

**INSTRUCTION MANUAL**

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**AUTO CHARGE<sup>®</sup>**  
**3 STEP**  
**AUTOMATIC BATTERY CHARGER**

MODEL #091-128-XX-XX-(XXX)(XX)

**3 YEAR WARRANTY**

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## **INTRODUCTION**

The Auto Charge-3 STEP CHARGER, Model 091-128-XX-XX-(XXX)(XX) is a compact, completely automatic single channel battery charger designed specifically for periodic charging. Of rugged construction, the charger is made to withstand the shock and vibration encountered in vehicle mounted equipment. Utilizing components, which meet international safety standards, makes this charger ideal for worldwide applications.

## **BATTERY CHARGER FEATURES**

Completely automatic operation, charges battery on demand  
Output Voltage regulated, eliminates overcharging battery  
Output Voltage, temperature compensated (optional)  
Output, current limited to protect charger from overloading  
A 5-LED display indicating charge state and faults  
Reverse polarity protection

## **INSTALLATION**

The 3 STEP CHARGER should be installed in an area with adequate ventilation.  
Mount the charger using the four holes provided.  
Connect wiring from the battery to the output terminal strip.  
Double check battery wiring. Verify that the battery voltage appears at the charger output terminals (See Figure 2).

# PRINCIPLES OF OPERATION

A three-step lead acid battery charger operates in the three stages described below:

- 1) A discharged battery is recharged at a constant current (**bulk charge**) until its voltage reaches an overcharge level of 2.48 volts per cell. At this time the charger will switch to Finish Charge. The battery accepts 75-85% of its capacity during bulk charge.
- 2) This overcharge voltage is now maintained constant at 2.48 volts per cell (**absorption or finish charge**) until the charge current tapers down to {battery capacity/35} amperes. For the 12 volt, 40 ampere charger this current is 6 amperes. The battery accepts 15-25% of its capacity during absorption charge.
- 3) Once the charge current reaches the tapered down value (see above), the voltage is set to a float-voltage of 2.24 volts per cell, and maintained at float charge. The battery is maintained at full charge during float charge, and the green indicator labeled "Battery Charged" is illuminated.

Figure 1 depicts the above described operation. Note that the term "absorption charge" is used interchangeably with "finish charge". Upon application of AC power, the charger is placed into bulk charge. When the charger switches to finish charge, a timer starts. In the event that the charge current did not taper down to approximately C/35 amperes after 2 ½ hours, the charger will automatically go to float charge, and a timeout will be indicated. This timeout indicator can indicate an old or leaky battery, or it can indicate that the charger is undersized for the battery being charged.

A battery fault indicator is provided to indicate the absence of a battery, a battery connected with reverse polarity, or a battery with an open circuit terminal voltage of less than 1.35 volts per cell.

# TEMPERATURE COMPENSATION

Temperature compensation is provided as an optional feature. A temperature probe is provided which can be placed in the air surrounding the battery or bonded to the battery case.

