

# TU-3

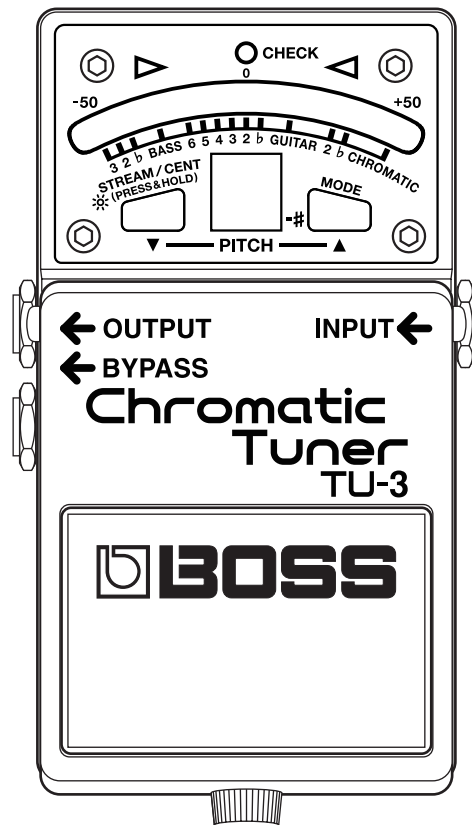
## Chromatic Tuner

# SERVICE NOTES

*Issued by RJA*

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**Roland**

17058650E0

CC-KWS

## Cautionary Notes

Before beginning the procedure, please read through this document. The matters described may differ according to the model.

## User Data Cannot Be Saved

This product cannot save user data. Refer to "Data Backup and Restore Operations" (p. 8) and note down the information on paper as required.

## Part Replacement

When replacing components near the power-supply circuit or a heat-generating circuit (such as a circuit provided with a heat sink or including a cement resistor), carry out the procedure according to the instructions with respect to the part number, direction, and attachment position (mounting so as to leave an air gap between the component and the circuit board, etc.).

## Parts List

A component whose part code is \*\*\*\*\* will not be supplied as a service part because one of the following reasons applies.

- Because it is supplied as an assembled part (under a different part code).
- Because a number of circuit boards are grouped together and supplied as a single circuit board (under a different part code).
- Because supply is prohibited due to copyright restrictions.
- Because reissuance is restricted.
- Because the part is made to order (at current market price).
- Because it is carried in electronic data on the Roland web site.
- Because it is a package or an accessory irrelevant to the function maintenance of the main body.
- Because it can be replaced with an article on the market. (battery or etc.)

## Circuit Diagram

In the circuit diagram, "NIU" is an abbreviation for "Not in Use," and "UnPop" is an abbreviation for "Unpopulated." They both mean non-mounted components. The circuit board and circuit board diagram show silk-screened indications, but no components are mounted.

## Specifications

### TU-3: Chromatic Tuner

#### Tuning Range

C0 (16.35Hz)–C8 (4186Hz)

#### Reference Pitch

A4=436–445 Hz (1Hz step)

#### Tuning Accuracy

±1 cent

#### Power Supply

DC 9 V: Dry battery 6F22 (9 V) type (carbon),  
Dry battery 6LR61 (9 V) type (alkaline),  
AC Adaptor (PSA series: optional)

#### Current Draw

30 mA (DC 9 V)  
85 mA (DC 9 V, when High Brightness mode is on)

#### Dimensions

73 (W) x 129 (D) x 59 (H) mm  
2-7/8 (W) x 5-1/8 (D) x 2-3/8 (H) inches

#### Weight

390 g / 14 oz (including battery)

#### Accessories

Owner's Manual (#5100007386)  
Leaflet ("USING THE UNIT SAFELY," "IMPORTANT NOTES," and "Information") (\*\*\*\*\*)  
Dry battery / 9 V type (6F22) (\*\*\*\*\*)

#### Options

AC adaptor: PSA series  
Parallel DC cord: PCS-20A

\* Duration of continuous use with battery operation: These figures will vary depending on the actual conditions of use.

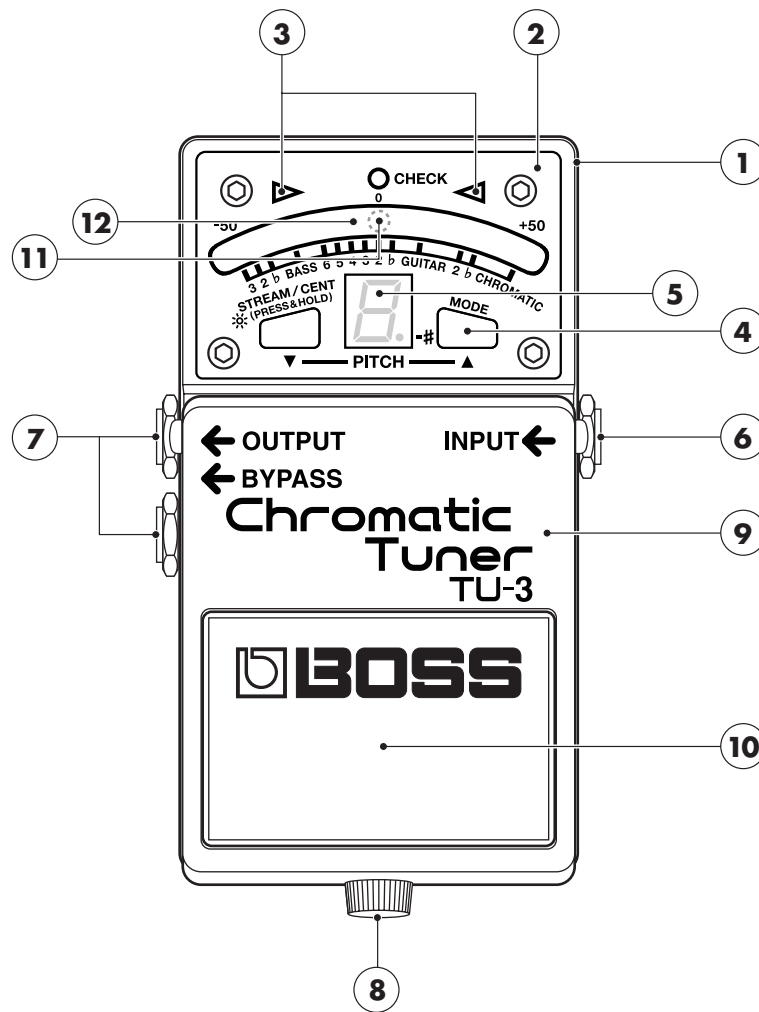
Battery	When the tuner is continuously on		When the tuner is on for one minute and off for three minutes	
	When High Brightness mode is off	When High Brightness mode is on	When High Brightness mode is off	When High Brightness mode is on
Carbon	5.5 hours	0.5 hours	12 hours	2 hours
Alkaline	14 hours	3 hours	23.5 hours	11 hours

