



ALSTOM
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GM4000A
Wayside Switch Machine

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WWW.ALSTOMSIGNALINGSOLUTIONS.COM

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INTRODUCTION

GM4000A™ WAYSIDE SWITCH MACHINE

Founded on over 100 years of design experience, the GM4000A™ is the industry benchmark when compared to *any* wayside machine. The GM4000A™ is designed, engineered and manufactured utilizing ALSTOM's experience and expertise in the Switch Machine business to ensure that our customers receive the best value for their purchases.

The revolutionary design paired with its universal capabilities makes the GM4000A™ especially well suited to meet rigorous operating demands. The advantages are hard to deny; reduced maintenance, faster field-testing, and more control options make this machine a must-have for Heavy-Volume Rail lines.

With more competitive pricing options than ever before, this machine is the most affordable choice to designate as your Property Design Standard. ALSTOM is ready to show you how the GM4000A™ can simplify your operations while improving your bottom line. Our experienced staff of Design & Application Engineers can provide training classes to familiarize your work force with the GM4000A™.

This Product Brochure will introduce you to the key Features and Benefits of the new GM4000A™. For any additional questions or information, please contact ALSTOM Signaling's Customer Service line at 1-800-717-4477.



PRODUCT DESCRIPTION

The **GM4000A™ Switch Machine** incorporates all of the features required to meet today's interlocking demands. The machine is easy to install, operate and maintain. One model does it all! It's truly universal. There is no need to purchase different machines for different locations, because this unit is a drop-in replacement for any industry machine. Large inventories of spare parts are reduced because of the GM4000A™ Modularity Design Concept. The machine uses 50% fewer parts than traditional switch machines, and it is adaptable to all site-specific requirements without having to make application or electrical wiring changes.

With a low 8-3/4" profile, the GM4000A™ is especially well suited for applications with height restrictions. Having the capability to deliver more than 4,000 lbs. of thrust, this machine is an ideal solution for long turnouts, switch points plagued by extreme environmental conditions, or locations that have neglected track maintenance. A maintenance-free, brushless servomotor eliminates worn brush replacements and the need for dynamic snubbing. The machine's solid-state controller eliminates a mechanical clutch, provides **universal power** (85 to 160VAC or 13 to 160VDC), offers field-configurable control (2, 3, 4 or 5 wire), and has an integrated five-second overload protection which eliminates the need for overload relays. The local control feature also facilitates maintenance and enables the machine to be operated electrically at the trackside, while performing monthly testing.

The point-detection system indicates normal or reverse switch positions and breaks indication if a switch-point has moved away from the stock rail. This system also includes mechanical Latch-Out functionality that can be customer configured (restoring, non-restoring or disabled). Field-obstruction testing and adjustments are simplified with the use of a spoon gauge.

The GM4000A is easily configured for single or dual control and right or left hand operation. Its universal footprint matches all industry standard hole patterns and requires no extra drilling at the time of installation. This machine's versatility, dramatically reduced life cycle costs, and operational reliability make it the clear choice to designate it as your Property Design Standard.



Applications

- Single Switch
- Single & Double Slip Switch
- Derails
- Frogs

Field Layouts

- Left or Right Hand Throw

Control

- Single or Dual control

Mounting Requirements

- Universal Footprint that matches all industry-standard Bolt Patterns

Thrust

- Rated Thrust; 4,000 lbs.
(Requires 85V min., 4-second speed setting, and High-Current setting)

Weight

- 1,000 lbs.

Motor Type

- Maintenance-free Brushless-Servo
- No Dynamic Snubbing or Magnetic Detent Needed

Hand Crank

- Available for maintenance and emergency use
- Uses gearbox torque benefits for easier cranking