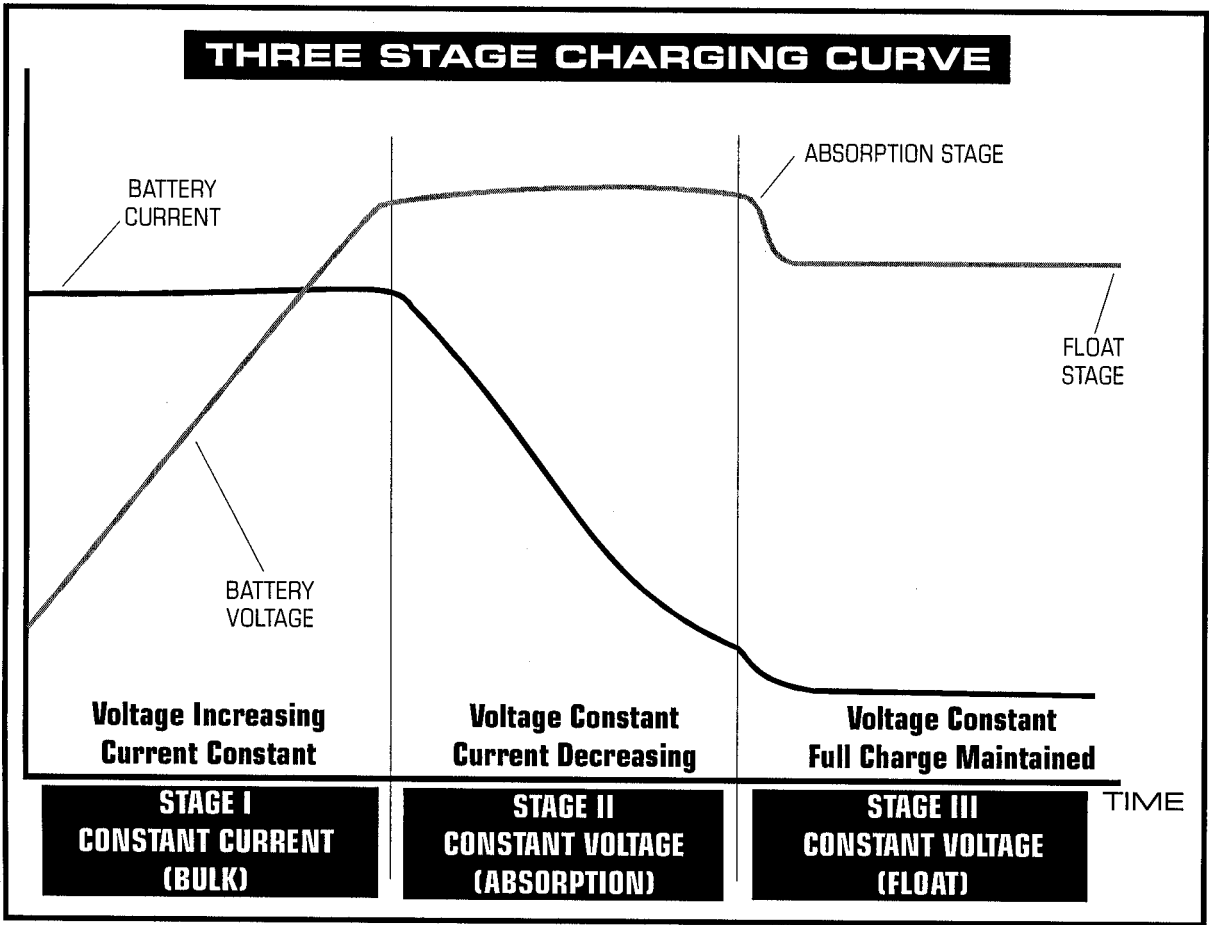
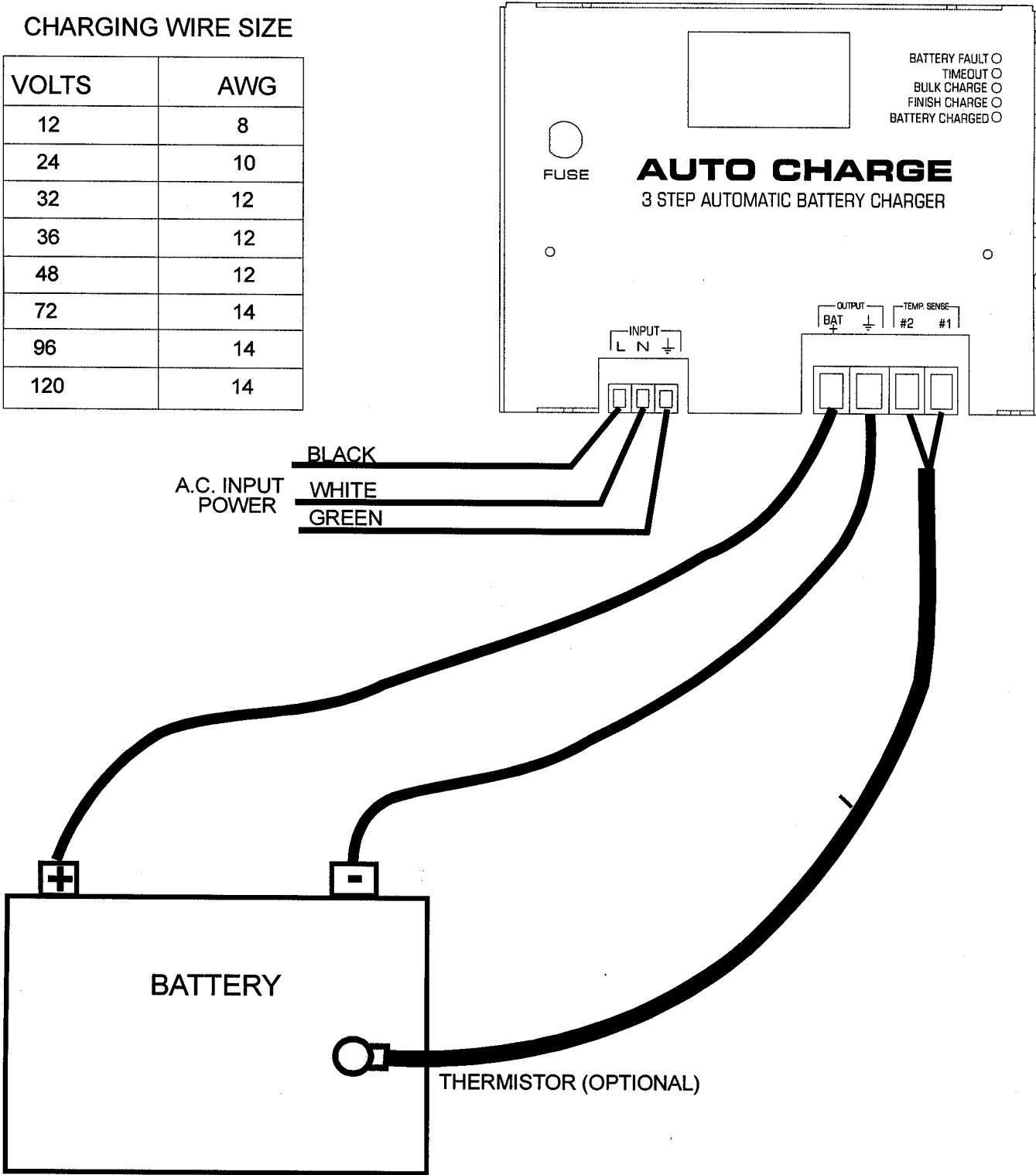


