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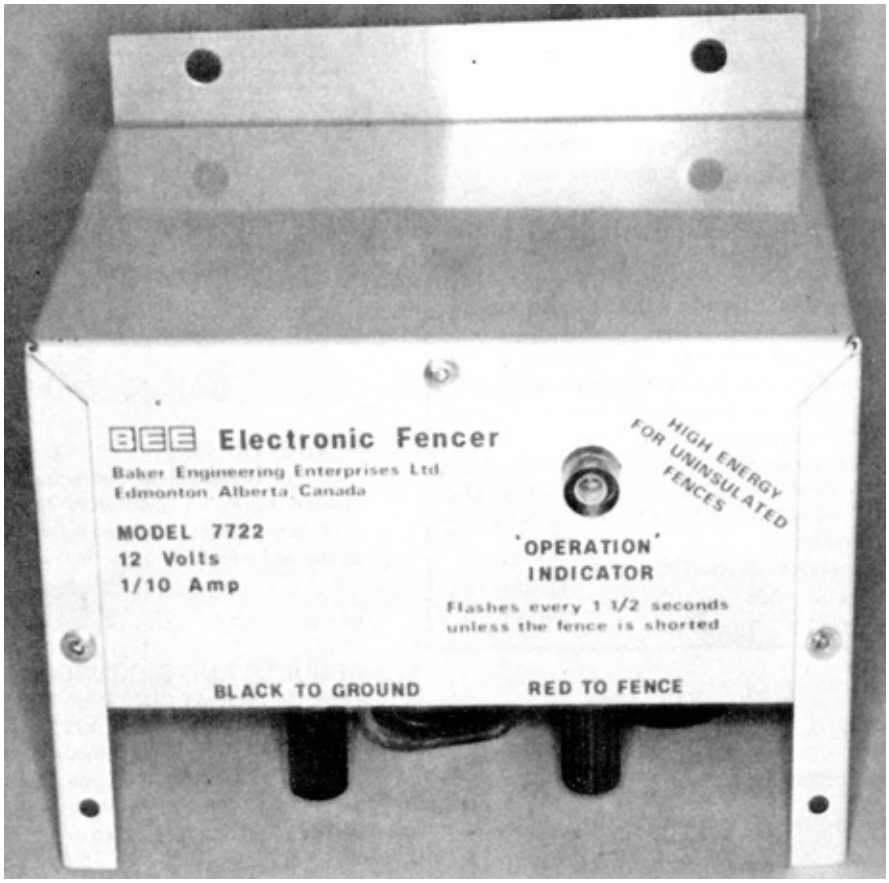

Bee 7722 Electric Fence Controller

A Co-operative Program Between

ALBERTA FARM MACHINERY RESEARCH CENTRE

PAMI
PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

BEE 7722 ELECTRIC FENCE CONTROLLER

MANUFACTURER:

Baker Engineering Enterprises Ltd.
9620 - 27 Avenue
Edmonton, Alberta

RETAIL PRICE:

$99.00 (March, 1981, f.o.b. Humboldt)

DISTRIBUTOR:

Alpec Merchant Corporation
-- 9620 - 27 Avenue
Edmonton, Alberta
T6N 1B2
-- 1342 Fleet Street
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-- P.O. Box 97
Alexander, Manitoba
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SUMMARY AND CONCLUSIONS

The BEE 7722 electric fence controller was suitable for use over a wide range of fence conditions. Wire insulators were unnecessary for most fences while plant growth did not appreciably affect controller performance in most conditions.

Peak voltage output on a 5.4 km (3.3 mi) single wire fence varied from 3110 V for a well-insulated, grass-free, dry fence to 2370 V for an uninsulated, grass-grown, wet fence. Output was welt above the 2000 V minimum guard voltage recommended for long-haired animals.

Peak voltage output on a 16 km (10 mi) single wire fence varied from 1860 V for a well-insulated, grass-free, dry fence to 1560 V for an uninsulated, grass-grown, wet fence.

Peak current flow through a cow touching well-insulated 5.4 and 16 km (3.3 and 10 mi) single wire fences varied from 4.9 to 2.9 A for a cow standing in water and from 0.83 to 0.49 A for a normally-grounded cow. The high peak current output indicated that the BEE 7722 generated quite an intense shock on fairly long or poorly insulated fences.