Electrical Control Scheme

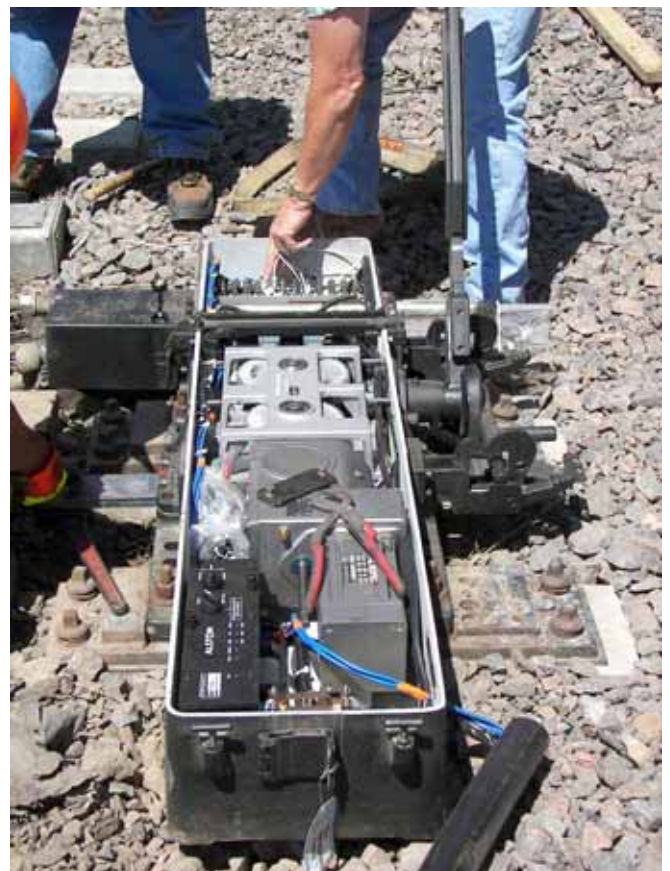
- 2, 3, 4 or 5-wire
- NO FIELD RE-WIRING REQUIRED!*

Control Voltage

- 8-36 VDC

Throw Bar Stroke

- 6.5 Inches



Split-Link Cam Bar

Prevents Opening/Shaving of Lock Rod Slot

Trackside Electrical Operation

Faster Monthly/Quarterly Testing

Fewer Back Injuries

Electronic Overload Protection (Internal)

No Overload Relays Needed

No Mechanical Clutch Maintenance

Brushless Motor

Eliminates Motor Maintenance (brushes / dust)

Solid-State Electronic Controller

Allows Flexibility to design & integrate the GM4000A
to any existing wiring, without field wiring changes

Limit Switches (Positive-Break Type)

No Contact Finger Adjustments

No Burned Contacts (Milli-Amp Current Draw)

No Frost on Contacts (IP-67 enclosed design)

New Point Detector Design

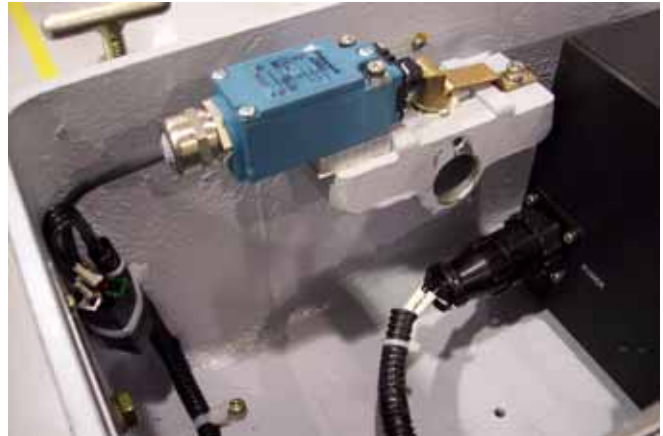
Easier Installation, Testing, & Maintenance



FEATURES

Hand-Crank & Cut-Out Switch

Power is cut to the motor when the Hand Crank is inserted into the allotted slot, keeping the machine from being operated electrically. It can also break the indication circuit if desired. The hand crank is strategically located in line with the gearbox, so the maintainer can turn the crank effortlessly when performing monthly tests or maintenance. (Fewer Back-Related Injuries)



Trackside Electrical Operation

The controller is designed to allow maintainers the ability to operate the machine electrically while performing maintenance or testing. By simply turning the selector dial from REMOTE to LOCAL, and then having a "CALL" issued to the machine from the dispatcher, the machine can be cycled under power at the machine rather than having to use the Hand-Crank!



