GO or NO GO...

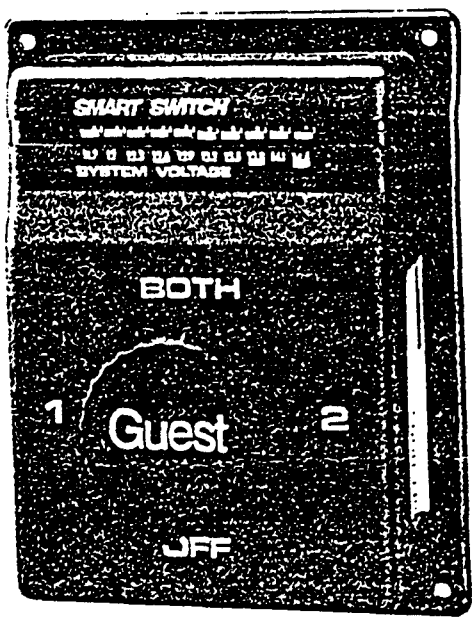
Three volts make all the difference in starting your engine.

How to read & interpret the Guest Smart Switch & SVS

The information you are about to read assumes the following conditions:

A. The boat's system is capable of producing enough energy for its DC load requirements.

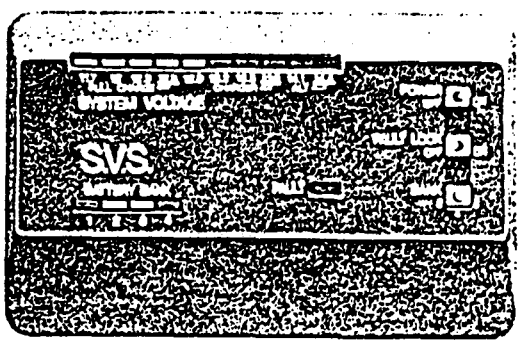
B. The battery is adequate to operate these DC loads when the electrical system is not being charged, either from a battery charger or an alternator.



The Smart Switch

The Smart Switch

This built-in battery volt meter has a lighted bar graph which shows the condition of the batteries right at the selector switch. When switched on, computerized lights display the voltage immediately. Alternator output and dockside charger are also monitored.



The SVS

The SVS

Guest's Systems Voltage Scanner automatically scans battery voltages. A lighted bar graph shows the precise condition of the electrical system with a new reading every four seconds. If there is ever a problem, a flashing red light signals the condition immediately.

SMART SWITCH and SVS READING STANDARDS

Readings of these instruments fall into these two categories:

1. Voltages from 11.7 to 12.6 are usually associated with the battery and its loads only; they have little to do with the charging system.
2. Voltages from 12.9 to 14.4 are the results of the charging system on the battery.

In terms of voltage, the most accurate measurement of the boat's batteries must be made under a no-load condition. This occurs when a storage battery is disconnected from the electrical devices that usually draw current from it or charge it.

To measure battery conditions accurately, disconnect the battery for at least 15 or 20 minutes. Although the Smart Switch and SVS do draw a small amount of current, this is negligible compared to the batteries it measures.

READING INTERPRETATIONS

11.7 volts

This reading means that the battery is not charged. It won't start the engine. To check the source of the problem, first check the electrolyte level in the battery. If that is normal, hook up the battery charging system to shore power or jump-start the engine.

12.0-12.3 Volts

At 12.0 volts there is still very little action. A hand-held spotlight would just glow.

With a reading of 12.3 the engine should start if the weather isn't too cold and if it is not diesel engine. A Loran C or VHF radio can also be run on this voltage.

When problem-solving, again check the electrolyte level first. Then, and only then, connect any available dockside charging source to the battery in question. When the Smart Switch or SVS shows 13.8 on that battery bank, the battery is at operating level.

12.6 Volts

This is the ideal voltage. The battery is fully charged, similar to a topped off fuel tank. A complex chemical change has taken place, and the rating printed on the battery has been restored. Maintaining this no-load voltage will help the battery to last as long as the manufacturer believes it will.

12.9-13.5 Volts

It is at this point that the charging system becomes the direct cause for the voltages seen on the Smart Switch or SVS. These readings indicate that energy taken from the batteries is being replaced by the battery charger, generator set or alternator.

The voltage should steadily rise and level off very close to 13.8. Close means plus or minus 0.1 volt. While 0.1 volt might not seem like much, keep in mind that a reading of 11.7 wouldn't even turn the engine over.

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13.8 Volts

A healthy battery can be maintained at this desirable state indefinitely with one precaution: The electrolyte must not fall below the plate tops. Add distilled water to maintain the proper level.

