


<b>CLASS TS</b>	<b>DWG NO. 370633</b>
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REVISIONS				
REV	DESCRIPTION	CHECK	ENG	DATE
02	INITIAL BOSE VERSION			28/5/14
03	ADD LOGICAL TEST FAILED DIALOG		N,M	25/09/14
04	ADD BLANK SETTING UPLOAD		N,M	16/10/14
05	ADD BLANK CHECK FUNCTION		N,M	01/12/14


BOSE APPLICABLE DOCUMENTS:



DOC LVL	DRAFTER NOTIO MAEDA @ AUBIT	DATE 28/05/14	 FRAMINGHAM, MA 01701-9168				
3	CHECKER		DESCRIPTION  TEST SPEC, CONTROLSPACE ESP-00 II (Zamboni project) (720110-001S)Motherboard (720112-001S)DSP-HIGH-PERFORMANCE (720111-001S)DSP-STANDARD				
2	ENGINEER						
	SAFETY ENGINEER						
1	RLS TO PROD		SIZE A	FSCM 32108	CLASS TS	DWG NO. 370633	REV. 05
						SHT 1 OF 23	

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# 1. Overview

## 1.1. Purpose

This document describes the manufacturing test procedure for the ControlSpace ESP-00II (Zamboni project). This document can be applied to the Flash-ROM that burned by ROM programmer.

This document can be applied to these product or assembled PCB.

(370633-0020)ESP-00II

(720110-001S)Motherboard

(720112-001S)DSP-HIGH-PERFORMANCE

(720111-001S)DSP-STANDARD

Rev\_21b function:

The (720110-001S)Motherboard has +48V phantom power supply function, but the old MB-RevB does not have. In this testing, this difference of MB will be checked and recorded.

If the MB-RevB would be used, the +48V testing will be omitted and it will be warned by Excel macro.

## 1.2. Scope

### 1.2.1. Identification

This release is identified by the following configuration items:

- ControlSpace Designer 4.20\_015
- ESP Firmware espII\_v4.200.frm
- ATS-2 Test Macro Rev. 201b
- (720110-001S)(BSE99A1)Motherboard
- (720112-001S)(BSE98A1)DSP-HIGH-PERFORMANCE
- (720111-001S)(BSE97A1)DSP-STANDARD
- (638300-0010)(BSE52A1)GPIO II
- (638298-0010)(BSE50A1)MIC+LINE INPUT II
- (638299-0010)(BSE51A1)LINE OUTPUT II

### 1.2.2. System Overview

This test procedure is used for production testing of ControlSpace ESP-00II (Zamboni project : including DSP-high-performance card). This test should be performed on all ESP-00II and each ESP-00II shall "PASS" prior to shipping.

This test utilizes 8 cards of loopback cards that was retrofitted from 4x4 card.

This test utilizes a MIC+LINE INPUT II and LINE OUTPUT II card in the test – This card is for the reference.

The switcher system is Accutrex measurement switcher ( USB ).

### 1.3. Definitions and Abbreviations

#### 1.3.1. Definitions

Term	Definition
ESP-00 II	ESP-00II frame with : (720110-001S)(BSE99A1)Motherboard (720111-001S)(BSE97A1)DSP-STANDARD (720112-001S)(BSE98A1)DSP-HIGH-PERFORMANCE (638300-0010)(BSE52A1)GPIO II ASTEC Power supply
Switcher	Accutrex measurement switcher : MS-101 / MS-111
ESP for fixture	The ESP that is used for data converter / Voltmeter.

#### 1.3.2. Acronyms

Term	Definition
ESP	ControlSpace Engineered Sound Processor
CSD	ControlSpace Designer software
MB	ESP Motherboard
DSP-STD card	Main card with digital processing
DSP-HP card	DSP processing card with 3 DSP device
GPIO	8 control inputs and 8 control outputs.
CC-16	Zone Controller with RS485 interface
DUT	Device Under Test

### 1.4. Change History

Revision	Date	Section	Description	Changed By
02	20/05/14	All	Initial Bose version following Pilot	Notio Maeda @ AuBit
03	25/09/14	7.7	Add Logical test failed dialog	Notio Maeda @ AuBit
04	16/10/14	8.7	Add Blank setting upload	Notio Maeda @ AuBit
05	01/12/14	8.7/10.13	Add Blank check function Update ATS macro and Excel to Rev21b Rev21b can use ESP880/ESP124/ESP412/ESP160 INPUT-II/OUTPUT-II/GPIO-II/PMAES. Correct Test Setup Wiring Diagram.	Notio Maeda @ AuBit

# 2. References

## 2.1. Industry Standards

Ref #	Title	By	Rev	URL

## 2.2. Bose Corporation Documents

Ref	Title	By	Rev	URL

## 2.3. Project Documents

Ref	Title	By	Rev	URL
	Product specification			

## 3. Introduction

This ESP-00II is basic frame of Control Space system.  
ESP-00II has DSP-HP (expansion) card.  
The DSP-STD (main) card is the master controller of ESP system.  
This frame has one GPIO-II card.  
This frame have no audio IO card.

### 3.1. Pre-test Programming

The following devices must be programmed prior to testing:

#### 3.1.1. DSP-II card

This should be programmed with the latest ESP firmware before PCB assembling.  
Once the firmware is programmed in the flash ROM, following update can be done with CSD software.

#### 3.1.2. GPIO-II

This should be programmed with the latest GPIO-II firmware.  
GPIO-II can be wrote the firmware by using IOpgm.exe through Ethernet.

### 3.2. Restrictions

The MB-II , DSP-STD , DSP-HP and GPIO-II shall be applied to this Zamboni –ESP-00II.  
If the MB-RevB would be used, the +48V testing will be omitted and it will be warned by Excel macro.

### 3.3. Structure of the test

This test is consisted by following tests.

- a) Frame check..
- b) MAC address writing.
- c) Frame function test.
- d) Audio performance test.

## 4. Frame check

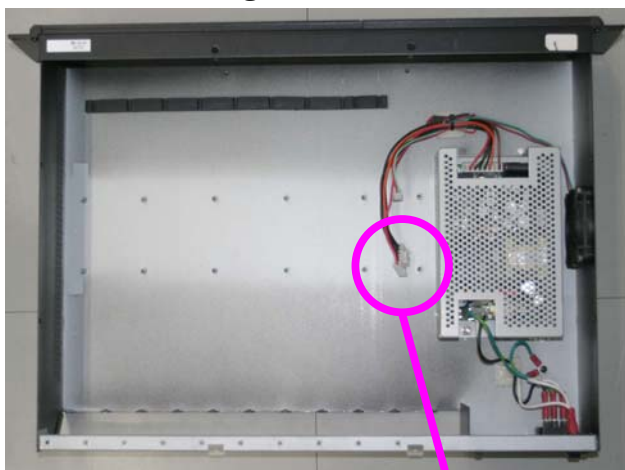
### 4.1. Equipment for the frame check

Equipment	Manuf.	Notes
Volt meter	Any	To check the voltage of the power supply.

### 4.2. Needed ESP-00II(Zamboni) part

Part	Manuf.	Notes
All mechanical part	Any	These mechanical part is for the shipment.
ASTEC power supply	ASTEC	This power supply is for the shipment
Power Cable		

### 4.3. Harness Voltage Check



For check the proper voltage is connected to the connector, measure the voltage on the conector.

