SECTION 5
CIRCUIT ADJUSTMENTS

Perform this section only when the components of each board have been replaced. When the completed board had been replaced, the following adjustments will not be required.

5-1. POWER BLOCK

5-1-1. DC (+) Adjustment

1. Remove the GA board, and connect it back through the extension board.
2. Connect a digital voltmeter to pin 1 and pin 3 of CN11 of the GA board.
3. Adjust RV101 on the GAA board of CN14 side so that the voltage becomes the following specification.
   Specification: 375 ±2 V
4. Connect a digital voltmeter to pin 6 and pin 4 of CN11 of the GA board.
5. Adjust RV101 on the GAA board of CN15 side so that the voltage becomes the following specification.
   Specification: 375 ±2 V

5-1-2. +115 V Adjustment

1. Remove the GB board, and connect it back through the extension board.
2. Connect a digital voltmeter to pin 2 and pin 6 of CN34 of the GB board.
3. Adjust RV403 on the GBB board so that the voltage becomes the following specification.
   Specification: 116 ±0.5 V

5-1-3. +200 V Adjustment

1. Remove the GB board, and connect it back through the extension board.
2. Connect a digital voltmeter to pin 1 and pin 6 of CN34 of the GB board.
3. Adjust RV404 on the GBB board so that the voltage becomes the following specification.
   Specification: 200 ±1.0 V

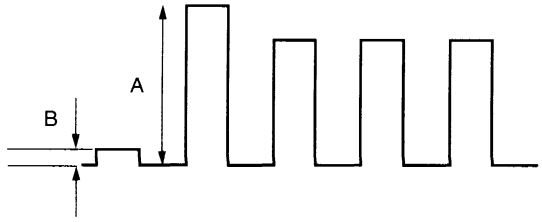
5-1-4. Oscillating Frequency Adjustment

1. Remove the GB board, and connect it back through the extension board.
2. Connect a frequency counter to the gate terminal of Q6 of the GB board.
3. Adjust RV201 on the GBA board so that the frequency becomes the following specification.
   Specification: 85 ±2 kHz
4. Connect a frequency counter to the gate terminal of Q10 of the GB board.
5. Adjust RV202 on the GBA board so that the frequency becomes the following specification.
   Specification: 95 ±2 kHz
6. Connect a frequency counter to the gate terminal of Q8 of the GB board.
7. Adjust RV402 on the GBB board so that the frequency becomes the following specification.
   Specification: 85 ±2 kHz
8. Connect a frequency counter to the gate terminal of Q12 of the GB board.
7. Adjust RV401 on the GBB board so that the frequency becomes the following specification.
   Specification: 100 ±2 kHz

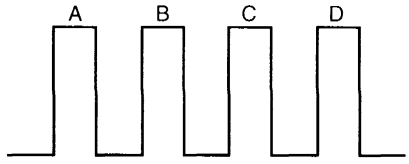
5-2. BA BOARD ADJUSTMENT

5-2-1. Picture Control Adjustment

1. Connect an oscilloscope to TP1612 of the BA board.
2. Connect a communication controller to the RS-422A connector of the YA board.
   Note: Be sure to set this unit and the communication controller to the same baud rate.
3. Turn the power on.
4. Input the NTSC 100 % color bars signal.
5. Change the PICTURE (SUB PICTURE) data of CXA2101Q (IC1600) with a communication controller. Set the level "A (from the pedestal to 100 IRE)" so that it is closest value to 0.700 Vp-p.
6. Change the BRIGHT (SUB BRIGHT) data of CXA2101Q (IC1600) with a communication controller. Set the level "B" so that it is closest value to zero volt.



