the motor shaft using the handwheel on the end of the shaft. Perform the following to use the physical override on a Hale master intake valve.

ATTENTION ⚠ DANGER

ELECTRICAL POWER TO THE VALVE MOTOR SHOULD BE DISCONNECTED BEFORE OPERATING THE VALVE PHYSICALLY USING THE MANUAL OVERRIDE HANDWHEEL.

ATTENTION ⚠ CAUTION

VALVES OPERATE AUTOMATICALLY. REMOVE POWER BEFORE OVERRIDE

A. Access the desired MIVs physical location. See OEM documentation for instructions/drawings.

B. Disconnect MOTOR power as follows.

1. On MOTOR connector, lift locking tab.
2. Separate connectors.

C. Locate MIVs Manual Override placard/handwheel. See Figure 121.

Figure 121. MIV Manual Override Placard (Handwheel NOT Shown)

D. Override current valve position as follows.

1. Rotate handwheel CW to close valve.
2. Rotate handwheel CCW to open valve.
3. Turn handwheel (as indicated by placard) until it stops.

NOTE

To verify master intake valve position there is an indicator arrow located on the master intake valve gearbox that points to an OPEN or a CLOSE label when the master intake valve is fully in that position.

6.3.6.2 Akron Brass Swing-Out Valve Physical Override

ATTENTION ⚠ CAUTION

VALVES OPERATE AUTOMATICALLY. REMOVE POWER BEFORE OVERRIDE.

All Akron Brass Swing-Out valves can be opened (or closed) by rotating the motor shaft using the 7/16-inch hex end on the motor shaft. Perform the following to use the physical override on an Akron Brass Swing-Out valve (for an intake or a discharge).

ATTENTION ⚠ DANGER

ELECTRICAL POWER TO THE VALVE MOTOR SHOULD BE DISCONNECTED BEFORE OPERATING THE VALVE PHYSICALLY USING THE MANUAL OVERRIDE.

A. Access the desired valves physical location. See OEM documentation for instructions/drawings.

B. Locate and disconnect valve power connector. See Figure 122.

Figure 122. Akron Brass Valve Power Connector

C. At hex end of motor shaft, attach a 7-16-inch wrench (a ratchet wrench is easier and quicker to use) or socket. If using a socket, attach an electric driver (easiest and fastest) or ratchet. See Figure 122.

D. Override current valve position as follows.

1. Rotate motor shaft CW to close valve.
2. Rotate motor shaft CCW to open valve.
3. Using 7/16-in wrench/socket and drill driver/adjustable wrench, turn override until it stops.

6.3.7 Operator Responses To SAM Alarms

The system includes a buzzer to provide beeps to get the operators attention. The system also comes standard with speakers to alert the operator and others on the fireground when critical events are happening with the water flow or truck. SAM Speaks follows selected caution/messages/warning tones by spoken details of what is happening so the operator can react.

Table 8 show symptoms, potential causes, and remedies of potential issues with the system. If your issue is not on this list, see the SAM Technical Manual (FSG-MNL-00211) or contact Hale Customer Support (800–533–3569).

ATTENTION ⚠ CAUTION

VALVES OPERATE AUTOMATICALLY. REMOVE POWER BEFORE OVERRIDE

Table 8. SAM Operator Troubleshooting

SYMPTOM	CAUSE	REMEDY
WARNINGS		
AUXILIARY INTAKE LOST USE MANUAL OVERRIDE	Equipment failure	Perform valve physical override (See paragraph 6.3.6.2, pg. 104)
		NOTE Report incident to maintenance
CAFS COMM LOSS, USE SMARTCAFS DISPLAY	Equipment failure	Fully open associated valve (using manual or physical operation), then use the SmartCAFS display to control the CAFS lines
		NOTE Report incident to maintenance
CAUTION LOW INTAKE PRESSURE (SAM reduces engine RPM to maintain minimum intake pressure to help prevent water supply collapse)	Discharge flow exceeds available water supply	Check for supply restrictions (Such as closed hydrant valve, damaged/kinked supply hose, etc.)
		Reduce discharge flow rate (Water supply problem other than above)
		Close discharge to get out of low intake pressure condition
CAVITATION WARNING	SAM detects an increase in engine speed AND a decrease in discharge pressure(s)	Check for supply restrictions (Such as partially closed hydrant valve, damaged/kinked supply hose, etc.)
		Reduce discharge flow rate (Water supply problem other than above)
	Equipment failure	NOTE Report incident to maintenance

