

# SMART SWITCH TECHNOLOGIES



## **AL-8000 Alarm Monitor**

# **Installation Manual**

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# Introduction

Thank you for purchasing the AL-8000 Alarm Monitor. Smart Switch Technologies is very proud to be able to provide this product to you. You have selected a capable system designed to provide years of reliable service under the most demanding conditions.

Smart Switch Technologies are a pioneer in the design and development of distributable intelligence controller systems for the marine industry. The AL-8000 Alarm Monitor is a versatile, compact, modern, stylish, user-friendly intelligent network system. Our Research and Development Team have developed this system specifically for the marine environment using proven techniques and materials, which will ensure a long life at sea.

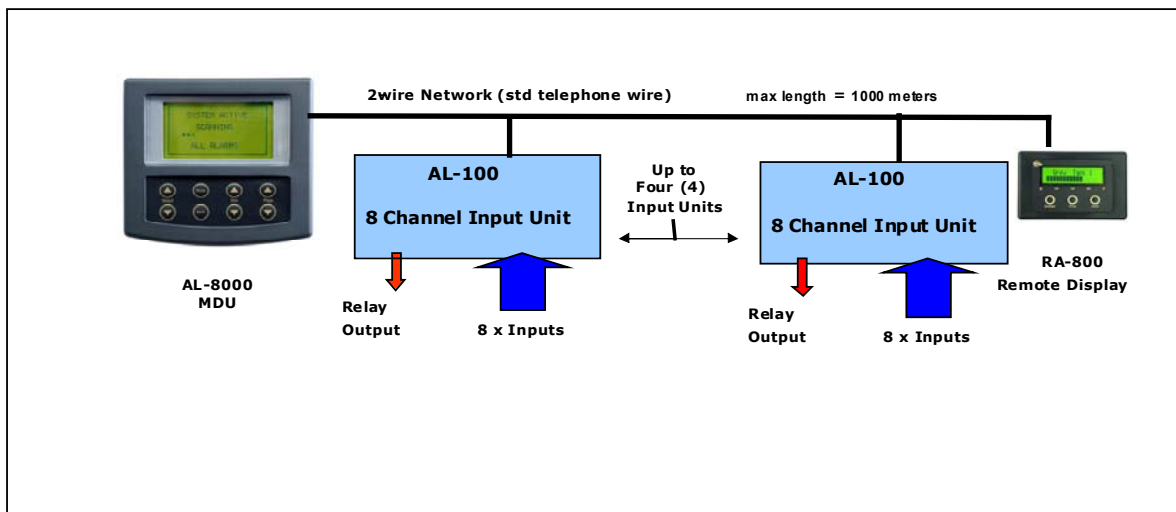
The AL-8000 provides features found only in expensive computer-based systems on mega-yachts, but does so for a fraction of the cost. It is an economical and capable alternative to simplistic monitoring systems. The AL-8000 is a system with maximum functionality thereby providing boat owners with excellent visibility into any alarm condition.

## System Overview

The AL-8000 Alarm Monitor has been developed to allow monitoring of up to 32 alarms. It is a network system consisting of the AL-8000 Master Display Unit and up to 4 Input/Output Units located any where on the vessel. In addition, and as an option, any number of RA-800 Remote Display Units may be added to provide additional displays throughout the vessel.

A 2-wire network cable, similar to that used for telephone installations, interconnects all devices. The Master Display Unit (MDU) controls communication with all attached I/O Units. System components may be located anywhere on the network cable and the cable may be up to 1000 meters in length.

**These features, unique to the AL-8000, provide boat builders and retrofitters maximum flexibility in locating components onboard the vessel while minimizing wiring costs.**



## **AL-8000 Master Display Unit (MDU)**

**Provides the following functions:**

- **Provides latched display for up to 32 Alarms**
  - **All names are user programmable**
  - **Network communication fault**
  - **Visual alarm with tone**
  - **Visual alarm with-out tone**
  - **Visual alarm with repeating tone**