When the level gets too low, a small part of the battery's capability to produce energy is lost. Even when the cell is refilled, that small portion is gone forever.

14.1 Volts

This reading indicates another small but important change, and it could mean trouble from either of two sources.

The first problem area could be the battery charger. If it applies 14.1 volts continuously to the battery, the electrolyte may boil off very rapidly, resulting in the lowering of the fluid level and the warping and buckling of the internal plates. Once they touch each other, the electrical potential across those plates is lost forever. The result is a lowered no-load voltage. The charger, however, continues to charge at the 13.8 volt level. Unfortunately, that voltage is now excessive and it will lead to overheating and to the eventual distruction of the battery.

A second possible cause for a reading of 14.1 volts is a faulty voltage regulator in the alternator. When an alternator is involved, a 14.1 voltage reading is actually low. In contrast to a charger that is continuous, the alternator in use deals with the battery's voltage on an intermittent basis and produces higher readings, but for a limited time.

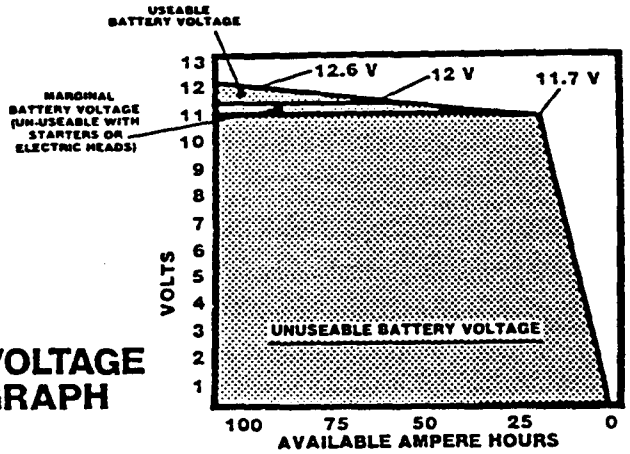
14.4 Volts

This is generally considered normal for an alternator. When the alternator is working, the Smart Switch or SVS would be fully lighted.

The Importance of Voltage

Voltage is the critical element that drives your whole D.C. electrical system. Without the proper voltage, none of your electrical accessories will operate normally and, in some cases, they won't operate at all. The most important of all these, of course, is the engine. Nominal, no load, voltage for a typical marine battery should be in the range of 12.6 volts and yet most inboard marine engines will not even turn over at 12.0 volts. Just this small drop in battery voltage from 12.6 to 12.0 can make the critical difference between running and being dead in the water.

Let's look at a DC marine refrigerator. When the voltage goes below 12.4, the refrigerator will begin losing efficiency and instead of cycling on and off as it is designed to do, it will begin operating continuously as the voltage continues to drop. The end result can be a continuous battery drain. Many electronic accessories, such as your VHF radio, will not work properly without adequate voltage. The radio output power, which translates into distance transmitted, diminishes in direct relation to the voltage applied to the radio. Bottom line: the lower the voltage, the less the distance transmitted.



VOLTAGE GRAPH

In short, if your batteries aren't charged to the design voltage, your electrical system will never function correctly.

Maintaining the Health of your Batteries

In order to insure the health and long life of your batteries, they should be charged and maintained at the proper voltages. When running, your alternator should be charging the batteries in the range of 14.2 to 14.8 volts. When at dockside, your charger should reach a finish voltage of 13.8. That is the optimum voltage for maintaining a battery over extended periods of time. These voltages are critical because if you charge in excess of them, you run the risk of boiling away your battery electrolyte and warping the metal batteryplates, and if you undercharge, your battery will sulfate which is the gradual deterioration of the metal plates. Therefore, the SVS bar graph is highlighted at 12.6 (the no-load full battery charge) 13.8 (the finish voltage of dockside battery charging) and 14.4 (mid-range for proper alternator charging voltage). That makes it simple to monitor the proper functioning of your battery system in all modes.

CONSIDER THIS

One of the easiest ways to ruin a battery is by not maintaining the proper electrolyte level. For proper battery performance it should be checked regularly, along with the engine oil. Rapid and frequent loss of electrolyte usually means the charging voltage is too high.

GUEST

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HAPPY BOATING!

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I-22278
Rev. A

INSTALLATION AND OPERATING INSTRUCTIONS
FOR #991 SYSTEMS VOLTAGE SCANNER

The Guest Systems Voltage Scanner (SVS) is a precise solid-state instrument that automatically scans the voltage of up to four banks of batteries on a continuous basis and provides the information in an easy-to-read lighted bar-graph display, and will also flash a red alert light if it detects a low voltage situation. The SVS also tells you whether your battery charger and alternator are performing properly.