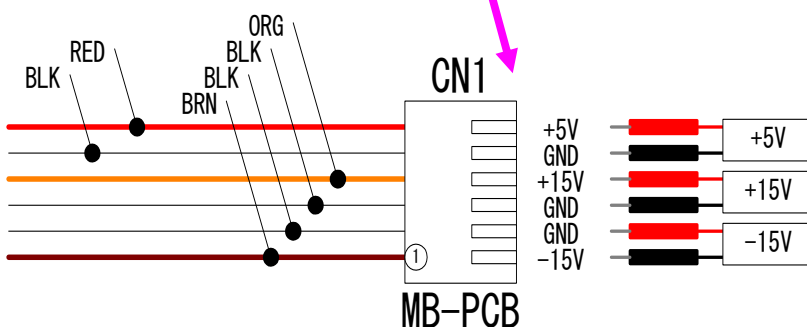
When the power switch is on,

Red-BLK = +5V

ORG-BLK = +15V

BRN-BLK = -15V

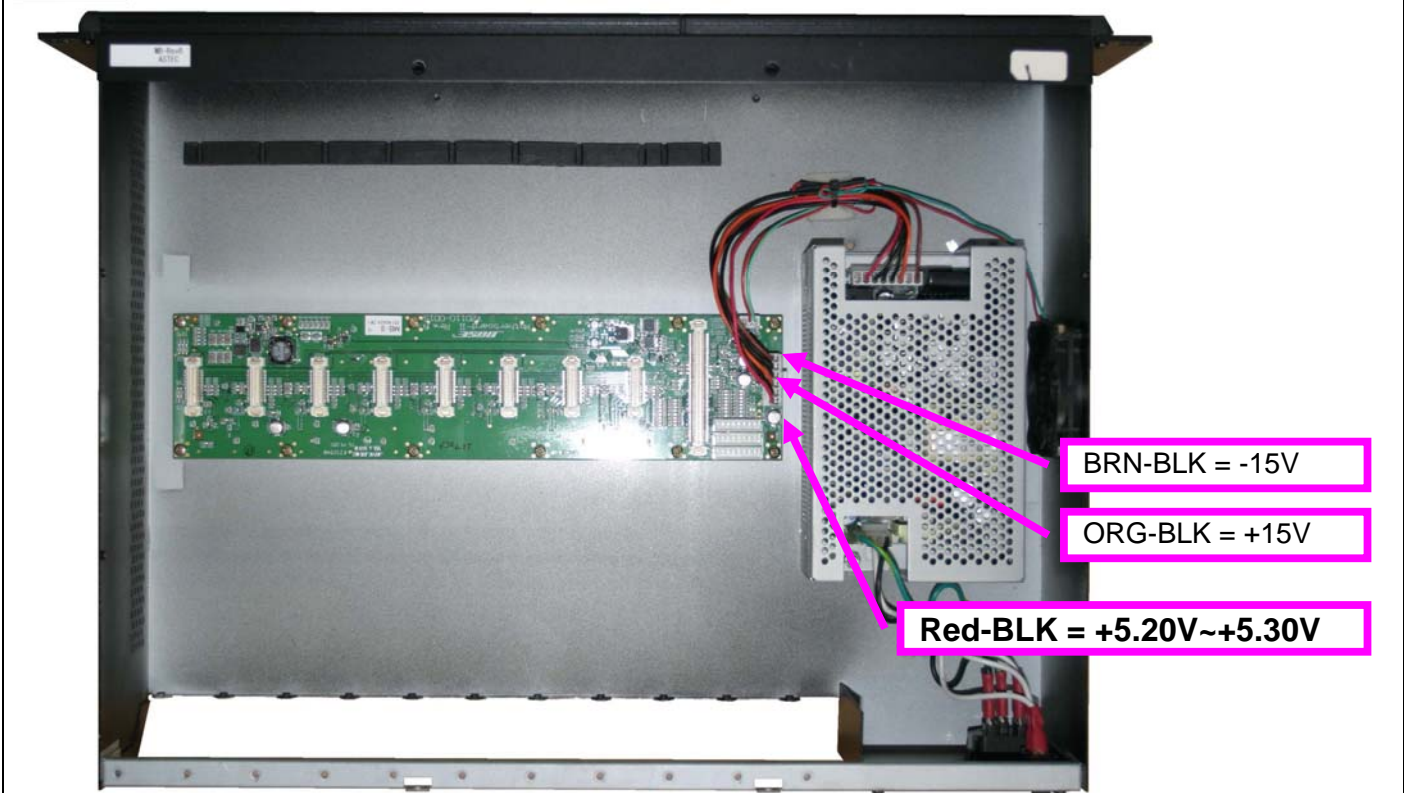
After this check , the power switch shall be turned off.





4.4. Assemble MB-II and Connected voltage

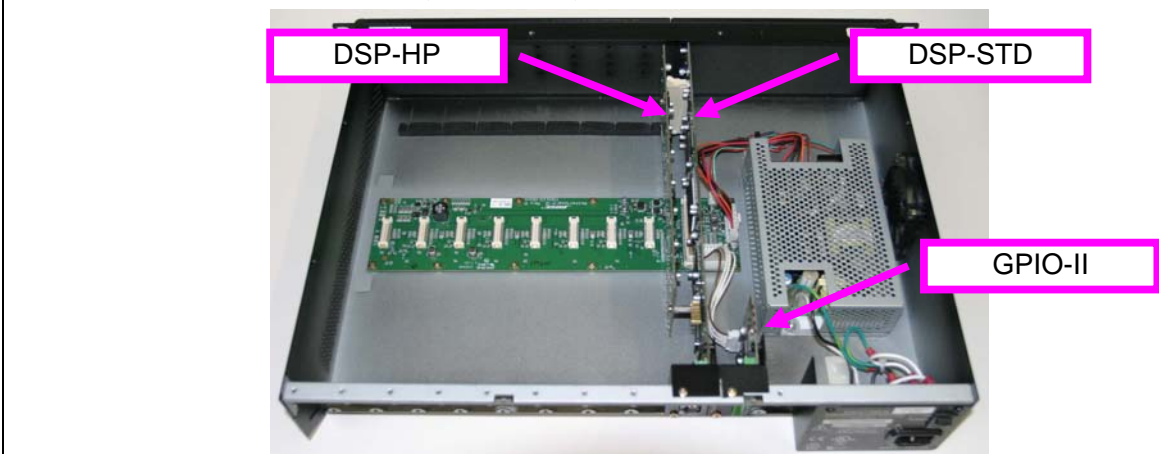
Assemble the MB-II into the chassis, connect the power connector and FAN connector. After power on, the voltage on the connector shall be as below voltage.



4.5. Voltage adjustment

The RED-BLK voltage is required +5.20V~+5.30V. If the voltage is not within this range, voltage adjustment is needed.

4.6. Assemble DSP-STD,DSP-HP,GPIO-II.



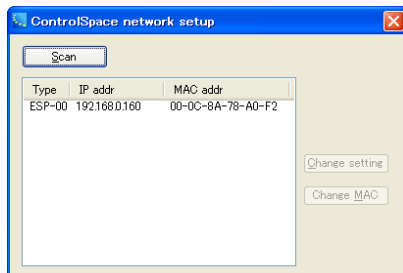
<b>BOSE</b> Framingham, MA 01701-9168	SIZE <b>A</b>	FSCM <b>32108</b>	CLASS <b>TS</b>	DWG NO. <b>TS370633</b>	SHEET <b>9 of 32</b>	REV. <b>05</b>
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## 5. MAC address writing

### 5.1. Software requirements

Software	Manuf.	Notes
NetworkSetupV4.exe	Bose(AuBit)	2014/05/31 V4.0 can write MAC address to ESP-00II

### 5.2. Procedure of MAC address writing



The MAC address shall be written in this process. (Before Frame function test)

Run the "NetworkSetupV4.exe".  
Push [ Scan ] button to search the ESP-00II.  
In ordinary, the IP address is 192.168.1.160.

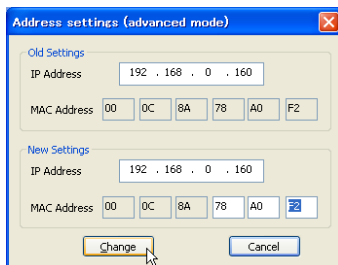
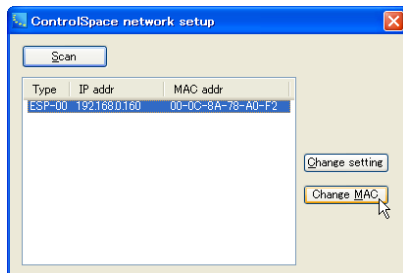
Choose the ESP-00II to write MAC address.  
To avoid mistake single ESP-00II shall be connected to the network.

Push [ Change MAC ] button to change MAC address.

Fill the new MAC address to the [New Setting]-[MAC address] field.

Confirm the IP Address as 192.168.0.160.

Push [ Change ] button to change MAC Address.



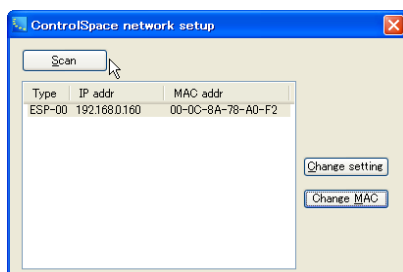
The dialog will come up. Push [ OK ] button to change MAC address.

After 5 second or later, push [ Scan ] button to find ESP00II that has the new MAC address.

By this process, the MAC address had been written.



Note: The "Network Setup V4.exe" does not need the shortcut for command line option.



