

M-3E and M-23E Electric Switch Machines (With Integral Electronic Circuit Controller)

ASTS USA's new M-3E and M-23E™ Electric Switch Machines achieve a new level of efficiency in switch-machine operation. Featuring the revolutionary ECC™ Electronic Circuit Controller, the patented M-3E and M-23E are designed with input from ASTS USA customers to dramatically reduce the installation, maintenance and adjustment time and activities traditionally associated with switch machines. An optional predictive-maintenance feature also helps eliminate the operational headaches that result from switch-machine failures.

General Description: M-23E

The M-23E is the next generation "M-style" switch machines from ASTS USA. It utilizes the basic ASTS USA M-style machine drive-train designs, which have been proven to provide years of reliable service. The M-23E is equipped with a solid-state Electronic Circuit Controller and incorporates simple, modular construction that requires a low degree of maintenance. All serviceable parts of the M-23E can be maintained with one tool (a ratchet with a 3/4" socket and 10" extension). The M-23E features many other design improvements over its predecessors, including a significantly lower vertical profile, integrated latch-stand assemblies, local/remote control capability, self-lubricating bearings, and interchangeability with other switch machines. They are available in both "full lock" and "restrictive lock" manual-operation modes, and both versions are equipped with a hand-crank feature (M-3E available with hand crank only, no hand throw). The M-23E is available with either a 24/36 Vdc or 110 Vdc permanent magnet motor, with increased horsepower capability for optimum performance.

A key component of the M-23E is its new Electronic Circuit Controller, a microprocessor-based unit that can be used as a "drop-in" replacement for the mechanical circuit controller in all ASTS USA M-style switch machines. A true linear detection device with no moving mechanical parts to maintain, the ECC circuit-controller eliminates sensitivity degradation due to component wear.

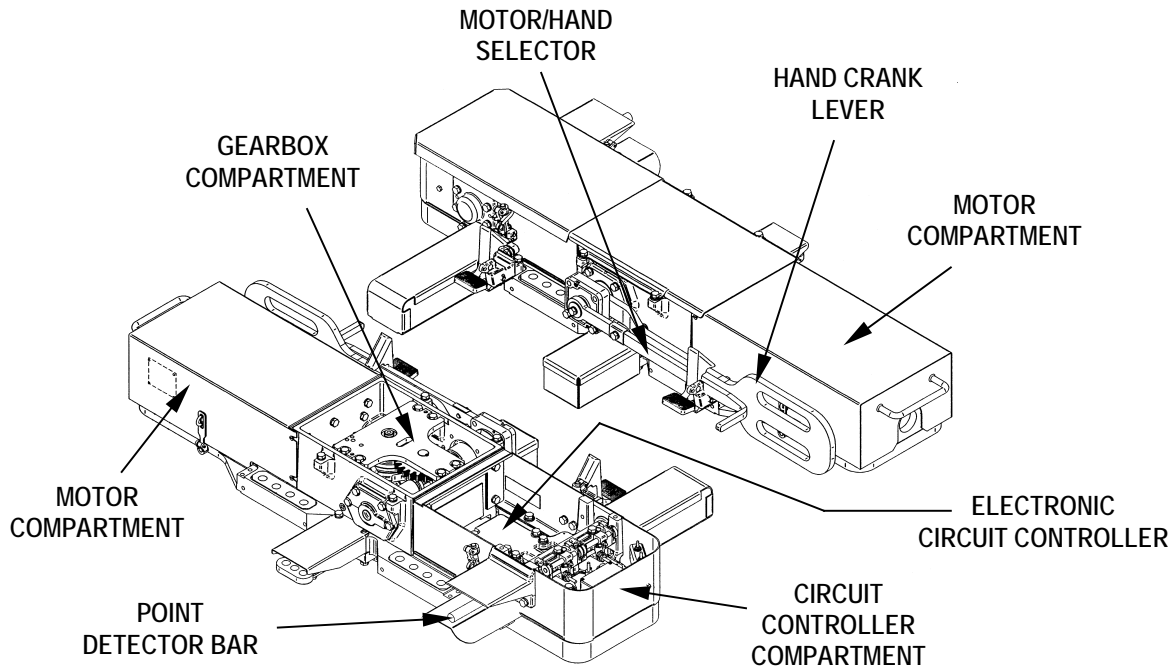


The ECC utilizes inductive proximity sensors to continuously monitor switch-machine conditions. It vitally monitors the position of the switch points and the internal locking mechanism, delivering switch-machine indications to the wayside.

The ECC's advanced diagnostics system analyzes both local machine status and adjacent switch-machine indication circuitry. The unit also can be equipped with an optional auxiliary switch-point detection system that monitors switch-point position to a tighter tolerance, reporting marginal switch-machine performance to the wayside and predicting failures before they occur.