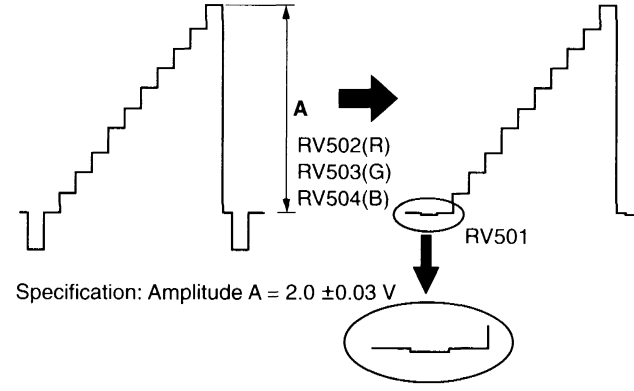
7. Input the NTSC 75 % color bars signal.
8. Change the SUB-COL (NT3.58EXB OFF) data and SUB-HUE (NT3.58) data of CXA2101Q (IC1600) with a communication controller. Set the levels "A, B, C, and D" so that they are visibly equal in amplitude.



9. Input the SUB-COL (NT3.58EXB OFF) data adjusted in step 8 to SUB-COL (NT3.58EXB ON).
10. Input the PAL 75% color bars signal.
11. Change the SUB-COL (PALEXB OFF) data and SUB-HUE (PAL) data of CXA2101Q (IC1600) with a communication controller. Set the levels "A, B, C, and D" so that they are visibly equal in amplitude.
12. Input the same data as SUB-COL (PAL EXB OFF) adjusted in step 11 to SUB-COL (SECAM EXB OFF), SUB-COL (NT4.43EXB OFF), SUB-COL (PAL-M EXB OFF), SUB-COL (PAL EXB ON), SUB-COL (SECAM EXB ON), SUB-COL (NT4.43 EXB ON), and SUB-COL (PAL-M EXB ON).
13. Input the same data as SUB-HUE (PAL) adjusted in step 11 to SUB-HUE (SECAM), SUB-HUE (4.43), SUB-HUE (PAL-M), SUB-HUE (RGB), SUB-HUE (15kRGB), SUB-HUE (YPbPr), SUB-HUE (RGB), and SUB-HUE (IDTV).
14. Press the MEMORY key.

5-2-2. Signal Level Adjustment

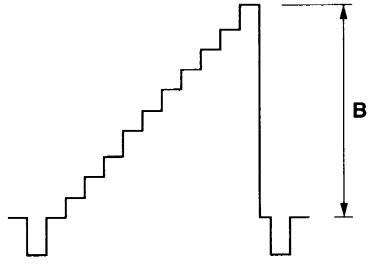
1. Input the 10-STEP signal to VIDEO IN.
2. Set the CONTR and GAIN of each color to maximum position.
3. Connect 75 Ω resistor between pin-A/B/C16 (RED OUT) of connector CN341 on the BA board to ground. Connect 75 Ω resistors between pin-A/B/C18 (GREEN OUT) and ground, and pin-A/B/C20 (BLUE OUT) and ground of connector CN341 on the BA board toground.
4. Short-circuit between pin-B26 (ABL) of CN 340 on the BA board and ground.
5. Adjust RV502 (R), RV503 (G), and RV504 (B) on the BA board in sequence so that the amplitude of R, G, and B levels become 2 ±0.05 V.
6. Adjust RV501 on the BA board so that the sync level of GREEN OUT signal becomes the same level aspedestal level. Check to see that the sync levels of RED OUT and BLUE OUT signals are within the pedestal level.



Note: Adjust the sync level so that it becomes the same level as pedestal level. If the sync level fluctuates, stop RV501 where it is stable position.

5-2-3. Analog Test Signal Amplitude Adjustment

1. Press the GAIN key to output the analog test signal.
2. Connect an oscilloscope to pin 4 of IC208 on the BA board.
3. Adjust RV200 on the BA board so that the level of analog signal meets the following specification.



Specification: B = 0.7 ±0.02 V

5-2-4. ABL Adjustment

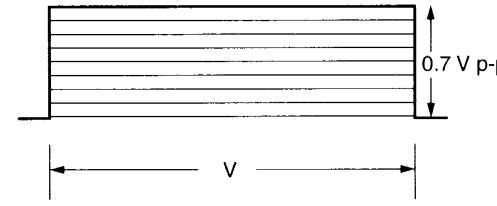
1. Receive the white signal.
2. Set the CONTR, BRIGHT, and GAIN to the maximum position.
3. Connect a digital voltmeter to base of Q813 on the BA board. Adjust RV800 so that the voltage is −3.34 ±0.05V.