The BEE 7722 was very suitable for cold weather use on feeding fences. Peak voltage output at -35°C on a 5.4 km (3.3 mi) single wire fence was about 3000 V, only 4% lower than its output at room temperature.

No durability problems occurred during testing.

RECOMMENDATIONS

A need for recommendations was not apparent.

Chief Engineer -- E. O. Nyborg
Senior Engineer -- G. E. Frehlich
Project Technologist -- G. G. Burton

NOTE: This report has been prepared using SI units of measurement. A conversion table is given in APPENDIX II.

GENERAL DESCRIPTION

The BEE 7722 electric fence controller is designed for 12 V battery operation. It is meant to be mounted in a suitable weather-proof enclosure.

The BEE 7722 contains solid-state electronics, with no moving parts. It may be used on fences without insulators. A light is provided to indicate operation.

Detailed specifications are given in APPENDIX I.

SCOPE OF TEST

The performance characteristics of the BEE 7722 were determined in the laboratory for a range of simulated fence conditions.* It was evaluated for ease of operation, quality of work, safety and suitability of the instruction manual.

RESULTS AND DISCUSSION

EASE OF OPERATION

Installation: The BEE 7722 is equipped with wire leads for connection to a 12 V automotive battery. The controller is to be mounted indoors and if mounted outdoors, it should be placed in an appropriate weather-proof shelter. The manufacturer recommends that it not be installed in a barn with a damp or corrosive atmosphere.

The controller is connected to the fence with a length of insulated wire. In addition, a suitable ground rod has to be installed and connected to the controller. Depending on ground conditions, a ground rod up to 3 m (10 ft) long may be needed.

Fence Condition: The manufacturer states that the BEE 7722 may be used on fences without wire insulators. The wire can be stapled directly to wooden posts, but should not be directly attached to live trees, green posts, salt-treated wooden posts or steel posts. If the fence is in good repair, the controller is designed to operate effectively with a certain amount of plant growth touching the charged wire.

The manufacturer recommends that for cattle fences, in areas with normal ground conditions, a single charged wire provides a suitable fence. For very dry or frozen soil, which provide poor ground conditions, a two-wire fence, with one charged wire and one ground wire, may be necessary.

**PAMI T7850, Detailed Test Procedures for Electric Fence Controllers.*

Operation: The BEE 7722 is equipped with a flashing light to indicate that the fence is properly charged. If this light does not flash, it indicates that insufficient charge is being placed on the fence, which may be the result of too long a fence or poor insulation. A portable tester is supplied with the BEE 7722, for locating short circuits in fences.

The controller was factory sealed. As a result, if the indicator light should need replacement, the controller would need factory servicing.

QUALITY OF WORK

General: Operation of an electric fence controller is quite complex. To be effective, an electric fence has to deliver a minimum guard voltage to overcome the insulation resistance of the hide and hair of an animal. In addition, once the insulation resistance of the animal is overcome, the controller must deliver a pulse of electrical energy to the animal to create a shock. The amount of energy (charge) delivered is related to the current flow and its duration. If too much energy is delivered, the fence will be hazardous to both animals and humans while if not enough energy is delivered, animal control will be ineffective.

Little is known about the physiological effect of shock pulses on animals. In general, the following guidelines are used in assessing fencer performance: the minimum guard voltage needed to overcome animal insulation resistance should be at least 2000 V for sheep and for long-haired cattle, such as Herefords or Charolais. For shorter haired animals, such as most dairy cows, a minimum guard voltage of 700 V is sufficient. The shape of the current pulse affects what the animal feels when it touches an electrical fence, but little reliable information is available. It has been found that shock intensity is more related to the peak current value in a pulse than to the total value of the electrical charge.

Fence conditions determine the guard voltage produced by a fence controller and limit the amount of charge which a controller is capable of delivering to an animal. The insulation resistance of a 1.6 km (1 mi) single wire fence typically varied from about 1 kΩ for an uninsulated, grass-grown, wet fence to well above 500 kΩ for a well-insulated, grass-free, dry fence. The higher the fence insulation resistance, the greater is the length of fence on which a controller can be effectively used. To receive a shock from a single wire electrified fence, an animal must be sufficiently grounded to permit current to flow from the fence, through the animal. Typical electrical resistances of cattle vary from about 0.5 kΩ for a cow standing in water and licking a charged wire to about 4 kΩ for typical ground conditions. If ground conditions are too poor, animal resistance to ground is so great that no shock occurs.