\* The battery that was supplied with the unit is for temporary use, intended primarily for testing the unit's operation.

\* Printed matters will not be supplied after the end of the production. Then, download the electronic file from the Roland web site.

\* In the interest of product improvement, the specifications and/or appearance of this unit are subject to change without prior notice.

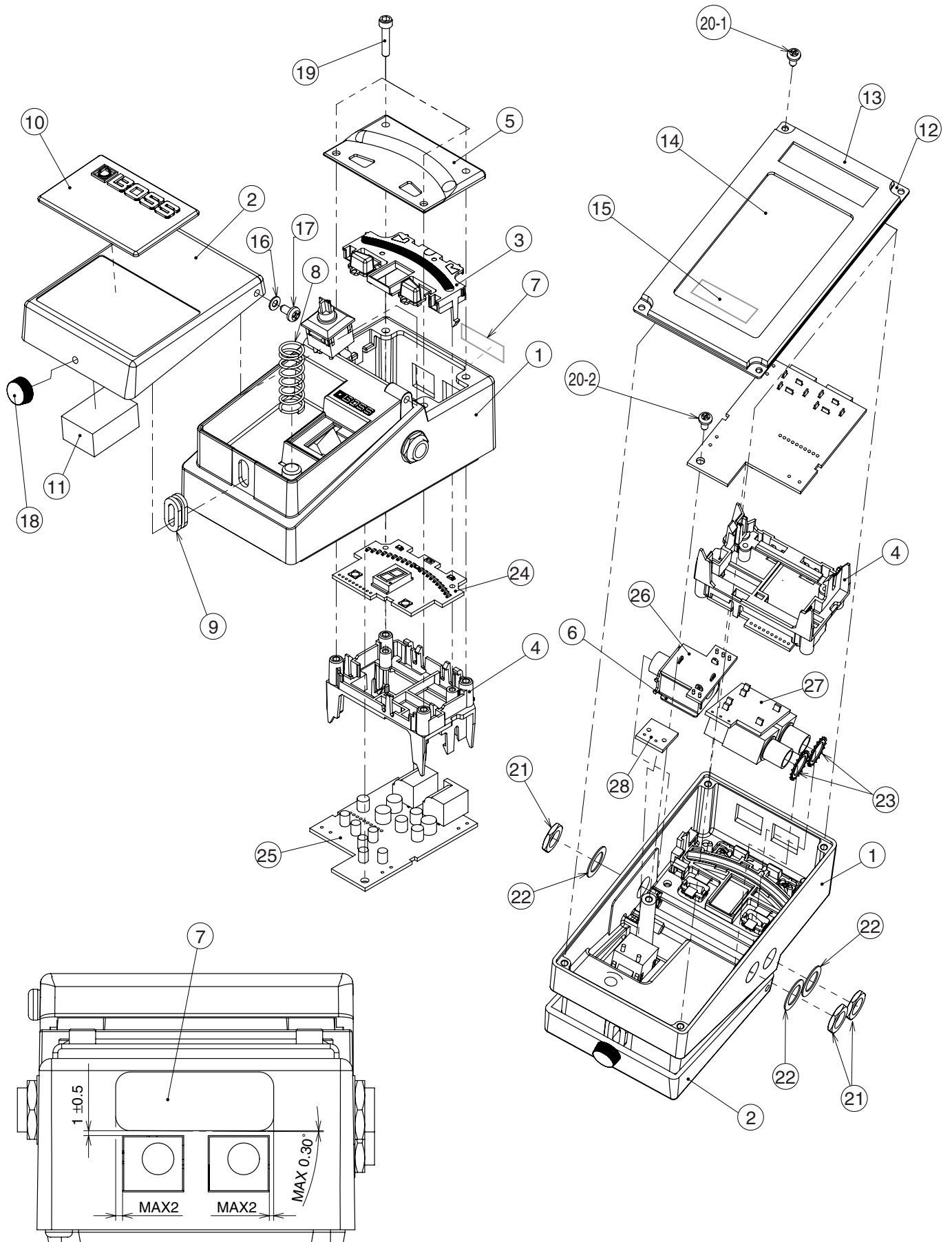
## Location of Controls



## Location of Controls Parts List

No.	Part Code	Part Name	Description	Q'ty
1	5100008544	CASE		1
2	5100008548	DISPLAY COVER		1
3	5100009104	LED	KPTL-3216SYCK	2
4	5100008546	ESCUTCHEON		1
5	5100006345	LED	KCSA04-104	1
6	01903234	6.5MM JACK	HTJ-064-13D	1
	5100003918	JACK NUT M9X12X2	NI RTC(H5039510R0)	1
	5100003926	WASHER	9X13.5X0.5T NI(H5039158R0)	1
7	5100001342	6.5MM JACK	HTJ-064-12IMP (13449155R1)	2
	5100003918	JACK NUT M9X12X2	NI RTC(H5039510R0)	2
	5100003926	WASHER	9X13.5X0.5T NI(H5039158R0)	2
8	5100007512	THUMB SCREW	(H5029820R0)	1
9	5100008545	PEDAL		1
10	5100008294	PEDAL PLATE	(22357304R0)	1
11	5100007408	LED (F5339532R0)	19-226SURSYGC/S530-A3/E2/TR8	1
12	5100007410	LED (F5339534R0)	19-21/R6C-AL2N1VY/3T	21