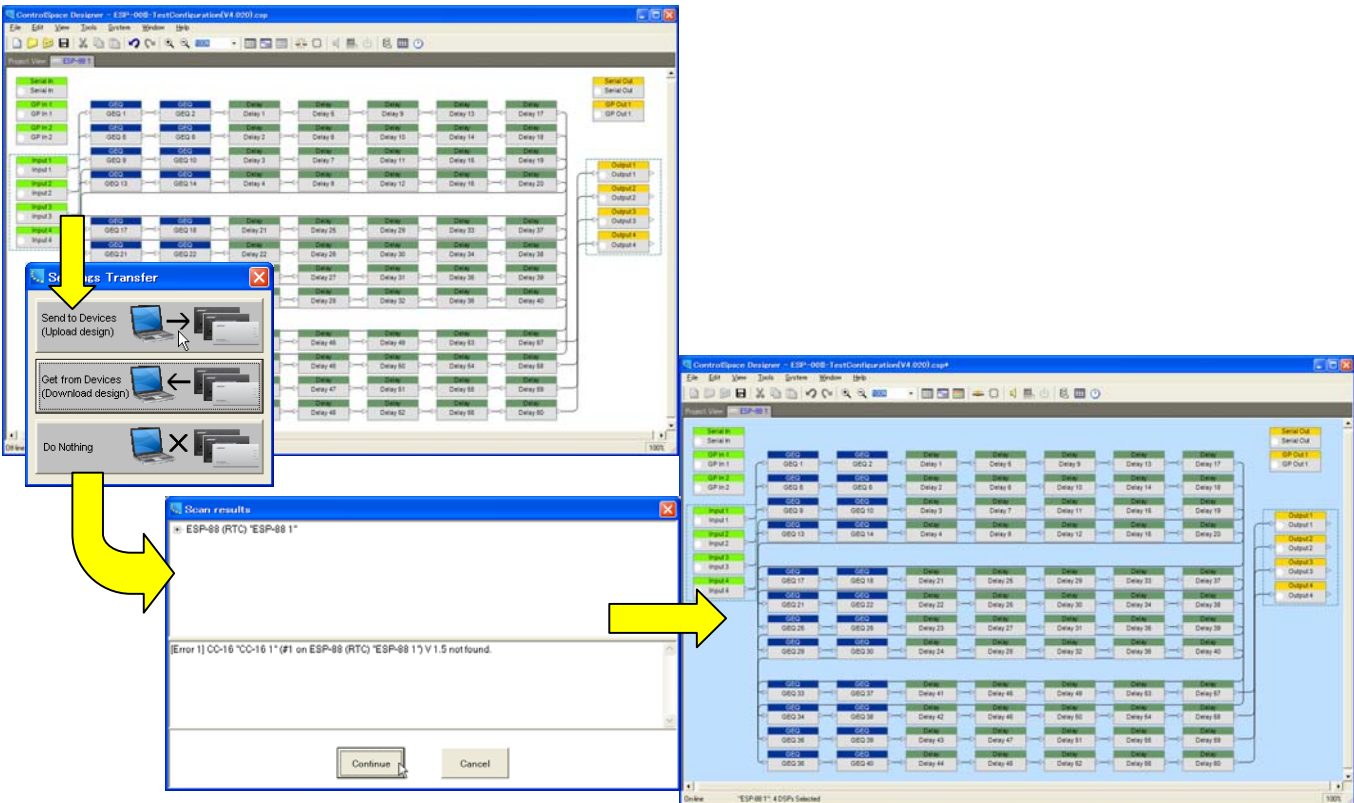
## 6. The files for this test

File name	Software	Notes
ESP88C_Test_Macro_Rev_21b.atsb	ATS 1.60	These files are the modules for these test.
ESP_ESP-00II_AcommandII01.atsb	ATS 1.60	
ESP_GPIO-II.atsb	ATS 1.60	
ESP_INPUT-II+OUTPUT-II.atsb	ATS 1.60	
PMAES3IN.atsb	ATS 1.60	
RedlineAudioPerformanceTestingModule01a.atsb	ATS 1.60	
RedlineMacAddressWritingModule.atsb	ATS 1.60	
RedlinePhantomTestingModule.atsb	ATS 1.60	
ESP-00II-TestConfiguration(V4.020).csp	CSD V4.1GM	
ESP00II_blank_design_as_last_step.csp	CSD V4.1GM	
ControlSpace_Test_Report_form_Rev_21b.xls	Excel	

# 7. Frame function test

## 7.1. CSP file upload.

After writing the MAC address, the CSP file shall be uploaded to the ESP-00II for testing. ESP-00II-TestConfiguration(V4.020).csp is the configuration file for following test. If the error dialog will be shown, continue upload. (It is caused to the hardware configuration but upload will proceed. The hardware configuration will be changed after this test.)



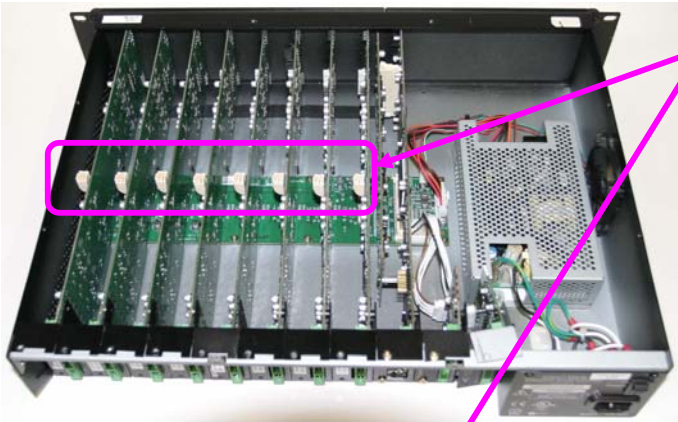
After uploading:  
Disconnect ESP-00II.  
Turn off the DUT (ESP-00II) to install the loop back card.

7.2. Equipment requirements and ESP hardware setup

These cards shall be installed to the ESP-00II frame.  
The yellow marked line is the device for shipping.  
The other cards are the reference card for this test.

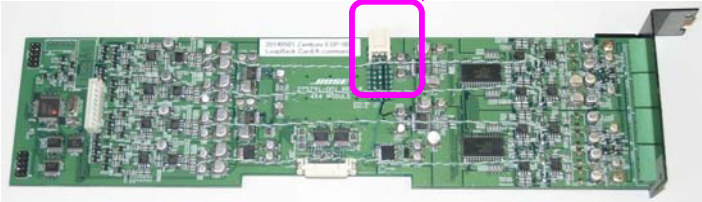
Slot Number	Item	Note
GPIO2	GIO-II	This slot will be used for test only.
GPIO1	GIO-II	This GIO will be shipped.
DSP*	DSP-STD + DSP-HP	This DSP will be shipped.
SLOT 1	Audio Loop back card	This slot will be used for test only.
SLOT 2	Audio Loop back card	This slot will be used for test only.
SLOT 3	Audio Loop back card	This slot will be used for test only.
SLOT 4	Audio Loop back card	This slot will be used for test only.
SLOT 5	Audio Loop back card	This slot will be used for test only.
SLOT 6	Audio Loop back card	This slot will be used for test only.
SLOT 7	Audio Loop back card	This slot will be used for test only.
SLOT 8	Audio Loop back card	This slot will be used for test only.
MB	MB-II	This MB will be shipped.
Chassis	Chassis	This Chassis will be shipped.
Power Supply	Chassis	This Power supply will be shipped.

Installed ESP-00II



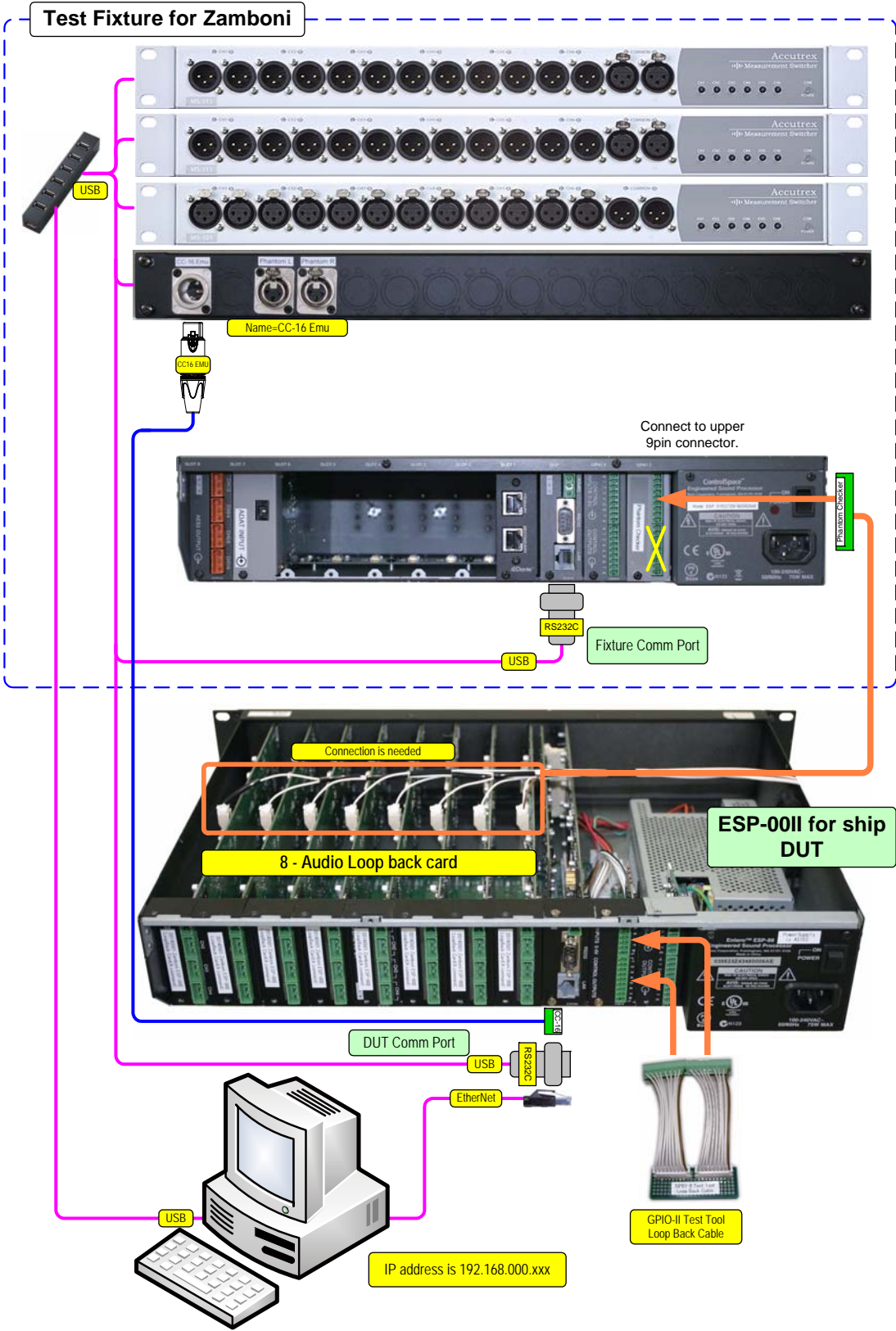
Note:  
This ESP-00II(Zamboni) has +48V power supply function on the MB-II.  
For test this function, the loop back card needs the +48Vterminal connector.