Brushless Motor

The Servo-Type motor is the latest technology when compared to the massive motors of the past. Compact and versatile, it will run at both 24 and 110 Volt power inputs. There is no need to stock 2 different motors for different voltage areas. From a maintenance perspective, it is much more maintainer friendly because it lacks motor brushes that typically wear and need replacing. It is directly wired to the controller by means of a quick disconnect coupler, making it easy to connect & disconnect wires when needed. Lastly, it does not have a Magnetic-Detent or Dynamic Snubbing Wire.



FEATURES

NO Clutch

The machine does not have a mechanical clutch, which means Less Maintenance for the Maintainer! The controller is designed to electrically cut power to the motor if an obstruction is encountered between the points. Once the current spike reaches a set, an internal timer is commenced to remove power from the motor after a 5-Second time lapse.



NO Overload Relays Needed

Related to the No-Clutch feature are the Internal Overload Protection Electronics included in the controller. No Overload Relays are required in the Relay Room. This is a *significant cost reduction* when designing new locations that include a GM4000A, or an existing location refurbishment.



Reference LED's for Troubleshooting

The top surface of the Controller is clustered with LED's to help diagnose any potential fault. This is extremely helpful when returning the machine into service is time sensitive!

- RUN: Motor is running
- LOCAL: Control is transferred to maintainer at machine
- REMOTE: Dispatch has control of machine
- OVER LOAD: Machine was recently obstructed
- CTRL FAULT: Controller is damaged or Input Power from equipment room is varying or incorrect (i.e.: Under Voltage)
- MOTOR FAULT: Motor is damaged



FEATURES

Maintenance Free Gearbox

The mating gearbox to the motor is a completely sealed, self-lubricated Oil-Bath gear collection that does not require maintenance for long periods of time. 10-15 years of normal use should be the general operating life of the oil before it requires inspection. Even then, it may be in fine condition. The unit is easily removed using standard tools. Roughly a 5-minute process, with no Gear Timing required.



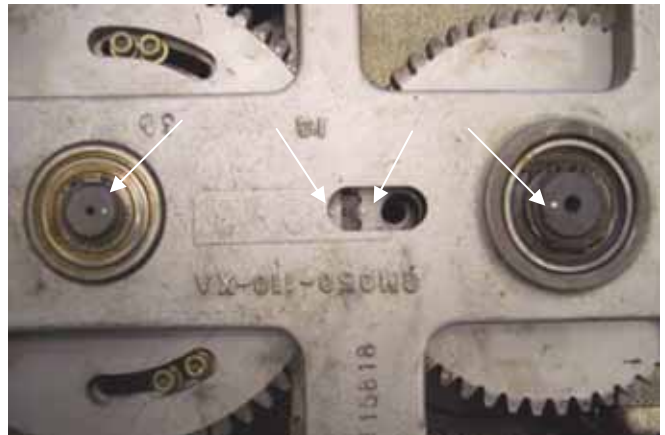
Main Dive Module

The Mechanical heart of the machine; it is the driving force behind the 4000 lbs. of thrust through the throw bar. It is also the interchange for the Hand Throw Module, Power Operation, and the Motor Limit Switches. The unit is easily removed using standard tools. Roughly a 10-minute process!



Gear Timing

The Gears on the Main drive Module are all timed from the mid-stroke position. A clever little window allows you to easily identify and set the 4 Time-Marks located on the top-level gears.



FEATURES

Throw Bar

The Throw Bar is a standard design. It can withstand 20,000 lbs. of thrust during a trailing movement, allowing you to salvage most of the machine and limit repairs to the layout connecting rods.



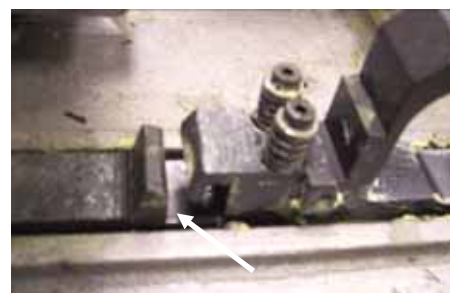
Hand Throw

The hand throw is easily repositioned from a left-hand to a right-hand orientation, with an easy 15-Minute procedure.