## **AL-100 Input Unit: (I/O Box)**

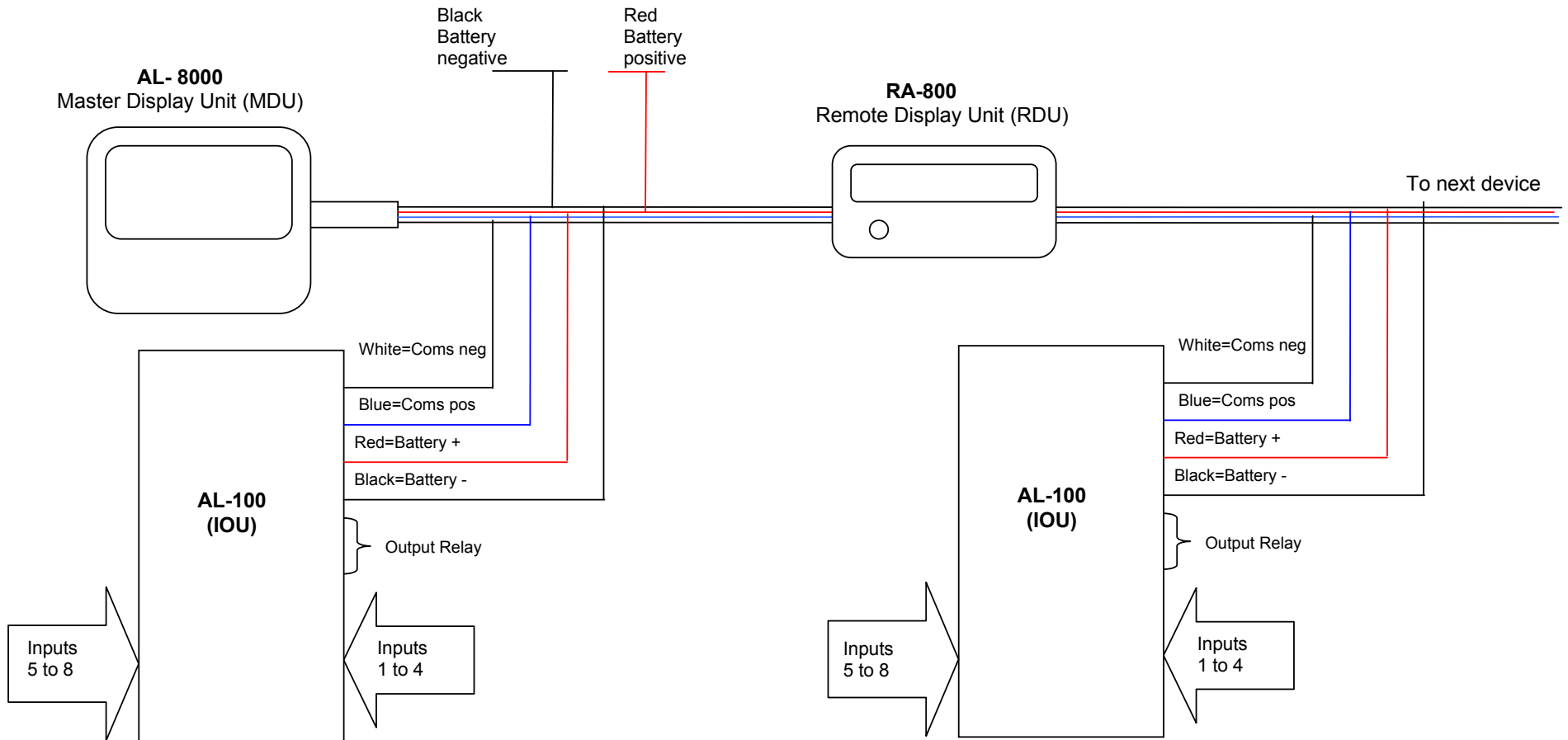
**The AL-100 has 8 Inputs and one Output Relay.**

- **Each input can be configured as follows:**
  - **normally open & closing to + vdc on fault**
  - **normally open & closing to ground on fault**
  - **normally ground & opening on fault**
  - **2k2 end of line resistor for supervised line**
  