Audio Loop back card





7.3. Connection of Frame function test



(DUT view point ) The connectors shall connect to this device.

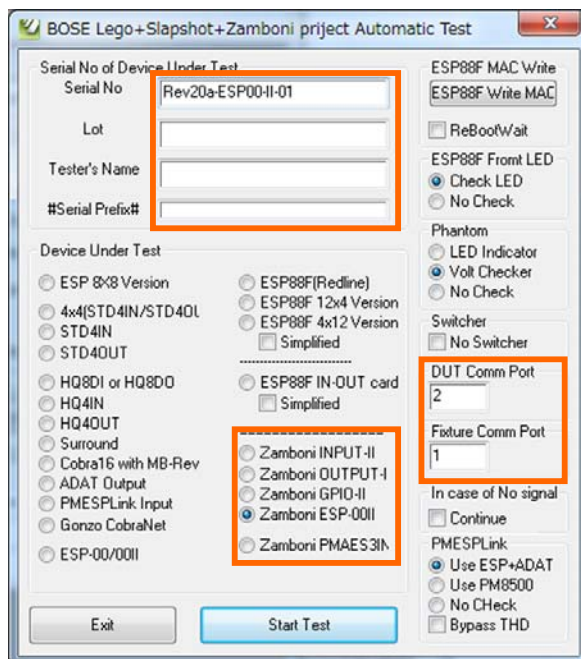
Slot Number	Item	Device	Note
<b>GPIO2</b>	GIO-II for Test	CN203 on MB-II	This is for test.
<b>GPIO1</b>	GIO-II for ship	None	
<b>DSP</b>	DSP-STD+DSP-HP For ship	CC16 RS232C Ethernet	
<b>SLOT 1</b>	Audio Loop back card	Phantom checker	These connector is placed top of the audio loop back card.
<b>SLOT 2</b>	Audio Loop back card	Phantom checker	
<b>SLOT 3</b>	Audio Loop back card	Phantom checker	
<b>SLOT 4</b>	Audio Loop back card	Phantom checker	
<b>SLOT 5</b>	Audio Loop back card	Phantom checker	
<b>SLOT 6</b>	Audio Loop back card	Phantom checker	
<b>SLOT 7</b>	Audio Loop back card	Phantom checker	
<b>SLOT 8</b>	Audio Loop back card	Phantom checker	

## 7.4. Procedure of Frame function test

This frame function test is performed by ATS-2 macro.

The filename of the macro is **ESP88C\_Test\_Macro\_Rev\_21b.atsb** .

Related files also needed.



This is the dialog of this test.

Before running this test , all equipments of the fixture power shall be turned on.

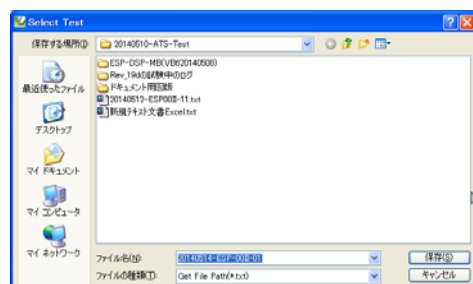
Orange marked part is the function for this test.

To start this test, choose [ Zamboni ESP-00II ]  
And fill the [ Serial number ] or other fields.

The [ DUT Comm Port ] and [ Fixture Comm Port ] field is for the COM port number to communicate to the ESP-00II for shipping ( Device Under Test ) and the ESP that in the fixture.

After filling the fields and check the DUT, push the [ Start Test ] Button.

The file name dialog will come up.



The serial number is utilized for the file name.  
This file name will be used for the Excel macro.

Note : The [ #Serial Prefix# ] field will utilize for the beginning of the serial number for following test.

For example the serial number for test is

060849Z31400001AE to 060849Z31400099AE

Please input [ 060849Z314000 ] .

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The confirmation dialog will come up.

After confirmation of the all connection for frame test, Power on the ESP-00II.

Wait 6 second.

After pushing the [ OK ] button, this test will start.

The status window will come up.



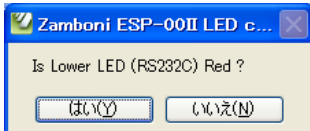
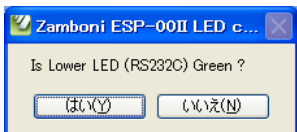
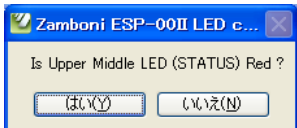
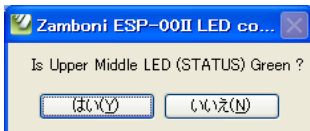
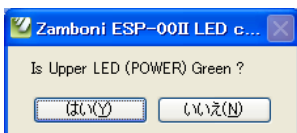
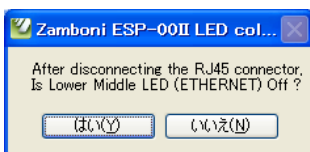
## 7.5. Frame test – LED color test.

The LED color dialogs will come up.

The test will proceed :

Ethernet LED off test  
Power LED Green test  
Power LED Red test  
STATUS LED Green test  
STATUS LED Red test  
RS232C LED Green test  
RS232C LED Red test  
Ethernet LED Green(Orange) test

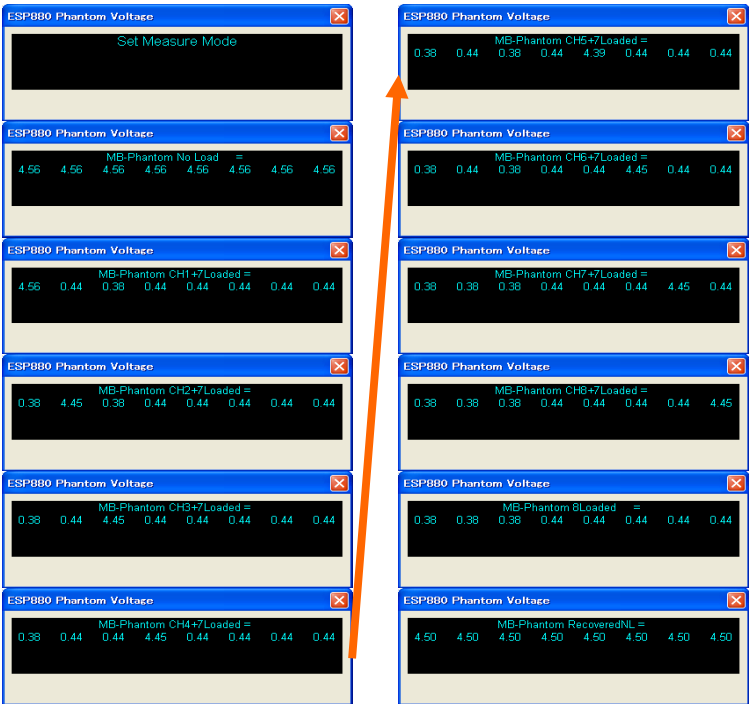
When the color of the LED that on the panel of the ESP-00II is specified color in the dialog, push [ Yes ] button.



These results will be recorded to the file automatically.



7.6. Frame test – MB Phantom voltage test



For the test of the MB +48V phantom power supply circuit, these test will be tested by automatically.