Peak Voltage Output: FIGURES 1 and 2 show peak voltage outputs of the BEE 7722 for 5.4 and 16 km (3.3 and 10 mi) lengths of single wire fence over a range of insulation resistances. On a 5.4 km (3.3 mi) fence (FIGURE 1), peak voltage output varied from 3110 V for a well-insulated, grass-free, dry fence to 2370 V for an uninsulated, wet fence with considerable grass touching the charged wire. The voltage output for all fence conditions, was well above the 2000 V minimum guard voltage needed for long-haired animals. From FIGURE 1, it can be seen that the BEE 7722 can be satisfactorily used on this length of fence without wire insulators.

On a 16 km (10 mi) fence (FIGURE 2), peak voltage output ranged from 1860 V for a well-insulated, grass-free, dry fence to 1560 V for an uninsulated, grass-grown, wet fence. Voltage output was below the 2000 V minimum required for long-haired animals, but was above the 700 V minimum required for short-haired animals, for all fence conditions.

As can be seen from both FIGURES 1 and 2, plant growth touching a fence did not appreciably affect controller performance. The BEE 7722 can be expected to operate over a wide range of fence conditions.

Electrical Charge: FIGURES 3 to 6 show the current output of the BEE 7722 when a cow touches 5.4 and 16 km (3.3 and 10 mi) lengths of well-insulated, single wire, fence. FIGURES 3 and 4 are for an animal resistance of 0.5 kΩ, which represent the most extreme condition of a cow standing in water and licking the charged wire, while FIGURES 5 and 6 are for an animal resistance of 4 kΩ, representing more normal ground conditions. The shock

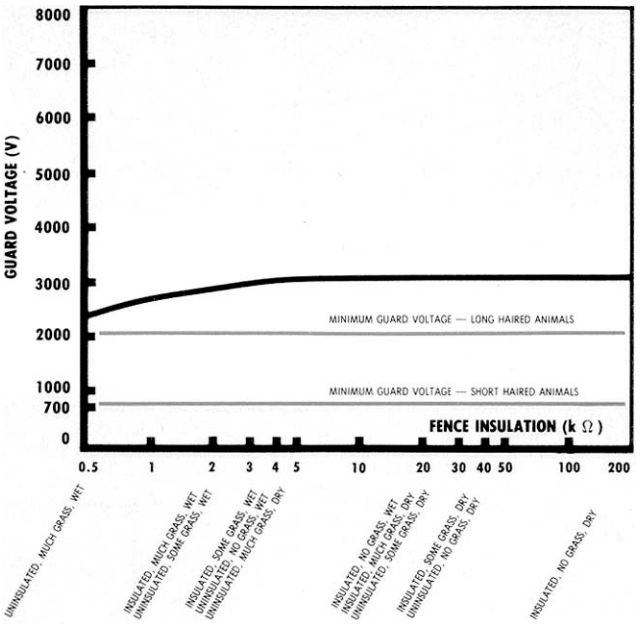

FIGURE 1. Guard Voltage Produced on a 5.4 km Single Wire Fence.

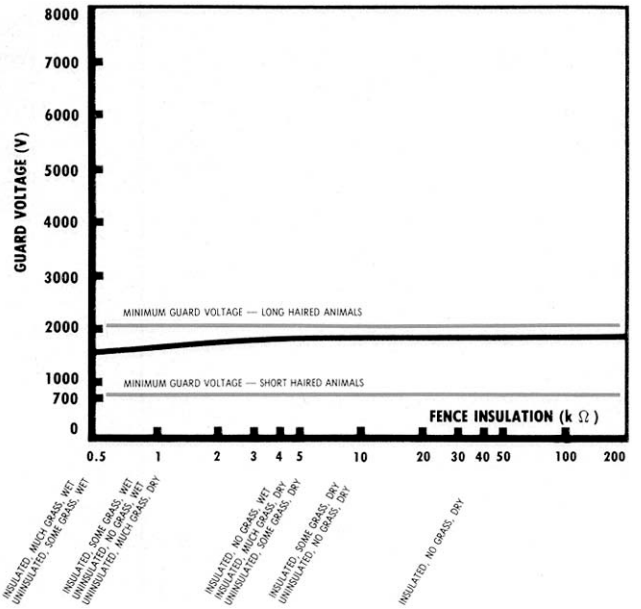

FIGURE 2. Guard Voltage Produced on a 16 km Single Wire Fence.

intensity is related to the peak current in the pulse. The higher the peak current, the more intense will be the shock.