5-3. CAR/CAG/CAB BOARDS ADJUSTMENT

5-3-1. Preparation Before Adjustments

1. Input the following signal.

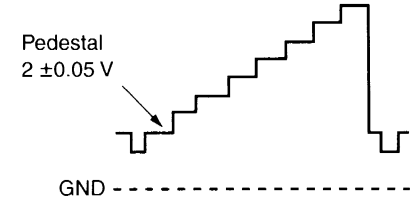
Specification		
	fH:	64 kHz
	fV:	60 Hz
	Amplitude:	0.7 ±0.01 V
	Sync:	off



2. Remove the CAR/CAG/CAB boards and CDR/CDG/CDB board in sequence, and connect it back through the extension board.

5-3-2. Pedestal Level Adjustment

1. Connect an oscilloscope to TP511.
2. Adjust the pedestal level by RV145.

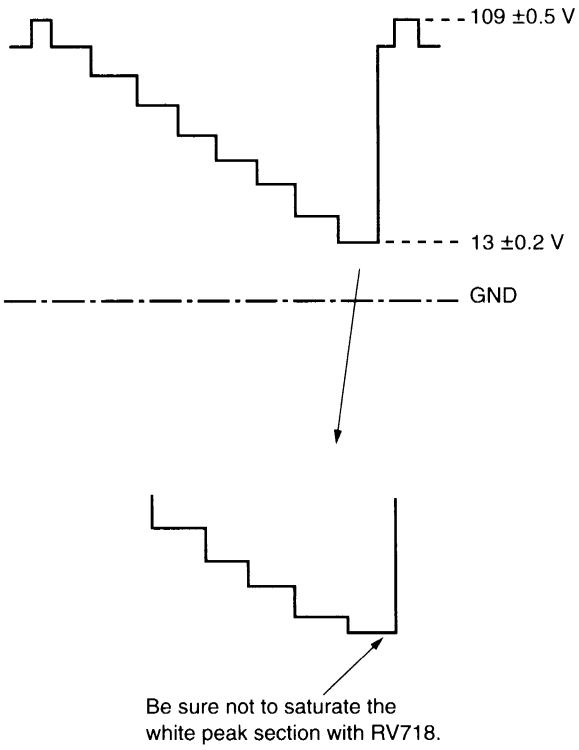


5-3-3. CRT Protector Adjustment

1. Connect a variable current source (3.5 mA to 4.5 mA) between the cathode terminal (pin 8 of CRT socket) of the CBR (CBG and CBB) board and B +12 V line of the CDR (CDG and CDB) board.
2. Connect a pull-up resistor (4.7 kΩ) between pin 3 of CN244 (CN264 and CN284) and +5 V line of the CDR (CDG and CDB) board, then connect an oscilloscope to it.
3. Gradually raise the output of the variable current source, and adjust RV965 of the CAR (CAG and CAB) board so that the waveform on the oscilloscope changes from "High" to "Low" level at 3.9 ±0.1 mA.

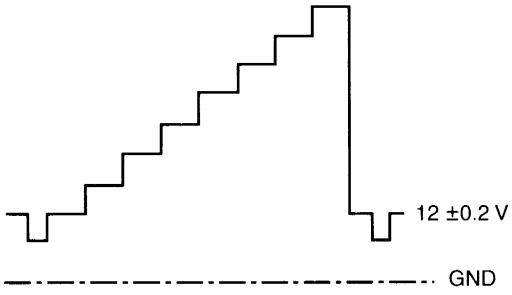
5-3-4. Cathode Level Adjustment

1. Apply the following voltages to CN244 (CN264 and CN284) of the CDR (CDG and CDB) board:
   CN244/CN264/CN284 Pin 1: +175 ±1 V
   CN244/CN264/CN284 Pin 10: +115 ±0.5 V
2. Connect an oscilloscope to TP1201 on the CBR (CBG and CBB) board, and adjust RV1223 so that the voltage becomes 113 ±0.5 V.
3. Connect an oscilloscope to base terminal of Q948 on the CDR (CDG and CDB) board, and adjust RV785 on the CAR (CAG and CAB) board so that the peak section of the black level becomes 109 ±0.5 V.
4. Adjust RV718 so that the amplitude of white peak section becomes 13 ±0.2 V.