- MB-Phantom No Load
- MB-Phantom CH1+7Loaded
- MB-Phantom CH2+7Loaded
- MB-Phantom CH3+7Loaded
- MB-Phantom CH4+7Loaded
- MB-Phantom CH5+7Loaded
- MB-Phantom CH6+7Loaded
- MB-Phantom CH7+7Loaded
- MB-Phantom CH8+7Loaded
- MB-Phantom 8Loaded
- MB-Phantom Recovered No Load

These results will be recorded to the file automatically.

When the MB is RevB, this test will be omitted.

7.7. Frame test – Logical test

The logical test will start automatically after MB-Phantom test.

The [ DSP-MB.exe ] test was obsoleted because this frame test includes that test.

This logical test issue [ A command ] to the DSP-STD card and DSP-STD card will tests the peripheral by itself.

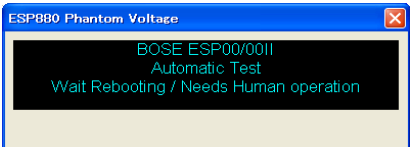
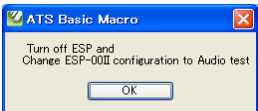
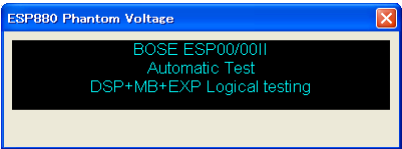
The audio loop back card is utilized for this logical test. If the audio loop back card is not applied to the ESP-00II, this test will be failed.

After logical test was finished, the turn off dialog will come up.

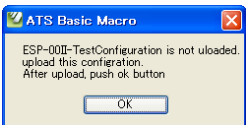
When the logical test was failed, the retry dialog will come up.

In case of proper csp cannot be found, request dialog come up. Upload proper csp file.

Turn of the ESP-00II and change the cards for following audio performance testing. Keep the ATS macro running. Continue to [ Procedure of audio performance test ]



In case of proper csp can't be found



## 8. Audio performance test

The ESP-00II doesn't have any audio IO cards. They will be installed in the field.

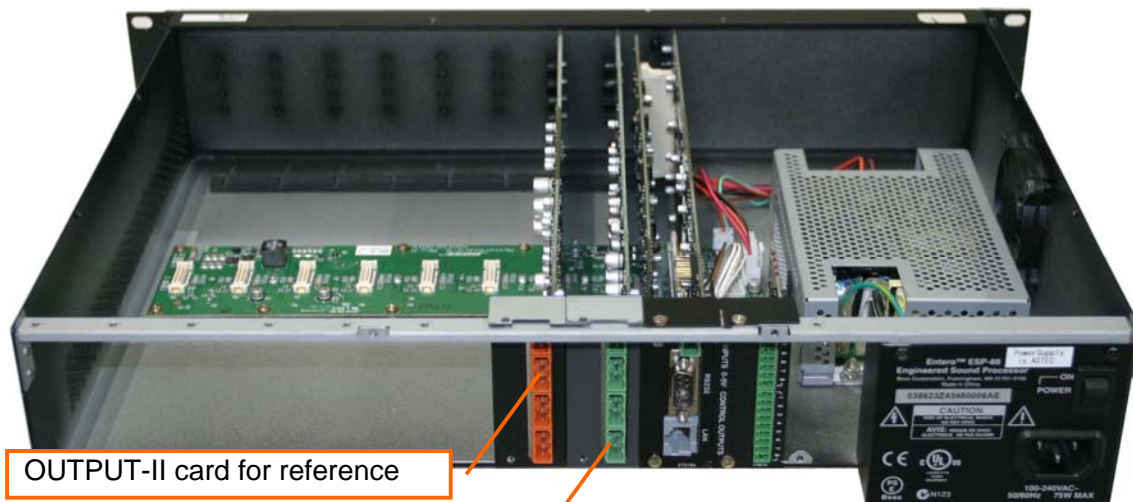
To ensure the working with the audio, this audio performance test will test the audio quality by using INPUT-II and OUTPUT-II cards.

### 8.1. Equipment requirements and ESP hardware setup

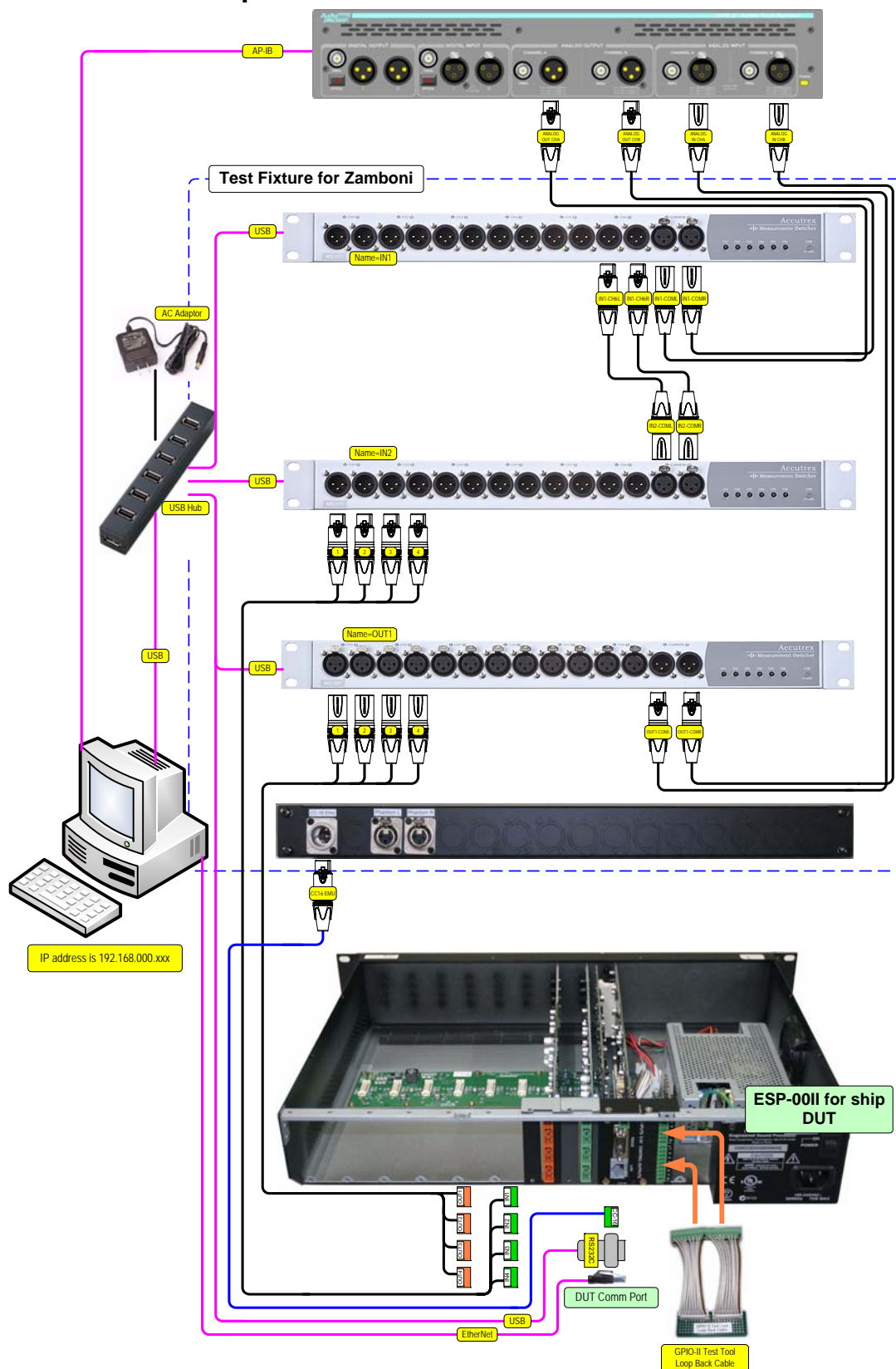
These IO cards. The yellow marked line is the cards for shipping.

The INPUT-II and OUTPUT-II card is for reference. They shall removed on end of this test

Slot Number	Item	Note
<b>GPIO2</b>	No need	This slot will be used for test only.
<b>GPIO1</b>	GIO-II	This GIO will be shipped.
<b>DSP*</b>	DSP-STD + DSP-HP	This DSP will be shipped.
<b>SLOT 1</b>	INPUT-II	This slot will be used for test only.
<b>SLOT 2</b>	OUTPUT-II	This slot will be used for test only.
<b>SLOT 3</b>	No need	
<b>SLOT 4</b>	No need	
<b>SLOT 5</b>	No need	
<b>SLOT 6</b>	No need	
<b>SLOT 7</b>	No need	
<b>SLOT 8</b>	No need	
<b>MB</b>	MB-II	This MB will be shipped.
<b>Chassis</b>	Chassis	This Chassis will be shipped.
<b>Power Supply</b>	Chassis	This Power supply will be shipped.