# Exploded View



# Exploded View Parts List

No.	Part Code	Part Name	Description	Q'ty
1	5100008544	CASE		1
2	5100008545	PEDAL		1
3	5100008546	ESCUTCHEON		1
4	5100008547	HOLDER		1
5	5100008548	DISPLAY COVER		1
6	5100008549	SHIELD COVER		1
7	5100008238	PSA CAUTION	(G2537401R0)	1
8	5100007504	COIL SPRING	(22177109R0)	1
9	5100007505	PEDAL GUIDE BUSH	(22157702R0)	1
10	5100008294	PEDAL PLATE	(22357304R0)	1
11	5100007503	BATTERY CUSHION	(22267333R0)	1
12	5100006632	BOTTOM COVER	(22027851R0)	1
13	5100006633	BOTTOM FOOT	(22357305R0)	1
14	5100006631	CAUTION SEAL	PSA (FCC / EMI)(G2537516R2)	1
15	*****	LABEL	SERIAL 5X25 SIL/BLK RTC	1
16	5100008092	PLAIN WASHER 3X6X0.5	RESIN RTC(H5039708R0)	2
17	40010267	BINDING SCREW	M3X10 FE BZC	2
18	5100007512	THUMB SCREW	(H5029820R0)	1
19	5100008240	SCREW 3X12 (H5029842R0)	HEXSOCKET TAPTITE P BZC	4
20-1	5100007965	SCREW 3X6(H5029325R0)	PAN TAPPING B1 BZC	4
20-2	5100007965	SCREW 3X6(H5029325R0)	PAN TAPPING B1 BZC	1
21	5100003918	JACK NUT M9X12X2	NI RTC(H5039510R0)	3
22	5100003926	WASHER	9X13.5X0.5T NI(H5039158R0)	3
23	5100008086	INT TOOTH WASHER 9.5X12.5X0.5	NI RTC(H5039205R0)	2
	5100005959	PANEL SHEET ASSY		
		* This unit includes the following parts.		
24	*****	PANEL BOARD ASSY		1
25	*****	ANALOG BOARD ASSY		1
26	*****	INPUT BOARD ASSY		1
27	*****	OUTPUT BOARD ASSY		1
28	*****	SW BOARD ASSY		1

# Parts List

**SAFETY PRECAUTIONS:**  
The parts marked  $\Delta$  have safety-related characteristics. Use only listed parts for replacement.

Due to one or more of the following reasons, parts with parts code \*\*\*\*\* cannot be supplied as service parts.

- Part supplied only as a component in a complete assembly
- Copyright does not permit the part to be supplied
- Part is sold commercially

NOTE: The parts marked # are new. (initial parts) The description "Q'TY" means a necessary number of the parts per one product.

<b>CASING</b>				
	5100006632	BOTTOM COVER	(22027851R0)	1
#	5100008544	CASE		1
#	5100008545	PEDAL		1
#	5100008546	ESCUTCHEON		1
#	5100008548	DISPLAY COVER		1
<b>CHASSIS</b>				
#	5100008294	PEDAL PLATE	(22357304R0)	1
#	5100008547	HOLDER		1
#	5100008549	SHIELD COVER		1
<b>SWITCH</b>				
#	5100006349	SWITCH	EVQP6DB35	2
	13129710R0	SWITCH(PUSH)	JM-0404	1
<b>JACK, EXT TERMINAL</b>				
	04908701	ADAPTOR JACK	KM02018ABM1P	2
	01903234	6.5MM JACK	HTJ-064-13D	1
	5100001342	6.5MM JACK	HTJ-064-12IMP (13449155R1)	2
<b>PWB ASSY</b>				
#	5100005959	PANEL SHEET ASSY		1
		<i>* This unit includes the following parts.</i>		
	*****	PANEL BOARD ASSY		1
	*****	ANALOG BOARD ASSY		1
	*****	INPUT BOARD ASSY		1
	*****	OUTPUT BOARD ASSY		1
	*****	SW BOARD ASSY		1
<b>DIODE</b>				
#	5100006345	LED	KCSA04-104	1
#	5100009104	LED	KPTL-3216SYCK	2
	5100007408	LED (F5339532R0)	19-226SURSYGC/S530-A3/E2/TR8	1
	5100007410	LED (F5339534R0)	19-21/R6C-AL2N1VY/3T	21
<b>CONNECTOR</b>				
	5100007872	BATTERY CONNECTOR	006P BATTERY SNAP (F3419102R0)	1
<b>SCREWS</b>				
	40010267	SCREW M3X10	BINDING MACHINE FE BZC	2
	5100007965	SCREW 3X6 (H5029325R0)	PAN TAPPING B1 BZC	5
#	5100008240	SCREW 3X12 (H5029842R0)	HEXSOCKET TAPTITE P BZC	4
	5100007512	THUMB SCREW	(H5029820R0)	1
	5100003918	JACK NUT M9X12X2	NI RTC(H5039510R0)	3
	5100008092	PLAIN WASHER 3X6X0.5	RESIN RTC(H5039708R0)	2
	5100003926	PLAIN WASHER 9X13.5X0.5T	NI(H5039158R0)	3
	5100008086	INT TOOTH WASHER 9.5X12.5X0.5	NI RTC(H5039205R0)	2

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MISCELLANEOUS				
	40016512	INSULOK TIE	80M/M T-18S	1
	5100006633	BOTTOM FOOT	(22357305R0)	1
	5100007504	COIL SPRING	(22177109R0)	1
	5100007505	PEDAL GUIDE BUSH	(22157702R0)	1
#	5100010361	BATTERY SNAP		1
	5100007503	BATTERY CUSHION	(22267333R0)	1
	5100006631	CAUTION SEAL	PSA (FCC/EMI)(G2537516R2)	1
#	5100008238	PSA CAUTION	(G2537401R0)	1
<hr/>				
ACCESSORIES (Standard)				
#	5100007386	OWNER'S MANUAL	JAPANESE/ENGLISH	1

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## Verifying the Version Numbers

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Verify the version number in the **Test Mode** (p. 9).