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
CHECK HYDRANT SUPPLY	During transition to hydrant (pressurized water supply) excessive time elapses without an appropriate intake pressure	Check for supply restrictions (Such as a closed hydrant valve, damaged/kinked supply hose, etc.)
	Equipment failure	Perform Bypass Venting, paragraph 6.3.1.2.1, page 70 or paragraph 6.3.1.2.2, Bypass Opening, page 71 as appropriate
		NOTE **Report incident to maintenance**
CHECK WATER SUPPLY	After hydrant is established; pressure falls below hydrant established level	Check for supply restrictions (Such as a closed hydrant valve, damaged/kinked supply hose, etc.)
COOLANT TEMPERATURE HIGH CRITICAL	Equipment failure	Reduce load on engine and shut down engine as soon as possible
		NOTE **Report incident to maintenance**
DISCHARGE VALVE SIGNAL LOST USE PHYSICAL OVERRIDE	Equipment failure	Perform valve physical override (See paragraph 6.3.6.2, pg. 104)
		NOTE **Report incident to maintenance**
DRAFT PROBLEM–CHECK CONNECTIONS **(Vacuum reading is not dropping as fast as it should)**	Suction hose/strainer position NOT correct	Check and correct position of inlet end of hose/strainer Check and correct position of suction hose (No air traps)
	Hose gaskets missing and/loose connections	Check suction hose connections for missing hose gaskets and/or tighten connections
	Drain valves are open	Ensure all drain valves are fully closed
	Intake valves open or leaking	Ensure all intake valves are fully closed and/or cap leaking valve(s)
	Intake relief valve leaking	If equipped with intake relief valve, cap leaking valve(s) **NOTE** **Remove cap when draft operation is complete**
	Equipment failure	**NOTE** **Report incident to maintenance**

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
FOAM COMM LOSS, USE SMARTFOAM DISPLAY	Equipment failure	Use the SmartFOAM display to control foam lines **NOTE** **SAM does NOT auto flush:** • **flush after Type B foam ops required** • **flush after Hale approved Type A foam ops NOT required (but recommended)** • **flush after other Type A foam ops required**
		NOTE **Report incident to maintenance**
FRONT INTAKE MASTER INTAKE VALVE MODULE LOST OPERATE FRONT MASTER INTAKE VALVE WITH MANUAL OVERRIDE KNOB	Equipment failure	Perform valve physical override (See paragraph 6.3.6.1, pg. 103)
		NOTE **Report incident to maintenance**
HIGH GEARBOX TEMPERATURE	Insufficient gear oil level	If possible, reduce engine speed (If possible, stop ops)
		Add gear oil (if possible)
	Equipment failure	**NOTE** **Report incident to maintenance**
HIGH PUMP TEMPERATURE (Water temperature above 122°F [50°C])	No water flowing **NOTE** **Water is automatically circulated thru the onboard water tank; however, a small tank may become overheated**	Manually increase tank fill and/or tank-to-pump valve position [open valve(s) more]
		Flow water to atmosphere (ground); ensure an intake (external water source) is open and slightly open a discharge
	Equipment failure	**NOTE** **Report incident to maintenance**
HYDRANT DETECTION SENSOR LOST. USE OVERRIDE	Ice in plumbing	Perform Bypass Venting, paragraph 6.3.1.2.1, page 70
		Thaw plumbing when possible
	Equipment failure	**NOTE** **Report incident to maintenance**