I. INSTALLATION

A. Mounting the SVS:

1. Select a location that will accept the SVS (3¼" wide x 5-3/16" long x 1¼" thick). The mounting surface should be flat, clean, and free from obstacles such as screws, panel covers, etc.

2. Locate and drill one hole 11/32" diameter using template provided on back page. This is a clearance hole for the unit wires.

3. Clean the mounting surface with alcohol for good adhesion.

4. Remove the backing from the tape on the unit.

5. Install the wire through the hole and position the unit squarely on the mounting surface. Press to secure.

B. Wiring the SVS:

Note: To extend any wires, use #18 (minimum) wire size and appropriate connectors.

1. Connect red lead wire from SVS to any +12VDC accessory terminal.

2. Connect black lead wire from SVS to common DC ground (-12VDC).

3. Connect yellow lead wire from SVS to Battery #1.

4. Connect brown lead wire from SVS to Battery #2.

5. Connect blue lead wire from SVS to Battery #3.

6. Connect orange lead wire from SVS to Battery #4.

7. If your boat has only 2 or 3 batteries, then the extra available channels may be connected to any 12V load (accessory), such as bilge pump or refrigerator, which you would like to monitor. Connect lead wires as close as possible to the input terminal of the load.

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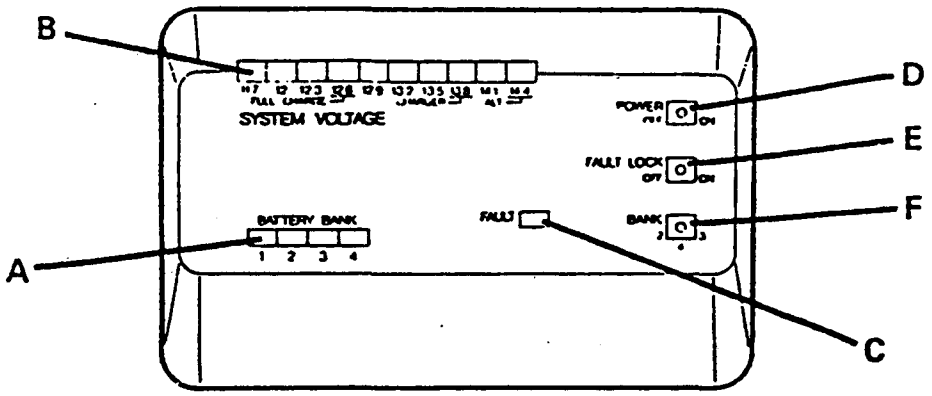
II. OPERATING INSTRUCTIONS



A. Battery Bank

The four green indicator lights, located on the lower left corner of your SVS indicate which of four input channels are being displayed on the lighted voltage bar-graph.

Example:

An indicator light for a battery bank (channel) is lit. The lighted bar-graph shows 13.8 system volts. This indicates a fully charged 12 volt battery that is attached to a battery charger.

B. Bar-Graph (System Voltage)

The ten element green bar-graph is generically termed an "expanded scale volt meter". The "expansion" in the case of the SVS means that those voltages which are of specific importance to you as a boater are the only voltages that are displayed. Each segment of the bar-graph, beginning at 11.7 volts, increases in 300 M.V. steps. Although these divisions may seem very small, each step on the bar is truly meaningful to full comprehension of your electrical systems function.

Example:

Your SVS is displaying a system voltage of 12.3 volts. Your engine is not running and there is no other load attached to the battery. The 12.3 reading on the bar graph tells you that this battery is approaching a critical state of discharge. Your action at this point should be to turn your battery charger on and wait until the reading on the bar-graph shows 13.8 volts.

C. Fault Indicator

The single red indicator light serves the function of automatically alerting the user of either impending or existing problems. The point at which the fault circuitry becomes active is fixed at less than 12.3 volts. If the voltage is less than 11.7 volts, the bar-graph lights will not be lit, however, the fault light will continue to flash. You should note that a condition can exist under which a good battery might be flagged by the fault indicator. This condition can be caused by the simple act of starting your engines. The load of the starter is so great that for the few seconds it takes to start your

engines, the battery will drop below the 12.3 volt level. This is normal and is of concern only when, after the engine runs for a few minutes, the voltage does not return to a level greater than 12.6 volts.