## Data Backup and Restore Operations

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On the TU-3, the following settings remain in memory even after the power is switched off. Executing a factory reset returns these settings to their factory defaults. Before performing servicing or testing, note down user setting values on paper.

Saved setting	Obtainable setting values
Tuning-mode settings	Chromatic, Chromatic Flat, Guitar, Guitar Flat, Bass, Bass Flat
Reference-pitch setting	436 through 445 Hz
Meter display-pattern setting	CENT, STREAM
Accu-Pitch sign function on/off setting	On, Off

For information on how to verify user-setting values and how to change settings, refer to the owner's manual.

## Performing a Factory Reset

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Executing a factory reset returns the settings described earlier to their factory defaults. Before executing this, note down the values on paper.

1. Hold down the **MODE** button and switch on the power (by inserting a plug into the INPUT jack).  
The green light at the center of the meter lights up.
2. Within approximately 3 seconds, press the **MODE** button again.  
The green light at the center of the meter flashes three times, the factory-default settings are restored, and the unit returns to its normal mode.

*\* If several seconds elapse without the **MODE** button being pressed, or if any button other than the **MODE** button is pressed, the unit changes to its normal mode without restoring the factory-default settings.*

## Updating the System

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If a system update is required, replace the circuit board with an updated one.

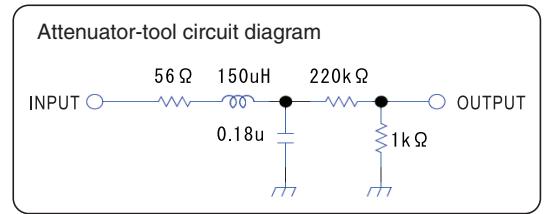


# Test Mode

## Items Required

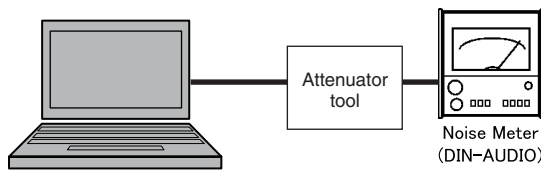
- Signal generator
- Oscilloscope
- Noise meter (e.g., NF M2177)
- Tester
- 47-k $\Omega$  dummy plug x 1
- Amp-equipped monitor speaker
- Computer (running Windows XP)
- WAV data (the following three files—obtained via Service Net)
  - 1C0\_JUST.WAV
  - 2A4\_JUST.WAV
  - 3C8\_just.WAV

- Attenuator tool x 1



## Preliminary Preparations

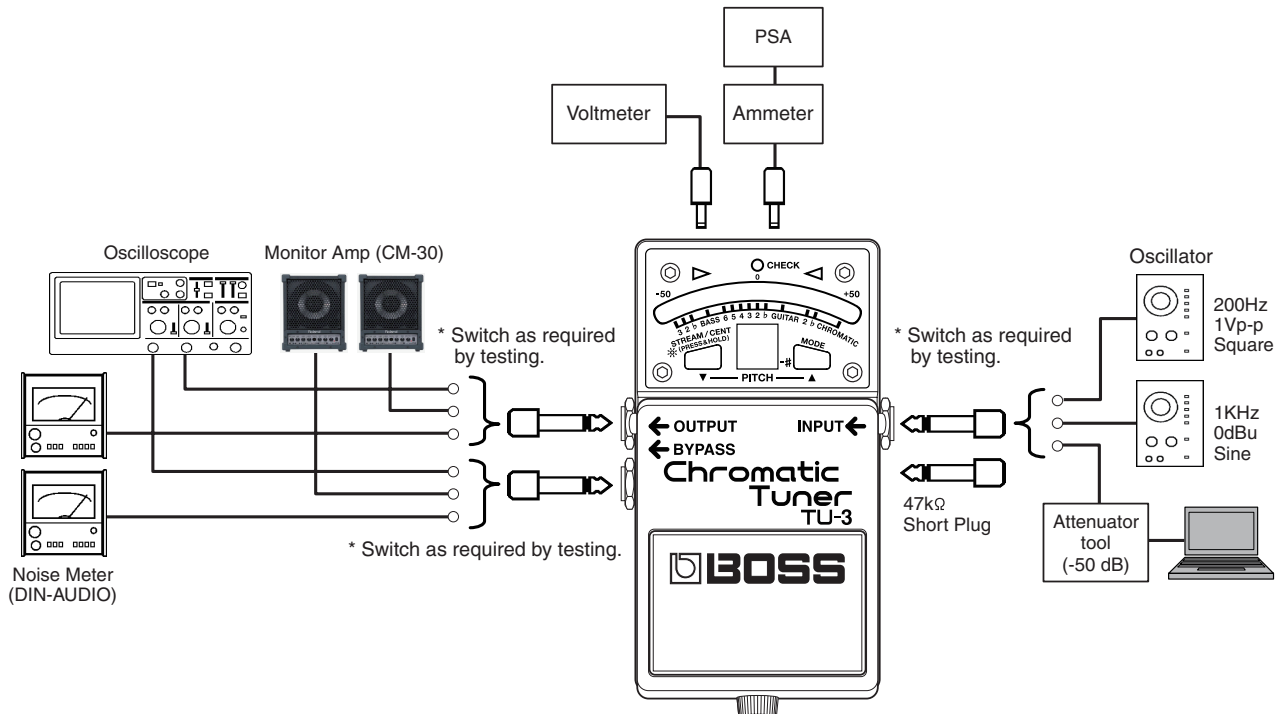
1. Connect the respective pieces of equipment as shown below.