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
INLINE INTAKE MASTER INTAKE VALVE MODULE LOST OPERATE IN LINE MASTER INTAKE VALVE WITH MANUAL OVERRIDE KNOB	Equipment failure	Perform valve physical override (See paragraph 6.3.6.1, pg. 103)
		NOTE **Report incident to maintenance**
INTAKE MODULE SIGNAL LOST **Note: Operate LH, RH, front, rear, or inline intake valve with panel switches**	Equipment failure	Operate intake valve(s) from the associated panel mounted rocker switch
		NOTE **Report incident to maintenance**
INTELLIGENT TANK LEVEL SIGNAL LOST AUTO TANK FILL DISABLED FILL TANK MANUALLY	Equipment failure	Fill and/or maintain water tank level manually (Use tank fill valve control) Or perform valve physical override (See paragraph 6.3.6.2, pg. 104) **NOTE** **Over fill tank to ensure tank does not run empty**
		NOTE **Report incident to maintenance**
LH, RH, FRONT, REAR, OR INLINE INTAKE MIV MODULE LOST OPERATE MIV WITH MANUAL OVERRIDE KNOB	Equipment failure	Perform valve physical override (See paragraph 6.3.6.1, pg. 103)
		NOTE **Report incident to maintenance**
LOSS OF INTAKE - RETURNING TO TANK	If drafting, draft problem	See DRAFT PROBLEM–CHECK CONNECTIONS above
	No intake or discharge pressure and an intake is open	Check water supply: Check for supply restrictions (Such as a closed hydrant valve, damaged/kinked supply hose, etc.)
	Loss of prime	Prime system using manual PRIME button **NOTE** **Do NOT exceed 45 seconds per attempt**
	Equipment failure	**NOTE** **Report incident to maintenance**
LOSS OF TWISTER. TWISTER CONTROL WILL NOT WORK. USE PUMP CONTROLLER TO OPERATE ENGINE	Configuration error Or Equipment failure	Control Engine RPM (RPM Mode) or Pressure (PSI Mode) using SAM Pump Controller **NOTE** **Report incident to maintenance**

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
LOW OIL PRESSURE CRITICAL	Apparatus engine low oil level NOTE Message passed thru from engine ECU (via the CAN network) for SAM to display	Shut down apparatus engine as soon as possible Check apparatus engine oil level and correct if low NOTE Report incident to maintenance
LOW OIL PRESSURE WARNING	Apparatus engine low oil level NOTE Message passed thru from engine ECU (via the CAN network) for SAM to display	Immediately reduce apparatus engine load Turn off apparatus engine Check apparatus engine oil level and correct if low NOTE Report incident to maintenance
LOW VOLTAGE CRITICAL	Excessive electrical load	Turn off electrical loads to allow battery voltage to recover
		NOTE Report incident to maintenance
LOW VOLTAGE WARNING	Excessive electrical load	Turn off electrical loads to allow battery voltage to recover
		NOTE Report incident to maintenance
MANUAL MODE	Operator error	Touch ACTIVATE SAM AUTOFLOW button
	Equipment failure	Operate SAM in Manual Mode
		NOTE Report incident to maintenance
PLACE PUMP IN GEAR (Pump should be placed in gear when flowing water to prevent pump damage.)	Operator error	Operator training should include always placing the pump in gear when flowing water. Even if ONLY using the pump as a distribution manifold for a positive water supply. IMPORTANT ▲ NOTICE FAILURE TO PLACE PUMP IN GEAR MAY RESULT IN DAMAGE TO THE GEARBOX.

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
POSSIBLE CAVITATION	SAM detects an increase in engine speed AND no increase in discharge pressure(s)	Check for supply restrictions (Such as partially closed hydrant valve, damaged/kinked supply hose, etc.)
		Reduce discharge flow rate (Water supply problem other than above)
	Equipment failure	**NOTE** **Report incident to maintenance**
POSSIBLE VACUUM LEAK	Draft problem	See DRAFT PROBLEM–CHECK CONNECTIONS above
PRESSURE EXCEEDS LDH LIMITS	Exceeding the pressure limit of an LDH connected to a discharge port	Lower set pressure to within LDH pressure limit
		Utilize a discharge(or discharges) that are not attached to an LDH for higher pressure settings
PRESSURE FALLING	Discharge pressure drops below 30 psi due to:	Check for supply restrictions (Such as partially closed hydrant valve, damaged/kinked supply hose, etc.)
	Intermittent/weak hydrant	Add another water source (or change to new one)
	Loss of prime	Prime system using manual PRIME button **NOTE** **Do NOT exceed 45 seconds per attempt**
Pressure Falling – CONTINUED	No tank water	Refill tank or establish external water supply
	Equipment failure	**NOTE** Report incident to maintenance
PRESSURE INCREASE WARNING - SWITCH TO PSI MODE	Governor mode NOT correct to maintain pressure and pressure is rising	Set Pump Controller screen to PSI Mode **NOTE** **(Review training and SOG for governor operations)**
REAR INTAKE MASTER INTAKE VALVE MODULE LOST OPERATE REAR MASTER INTAKE VALVE WITH MANUAL OVERRIDE KNOB	Equipment failure	Perform valve physical override (See paragraph 6.3.6.1, pg. 103)
		NOTE **Report incident to maintenance**