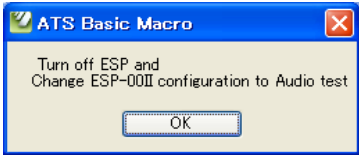


## 8.2. Connection of audio performance test



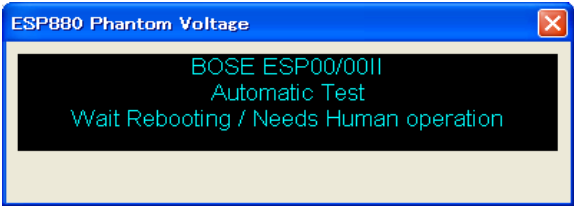
8.3. Procedure of audio performance test

This audio performance test is chained after the frame function test.  
This test will be done by the ATS macro that was started for the frame function test.

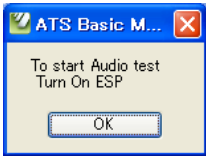


Left dialog is the end dialog of the frame function test.

When this dialog come up, turned off the DUT and change the configuration of the DUT.

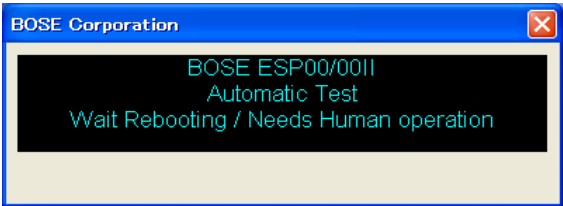


8.4. Audio performance test



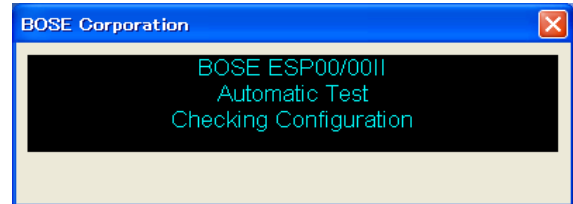
After pushing the [ OK ] button on the previous dialog, this new requesting turned on dialog will come up.

Push [ OK ] button after all device and cable and connection was checked.



Turn on the DUT power immediately after pressing [ OK ] button .

ATS macro will wait for a while until DUT will send [ Ready ] strings to the RS232C line.

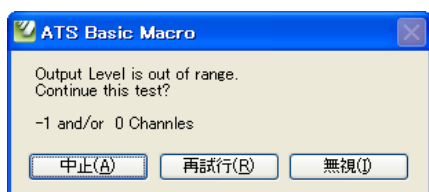


After [ Ready ] was detected, ATS macro will start the audio performance test.

This test needs the Accutrex measurement switcher control software.  
Run this soft before ATS macro will start.



When the control software did not started, warning dialog will come up.



When the warning dialog was shown, the switcher didn't work. In this case, the audio level is not proper. When the audio level can't detect, the ATS macro will ask how to proceed.

When [ Abort ] is chosen, this macro will return to the beginning.

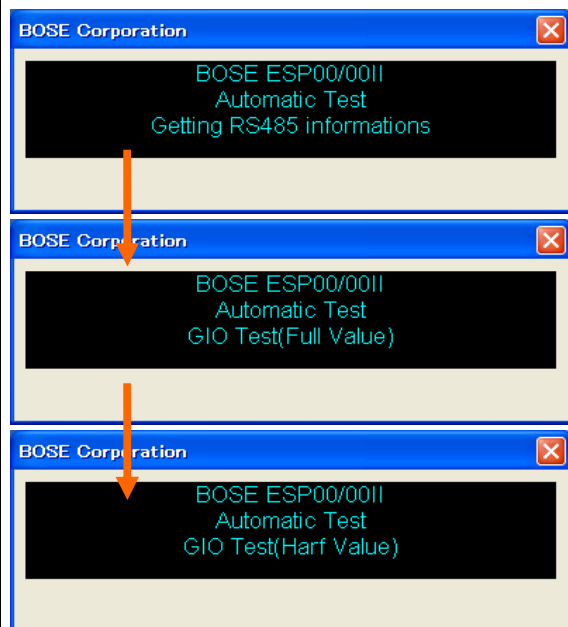
When [ Retry ] is chosen, this macro will retry this channel again.

When [ Ignore ] is chosen, this error will be ignored and record as failed.

If the measured level is proper, the switcher will be controlled by ATS macro automatically.



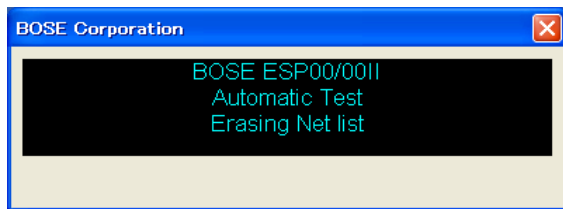
## 8.5. Control IO test



RS485 , GPIO-II test also be processed by automatically.

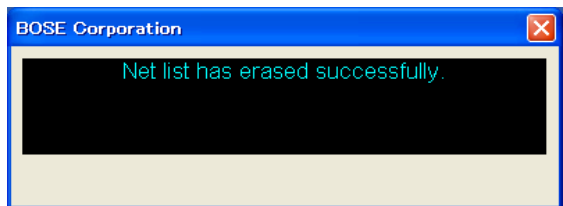
When all test has been done , ATS macro will return to the 1st dialog.

## 8.6. Erasing net list



This DUT ( ESP-00II) will be shipped.

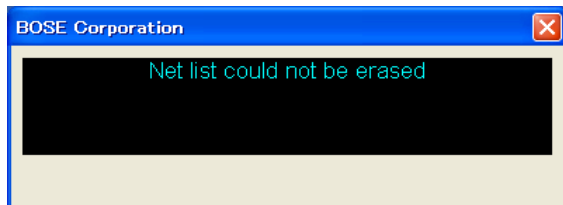
Testing csp configuration is not needed for the shipped ESP-00II, the testing net list ( csp file ) in the ESP-00II will be erased.



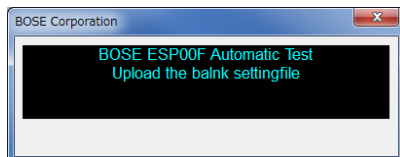
In ordinary, the report is "Net list has erased successfully".

When it can not be erased, the report will "Net list could not be erased".

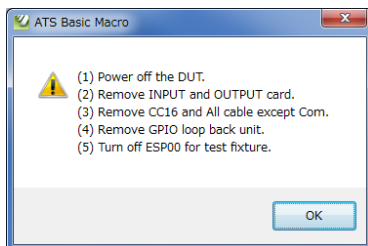
This result is recorded in the log file.



## 8.7. Upload Blank setting and test.



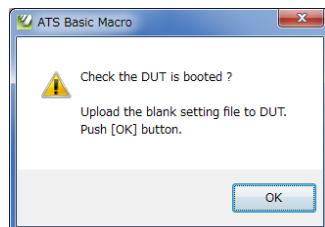
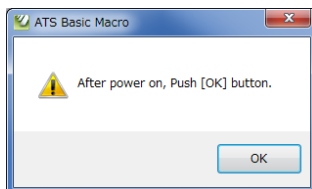
When the test has been done, the upload blank setting process will start.



When the following dialog box will be shown, do these things.

- (1) Power off the DUT.
- (2) Remove INPUT and OUTPUT card.
- (3) Remove CC16 and All cable except Com.
- (4) Remove GPIO loop back unit.
- (5) Turn off ESP00 for test fixture.

These things has finished, push the [ OK ] button.



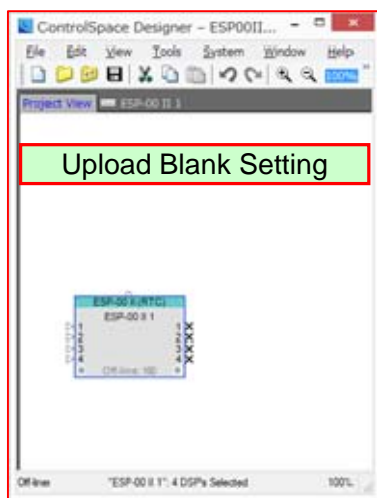
After it, turn on the power.

After booted, upload this file to DUT.

ESP00II\_blank\_design\_as\_last\_step.csp

Then push the [ OK ] button to proceed this test.





The blank file seems like this on the CSD.

During this blank check process, these items will be checked.

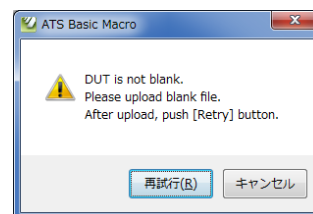
- (1) Slot 1-8 audio card does not exist.
- (2) Slot9 GPIO does not exist.
- (3) CC16 is not connected.
- (4) Uploaded csp file is blank setting.

When the unexpected modules or connection is found, these messages will appear.

Clear the issue according to the dialog.

When [ Retry ] button is pushed, same test will be retried.