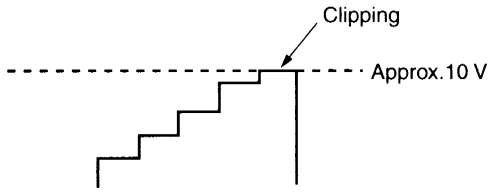


5-3-5. G1 Level Adjustment

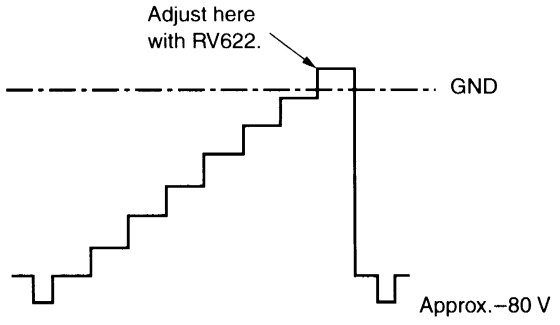
1. Connect an oscilloscope to the plus (+) terminal of capacitor C820 on the CDR (CDG and CDB) board, and adjust RV682 so that the black level becomes 12 ±0.2 V.



2. Connect an oscilloscope to TP891 of the CDR (CDG and CDB) board, and adjust RV623 so that the white peak section of the waveform doesn't clip.



3. Connect an oscilloscope to TP891 on the CDR (CDG and CDB) board. Make sure that the peak section of the waveform clips when turn RV622 on the CAR (CAG and CAB) board counterclockwise. Turn RV622 gradually clockwise and stop it just before the limiter circuit works.



5-3-6. VPS Limiter Adjustment

Note: Be sure to perform this adjustment when increasing Contrast and if there is VPS (Video Peak Saturation) on the screen.

1. Input the signal which contains VPS components.
2. Set the unit in the EXPERT MODE.
3. Set the unit in SERVICE SETTING3/DEVICE CONTROL/VPS LIMITER mode, then press the ENTER key.
4. Cut off the color which is no VPS. If there are VPS on two or three colors, perform adjustment color by color.
5. Set the CONTR to maximum position.
6. Decrease the data value until the VPS disappears.
7. After the adjustment, press the MEMORY key.

5-4. DA/DB/DD BOARDS ADJUSTMENTS

5-4-1. F/V Voltage Adjustment (DA Board)

1. Input the signal of its horizontal frequency (fH) is 64 kHz to R/G/B INPUT connectors.
2. Connect a digital voltmeter to TP104.
3. Adjust RV101 so that the voltage at TP104 is 3 ±0.05 V.

5-4-2. AFC Adjustment (DA Board)

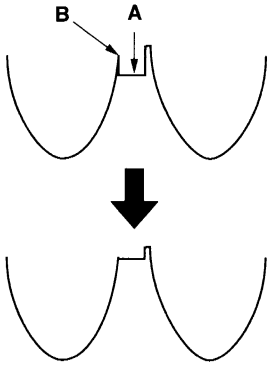
1. Set the HD OFF switch (S102) to "OFF" position.
2. Input the signal of its horizontal frequency (fH) is 64 kHz to R/G/B INPUT connectors.
3. Adjust RV104 to lock the horizontal sync properly on the screen.
4. Input the signal of its horizontal frequency (fH) is 150 kHz.
5. Adjust RV103 to lock the horizontal sync properly on the screen.
6. Input the video signal to the VIDEO INPUT connector.
7. Adjust RV105 to lock the horizontal sync properly on the screen.
8. Set the HD OFF switch (S102) to "ON" position.
9. Input the 15.75 kHz, 30 kHz, 64 kHz, 100 kHz, and 150 kHz signals in sequence, and make sure that the horizontal sync is locked properly.