- **Output Relay**
  - **3 amp inductive**
  - **closes on any fault**

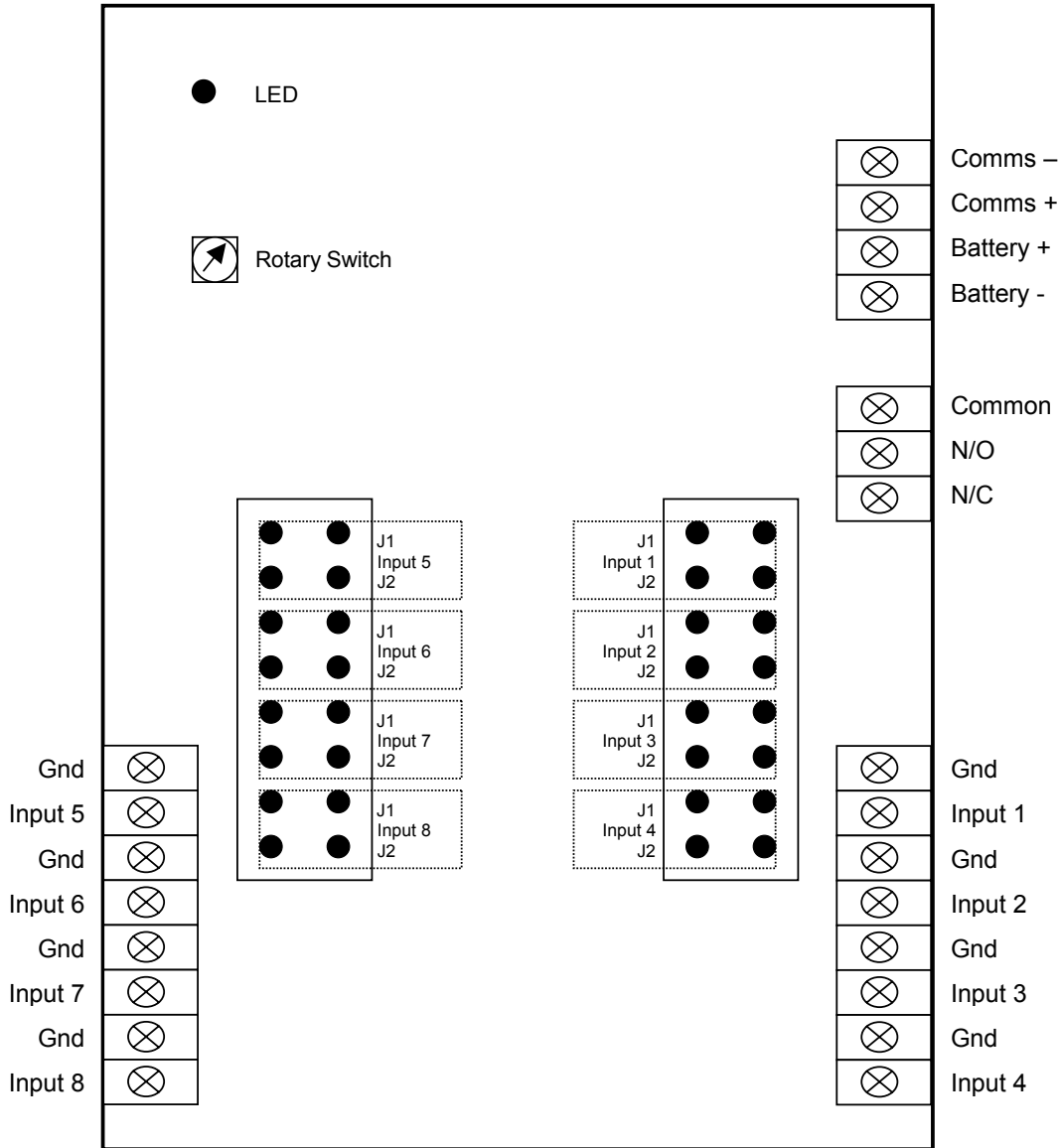
## **RA-800 Remote Display Unit (RDU)**

**The RA-800 Repeater Display is an optional extra.  
Any number of these may be connected throughout the vessel for convenient monitoring.**

# Wiring Block Diagram



# Wiring Diagram for Model AL-100



Jumper Setting	J1	J2
Normally Open & Shorting to +VDC On Fault	Off	Off
2k2 End of line resistor = Opening or Closing on Fault	On	Off
Normally Shorted to Gnd & Open On Fault	Off	On
Normally Open & Shorting to Gnd On Fault	On	On

## NOTE

Once all jumpers have been placed, or removed, as per user requirements, turn the Rotary Switch to position 0, the LED will flash once (indicating settings have been stored into memory). Place Rotary Switch to either position 2,3,4 or 5 depending on the network address as per page 7.