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
RH INTAKE MASTER INTAKE VALVE MODULE LOST OPERATE RH MASTER INTAKE VALVE WITH MANUAL OVERRIDE KNOB	Equipment failure	Perform valve physical override (See paragraph 6.3.6.1, pg. 103)
		NOTE **Report incident to maintenance**
SAM SCREEN SIGNAL LOST OPERATE IN MANUAL MODE OR USE REMOTE SCREEN	Equipment failure	If equipped with auxiliary SAM Control Center, use auxiliary
		If equipped with tablet option, operate from tablet ATTENTION ⚠ WARNING THE TABLET ONLY OPERATES FROM THE SAM CONTROL CENTER LOCATED IN THE OPERATORS PANEL, IF THAT SCREEN FAILS, THE TABLET MAY NOT CONTROL THE APPARATUS
		If SAM Control Center is no longer functioning, press idle button to enter Manual Mode and set pump pressure using Twister
SENSOR MODULE NOT FOUND PUMP NOT PROTECTED FROM OVERHEAT	Equipment failure **NOTE** **Water is typically circulated automatically thru the onboard water tank; however, a small tank may become overheated**	Manually open tank fill and/or tank-to-pump valve [open valve(s) more if already partially open]
		Flow water to atmosphere (ground); ensure an intake (external water source) is open and slightly open a discharge
		NOTE **Report incident to maintenance**
TANK-TO-PUMP COM LOST USE MANUAL OVERRIDE	Equipment failure	Perform valve physical override (See paragraph 6.3.6.2, pg. 104)
		NOTE **Report incident to maintenance**
WARNING LOW FOAM TANK	Operator error	Foam tank empty Refill foam tank
	Equipment failure	EZ Fill failure **NOTE** **Report incident to maintenance**

Table 8. SAM Operator Troubleshooting–CONTINUED

SYMPTOM	CAUSE	REMEDY
WARNINGS–CONTINUED		
WARNING LOW INTAKE PRESSURE	Intake pressure falls below low intake pressure governor set point	Check for supply restrictions (Such as partially closed hydrant valve, damaged/kinked supply hose, etc.)
	Intermittent/weak hydrant	Add another water source (or change to new one)
		Reduce discharge flow rate (Water supply problem other than above)
WARNING LOW TANK WATER	Water supply NOT adequate to allow SAM to refill water tank	Establish adequate water supply
		Manually (or physically) open tank fill to add water to tank
		NOTE **Report incident to maintenance**
WATER TANK IS EMPTY	Water supply NOT adequate for SAM to fill water tank	Establish adequate water supply
		Manually (or physically) open tank fill valve to add water to tank
		NOTE **Report incident to maintenance**

6.4 Shutdown

This section provides instructions to properly shutdown the SAM tablet and top level instruction to shutdown the SAM system on the apparatus.

6.4.1 SAM Tablet Shutdown

IMPORTANT ⚠ NOTICE

DO NOT HARD SHUTDOWN THE TABLET (POWER OFF BY HOLDING THE POWER BUTTON FOR LONGER THAN 5 SECONDS). A HARD SHUTDOWN MAY CORRUPT THE OPERATING SYSTEM, MAKING THE TABLET UNUSABLE.

The tablet requires a software shutdown/power off. Perform the following to shutdown/power off the tablet.

A. Touch System Options icon (touch and hold icon if required). System options buttons are displayed (see Figure 123).

NOTES

If the Loading Icon ( ) is displayed when the System Options button ( ) is touched, hold the System Options button until the Loading Icon completes the circle and the system options are displayed.

The BACK and CLEAR buttons only function for the password portion of the screen.