Figure 1

**CHARGING WIRE SIZE**

VOLTS	AWG
12	8
24	10
32	12
36	12
48	12
72	14
96	14
120	14



**Figure 2**

**INSTALLATION WIRING**

# SPECIFICATIONS:

Input Power & Fuse: See Chart

Output Power: See Chart

Charge Indicators: See Chart

Mode Indicators: Battery Fault, Timeout, Bulk Charge & Battery Charged

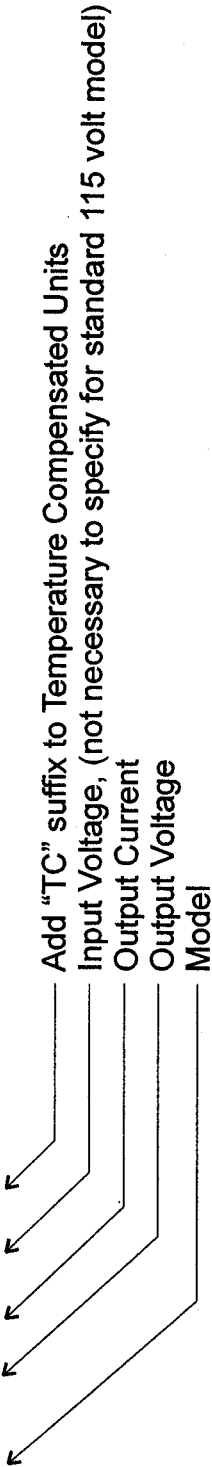
Recommended Battery Size: See Chart

Weight: 28 pounds

Temperature Compensation: Add suffix "TC" to Model Number shown in table

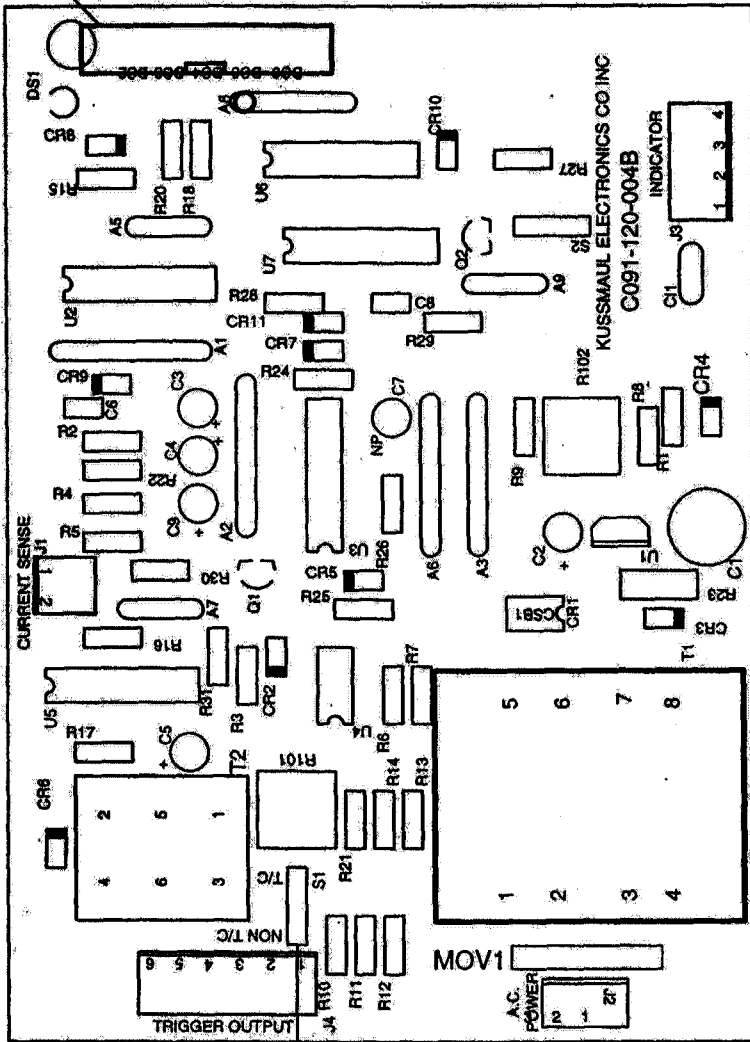
Model Number Definition:

091-128-XX-XX-XXX-XX



Model Number	Input Power	Input Fuse	Output	Charge Indicator	Battery Size
091-128-12-40	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	12 Volts, 40 Amps	50 Amperes	150 to 300 ampere-hours
091-128-24-20	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	24 Volts, 20 Amps	25 Amperes	75 to 150 ampere-hours
091-128-32-15	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	32 Volts, 15 Amps	15 Amperes	55 to 110 ampere-hours
091-128-36-14	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	36 Volts, 14 Amps	15 Amperes	50 to 100 ampere-hours
091-128-48-10	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	48 Volts, 10 Amps	15 Amperes	38 to 76 ampere-hours
091-128-72-7	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	72 Volts, 7 Amps	8 Amperes	25 to 50 ampere-hours
091-128-96-5	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	96 Volts, 5 Amps	8 Amperes	20 to 40 ampere-hours
091-128-120-4	115 Volts, 60 Hz, 10 Amps	15 Amp, Slo-Blo	120 Volts, 4 Amps	8 Amperes	15 to 30 ampere-hours
091-128-12-40-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	12 Volts, 40 Amps	50 Amperes	150 to 300 ampere-hours
091-128-24-20-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	24 Volts, 20 Amps	25 Amperes	75 to 150 ampere-hours
091-128-32-15-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	32 Volts, 15 Amps	15 Amperes	55 to 110 ampere-hours
091-128-36-14-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	36 Volts, 14 Amps	15 Amperes	50 to 100 ampere-hours
091-128-48-10-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	48 Volts, 10 Amps	15 Amperes	38 to 76 ampere-hours
091-128-72-7-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	72 Volts, 7 Amps	8 Amperes	25 to 50 ampere-hours
091-128-96-5-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	96 Volts, 5 Amps	8 Amperes	20 to 40 ampere-hours
091-128-120-4-230	230 Volts, 60 Hz, 5 Amps	8 Amp, Slo-Blo	120 Volts, 4 Amps	8 Amperes	15 to 30 ampere-hours

TST-110-01-T-S CONNECTOR  
FAR SIDE



SWITCH S1  
PLACE IN  
T/C POSITION  
WHEN INSTALLING  
THERMISTOR



FIGURE 3  
THERMISTOR INSTALLATION SWITCH SETTING

KUSSMAUL ELECTRONICS CO. INC.	
P.C. BOARD, 3 STEP CHARGER, AUTO CHARGE 75	
<b>A</b>	Rev
Date MAY 11, 2000	Drawn by AC/EA/K
Filename A:9112004.PCB	Sheet 1 of 1