Split-Link Cam Bar

The Split-Link Cam Bar is a patented design, which prevents the machine from Opening / Shaving the Lock Rod slot when fouled (Out of Adjustment).



Selector Lever

The machine comes with a Hand-Mode / Power-Mode Selector lever, which cuts power & correspondence when rotated to the Hand-Mode position.

Hand Throw Cut-Out Switch

The Selector Lever actuates the Plunger on the Hand Throw Cut Out Switch. It is located on the Bottom Level of the Main Drive Module.

Latch-Out

Latch-Out is a "Mechanical Memory Mechanism" that helps preserve a momentary Loss-of-Indication. Without a latch out feature, a loose point could Theoretically:

1. Move ¼" away from the Stock Rail & cause a loss of Indication
2. Move Back against the Stock Rail & regain Indication
3. All within a split second

If the dispatcher is not watching the monitor, there is no way to know that a potential issue has occurred at the switch.

The Factory Adjusted Latch-Out Mechanism will mechanically retain the contacts "OPEN" in the event that the Point Detector Rod moved ¼" away from the stock rail.

This loss of indication will alert the dispatcher to an apparent issue in the field, and allow a maintainer to evaluate the problem.

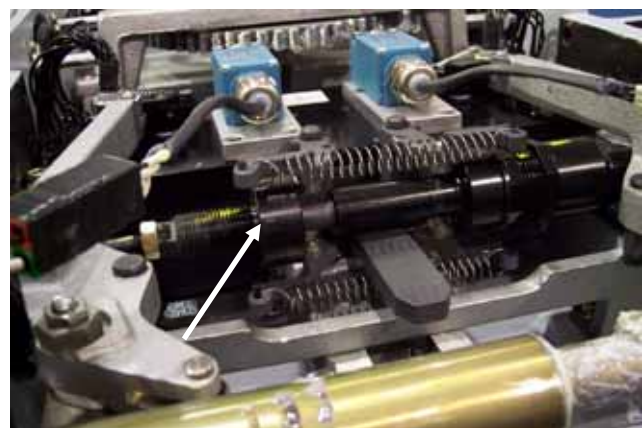
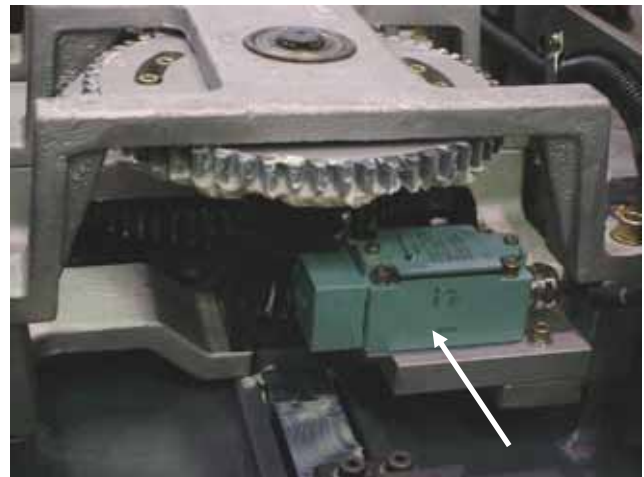
A Maintainer can select two Electrical Options.

Restorable Mode:

Allows the dispatcher to throw the machine in the opposite direction after a Latch-Out fault (bypassing the Latch-Out Mechanism)

Non-Restorable Mode:

Prevents Remote operation of the machine by a dispatcher after a Latch-Out fault. Can only be reset by a maintainer at the switch.



FEATURES

Terminal & Gearbox Heaters

Depending on climate conditions and customer preference, heaters are available to help reduce condensation / frost. The 24 or 110-Volt heaters are available for the Terminal & Gearbox areas. These are paper-thin Thermofoil Heaters that provide heat to the areas that are needed.



NO Floating of the Lock Rod

Using a Spoon Gauge, a maintainer can now perform the monthly point detector test independently from the Lock Rod, to verify the absence of correspondence with a 1/4" or 3/8" obstruction.



