


Evaluation Report

618



Battery Saver
BEE 8088
BEE 8105C
BEE 8355C
Captivator Super 1200
Shur Shock
Speedrite 240
Speedrite SP580
Stockman
Trident
Winterburn WB-131C
Winterburn WB-151

Electric Fence Controllers

A Co-operative Program Between



ALBERTA
FARM
MACHINERY
RESEARCH
CENTRE



PRAIRIE AGRICULTURAL MACHINERY INSTITUTE

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ELECTRIC FENCE CONTROLLERS

INTRODUCTION TO REPORT

OPERATING CONDITIONS

Actual fence controller operating conditions in the field are extremely variable and depend on many factors such as fence length, weather, plant growth, and fence insulation. To standardize and control these variables, PAMI tests electric fence controllers in the lab, using combinations of resistors and capacitors to simulate specific operating conditions. Resistance varies with fence length and operating conditions, and is measured in ohms (Ω). Capacitance is largely dependent on fence length.

An uninsulated fence with wet grass touching the wire has a low resistance. In this condition most of the fence controller's output shorts to ground, and the shock to the animal is reduced. If the fence is well-insulated with no grass touching the wire, almost all of the controller's output is used to shock the animal, and the shock is maximized.

Since cold temperatures can affect performance of some fence controllers, PAMI also tests at reduced temperatures to ensure proper winter operation.

SHOCK DELIVERY

To deliver a shock, an electric fence controller must maintain adequate guard voltage to overcome the insulation resistance of the hide and hair of the animal, and of the ground return path. This minimum guard voltage has been defined as 700 V for short-haired animals, such as dairy cows, and 2000 V for long-haired animals, such as sheep. If the guard voltage is above the specified minimum, the animal will receive a shock. If the guard voltage is below the minimum, no shock will be felt. It is important to realize that guard voltage only determines whether or not a shock will be delivered to the animal, and is not a measure of how much shock will be felt.

SHOCK INTENSITY

If the guard voltage is adequate to deliver a shock, the effectiveness will then depend on how much shock is produced (shock intensity). Rating the shock intensity of an electric fence controller is difficult because little is known about the physiological effects of shock pulses on animals. As indicators of shock intensity, PAMI reports both the peak current and electrical energy outputs delivered by the fence controller. These are both dependent on the operating conditions and the fence controller's ability to produce a shock under those conditions.

The peak current is the maximum current achieved during the shock pulse and is measured in amps (A). This is an instantaneous value which is not related to shock duration (pulse on-time). High currents indicate high shock intensities.

The energy output in a shock pulse is another indicator of shock intensity. It is related to the combination of amps, volts and pulse on-time, and is measured in joules (J). High energy values indicate high shock intensities. Although manufacturers rate their fence controller shock intensity in several ways, the use of joules is quite common.

SAFETY

Because of the potential for annoying shock pulses in other electrical equipment and other damage possible from lightning strikes, it is very important to install and operate electric fence controllers safely. The controller should be installed and grounded adequately, as indicated in the operator's manual.

The Canadian Standards Association (CSA) tests electric fence controllers to ensure that their operation and output is within safe limits. Fence controllers designed for 115 V AC operation must be CSA approved to be legally sold on the prairies. There are no provincial regulations regarding battery powered fence controllers.

REPORT INTERPRETATION

To assess a fence controller's performance, both shock delivery and shock intensity must be considered in various conditions. To simplify comparison in this report, PAMI specifies output in two conditions.

In the shock delivery section of the report, a "clean" fence is defined as a 3.3 mi (5.4 km) fence with 4 k Ω resistance, and a "weeded" fence is defined as a 10 mi (16 km) fence with 100 Ω resistance. The higher the guard voltage is, the more effective the electric fence will be.

In the shock intensity section, a "dry" condition represents a cow standing on dry ground while touching the wire. A "wet" condition represents a cow standing on very wet ground and touching the wire. The higher the current or energy produced by the fence controller, the more intense the shock will be.

As an example, TABLES 1 and 2 includes test results that might be found in a PAMI report.

TABLE 1. Shock Delivery Example

FENCE CONDITION	GUARD VOLTAGE
Clean Fence	3500 V
Weeded Fence	1500 V

The fence controller in the above example would deliver a shock to all animals if the fence was clean, but if the fence had many weeds or grass touching it, a shock would only be delivered to short-haired animals, as the voltage is between 700 V and 2000 V.

Once it is determined that the controller will deliver a shock for the given fence condition, the "Shock Intensity" section of the report will indicate how effective the shock will be.

TABLE 2. Shock Intensity Example.

OPERATING CONDITION	PEAK CURRENT	ENERGY
Dry	2.0 A	1.0 J
Wet	15.0 A	2.5 J

Values from the above tables can be compared to other fence controllers to determine whether shocks will be delivered and the respective outputs in the two reported conditions.

In all cases, fence controllers will produce a more intense shock in wet conditions than in dry conditions. This is because the ground conducts electricity back to the controller better when the ground is wet. If ground conditions are very dry, a second fence wire can be used as a ground. When the animal contacts both wires, the shock intensity will be the same as in a wet condition.

SCOPE OF TEST

Each electric fence controller was operated in the lab for about 10 hours. The performance characteristics were determined using various simulated operating conditions. The controllers were evaluated for quality of work, ease of operation, operator safety and suitability of the operator's manual.

Senior Engineer: J. D. Wassermann

Project Engineer: D. E. Lischynski

Project Technologist: W. A. Morley

BATTERY SAVER

MANUFACTURER AND DISTRIBUTOR:

J.C. Hallman Manufacturing Co. Ltd.
 141 Weber Street South
 Waterloo, Ontario
 N2J 2A9
 (519) 743-2681

RETAIL OUTLETS:

Macleods, Federated Co-op, Home Hardware, Peavy Mart Stores

RETAIL PRICE:

\$109.99 (June 1989, f.o.b. Humboldt, Sask.)

SUMMARY AND CONCLUSIONS

Guard voltage output of the Battery Saver was 6660 V for a clean fence condition and 2230 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.7 A for a dry condition and 22.3 A for a wet condition. Energy outputs at these conditions were 0.25 and 120 J, respectively. A shock pulse was delivered every 1.6 seconds with the shock frequency switch on Normal.

The Battery Saver was a 12 V DC unit intended for mounting outdoors. Two 2-position switches could be utilized for reduced outputs or pulse frequency. It had no indicator lights. A 70 amp-hour battery would last about 1.7 weeks when the switches were set at High-Normal.

The Battery Saver had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.
2. Providing an indicator light to aid in troubleshooting.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well installation information is included in the fence controller carton.
2. An indicator light is not provided since at even 8 milliamps, the battery life would be shortened by up to 20% and the resulting illumination of the indicator light would likely render it ineffective in bright daylight. We feel the indicator light to be of dubious value.

MANUFACTURERS ADDITIONAL COMMENTS

We feel that PAMI should have reported on product warranty as a part of this evaluation. Our products are warranted to be free of defects in material and workmanship as well as against lightning damage for a period of two years from the date of original purchase. We reserve the right to repair or replace the unit at our option.

Since, in accordance with CSA Standards, there are no user serviceable parts within, if the fencer is inoperative it should be returned to the nearest authorized depot for repair.

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

GENERAL DESCRIPTION

The Battery Saver is a peak-discharge electric fence controller containing solid state electronics (FIGURE 1). It is designed for 12 V DC operation. It has two 2-position switches, one of which changes shock intensity. The other switch engages a photocell that reduces shock frequency during nighttime, to increase battery life.



FIGURE 1. Battery Saver Electric Fence Controller.

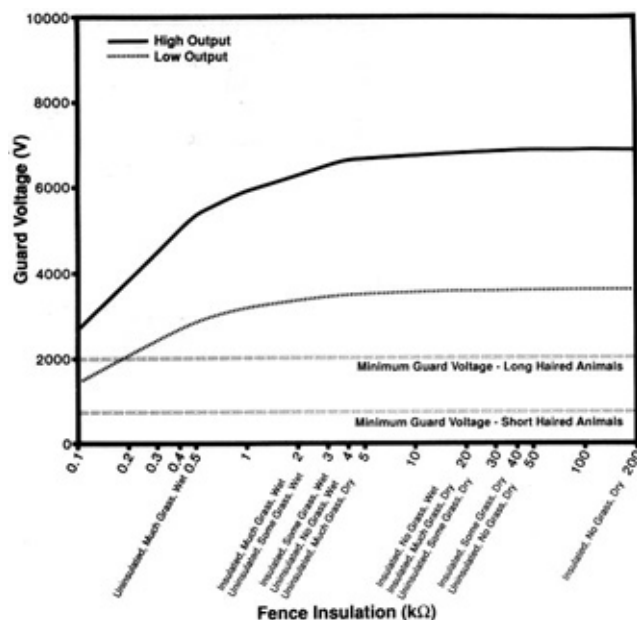


FIGURE 2. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

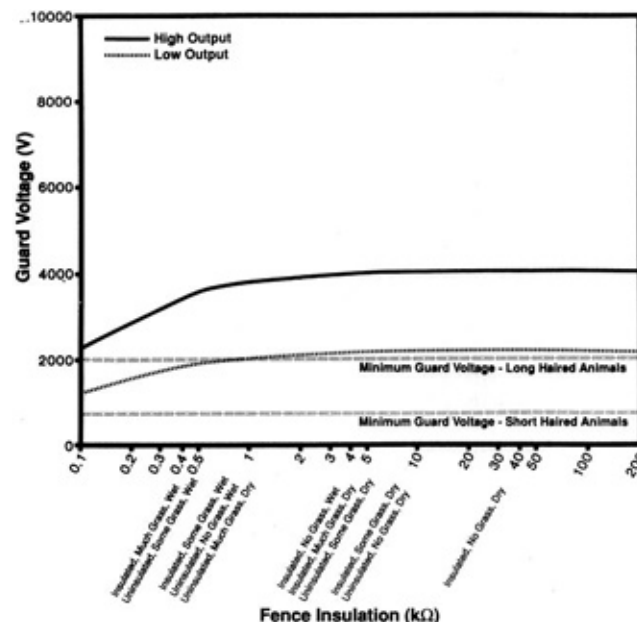


FIGURE 3. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 2 and 3 show guard voltage outputs of the Battery Saver for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

With the switches set at High and Normal on a 3.3 mi (5.4 km) fence (FIGURE 2), guard voltage output varied from 6870 V for a well-insulated, grass-free, dry fence to 2710 V for an uninsulated wet fence with considerable grass touching the charged wire.

With the switches set at High and Normal on a 10 mi (16 km) fence (FIGURE 3), guard voltage output varied from 4020 V for a well-insulated, grass-free, dry fence to 2230 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 6660 V for a clean fence and 2230 V for a weeded fence. Guard voltage with the shock intensity switch set at Low was reduced, as shown in FIGURES 2 and 3. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all fence conditions.

As can be seen from FIGURES 2 and 3, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Battery Saver can be expected to deliver shocks over a wide range of fence conditions.

The Battery Saver could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 6400 V, which is 7% lower than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum

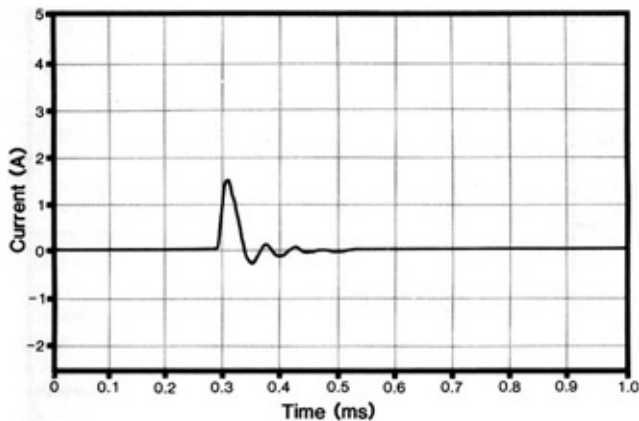


FIGURE 4. Dry Condition Current Output.

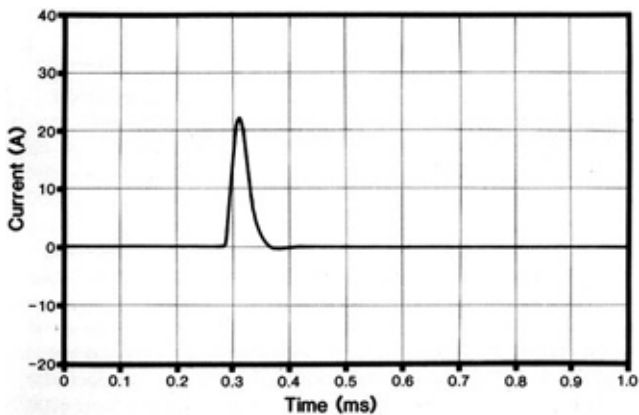


FIGURE 5. Wet Condition Current Output.

TABLE 3. Battery Saver Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT	ENERGY
	A	J
Dry	1.7	0.25
Wet	22.3	1.20

required to overcome the insulation resistance of long-haired animals, the Battery Saver was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 4 and 5.

The peak current delivered by the Battery Saver was 1.7 A for a dry condition and 22.3 A for a wet condition (TABLE 3). Corresponding energy output at these conditions were 0.25 and 1.20 J. Energy and current outputs for other conditions are given in APPENDIX II. Shock intensity was reduced with the shock intensity switch set to low. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

Shock Frequency: A shock pulse was delivered every 1.6 seconds with the shock frequency switch set at Normal, and every 5.5 seconds with the shock frequency lowered by the photocell (switch set to Battery Saver). The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.05 to 0.36 milliseconds.

EASE OF OPERATION

Installation: The Battery Saver was equipped with wire leads for connection to a standard 12 V automotive battery. The controller was intended to be mounted outdoors. The controller was connected to the fence with a length of insulated wire.

Indicators: The Battery Saver had no indicator lights. This made troubleshooting inconvenient. It is recommended that the manufacturer consider providing an indicator light to aid in troubleshooting.

Battery Consumption: A 12 V, 70 amp-hour battery will operate the Battery Saver for about 1.7 weeks with the switches set at High and Normal, and for about 6.1 weeks with the switches set at Low and the shock frequency lowered by the photocell (switch set to Battery Saver). This depends on the battery's naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Battery Saver was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Battery Saver enclosure was metal with a painted finish. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	J.C. Hallman
MODEL:	Battery Saver
SERIAL NUMBER:	4937
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	12 V DC
WEIGHT:	5.67 lb (2.57 kg)
OVERALL DIMENSIONS:	
- length	10.9 in (278 mm)
- width	8.0 in (203 mm)
- height	4.1 in (103 mm)
NUMBER OF INDICATOR LIGHTS:	none
OUTPUT SELECTION:	two switches: High-Low output; Normal-Battery Saver (pulse frequency reduction)
TYPE OF ENCLOSURE:	metal, for outdoor use

MANUFACTURER AND DISTRIBUTOR:

Baker Electronic Enterprises Inc.
 8522 Davies Road
 Edmonton, Alberta
 T6E 4Y5
 (403) 465-0107

RETAIL PRICE:

\$189.95 (June 1989, f.o.b. Humboldt, Sask.)

