GAI-TRONICS® CORPORATION
A HUBBELL COMPANY

AM7011 Permissible Loudspeaking Mine Telephone

Confidentiality Notice

General Description

Introduction

The AM7011 Permissible Loudspeaking Mine Telephone is designed to be used in mines where permissible devices must be used, as specified by mining laws. One 12 V dc battery is used during the paging operation to produce the required 12 V dc keying voltage on the telephone lines.

Provisions are made to keep the unit's speaker quiet when paging or receiving a normal audio signal. Input telephone line dc polarity does not have to be observed since the unit's design provides for polarity reversal. Individual volume controls are provided for the speaker and handset receiver.

This unit offers higher impedance for both ac and dc operation than other models and allows many units to operate on the same telephone lines.

Figure 1. AM7011 Permissible Loudspeaking Mine Telephone

Permissible System

For a system to be permissible, all telephones connected to the same telephone line must be permissible units.

Installation

One ¼-inch mounting slot is provided in the bottom center of the back plate and three key-punched holes are provided at the top of the back plate for mounting the unit to a wall, pole, desk or other similar structure.

Install battery (supplied by others) and make all connections.

⚠WARNING ⚠

This telephone must not be connected to a non-permissible telephone or to a permissible telephone designed to operate or page at voltages other than 12 V dc.

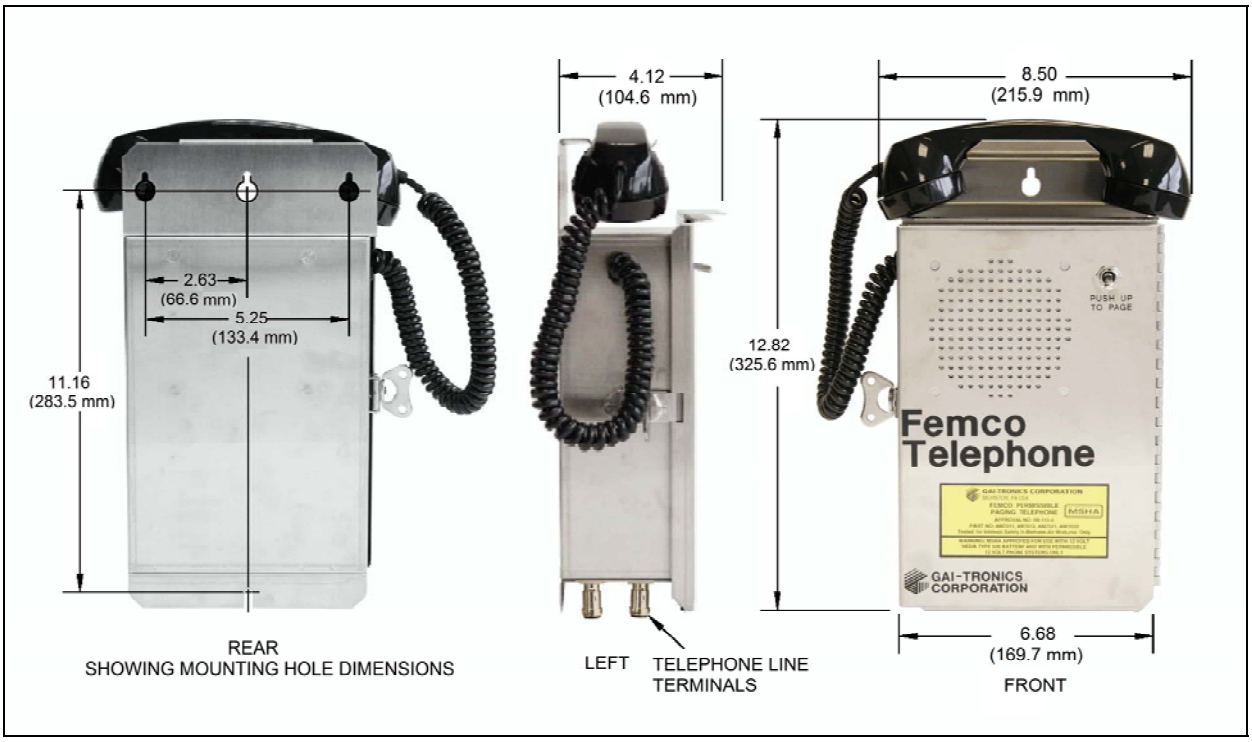


Figure 2.