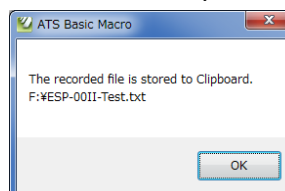
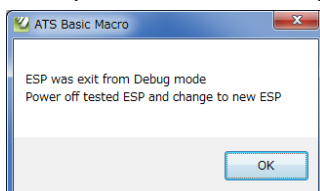
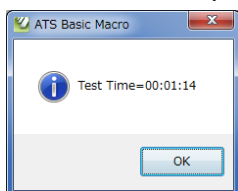
When [ Cancel ] button is pushed, the test will be canceled and procedure will proceed to next test. In this case, the result will fail.



This test will finish when these process has been done. After finish, these dialogs will appear.

The result of each test is recorded to the log file.

The log file name will be copied to the clip board for following Excel examination procedure.



## 8.8. Returning to the top for the next test.

After uploading the blank setting, the ATS macro will return to the top dialog for next DUT test.



## 9. Pass/Fail Evaluation and Test Report

After retrieving the log file for the test (using the TestLogOpen macro in the ControlSpace\_Test\_Report\_form\_Rev\_21b.xls file) the, pass/fail evaluation is done automatically. Gray colored cells are not used for pass/fail detection. If the result cell indicates "FAIL", this DUT cannot be shipped.

	A	B	C	D	E	F	G	H	I	J	K	
1	<b>BOSE®</b>											
	Date: 12-May-14											
3	Device under test				ControlSpace_Test_Report_form_Rev_19							
4	Serial Number	20140512-ESP00II-11										
5	Lot											
6	Date of test	2014,05,12				<b>Result</b>		<b>FAIL</b>				
7	Tester's Name					ESP Configuration = ESP-00II						
8	ZamboniESP-00II TEST				This ATS Macro ID = ESP88C_Test_Macro_Rev_19d							
9			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8		
10	7-1.(GV=0dB)	AMPL	4.34	4.31	4.32	4.32						
11		Nois	-90.70	-90.87	-90.74	-90.87						
12		FRQ20K	4.58	4.66	4.61	4.62						
13		FRQ20	4.25	4.23	4.24	4.24						
14		THDN	0.0018	0.0018	0.0018	0.0019						
15		19.5dBu	0.0089	0.0084	0.0087	0.0084						
16	7-2.GIO test(Full)	%	96.09	96.09	96.09	96.09	95.70	96.09	95.70	96.09		
17	7.2.GIO test(Half)	%	49.61	49.61	49.61	49.61	49.61	49.61	49.61	49.61		
18	7-3.Time test	Value	0	0								
19	7-4.LAN	Check	Pass									
20	7-5.RS232C	Check	Pass									
21	7-6.RS485	Check	Pass									
22												
23	7.8 Logical Test											
24	1.[FAN CONTROL]		OFF									
25	2.[+15V IN voltage]		15.10									
26	3.[ -15V IN voltage]		-14.90									
27	4.[+15V OUT voltage]		15.20									
28	5.[ -15V OUT voltage]		-15.00									
29	6.[Audio-Path]		PASSED									
30	7.[Audio-Level]		PASSED									
31	8.[Comm-Pass]		type:1 / vtype:1 / vtype:1 / vtype:1 / vtype:1 / vtype:1 / vtype:1 / vtype:1 / version:1									
32			type:18 / vtype:6 / version:2									
33	9.[Reset]		PASSED									
34	10.[Boot]		PASSED									
35	11.[GIO]		type:18 / vtype:6 / version:2									
36	12.[Flash-ROM]		PASSED									
37	13.[SD-RAM]		PASSED									
38	14.[FPGA-CONF]		PASSED									
39	15.[FPGA-ACC]		PASSED									
40	16.[HPI]		PASSED									
41	17.[Audio-Path]		PASSED									
42	18.[DSP-SD-RAM]		PASSED									
43	19.[LAN]	Reference	???									
44	20.[ETHERNET-LED]		Off	Green	Orange							
45	21.[MAC-ADDR]		00-0C-8A-00-CF-FF									
46	22.[IP-ADDR]		192.168.0.160									
47	23.[RS232C]		PASSED									
48	24.[RS485] TECHNIC		V 1.5	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	
49		Reference	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find		



# Passed Test report

	A	B	C	D	E	F	G	H	I	J	K
1	<b>BOSE</b> ®										
	Date: 12-May-14										
3	Device under test				ControlSpace_Test_Report_form_Rev_19						
4	Serial Number	20140512-ESP00II-11									
5	Lot										
6	Date of test	2014,05,12									
7	Tester's Name										
8	ZamboniESP-00II TEST	This ATS Macro ID = ESP88C_Test_Macro_Rev_19d									
9			CH1	CH2	CH3	CH4	CH5	CH6	CH7	CH8	
10	7-1.(GV=0dB)	AMPL	4.34	4.31	4.32	4.32					
11		Nois	-90.70	-90.87	-90.74	-90.87					
12		FRQ20K	4.56	4.66	4.61	4.62					
13		FRQ20	4.25	4.23	4.24	4.24					
14		THDN	0.0018	0.0018	0.0018	0.0019					
15		19.5dBu	0.0089	0.0084	0.0087	0.0084					
16	7-2.GIO test(Full)	%	96.09	96.09	96.09	96.09	95.70	96.09	95.70	96.09	
17	7.2.GIO test(Half)	%	49.61	49.61	49.61	49.61	49.61	49.61	49.61	49.61	
18	7-3.Time test	Value	0	0							
19	7-4.LAN	Check	Pass								
20	7-5.RS232C	Check	Pass								
21	7-6.RS485	Check	Pass								
22											
23	7.8 Logical Test										
24	1.[FAN CONTROL]		OFF								
25	2.[+15V IN voltage]		15.10								
26	3.[ -15V IN voltage]		-14.90								
27	4.[+15V OUT voltage]		15.20								
28	5.[ -15V OUT voltage]		-15.00								
29	6.[Audio-Path]		PASSED								
30	7.[Audio-Level]		PASSED								
31	8.[Comm-Pass]		type:1 / v	type:1 / v	type:1 / v	type:1 / v	type:1 / v	type:1 / v	type:1 / v	type:1 / v	type:1 / v
32			type:18 / v	type:6 / version:2							
33	9.[Reset]		PASSED								
34	10.[Boot]		PASSED								
35	11.[GIO]		type:18 / v	type:6 / version:2							
36	12.[Flash-ROM]		PASSED								
37	13.[SD-RAM]		PASSED								
38	14.[FPGA-CONF]		PASSED								
39	15.[FPGA-ACC]		PASSED								
40	16.[HPI]		PASSED								
41	17.[Audio-Path]		PASSED								
42	18.[DSP-SD-RAM]		PASSED								
43	19.[LAN]	Reference	???								
44	20.[ETHERNET-LED]		Off	Green	Orange						
45	21.[MAC-ADDR]		00-0C-8A-00-CF-FF								
46	22.[IP-ADDR]		192.168.0.160								
47	23.[RS232C]		PASSED								
48	24.[RS485] TECHNIC		V 1.5	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find
49		Reference	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	Not Find	

20140512-ESP00II-11/

# 10. Testing method and criteria

This section describes the criteria of performance test. Determining if the DUT passes on each test is done automatically by the Excel Macro.

For the ESP-00II , 6 sets of tests are performed to verify the audio paths to the ESP.

## 10.1. Audio performance

ESP Setting : Set all channel gain = 0dB.

(Command on COM = ^BA{1/2}{L/R}00^C)

AMPL(1kHz)

ATS2 Setting.

Item	Setting
Frequency	1kHz
Amplitude	+4.00dBu
B/W	<10HZ / FS/2
Filter	None

Criteria.

Item	Upper limit	Lower limit
Level	+5.5dBu	+2.5dBu

Noise

ATS2 Setting.

Item	Setting
Frequency	--
Amplitude	Off
B/W	22HZ / 22KHz LPF
Filter	"A" Weighting

Criteria..

Item	Upper limit	Lower limit
Level	-85dBu	-200dBu

FRQ20kHz

ATS2 Setting.

Item	Setting
Frequency	20kHz
Amplitude	+4.00dBu
B/W	<10HZ / FS/2
Filter	None

Criteria . ( difference from 1kHz )

Item	Upper limit	Lower limit
Level	+1.5dB	-1.5dB

FRQ20Hz

ATS2 Setting.

Item	Setting
Frequency	20Hz
Amplitude	+4.00dBu
B/W	<10HZ / FS/2
Filter	None

Criteria. ( difference from 1kHz )

Item	Upper limit	Lower limit
Level	0dB	+3dB

THD+N

ATS2 Setting.

Item	Setting
Frequency	1kHz
Amplitude	+4.00dBu
B/W	22HZ / 22KHz LPF
Filter	“A” Weighting

Criteria.

Item	Upper limit	Lower limit
Function(THD+N)	0.005%	0

19.5dBu

ATS2 Setting.

