



Side Mount Automated Type G

Manual of Operation

Revision C

12/20/2019



Section 1

Table of Contents

| Table of Contents | Section 1 |
|---------------------------|------------|
| General Information | Section 2 |
| Safety Precautions | Section 3 |
| Component Identification | Section 4 |
| Principle of Operation | Section 5 |
| Operating Instructions | Section 6 |
| Installation Instructions | Section 7 |
| Adjustment Procedures | Section 8 |
| Inspection Procedures | Section 9 |
| Trouble Shooting | Section 10 |



Section 2

General Information

This manual consists of information, which will be useful in operating and maintaining your Miner Automated Side Mounted Type $G^{\mathbb{M}}$ equipped cars. It includes operating, maintenance and trouble shooting procedures along with illustrations to assist in identifying various components by name and part number.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS, SECTION 3 of this manual.

These instructions are issued to supply acceptable methods for the operation, maintenance and trouble shooting of the Miner Automated Side Mounted Type G^{TM} , and to supply safety information to the user, which is in addition to safety, precautions prescribed by the AAR, FRA and individual handling railroads.

It is expressly understood that issuance of these Miner instructions which were prepared in good faith and are believed to be complete and accurate, shall not be construed to mean that Miner Enterprises, Inc. assumes any liability on account of accidents to persons or property involving the Miner Automated Side Mounted Type G^{TM} .

Miner Enterprises is not responsible for car construction or design, including modifications for mechanism application.



Section 3

Safety Precautions

3.1 General Description

In addition to safety precautions prescribed by the car owner, loading site, unloading site, repair shop and handling railroad, the following safety precautions must be observed whenever a Miner Automated Side Mounted Type G[™] is operated and whenever any maintenance is performed on it.

- 1. All maintenance, repair, or adjustment must be made on a shop or repair track where the car will not be moved.
- 2. Protective eye wear and hearing protection should be used when doors are operated.
- 3. All personnel must stay clear of the car when the doors are being operated. <u>WARNING!</u> The doors operate rapidly! This includes the main air cylinder and the main operating lever areas.
- 4. Do not operate the doors manually unless the car has completely stopped moving.
- 5. When operating the doors manually, the operator must stand clear of all the doors and operating mechanism. The operator must also have an assistant on each side of the car to ensure that everyone stands clear of the car doors.
- 6. Do not attempt to force the door system in any way.
- 7. Do not make any adjustments to the door system without fully releasing the air pressure from the system. To release the air pressure, remove the wayside air.
- 8. Do not load or move car unless all door connecting links are over center (locked) and the secondary lock hook is in the locked position.
- 9. During car construction, the doors should always be secured until the mechanism is properly adjusted per Adjustment Procedures, Section 8, when rolling a car upside down or right side up. (*Do not rely on the Mechanism to keep the doors closed, while the railcar is being rotated.*)



3.2 Preventing Unauthorized Operation

- 1. Ensure all the doors are closed and locked in accordance with the Operation Manual.
- 2. Remove residual air pressure by completely draining air from the system.
- 3. Close and lock the door on the box enclosing the valve, if applied.



Section 4

Component Identification

4.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper, and all devices will open and close simultaneously.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.



4.2 Component List

For a complete list of parts, descriptions, and Miner part numbers refer to the latest revision of the Customer . This can be obtained at the

Miner Enterprises Inc. customer portal web page located at <u>http://www.minerent.com/customers</u> or call 630 232 3000.

4.3 Drawing Package

A complete set of drawings can be obtained at the Miner Enterprises Inc. web page located at <u>http://www.minerent.com/customers</u> or call 630 232 3000.



Section 5

Principle of Operation

5.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper, and all devices will be operated simultaneously. The cylinder which can be controlled using override buttons on the valve or electrical input from a way side source operates the mechanism to close the doors.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS, SECTION 3 of this manual.

5.2 Device Operating Systems

The device operating system can be broken down into three major areas:

- 1. *The Electrical System*: This includes the Touch Pads, the electrical portion of the solenoid operated valve, and associated wiring and other miscellaneous components (See Component Identification Section 4).
- 2. *The Pneumatic System*: This includes the (3) double acting air cylinder, four-way valve, air filter, piping and other miscellaneous components (See Component Identification Section 4).
- 3. *The Mechanical System*: This includes the air cylinder, secondary lock, main operated adjustable lever, door operating levers, operating shaft, connecting links, and other miscellaneous components (See Component Identification Section 4).