Circuit Analysis

Introduction

This section of the manual is provided for acquainting maintenance personnel with the circuit operation of the unit. Block diagrams are provided to show the general operation of the unit.

Block Diagrams

Refer to Figure 3, which shows the unit operation when receiving a page and when receiving an audio signal during normal conversation. A dc voltage is imposed on the telephone line by the paging party from a distant unit. This is full wave bridge rectified which handles any polarity reversal on the telephone line. The rectified dc voltage allows Q2 to conduct which in turn, allows Q3 to conduct.

When Q3 conducts, it allows IC1 to operate and amplify the audio signal. When being paged, the audio signal is transformer-coupled through T1 and amplified by IC1 before passing to the speaker. The volume is adjusted by the SPEAKER VOLUME CONTROL. During normal conversation and when not being paged, there is no dc voltage imposed on the lines. This cuts off Q2 and Q3 which, in turn, prevents IC1 from amplifying any audio signal and passing it to the speaker. The audio signal is now transformer coupled through the HANDSET VOLUME CONTROL, to the handset receiver where it is heard by the operator.

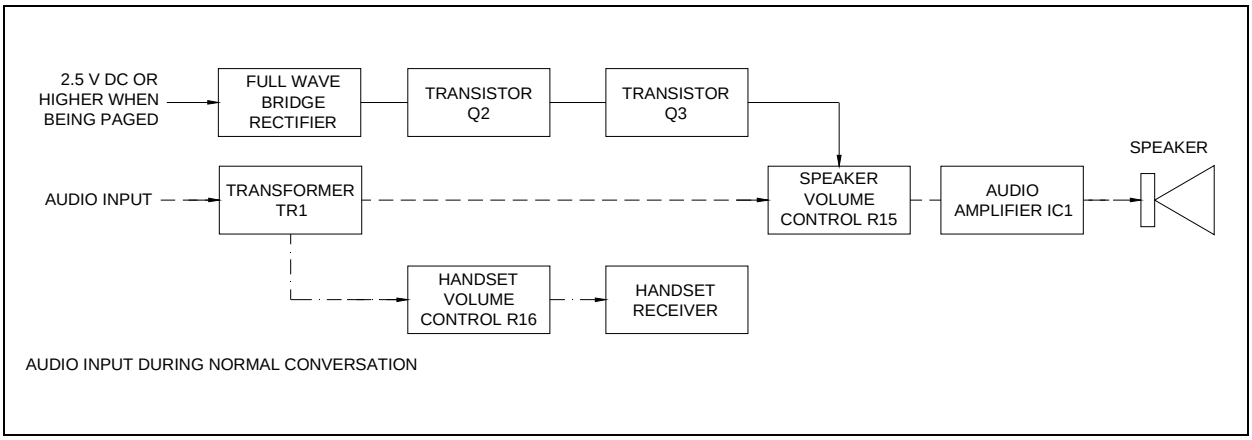


Figure 3. Unit operation when receiving a page and when receiving an audio signal during normal conversation

Figure 4 shows the unit operation when paging another operator or when transmitting during normal conversation. When not paging, speaking during normal conversation causes battery BA1 to be connected through switch SW1. This allows the 12 V dc to pass through the handset switch and permits Q1 to conduct. When Q1 conducts, it cuts off Q2 which in turn cuts off Q3. With Q3 off, IC1 is prevented from applying an audio signal and passing it to the unit's speaker. When the operator speaks into the handset, the audio signal is amplified by IC2 and transformer-coupled by TR1 to the telephone lines.

When paging, the operation just discussed still occurs. However, battery BA1 is now connected through SW1, which is not activated, and applies the 12 V dc keying voltage to the telephone lines. Extra protection takes place to insure no audio signal reaches the unit's speaker. This is also done through the activated SW1 switch, which removes the positive voltage from Q3 further insuring IC1 is inoperative.