5-4-3. V Hold Adjustment (DA Board)

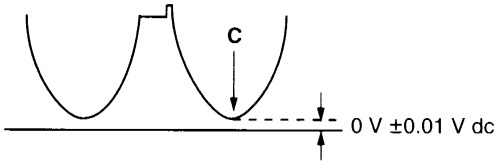
1. Connect a frequency counter or oscilloscope to pin-C11 (V.TRIGGER) of connector CN170 or pin 12 of IC110.
2. Input the signal of its vertical frequency (fV) is 60 Hz to R/G/B INPUT connectors or VIDEO INPUT connector.
3. Set the V SYNC OFF switch (S101) to "OFF" position.
4. Adjust RV102 so that the frequency is 50 Hz (or one vertical period is 20 msec.).
5. Set the V SYNC OFF switch (S101) to "ON" position.
6. Input the 38 Hz, 50 Hz, 60 Hz, 100 Hz, and 150 Hz signals in sequence, and make sure that the vertical sync is locked properly.

5-4-4. H Parabola Waveform Adjustment (DA Board)

1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "240."
3. Set the data value of V SIZE COARSE to "maximum."
4. Connect an oscilloscope to TP402.
5. Adjust RV301 so that A section of a waveform is identical with B section.
   Specification: A level = B level



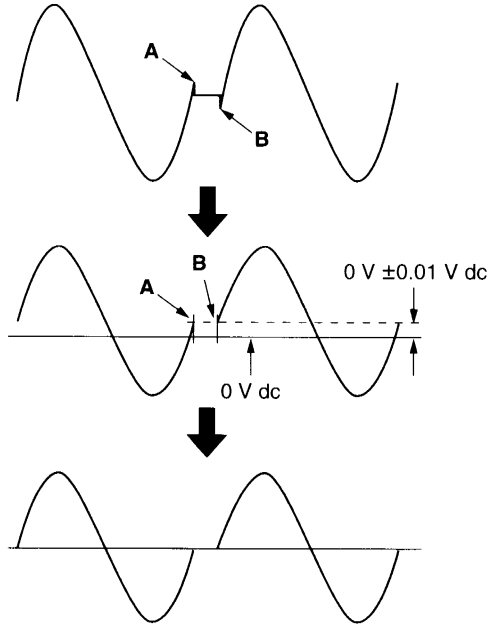
6. Adjust RV302 so that C section of a waveform is 0 ±0.01 V dc.
   Specification: C level = 0 ±0.01 V dc



7. Repeat steps 5 and 6 until satisfy the specifications.

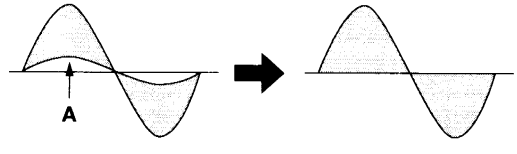
5-4-5. H SIN Adjustment (DA Board)

1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "240."
3. Set the data value of V SIZE COARSE to "maximum."
4. Connect an oscilloscope to TP403.
5. Adjust RV402 so that A section of a waveform is identical with B section.
   Specification: A level = B level
6. Adjust RV403 so that voltage of A and B sections are 0 ±0.01 V dc.
   Specification: A and B voltages = 0 ±0.01 V dc
7. Repeat steps 5 and 6 until satisfy the specifications.



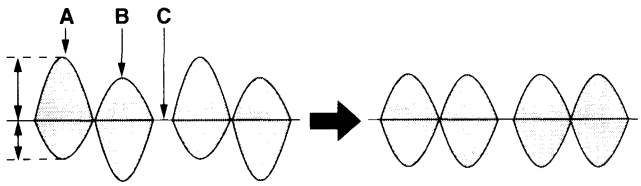
5-4-6. H SIN × VP Waveform Adjustment (DB Board)

1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP102.
5. Adjust RV202 so that A section of an envelope waveform is 0 V.