Item	Setting
Frequency	1kHz
Amplitude	+23.5dBu (Nominal +19.5dB)
B/W	22HZ / 22KHz LPF
Filter	“A” Weighting

Criteria.

Item	Upper limit	Lower limit
Function(THD+N)	0.1%	0

This test is performed on channels 1 through 4.

## 10.2. GIO test(Full) and GIO test(Half) test

This GIO test will be done by ATS2 macro automatically.

This test needs “GIO 2.2k ohm loop back cable”.

GIO setting is this.


ESP Setting : Set GIO outputs.

(Command on COM = ^BO{0~7}{0/1}^C)

ESP Setting : Get the value of GIO input .

(Command on COM = ^BI^C)

Criteria..

 Framingham, MA 01701-9168	SIZE <b>A</b>	FSCM <b>32108</b>	CLASS <b>TS</b>	DWG NO. <b>TS370633</b>	SHEET <b>27 of 32</b>	REV. <b>05</b>
--	------------------	----------------------	--------------------	----------------------------	--------------------------	-------------------

Item	Upper limit	Lower limit
GIO test (Full)	97.5%	92.5%
GIO test (Half)	52.5	47.5

Do this test port 0 through 7.

### 10.3. Time test Test

This time test will be done by ATS2 macro automatically.

In this test, the time that got from ESP is compared with the PC time by ATS2 macro.

ESP Setting : Get time report from ESP.

(Command on COM = t )

Criteria.

Item	Upper limit	Lower limit
Date diff	0.1	-0.1
Time diff	+5	-5

### 10.4. LAN Test

The configuration of ESP is done by LAN.

Therefore LAN communication can be confirmed by ESP can settled by design tool and that can measure in correct situation.

Criteria..

Item	Pass	Fail
LAN	ATS2 macro can reach this item.	Can not reach.

### 10.5. RS-232C Test

The measurement by ATS2 macro is done by RS232C line.

Therefore RS232C communication can be confirmed by ESP can measure in correct situation.

Criteria..

Item	Pass	Fail
RS232C	ATS2 macro can reach this item.	Can not reach.

## 10.6. RS-485 Test

When “CC16” could be found in the RS485 line of ESP setting(refer to section 4),this test is passed.

Criteria..

Item	Pass	Fail
RS485	“CC16” could be found in design tool.	Can not found.

## 10.7. Logical Test

The logical test will test the inside of DSP card or the other part by logical method. This test should have been carried out during the production like section 3.3.

Originally, this test requires the special loopback card , but for simplification of this shipping test, the special loopback cards are not utilized.

Therefore, some tests returns the fail because the ESP-00 / ESP-00 II does not applied the special loopback cards.

This failed result is caused from above reason, the failed result can be ignored.

Item	Note
1.[FAN CONTROL]	The fan will be stopped by SH2 control
2.[+15V IN voltage]	Return the voltage of +15V input by value
3.[-15V IN voltage]	Return the voltage of -15V input by value
4.[+15V OUT voltage]	Return the voltage of +15V output by value
5.[-15V OUT voltage]	Return the voltage of -15V output by value
6.[Audio-Path]	This item returns Fail because loopback is not applied. This result shall be ignored.
7.[Audio-Level]	This item returns Fail because loopback is not applied. This result shall be ignored.
8.[Comm-Pass]	Returns the result of communication between SH2 and H8 on each audio cards. The result is the card type that applied on the slot. In case of this test, slot 1 and 9 returns the card type. The other slot can be ignored.
9.[Reset]	This test returns the reset function of audio card slots.
10.[Boot]	This test returns the boot mode updatibility of the audio card slots.
11.[GPIO]	This test returns the existence of GPIO on slot 9 and 10.
12.[Flash-ROM]	This test returns the accessibility of the Flash-ROM from SH2
13.[SD-RAM]	This test returns the accessibility of the SD-RAM from SH2
14.[FPGA-CONF]	This test returns the configurability of the FPGA from SH2.
15.[FPGA-ACC]	This test returns the accessibility of the configured FPGA from SH2.
16.[HPI]	This test returns the accessibility of the DSP

	HPI interface via FPGA.
17.[Audio-Path]	This test returns the signal passing route FPGA to DSP.
18.[DSP-SD-RAM]	This test returns the accessibility of the SD-RAM from DSP to it's SD-RAM on the main card.
19.[LAN]	This test can't be returns proper result because the LAN accessing is tested by another method.
20.[ETHERNET-LED]	This test can't be returns proper value because LED lights can't detected by this command itself.
21.[MAC-ADDR]	Returns the value of settled MAC address.
22.[IP-ADDR]	Returns the value of settled IP address.
23.[RS232C]	Returns the PASSED because this test has been started by RS232C communication.
24.[RS485] TECHNIC	This test issue inquiry on the RS485 line and it returns found CC16 by it's firmware version.
25.[POWER-LED]	This test will skipped because LED lights can't detected by this command.
26.[STATUS-LED]	This test will skipped because LED lights can't detected by this command.
27.[RS232C-LED]	This test will skipped because LED lights can't detected by this command.
28.[RTC]	This test returns the date/time value that counted in the DSP main card.
29.[SUB-HPI2] - [SUB-HPI4]	This test returns the accessibility of the DSP HPI o interface n the DSP expansion card via FPGA.
30.[SUB-Audio-Path]	This test returns the signal passing route FPGA to DSP on the DSP expansion card.
31.[SUB-SD-RAM2] - [SUB-SD-RAM4]	This test returns the accessibility of the SD-RAM from DSP on the DSP expansion card to its SD-RAM.
32.[Firmware-version]	Return the firmware build number.
33.[number-of-DSPs]	Return the amount of DSP chip in system.

## 10.8. ESP Configuration

The ATS2 macro inquiries the existence of Delay module in the CSD design that was loaded to the ESP.

If the CSD design has Delay 60 module, this macro define the DUT as ESP-00II.

If the CSD design doesn't have Delay 60 module, this macro define the DUT as ESP-00.

### 10.9. MB-II Phantom voltage and load test

This test will test the phantom power supply circuit on the MB-II.

To test it ,the audio loop back card will output the +48V with 4 pcs of 6.8k ohm to the GPIO.

GPIO will measure the no load voltage and loaded voltage.

Condition	Max	Min
No load voltage	-	45V
Loaded voltahe	5V	

MB type is the detected MB type strings.

Item	Measuring condition
MB-Phantom No Load	All slot(CH) are not loaded. The voltage indicates the +48V source voltage. Expecting no load voltage.
MB-Phantom CH1+7Loaded	CH1(Slot1) is no load. The other 7CH are loaded. CH1(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH2+7Loaded	CH2(Slot2) is no load. The other 7CH are loaded. CH2(Slot2) expects no load voltage, the other expects loaded voltage
MB-Phantom CH3+7Loaded	CH3(Slot1) is no load. The other 7CH are loaded. CH3(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH4+7Loaded	CH4(Slot1) is no load. The other 7CH are loaded. CH4(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH5+7Loaded	CH5(Slot1) is no load. The other 7CH are loaded. CH5(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH6+7Loaded	CH6(Slot1) is no load. The other 7CH are loaded. CH6(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH7+7Loaded	CH7(Slot1) is no load. The other 7CH are loaded. CH7(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom CH8+7Loaded	CH8(Slot1) is no load. The other 7CH are loaded. CH8(Slot1) expects no load voltage, the other expects loaded voltage
MB-Phantom 8Loaded	All CH(Slot) are loaded. Expects loaded voltage
MB-Phantom Recovered No load	All slot(CH) are not loaded. The voltage indicates the +48V source voltage. Expecting no load voltage.
MB-Phantom test result	Pass / Fail indication

### 10.10. Sum of the boot area

This information is read from the Flash ROM on the DSP-STD card.

It indicates the IPL reason summary value.

### 10.11. Audio test card configuration

This information is a record of the audio IO card type and version.

### 10.12. Loaded CSP file delay module existence

This information indicates the delay module existence and setting on the csp file.

If this field is not meet, the csp file is not meet with this audio performance test.

### 10.13. **Blank setting upload.**

The last setting of the ESP is checked by these items.

Item name = passing condition.	description
UpBlank:Slot = Pass	All audio slot and GPIO 10 is blank.
UpBlank:CC16 = Pass	CC16 is not connected.
UpBlank:BlankCHK =Pass	Blank csp file is uploaded.

### 10.14. **Overall rating**

To detect the failure, this macro calculate these portion.

Meet with the criteria of each tested item.

- 7.1 Audio path
- 7.2 GIO test(Full) and GIO test(Half) test
- 7.3 Time test Test
- 7.4 LAN Test.
- 7.5 RS-232C Test.
- 7.6 RS-485 Test.
- 7.7 Information of DSP card.
- 7.8 Logical Test.

This macro compare the DUT type ( ESP-00 / ESP-00II ) and number of DSP.  
If the DSP amount meets the DUT type, this macro gives the passed result.