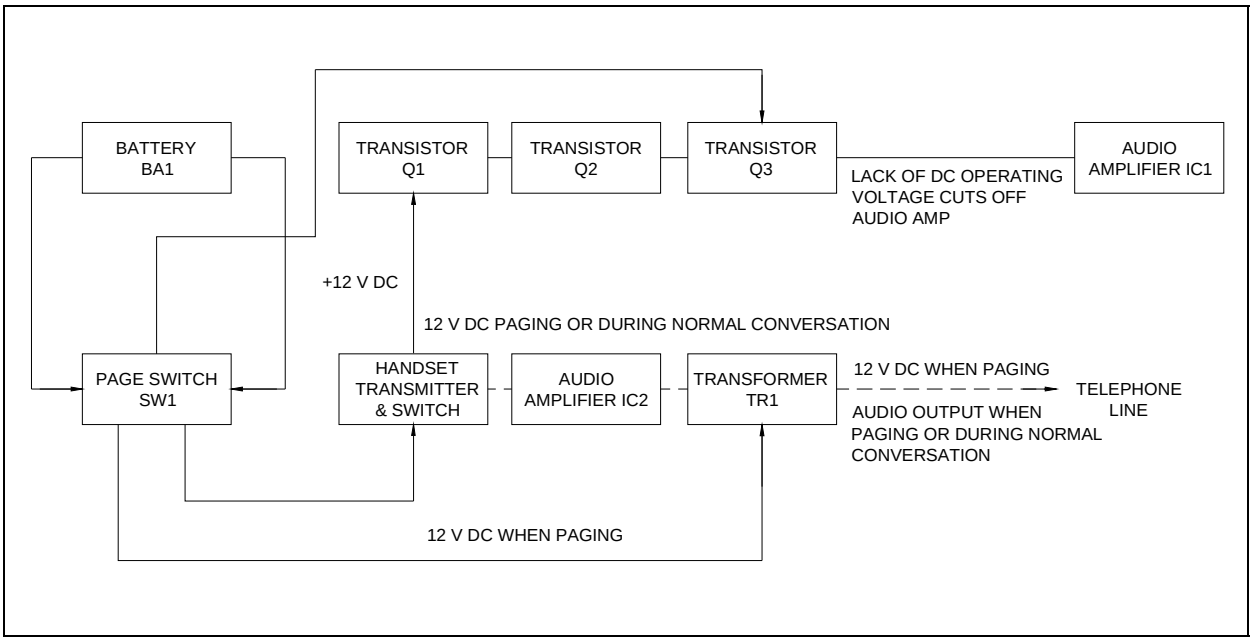


Figure 4. Unit operation when paging another operator or when transmitting during normal conversation

Maintenance

Introduction

This section of the manual contains information pertaining to the maintenance of the unit. Troubleshooting charts are provided to help in localizing the problem areas. Before any serious maintenance is considered, however, replace the battery to insure the correct operating voltage.

A troubleshooting chart, Table 1, is provided to assist maintenance personnel in localizing the general problem areas. The chart contains three columns which are Symptom, Probable Cause and Remedy.

Troubleshooting

Table 1. Troubleshooting Chart

Problem	Probable Cause	Remedy
When receiving a page, telephone lines are keyed by 12 V dc but there is no operating dc voltage for transistor Q2.	PCBA is defective.	Replace PCBA.
DC operating voltage OK, but when receiving a page, audio does not reach speaker.	The speaker volume control (R15) is misadjusted.	Re-adjust the speaker volume control (R15).
	PCBA is defective.	Replace PCBA.
When receiving a normal message but not being paged, audio does not reach operator.	Handset volume control (R16) is misadjusted.	Re-adjust handset volume control (R16).
	Receiver element in handset is defective.	Replace receiver element in handset.
	PCBA is defective.	Replace PCBA.
When paging another party, correct 12 V dc is not imposed on phone lines.	Battery BA1 is weak or defective.	Replace battery BA1.
	The PAGE switch, SW1 is defective.	Replace PAGE switch.
When paging another party or transmitting during normal conversation, no audio signal is produced.	Transmitting element in handset is defective.	Replace transmitting element in handset.
	PCBA is defective.	Replace PCBA.