5.3 Principle of Operation

The device may be operated two ways: Electrically and Pneumatically. These options provide redundancy to the system that ensures that regardless of the situation, the railcar can be unloaded safely.

5.3.1 Electrically Controlled Operation

This is the primary way to unload the railcar hopper. This operation uses the electrically conductive Touch Pads located on opposite sides of the railcar and 12-volt DC electricity to control the operation of the pneumatic valve. The valve then directs the wayside air through the auxiliary train line air to an air cylinder. The air cylinder applies a load to the mechanism. First the secondary locking system is moved clear to allow the device to move freely. As the air cylinder continues its travel it unlocks the primary over center lock, and then opens the doors.

5.3.2 Pneumatically Controlled Operation

This is a secondary option to unload the railcar hopper. This option can be used when there is wayside air source or auxiliary train line air but not a 12-volt DC electricity source. In this option, the override buttons located on the valve are used to shift the spool in the valve. The valve then directs the wayside air to an air cylinder. The air cylinder applies a load to the mechanism. First the secondary locking system is moved clear to allow the device to move freely. As the air cylinder continues its travel it unlocks the primary over center lock, and then opens the doors.



Section 6

Operating Instructions

6.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper, and each device can be operated independently. This device uses a pneumatic cylinder to operate the mechanism and open the doors, allowing commodity to empty out of the bottom of the car. The cylinders can be controlled using override buttons on the valve or can be controlled by electrical input from a way side source to operate the mechanism to close the doors.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.

6.2 Electrically Controlled Operation

This is the primary way to unload the railcar hopper. This operation uses the electrically conductive Touch Pads located on opposite sides of the railcar and 12-volt DC electricity to control the operation of the pneumatic valve.

<u>6.2.1</u>

Position the hopper to be unloaded over the unloading pit.

6.2.2

Apply wayside air (min pressure 70psi) to either side of the car using the provided quick connect fittings.





6.2.3 To Open Doors Independently

Using a 12-volt DC power supply and applying a negative (-) charge to the Universal Bottom Rectangular Plate on the Touch Pad. The touch pad is located on opposite side corners of the rail car.



6.2.4 To Open Doors Independently

While keeping the negative (-) 12-volt DC charge to the Universal Bottom Rectangular Plate, apply the positive (+) charge to the Individual Hopper Plate that corresponds to the hopper to be unloaded.



<u>6.2.5</u>

Allow the hopper to completely unload.

<u>6.2.6</u>

Repeat steps 6.2.1 thru 6.2.5 until the entire railcar is empty.



6.2.7 To Close Doors Independently

To close the doors apply a positive (+) 12-volt DC charge to the Universal Bottom Rectangular Plate on the Touch Pad.



6.2.8 To Close Doors Independently

While keeping the positive (+) 12-volt DC charge to the Universal Bottom Rectangular Plate, apply the negative (-) charge to each of the Individual Hopper Plates. Each door will close when the corresponding Individual Hopper Plate is touched.





6.3 Pneumatically Controlled Operation

This is a secondary option to unload the railcar hopper. This option can be used when there is an air source but not 12-volt DC electricity. In this option the push buttons located on the valve are used shift the spool in the valve.

<u>6.3.1</u>

Position the car over the unloading pit.

<u>6.3.2</u>

Apply wayside air to either side of the car using the provided quick connect fittings.





<u>6.3.3</u>

Find the valve on the valve stack that corresponds to the hopper to be unloaded.



<u>6.3.4</u>

Depress the open button on the valve to discharge the hopper to be unloaded.





<u>6.3.5</u>

Allow the hopper to completely unload.

<u>6.3.6</u>

Repeat steps 6.3.1 thru 6.3.5 until the entire railcar is empty.

<u>6.3.7</u>

To close the doors depress the close button on the valve that corresponds to the hopper to be closed.





Repeat steps 6.3.7 until all doors are closed and locked.

<u>6.3.9</u>

Check to make sure that the primary lock is engaged. (See Section 9 for detailed inspection procedures)

<u>6.3.10</u>

Check to make sure that the secondary lock is engaged. (See Section 9 for detailed inspection procedures)

<u>6.3.11</u>

Disconnect the wayside air from the car using the provided train line fittings.





Section 7

Installation Instructions

7.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper and each device will open independently.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.

<u>7.1.1</u>

In order to complete installation it will be critical to obtain from Miner Enterprises the most appropriate version of required drawings (Section 4).



7.2 Mechanical Installation Instructions

7.2.1

Mount the Door Operating Lever Assembly on the center sill. Use the General Arrangement to identify the dimensions. Mark the locations, as noted below, on both sides of the center sill. Insure the assembly is level and square. Tack weld both sides of the assembly to the Center Sill.