SUMMARY AND CONCLUSIONS

Guard voltage output of the BEE 8088 was 6210 V for a clean fence condition and 2200 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.6 A for a dry condition and 22.0 A for a wet condition. Energy outputs at these conditions were 0.20 and 0.83 J, respectively. A shock pulse was delivered every 1.1 seconds.

The BEE 8088 was a 12 V DC unit intended for mounting outdoors. One light indicated fence charging. A 70 amp-hour battery would last about 2.3 weeks.

The BEE 8088 did not have CSA approval. The instruction manual was excellent. No durability problems occurred.

RECOMMENDATIONS

No recommendations were required.

GENERAL DESCRIPTION

The BEE 8088 is a peak-discharge electric fence controller containing solid state electronics (FIGURE 6). It is designed for 12 V DC operation. A light is provided to indicate fence charging.



FIGURE 6. BEE 8088 Electric Fence Controller.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 7 and 8 show guard voltage outputs of the BEE 8088 for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

On a 3.3 mi (5.4 km) fence (FIGURE 7), guard voltage output varied from 6360 V for a well-insulated, grass-free, dry fence to 2810 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 8), guard voltage output varied from 3810 V for a well-insulated, grass-free, dry fence to 2200 V for an uninsulated wet fence with considerable grass touching the charged wire.

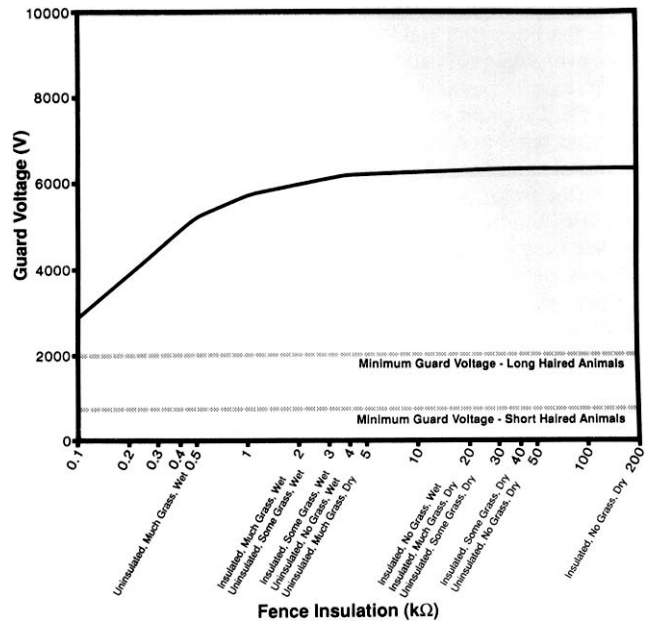


FIGURE 7. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

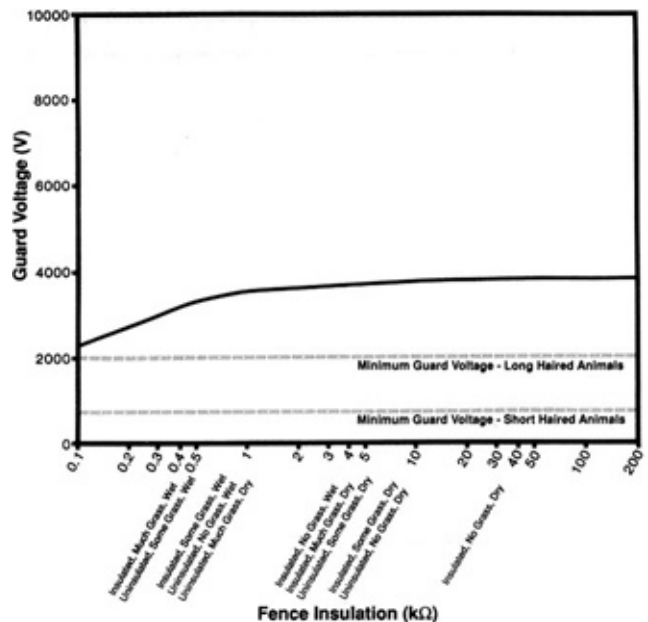


FIGURE 8. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

Guard voltage was 6210 V for a clean fence and 2200 V for a weeded fence. The voltage output for all fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals.

As can be seen from FIGURES 7 and 8, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for all fence conditions. The BEE 8088 can be expected to deliver shocks over a wide range of fence conditions.

The BEE 8088 could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 6700 V, which is 5% higher than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the BEE 8088 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 9 and 10.

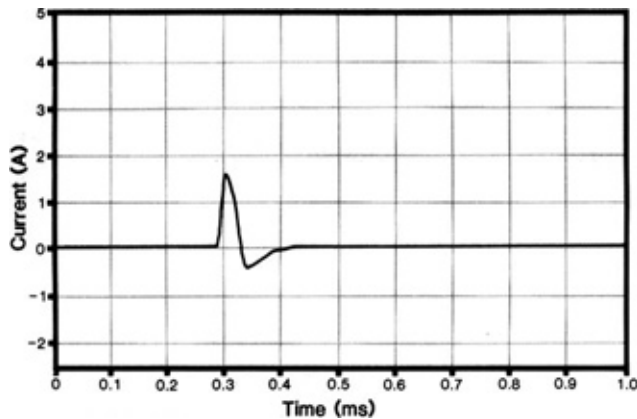


FIGURE 9. Dry Condition Current Output.

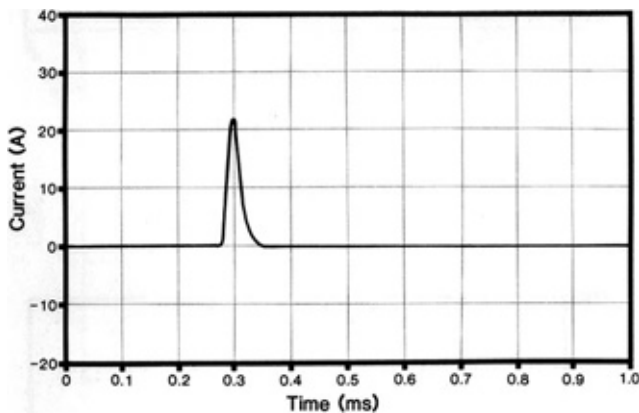


FIGURE 10. Wet Condition Current Output.

The peak current delivered by the BEE 8088 was 1.6 A for a dry condition and 22.0 A for a wet condition (TABLE 4). Corresponding energy output at these conditions were 0.20 and 0.83 J. Energy and current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

TABLE 4. BEE 8088 Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	1.6	0.20
Wet	22.0	0.83

Shock Frequency: A pulse charge was delivered every 1.1 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.05 to 0.44 milliseconds.

EASE OF OPERATION

Installation: The BEE 8088 was equipped with wire leads for connection to a standard 12 V automotive battery. The controller was intended to be mounted outdoors. The controller was connected to the fence with a length of insulated wire.

Indicators: The BEE 8088 was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

Battery Consumption: A 12 V, 70 amp-hour battery will operate the BEE 8088 for about 2.3 weeks, depending on the battery's naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The BEE 8088 was not Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was excellent. It outlined installation, safety considerations, grounding of the fence controller, troubleshooting, and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The BEE 8088 enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Baker Electronics Enterprises
MODEL:	8088
SERIAL NUMBER:	32187EFB
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	12 V DC
WEIGHT:	2.47 lb (1.12 kg)
OVERALL DIMENSIONS:	
- length	9.1 in (232 mm)
- width	4.5 in (114 mm)
- height	3.0 in (77 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
TYPE OF ENCLOSURE:	plastic, for outdoor use

MANUFACTURER AND DISTRIBUTOR:

Baker Electronic Enterprises Inc.
 8522 Davies Road
 Edmonton, Alberta
 T6E 4Y5
 (403) 465-0107

RETAIL PRICE:

\$329.95 (June 1989, f.o.b. Humboldt, Sask.)

SUMMARY AND CONCLUSIONS

Guard voltage output of the BEE 8105C was 8440 V for a clean fence condition and 4000 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 2.1 A for a dry condition and 40.0 A for a wet condition. Energy outputs at these conditions were 0.35 and 4.38 J, respectively. A shock pulse was delivered every 0.9 seconds.

The BEE 8105C was a 120 V AC unit intended for mounting indoors. One light indicated controller operation.

The BEE 8105C had CSA approval. The instruction manual was excellent. No durability problems occurred.

RECOMMENDATIONS

No recommendations were required.

GENERAL DESCRIPTION

The BEE Model 8105C is a peak-discharge electric fence controller containing solid state electronics (FIGURE 11). It is designed for 120 V AC operation. A light is provided to indicate controller operation.



FIGURE 11. BEE 8105C Electric Fence Controller.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 12 and 13 show guard voltage outputs of the BEE 8105C for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

On a 3.3 mi (5.4 km) fence (FIGURE 12), guard voltage output varied from 8560 V for a well-insulated, grass-free, dry fence to 4030 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 13), guard voltage output varied from 6950 V for a well-insulated, grass-free, dry fence to 4000 V for an uninsulated wet fence with considerable grass touching the charged wire.

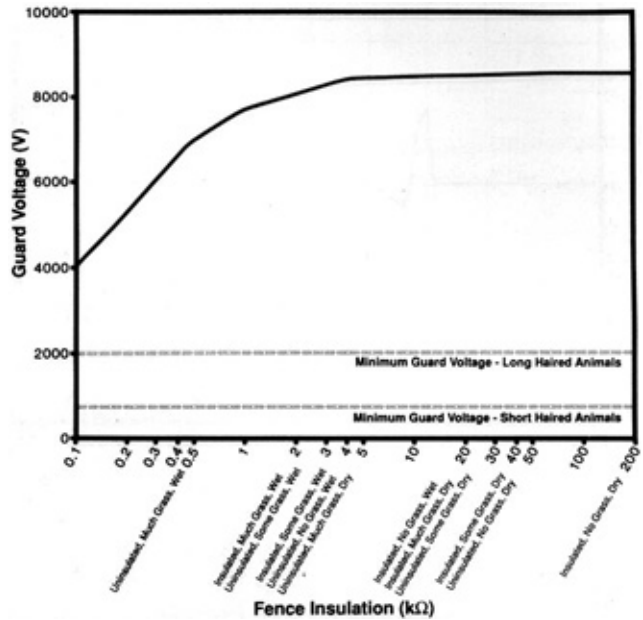


FIGURE 12. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

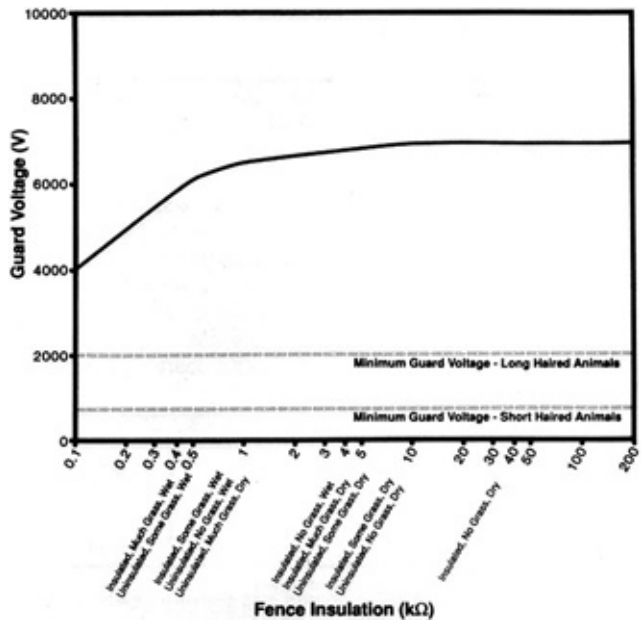


FIGURE 13. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

Guard voltage was 8440 V for a clean fence and 4000 V for a weeded fence. The voltage output for all fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals.

As can be seen from FIGURES 12 and 13, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for all fence conditions. The BEE 8105C can be expected to deliver shocks over a wide range of fence conditions.

The BEE 8105C could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 8400 V, which is only 2% lower than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the BEE 8105C was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 14 and 15.

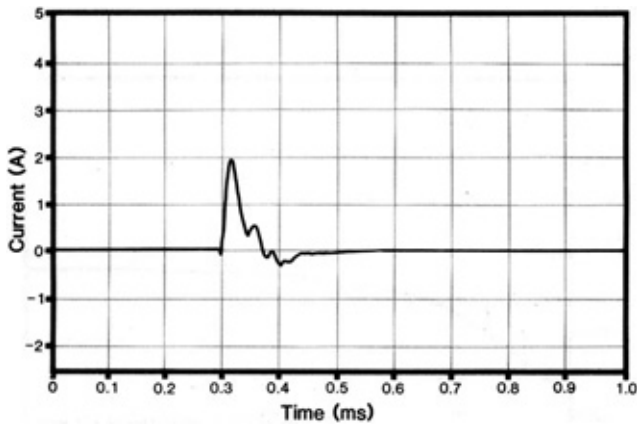


FIGURE 14. Dry Condition Current Output.

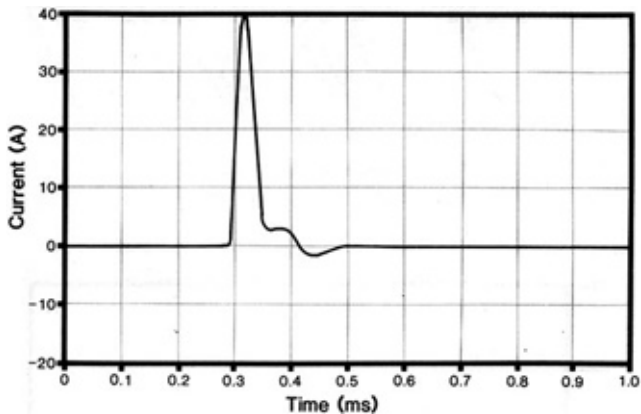


FIGURE 15. Wet Condition Current Output.