5-4-7. H SIN x V SIN Waveform Adjustment (DB Board)

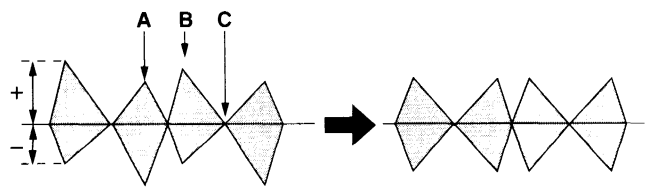
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP101.
5. Adjust RV102 so that A and B sections of a waveform become even with C section as shown in the figure.



6. Adjust RV101 so that C section of a waveform is 0 V.

5-4-8. HS x VS Waveform Adjustment (DB Board)

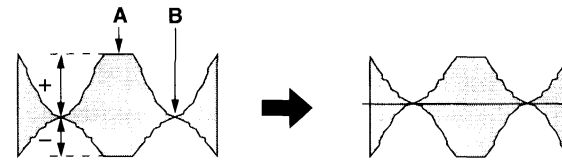
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP104.
5. Adjust RV402 so that A and B sections of a waveform become even with C section as shown in the figure.



6. Adjust RV401 so that C section of a waveform is 0 V.

5-4-9. HP x V SIN Waveform Adjustment (DB Board)

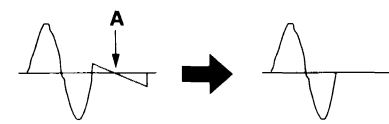
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP301.
5. Adjust RV302 so that A section of a waveform become even with B section as shown in the figure.



6. Adjust RV301 so that B section of a waveform is 0 V.

5-4-10. 1/2 SIN1 Waveform Adjustment (DB Board)

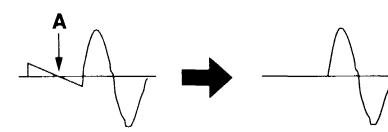
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP702.
5. Adjust RV703 so that A section of a waveform become even as shown in the figure.



6. Adjust RV704 so that A section is 0 V.

5-4-11. 1/2 SIN2 Waveform Adjustment (DB Board)

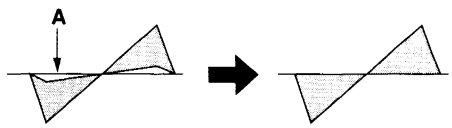
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP701.
5. Adjust RV701 so that A section of a waveform become even as shown in the figure.



6. Adjust RV702 so that A section is 0 V.

5-4-12. HS × VS Waveform Adjustment (DB Board)

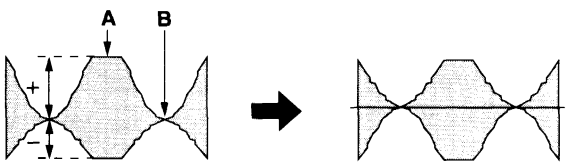
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP601.
5. Adjust RV601 so that A section of a waveform become even as shown in the figure.



6. Adjust RV602 so that A section is 0 V.

5-4-13. HP × VS Waveform Adjustment (DB Board)

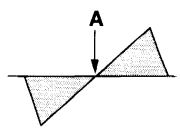
1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP602.
5. Adjust RV603 so that A section of a waveform become even as shown in the figure.



6. Adjust RV604 so that A section is 0 V.

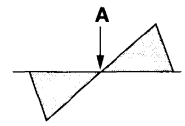
5-4-14. B KEY Waveform Adjustment (DB Board)

1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP502.
5. Adjust RV502 so that A section is 0 V.