Air Vents

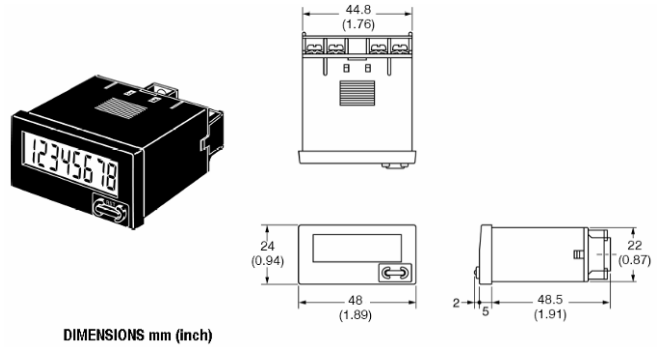
The Machine Housing has 2 air vents to help the machine "breathe" during fluctuating weather patterns that typically cause condensation.



FEATURES

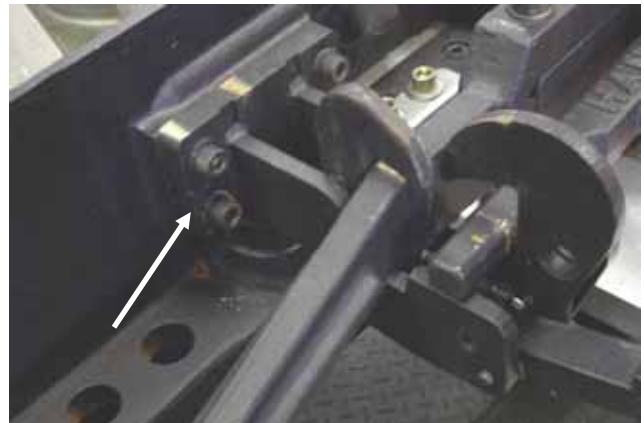
Cycle Counter

A cycle counter accessory is available with the machine to keep track of line-use and to make maintenance records easier. It can be installed in line with the correspondence Relay in the Instrument House.



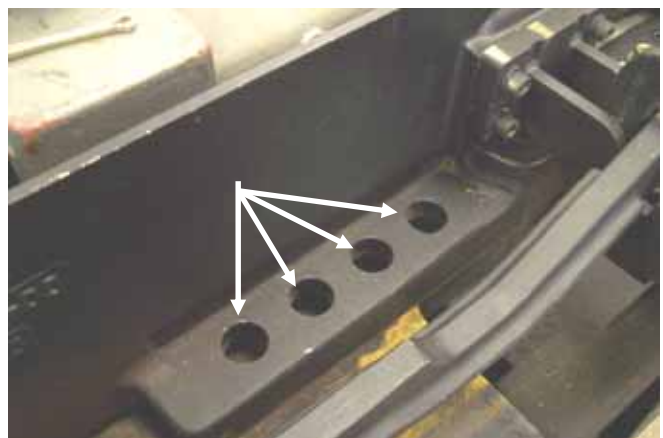
Machine-Mounted Latch Stands

The machine housing is designed with Integrated Latch stands. No longer is it required to drill holes into the Ties for mounting of separate latch stands.



Universal Bolt Hole Pattern

Fits any Bolt-Hole Mounting Pattern, allowing you to substitute any machine with the GM4000A. Additional hole drilling into the ties is no longer needed.



Low-Profile

The 8 ¾" Profile reduces damage caused by frequent dragging of equipment.



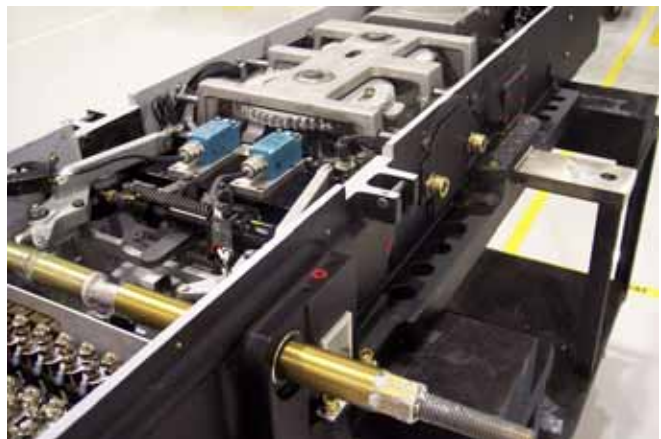
Lightweight Covers

Dramatically reduce back injuries! Strong, lightweight cast-aluminium covers have replaced the old Heavy, cast-steel covers.