ECC Unit





Advantages: M-23E

- Meets or exceeds all applicable AREMA standards.
- Modular, low-profile mechanical design based on original, history-proven M-3/M-23 drive train.
- Reduced size and low profile facilitate flexible installation options, without requiring tie-cutting.
- Dual control that provides both a hand-throw lever and hand crank for manual operation.
- Available in both "A" (full lock) and "B" (restrictive lock) manual-operation modes.
- Integrated latch stands.
- Ergonomically designed hand-throw lever.
- Lower profile than equivalent all-mechanical "M" series machines.
- Field conversion from right-hand to left-hand layout (and vice versa) in less than 30 minutes.
- Only one tool required for all maintenance and repair.
- No mechanical moving circuit-controller parts to deteriorate or maintain.
- No mechanical contacts or sealed switches.
- ECC can detect all possible states of proximity sensors: on, off, shorted or open.
- Simple set-up and adjustment of point-detection system reduces adjustment time by more than 60 percent.
- Advanced LED diagnostics provide information on state of local and adjacent switch machines.
- LED diagnostics lead maintenance personnel directly to problem without use of a multimeter or similar device.
- Available with optional auxiliary point-detection system that reports marginal switch-machine operation in advance of failure.
- Predictive-maintenance feature can reduce operational costs associated with train delays resulting from switch machine malfunctions.
- Local/remote switch control. capability.
- Electronic latch-out feature that can be restored manually or automatically and cannot be restored in "manual" operation mode by moving hand-throw lever.
- 24/3 Vdc and 110 Vdc motor-control options capable of producing up to 50 percent more output thrust.

M-3E and M-23E Electric Switch Machines (With Integral Electronic Circuit Controller)

Ansaldo STS USA
(Formerly known as Union Switch & Signal)

RSE-6A2
Rev. 3-09

Application: M-23E

The M-23E can be configured for installation in existing ASTS USA M-style switch-machine locations, as well as applications where other manufacturers' machines have been used. Their low profile minimizes the need to dap (cut) switch ties. The M-23E easily can be configured to operate on 2-, 3- and 5-wire control systems. Mounting-lug insert plates make the machine adaptable to ASTS USA and Alstom switch-machine footprints.

The ECC operates on continuous battery power ranging from 10 to 16 Vdc. Up to three machines can be series-connected for indication-circuit operation. Switch indication circuits can be configured for either 2-wire bi-polar or 4-wire applications. Advanced LED diagnostics provide information on the state of each vital sensor and indicate the presence of switch-indication power from an adjacent machine. LED diagnostics also are provided for indication output from the machine, motor-power availability and the latch-out feature.

The optional auxiliary point-detection system generates an output that can provide advance notice to warn maintenance personnel of marginal switch-machine operation. The sensing threshold of each auxiliary sensor is offset from the vital point detector sensors by 1/8" (3.175 mm) to detect switch-point displacement before the vital sensors indicate point-detector bar movement. With the auxiliary system, switch-point displacement caused by debris build-up or expansion and contraction of the rail can be detected before a switch failure occurs.

Ordering Information: M-23E

- Refer to ordering tabulation for M-23E Electric Switch Machine part numbers.
- Check the "Configuration Guide" below for machine design options.
- Refer to **RSE-6A5** for M-23E ECC Portable Test Unit ordering information.
- Refer to **RSE-6J1** for tools to service the mechanical portion of the M-23E machines.
- Request ASTS USA Service Manual SM-9428 for M-23E replacement parts.

Specifications: M-23E

Dimensions:	M-23E: 9-5/8"H x 33"W* x 65"D (24.45 cm x 83.82 cm x 165.10 cm) *With snow covers
Weight:	920 lbs. (417.3 kg)
Mounting Footprint:	Configurable to mount in most mainline switch-machine applications.
Application:	Field-configurable for right-hand and left-hand applications.
Motor Options:	24/36 Vdc and 110 Vdc operation, 2-wire control.
Gear-Ratio Options:	189:1, 360:1 and 528:1
Latch-Out Options:	Manual restoration, automatic restoration and disable.
Op. Temp. Range:	-40°C to +70°C (-40°F to +158°F)
ECC Input Voltage:	10 to 16 Vdc.
Indica. Output Voltage:	12 Vdc nominal.
Bi-Polar Aux. Output:	12 Vdc nominal.
I/O Connections:	Wago terminals mounted on DIN rail; AREMA binding posts for motor-power terminations.