2. On the computer, use Windows Media Player to play **2A4\_JUST.WAV**, and adjust the output level so that the noise meter displays a value of **-60 dBu**.

## Entering the Test Mode

1. Referring to the figure below, connect the equipment at all points except the **INPUT** jack.



2. Hold down the **MODE** and **STREAM/CENT** buttons and insert the plug into the **INPUT** jack.

## Quitting the Test Mode

Disconnect the plug from the **INPUT** jack.

\* Because disconnecting the plug from the **INPUT** jack while testing is in progress switches off the power, interposing a switching tool between the **INPUT** jack and the plug can facilitate operations.

## Test Items

1. **Version Check, EEPROM Check, and Switch Check** (p. 10)
2. **LED and Current-consumption Check** (p. 10)
3. **OUTPUT Check** (p. 11)
4. **TUNER Operation Check** (p. 11)
5. **Noise Check** (p. 12)
6. **DC OUT Check** (p. 12)
7. **Battery Operation Check** (p. 12)

### 1. Version Check, EEPROM Check, and Switch Check

This item combines both the version check and the check of **STREAM/CENT** and **MODE** switch operation.

For the version, performing the operation described below makes the digits of the version number appear in sequence. The screens shown below display version 1.00.

1. Hold down the **MODE** and **STREAM/CENT** buttons and insert the plug into the **INPUT** jack.  
The value of the integer portion of the version number appears on the seven-segment LED display.



\* A check of the EEPROM is carried out automatically at this time. If a problem is found in the EEPROM, **E** appears on the seven-segment LED display.

2. Within 2 seconds after the operation in step 1, press the **MODE** switch.  
The value of the version number's first digit to the right of the decimal point appears on the seven-segment LED display.



3. Press the **STREAM/CENT** button.  
The value of the version number's second digit to the right of the decimal point appears on the seven-segment LED display.



4. Depress the pedal to advance to the next test.

### 2. LED and Current-consumption Check

1. Verify that the connections and signal input are as shown below.  
**INPUT:** 200 Hz, 1.0 Vp-p, rectangular wave  
**OUTPUT:** Oscilloscope (channel 1)  
**BYPASS:** Oscilloscope (channel 2)  
Oscilloscope settings: 0.5 V/div., 1.0 ms/div., coupling DC
2. The LEDs on the panel light up or flash as shown below. Verify that no locations remain dark.
  - **CHECK LED:** Flashing
  - Meter LEDs (red/green): The LEDs light up in sequence from left to right, then the center LED lights up green. (This is repeated.)
  - Guide LEDs (▶ and ◀; yellow): The left and right LEDs light up in alternation
  - 7-segment LED display: The segments light up clockwise, with the dot at bottom right lighting up last.



3. Depress the pedal.  
An LED pattern for verifying current consumption is displayed.



4. Verify that the current-consumption value is **76 mA** or less.
5. Depress the pedal.  
All LEDs light up, alternating between high and low brightness.



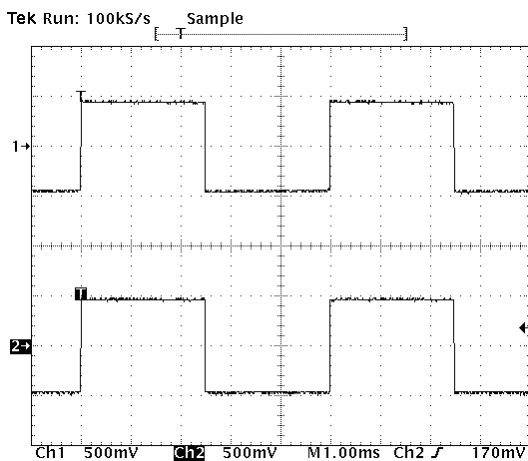
6. Verify that the brightness changes and that no locations remain dark. This completes the testing in the Test Mode.
7. Depress the pedal.  
Execution changes to the normal mode. Immediately go on to the test items on the next page.  
If the unit is powered down at this point, then when restarting it, start up in the normal mode.

### 3. OUTPUT Check

- Verify that the connections and signal input are as shown below.  
**INPUT:** 200 Hz, 1.0 Vp-p, rectangular wave  
**OUTPUT:** Oscilloscope (channel 1)  
**BYPASS:** Oscilloscope (channel 2)  
 Oscilloscope settings: 0.5 V/div., 1.0 ms/div., coupling DC
- Verify that the **CHECK** LED has gone dark.



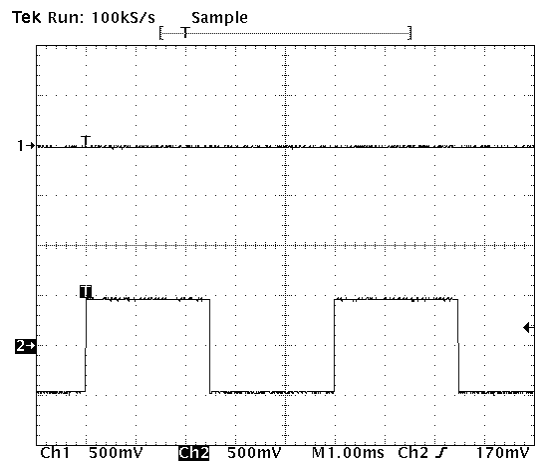
- Verify that signals like the following are output.  
**OUTPUT:** 1.0+/-0.1 Vp-p  
**BYPASS:** 1.0+/-0.1 Vp-p



- Depress the pedal and verify that the **CHECK** LED lights up.



- Verify that signal output stops for **OUTPUT** only.



- Change the connections and signal input as shown below.  
**INPUT:** 1 kHz, 0 dBu, sine wave  
**OUTPUT:** Noise meter (DIN audio)  
**BYPASS:** N/A
- Verify that the noise-meter value (OUTPUT mute level) is **-90 dBu** or less.