If you change a jumper after you have done this you must do this again as this stores the jumper settings in memory so if a jumper came off in a year or two it won't matter to the operation of the unit.

# Installation Steps

***Smart Switch Technologies Ltd recommends a Qualified Marine or Auto-Electrician installs this product.***

**Step 1:**

Install and connect the Master Display Head Unit (AL-8000).

**Step 2:**

Install and connect the Input Units (AL-100).

**Step 3:**

Set-up Rotary Switches.

**Step 4:**

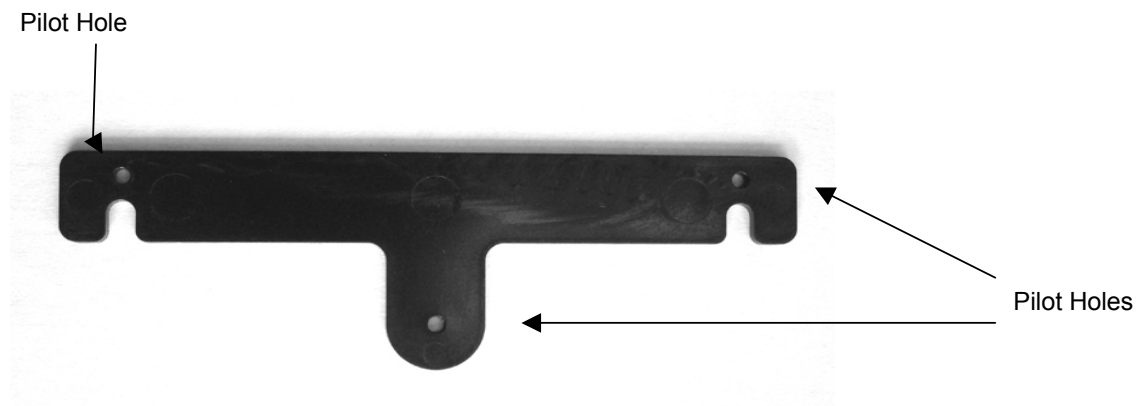
Program the Master Display Unit.

# Mounting the AL-8000 Master Display Unit

Position the mounting template tool provided and mark all three pilot holes. Drill a 3mm hole on the two outside holes and fit the mounting screws provided. Place the template tool back over the screws and tighten the screws until the template tool can just slip on and off the screws (ensure the tool is not too loose).

Drill the bottom hole to 12 mm (cable hole).

Place the Display Unit keyholes over the two screws and gently pull down. If the screws have been tightened to the correct depth the Display will clip down and self tighten.



For wiring details see page 3 (Wiring Block Diagram).



# Setting Rotary Switch (Network Address)

To enable the MDU to remotely monitor, each I/O (AL-100) unit must have a unique network address. This is accomplished by setting the Rotary Switch inside the I/O unit to either Switch Position 2, 3, 4 or 5.

Important: Each AL-100 on the network must have the Rotary Switch set to a unique number. No two devices may share the same Rotary Switch Number.

Each AL-100 installed must use the next Switch Number available. E.g. if three are installed then switch settings must be 2,3,4 (NOT 2,4,5).

For ease of reference please use the chart provided below, as this will enable quick reference when programming the Master Display Unit.

## NOTE: I/O Unit set to Switch Position 2: (Override groups)

This system provides for Four Override functions.

If the override feature is required (see program instructions Step 5 for details), then override signal One MUST be connected to I/O box Switch Position 2, Input 1.

If Two are required, then override signal Two MUST be connected to I/O box Switch Position 2, Input 2.

If Three are required, then override signal Three MUST be connected to I/O box Switch Position 2, Input 3.

If Four are required, then override signal Four MUST be connected to I/O box Switch Position 2, Input 4.

