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CableTest Application Note

Horizon - Marine Application



In-process and final testing of electrical wiring harnesses for recreational boat manufacturers...

Introduction:

CableTest Systems Inc. has addressed the marine industry's testing requirements with its unique Horizon cable and harness tester configuration that allows recreational boat manufacturers to do in-process and final testing of electrical wiring harnesses as part of their manufacturing process.

CableTest's Horizon marine analyzer will expand testing beyond the simple continuity testing that, until now, has been standard in the recreational boating industry. Using a 19-foot runabout with I/O as a model, the Horizon performs functional tests on the boat and the helm assembly, and runs a final test with 100% interconnect verification of the wiring in less than three minutes. This verifies the correct placement and wiring of all the gauges, radios, pumps, bilges, engine sensors, and navigational lights.

Utilizing an interactive test procedure that runs through the complete vessel test, the operator is prompted both visually and audibly using a remote hand-held control module to respond to a series of pre-programmed commands. This testing concept verifies that each boat component is tested and ensures that no failed product or component will be allowed to proceed until corrected. The Horizon Marine Analyzer will not allow any defective product to be accepted.

Functional Testing:

In this configuration, Horizon extends its testing capabilities into the functional testing area by means of an Application Interface Box (AIB) and a number of Personality Test Modules (PTM).

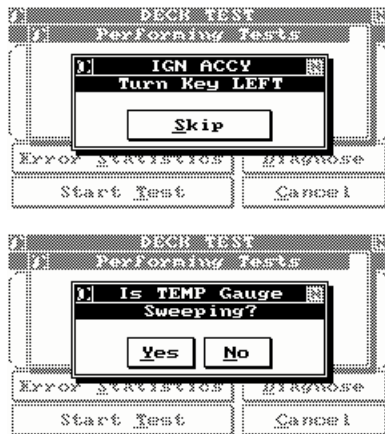
Each different type of helm unit may require its own PTM but will use the same AIB.

For some types of gauges, the Horizon will apply appropriate stimuli to move the gauge through predetermined positions (typically its minimum, middle and maximum positions). For other types of gauges, the Horizon will apply a calibrated stimulus and the gauge has to indicate a specific reading.

This way, the system not only verifies that the wiring is correct but also that the appropriate type of gauge was used and/or the gauge was configured correctly.

The interactive test procedure guides the user through all the necessary steps. The prompts are displayed and user input can be taken both using the Horizon screen and the hand-held probe. The hand-held probe is especially useful for performing the final test when the operator may need to climb in the boat to perform the hookup and run the test.

Some of the messages displayed during testing are shown below:



The system will automatically detect the closure and opening of switches, however, in cases where the device is malfunctioning or is miswired, the operator can skip the test, avoiding thus a deadlock.

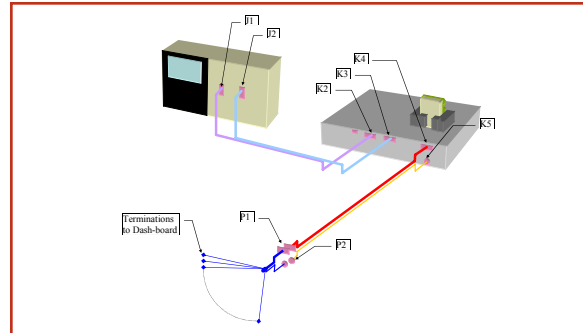


Figure 1 - Horizon 1500/Application Interface Box Wiring Diagram

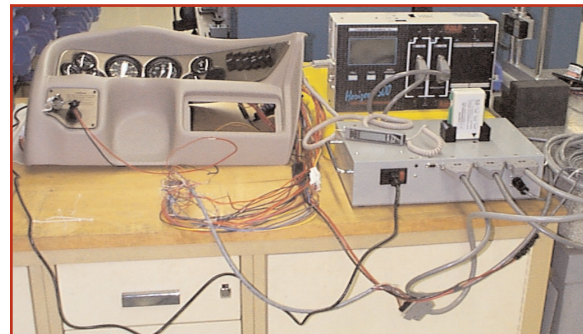


Figure 2 - Test setup including dashboard, application interface box with personality module, Horizon-1500 and smart probe.



Figure 3 - Connecting the umbilical cables to the Application Interface Box



Figure 4 - Attaching the adapter cable's cigarette plug to the dashboard's 12V receptacle.