Figure 123. System Options Buttons

B. Touch SHUT DOWN button. (See Figure 123.)

C. At arrow on shutdown screen, touch screen. (See Figure 124.)

Figure 124. Shutdown Screens

D. Drag finger to bottom of screen. (See Figure 124.)

E. Lift finger off screen.

F. On confirmation pop up, touch YES. (See Figure 125.)

Figure 125. Shutdown Confirmation

G. Wait for tablet to turn off (screen goes dark).

6.4.2 SAM At The Apparatus Shutdown

When SAM operations conclude, perform the following, as applicable and/or as desired, to shut-down and prepare the apparatus to stop pumping operations.

A. If FOAM/CAFS equipped, shutdown FOAM/CAFS operations per FSG-MNL-00158 (SmartFOAM) or FSG-MNL-00157 (SmartCAFS). (Respectively.)

NOTES

Flushing the pump/plumbing is required if Type B foam was used. Flushing the pump/plumbing is NOT required if Hale approved Type A foam was used. (However, flushing is recommended.) Flushing must always be performed manually (or automatically if foam system is equipped with an ADT (and Auto Flush is configured/enabled).

If using SAM to accomplish flushing, allow one (or more) discharges to flow water only and set the FOAM system, MDT or MST Selector, to FLUSH until discharge(s) flow clear water.

B. On SAM Control Center home screen, close all discharge valves as follows. (SAM will control engine speed.) (See Figure 126).

1. Touch discharge display for valve you desire to close. VALVE X screen appears.
2. Swipe CLOSE LINE balloon to target.
3. Repeat Step 1 and Step 2, until all discharges are closed.

Figure 126. SAM Home Screen (With Active Quickset Shown)

C. If connected to an external water source, (depending on water quality) allow time for onboard water tank to fill.

D. With onboard water tank full (if applicable), close all intake valves as follows.

1. Swipe balloon for intake you desire to close to target.
2. Wait for close sequence to complete. (Approximately 15 seconds.)
3. Repeat Step 1 and Step 2, until all intakes are closed.

E. Disengage pump gear interlocks and set apparatus for road gear (or PTO off).

7. PREVENTIVE MAINTENANCE

Regular preventive maintenance assures continued dependable operation. This section provides recommended actions to be completed for SAM system unique items. Refer to the Hale and/or OEM/ apparatus builder manual that came with the apparatus/pump for all ancillary item and/or pump maintenance item and their associated schedules.

The SAM unique preventive maintenance actions referenced are scheduled to be completed after each use and on an annually basis. This section also provides general information and procedures for the operation of a SAM system for maintenance purposes and ONLY when local procedures/policies/recommendations are NOT provided by the AHJ or in the apparatus/truck/unit manual(s).

7.1 Preventive Maintenance Plan And Schedule

Table 9 provides the preventive maintenance (checks and/or testing) and inspections Hale Products requires to be performed as scheduled.

Table 9. Recommended Preventive Maintenance

Interval	Check/Test	Action Required	Item(s) Required
After Each Use			
	Display Cleaning	Clean display with a damp (water only) soft cloth and dry. (See paragraph 7.1.1.1, Display Cleaning.)	Water, Soft Cloth
Annually (Every 12 Months)			
	Akron Brass Swing-Out™ Valve Lubrication Check	Check motor operating current (Determines if valve requires lubrication)	Refer to 117113 (8600 Series Electric Actuator Installation Instructions, Maintenance Instructions)
*	Perform Flow Meter Calibration	(If equipped) Check and correct flow meter calibration	See Section 8 (Page 123)
	Perform Pressure Sensor Calibration	Check pressure sensor calibration (correct if required)	See Section 8 (Page 123)
	Perform NFPA 1911 Performance Level Tests	Check the pump at each capacity and compare the results to when the pump was first placed in service.	Supply of clean water

* If equipped.

Additionally, Hale Products recommends the preventive maintenance and inspections listed in Table 10 also be performed as scheduled. Hale and OEM ancillary equipment preventive maintenance tasks take little time to accomplish and consist of leak testing, operational checks, lubrication and cleaning. The listed preventive maintenance, inspections and operational checks are required to ensure proper and economical operation and to minimize corrective maintenance. lists the projected preventive maintenance on a weekly, monthly, quarterly, and annual basis.