**AL-100 (IOU) Rotary Switch Position 2**

Switch Position 2 Input	Alarm Input
1	<i>Override 1 Signal (if used)</i>
2	<i>Override 2 Signal (if used)</i>
3	<i>Override 3 Signal (if used)</i>
4	<i>Override 4 Signal (if used)</i>
5	
6	
7	
8	

**AL-100 (IOU) Rotary Switch Position 3**

Switch Position 3 Input	Alarm Input
1	
2	
3	
4	
5	
6	
7	
8	

**AL-100 (IOU) Rotary Switch Position 4**

Switch Position 4 Input	Alarm Input
1	
2	
3	
4	
5	
6	
7	
8	

**AL-100 (IOU) Rotary Switch Position 5**

Switch Position 5 Input	Alarm Input
1	
2	
3	
4	
5	
6	
7	
8	

# Programming Instructions

## Explanation of Override Groups:

There are four override groups 1, 2, 3, and 4.

If this option is selected then any Input (alarm) that is joined to the override group will **ONLY** be active when that override Input is active (typically used for engine override).

**Example:** If Input 5, 6 & 7 are joined to the override one group and the override one signal is connected to the Port engine running signal then the system will only look at these inputs when the Port engine is running.

**Override groups are attached to I/O Rotary Switch 2 Inputs 1, 2, 3 and 4.**

## Explanation of Inputs with Timers:

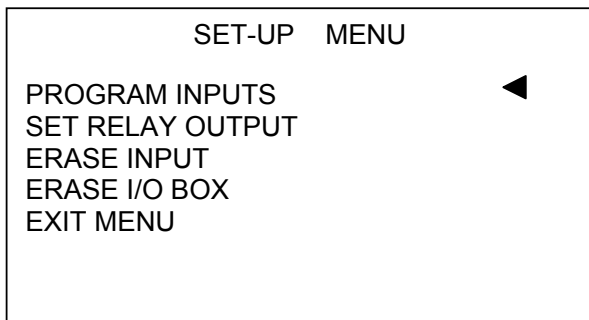
There are 8 timers available and may be programmed from 5 seconds to 10 minutes. Once an Input attached to a timer has been activated the programmed timer will start but the system will not look at the Input until the timer has expired. These timers are attached to Input 5, 6, 7, 8 with the I/O Box Switch Position set to 2, and/or Input 1, 2, 3, and 4 with the I/O Box Switch Position set to 3. Giving a total of 8 spread over 2 I/O Boxes. See Step 8.

## Step 1: Placing the unit in Program Mode

Press and hold down the Mute & Select Up keys together for 3 seconds. This will place the unit in program mode.

## Step 2: Selecting Program Function from Set-Up Menu

The display will now show:



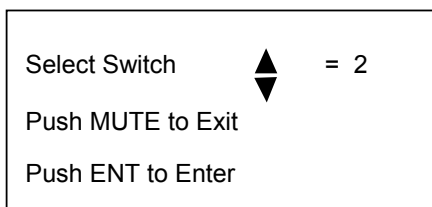
**NOTE:** On the SET-UP MENU, use the SELECT up/down arrows to move from PROGRAM INPUTS to SET RELAY OUTPUT to ERASE INPUT to ERASE I/O BOX to EXIT MENU. Use the ENT button to select the desired action.

See Step 3 for Program  
See Step 12 for Relay Output  
See Step 13 for Erase

Scroll to PROGRAM INPUTS and press the ENT key.

## Step 3: Program

The display will now show:

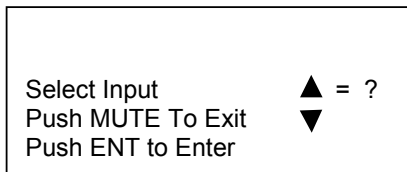


Use the Select Up or Down keys to change the Switch Number, which corresponds to the I/O unit being programmed (refer to page 7) for Switch Numbers.

Once the Switch Number has been selected press the ENT key to accept.

## Step 4: Select Input

The display will now show:



Use the Select Up or Down keys to change the Input number, which corresponds to the Input being programmed.

Once the Input Number has been selected press the ENT key to accept.