<u>7.2.2</u>

Mount the Cylinder Mount Assembly. Use the General Arrangement to identify the dimensions. Mark the locations as noted below, on both sides of the Center Sill. Insure that the assembly is level and square. Tack weld the Cylinder Mount Assembly.





Mount the Eyebolt Clevis Brackets on to the door. Use the General Arrangement to identify the dimensions. Insure that the bracket is in line with the levers. Tack weld the Eyebolt Clevis Brackets to the door.





<u>7.2.4</u>

Pre-Adjust the Connecting Link Assemblies.



<u>7.2.5</u>

Apply the Connecting Link Assemblies to the Door Operating Lever and Clevis Eyebolt Bracket on the door using pins, washers and cotter pins.





<u>7.2.6</u>

Properly adjust the Operating Shaft to insure that the dimensions below are the same. Use the General Arrangement to identify the dimensions.



<u>7.2.7</u>

As detailed General Arrangement weld the Door Operating Lever Assembly, Cylinder Mount Assembly, and Eyebolt Clevis Bracket







<u>7.2.9</u>

Thread Cylinder Rodeye Assembly onto the cylinder rod up to the Hex Nut.





7.2.10

Apply the Secondary Lock Bracket using two fine thread Hex Head bolts and two Tooth Lock Washers.



<u>7.2.11</u>

Apply the Secondary Lock Hook using the Clevis Pin two washers and two cotter pins. Apply heavy duty grease or lubricant along sliding surfaces between the lock hook and rodeye.







<u>7.2.12</u>

Apply the Secondary Lock Spring Assembly, and Spring Retainer Assembly using two fine thread bolts and two Tooth Lock Washers. Torque bolts to 30-40 lb-ft.





Determine which pipe fittings are needed on cylinder. As needed ³/₄" NPT hollow hex plug can be moved to opposite side of cylinder.



7.2.13.1

Plug reinstallation procedure.

- 1.) Remove the port plug with 9/16" hex socket bit.
- 2.) If necessary wipe excess oil off plug and port. (Be sure not to get debris inside of the cylinder).
- 3.) Coat the port plug with Blue Loctite #243.
- 4.) Wipe up excess Loctite.
- 5.) Replace the port plug and apply 40-48 ft. lbs. of torque.
- 6.) Let the Loctite set for 10 min.
- 7.) Replace the air supply and energize with 80psi.
- 8.) Use a leak test fluid on the port plug. No bubbling or spraying should be seen.



Mount rear of Cylinder Assembly to the Cylinder Mount Assembly using pin and cotter pin provided.



<u>7.2.15</u>

Attach the Cylinder Rod Eye to the Adjustable Lever Assembly on the Door Operating Lever Assembly using the Clevis Pin, two washers and two cotter pins.





<u>7.2.16</u>

Apply Secondary Lock Spring to Adjustable Level Assembly



7.2.17

- Ensure all cotter pins are properly bent over.
- Ensure all bolts and nuts are properly secured using LockTite[®], lock washers, or tack welds where appropriate.
- Apply high quality multi-purpose anti-splatter grease to all grease fittings.

<u>7.2.18</u>

Check to make sure that the primary lock is engaged. (See Section 9 for detailed inspection procedures)

<u>7.2.19</u>

Check to make sure that the secondary lock is engaged. (See Section 9 for detailed inspection procedures)

7.2.20

Properly adjust according to the procedures proscribed in Mechanism Adjustments SECTION 8.



7.3 Electrical Installation Instructions

<u>7.3.1</u>

Install electric components according to drawing Electric Schematic.

<u>7.3.2</u>

All wire cables should be securely fastened, making sure that they are clear of sharp edges, or other areas that may cause wear to the jacket.

Optional: Coat bare ends with Liquid Electrical Tape (vinyl dielectric liquid) to prevent corrosion.

7.3.3

Avoid applying heat to any of the electrical components

7.4 Pneumatic Installation Instructions

<u>7.4.1</u>

Install pneumatic components according to drawing Pneumatic Schematic.

<u>7.4.2</u>

All hoses should be securely fastened, making sure that they are clear of sharp edges, or other areas that may cause wear, and are kink free.

<u>7.4.3</u>

All pipe connections should be properly treaded using Teflon tape or pipe dope.

<u>7.4.4</u>

Do not over tighten fittings into valve cylinder, filter or valve. Over tightening can damage the treads of these components.

