

REFERENCE MANUAL FEMCO GROUND CHECK MONITOR
GM8000 and GM8001
PILOT WIRE SYSTEM

This manual provides performance, applications, installation and operation for GM8000 and GM8001 Ground Monitors using a pilot wire filter and choke.

SECTION 1 -Performance Characteristics

Describes the general performance and applications of the product. Mechanical, electrical and environmental specification are included.

SECTION 2 -Installation

Covers site selection, wiring, adjustments, connections and outline and mounting dimensions.

If more detailed information is required, a complete maintenance manual can be obtained by contacting your sales representative or Headquarter Sales:

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Femco Division
P.O. Box 33, 2000 Bethel Drive
High Point, N.C. 27261-0033
Telephone: (919) 887-2611
TWX 510-926-1937

Femco Ground Monitor should be returned to the manufacturer or authorized representative for service. Substitution of components not approved by MSHA will void MSHA Acceptance number.

Circuitry described in this manual is covered by Femco Patent Nos. 3,728,582 and 3,855,501.

ARC TRAP - Femco Registered Trademark
GROUND SENTINEL - Femco Registered Trademark

DO NOT CHANGE WITHOUT APPROVAL OF MINE SAFETY AND HEALTH ADMINISTRATION.

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MSHA B.T.S. Acceptance No. GM8000:050884FE
GM8001:050784FE

SECTION 1

INTRODUCTION

The Gulton/Femco Ground Sentinel along with the associated filters is designed to monitor the integrity of the ground circuit of power distribution circuits in coal mines. Either the three phase wires or a pilot wire can be used as a return signal path for the Ground Sentinel. If the ground check circuit has fifteen ohms or less loop resistance, the internal relay will be energized and the circuit breaker that feeds power to the cable can be energized. A disruption of the ground check circuit that lasts longer than one fourth of a second will de-energize the relay and trip the circuit breaker. The time delay prevents false trips. Three LED's indicate the condition of the ground check circuit. Shorting the pilot wire to the ground wire will cause the unit to trip.