Modularity Design Concept

Large inventories of spare parts are reduced thanks to the GM4000A Modularity Design Concept. The machine is modularly designed, so any part that fails in the field can be replaced in 15 minutes or less. This allows you to keep your trains moving while failed units are repaired in the shop, at the maintainer's leisure.



FEATURES

Wide or Narrow Notch Lock Rods

Both Narrow & Wide Notch Locks Rods are available for your custom machine.



Speed, Current, & Selection

Switch machine speed at 24 VDC speed is approximately 24 seconds. However, at 110 VDC or VAC there are 2 available speeds: 4 seconds and 15 seconds. Default at 110 VDC or VAC is 15 seconds. The suggested current configuration of the GM4000A is the high-current operation option. At this setting the switch machine produces up to 4000 pounds of force at the end of stroke.

2, 3, 4, & 5 Wire Mode Compatible

The controller can be set for 2-wire (Model 55E), 3-wire (model 5E/5F and M23), 4-wire (model 5G/5H), or 5-wire (model M23) power & control through the different wiring configurations. There are four motor control wiring configurations that determine how incoming wiring is connected to the terminals AND must be configured through the controller wiring connection. The power lines are 24 VDC, 110 VDC, or 110 VAC. The four field wiring configurations shown on the right show the TB1 terminal locations.

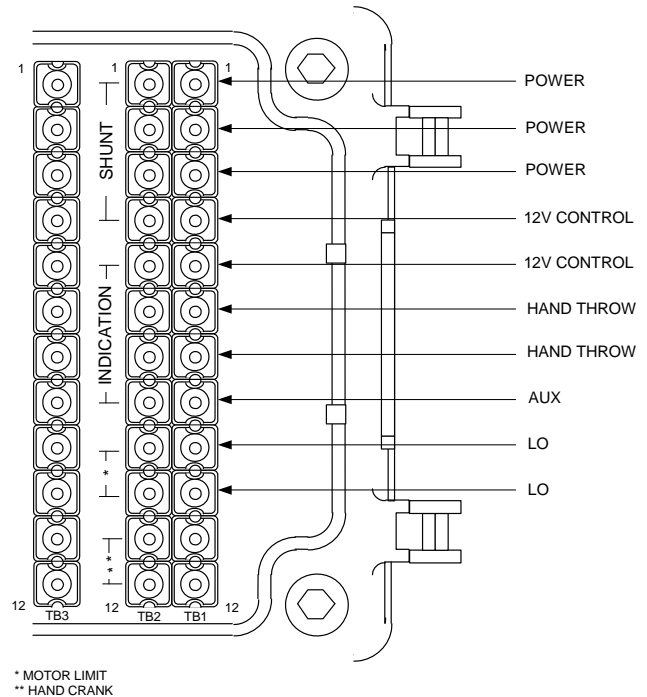
	2-wire	3-Wire	4-wire	5-wire
Power	TB1-1	TB1-1	TB1-1	TB1-1
Power	TB1-2	TB1-2		TB1-2
Power		TB1-3	TB1-3	TB1-3
Control			TB1-4	
Control			TB1-5	
Auxiliary				TB1-8 (2 wires)

Configuration	Wiring Connection
2-wire Mode Motor Control	Connect P1-15 (BLACK) to HC-11 (BLUE) Hand Crank Switch Lead
3-wire Mode Motor Control	Connect P1-15 (BLACK) to HC-11 (BLUE) Hand Crank Switch Lead AND Connect P1-22 (YELLOW) to P1-23 (YELLOW)
4-wire Mode Motor Control	Connect P1-7 (WHITE) to HC-11 (BLUE) Hand Crank Switch Lead AND Connect P1-22 (YELLOW) to P1-23 (YELLOW)
5-wire Mode Motor Control	For the three control wires connect P1-15 (BLACK) to HC-11 (BLUE) Hand Crank Switch Lead AND Connect P1-22 (YELLOW) to P1-23 (YELLOW) THEN Verify that the two auxiliary wires are connected to post TB1-8 (see Figure 3-2 for the location of TB-1)
High Speed Operation	Connect P1-17 (GREEN) to P1-10 (GREEN)
Low Speed Operation	Disconnect P1-17 (GREEN) to P1-10 (GREEN)
High Current Operation	Connect P1-17 (RED) to P1-3 (RED)
Low Current Operation	Disconnect P1-17 (RED) to P1-3 (RED)
Low Voltage Shutoff	Disconnect P1-17 (GRAY) to P1-11 (GRAY)