The peak current delivered by the BEE 8105C was 2.1 A for a dry condition and 40.0 A for a wet condition (TABLE 5). Corresponding energy output at these conditions were 0.35 and 4.38 J. Energy and current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

TABLE 5. BEE 8105C Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT	ENERGY
	A	J
Dry	2.1	0.35
Wet	40.0	4.38

Shock Frequency: A shock pulse was delivered every 0.9 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.11 to 0.26 milliseconds.

EASE OF OPERATION

Installation: The BEE 8105C was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The BEE 8105C was equipped with one light for troubleshooting of controller operation. If the light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The BEE 8105C was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was excellent. It outlined installation, safety considerations, grounding of the fence controller, troubleshooting, and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The BEE 8105C enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Baker Electronic Enterprises
MODEL:	8105C
SERIAL NUMBER:	58270 EFL
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	8.3 lb (3.78 kg)
OVERALL DIMENSIONS:	
- length	12.0 in (305 mm)
- width	8.2 in (208 mm)
- height	3.5 in (89 mm)
NUMBER OF INDICATOR LIGHTS:	1 (controller operation)
TYPE OF ENCLOSURE:	plastic, for indoor use

MANUFACTURER AND DISTRIBUTOR:

Baker Electronic Enterprises Inc.
 8522 Davies Road
 Edmonton, Alberta
 T6E 4Y5
 (403) 465-0107

RETAIL PRICE:

\$149.95 (June 1989, f.o.b. Humboldt, Sask.)

SUMMARY AND CONCLUSIONS

Guard voltage output of the BEE 8355C was 5300 V for a clean fence condition and 1910 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.3 A for a dry condition and 19.1 A for a wet condition. Energy outputs at these conditions were 0.13 and 0.57 J, respectively. A shock pulse was delivered every 1.0 seconds.

The BEE 8355C was a 120 V AC unit intended for mounting indoors. One light indicated controller operation.

The BEE 8355C had CSA approval. The instruction manual was excellent. No durability problems occurred.

RECOMMENDATIONS

No recommendations were required.

GENERAL DESCRIPTION

The BEE Model 8355C is a peak-discharge electric fence controller containing solid state electronics (FIGURE 16). It is designed for 120 V AC operation. A light is provided to indicate fence condition.



FIGURE 16. BEE 8355C Electric Fence Controller.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 17 and 18 show guard voltage outputs of the BEE 8355C for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

On a 3.3 mi (5.4 km) fence (FIGURE 17), guard voltage output varied from 5450 V for a well-insulated, grass-free, dry fence to 2500 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 18), guard voltage output varied from 3200 V for a well-insulated, grass-free, dry fence to 1910 V for an uninsulated wet fence with considerable grass touching the charged wire.

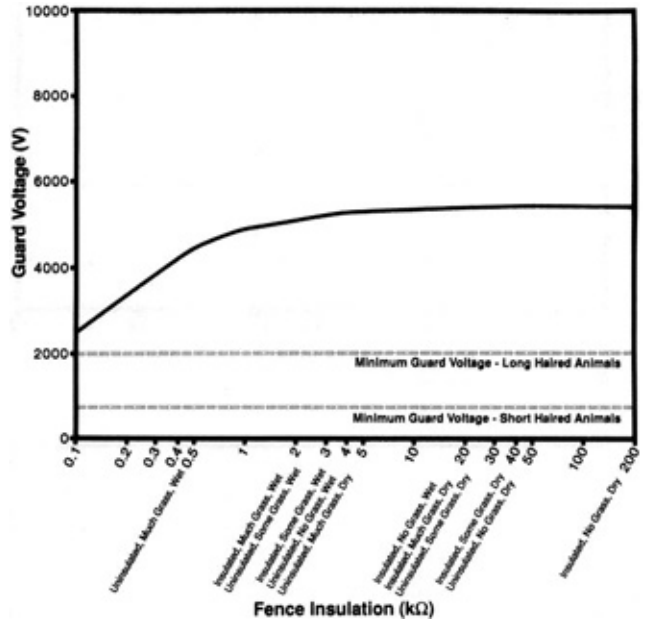


FIGURE 17. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

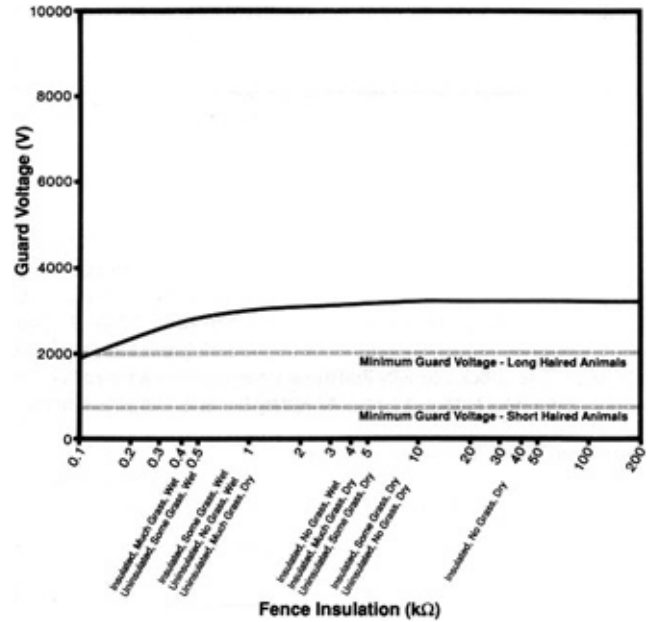


FIGURE 18. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

Guard voltage was 5300 V for a clean fence and 1910 V for a weeded fence. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all fence conditions.

As can be seen from FIGURES 17 and 18, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The BEE 8355C can be expected to deliver shocks over a wide range of fence conditions.

The BEE 8355C could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 5200 V, which is only 4% lower than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the BEE 8355C was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 19 and 20.

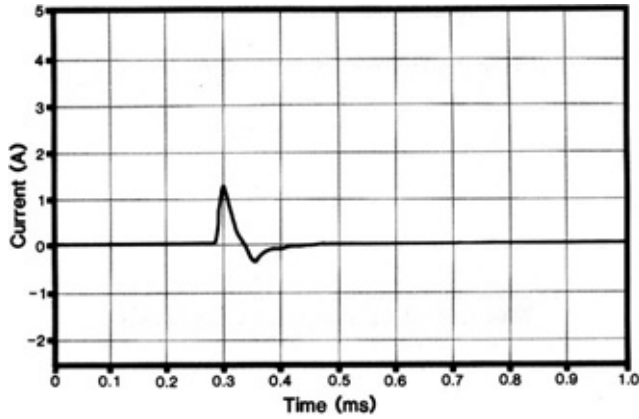


FIGURE 19. Dry Condition Current Output.

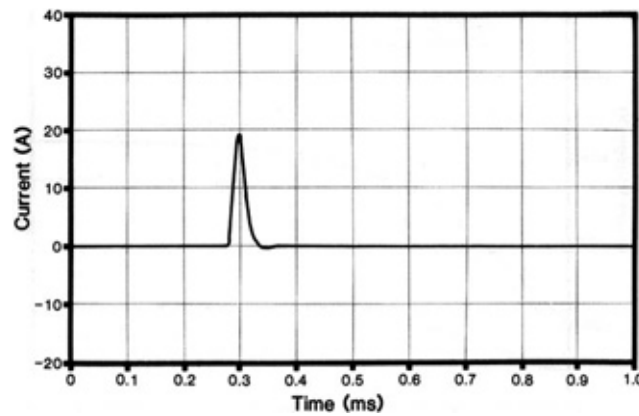


FIGURE 20. Wet Condition Current Output.

The peak current delivered by the BEE 8355C was 1.3 A for a dry condition and 19.1 A for a wet condition (TABLE 6). Corresponding energy output at these conditions were 0.13 and 0.57 J. Energy and current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

TABLE 6. BEE 8355C Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	1.3	0.13
Wet	19.1	0.57

Shock Frequency: A shock pulse was delivered every 1.0 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.05 to 0.42 milliseconds.

EASE OF OPERATION

Installation: The BEE 8355C was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The BEE 8355C was equipped with one light for troubleshooting of controller operation. If the light does not flash, there is insufficient charge being placed on the fence which may be a result of

too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The BEE 8355C was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was excellent. It outlined installation, safety considerations, grounding of the fence controller, troubleshooting, and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The BEE 8355C enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Baker Electronic Enterprises
MODEL:	8355C
SERIAL NUMBER:	58216 EFL
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	2.5 lb (1.12 kg)
OVERALL DIMENSIONS:	
- length	9.1 in (231 mm)
- width	4.1 in (103 mm)
- height	3.1 in (78 mm)
NUMBER OF INDICATOR LIGHTS:	1 (controller operation)
TYPE OF ENCLOSURE:	plastic, for indoor use

CAPTIVATOR SUPER 1200

MANUFACTURER:

International Electric Company
 2411 7th Street North West
 P.O. Box 6117
 Rochester, Minnesota 55903-6
 U.S.A.

DISTRIBUTOR:

Crist Products
 P.O. Box 640
 Broadview, Saskatchewan
 S0G 0K0
 (306) 696-2974

RETAIL PRICE:

\$89.34 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 21. Captivator Super 1200 Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Captivator Super 1200 was 6150 V for a clean fence condition and 1780 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.5 A for a dry condition and 17.8 A for a wet condition. Energy outputs at these conditions were 0.46 and 0.95 J, respectively. With the shock frequency switch set at Fast, a shock pulse was delivered every 1.1 seconds.

The Captivator Super 1200 was a 12 V DC unit intended for mounting indoors. Two 2-position switches could be utilized for reduced outputs or pulse frequency. One light indicated fence charging. A 70 amp-hour battery would last about 2.7 weeks when the switches were set at High-Fast.

The Captivator Super 1200 did not have CSA approval. The instruction manual was excellent. No durability problems occurred.

RECOMMENDATIONS

No recommendations were required.

GENERAL DESCRIPTION

The Captivator Model Super 1200 is a peak-discharge electric fence controller containing solid state electronics (FIGURE 21). It is designed for 12 V DC operation. It has two 2-position switches to change shock intensity and shock frequency. A light is provided to indicate fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 22 and 23 show guard voltage outputs of the Captivator Super 1200 for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

With the switches set at High and Slow on a 3.3 mi (5.4 km) fence (FIGURE 22), guard voltage output varied from 6460 V for a well-insulated, grass-free, dry fence to 2030 V for an uninsulated wet fence with considerable grass touching the charged wire.

With the switches set at High and Slow on a 10 mi (16 km) fence (FIGURE 23), guard voltage output varied from 3930 V for a well-insulated, grass-free, dry fence to 1780 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 6150 V for a clean fence and 1780 V for a weeded fence. Guard voltage with the shock intensity switch set at Low was reduced, as shown in FIGURES 22 and 23. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all fence conditions.

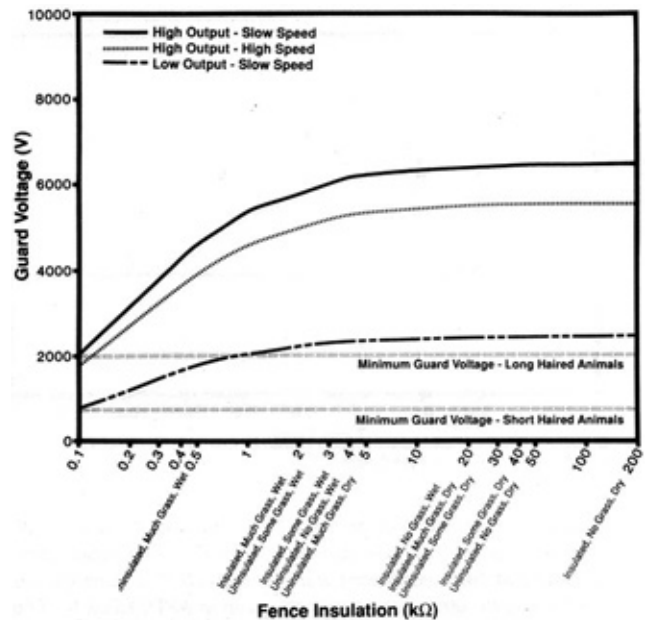


FIGURE 22. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

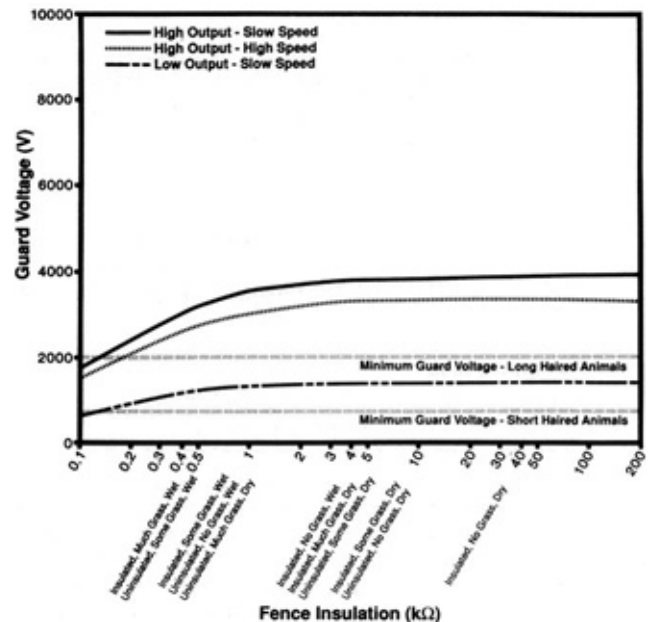


FIGURE 23. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

As can be seen from FIGURES 22 and 23, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Captivator Super 1200 can be expected to deliver shocks over a wide range of fence conditions.

The Captivator Super 1200 could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 4500 V, which is 30% lower than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Captivator Super 1200 was suitable for winter operation.

Shock Intensity: Current output for dry and wet fence conditions with the switches set at High-Slow are shown in FIGURES 24 and 25.

The peak current delivered by the Captivator Super 1200 was 1.5 A for a dry condition and 17.8 A for a wet condition (TABLE 7). Corresponding energy output at these conditions were 0.46 and 0.95 J. Energy and current outputs for other conditions are given in APPENDIX II. Shock intensity was reduced with the shock intensity switch set to Low. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

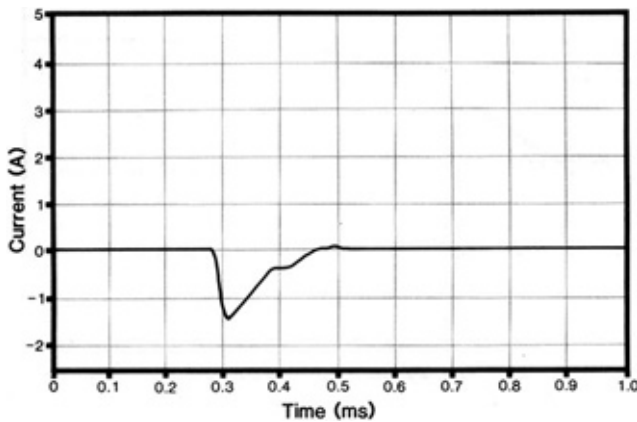


FIGURE 24. Dry Condition Current Output.