Configuration Guide: M-23E

A	(Ref. not used in this catalog edition)
B	Includes 15W/115V motor heater
C	(Ref. not used in this catalog edition)
D	(Ref. not used in this catalog edition)
E	Includes local/remote control feature
F	Includes auxiliary point detector feature
G	(Ref. not used in this catalog edition)
H	Mounting lug insert plates for 7/8" fasteners
I	(Ref. not used in this catalog edition)
J	Includes 15W-115/230V motor heaters
K	Aluminum paint
L	Black paint

M-23E "A" Style Machines (1)								
Order No.	Layout	110V 189:1 (2)	110V 360:1 (2)	36-20V 360:1 (2)	36-20V 528:1 (2)	Point Det. Bar	Aux. Point Det. Pox. Sensors	Options (3)
N42255101	Left-Hand	X	--	--	--	Threaded	X	B, H
N42255102	Right-Hand	X	--	--	--	Threaded	X	B, H
N42255107	Left-Hand	--	--	--	X	Threaded	--	H, J, K
N42255108	Right-Hand	--	--	--	X	Threaded	--	H, J, K
N42255113	Left-Hand	--	--	X	--	Clevis	X	E, H, L
N42255114	Right-Hand	--	--	X	--	Clevis	X	E, H, L
N42255115	Left-Hand	--	--	--	X	Threaded	X	E, F, H, L
N42255116	Right-Hand	--	--	--	X	Threaded	X	E, F, H, L
N42255117	Left-Hand	--	--	--	X	Threaded	--	H, L
N42255118	Right-Hand	--	--	--	X	Threaded	--	H, L
N42255119	Left-Hand	X	--	--	--	Threaded	X	B, E, F, H, K
N42255120	Right-Hand	X	--	--	--	Threaded	X	B, E, F, H, K
N42255121	Left-Hand	--	--	--	X	Threaded	X	E, F, H, J, K
N42255122	Right-Hand	--	--	--	X	Threaded	X	E, F, H, J, K
<p>Note (1): Hand-throw lever gives same mech. stroke and full lock-rod protection as power-operated mode (see Note (1) of "B" Style tab. below).</p> <p>Note (2): Motor/gear ratio combination.</p> <p>Note (3): Refer to configuration guide for options.</p>								

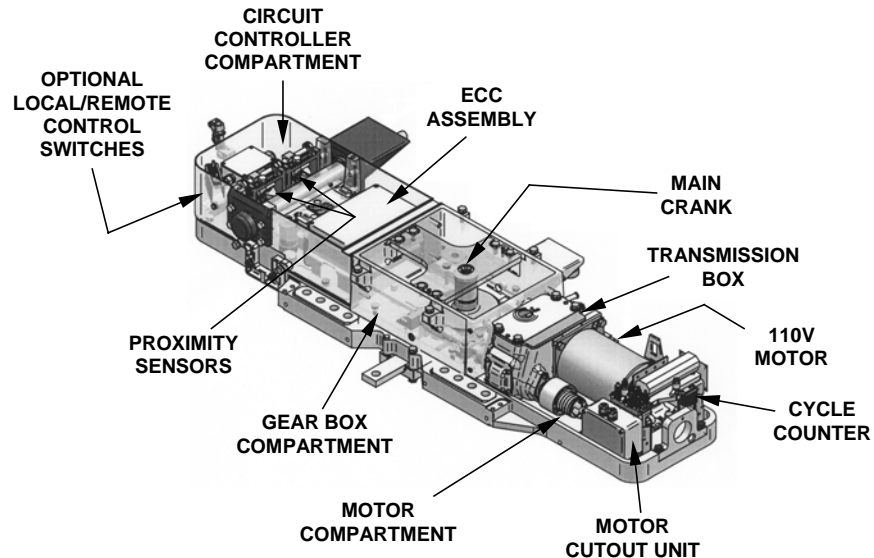
M-23E "B" Style Machines (1)								
Order No.	Layout	110V 189:1 (2)	110V 360:1 (2)	36-20V 360:1 (2)	36-20V 528:1 (2)	Point Det. Bar	Aux. Point Det. Pox. Sensors	Options (3)
N42255207	Left-Hand	--	--	--	X	Threaded	--	H, J, K
N42255208	Right-Hand	--	--	--	X	Threaded	--	H, J, K
N42255209	Left-Hand	X	--	--	--	Clevis	X	B, E, F, H
N42255210	Right-Hand	X	--	--	--	Clevis	X	B, E, F, H
N42255217	Left-Hand	--	--	--	X	Threaded	X	E, F, H, J, K
N42255218	Right-Hand	--	--	--	X	Threaded	X	E, F, H, J, K
<p>Note (1): Hand-throw lever does not provide lock rod protection; slide bar and lock box do not move full stroke.</p> <p>Note (2): Motor/gear ratio combination.</p> <p>Note (3): Refer to configuration guide for options.</p>								

M-3E and M-23E Electric Switch Machines (With Integral Electronic Circuit Controller)

Ansaldo STS USA
(Formerly known as Union Switch & Signal)

RSE-6A2
Rev. 3-09

General Description: M-3E Electric Switch Machine



Basic Machine

The M-3E is a next generation "M" style switch machine developed by ASTS USA. It incorporates a state-of-the-art Electronic Circuit Controller (ECC); simple, mechanical, modular construction; and a lower level of required maintenance. In addition, all serviceable parts of the M-3E can be maintained with a single tool (a 3/8" or 1/2" drive ratchet with a 1" long, 3/4" socket, and a 10" extension).