### 4. TUNER Operation Check

- Depress the pedal and verify that the **CHECK** LED lights up.
- Press the **MODE** button several times to make **CHROMATIC** light up.
- Connect audio output from the computer to the **INPUT** jack via the attenuator tool.
- Play **1C0\_JUST.WAV** on the computer.  
 A 16.352-Hz sine wave at -50 dBu is input to the **INPUT** jack.
- Verify that the center light of the LED meter lights up and **C** appears on the seven-segment LED display.



- Play **2A4\_JUST.WAV** on the computer.  
 A 440.00-Hz sine wave at -60 dBu is input to the **INPUT** jack.
- Verify that the center light of the LED meter lights up and **A** appears on the seven-segment LED display.



- Play **3C8\_just.WAV** on the computer.  
 A 4,186-Hz sine wave at -60 dBu is input to the **INPUT** jack.

9. Verify that the center light of the LED meter lights up and **C** appears on the seven-segment LED display.



10. Depress the pedal and verify that the **CHECK** LED goes dark.

## 5. Noise Check

- Change the connections as shown below.
  - INPUT:** 47-k $\Omega$  dummy plug  
(Connect this directly to the **INPUT** jack.)
  - OUTPUT:** Noise meter (DIN audio)
  - BYPASS:** Noise meter (DIN audio)
- Depress the pedal to switch on the tuner, then verify the residual noise.
  - BYPASS:** -102 dBu or less
  - OUTPUT:** -106 dBu or less
- Change the connections as shown below.
  - INPUT:** 47-k $\Omega$  dummy plug  
(Connect this directly to the **INPUT** jack.)
  - OUTPUT:** Monitor amp
  - BYPASS:** Monitor amp
- Depress the pedal several times and verify that no switching noise occurs.

## 6. DC OUT Check

- Change the connections as shown below.
  - INPUT:** Computer output
  - OUTPUT:** N/A
  - BYPASS:** N/A
- Connect an AC adaptor (PSA-series device) directly to **DC IN**.
- Verify the following.
  - Voltage at **DC OUT** is 8.5 V or higher.
  - The product is in operation.

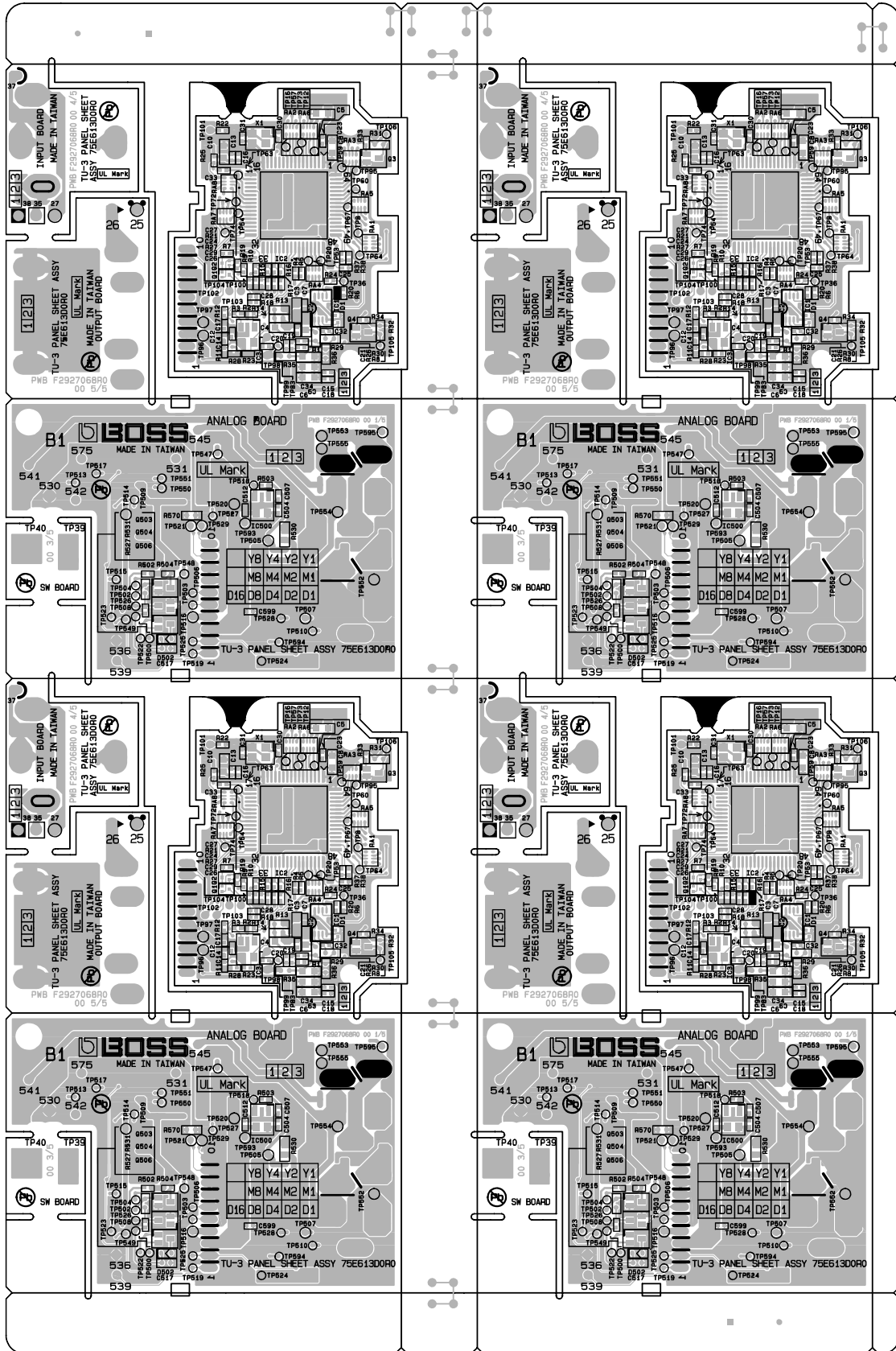
## 7. Battery Operation Check

- Disconnect the AC adaptor.
- Insert a battery into the battery compartment, then insert a plug into the **INPUT** jack.
- Verify that the **CHECK** LED lights up.