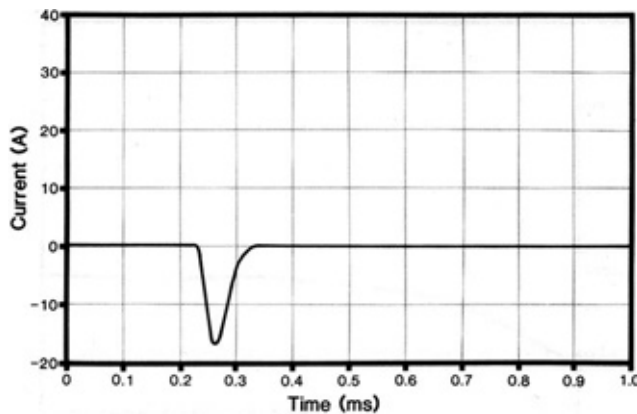


FIGURE 25. Wet Condition Current Output.

TABLE 7. Captivator Super 1200 Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	1.5	0.46
Wet	17.8	0.95

Shock Frequency: A shock pulse was delivered every 1.1 seconds with the shock frequency switch set at Fast, and every 1.5 seconds with the switch set at Slow. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 0.13 to 0.61 milliseconds, with the shock frequency switch set to Slow.

EASE OF OPERATION

Installation: The Captivator Super 1200 was equipped with wire leads for connection to a standard 12 V automotive battery. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The controller was connected to the fence with a length of insulated wire.

Indicators: The Captivator Super 1200 was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

Battery Consumption: A 12 V, 70 amp-hour battery will operate the Captivator Super 1200 for about 2.7 weeks with the switches set at High and Fast, and for about 9.5 weeks with the switches set at Low and Slow, depending on the battery's naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Captivator Super 1200 was not Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was excellent. It outlined installation, safety considerations, grounding of the fence controller, troubleshooting, and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Captivator Super 1200 enclosure was metal. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Captivator
MODEL:	Super 1200
SERIAL NUMBER:	06907-13
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	12 V DC
WEIGHT:	6.0 lb (2.7 kg)
OVERALL DIMENSIONS:	
- length	12.0 in (305 mm)
- width	7.1 in (180 mm)
- height	4.3 in (109 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
OUTPUT SELECTION:	two switches: High-Low output Fast-Slow pulse frequency
TYPE OF ENCLOSURE:	metal, for indoor use

SHUR SHOCK

MANUFACTURER AND DISTRIBUTOR:

J.C. Hallman Manufacturing Co. Ltd.
 141 Weber Street South
 Waterloo, Ontario
 N2J 2A9
 (519) 743-2681

RETAIL OUTLETS:

Macleods, Federated CO-OP, Home Hardware, Peavy Mart Stores

RETAIL PRICE:

\$79.99 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 26. Shur Shock Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Shur Shock was 4720 V for a clean fence condition and 1810 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.2 A for a dry condition and 18.1 A for a wet condition. Energy outputs at these conditions were 0.19 and 1.24 J, respectively. A shock pulse was delivered every 1.2 seconds.

The Shur Shock was a 120 V AC unit intended for mounting indoors. One light indicated fence charging.

The Shur Shock had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well installation information is included in the fence controller carton.

MANUFACTURERS ADDITIONAL COMMENTS

We feel that PAMI should have reported on product warranty as a part of this evaluation. Our products are warranted to be free of defects in material and workmanship as well as against lightning damage for a period of two years from the date of original purchase. We reserve the right to repair or replace the unit at our option.

Since, in accordance with CSA Standards, there are no user serviceable parts within, if the fence is inoperative it should be returned to the nearest authorized depot for repair.

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

GENERAL DESCRIPTION

The Shur Shock is a peak-discharge electric fence controller containing solid state electronics (FIGURE 26). It is designed for 120 V AC operation. A light is provided to indicate fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 27 and 28 show guard voltage outputs of the Shur Shock for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

On a 3.3 mi (5.4 km) fence (FIGURE 27), guard voltage output varied from 4950 V for a well-insulated, grass-free, dry fence to 1810 V for an uninsulated wet fence with considerable grass touching the charged wire.

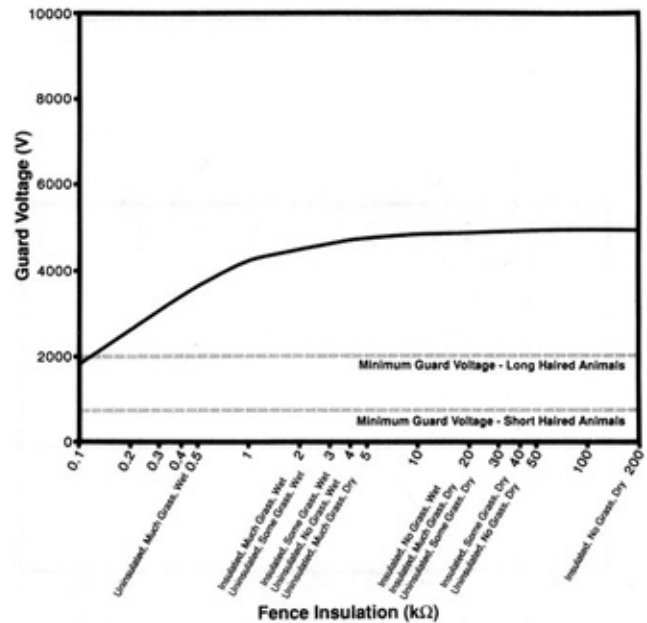


FIGURE 27. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

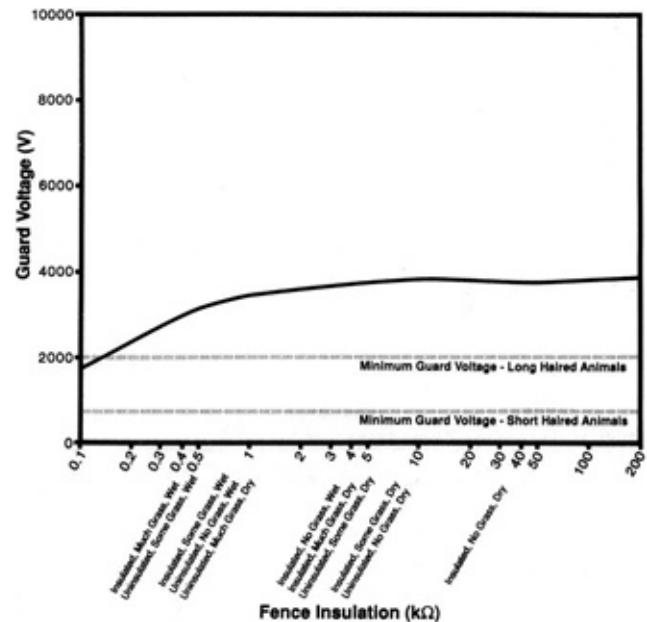


FIGURE 28. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

On a 10 mi (16 km) fence (FIGURE 28), guard voltage output varied from 3820 V for a well-insulated, grass-free, dry fence to 1810 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 4720 V for a clean fence and 1810 V for a weeded fence. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals.

As can be seen from FIGURES 27 and 28, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for most fence conditions and was above the 700 V minimum guard voltage for all fence conditions. The Shur Shock can be expected to deliver shocks over a wide range of fence conditions.

The Shur Shock could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -13°F (-25°C) on a 3.3 mi (5.4 km) single wire fence was about 4500 V, which is 10% lower than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Shur Shock was suitable for winter operation. The Shur Shock did not operate below -13°F (-25°C).

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 29 and 30.

The peak current delivered by the Shur Shock was 1.2 A for a dry condition and 18.1 A for a wet condition (TABLE 8). Corresponding energy output at these conditions were 0.19 and 1.24 J. Energy and current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

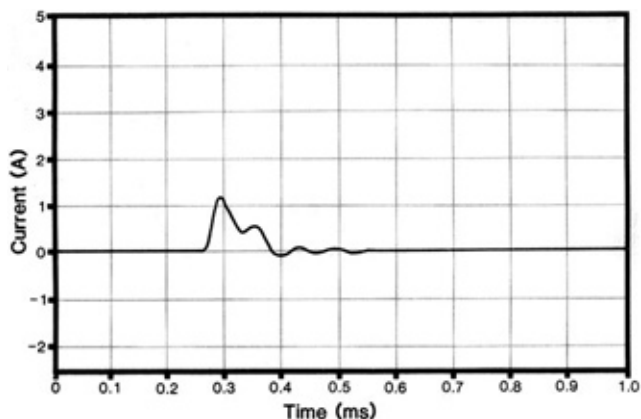


FIGURE 29. Dry Condition Current Output.

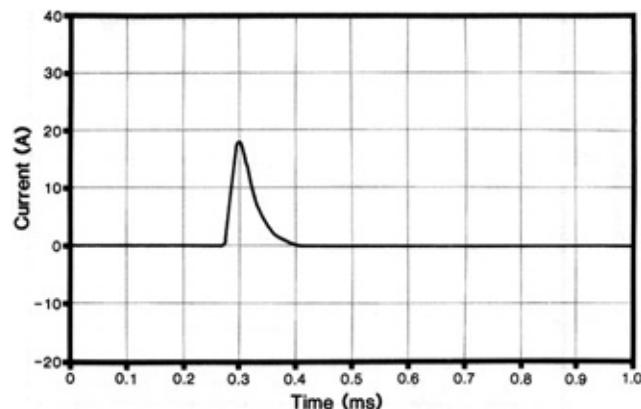


FIGURE 30. Wet Condition Current Output.

TABLE 8. Shur Shock Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT	ENERGY
	A	J
Dry	1.2	0.19
Wet	18.1	1.24

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.10 to 0.60 milliseconds.

EASE OF OPERATION

Installation: The Shur Shock was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The Shur Shock was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Shur Shock was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Shur Shock enclosure was metal with a painted finish. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	J.C. Hallman
MODEL:	Shur Shock
SERIAL NUMBER:	A 8415
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	5.8 lb (2.65 kg)
OVERALL DIMENSIONS:	
- length	11.0 in (279 mm)
- width	8.0 in (203 mm)
- height	4.1 in (103 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
TYPE OF ENCLOSURE:	metal, for indoor use

SPEEDRITE 240

MANUFACTURER:

Speedrite Equipment Ltd.
P.O. Box 1910
Palmerston North, NEW ZEALAND

DISTRIBUTOR:

Hawk Fence Supply Inc.
P.O. Box 1298
Peterborough, Ontario
K9J 7H5
1-800-461-1985

RETAIL OUTLETS:

Federated Co-op, Home Hardware, and Independent dealers

RETAIL PRICE:

\$216.00 (June 1989, f.o.b. Humboldt, Sask.)

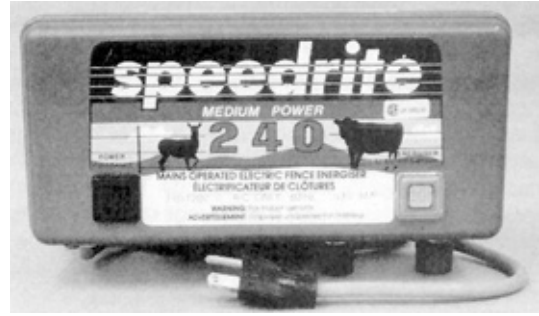


FIGURE 31. Speedrite 240 Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Speedrite 240 was 8810 V for a clean fence condition and 1830 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 2.2 A for a dry condition and 18.3 A for a wet condition. Energy outputs at these conditions were 1.06 and 2.27 J, respectively. A shock pulse was delivered every 1.1 seconds.

The Speedrite 240 was a 120 V AC unit intended for mounting indoors. Two indicator lights were convenient for troubleshooting AC line condition and fence charging.

The Speedrite 240 had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We note the recommendation but we feel that the instructions supplied are more than sufficient in most situations. Often, more detail will discourage the user from reading the instructions at all. We will, however, look at any possible improvements.

GENERAL DESCRIPTION

The Speedrite Model 240 is a peak-discharge electric fence controller containing solid state electronics (FIGURE 31). It is designed for 120 V AC operation. Lights are provided to indicate AC line condition and fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 32 and 33 show guard voltage outputs of the Speedrite 240 for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

On a 3.3 mi (5.4 km) fence (FIGURE 32), guard voltage output varied from 9460 V for a well-insulated, grass-free, dry fence to 1930 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 33), guard voltage output varied from 6020 V for a well-insulated, grass-free, dry fence to 1830 V for an uninsulated wet fence with considerable grass touching the charged wire.

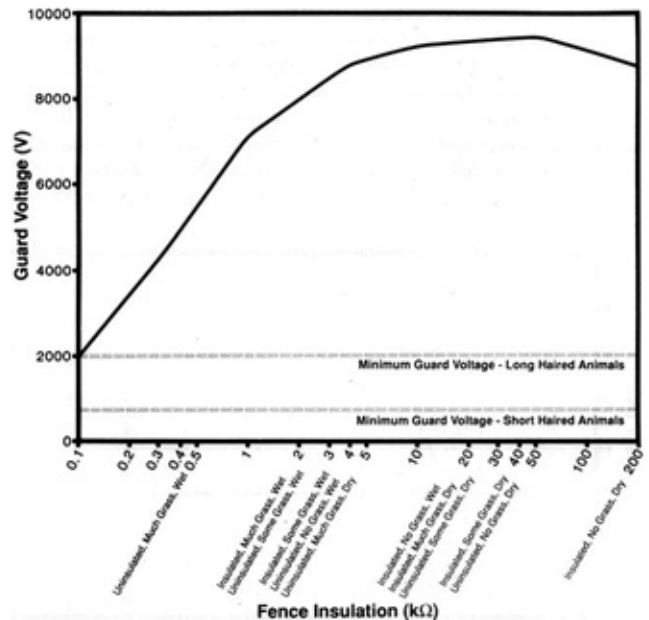


FIGURE 32. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

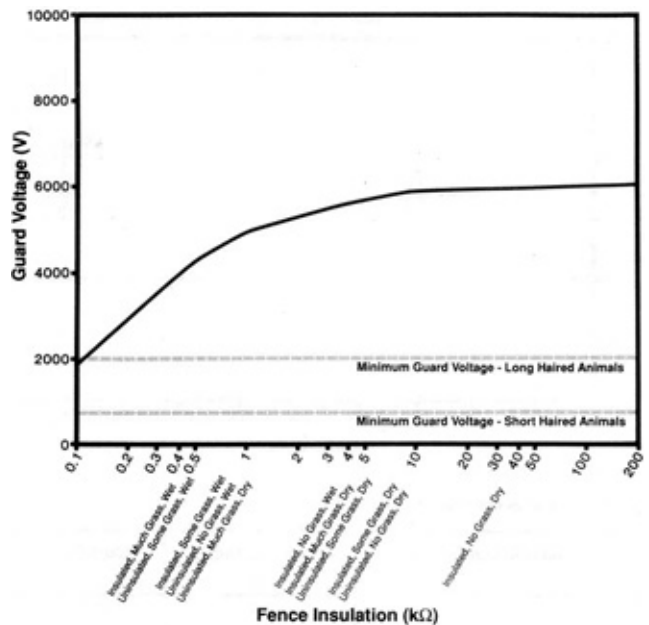


FIGURE 33. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

Guard voltage was 8810 V for a clean fence and 1830 V for a weeded fence. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all but the most severe fence conditions.