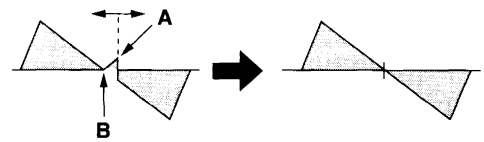
5-4-15. T KEY Waveform Adjustment (DB Board)

1. Input the signal of its frequency is 64 kHz.
2. Set the data value of H SIZE COARSE to "250."
3. Set the data value of V SIZE COARSE to "180."
4. Connect an oscilloscope to TP501.
5. Adjust RV501 so that A section is 0 V.



5-4-16. 1/2H Switching Waveform Adjustment (DA/DB Boards)

1. Input the signal of its frequency is 15 kHz.
2. Connect an oscilloscope to TP501 on the DB board.
3. Adjust RV303 on the DA board so that the switching point (A) coincides with 0V cross-point as shown in the figure.



5-4-17. D/A Converter Offset Adjustment (DD Board)

1. Pull out the DB board, then inset the extension board instead. Short-circuit pins B32 and C32 of the extension board's connector with a jumper wire.
2. Short-circuit both ends of capacitors C136 and C342 on the DD board with a jumper wires respectively.
3. Turn on the power.
4. Adjust RV301 so that the voltage at pin-A5 of CN211 is 0 ±0.01 Vdc.
5. Adjust RV302 so that the voltage at pin-A3 of CN211 is 0 ±0.01 Vdc.
6. Adjust RV303 so that the voltage at pin-A1 of CN211 is 0 ±0.01 Vdc.
7. Adjust RV304 so that the voltage at pin-A11 of CN211 is 0 ±0.01 Vdc.
8. Adjust RV305 so that the voltage at pin-A9 of CN211 is 0 ±0.01 Vdc.
9. Adjust RV306 so that the voltage at pin-A7 of CN211 is 0 ±0.01 Vdc.

5-5. VCO OFFSET/LIMITER ADJUSTMENT

Note: The electric power (+200 V) remains on the PA board for several minutes after even turning off the unit power. When withdrawing the PA board from the unit, check that the voltage of TP600 (+200 HV) has dropped. In case of hurry, it may be allowed to discharge with the resistance of approximately 1 kΩ/3 W. In that case, withdraw the PA board after checking the power voltage.

1. Turn off the power of the unit, then disconnect CN87 from the PA board.
2. Connect an oscilloscope to TP152 (HVDRV), and connect a voltmeter to TP151 (VCO IN) on the PA board.
3. Turn on the power of the unit.
4. Adjust RV101 (VCO LIMIT VOL) on the PA board so that the voltage at TP151 is 2.00 ±0 .01 V.
5. Adjust RV150 (VCO RANGE) on the PA board so that the pulse width at TP152 is 54.5 ±0.1 kHz
6. Adjust RV101 (VCO LIMIT VOL) on the PA board so that the voltage at TP151 is 1.70 ±0 .01 V.
7. Turn off the power of the unit, then remove the oscilloscope and voltmeter from the PA board.
8. Connect CN87 connected in step 1.

5-6. YA BOARD REPLACEMENT

5-6-1. Replacement Procedure

1. Remove the defective YA board
   Remove IC233, IC333, and IC334 from the YA board removed, and attach all to the new YA board.
   * IC233 : Boot program/Uploader program
     IC333 : User data save
     IC334 : Factory data save/Service data save/User data back up
2. During this time, be careful of the direction for attaching the ICs, and make sure no pins are bent, etc.
3. Set the rotary switches of the new board to the same value as the old board.
   * IC233 : Need not be replaced if the Ver. No. on the ROM is the same.
4. Attach the new board to the unit and check operations. If normal, the 7-segment LED on the YB board should change as follows when AC is turned ON.
   Red : 88 (Approx. 0.5 seconds) → Orange : 88 (Approx. 1.0 second) → Off
5. If images are displayed correctly when the power is turned on, it means that the board was replaced successfully.
   → Check the software version from the menu, upload the program as necessary if the version is old. Adjust the various data as necessary, and create and save the factory data and service data. (Refer to the next page for details on creating data.)