Programming Tips:

Due to the complex nature of their scope, the marine application test programs require the embedded TCL scripting capability. The TCL language allows complex custom test sequences to be built using the Horizon's test capabilities.

Functional testing cannot rely on the Horizon's self-learn feature and while each different type of helm unit requires custom programming, CableTest offers both turn key solutions with test programs developed by CableTest) and template programs that can be modified by the customers themselves.

The sample test programs include comments to help the customer modify them. The test program excerpt shown below illustrates a typical analog gauge test.

```
#####  
# The following procedure tests the  
# engine temperature gauge.  
# It does that by simulating three  
# temperature levels: LOW, MED and  
# HIGH. The operator is prompted at  
# each step to confirm the gauge's  
# readings.
```

```
#####  
proc TemperatureGaugeTest {} {  
  # Common for the relays used in  
  # this test  
  global ANA_COMM_1  
  
  # Relay for LOW (100F/50C)  
  global TEMP_LOW  
  
  # Relay for MED (175F/80C)  
  global TEMP_MID  
  
  # Relay for HIGH (250F/110C)  
  global TEMP_HIGH  
  
  # Text for interactive prompts  
  set line1      "Is TEMP Gauge"  
  set line2sweep "Sweeping?"  
  set line3a     "Press A for Yes"  
  set line4b     "Press B for No "  
  
  # Displays text on probe  
  ProbeDisplay $line1 \  
               $line2sweep \  
               $line3a \  
               $line4b
```

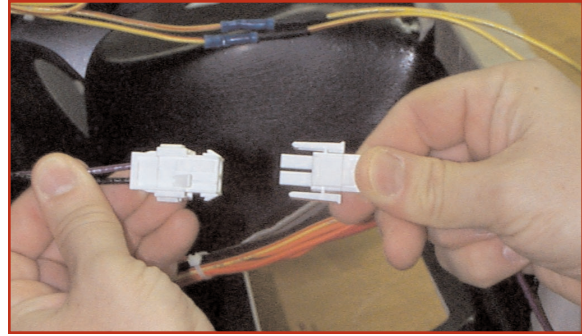


Figure 5 - Interconnecting the adapter cable's 2-pin plug to the dashboard.

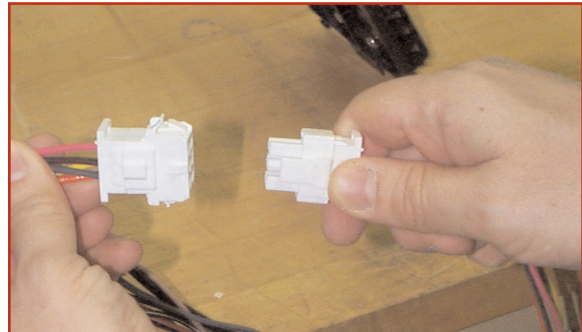


Figure 6 - Interconnecting the adapter cable's 6-pin plug to the dashboard.

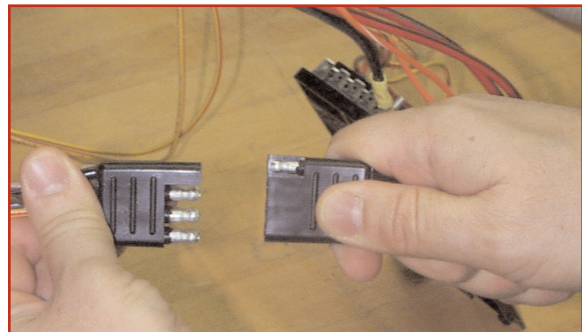


Figure 7 - Interconnecting the adapter cable's 8-pin plug to the dashboard.