As can be seen from FIGURES 32 and 33; plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Speedrite 240 can be expected to deliver shocks over a wide range of fence conditions.

The Speedrite 240 could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 8800 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Speedrite 240 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 34 and 35.

The peak current delivered by the Speedrite 240 was 2.2 A for a dry condition and 18.3 A for a wet condition (TABLE 9). Corresponding energy output at these conditions were 1.06 and 2.27 J. Energy and current outputs for other fence conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

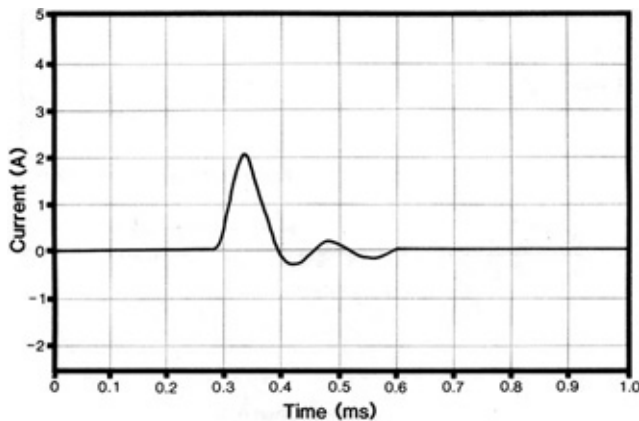


FIGURE 34. Dry Condition Current Output.

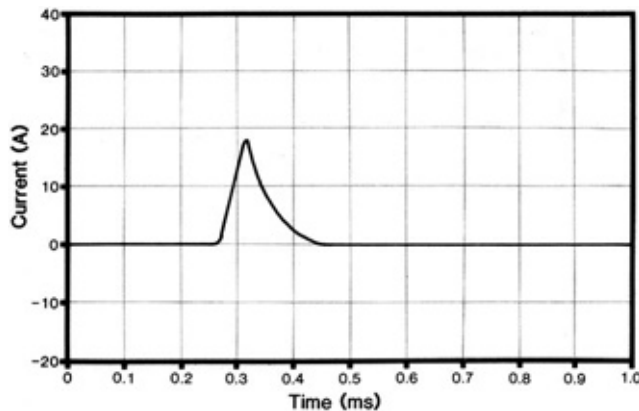


FIGURE 35. Wet Condition Current Output.

TABLE 9. Speedrite 240 Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	2.2	1.06
Wet	18.3	2.27

Shock Frequency: A shock pulse was delivered every 1.1 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.25 to 1.2 milliseconds.

EASE OF OPERATION

Installation: The Speedrite 240 was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The Speedrite 240 was equipped with two indicator lights for convenient troubleshooting of AC line condition and fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The lights worked well and were easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Speedrite 240 was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Speedrite 240 enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Speedrite
MODEL:	240
SERIAL NUMBER:	1514
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	2.84 lb (1.3 kg)
OVERALL DIMENSIONS:	
- length	10.4 in (264 mm)
- width	6.0 in (152 mm)
- height	2.4 in (62 mm)
NUMBER OF INDICATOR LIGHTS:	2 (power supply and fence charge)
TYPE OF ENCLOSURE:	plastic, for indoor use

MANUFACTURER:

Speedrite Equipment Ltd.
 P.O. Box 1910
 Palmerston North, NEW ZEALAND

DISTRIBUTOR:

Hawk Fence Supply Inc.
 P.O. Box 1298
 Peterborough, Ontario
 K9J 7H5
 1-800-461-1985

RETAIL OUTLETS:

Federated Co-op, Home Hardware, and Independent dealers.

RETAIL PRICE:

\$382.00 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 36. Speedrite SP580 Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Speedrite SP580 was 8370 V for a clean fence condition and 3110 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 2.1 A for a dry condition and 31.1 A for a wet condition. Energy outputs at these conditions were 0.70 and 5.38 J, respectively. A shock pulse was delivered every 1.2 seconds.

The Speedrite SP580 was a 120 V AC unit intended for mounting indoors. A second hookup terminal could be utilized for reduced outputs. Three indicator lights were very convenient for troubleshooting AC line condition, controller operation, and fence charging.

The Speedrite SP580 had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We note the recommendation but we feel that the instructions supplied are more than sufficient in most situations. Often, more detail will discourage the user from reading the instructions at all. We will, however, look at any possible improvements.

GENERAL DESCRIPTION

The Speedrite Model SP580 is a peak-discharge electric fence controller containing solid state electronics. It is designed for 120 V AC operation. It has two output terminals for alternate output levels. Lights are provided to indicate AC line condition, controller operation, and fence condition (FIGURE 36).

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 37 and 38 show guard voltage outputs of the Speedrite SP580 for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

With the fence connected to the Fence 1 output terminal on a 3.3 mi (5.4 km) fence (FIGURE 37), guard voltage output varied from 9010 V for a well-insulated, grass-free, dry fence to 2900 V for an uninsulated wet fence with considerable grass touching the charged wire.

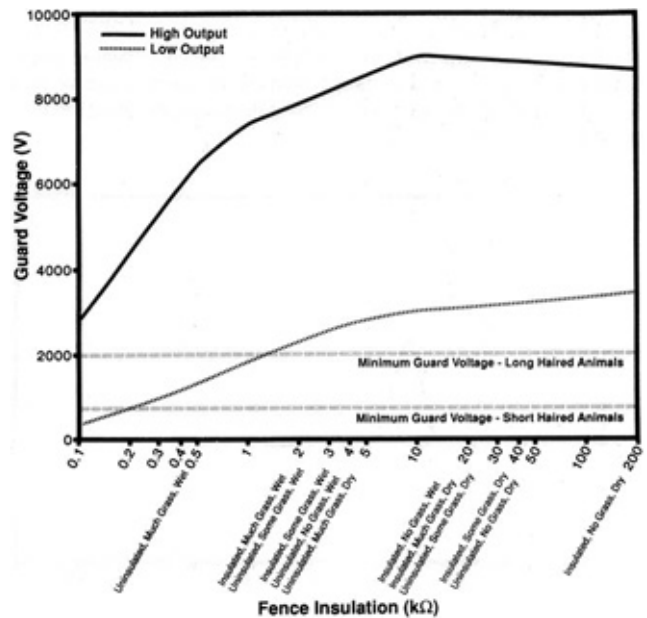


FIGURE 37. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

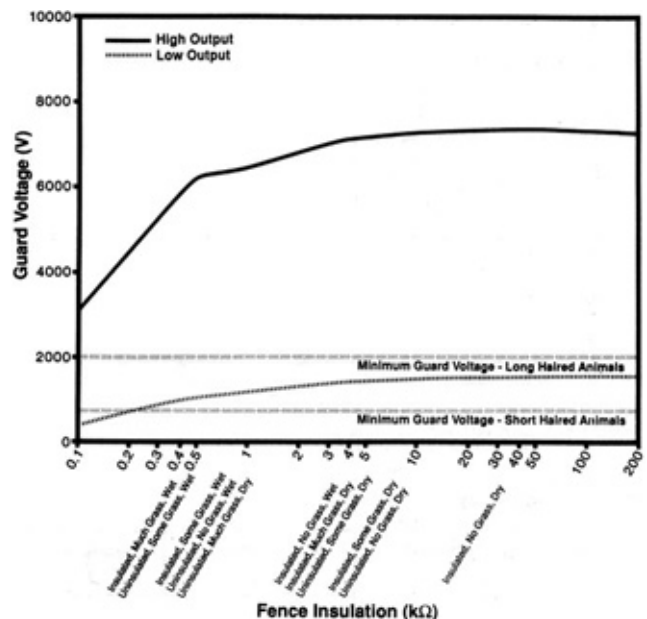


FIGURE 38. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

With the fence connected to the Fence 1 output terminal on a 10 mi (16 km) fence (FIGURE 38), guard voltage output varied from 7370 V for a well-insulated, grass-free, dry fence to 3110 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 8370 V for a clean fence and 3110 V for a weeded fence. Guard voltage with the fence connected to the Fence 2 terminal was reduced, as shown in FIGURES 37 and 38. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all but the most severe fence conditions.

As can be seen from FIGURES 37 and 38, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Speedrite SP580 can be expected to deliver shocks over a wide range of fence conditions.

The Speedrite SP580 could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 8650 V, which is similar to its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Speedrite SP580 was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions while hooked to the Fence 1 terminal are shown in FIGURES 39 and 40.

The peak current delivered by the Speedrite SP580 was 2.1 A for a dry condition and 31.1 A for a wet condition (TABLE 10). Corresponding energy output at these conditions were 0.70 and 5.38 J. Energy and

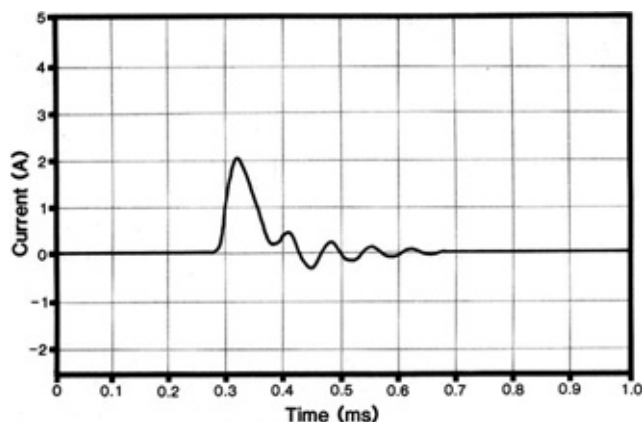


FIGURE 39. Dry Condition Current Output.

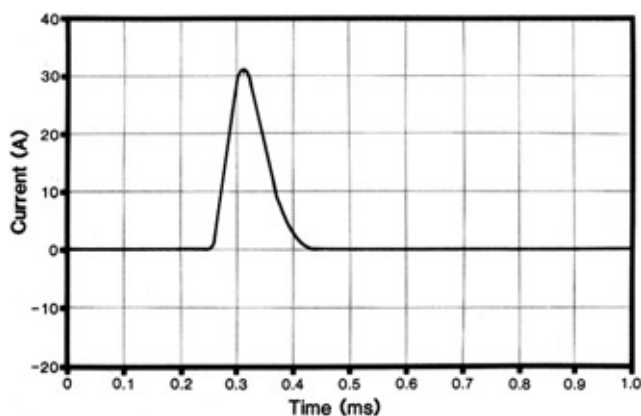


FIGURE 40. Wet Condition Current Output.

TABLE 10. Speedrite SP580 Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	2.1	0.70
Wet	31.1	5.38

current outputs for other conditions are given in APPENDIX II. Shock intensity when hooked to the Fence 2 terminal was reduced. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

Shock Frequency: A shock pulse was delivered every 1.2 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.17 to 0.82 milliseconds.

EASE OF OPERATION

Installation: The Speedrite SP580 was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire. A second hookup terminal (Fence 2) could be utilized for reduced outputs.

Indicators: The Speedrite SP580 was equipped with three lights to very conveniently troubleshoot AC line condition, correct controller operation, and that the fence is properly charged. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The lights worked well and were easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Speedrite SP580 was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Speedrite SP580 enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Speedrite
MODEL:	SP580
SERIAL NUMBER:	27393
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	4.96 lb (2.3 kg)
OVERALL DIMENSIONS:	
- length	8.9 in (226 mm)
- width	8.4 in (214 mm)
- height	4.8 in (122 mm)
NUMBER OF INDICATOR LIGHTS:	3 (power supply, controller operation, fence charge)
OUTPUT SELECTION:	two terminals: Fence 1 or Fence 2
TYPE OF ENCLOSURE:	plastic, for indoor use

STOCKMAN

MANUFACTURER AND DISTRIBUTOR:

J.C. Hallman Manufacturing Co. Ltd.
 141 Weber Street South
 Waterloo, Ontario
 N2J 2A9
 (519) 743-2681

RETAIL OUTLETS:

Macleods, Federated Co-op, Home Hardware, Peavy Mart Stores

RETAIL PRICE:

\$139.99 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 41. Stockman Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Stockman was 6160 V for a clean fence condition and 2030 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for all operating conditions.

The peak current was 1.5 A for a dry condition and 20.3 A for a wet condition. Energy outputs at these conditions were 0.21 and 0.86 J, respectively. A shock pulse was delivered every 1.1 seconds.

The Stockman was a 120 V AC unit intended for mounting indoors. One light indicated fence charging.

The Stockman had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well installation information is included in the fence controller carton.

MANUFACTURERS ADDITIONAL COMMENTS

We feel that PAMI should have reported on product warranty as a part of this evaluation. Our products are warranted to be free of defects in material and workmanship as well as against lightning damage for a period of two years from the date of original purchase. We reserve the right to repair or replace the unit at our option.

Since, in accordance with CSA Standards, there are no user servicable parts within, if the fencer is inoperative it should be returned to the nearest authorized depot for repair.

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

The reader of this report should be aware that PAMI has chosen to report peak voltage and current with respect to ground rather than from the positive to negative peaks. We take issue with this aspect of the report as this procedure results in a significantly lower output than what we feel is produced.