If the board operations appear abnormal;

- If an error code is displayed, follow the instructions.
- If the 7-segment LED of the YB board does not change from Red : 88.
  → The CPU-bus may be abnormal. Check the short-circuit of each bus line.
- Other problems after turning on the power.
  → Repair the circuit block with abnormal operations (See Block Diagram).

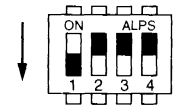
5-6-2. Uploading Program (Emergency Mode)

1. When the 7-segment LED of the YB board changes as follows when the AC is turned ON, the program upload mode will forcibly be set due to the abnormal program data inside. (Emergency mode)
   Red : 88 (Approx. 0.5 seconds) → Orange : 88 (Approx. 1.0 seconds) → Green : 10 (blinks twice) → Green : 11 (communication standby)
2. Prepare to upload program.
   Preparations : Set the S961 knob to the left.
   (RS-232C ↔ RS-422A switch)
   Connect the RS-232C controller.
3. Start the uploader software of the RS-232C controller, and start uploading the program data according to the proper procedure.
   The 7-segment LED on the YB board changes as follows;
   Green : 11 (loding) → Green :12 (updating) → Green : 11 → Green : 12 → (repeated) → Green : ZF (Aoorix. 0.5 seconds) → Red : 88 (Approx. 0.5 seconds) → Orange : 88 (Approx. 1.0 seconds) → Off
4. Initialization ends after about 11 minutes.
   → If Green : 30 (Lit) lights up on the 7-segment LED of the YB board without going off, it means that the software is requesting initialization of the user SRAM. Press S202 for about 5 seconds in the Green : 30 (lit) state, and the 7-segment LED should change as follows.
   Green :30→31 (Approx. 0.1 seconds) → Off
   End of intialization
   * Take note that initializing the user SRAM erases all user data.
5. Turn on the power and check operations.

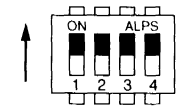
5-6-3. Creating Factory Data

To forcibly overwrite current factory data

1. Set S201-(1) to OFF in the AC OFF state.
   → Initial setting for entering the factory mode.



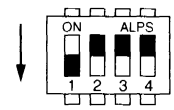
2. Perform AC ON, various adjustments, settings, data saving (user area).
3. In the AC ON state (or Standby state), set S201-(1) to ON.
   → The data will automatically be overwritten when the factory mode is exited.



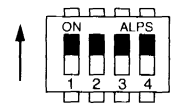
4. The 7-segment LED changes from 38 lit to off.
   * Duration of 38 lit is changed in accordance with data amount adjusted.
5. End of creating data

If data needs to be created again due to program version upgrading and parts replacement (IC334)

1. In the AC OFF state, set S201-(1) to OFF.
   → Initial setting for entering the factory mode.



2. Perform AC ON, various adjustments, settings, data saving (user area).
3. In the AC ON state (or Standby state), set S201-(1) to ON.
   → The data will automatically be overwritten when the factory mode is exited.



4. The 7-segment LED changes as follows;
   37 (approx. 90 seconds) → 38 (approx. 40 seconds) → Off
5. End of creating data

5-6-4. Creating Service Data

To forcibly overwrite existing service data

1. Enter the service mode in the AC ON state, and perform various adjustments, settings, data saving (user area).
2. Set the normal state. (Nothing displayed on OSD)
3. Press the ENTER key for about 5 seconds.
   → As the message "Do you save all data as SERVICE DATA?" will be displayed on the OSD, select "YES."
4. The 7-segment LED changes from 35 lit to off.
   * Duration of 35 lit is changed in accordance with the data amount adjusted.
5. End of creating data

If data needs to be created again due to program version upgrading and parts replacement (IC334)

1. Enter the service mode in the AC ON state, and perform various adjustments, settings, data saving (user area).
2. Set the normal state. (Nothing displayed on OSD)
3. Press the ENTER key for about 5 seconds.
   → As the message "Do you save all data as SERVICE DATA?" will be displayed on the OSD, select "YES."
4. The 7-segment LED changes as follows;
   * 34 (approx. 90 seconds) → 35 (approx. 40 seconds) → Off
5. End of creating data