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***Service Report***

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| **CUSTOMER:**  **UNOLS** | **VESSEL/FACTORY/SITE:**  **Atlantis** | **DATE:**  3/3/2016 - 3/7/2016 |
| **LOCATION:**  Barbados | **ENGINEER/Technician**  Gregg Juergens | **SERIAL/FILE No:**  n/a |
| **WORKORDER / PO:**  **WO#00542S** | **ACCOUNT/PROJECT No:**  n/a | **CONTRACT No:**  n/a |

***EQUIPMENT DELIVERED/INSTALLED/REPLACED.***

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| **QTY** | **Part Desc.** | **Part No.** | **Serial No.** | **Comments.** |
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1. ***Main Purpose of Visit –***
   * To service EM122
     + Customer reports HV PSU (170V) will not power up
2. ***Overview –***
   * 3/3-2016 – 3/4/2016
     + Travel Day(s) Seattle, WA. to Barbados
   * 3/4/2016
     + Arrived to vessel
     + Discussed issues with EM122 with Catie Graver (SSSG), following is schedule of issues experienced -
       - Dec 2015 original HV PSU (SN# 0844001012) reported erratic readings
       - Dec 2015, replaced original HV PSU with “NEW” ships spare HV PSU (SN# 1008001011)
         * This HV PSU worked once (maybe twice) then ship went into ship yard
         * During yard period 3ea TX36’s, 12, 23, & 24 were pulled and sent in for repair (SN#’s {12}211131, {23}211543, & {24}212173)

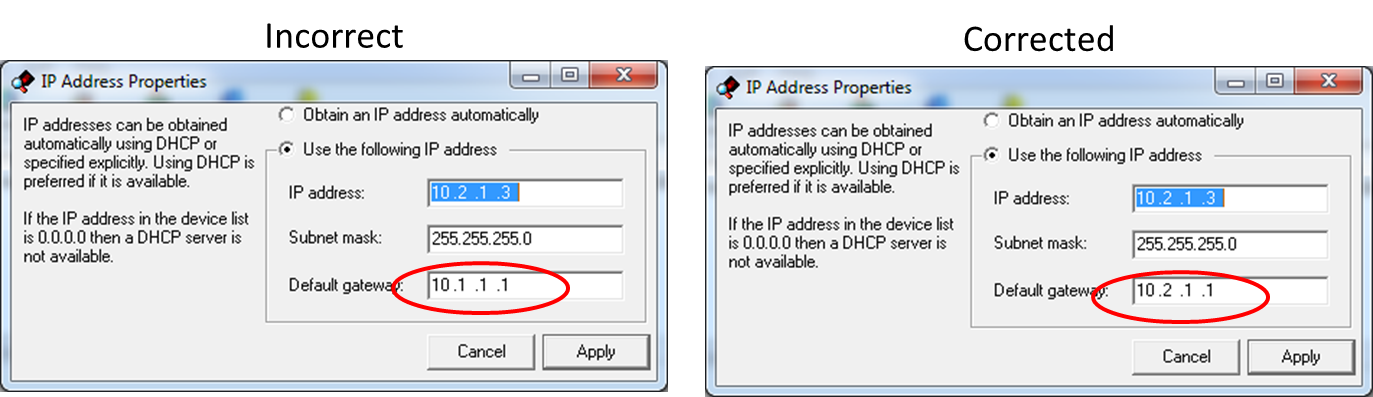
Repair of the cards were done at UNOLS facility, not by Kongsberg. Repair performed was that F2 on all three were replaced. This fuse is for Bridge 1 High voltage

* + - * January 2016, vessel departed shipyard, HV PSU would not pass BIST, IE: not boot up
      * January 2016, vessel replaced this HV PSU with a “refurbed” HV PSU (SN# 1438001007). HV PSU still would not boot up
      * February 2016, UPS was replaced with an APC’s current model
        + APC Smart-UPS SUART 6000 XLIM
    - Inspected installation, all appears OK
    - Performed BIST on system < Initial\_Pre\_Chk\_4-4-2016.txt>, confirmed system failed BIST #1, 3, 4 & 7
    - Performed following checks on system-
      * Confirmed input voltage, stable 230VAC on both AC inputs to Transceiver
      * Removed HV Capacitor modules, 5ea. Inspected back plane, visually appears OK
        + Noted ‘lower’ support rail for card #4 not installed correctly, moved so rail is used by card now for support.
      * Removed HV PSU module (SN#1438001007), visually appears OK
      * Removed HV RIO card, verify Fuses, F1-4, all OK
      * Inspected back side of HV Subrack backplane, visually appears OK
      * Disconnected Conductors from T1, T2, T3 & T4 on HV Subrack back plane PCB for removal of unit
        + Discovered during this process that T1, 2 & 3 were not securely soldered to backplane PCB. Re-soldered connections to PCB, now secured.

Backplane PCB SN# 669290

* + - * + With HV PSU Subrack assembly removed from Transceiver re-installed HV PSU, HV RIO and 2 AC inputs. Connected to laptop and using <Locator.exe> utility verified IP address settings

HV PSU SN# 1008001011, found that default gateway incorrect, corrected to default value (10.2.1.1) provided in doc# 310232 – EM122 Test Procedure



* + - * + Performed HV PSU test outlined under doc#310232 using utility <ILP1000\_Test.exe>

All tests PASS

* + - * + After performing tests removed HV PSU (SN# 1438001007) and installed HV PSU (SN# 1008001011), performed same test as above, all tests PASS.