SPECIFICATIONS

Mechanical

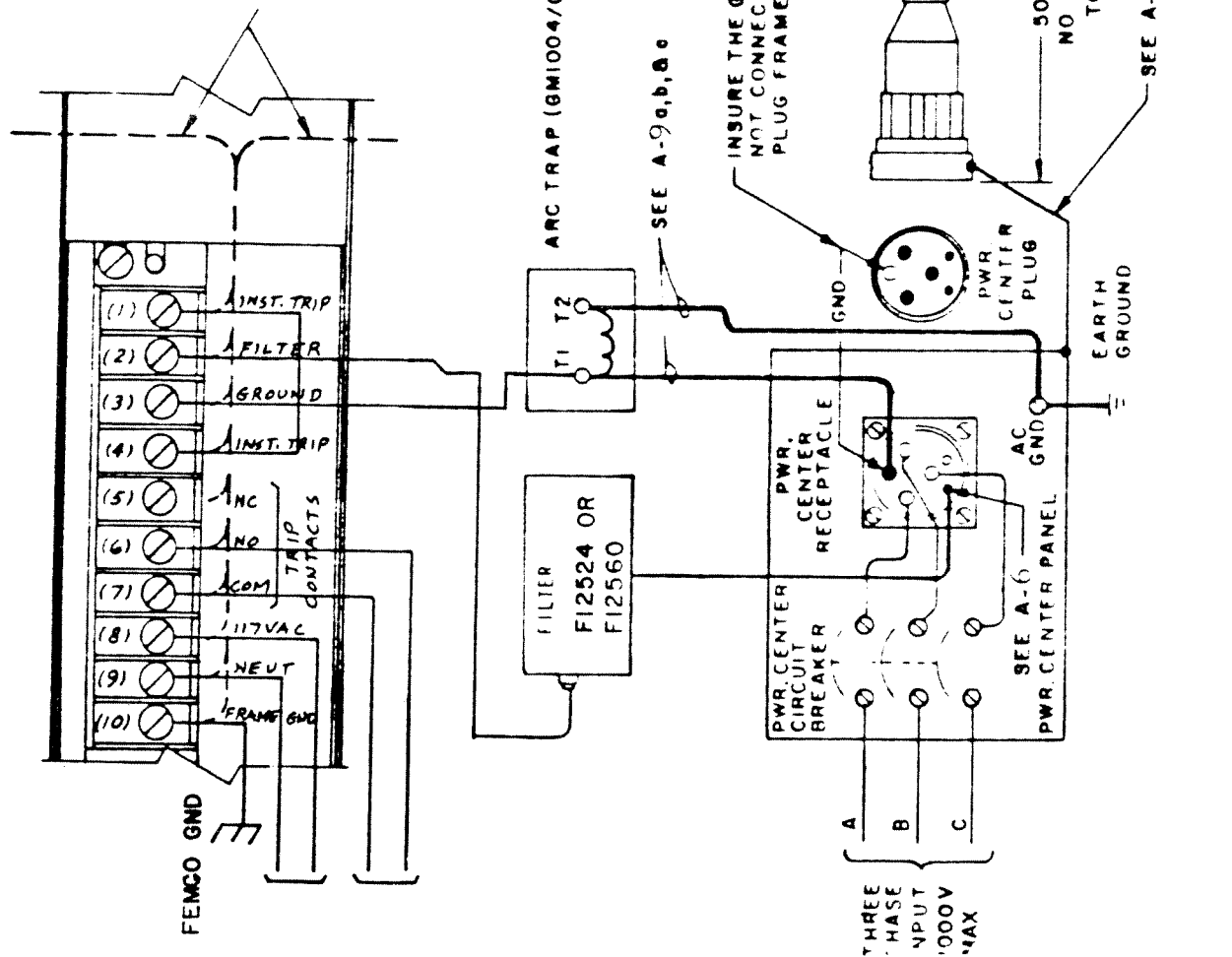
Size LWH (Fits on one half GM1000 Foot Print)	7.46" x 2.32" x 5.62" (189.5 x 58.9 x 142.7mm)
Construction	Stainless Steel
Weight	3 lb. 8 oz.
Serviceability	One plug in board contains all electronics including the relay.
<u>Power</u>	
<u>Supply Voltage</u>	117V \pm 15% 60 Hz (105 - 135)
Supply Voltage Dip for one minute no trip w/good loop	Down to 84V (MSHA 94V)
Supply Current	60 ma with good ground loop 30 ma with 75 ohm ground loop
Supply Transient Rejection (MSHA Waveforms)	1200V - 117V terminals 2400V - 117V to GW 2400V - 117V to case
Case Ground	Terminal provided
Circuit Isolation	2500V RMS from case
<u>Transmitter</u>	
<u>Frequency</u>	3700 - 4300 Hz adjustable (determined by loop)
Signal to loop	0.3A RMS \pm 10%

Output Impedance	5 ohms
Withstand indefinite short on output terminals	
Transient Rejection (MSHA Waveforms)	2400V
<u>Receiver</u>	
Loop Resistance For Trip (over voltage and temperature range)	15 ohms \pm 2 ohms
Trip Time Delay (after loop opened)	250 msec (max)
Instantaneous Trip	Opens relay coil circuit
Loop Resistance for Pickup	12 ohms \pm 2 ohms
Output Short Circuit Trip	0 - 1 ohm
Noise Rejection	Accomplished by filters
Transient Rejection	(same as transmitter)
Relay Contact Rating (UL)	10A, 1/3 HP 125, 250 VAC 10A, 30 VDC
Loop Current Indication	YEL LED brightness proportional to loop resistance
Trip Indication	RD LED - on when relay tripped
Trip Flag Indication	RD LED - on after relay tripped until reset
3-Position Test Switch	1. Normal position (Maintained) 2. Test position (Maintained) - trip 3. Unit check (MOMENTARY) GM8000-Trip (due to shorted output detector) GM8001-Not tripped but relay drops