Specifications

Electrical

Power source ..... 12 V dc NEDA 926 Battery

Battery requirements

Standby ..... 0 mA

Speaker amplifier ..... 28 mA at standby, 250 mA peak

Handset amplifier ..... 110 mA nominal into 200 ohms (varies with telephone lines and number of telephones)

Telephone line ..... 17 k-ohms dc, 4.5 k-ohms @ 1 kHz

Paging voltage ..... 12 V dc

Paging sensitivity ..... Pick up at 2.5 V dc or greater; drop out at 2.0 V dc

Paging switch ..... Bat handle

Speaker ..... 3-watt, 8-ohm, 4-inch cone

Handset ..... Standard handset with push-to-talk switch and 4-foot coiled cord

Controls

Speaker amplifier R15 ..... Adjustable to 30 dB

Handset receiver R16 ..... Adjustable to 30 dB

Output Power

Speaker amplifier ..... Maximum of 2 watts into 8 ohms (clipped)

Handset amplifier ..... 380 mW into 200-ohm load

Short Circuit Paging

Current ..... 0.35 amperes

Insulation ..... 600 V dc between line and ground

Carrier Impedance ..... Line-to-line: 7 k-ohms
Line-to-ground: 100 k-ohms

Mechanical

Dimensions ..... 6.68 W × 12.38 H × 3.30 D inches (170 × 315 × 84 mm)

Weight ..... 9 lbs. 6 oz. with battery

Construction ..... 18-gauge stainless steel

Connections ..... Two spring loaded push terminals for telephone line

Environmental

Moisture resistance ..... 0 to 95% humidity with printed circuit board, conformal coated