FEATURES

Voltage Frequency

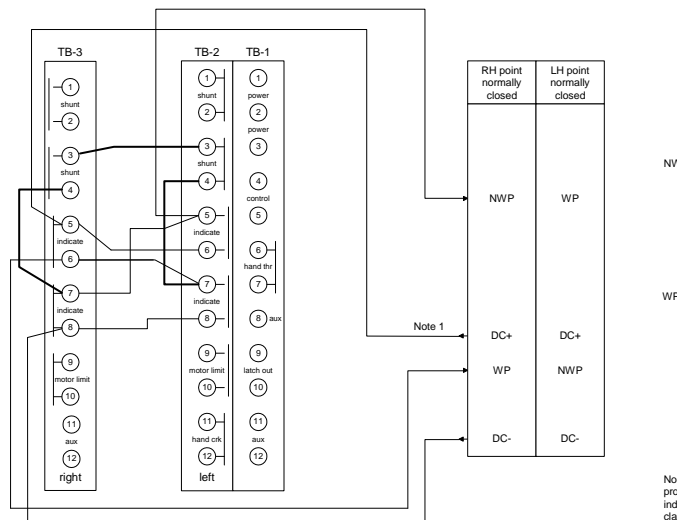
The machine will operate at 50Hz, 60Hz, or 100Hz AC.
This allows designers more flexibility for new-work construction.



Control Voltage

The machine will accept Control Voltage in the range of:
9-35 VDC.

Typical Polarized Switch Repeater Circuit, Single Switch
Point detector contacts are shown in position for right hand point normally closed, INDICATION IN HAND THROW



FEATURES

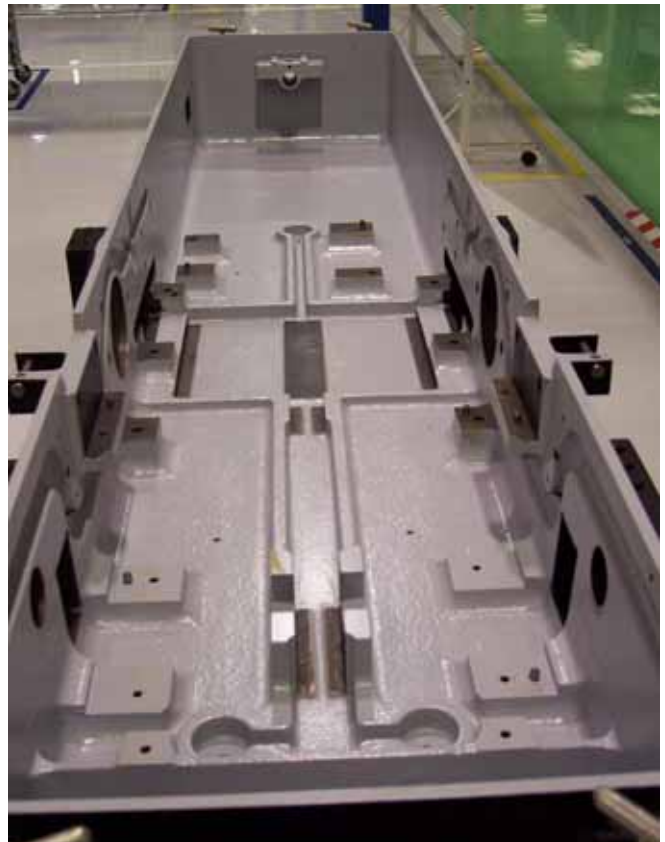
Dual Wire Entrance ports

A second wire entrance port is available in the event that an inconvenient junction box location requires a longer wire run.