SECTION 2

- A. Power Center Unit Installation (Refer to page 2/3)
1. Prepare a place to mount the GM8000/1 either inside the power center or in a separate enclosure.
 2. Connect terminal 10 of the GM8000/1 to the power center frame ground.
 3. Connect terminals 8 and 9 of the GM8000/1 to the 117 VAC control voltage source.
 4. Connect a jumper wire between terminals 1 and 4 of the GM8000/1.
 5. Mount the approved filter to provide convenient wiring to the associated power center receptacle.
 6. Connect terminal 2 of the GM8000/1 to one wire of the filter. Connect the other wire on the filter to one of the interlock pins on the power center receptacle that breaks connection first when the plug is removed. Be sure that the same pin on the plug is connected to the pilot wire. NOTE: This pin MUST NOT be connected to any other pin or to the plug shell.
 7. Mount the ARC TRAP to provide convenient wiring to the power receptacle.
 8. Connect terminal 3 on the GM8000/1 to terminal T1 of the ARC TRAP
 9. Connect trap terminal T1 to the power center's receptacle isolated ground pin. Connect the other terminal of the ARC TRAP to the power center AC ground.
 - a. Insure that the power receptacle's ground pin is isolated and not connected to the receptacle shell, for it will short circuit the ARC TRAP.
 - b. Insure that the isolated ground pin on the electrical cable plug is not connected to the plug shell, for it will also short circuit the ARC TRAP.
 - c. Insure that the wire size used in Step 9 is equal to or greater than 1/2 the phase wire size.
 - d. You must ground the shell of plug to the frame of the power center with separate strap equal to or greater than 1/2 size of phase wire.
 10. The GM8000/1 has both normally open (NO) and normally closed (NC) contacts connected to the terminal strip. Circuit breakers that require an open circuit to trip (a closed contact to seal in when the ground wire is good) should be wired to terminals 6 and 7. Circuit breakers that require a closed circuit to trip should be wired to terminals 5 and 7.