The peak current delivered by the BEE 7722 varied from 4.9 A for a well-grounded cow touching the 5.4 km (3.3 mi) fence to 0.49 A for a normally-grounded cow touching the 16 km (10 mi) fence. The BEE 7722 gave quite an intense shock on fairly long or poorly insulated fences.

About 55 charge pulses per minute were delivered. The number of pulses did not vary with fencer load, however, the on-time was affected by load. On-time varied from about 0.05 to 1.17 ms.

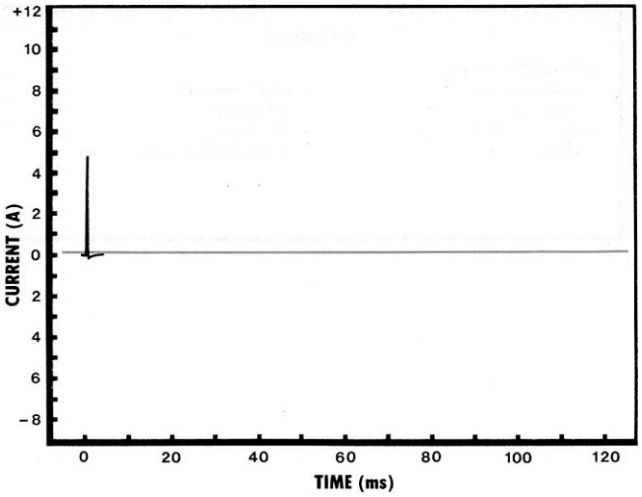

FIGURE 3. Current Delivered to a Well-Grounded Cow Touching a 5.4 km Well-Insulated Fence.

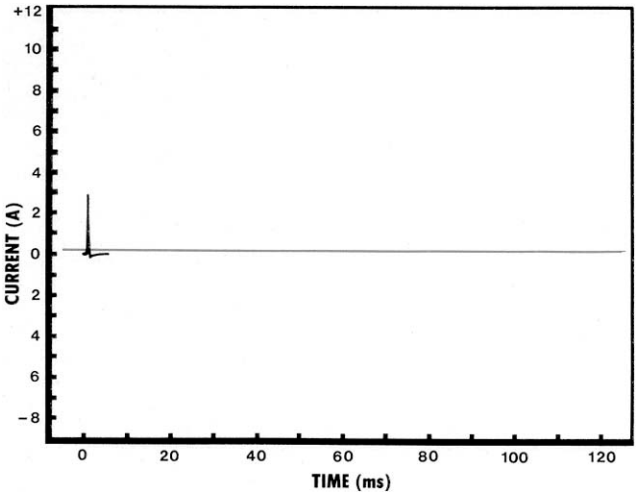

FIGURE 4. Current Delivered to a Well-Grounded Cow Touching a 16 km Well-Insulated Fence.

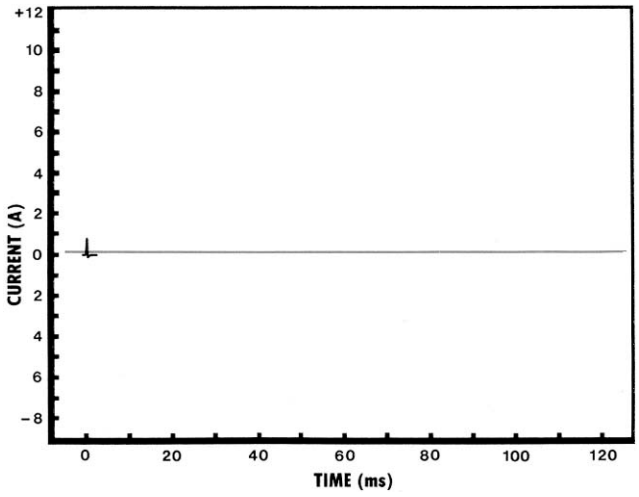

FIGURE 5. Current Delivered to a Normally-Grounded Cow Touching a 5.4 km Well-Insulated Fence.