Example:

The indicator for battery bank 3 is lit. The bar-graph is showing 12 volts and the fault indicator is flashing. You as the user know that bank 3 is a battery that is reserved to power your bilge pumps. This very low battery voltage indicates that soon your bilge pumps will cease to function unless you charge your battery to a no-load charger voltage of 13.8 volts.

D. Power Switch

This control is used to remove or apply power to your SVS.

E. Fault Lock

This control programs the fault circuitry to "lock" onto the fault condition. This means that the bank (channel) on which the fault is detected will cause the following sequence of events:

1. Automatic scanning halts and channel indicator locks onto problem voltage.
2. Bar-graph locks voltage onto display.
3. Fault light continuously flashes.

The unit will automatically resume scanning when one of the following occurs:

1. Fault lock switch is place on the "Off" position.
2. Source of fault is corrected.

F. Bank 2 - 4 - 3

This switch programs your SVS to select and display only the battery banks (channels) on your vessel that you are desirous of monitoring. The SVS will automatically return to bank one after scanning the number of banks selected.

THINGS TO REMEMBER

1. The only accurate method of measuring battery voltage with a volt meter is under no-load.
2. 12.6 volts is an industry average for a fully charged 12 volt battery under no-load. Your battery may exhibit a slightly different fully charged no-load voltage.
3. Consider monitoring devices other than your batteries. For example, your bilge pumps may have separate inline fuses. If they blow and you are unaware of the occurrence, the problem is obvious. Attach an unused channel of your SVS on the load side of the fuse. In the event of the above described occurrence, your SVS will instantly alert you to your fuse problem.

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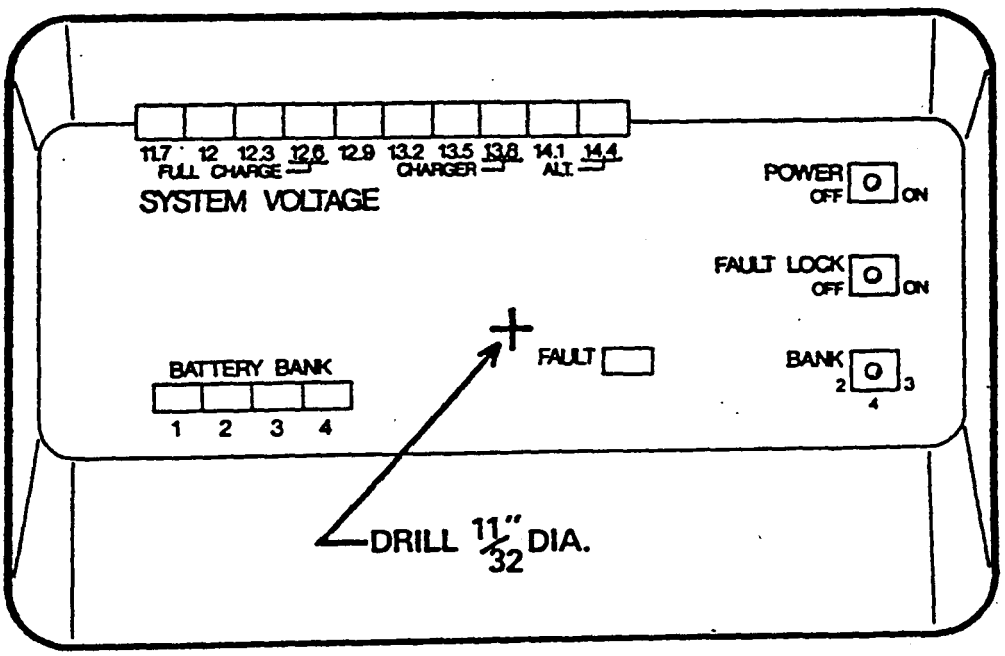
Finally, your SVS was designed and built using the finest materials available. Properly used, it should give you years of trouble-free service.

Maintaining The Health Of Your Batteries

In order to maximize the health and long life of your batteries, they should be charged and maintained at the proper voltages. When running, your alternator should be charging the batteries in the range of 14.2 to 14.8 volts and when at dockside, your charger should reach a finish voltage of 13.8 volts, which is the optimum voltage for maintaining a battery over extended periods of time.

These voltages are critical because if you charge in excess of them, you run the risk of boiling away your battery electrolyte and if you under-charge, your battery will sulfate, which can result in permanent damages to your batteries. Therefore, you will note that the SVS bar-graph is highlighted at 12.6 (the no-load full battery charge), 13.8 (the finish voltage of dockside battery charging), and 14.4 (mid-range for proper alternator charging voltage), in order that you can easily monitor the proper functioning of your battery system in all modes.



LOCATION TEMPLATE