<u>7.4.5</u>

Securely mount the air filter using 3/8" bolt holes provided.

<u>7.4.6</u>

Securely mount the air valve using all of the mounting holes provided. Mount the valve perpendicular to track direction. The valve may be mounted right side up or perpendicular to ground.



Section 8

Adjustment Procedures

8.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity and will open and close simultaneously.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.

First determine through visual inspection as outlined in SECTION 9 if adjustment is required.

The Automated Side Mounted Type G has three major areas that allow for adjustment:

<u>8.1.1</u>

Lever Assembly serves to open and close the doors and provide the primary locking means to hold the doors closed.





<u>8.1.2</u>

The Secondary Lock Assembly is located at the air cylinder. This serves as a backup locking system.



<u>8.1.3</u>

The doors provide a means to retain the commodity in the car and prevent any leakage.





8.2 Pre Adjustment Procedures

<u>8.2.1</u>

Close doors using a source of air of at least 70 psi. If doors cannot be fully closed and the cylinder is not fully retracted the doors are too tight. The eyebolts on the Connecting Link Assembly must be backed off to allow mechanism to fully close.



<u>8.2.2</u>

If the Lever Assembly is over-center, but the cylinder is not fully retracted then it may be necessary to adjust the Adjustable Lever Assembly bolts to fully retract the air cylinder. If a Locking Strap is present then it must be removed.





8.3 Secondary Lock Assembly Adjustment

Adjust secondary lock gap to 1/4" to 3/8" with cylinder rod fully retracted under air pressure and cylinder rod Clevis Pin contacting the front of slot.



<u>8.3.1</u>

To properly inspect the Automated Side Mounted Type G Secondary Lock Assembly, follow the procedures proscribed in Inspection Procedures SECTION 9.



Loosening the Hex Jam Nut and rotating the cylinder rod will adjust the gap. If a tack weld is present, this weld must be removed.

The cylinder rod cannot be rotated while there is air pressure on the cylinder, therefore, estimate the number of revolutions required. One-revolution changes gap approximately 3/32".



<u>8.3.3</u>

Remove air pressure, and turn cylinder rod to increase or decrease gap. Re-check the gap after applying air pressure. Repeat if correct gap is not attained.



<u>8.3.4</u>

When correct gap is attained under air, tighten Hex Jam Nut securely then tack-weld the Hex Nut to the Rodeye Assembly.



<u>8.3.5</u>

With air pressure removed gap should be 0" to 3/16" of an inch. If the gap is 0": check to see that the Secondary Lock Hook can be easily pried up. If the hook is too tight or the gap is greater than 3/16" then adjust the Adjustable Lever Assembly bolts. If a Locking Strap is present then it must be removed.





Weld Locking Strap to adjustment bolts on the Adjustable Lever Assembly.



8.4 Lever Assembly Adjustment

With the Secondary Lock Assembly properly engaged close the doors. The Lever Assembly should be locked over-center.



<u>8.4.1</u>

To properly inspect the Automated Side Mounted Type G Lever Assembly follow the procedures proscribed in Inspection Procedures SECTION 9.

<u>8.4.2</u>

If the Lever Assembly is not completely locked over-center and the Secondary Lock Assembly is not properly engaged refer to the Trouble Shooting SECTION 10.



8.5 Door Adjustment

The Lever Assembly and Secondary Lock Assembly must be properly adjusted before door tightness is checked.

 $\frac{8.5.1}{\text{To properly inspect the Automated Side Mounted Type G doors follow the procedures}$ proscribed in Inspection Procedures SECTION 9.

<u>8.5.2</u>

Adjustment is made by removing pin at the eyebolts on the Connecting Link Assembly when doors are open and turn eyebolt so as to increase length of link. Be sure that both eyebolts are turned the same number of rotations.





After the above adjustment is complete with the door gap eliminated, check air pressure requirements to determine if doors are too tight or too loose. This is accomplished by inserting a pressure gage into the system to monitor system air pressure. The pressure gage test rig can modified to connect directly to the Wayside quick connect fittings.







With the doors open and the system drained, slowly build up air pressure. When the pressure reaches approximately 20psi, actuate valve in the closing direction. Continue to slowly build up air pressure and note pressure where the door operating levers snap over center. This pressure should be 40^{+10}_{-0} psi.

<u>8.5.5</u>

If pressure is higher than 50psi or if doors cannot be closed, back off eyebolts. Remember to observe both sides of the car. After each change, recheck closing pressure.