GENERAL DESCRIPTION

The Stockman is a peak-discharge electric fence controller containing solid state electronics (FIGURE 41). It is designed for 120 V AC operation. A light is provided to indicate fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 42 and 43 show guard voltage outputs of the Stockman for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

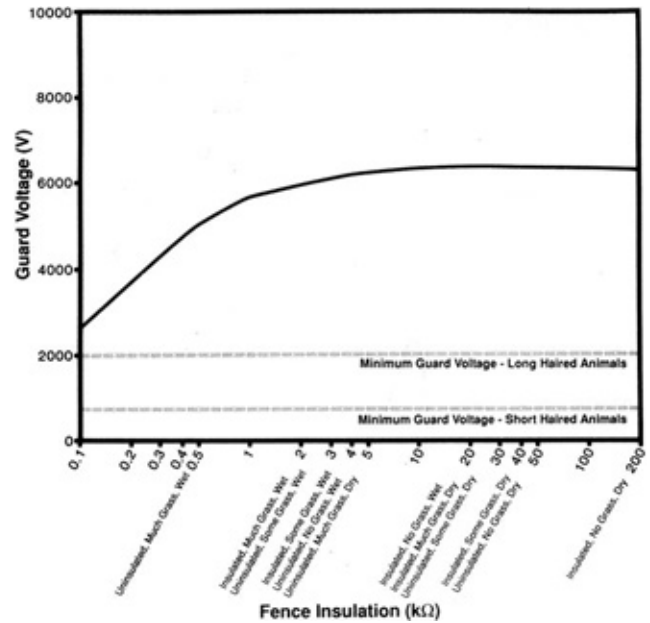


FIGURE 42. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

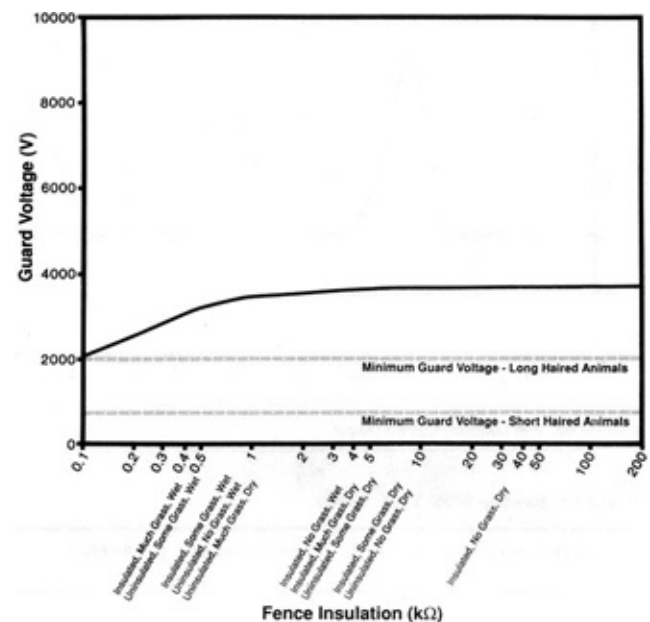


FIGURE 43. Guard Voltage for a 10 mi (16 km) Single Wire Fence

On a 3.3 mi (5.4 km) fence (FIGURE 42), guard voltage output varied from 6340 V for a well-insulated, grass-free, dry fence to 2570 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 43), guard voltage output varied from 3670 V for a well-insulated, grass-free, dry fence to 2030 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 6160 V for a clean fence and 2030 V for a weeded fence. The voltage output for all fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals.

As can be seen from FIGURES 42 and 43, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for all fence conditions. The Stockman can be expected to deliver shocks over a wide range of fence conditions.

The Stockman could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -18°F (-28°C) on a 3.3 mi (5.4 km) single wire fence was about 6500 V, which is 3% higher than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Stockman was suitable for winter operation. The Stockman did not operate below -18°F (-28°C).

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 44 and 45.

The peak current delivered by the Stockman was 1.5 A for a dry condition and 20.3 A for a wet condition (TABLE 11). Corresponding energy output at these conditions were 0.21 and 0.86 J. Energy and

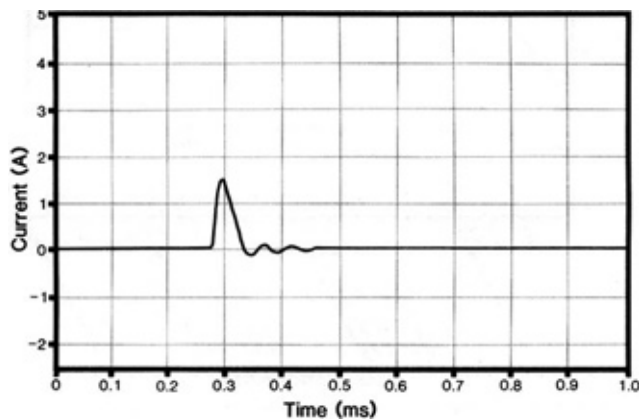


FIGURE 44. Dry Condition Current Output.

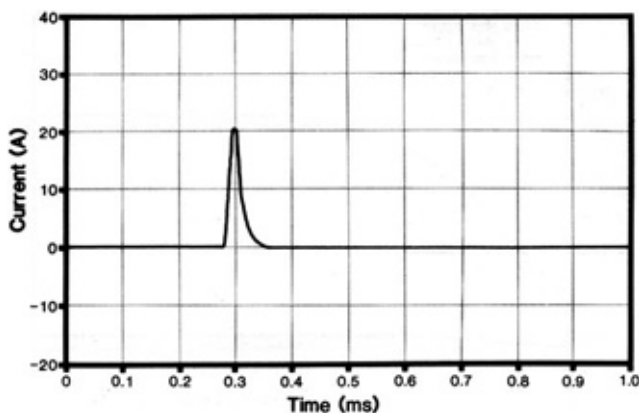


FIGURE 45. Wet Condition Current Output.

TABLE 11. Stockman Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT	ENERGY
	A	J
Dry	1.5	0.21
Wet	20.3	0.86

current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

Shock Frequency: A shock pulse was delivered every 1.1 seconds. The number of pulses did not vary with fence load. However, the on-time was affected by load and varied from about 0.05 to 0.55 milliseconds

EASE OF OPERATION

Installation: The Stockman was equipped with a three-wire cord and plug for connection to a standard, grounded, 120V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The Stockman was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Stockman was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Stockman enclosure was metal with a painted finish. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	J.C. Hallman
MODEL:	Stockman
SERIAL NUMBER:	F 7414
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	5.9 lb (2.66 kg)
OVERALL DIMENSIONS:	
- length	10.9 in (278 mm)
- width	8.0 in (203 mm)
- height	4.1 in (103 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
TYPE OF ENCLOSURE:	metal, for indoor use

TRIDENT

MANUFACTURER AND DISTRIBUTOR:

J.C. Hallman Manufacturing Co. Ltd.
 141 Weber Street South
 Waterloo, Ontario
 N2J 2A9
 (519) 743-2681

RETAIL OUTLETS:

Macleods, Federated Co-op, Home Hardware, Peavy Mart Stores

RETAIL PRICE:

\$359.99 (June 1989, f.o.b. Humboldt, Sask.)

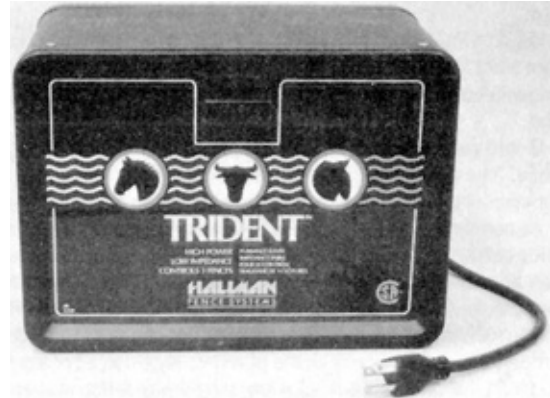


FIGURE 46. Trident Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Trident was 8140 V for a clean fence condition and 2860 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 2.0 A for a dry condition and 28.6 A for a wet condition. Energy outputs at these conditions were 0.87 and 5.83 J, respectively. A shock pulse was delivered every 1.4 seconds.

The Trident was a 120 V AC unit intended for mounting indoors. Two additional hookup terminals could be used for reduced output. One light indicated fence charging.

The Trident had CSA approval. The instruction manual was good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and operating tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. Operating and cautions are printed on the back label. As well installation information is included in the fence controller carton.

MANUFACTURERS ADDITIONAL COMMENTS

We feel that PAMI should have reported on product warranty as a part of this evaluation. Our products are warranted to be free of defects in material and workmanship as well as against lightning damage for a period of two years from the date of original purchase. We reserve the right to repair or replace the unit at our option.

Since, in accordance with CSA Standards, there are no user servicable parts within, if the fencer is inoperative it should be returned to the nearest authorized depot for repair.

A list of authorized warranty/repair depots and full warranty statement is included with each unit.

GENERAL DESCRIPTION

The Trident is a peak-discharge electric fence controller containing solid state electronics (FIGURE 46). It is designed for 120 V AC operation. It has three output terminals for alternate output levels. A light is provided to indicate fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 47 and 48 show guard voltage outputs of the Trident for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

With the fence connected to the High output terminal on a 3.3 mi (5.4 km)/fence (FIGURE 47), guard voltage output varied from 8350 V for a well-insulated, grass-free, dry fence to 2790 V for an uninsulated wet fence with considerable grass touching the charged wire.

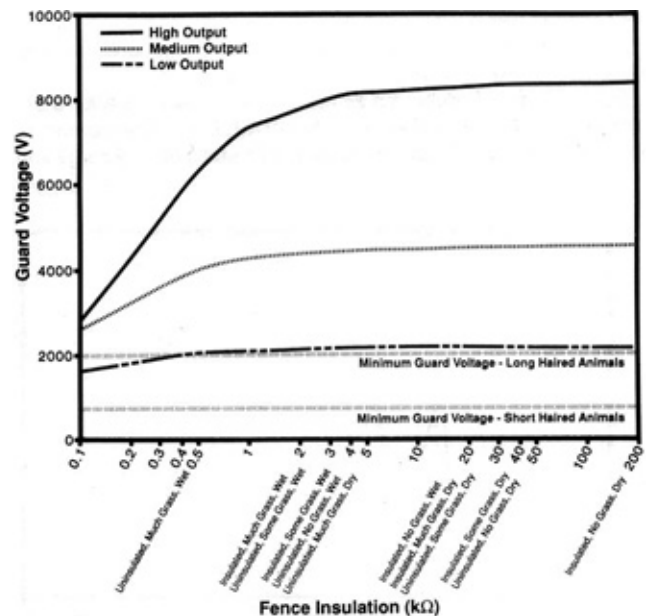


FIGURE 47. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

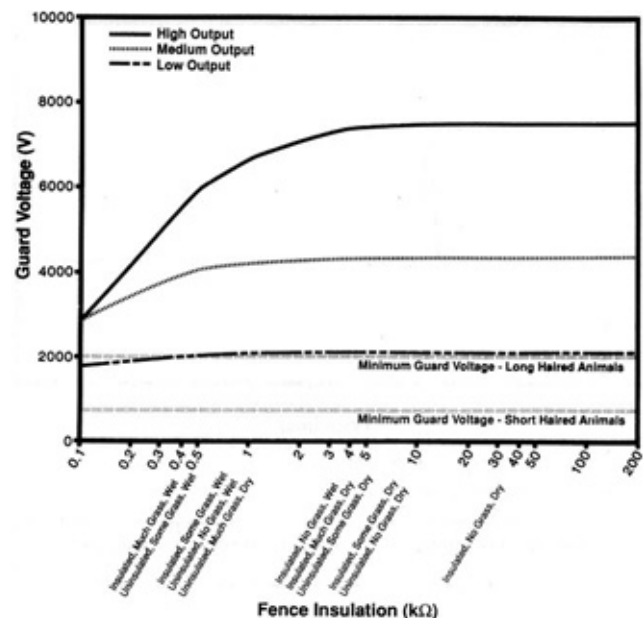


FIGURE 48. Guard Voltage for a 10 mi (16 km) Single Wire Fence.

With the fence connected to the High output terminal on a 10 mi (16 km) fence (FIGURE 48), guard voltage output varied from 7530 V for a well-insulated, grass-free, dry fence to 2860 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 8140 V for a clean fence and 2860 V for a weeded fence. Guard voltage with the fence connected to the Medium and Low terminals was reduced, as shown in FIGURES 47 and 48. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all fence conditions.

As can be seen from FIGURES 47 and 48, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Trident can be expected to deliver shocks over a wide range of fence conditions.

The Trident could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 8400 V, which is 1% higher than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Trident was suitable for winter operation.

Shock Intensity: Current output for dry and wet conditions while hooked to the High terminal are shown in FIGURES 49 and 50.

The peak current delivered by the Trident was 2.0 A for a dry condition and 28.6 A for a wet condition (TABLE 12). Corresponding energy output at these conditions were 0.87 and 5.83 J. Energy and current outputs for other conditions are given in APPENDIX II. Shock intensity when hooked to the Medium and Low terminals was reduced.

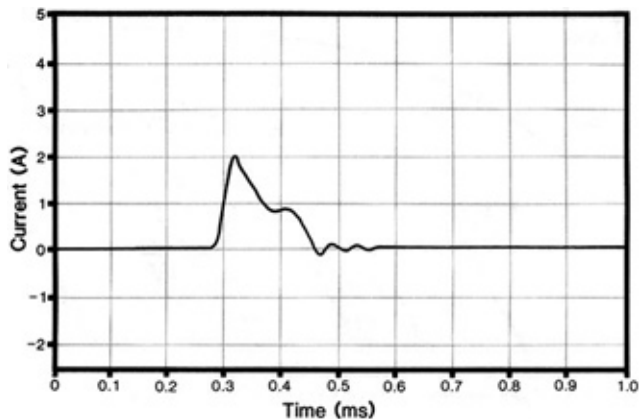


FIGURE 49. Dry Condition Current Output.

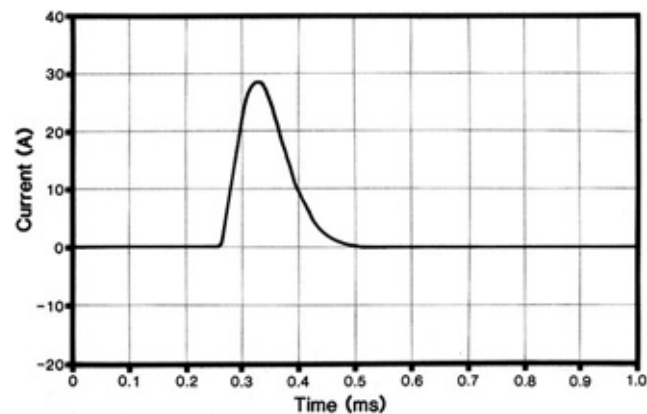


FIGURE 50. Wet Condition Current Output.