Table 10. Recommended Preventive Maintenance–Ancillary Equipment

Interval	Check/Test	Action Required	Item(s) Required
After Each Use			
	Check Master Intake Valve (Hale MIV)	Inspect valve for debris. Flush if exposed to contaminated water (foam, salt, etc.) Lubricate disc edges	Supply of clean water Grease
	Check And Clean Foam Strainers	Remove strainers and clean strainers. Inspect strainers for any damage.	Supply of clean water
Weekly			
	Test Pump Shift Warning Indicator	Engage the pump and verify the indicator lights on the control panel function properly and agree with the indicators in the cab.	Wheel chocks
	Check Valves	Verify each valve operates easily and closes completely.	None
	Check And Clean Intake Strainers	Remove strainers. Clean strainers. Inspect strainers for any damage.	Supply of clean water
	Check Pump Controls	Check the pump drive controls to verify the pump can be engaged. Verify all indicator lights work properly.	Onboard water
	Inspect Water And Foam Tanks (If Foam Equipped)	Visually inspect water and foam tanks for proper level, gauge readings, and debris. If debris is present, flush tank to protect the pump from dirty water or foam concentrate contamination.	Supply of clean water
	Check Roof And Bumper Turrets (and/or Deck Gun)	Verify all turrets function properly, and no leaks are present.	Supply of clean water
Monthly			
	Check Auxiliary Fire Suppression Equipment	Visually inspect all piping and valves on the pump and auxiliary equipment for corrosion or damage.	None
	Test Priming System	Dry vacuum test per NFPA 1901 or NFPA 1911	Inlet and outlet caps Vacuum gauge (or manometer) 5 min timer
	Check Drive Line Bolts	Inspect for missing bolts. Torque all drive line bolts. Inspect all drive line bolts are Grade 8 or stronger.	Torque wrench
	If foam equipped: Water Flow Calibration	Perform Water Flow Calibration Refer to FSG-MNL-00157 (for SmartCAFS) or FSG-MNL-00158 (for SmartFOAM)	Manual (Additional items listed in referenced manual)

Table 10 Recommended Preventive Maintenance–CONTINUED

Interval	Check/Test	Action Required	Item(s) Required
Bi-Monthly (Every 2 Months)			
	Check All Navigator Pro Controllers	Check that pressure indications are repeated, agree with the gauge on the operator panel. Check that all pressure indications read within 10% of a calibrated test gauge.	Calibrated test gauge
	If foam equipped and Foam Concentrate is left in the system	Operate System (Concentrate movement required to prevent jelling.) Refer to FSG-MNL-00157 (for SmartCAFS) or FSG-MNL-00158 (for SmartFOAM)	Manual (Additional items listed in referenced manual)
Annually (Every 12 Months)			
	Check Drain Lines	Check individual drain lines going to the multi-drain to ensure drains empty (providing protection from freezing).	None
	Test Flow Rate Tank-To-Pump	Compare flow rate measured to NFPA minimum (or designed rate of pump). If flow rate is lower, a problem exists in the tank-to-pump line. The minimum flow rate should be continuously discharged until 80% of the tank is discharged.	Supply of clean water
	Clean ESP Primer	Disassemble ESP primer and clean mineral deposits. Refer to FSG-MNL-00200, paragraph C.4.4.3, Clean ESP Primer.	Lime Scale Remover & Soft Bristle Brush
	If Foam Equipped: Perform Foam Feedback Calibration	Perform Foam Feedback Calibration Refer to FSG-MNL-00157 (for SmartCAFS) or FSG-MNL-00158 (for SmartFOAM)	Manual (Additional items listed in referenced manual)

7.1.1 After Each Use

Perform the procedure(s) listed below according to the schedule provided in Table 9 and Table 10.

7.1.1.1 SAM Display Cleaning

The display should be cleaned with water only to prevent any damage from chemicals or cleaning agents. Perform the following to clean a SAM Control Center, Pump Controller, or a foam system display.

A. Using a non-abrasive cloth, wipe display with a damp soft cloth.

B. Using a non-abrasive cloth, dry display with a dry soft cloth.

7.1.1.2 Flush Pump

After pumping salt water, contaminated water or foam solution, or if water containing sand/or other foreign matter has been used, connect the pump to a fresh water hydrant or other source of fresh clean fresh water and flush the contaminants out of the pump. Perform the following to flush a mid-ship pump with SAM.