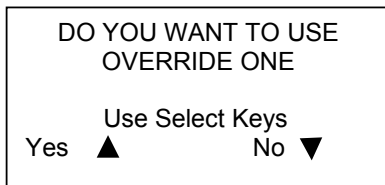
## Step 5: Override Feature

The overrides are only attached to **I/O Box Switch Position 2 Input 1, 2, 3, and 4**

Therefore if engine overrides are required then the engine running signal must be connected to these inputs.

The following will **ONLY** be displayed when **I/O Box switch position 2 Input 1, 2, 3, and 4** are being programmed.

The display will now show:



If No is selected the system will NOT ask about override 2, 3 or 4 and will proceed to Step 6.

If Yes is selected then the same question will be asked about override two when you are programming Input 2 and the same for Input three and Input four. This will take you to Step 5A

### One override only (Single engine vessel):

If this feature is required then the override one group must be on.

When programming I/O Box Switch Position 2 Input 1

Answer **YES** to " DO YOU WANT TO USE OVERRIDE ONE"

When programming I/O Box Switch Position 2 Input 2

Answer **NO** to " DO YOU WANT TO USE OVERRIDE TWO"

The engine running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 1**

### Two overrides (Twin-engine vessel):

If this feature is required for both Port and Starboard engines, then both override one and override two groups must be on.

When programming I/O Box Switch Position 2 Input 1

Answer **YES** to " DO YOU WANT TO USE OVERRIDE ONE"

When programming I/O Box Switch Position 2 Input 2

Answer **YES** to " DO YOU WANT TO USE OVERRIDE TWO"

When programming I/O Box Switch Position 2 Input 3

Answer **NO** to " DO YOU WANT TO USE OVERRIDE THREE"

When programming I/O Box Switch Position 2 Input 4

Answer **NO** to " DO YOU WANT TO USE OVERRIDE FOUR"

The Port engine running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 1.**

The Stb engine running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 2.**

### Three overrides (Two engine vessel & Aux):

When programming I/O Box Switch Position 2 Input 1  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE ONE”  
When programming I/O Box Switch Position 2 Input 2  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE TWO”  
When programming I/O Box Switch Position 2 Input 3  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE THREE”  
When programming I/O Box Switch Position 2 Input 4  
Answer **NO** to “ DO YOU WANT TO USE OVERRIDE FOUR”

The engine one running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 1.**  
The engine two running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 2.**  
The engine three running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 3.**

### Four overrides (Four engine vessel):

When programming I/O Box Switch Position 2 Input 1  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE ONE”  
When programming I/O Box Switch Position 2 Input 2  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE TWO”  
When programming I/O Box Switch Position 2 Input 3  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE THREE”  
When programming I/O Box Switch Position 2 Input 4  
Answer **YES** to “ DO YOU WANT TO USE OVERRIDE FOUR”

The engine one running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 1.**  
The engine two running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 2.**  
The engine three running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 3.**  
The engine four running signal **MUST** be connected to **I/O Unit Switch Position 2, Input 4.**

### Two overrides joined:

**Override one and two can be interconnected by selecting option 5 in Step 8.**

Both override one and two will need to be active before any input attached to them will be scanned by the system.

### Step 5A: Setting Delay Time:

The delay time is the time it takes (approx) to start the engine (and is programmable from 1 to 20 seconds). During this time, the Inputs are looked at by the system but NOT latched as genuine faults. If for example the delay time is set for 5 seconds and the engine is started, the oil pressure alarm will display and the buzzer will sound, if after 5 seconds the oil pressure is OK the buzzer will turn off and the display oil pressure fault will disappear. If however after 5 seconds (or any other time while the engine is running) the oil pressure is NOT OK the buzzer will keep sounding and the display will flash the text “Oil Pressure” or whatever text has been programmed.