TABLE 12. Trident Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT	ENERGY
	A	J
Dry	2.0	0.87
Wet	28.6	5.83

The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

Shock Frequency: A shock pulse was delivered every 1.4 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.17 to 0.60 milliseconds.

EASE OF OPERATION

Installation: The Trident was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire. Two additional hookup terminals could be used for reduced outputs.

Indicators: The Trident was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Trident was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was good. It outlined installation, safety considerations and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and operating tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Trident enclosure was metal with a painted finish. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	J.C. Hallman
MODEL:	Trident
SERIAL NUMBER:	G2333
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	10.7 lb (4.8 kg)
OVERALL DIMENSIONS:	
- length	10.9 in (279 mm)
- width	8.0 in (203 mm)
- height	6.4 in (162 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
OUTPUT SELECTION:	three terminals: High, Medium, Low
TYPE OF ENCLOSURE:	metal, for indoor use

WINTERBURN WB-131C

MANUFACTURER:

Winterburn Enterprises
 Hwy. 62 North
 P.O. Box 292
 Madoc, Ontario
 K0K 2K0
 (613) 473-4541

DISTRIBUTOR:

Federated Co-operative Ltd.
 401 22nd Street East
 Saskatoon, Saskatchewan
 (306) 244-3311

RETAIL OUTLET:

Home Hardware Stores

RETAIL PRICE:

\$149.00 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 51. Winterburn WB-131C Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Winterburn WB-131C was 3910 V for a clean fence condition and 1090 V for a weeded fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 1.0 A for a dry condition and 10.9 A for a wet condition. Energy outputs at these conditions were 0.17 and 0.41 J, respectively. A shock pulse was delivered every 1.0 seconds.

The Winterburn WB-131C was a 120 V AC unit intended for mounting indoors. Two lights indicated AC line condition and fence charging.

The Winterburn WE-131C had CSA approval. The instruction manual was very good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and safety tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We will certainly consider this recommendation. We have already produced a brochure containing information on lightning protection, vegetation loads, fence controller grounds, and the type of wire suitable for different situations.

MANUFACTURER'S ADDITIONAL COMMENTS

Blitzen electric fence controllers are designed and built to provide long-term reliability. High quality components are used with ratings that ensure long life, and lightning protection is a built-in feature.

GENERAL DESCRIPTION

The Winterburn Model WB-131C is a peak-discharge electric fence controller containing solid state electronics (FIGURE 51). It is designed for 120 V AC operation. Lights are provided to indicate AC line condition and fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURES 52 and 53 show guard voltage outputs of the Winterburn WB-131C for 3.3 and 10 mi (5.4 and 16 km) lengths of single wire fence over a range of insulation resistances.

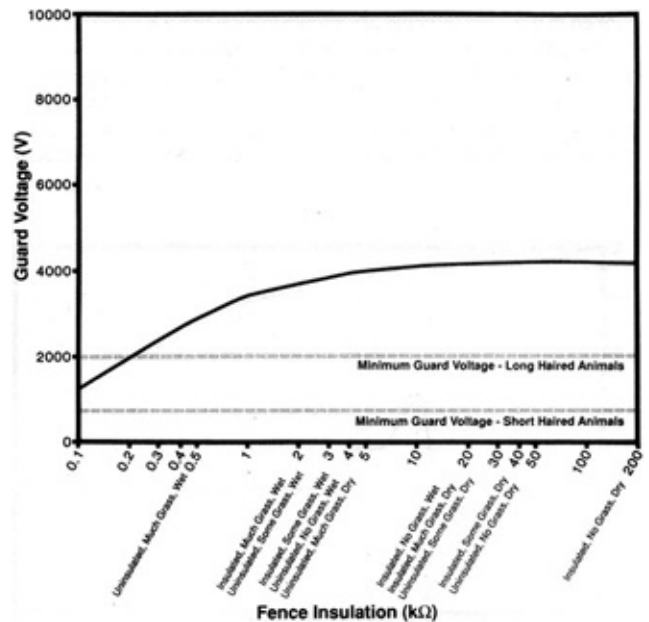


FIGURE 52. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

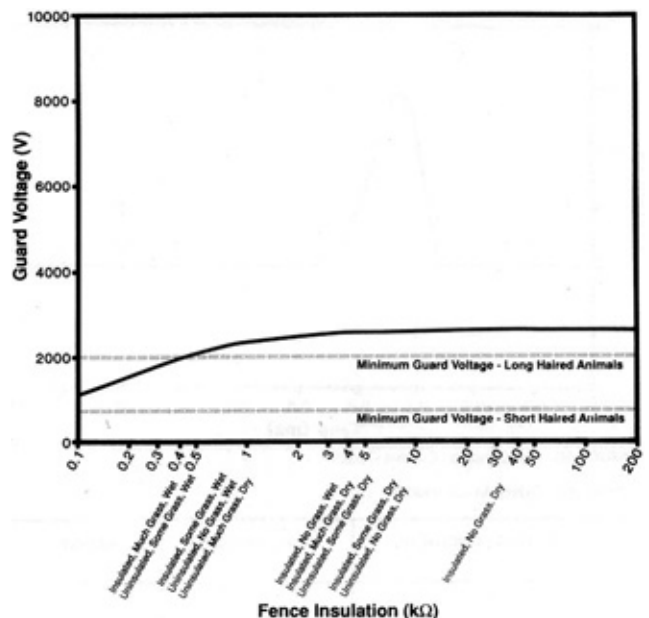


FIGURE 53. Guard Voltage for a 10 mi (16 km) Single Wire Fence

On a 3.3 mi (5.4 km) fence (FIGURE 52), guard voltage output varied from 4180 V for a well-insulated, grass-free, dry fence to 1220 V for an uninsulated wet fence with considerable grass touching the charged wire.

On a 10 mi (16 km) fence (FIGURE 53), guard voltage output varied from 2620 V for a well-insulated, grass-free, dry fence to 1090 V for an uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 3910 V for a clean fence and 1090 V for a weeded fence. The voltage output for most fence conditions was above the 2000 V minimum guard voltage needed to shock long-haired animals, and was above the 700 V minimum guard voltage for all fence conditions.

As can be seen from FIGURES 52 and 53, plant growth touching a fence did not appreciably affect shock delivery, since the voltage output was above 2000 V for nearly all fence conditions. The Winterburn WB-131C can be expected to deliver shocks over a wide range of fence conditions.

The Winterburn WB-131C could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 4200 V, which is 1% higher than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Winterburn WB-131C was suitable for winter operation.

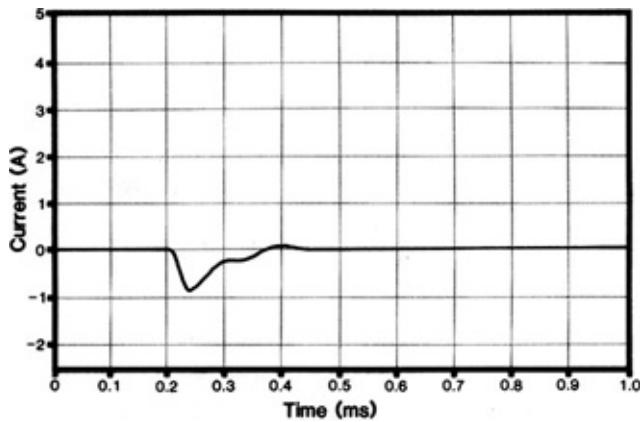


FIGURE 54. Dry Condition Current Output.

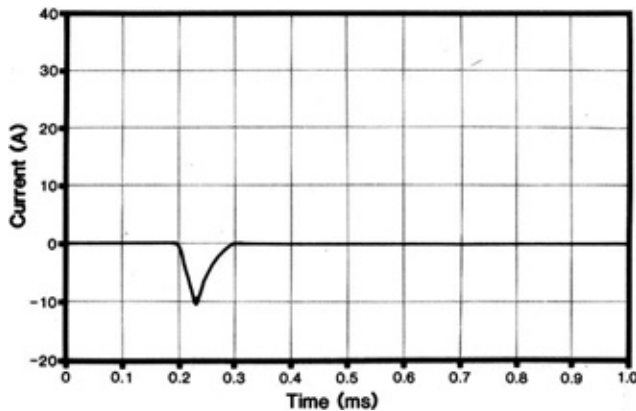


FIGURE 55. Wet Condition Current Output.

TABLE 13. Winterburn WB-131C Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	1.0	0.17
Wet	10.9	0.41

Shock Intensity: Current output for dry and wet conditions are shown in FIGURES 54 and 55.

The peak current delivered by the Winterburn WB-131C was 1.0 A for a dry condition and 10.9 A for a wet condition (TABLE 13). Corresponding energy output at these conditions were 0.17 and 0.41 J. Energy and current outputs for other conditions are given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

Shock Frequency: A shock pulse was delivered every 1.0 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.10 to 0.57 milliseconds.

EASE OF OPERATION

Installation: The Winterburn WB-131C was equipped with a three-wire cord and plug for connection to a standard, grounded, 120 V AC receptacle. The controller was intended to be mounted indoors. If mounted outdoors, it must be placed in an appropriate weather-proof shelter. The manufacturer recommends installation in a dry area near an electrical receptacle. The controller was connected to the fence with a length of insulated wire.

Indicators: The Winterburn WB-131C was equipped with two lights for convenient troubleshooting of AC line condition and fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The lights performed well and were easy to see in normal indoor lighting conditions.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Winterburn WB-131C was Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was very good. It outlined installation and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and safety tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Winterburn WB-131C enclosure was metal with a painted finish. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Winterburn
MODEL:	WB-131C
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	120 V AC
WEIGHT:	4.5 lb (2.0 kg)
OVERALL DIMENSIONS:	
- length	8.0 in (203 mm)
- width	6.3 in (160 mm)
- height	4.1 in (103 mm)
NUMBER OF INDICATOR LIGHTS:	2 (power supply and fence charge)
TYPE OF ENCLOSURE:	metal, for indoor use

WINTERBURN WB-151

MANUFACTURER:

Winterburn Enterprises
Highway 62 North
P.O. Box 292
Madoc, Ontario
K0K 2K0
(613) 473-4541

DISTRIBUTOR:

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Home Hardware Stores

RETAIL PRICE:

\$129.00 (June 1989, f.o.b. Humboldt, Sask.)



FIGURE 56. Winterburn WB-151 Electric Fence Controller.

SUMMARY AND CONCLUSIONS

Guard voltage output of the Winterburn WB-151 was 2560 V for a clean fence condition. The output was above the 2000 V minimum guard voltage for long-haired animals for most operating conditions.

The peak current was 0.6 A for a dry condition. Energy output at this condition was 0.06 J. A shock pulse was delivered every 1.3 seconds.

The Winterburn WB-151 was a 12 V DC unit intended for mounting outdoors. One light indicated fence charging. A 70 amp-hour battery would last about 10.2 weeks.

The Winterburn WB-151 did not have CSA approval. The instruction manual was very good. No durability problems occurred.

RECOMMENDATIONS

It is recommended that the manufacturer consider:

1. Providing a more detailed operator's manual, including troubleshooting and safety tips.

THE MANUFACTURER STATES THAT

With regard to recommendation number:

1. We will certainly consider this recommendation. We have already produced a brochure containing information on lightning protection, vegetation loads, fence controller grounds, and the type of wire suitable for different situations.

MANUFACTURER'S ADDITIONAL COMMENTS

Blitzen electric fence controllers are designed and built to provide long-term reliability. High quality components are used with ratings that ensure long life, and lightning protection is a built-in feature.

GENERAL DESCRIPTION

The Winterburn WB-151 is a peak-discharge electric fence controller containing solid state electronics (FIGURE 56). It is designed for 12 V DC operation. A light is provided to indicate fence condition.

RESULTS AND DISCUSSION

QUALITY OF WORK

Shock Delivery: FIGURE 57 shows guard voltage output of the Winterburn WB-151 for a 3.3 mi (5.4 km) length of single wire fence over a range of insulation resistances. The Winterburn WB-151 is not designed for fences longer than about 2 mi (3.2 km).

On a 3.3 mi (5.4 km) fence (FIGURE 57), guard voltage output varied from 2700 V for a well-insulated, grass-free, dry fence to 760 V for an

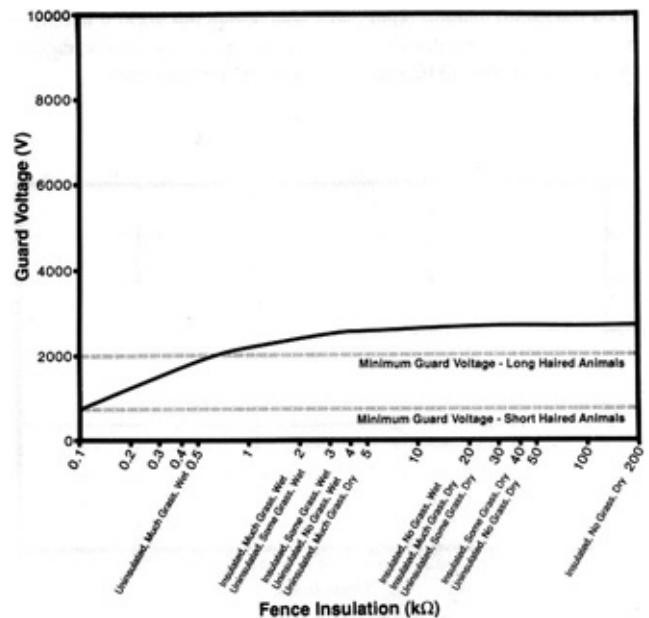


FIGURE 57. Guard Voltage for a 3.3 mi (5.4 km) Single Wire Fence.

uninsulated wet fence with considerable grass touching the charged wire.

Guard voltage was 2560 V for a clean fence. The voltage output with the 3.3 mi (5.4 km) fence was above the 2000 V minimum guard voltage needed to shock long-haired animals for most fence conditions, and was above the 700 V minimum guard voltage for all fence conditions.

As can be seen from FIGURE 57, plant growth touching a fence did not appreciably affect controller performance for the 3.3 mi (5.4 km) fence since the voltage output was above 2000 V for nearly all fence conditions. The Winterburn WB-151 is designed for shorter fences and therefore will not maintain a high guard voltage for long fences.

The Winterburn WB-151 could effectively be used to energize wires during cold temperatures. For example, the guard voltage output of the controller at -31°F (-35°C) on a 3.3 mi (5.4 km) single wire fence was about 2800 V, which is 4% higher than its output at room temperature. Since the guard voltage output was well above the 2000 V minimum required to overcome the insulation resistance of long-haired animals, the Winterburn WB-151 was suitable for winter operation.

Shock Intensity: Current output for a dry condition is shown in FIGURE 58.