CUSTOMER WIRING ACCESS THROUGH KNOCK-OUT ON EITHER SIDE, OR CUSTOMER MAY PROVIDE OTHER ENTRY TO SUIT HIS NEEDS



F12535 OR F12553 OR F12558

11. Mount the GM8000/1 in the prepared space. Be sure that the chassis is securely grounded.

12. Put the test switch in the "normal" position.

B. Machine Mounted Choke Installation

1. Select a mounting place for the choke inside a permissible electrical box on the machine.

2. Connect the pilot wire to one lead of the pilot wire choke.

3. Connect the other lead of the pilot wire choke to a machine frame ground using a different bolt than the ground wire.

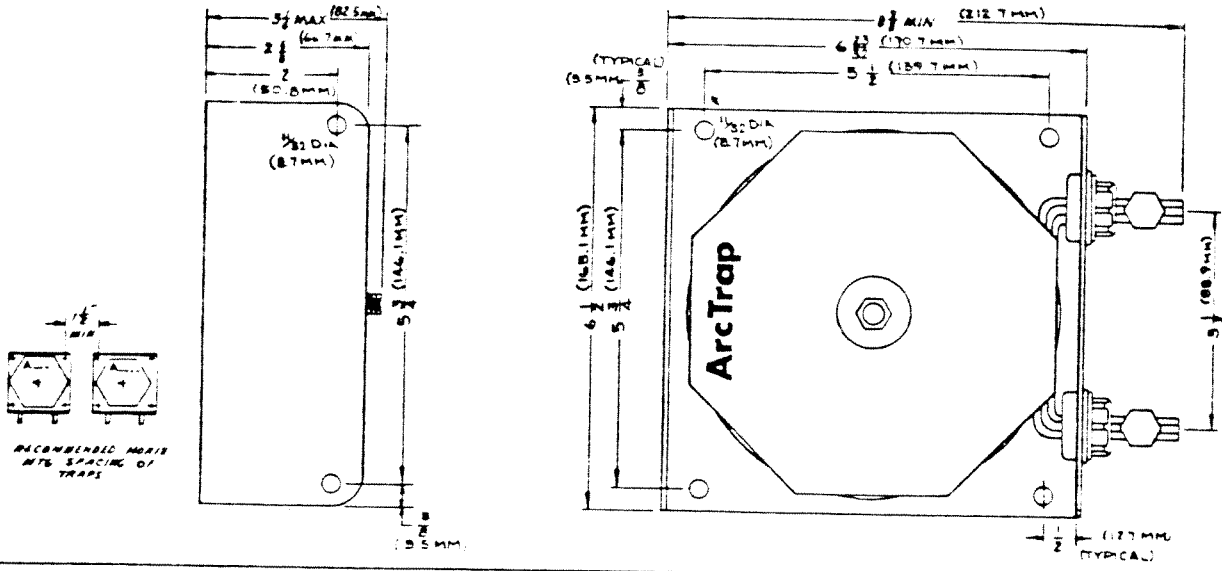
C. Installation Testing

1. Apply power to the power center. If the GM8000/1 has been installed properly, both red indicator's should be off and yellow tuning indicator should be on. All controls have been factory set and do not require field adjustment.

2. If neither red indicator is on, remove power to the load by opening the power center load circuit breaker, then disconnect the ground wire at the machine. If both red indicators come on, the installation is operating properly. The yellow tuning indicator should be off.

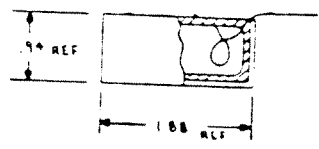
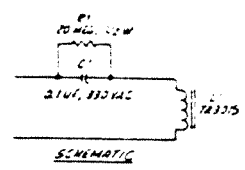
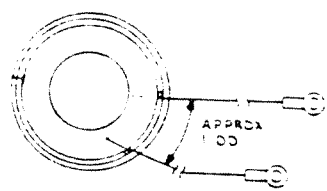
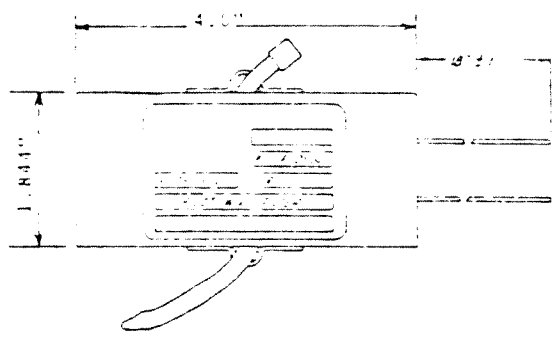
3. If both red indicators do not come on, put the test switch in the "TEST" position, the yellow tuning indicator should go off and the red indicators should come on. Then hold the test switch in the "UNIT CHECK" position. On model GM8000, the red trip indicator should go off momentarily and come back on, the yellow tuning indicator will come on momentarily and then go back off. The red latching trip indicator will remain on. On model GM8001, the red trip indicator should go off and the red latching trip indicator and yellow tuning indicator should be on. Pushing the "LATCH RESET" button should cause the red latching trip indicator to go off. Return the test switch to the "NORMAL" position. Operation as above indicates that the GM8000/1 is operating properly and any problems are a result of secondary ground paths, connector ground pins not isolated from the shell, or improper field wiring.

4. If the above procedure does not result in proper operation, see Adjustment Procedure in this manual or refer to the maintenance manual for a detailed troubleshooting guide.



NOTES
 1. FOR USE IN GROUND WIRES OF CABLES WITH 25MMCM OR SMALLER POWER CONDUCTORS PER MESA LETTER DATED 9-17-76

OUTLINE GROUND WIRE TRAP



Outline F12553, F12558 Potted Pilot Wire Choke

OUTLINE & MOUNTING DIMENSIONS F12560 PILOT WIRE FILTER

GM8000 and GM8001 Adjustment Procedure

Adjustment of the GM8000/1 consists of adjusting the frequency of the transmitter oscillator to the resonant frequency of the filters and stray cable impedance. The reactive components of the circuit impedance are tuned out and the GM8000/1 monitors circuit resistance.

This is accomplished by placing an AC meter in TP1 and TP2 and adjusting R4 for a peak on the meter. This should occur at about 1.2V RMS with a short cable and decrease as the length of the cable monitored increases.

The trip may be checked by adding resistance into the circuit. With no cable (just two filters) the trip resistance should be 15 ohms.