A. Inspect suction hose and rubber washers as well as washers in suction tube caps.
   1. Remove any foreign matter from hose(s) and coupling(s).
   2. Replace all worn, damaged, or dry rotted washer(s).

B. Using a clean water source, pump water until discharge water is clean and clear.
   1. If clean water source is a hydrant, pump from hydrant.
      (See paragraph 6.3.1.2, page 67, if no local or apparatus (OEM) procedures exist.)
   2. If clean water source is a lake, pond, or other waterway, pump from draft.
      (See paragraph 6.3.1.4, page 74 if no local or apparatus (OEM) procedures exist.)
   3. If clean water source is on board water tank(s), pump from onboard water tank.
      (See paragraph 6.3.1.3.1, page 71 if no local or apparatus (OEM) procedures exist.)

      NOTE

      If flushing is performed using the onboard water tank, ensure the tank is replenished from a water source of acceptable quality as soon as possible and/or per local procedures/requirements. Do NOT fill the tank with contaminated water or leave the tank supply reduced.

C. Verify all discharge valves, drain valves and drain cocks are closed.

D. Tighten suction caps.

7.1.2 Annually

Perform NFPA 1911 required performance level tests annually (at a minimum) and following major pump or powertrain repair. Refer to the applicable revision of NFPA 1911 for required tests, testing details and requirements, and testing conditions.

Top level SAM specific operation for maintenance purposes are provided in the following applicable titled subparagraphs.

7.1.2.1 NFPA 1901/1911 Testing Tips And Hints For The SAM System

The presence of the SAM system ONLY changes the way a discharge is controlled during NFPA 1911 required performance level tests. No additional testing is required due to presence of the SAM system.

The following information may be of help in deciding which mode to operate the SAM system in for NFPA 1911 performance level testing purposes.

- Auto Mode
  - The Auxiliary Cooling Solenoid always opens when pumping from tank and pump discharge pressure is present
  - The SAM system controls engine speed

- Manual Mode
  - No accuracy/resolution software override
  - The Auxiliary Cooling Solenoid is NOT open in Manual Mode
  - The Twister and/or the Pump Controller set point controls engine speed

The following information may be of help in operate the SAM system for NFPA 1911 performance level testing, Tank-to-Pump Flow Rate testing purposes.

- SAM does NOT automatically fill the onboard water tank to an overflow condition
- The Auxiliary Cooling Solenoid always opens when pumping from tank and pump discharge pressure is present in Auto Mode and is NOT open in Manual Mode
- The SAM system controls engine speed in Auto Mode while the Twister and/or the Pump Controller set point controls engine speed in Manual Mode
- SAM Auto Mode may or may NOT fully open a discharge valve to achieve the appropriate back-pressure.

7.1.2.2 Akron Brass Swing-Out™ Valve Motor Operating Current Check

Reference Akron Brass document number 117113, 8600 Series Electric Actuator, Section VI, Maintenance Instructions for the lubrication information for an Akron Brass Swing-Out™ valve.

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8. ADJUSTMENTS

This section provides descriptions of the SAM system adjustments and calibrations. This section also provides step by step instructions for the performance of SAM system adjustments and calibrations that may be performed by operators, installers, or maintenance personnel.

8.1 ITL–40 Calibration Using SAM Pump Controller

IMPORTANT ⚠ NOTICE

PERFORMING THIS PROCEDURE CAUSES SAM TO EXIT AUTO MODE.

Perform the following to calibrate the WATER LEVEL ITL-40 display (see Figure 127) using the Pump Controller.

Figure 127. ITL-40 Display

A. Fill onboard water tank completely.

B. On Pump Controller, touch and hold system options button until loading icon completes circle and Menu screen (Figure 50, page 38) is displayed.