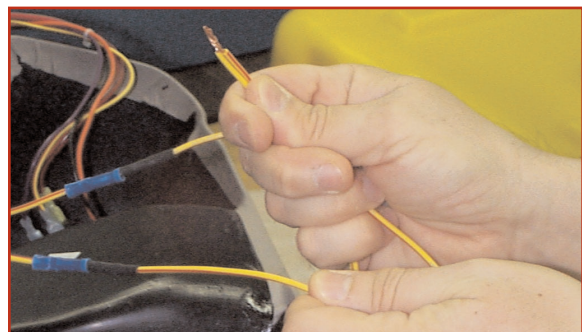


Figure 8 - Attaching test shorting jumper to safety wire splices

```

# Displays text on main screen
# and runs test in background
if { [promptYesNo \
    $line1 \
    $line2sweep \
    "InitAnalogGauge" \
    "SweepAnalogGauge" \
    $TEMP_LOW \
    $TEMP_MID \
    $TEMP_HIGH" \
    "ClearAnalogGauge"] } {

# Briefly turns on green LED
# on hand-held probe and beeps
# a pass condition
ProbePass

# This test's result is appended
# to the test report
return " TEMP gauge: PASSED\n"
} else {
# Briefly turns on red LED
# on hand-held probe and beeps
# a fail condition
ProbeFail

# This test's result is appended
# to the test report
error "*TEMP gauge: FAILED\n"
}
}

```

Power Requirements:

The test system can be powered with dock-side power at 110-Volts or, optionally, via boat battery power at 12-Volts. A 30-amp, 12-Volt power supply is included to exercise all the vessels components. A Pass or Fail message is indicated for each step of the test process.

About CableTest Systems Inc.

CableTest Systems Inc. provides total cable testing solutions to a wide array of industries including aerospace, computers, medical, telecommunications, transportation and the military. Customers rely on CableTest's high voltage interconnect equipment to test their cables, wiring harnesses, power cords, and backplanes with speed, accuracy and reliability. You can learn more about CableTest Systems Inc. at www.CableTest.com.

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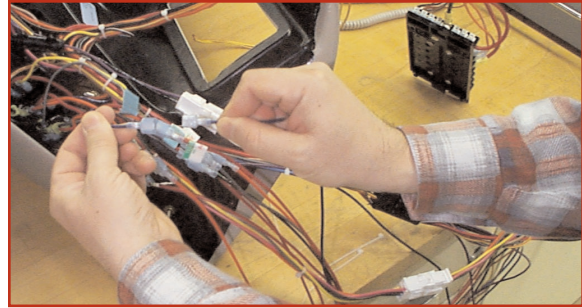


Figure 9 - Attaching the adapter cable's various spade lugs to dashboard

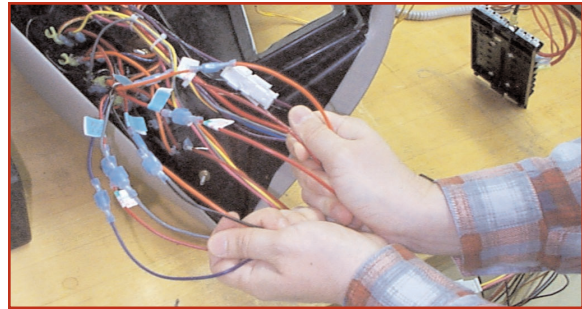


Figure 10 - All of the dashboard's spade lugs are connected to the adapter cable.

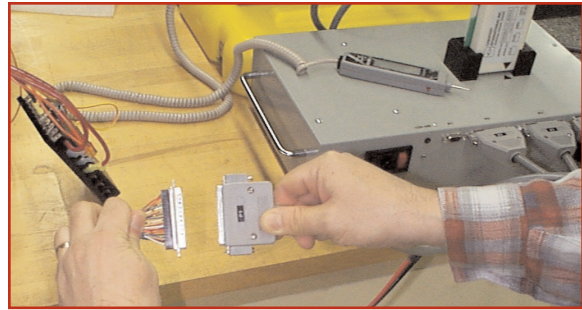


Figure 11 - Interconnecting the adapter cable to the 50-pin P1 DB50 connector.

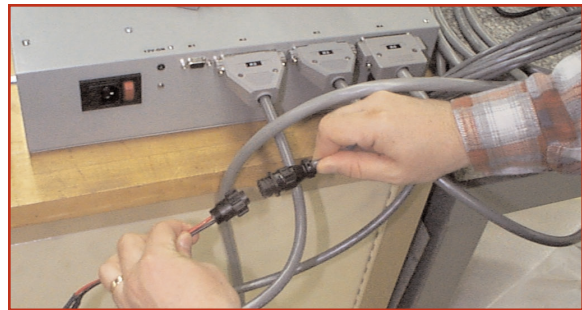


Figure 12 - Interconnecting the adapter cable to the 4-pin P2 circular connector.