The M-3E provides "full locking" in the hand-crank mode. It utilizes the same basic drive train design as all other "M" style machines. (This design has provided many years of reliable service.) The machine is presently equipped with a 110 Vdc permanent magnet motor, and incorporates many design improvements over the previous "M-3" style machine. These include a significantly lower vertical profile (9-3/4" (24.7 cm) overall height), an optional local/remote control capability, self-lubricating bearings, and direct interchangeability with non-ASTS USA mechanisms.

ECC

The M-23E's ECC is a microprocessor-based controller that monitors the state of four vital point detection proximity sensors and can identify each possible sensor state (on, off, shorted, or open). The ECC uses two of the four vital point detection proximity sensors to detect the position of the switch points (normal or reverse) and two to detect that the machine is fully locked (normal or reverse). In addition to the vital point detection proximity sensors, the ECC provides two auxiliary sensors which are used to

predict switch failure. These auxiliary sensors are preset to detect the linear position of the switch points 1/8" (3.175 mm) offset from the normal switch obstruction gauge dimension, typically 1/4" or 3/8" (0.63 cm or 0.95 cm).

The M-3E ECC proximity sensor system is a true linear detection device with no moving parts to wear out. This system requires no adjustment of the point detector bar but, using linear slides, provides internal adjustment capability of the vital point detection proximity sensors with respect to the point detector bar assembly. The Captive Point Detection System (CPDS) provides a captive point detector bar and target combination that accurately reports the true displacement of the switch points. Linear slide assemblies provide simple and dependable proximity sensor adjustment with respect to the ferrous metal target.

The ECC provides advanced diagnostics for identifying the current state of the machine and the indication state of an adjacent (daisy-chained) machine. Diagnostics verify the delivery of indication power and auxiliary indication power to the wayside, as well as provide information on motor power availability and the state of the latch-out function.

There are no mechanical contacts within the M-3E. All indication and motor circuits are controlled with solid-state equipment. Motor cutout during manual operation is achieved with one proximity sensor to indicate the position of the hand crank cover access door (actuated when the hand-crank cover door is opened).

RSE-6A2
Rev. 3-09

Advantages: M3E

- Incorporates latest in ECC technology
- Retains rugged, modular mechanical design of predecessors
- Serviceable parts maintained with a single tool
- Low vertical profile
- Local or remote control option
- Self-lubricating bearings
- Direct interchangeability with non-ASTS USA mechanisms

Specifications: M-3E

Motor Voltage/Control: 110 Vdc, 2-wire control
 Gear Ratio: 189:1
 Hand Crank: 33 rotations to produce one complete point move
 Mounting Footprint: Configurable to mount in most mainline switch-machine applications.
 Application: Field-configurable for right-hand and left-hand applications.
 Operating Temp. Range: -40°C to +70°C (-40°F to +158°F)
 ECC Input Voltage: 10 to 16 Vdc.
 Indication Output Volt.: 12 Vdc nominal.
 Bi-Polar Auxiliary Output: 12 Vdc nominal.
 I/O Connections: Wago terminals mounted on DIN rail; AREMA binding posts for motor-power terminations.

Ordering Information – M-3E

- Refer to ordering tabulation for presently available M-3E switch machines.
- Check the “Configuration Guide” below for machine design options.
- Refer to **RSE-6A5** for M-23E ECC Portable Test Unit ordering information.
- Request ASTS USA Service Manual SM-9194 for replacement parts and additional technical information
- For special M-3E configurations/applications not shown in this catalog section, contact your ASTS USA Account Executive.

Configuration Guide – M-3E

- A (Ref. not used in this catalog edition)
- B 15W, 115V motor heater
- C Lock rod openings closed
- D (Ref. not used in this catalog edition)
- E Equipped with local/remote control feature
- F Equipped with auxiliary point detector feature
- G Mounting lug insert plates for 1” fasteners
- H-K (Ref. not used in this catalog edition)
- L Black paint scheme
- M Equipped with surge suppressor

M-3E Style Machines						
Order No.	Layout	Point Det. Bar	Aux. Point Det. Pox. Sensors	Junction Box LHPC / RHPC Jumper Pos.	Options	Notes
N42255001	Left-Hand	Clevis	X	LHPC	B, C, E, F, G, L, M	(1), (2)
N42255002	Right-Hand	Clevis	X	RHPC	B, C, E, F, G, L, M	(1), (2)
Note (1): Configured for near point indication						
Note (2): Junction box latch out jumper position: Automatic						