Temperature range ..... −30º C to 60º C

Approvals

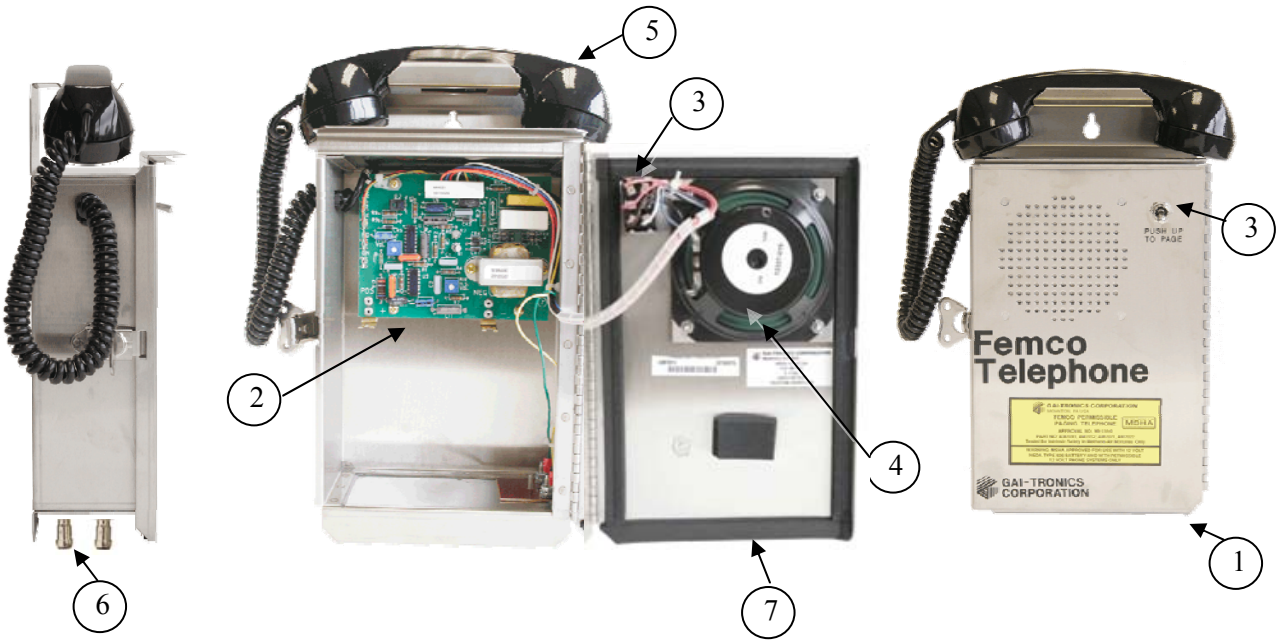
MSHA ..... Approval No. 9B-155-0

Parts Identification

The following information is presented to acquaint maintenance personnel with the procedure required for identifying parts. Normally, the parts identification is initiated by a breakdown of the major assemblies. The sub-assemblies, that comprise the individual major assemblies, are then reduced to their component parts. Each component part is identified by a circuit symbol, description and associated part number. Assembly and sub-assembly drawings are provided to facilitate in the part identification.

Replacement Parts

Item	Part. No.	Description
1	BO4600	Housing
2	WBA4097	Printed Circuit Board Assembly
3	SW3246	Switch
4	13327-019	Speaker
5	MI2806	Handset Assembly
6	TE2780	Binding Post
7	MC3589	Gasket



Warranty

Equipment. GAI-Tronics warrants for a period of one (1) year from the date of shipment, that any GAI-Tronics equipment supplied hereunder shall be free of defects in material and workmanship, shall comply with the then-current product specifications and product literature, and if applicable, shall be fit for the purpose specified in the agreed-upon quotation or proposal document. If (a) Seller's goods prove to be defective in workmanship and/or material under normal and proper usage, or unfit for the purpose specified and agreed upon, and (b) Buyer's claim is made within the warranty period set forth above, Buyer may return such goods to GAI-Tronics' nearest depot repair facility, freight prepaid, at which time they will be repaired or replaced, at Seller's option, without charge to Buyer. Repair or replacement shall be Buyer's sole and exclusive remedy. The warranty period on any repaired or replacement equipment shall be the greater of the ninety (90) day repair warranty or one (1) year from the date the original equipment was shipped. In no event shall GAI-Tronics warranty obligations with respect to equipment exceed 100% of the total cost of the equipment supplied hereunder. Buyer may also be entitled to the manufacturer's warranty on any third-party goods supplied by GAI-Tronics hereunder. The applicability of any such third-party warranty will be determined by GAI-Tronics.

Services. Any services GAI-Tronics provides hereunder, whether directly or through subcontractors, shall be performed in accordance with the standard of care with which such services are normally provided in the industry. If the services fail to meet the applicable industry standard, GAI-Tronics will re-perform such services at no cost to buyer to correct said deficiency to Company's satisfaction provided any and all issues are identified prior to the demobilization of the Contractor's personnel from the work site. Re-performance of services shall be Buyer's sole and exclusive remedy, and in no event shall GAI-Tronics warranty obligations with respect to services exceed 100% of the total cost of the services provided hereunder.

Warranty Periods. Every claim by Buyer alleging a defect in the goods and/or services provided hereunder shall be deemed waived unless such claim is made in writing within the applicable warranty periods as set forth above. Provided, however, that if the defect complained of is latent and not discoverable within the above warranty periods, every claim arising on account of such latent defect shall be deemed waived unless it is made in writing within a reasonable time after such latent defect is or should have been discovered by Buyer.

Limitations / Exclusions. The warranties herein shall not apply to, and GAI-Tronics shall not be responsible for, any damage to the goods or failure of the services supplied hereunder, to the extent caused by Buyer's neglect, failure to follow operational and maintenance procedures provided with the equipment, or the use of technicians not specifically authorized by GAI-Tronics to maintain or service the equipment. THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE IN LIEU OF AND EXCLUDE ALL OTHER WARRANTIES AND REMEDIES, WHETHER EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Return Policy

If the equipment requires service, contact your Regional Service Center for a return authorization number (RA#). Equipment should be shipped prepaid to GAI-Tronics with a return authorization number and a purchase order number. If the equipment is under warranty, repairs or a replacement will be made in accordance with the warranty policy set forth above. Please include a written explanation of all defects to assist our technicians in their troubleshooting efforts.

Call 800-492-1212 (inside the USA) or 610-777-1374 (outside the USA) for help identifying the Regional Service Center closest to you.