\* If the lighted **CHECK** LED is not bright, try using a fresh battery.

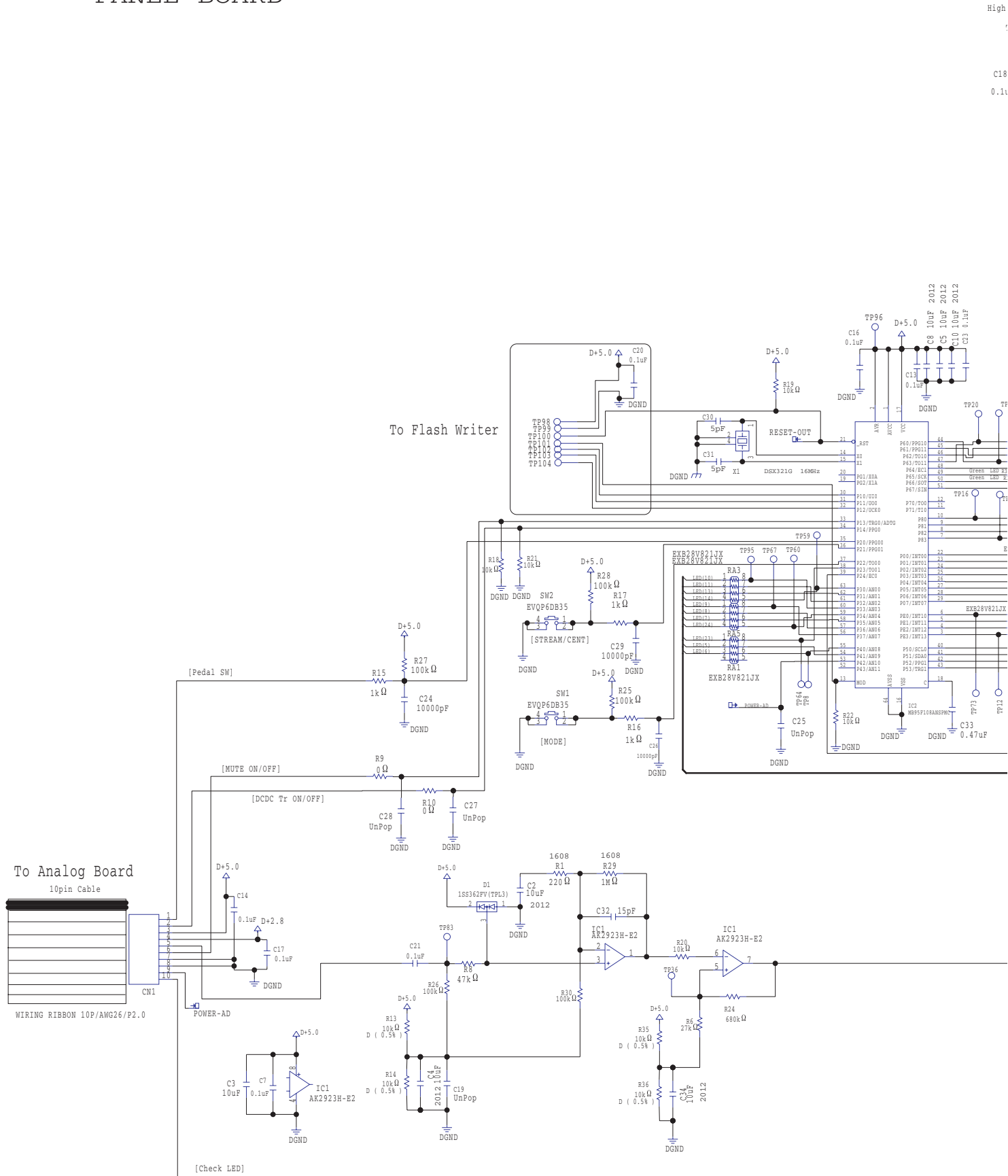






# Circuit Diagram (Panel Board)

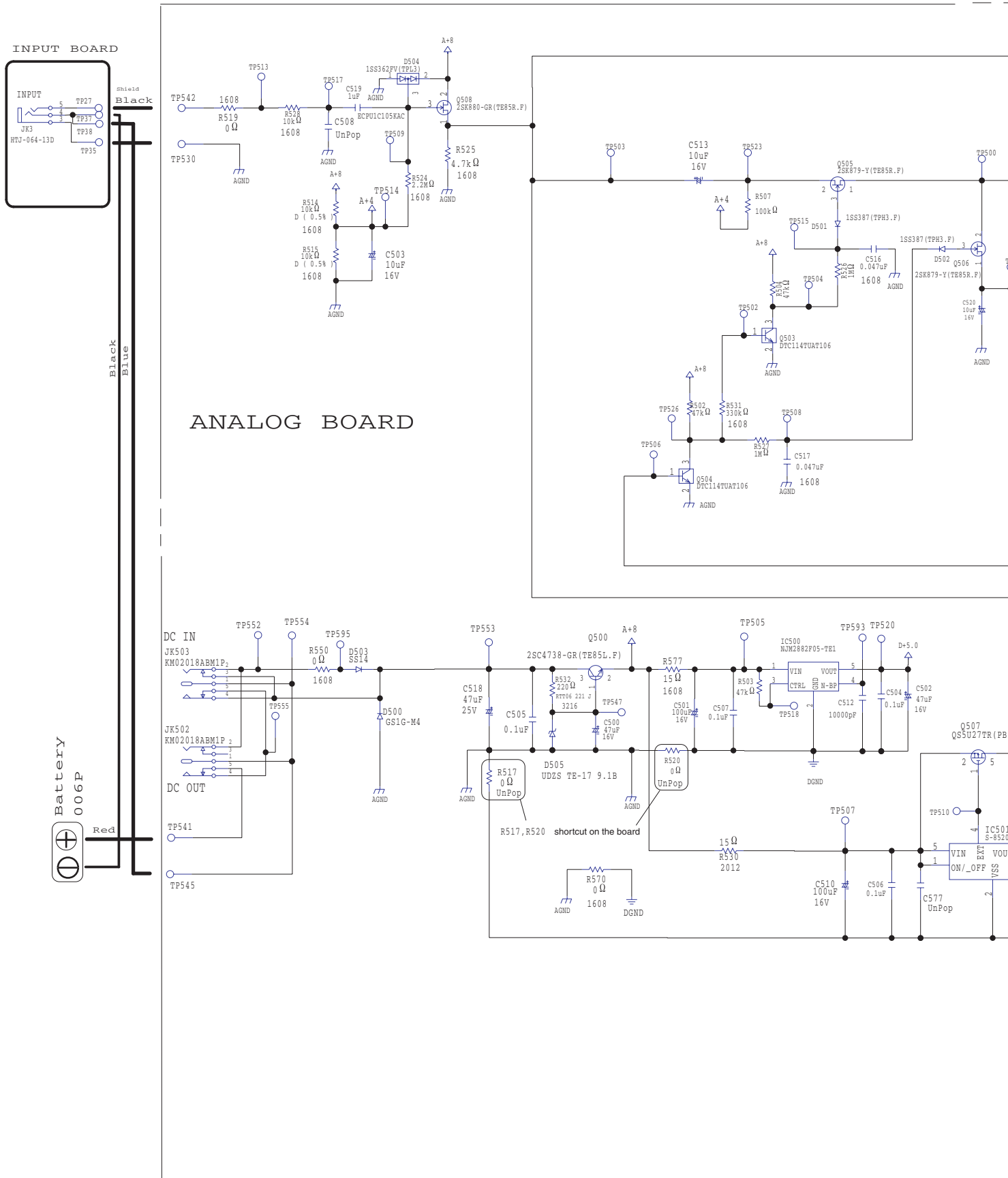