C. Enter ITL-40 Calibration password (see Table 7, page 51). ITL CALIBRATION screen appears (see Figure 128).

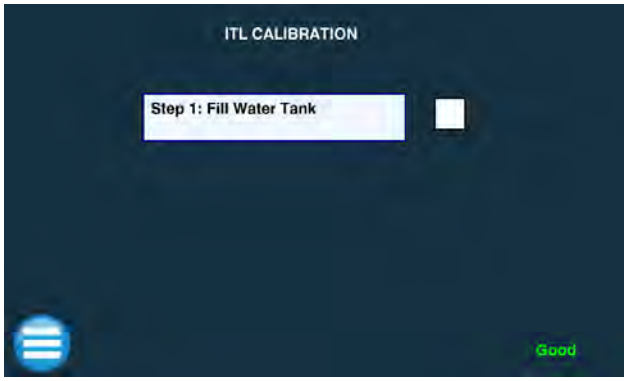

Figure 128. ITL-40 Calibration Screen

NOTE

To exit calibration at any time, touch System Options icon (located in lower left-hand corner of screen, see Figure 128 thru Figure 130).

D. Touch check box (located to the right of the instructions text box) when onboard water tank is full and you are ready to begin calibration. (see Figure 129).

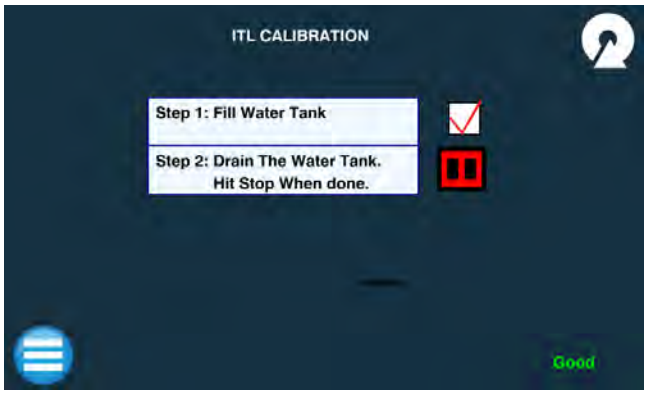

Figure 129. ITL-40 Calibration Screen

E. Drain water tank until pump starts to cavitate.

F. Touch stop icon (see Figure 129).

G. Stop pump.

H. Touch Save Button (see Table 3, page 14). Sends calibration to WATER LEVEL ITL-40.

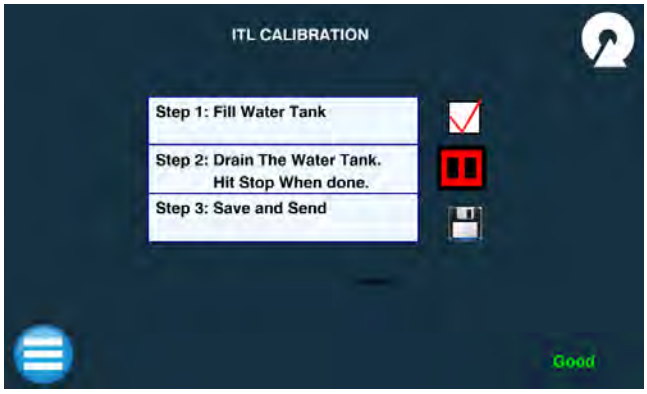

Figure 130. ITL-40 Calibration Screen

I. If calibration fails, touch Back To Previous Screen icon in upper right-hand corner of screen, and repeat calibration.

J. Touch System Options button (see Table 3, page 14).

K. Cycle SAM system power.

APPENDIX A.
MANUFACTURERS INFORMATION

This section provides a list that includes the name, address, and telephone number of the manufacturer's points of contact. Each provides the name address and telephone number of the manufacturer's representative and/or service organization that can provide replacements and is most convenient to the project sight.

A.1. Manufacturers Information

Additionally, included herein is warranty information.

MANUFACTURERS INFORMATION

Division	Address	Telephone
Class 1	Mailing: 607 NW 27th Ave, Ocala, FL 34475 Email: https://www.haleproducts.com	(800) 533-3569
Hale Products	Mailing: 607 NW 27th Ave, Ocala, FL 34475 Email: https://www.haleproducts.com	(800) 533-3569
Godiva LTD (A Unit of IDEX Corp.)	Mailing: Charles Street, Warwick, England, CV34 5LR Email: godiva@idexcorp.com	Tel: +44 (0) 1926 623600 FAX: +44 (0) 1926 623666

A.2. Warranty

See the Hale website (www.haleproducts.com) for product specific warranty and warranty procedures.