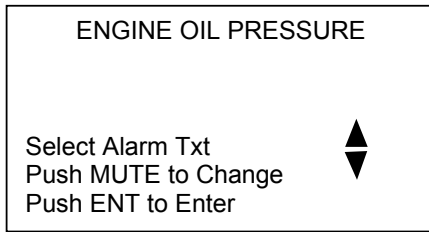
The display will now show:

Set Delay Time	
Override ?	
Seconds =	01 ▲
Push ENT to Enter	

Use the Select Up or Down keys to scroll through the delay times. Press the ENT key to accept, this will take you back to Step 4

## Step 6: Selecting / Creating Name's

The display will now show:



**NOTE:** There is a list of pre-programmed names in memory for you to choose from, if you want to change a name see step 6a below. Once a name has been changed or used **DO NOT** use the same name again when programming another Input choose another name from the list to either use or change.

**6a Change Text:** If you would like to create your own name press the Mute key. Use the Select up or down key to scroll through the alphabet and the Dim Up or Down keys to change to the next character.

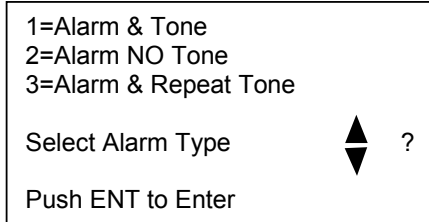
## Step 7: Setting Alarm Tones

**There are three alarm tones available:**

- 1/ Alarm & Tone - Gives an audible alarm tone on fault
- 2/ Alarm NO Tone - Does **NOT** give an audible alarm tone on fault
- 3/ Alarm & Repeat Tone - Gives an audible alarm tone on fault & after muting will return in 1 minute

Use the Select Up and Down keys to scroll through the alarm options.

The display will now show:

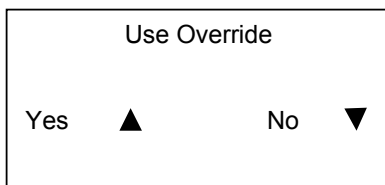


Press the ENT key once the desired alarm option is selected.

If Ignition Override has been set as per Step 5 this will take you to Step 8. If not and the Input has a timer attached, it will take you to Step 10, if no timer is attached it will take you to Step 11.

## Step 8: Use Override

The display will now show:



If Yes is selected and only ONE override group has been selected as per Step 5 (one override only) it will take you to Step 10 if the Input as a timer attached otherwise it will take you to Step 11.

If more than one override group has been selected it will take you to Step 9.

## Step 9: Which Override Group

The display will now show:

1=Group1	2=Group2
3=Group3	4=Group4
5=Group1	and Group2
Override group	1
Push ENT to Enter	

Press Select Up or Down key to scroll through the override groups.

Upon pressing the Ent key, the Input that you have just setup, now belongs to whichever group you selected and will only be active when the override Input is active. This will now take you to Step 7.

## Step 10: Timers

There are 8 timers available and may be programmed from 5 seconds to 10 minutes. These timers are attached to I/O Box Switch Position 2 Input 5, 6, 7, 8 and I/O Box Switch Position 3 Input 1, 2, 3, and 4. If one of these Inputs are being programmed the display will now show:

DO YOU WANT TO USE DELAY TIMER	
Yes	No

**Note:** This will only be asked if I/O Box Switch Position 2 Input 5, 6, 7, 8 or I/O Box Switch Position 3 Input 1, 2, 3, and 4 are being programmed.

If No is selected this will take you to Step11.

If Yes is selected the display will now show:

DO YOU WANT TO USE DELAY TIMER	
Seconds = 00	
Minutes =	
Push ENT to Enter	

Use the Select Up and Down keys to scroll through the times.

If zero seconds are required - press the ENT key, this will take you to the minute's field.

If zero minutes are required - press the ENT key, this will take you to Step 6.

## Step 11: Next or End

The display will now show:

Next	End
------	-----

Press the Select Up key to set-up the next Input or Select Down key which will take you to Step 12

## Step 12: Relay Output

The display will now show:

DO YOU WANT TO  
ACTIVATE THE RELAY  
ON ALL ALARMS

Use Select Keys

Yes   ▲                  No   ▼

If No is selected the Relay located in the I/O Box will follow the audible alarm on the MDU. E.g. If the alarm is sounding the Relay will be ON, if the alarm is muted the Relay will turn OFF. If "Alarm NO Tone" is selected in Step 6 the Relay will not activate upon a fault. This feature could be used for an external light or alarm.