## PANEL BOARD



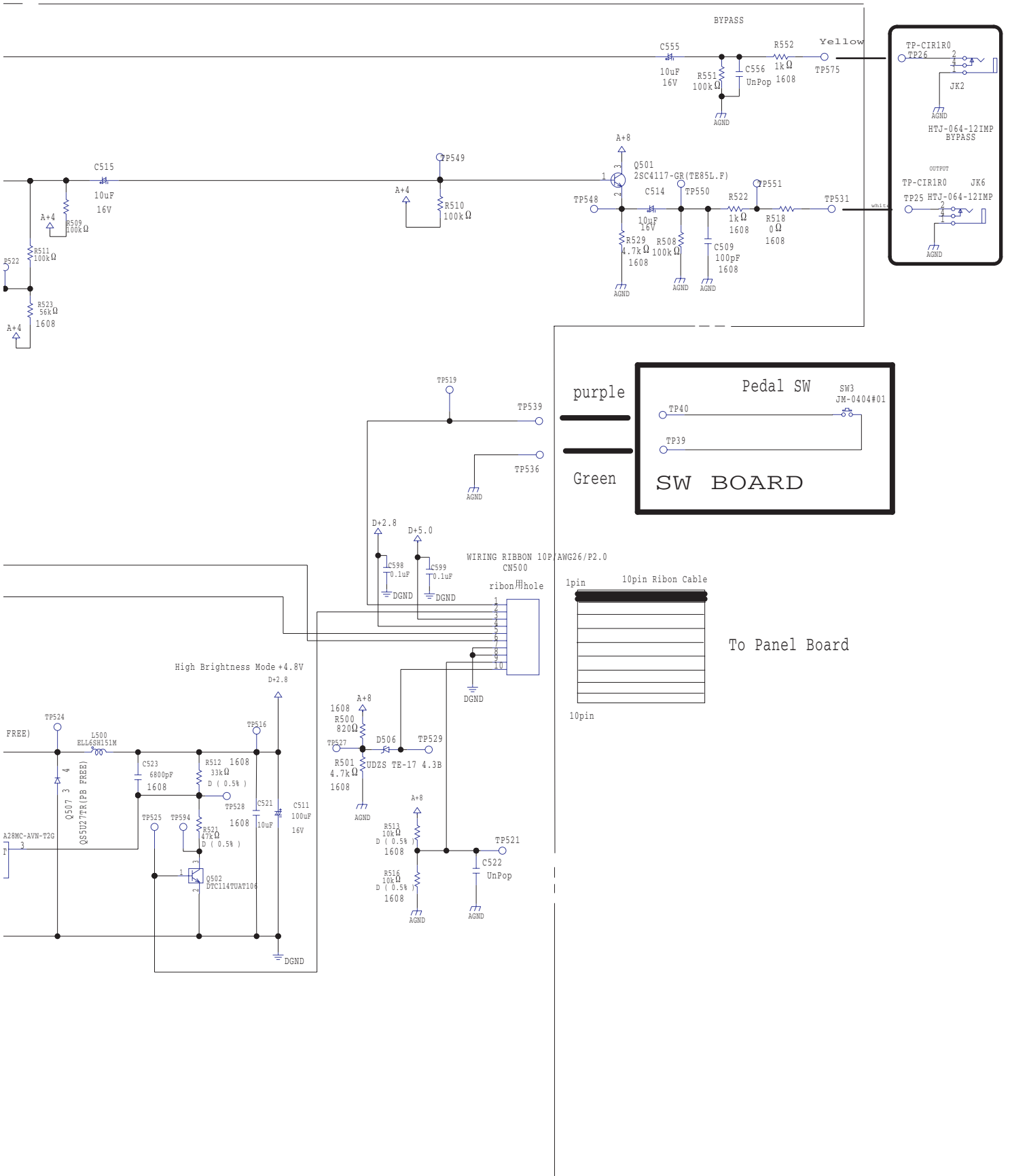




# Circuit Diagram (Analog, Input, Output, SW Board)



OUTPUT BOARD



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# MEMO