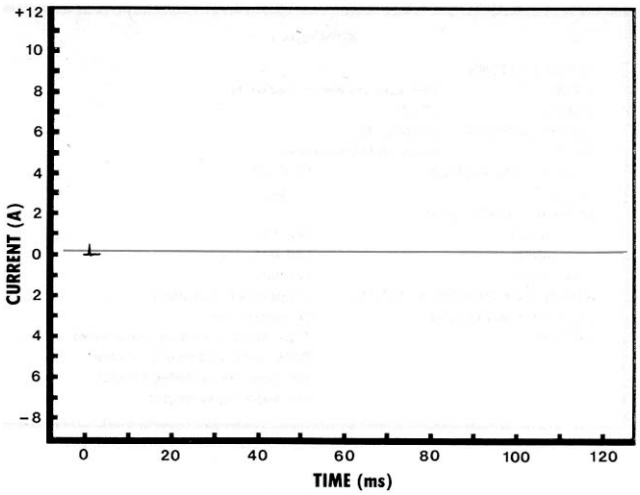

FIGURE 6. Current Delivered to a Normally-Grounded Cow Touching a 16 km Well-Insulated Fence.

Low Temperature Operation: The BEE 7722 could effectively be used to energize cattle feeding wires during low winter temperatures. The peak voltage output of the controller at -35°C on a 5.4 km (3.3 mi) single wire fence was about 3000 V, only 4% lower than its output at room temperature. Since the peak voltage outpul was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the BEE 7722 was very suitable for feeding enclosures.

Since battery voltage is severely reduced at low temperatures, it may be necessary to provide a heated battery enclosure to ensure effective winter operation. As frozen ground is often a very poor electrical conductor, two-wire systems, utilizing a separate ground wire, are usually most suitable for winter cattle feeding.

Battery Consumption: A 12 V, 70 amp-hour battery will operate lhe BEE 7722 about four weeks, depending upon the naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased. The battery should be regularly checked to ensure effective controller performance.

SAFETY

The instruction manual clearly outlined safety considerations. No safety problems were evident if lhe manufacturer's instructions were followed.

INSTRUCTION MANUAL

The instruction manual was clear, concise and well illustrated. It oullined installation, safely considerations and operation, as well as suitable fence configurations.

DURABILITY RESULTS

The intent of the test was functional evaluation. An extended durability evaluation was not conducted. No problems occurred during functional testing.

APPENDIX I

SPECIFICATIONS

MAKE:	BEE Electric Fence Controller
MODEL:	7722
SERIAL NUMBER:	15263EFB
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	12 V DC
WEIGHT:	1.1 kg
OVERALL DIMENSIONS:	
-- length	142 mm
-- width	122 mm
-- height	122 mm
NUMBER OF INDICATOR LIGHTS:	1 (operation indicator)
TYPE OF ENCLOSURE:	for indoor use
OPTION:	7707 fence matching transformer
	8004 cattle and poultry trainer
	820 peak fence voltage meter
	875 lightning protector

APPENDIX II

CONVERSION TABLE

1 millimetre (mm)	= 0.04 inches (in)
1 metre (m)	= 3.3 feet (ft)
1 kilometre (km)	= 0.6 mile (mi)
1 kilogram (kg)	= 2.2 pounds mass (lb)

ALBERTA FARM MACHINERY RESEARCH CENTRE

3000 College Drive South
Lethbridge, Alberta, Canada T1K 1L6
Telephone: (403) 329-1212
FAX: (403) 329-5562
http://www.agric.gov.ab.ca/navigation/engineering/afmrc/index.html

Prairie Agricultural Machinery Institute
Head Office: P.O. Box 1900, Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-2555

Test Stations:

P.O. Box 1060
Portage la Prairie, Manitoba, Canada R1N 3C5
Telephone: (204) 239-5445
Fax: (204) 239-7124

P.O. Box 1150
Humboldt, Saskatchewan, Canada S0K 2A0
Telephone: (306) 682-5033
Fax: (306) 682-5080