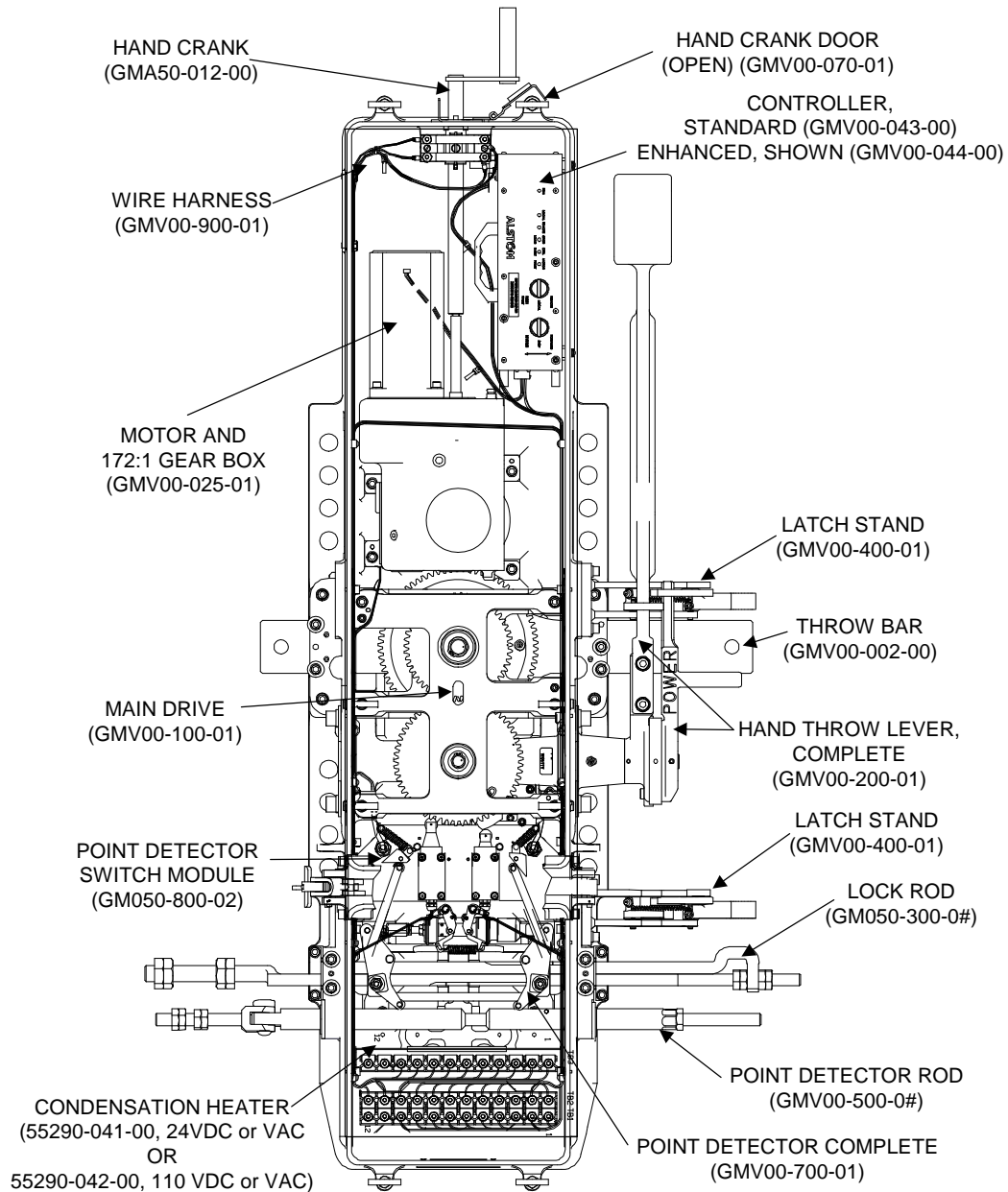


One-Piece Housing

The outdated "Layered Approach" of design, has been replaced with ALSTOM's Modularity Design Concept. The One-Piece Case is a welcomed enhancement that allows for easier access to all parts. Maintenance & Repairs are much easier.



GM4000A™ Machine Mechanical Drawing



For Questions and Inquiries, Contact Customer Service at

1-800-717-4477

OR

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