The peak current delivered by the Winterburn WB-151 was 0.6 A for a dry condition (TABLE 14). Corresponding energy output at this condition was 0.06 J. Energy and current outputs for other conditions are

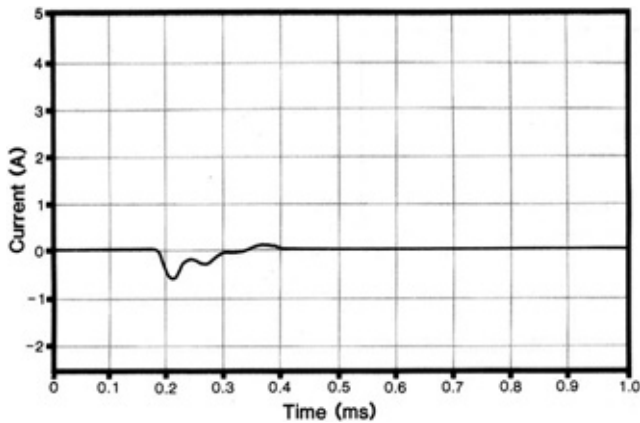


FIGURE 58. Dry Condition Current Output.

given in APPENDIX II. The above values represent the total shock intensity delivered by the fence controller. The shock intensity that the animal receives will be a certain portion of the total output, as determined by the operating conditions.

TABLE 14. Winterburn WB-151 Shock Intensity.

OPERATING CONDITIONS	PEAK CURRENT A	ENERGY J
Dry	0.6	0.06

Shock Frequency: A shock pulse was delivered every 1.3 seconds. The number of pulses did not vary with fencer load. However, the on-time was affected by load and varied from about 0.10 to 0.41 milliseconds.

EASE OF OPERATION

Installation: The Winterburn WB-151 was equipped with wire leads for connection to a standard 12 V automotive battery. The controller was intended to be mounted outdoors. The controller was connected to the fence with a length of insulated wire.

Indicators: The Winterburn WB-151 was equipped with one light for troubleshooting of fence charging. If the fence charging light does not flash, there is insufficient charge being placed on the fence, which may be a result of too long of a fence or poor insulation. The light performed well and was easy to see.

Battery Consumption: A 12 V, 70 amp-hour battery will operate the Winterburn WB-151 for about 10.2 weeks, depending upon the battery's naturally occurring discharge rate. The consumption rate did not increase as the load on the controller increased.

OPERATOR SAFETY

No safety problems were evident if the manufacturer's instructions were followed.

The Winterburn WB-151 was not Canadian Standards Association approved.

OPERATOR'S MANUAL

The operator's manual was very good. It outlined installation and grounding of the fence controller. However, more detail would have been helpful. It is recommended that the manufacturer consider providing a more detailed operator's manual, including troubleshooting and safety tips.

MECHANICAL HISTORY

The intent of the test was evaluation of functional performance. An extended durability test was not performed.

The Winterburn WB-151 enclosure was plastic. No mechanical problems were encountered during the 10 hours of testing.

SPECIFICATIONS	
MAKE:	Winterburn
MODEL:	WB-151
TYPE:	Solid State Electronic
POWER REQUIREMENTS:	12 V DC
WEIGHT:	1.9 lb (0.85 kg)
OVERALL DIMENSIONS:	
- length	7.5 in (190 mm)
- width	4.3 in (110 mm)
- height	2.4 in (60 mm)
NUMBER OF INDICATOR LIGHTS:	1 (fence charge)
TYPE OF ENCLOSURE:	plastic, for outdoor use

APPENDIX I

MACHINE RATINGS

The following rating scale is used in PAMI reports:

Excellent	Fair
Very Good	Poor
Good	Unsatisfactory

APPENDIX II SHOCK INTENSITY DATA

Battery Saver

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	27.1	10.7	5.9	1.7
10 mi (16 km) Fence	22.3	7.1	3.8	1.0

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	1.39	1.12	0.70	0.25
10 mi (16 km) Fence	1.20	0.87	0.53	0.17

BEE 8355C

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	25.0	8.9	4.9	1.3
10 mi (16 km) Fence	19.1	5.6	3.0	0.8

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	0.76	0.58	0.39	0.13
10 mi (16 km) Fence	0.57	0.36	0.23	0.07

BEE 8088

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	28.1	10.4	5.7	1.6
10 mi (16 km) Fence	22.0	6.6	3.5	0.9

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	1.05	0.88	0.61	0.20
10 mi (16 km) Fence	0.83	0.67	0.45	0.15

Captivator Super 1200

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	20.3	9.2	5.4	1.5
10 mi (16 km) Fence	17.8	6.4	3.5	1.0

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	1.05	1.16	0.98	0.46
10 mi (16 km) Fence	0.95	0.95	0.78	0.33

BEE 8105C

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	40.3	14.0	7.7	2.1
10 mi (16 km) Fence	40.0	12.2	6.5	1.7

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	4.49	2.12	1.21	0.35
10 mi (16 km) Fence	4.38	2.04	1.17	0.33

Shur Shock

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	18.1	7.3	4.3	1.2
10 mi (16 km) Fence	18.1	6.3	3.5	0.9

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < ----- >Dry			
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	1.26	0.94	0.61	0.19
10 mi (16 km) Fence	1.24	0.87	0.55	0.17

Continued

APPENDIX II Continued
SHOCK INTENSITY DATA

Speedrite 240

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	19.3	10.9	7.2	2.2
10 mi (16 km) Fence	18.3	8.5	4.9	1.4

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	2.39	2.61	2.57	1.06
10 mi (16 km) Fence	2.27	2.55	2.07	0.71

Trident

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	27.9	12.6	7.3	2.0
10 mi (16 km) Fence	28.6	11.9	6.7	1.8

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	5.87	4.77	2.94	0.87
10 mi (16 km) Fence	5.83	4.48	3.02	0.97

Speedrite SP580

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	29.0	13.0	7.5	2.1
10 mi (16 km) Fence	31.1	12.5	6.5	1.8

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	4.42	3.62	2.24	0.70
10 mi (16 km) Fence	5.38	4.38	2.27	0.75

Winterburn WB-131C

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	12.2	5.7	3.4	1.0
10 mi (16 km) Fence	10.9	4.1	2.3	0.6

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	0.46	0.51	0.40	0.17
10 mi (16 km) Fence	0.41	0.39	0.30	0.12

Stockman

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	25.7	10.0	5.6	1.5
10 mi (16 km) Fence	20.3	6.4	3.4	0.9

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	1.00	0.86	0.61	0.21
10 mi (16 km) Fence	0.86	0.65	0.44	0.15

Winterburn WB-151

Peak Current Output in Amps (A).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	7.6	3.7	2.2	0.6

Energy Outputs in Joules (J).

OPERATING CONDITIONS	Wet < -----	>Dry		
RESISTANCE (kΩ)	0.1	0.5	1.0	4.0
3.3 mi (5.4 km) Fence	0.14	0.17	0.13	0.06

SUMMARY CHART

BATTERY SAVER

RETAIL PRICE	\$109.99 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	6660 V
Weeded Fence	2230 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	1.7A
Wet Condition	22.3 A
Energy	
Dry Condition	0.25 J
Wet Condition	1.20 J
Shock Frequency	Shock pulse every 1.6 seconds (Normal frequency)
	Shock pulse every 5.5 seconds (Slow frequency)
EASE OF OPERATION	
Installation	12 V DC: mount outdoors: two 2 - position switches for reduced output
Indicators	None
Battery Consumption	70 amp-hour battery lasts 17 weeks at High-Normal: 6.1 weeks at Low-Battery Saver (photozell reducing shock frequency)
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Good: contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

BEE 8105C

RETAIL PRICE	\$329.95 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	8440 V
Weeded Fence	4000 V
Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity	
Peak Current	
Dry Condition	2.1A
Wet Condition	400 A
Energy	
Dry Condition	0.35 J
Wet Condition	4.38 J
Shock Frequency	Shock pulse every 0.9 seconds
EASE OF OPERATION	
Installation	120 V AC, 3-prong receptacle required: mount indoors
Indicators	One flashing light; indicated controller operation
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Excellent: contained useful information
MECHANICAL HISTORY	No problems encountered

BEE 8355C

RETAIL PRICE	\$149.95 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	5300 V
Weeded Fence	1910 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	1.3 A
Wet Condition	19.1 A
Energy	
Dry Condition	0.13J
Wet Condition	0.57 J
Shock Frequency	Shock pulse delivered every 1.0 seconds
EASE OF OPERATION	
Installation	120 V AC, 3-prong receptacle required; mount indoors
Indicators	One flashing light; indicated controller operation
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Excellent; contained useful information
MECHANICAL HISTORY	No problems encountered

BEE 8088

RETAIL PRICE	\$189.95 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	6210 V
Weeded Fence	2200 V
Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity	
Peak Current	
Dry Condition	1.6 A
Wet Condition	220 A
Energy	
Dry Condition	0.20 J
Wet Condition	0.83 J
Shock Frequency	Shock pulse every 1.1 seconds
EASE OF OPERATION	
Installation	12 V DC, mount outdoors
Indicators	One flashing light: indicated fence condition
Battery Consumption	70 amp-hour battery lasts 23 weeks
OPERATOR SAFETY	Not CSA approved
OPERATOR'S MANUAL	Excellent: contained useful information
MECHANICAL HISTORY	No problems encountered

Continued

SUMMARY CHART

CAPTIVATOR SUPER 1200

RETAIL PRICE	\$89.34 (June 1989. f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	6150 V
Weeded Fence	1780 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	1.5A
Wet Condition	17.8 A
Energy	
Dry Condition	0.46 J
Wet Condition	0.95 J
Shock Frequency	Shock pulse every 1.1 seconds (Fast Frequency)
	Shock pulse every 1.5 seconds (Slow Frequency)
EASE OF OPERATION	
Installation	12 V DC. mount indoors: two 2-position switches for reduced output
Indicators	One flashing light: indicated fence condition
Battery Consumption	70 amp-hour battery lasts 2.7 weeks at High-Fast, 9.5 weeks at Low-Slow
OPERATOR SAFETY	Not CSA approved
OPERATOR'S MANUAL	Excellent; contained useful information
MECHANICAL HISTORY	No problems encountered

SPEEDRITE 240

RETAIL PRICE	\$216.00 (June 1989 f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	8810 V
Weeded Fence	1830 V
Other Conditions	shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	2.2A
Wet Condition	18.3 A
Energy	
Dry Condition	1.06 J
Wet Condition	2.27 J
Shock Frequency	Shock pulses every 1.1 seconds
EASE OF OPERATION	
Installation	120 V AC. 3-prong receptacle required: mount indoors
Indicators	two flashing lights: indicated AC line condition and fence condition
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

SHUR SHOCK

RETAIL PRICE	\$79.99 (June 1989, f.o.b. Humboldt, Sask)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	4720 V
Weeded Fence	1810 V
Other Conditions	Shock delivered to long and shod-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	1.2A
Wet Condition	18.1 A
Energy	
Dry Condition	0.19J
Wet Condition	1.24 J
Shock Frequency	Shock pulse every 1.2 seconds
EASE OF OPERATION	
Installation	120 V AC. 3-prong receptacle required; mount indoors
Indicators	One flashing light: indicated fence condition
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

SPEEDRITE SP580

RETAIL PRICE	\$382.00 (June 1989. f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	8370 V
Weeded Fence	3110V
Other Conditions	shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	21A
Wet Condition	31.1 A
Energy	
Dry Condition	0.70 J
Wet Condition	5.38 J
Shock Frequency	Shock pulse every 1.2 seconds
EASE OF OPERATION	
Installation	120 V AC. 3-prong receptacle required: mount indoors: a second terminal was available for reduced outputs
Indicators	three flashing lights: very convenient for troubleshooting AC line condition. controller operation, fence condition
OPERATOR SAFETY	CSA approved
OPERATOR'S MANUAL	Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

Continued

SUMMARY CHART

Continued From Page 31

STOCKMAN	
RETAIL PRICE	\$139.99 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	6160 V
Weeded Fence	2030 V
Other Conditions	Shock delivered to long and short-haired animals in all conditions
Shock Intensity	
Peak Current	
Dry Condition	1.5A
Wet Condition	20.3 A
Energy	
Dry Condition	0.21 J
Wet Condition	0.86 J
Shock Frequency	
Shock pulse every 1.1 seconds	
EASE OF OPERATION	
Installation	
120 V AC, 3-prong receptacle required; mount indoors	
Indicators	
One flashing light; indicated fence condition CSA approved	
OPERATOR SAFETY	
OPERATOR'S MANUAL	Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

WINTERBURN WB-131C	
RETAIL PRICE	\$149.00 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	3910 V
Weeded Fence	1090 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	1.0A
Wet Condition	10.9 A
Energy	
Dry Condition	0.17 J
Wet Condition	0.41 J
Shock Frequency	
Shock pulse delivered every 1.0 seconds	
EASE OF OPERATION	
Installation	
120 V AC, 3-prong receptacle required; mount indoors	
Indicators	
Two flashing lights; convenient for troubleshot ing AC line/condition and fence condition CSA approved	
OPERATOR SAFETY	
OPERATOR'S MANUAL	Very Good; contained useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

TRIDENT	
RETAIL PRICE	\$359.99 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	8140 V
Weeded Fence	2860 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	2.0A
Wet Condition	28.6 A
Energy	
Dry Condition	0.87 J
Wet Condition	5.83 J
Shock Frequency	
Shock pulse every 1.4 seconds	
EASE OF OPERATION	
Installation	
120 V AC, 3-prong receptacle required; mount indoors; two additional terminals available for reduced outputs	
Indicators	
One flashing light; indicated fence condition CSA approved	
OPERATOR SAFETY	
OPERATOR'S MANUAL	Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered

WINTERBURN WB-151	
RETAIL PRICE	\$129.00 (June 1989, f.o.b. Humboldt, Sask.)
QUALITY OF WORK	
Shock Delivery	
Guard Voltage	
Clean Fence	2560 V
Other Conditions	Shock delivered to long and short-haired animals in most conditions
Shock Intensity	
Peak Current	
Dry Condition	0.6 A
Energy	
Dry Condition	0.06 J
Shock Frequency	
Shock pulse every 1.3 seconds	
EASE OF OPERATION	
Installation	
12 V DC, mount outdoors	
Indicators	
One flashing light; fence condition	
Battery Consumption	
70 amp-hour battery lasts 10.2 weeks	
OPERATOR SAFETY	Not CSA approved
OPERATOR'S MANUAL	Very Good; contained some useful information but more would have been helpful
MECHANICAL HISTORY	No problems encountered



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