<u>8.5.6</u>

If pressure is lower than 40psi and the doors appear loose. When in doubt, lightly hammer against doors and listen for either a solid or loose sound. Tighten doors by extending eyebolts. After each change, recheck closing pressure.

<u>8.5.7</u>

After all adjustments are complete, cycle mechanism seven times and re-check all inspection points as prescribed in the Automated Side Mounted Type G Inspection Procedures SECTION 9.

<u>8.5.8</u>

After door tightness adjustments is complete, verify that all cotter pins are in place and secured.



Section 9

Inspection Procedures

9.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper, and the device will operated simultaneously. This allows the commodity to be unloaded from each hopper individually.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.

The Automated Side Mounted Type G has four major areas that require Inspection:

<u>9.1.1</u>

General component inspection.

<u>9.1.2</u>

Lever Assembly serves to open and close the doors and provide the primary locking means to hold the doors closed.

<u>9.1.3</u>

The Secondary Lock Assembly is located at the air cylinder. This serves as a backup locking system.

<u>9.1.4</u>

The doors provide a means to retain the commodity in the car and prevent any leakage.



<u>9.2.1</u>

Check for damaged welds and components. (Inspect Before each loading and after each unloading.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.

9.2.2

Check for missing or damaged pins, washers or cotter pins. (Inspect once per year.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.3</u>

Check for damaged or missing bolts. (Inspect once per year.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.4</u>

Check for damaged air hose, pipes, fittings, and bracketing. (Inspect once per year.)

Replace and repair with like components.

<u>9.2.5</u>

Check and drain air filter (MKE8217). Drain water using the valve at the bottom of the filter and clean or replace filtering element. *(Inspect once per year.)*





Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.6</u>

Check air cylinder (MKE34678) for damages. (Inspect once per year.)



Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.7</u>

Check air valve for damages. (Inspect once per year.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.8</u>

Check Touch Pad Assembly for damages. (Inspect once per year.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.

<u>9.2.9</u>

Check for damaged Electrical Cords. (Inspect once per year.)

Contact Miner Enterprises for assistance in replacing damaged or missing components.



<u>9.3.1</u>

Check over center condition of Lever Assembly and Connecting Links. (Check before each loading and after each unloading)



Refer to Adjustment Procedures SECTION 8 for assistance in properly adjusting the mechanism.





<u>9.3.2</u>

Apply high-grade multi-purpose grease in bearings (P30005015). (Inspect once per year.)







<u>9.4.1</u>

Secondary Lock Spring to Adjustable Level Assembly for damages.

(Check once per year.)



Refer to Adjustment Procedures SECTION 8 for assistance in properly adjusting the mechanism.



Check for lock condition with Secondary Lock Hook Pin on inboard side of Adjustable Lever Lugs. (Check if Lock Hook Indicator is out of position)



Refer to Adjustment Procedures SECTION 8 for assistance in properly adjusting the mechanism.



Apply high-grade multi-purpose grease on cam surface of Rodeye Assembly and sliding surface of Secondary Lock Hook *(Check once per year.)*







<u>9.5.1</u>

Check that doors are closed tightly. (Check before each loading and after each unloading)



Refer to Adjustment Procedures SECTION 8 for assistance in properly adjusting the mechanism.



Section 10

Trouble Shooting

10.1 General Description

The Automated Side Mounted Type G was designed and built for triple hopper rail cars. The purpose of this device is to rapidly discharge commodity from the railcar. There is one device per hopper, and all devices will open and close simultaneously.

It is extremely important, before proceeding with operation or maintenance of your cars, that you carefully read and understand the SAFETY PRECAUTIONS SECTION 3 of this manual.

10.2 Trouble Shooting Lever Assembly

With the Secondary Lock properly engaged close the doors. The Lever Assembly should be locked over-center.



<u>10.2.1</u>

If the Lever Assembly is not locked over-center and the Secondary Lock is not engaged, be sure the air supply has a minimum pressure of 70psi.

<u>10.2.2</u>

If the air supply is adequate it may be necessary to back off the door eyebolts as prescribed in SECTION 8.2 Pre Adjustment Procedures.

10.2.3

If the air supply is adequate and doors are no longer touching, but the Lever Assembly is not locked over-center and the Secondary Lock is not engaged then check for binding and interface.



10.3.1 Check the air supply.

<u>10.3.2</u> Check the quick disconnect fittings.



 $\frac{10.3.3}{\text{Check the valve by pushing the solenoid buttons.}}$

<u>10.3.4</u>



C-074

Check the air cylinder (MKE34678) for damage. <u>10.3.5</u> Call Miner Enterprises Inc. for technical assistance.