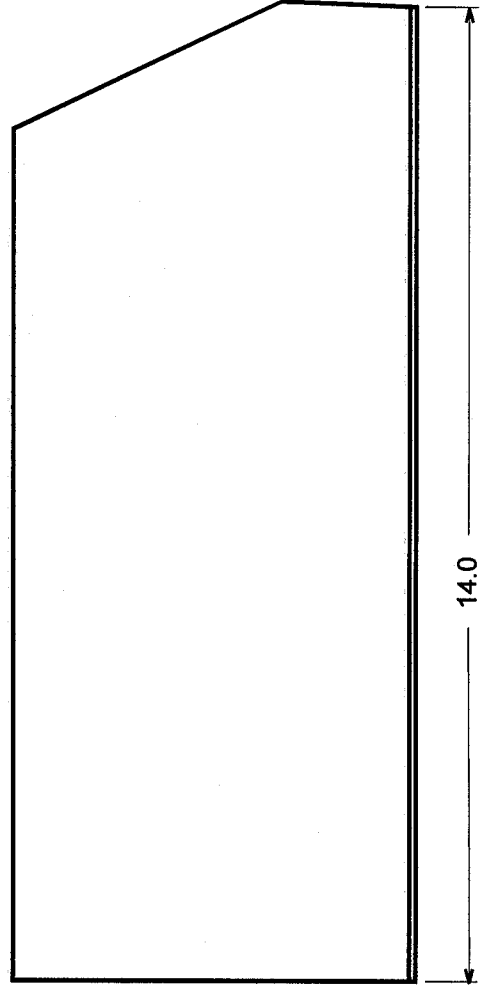
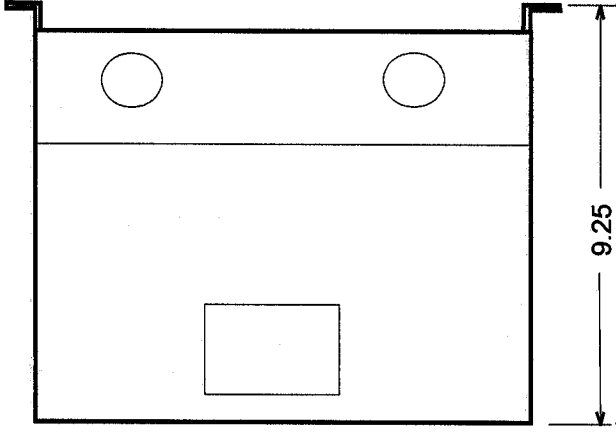
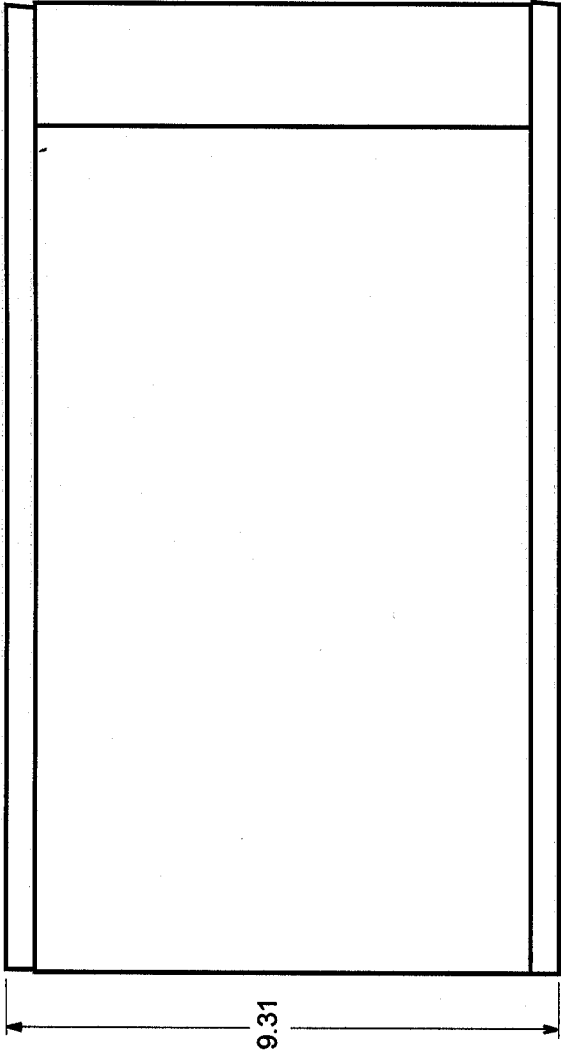


Figure 3

OUTLINE DRAWING

# INSTALLATION RECORD & WARRANTY

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**Date Installed** \_\_\_\_\_

**Installed By** \_\_\_\_\_

**Vehicle Identification** \_\_\_\_\_

**Vehicle Owner** \_\_\_\_\_

## WARRANTY

All products of Kussmaul Electronics Company Inc. are warranted to be free of defects of material or workmanship. Liability is limited to repairing or replacing at our factory, without charge, any material or defects which become apparent in normal use within 3 years from the date the equipment was shipped.

Kussmaul Electronics Company, Inc. shall have no liability for damages of any kind to associated equipment arising from the installation and /or use of the Kussmaul Electronics Company, Inc. products. The purchaser, by the acceptance of the equipment, assumes all liability for any damages which may result from its installation, use or misuse, by the purchaser, his or its employes or others.