If Yes is selected the Relay located in the I/O Box will come ON when ANY Input has been activated and OFF when no inputs are activated.

**You will now be returned to the Set-Up Menu**

### Erase Input:

Selecting Erase Input from the Set-Up Menu will allow you to select the Input you want to erase. Follow on screen directions.

### Erase I/O Box:

Selecting Erase I/O Box from the Set-Up Menu will erase all settings associated with the AL-100 (IOU). **If a mistake is made on any input a complete erase is not required just reprogram the input.**

The display will now show:

Select Switch   ▲▼   = ?

Push MUTE to Exit

Push ENT to Enter

Use the Select Up or Down keys to change the Switch Number, which corresponds to the I/O unit being erased (refer to page 7) for Switch Numbers.

Once the Switch Number has been selected press the ENT key to accept.

The display will now show:

ARE YOU SURE

Use Select Keys

Yes   ▲                  No   ▼

If Yes is selected the complete I/O Box settings will be erased and you will be returned to the Set-Up Menu. If No is selected the system will return you to the Set-Up Menu.

# Operating Instructions

## Keyboard:

**Select Up or Down** – used in program mode.

**Mute** - mutes the alarm.

**ENT** – used in program mode.

**Dim Up and Down** - adjusts the display contrast.

**Page Up or Down** – used for scrolling up or down a page if more than 8 alarms exist at once.

## Alarms:

Should an alarm trigger the alarm text will flash on the display. The audible alarm will sound if either option 1 or 3 was set for the Input (see Setting Alarm Tones page 11).

Pressing the Mute key will mute all alarms. If the fault condition is still present the alarm text will stop flashing and stay on, should another fault occur the alarm would start again. If the fault condition has gone the fault text will disappear from the screen.

## Normal Operation Screen:

```
SYSTEM ACTIVE
SCANNING ALL ALARMS
*****
```

## Interrogating the System:

Press and hold the ENT key for 3 seconds (you will hear a bleep every second) the system will now display each Input, the text and any association.

### Example:

---

Checking Input 1  
Programmed as  
Override One  
Alarm not programmed

INPUT CHECKED OK

---

Checking Input 2  
OIL PRESSURE  
Override One  
Alarm with Tone

INPUT CHECKED OK

---



# Error Messages

## Errors:

Should the Master Display Unit lose communication with the first I/O Box (AL-100) at rotary switch position 2 the following error message will be displayed will display  
"Cable / Fault I/O SW 2 "

If a second I/O Box is fitted:

Should the Master Display Unit lose communication with the second I/O Box (AL-100) at rotary switch position 3 the following error message will be displayed will display  
"Cable / Fault I/O SW 3 "

If a third I/O Box is fitted:

Should the Master Display Unit lose communication with the third I/O Box (AL-100) at rotary switch position 4 the following error message will be displayed will display  
"Cable / Fault I/O SW 4 "

If a forth I/O Box is fitted:

Should the Master Display Unit lose communication with the forth I/O Box (AL-100) at rotary switch position 5 the following error message will be displayed will display  
"Cable / Fault I/O SW 5 "

Should the Master Display Unit lose communication with all I/O Box (NV-100) the following error message will be displayed will display "-----NETWORK FAULT-----".  
"-----CHECK CABLE-----".

## Fix:

Check the I/O Box is wired correctly (power and comms) and that the rotary switch (see page 9) is in the correct position.

Check the network cable for open or short circuit, also check network polarity.

## Electrical Specifications AL-8000

Supply Voltage	12 to 32 Volts DC (Auto-Sensing)
Quiescent Current	0.028 Amps (backlight off)
Data Retention	50 years (without power)

## Electrical Specifications RA-800

Supply Voltage	12 to 32 Volts DC (Auto-Sensing)
Quiescent Current	0.03 Amps
Data Retention	50 years (without power)

## Electrical Specifications AL-100

Supply Voltage	12 to 32 Volts DC (Auto-Sensing)
Quiescent Current	0.024 Amps
Input Voltage (max)	30 vdc
High Relay Load	3 amps Inductive
Data Retention	50 years (without power)

## Network Cable

The cable connecting the Master Display Unit to the Input/Output Units is referred to as the network cable and may run up to 1000 meters in total length.

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