* + - * + Based on results of above testing HV Subrack and HV PSU(s) are OK
      * Installed subrack assembly back into Transceiver
      * Populated subrack with all cards, HV PSU (SN#1008001011), HV RIO, HV Capacitors
        + Powered up system locally with on/off switch, noted HV PSU not coming on, suspect something on the TX36 subrack assembly pulling system down
        + Removed all TX36’s and 12V power supply
        + Powered system back up locally again, HV PSU now comes on line, powered down
        + Installed 12V PSU, 1-6 TX36’s, power system up HV PSU comes on line, powered down system
        + Installed 7-12 TX36’s, powered up system, HV PSU does did not come on line, powered down

During the installation of 7-12TX36’s noted card #12 appears to have been repaired (F2 replaced) by a Hugh Popenoe

Pulled card TX36 #12 and left TX36’s 1-11 installed, powered up system, HV PSU now comes on line, powered down system

Installed vessels spare TX36 in slot 12, powered up system, HV PSU comes on line

* + - * + Installed TX36’s 13-22, powered up system, HV PSU comes on line
        + TX36’s 23 & 24 looks to have been repaired as noted above for card 12. Installed card 23 and powered up system, HV PSU did not come on line. Powered down system. Removed card 23 and installed card 24 into card 23’s slot, powered up system, HV PSU still would not come on line.
        + Due to repairs attempted removed F2 on card 23 & 24, re-installed into transceiver, powered up system. HV PSU now comes on line.
        + Powered down system
      * Using remote on/off switch powered up transceiver, once booted start SIS and perform BIST, as expected BIST 1, 3, & 7 fail due to F2 being removed which opens the “HV Bridge 1” supply on card 23 & 24. BIST #7 now passes which is the HV PSU
      * Set system to ping and all operations appear normal. Powered down system for evening
    - Depart vessel approximately 1:00am
  + 3/5/2016
    - Arrive to vessel approx 9:00am
    - Informed Catie of findings the previous night
    - Powered up system
    - Performed BIST < Post\_Card23,24\_Removed\_Fuse.txt > and as expected same results as last night, all tests pass with the exception of # 1, 3 & 7. This is due to F2 being removed from cards 23 & 24.
    - Set system to ping for a short spell pier side. All OK
    - Stop pinging and perform another BIST to confirm all op’s <Post\_Card23,24\_Removed\_Fuse\_aftr\_operation\_at\_Pier.txt > Same results
    - Let system stay powered up but not pinging.
    - Informed Catie that they will need to obtain replacement TX36 cards for slots 23 & 24. They are OK to run system in the interim with that configuration as is, but am strongly suggesting they get replacement cards ordered and installed

1. ***Summary –***
   * Appears repair attempt on cards 12, 23, & 24(SN#’s {12}211131, {23}211543, & {24}212173) caused the HV PSU to not boot properly, loading system down.
     + Once Card 12 replaced and F2 removed from card 23 & 24 system now powers up OK
   * T1. T2 and T3 are re-soldered to HV Subrack assembly
   * EM122 system is not technically fully operational but will proved degraded data until cards 23 & 24 are replaced.
   * Vessel to get on order at minimum 2ea TX36’s to replace cards in slots 23 & 24. Once done system should be fully operational
2. ***Concerns/Remarks –***
   * TX36’s that have had a fuse blow may have deeper issues than just a fuse needing replacement. Suggest any card blowing fuses be replaced and suspect card to be sent in for repair / evaluation
3. ***Signatures.***

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| *DATE:*  *3/5/2016* | *KM Representitive signature:*  *Printed: Gregg Juergens* | *Work Accepted on behalf of Customer signature:*  *Printed: Catie Graver* |

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| Customer  UNOLS | | | | Vessel/Factory/Site  Atlantis / Barbados | | | | Serlal no.  n/a | | |
| Employee no.  JUER001 | | | | Service Engineer  Gregg Juergens | | | | Page 5 of 5 | | |
| Location  Barbados | | | | Account no./Job no.  WO#00542S | | | | Week no. | | |
| Day/ date | Off- shore | Description | | | | | Time from/to | | Norm time | Time |
| diff. |
| 3/3/2016 3/4/2016 |  | Travel day | | | | |  | | 8 |  |
| Travel day | | | | |  | | 8 |  |
|  | | | | |  | |  |  |
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| 3/4/2016 |  | Work on vessel trouble shooting EM122 system | | | | |  | | 7.5 |  |
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| 3/5/2016 |  | Work on vessel, finish with testing of EM122 | | | | |  | | 5 |  |
| Finish paper work / trip report | | | | |  | |  |  |
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| 3/6/2016 |  | Travel day | | | | |  | | 8 |  |
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|  |  | **\*\*HOURS NOTED ABOVE MAY NOT REFLECT**  **ADDITIONAL ADMINISTRATION TIME THAT WILL BE ADDED ONCE BACK TO OFFICE** | | | | |  | |  |  |
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| Date  3/5/2016 | | Kongsberg representative signature | | | Work accepted on behalf of customer | | Working lime | | 12.5 |  |
| Printed | | Waiting time | |  |  |
| Signature | | Traveling time | | 24 |  |
| Service provided by: Kongsberg Underwater Technology,lnc. | | | | | | Kongsberg Underwater Technology, lnc. 19210 33rd Avenue West, Suite A Lynnwood, WA 98036-4707 425-712-1107 (tel) 425-712-1197 (fax) | | | | |
| Service **XXXX** ~~Repair & retum Guarantee~~ | | | On board **XXXX** ~~Yes\_\_\_\_\_\_\_ Yes\_\_\_\_\_\_\_~~ | ~~In shop\_\_\_\_ No\_\_\_\_\_\_\_ No\_\_\_\_\_\_\_~~ | |