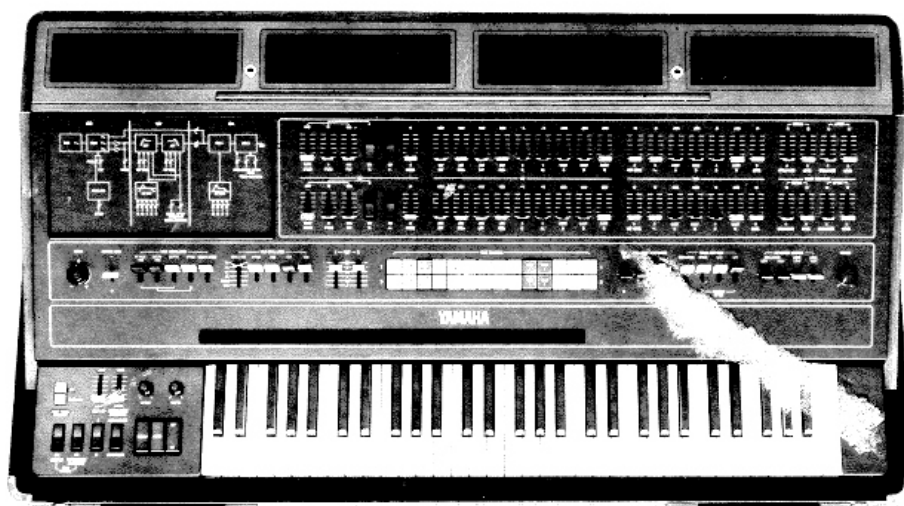


YAMAHA CS-80 POLYPHONIC SYNTHESIZER

— Adjustment Procedure —



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POWER SUPPLY

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	+15V power supply	As desired	Between +15V tie point and GND tie point: DVM	VR721, SVU board	Adjust to specs.	+15.00 ± .01V
2	-15V power supply	"	Between -15 terminal on M18 board and GND tie point: DVM	VR722, SVU board	"	-15.00 ± .01V
3	+8.5V power supply	"	Between +8.5 (+V) terminal on KBC board and GND tie point: DVM	VR723, SVU board	"	+8.5 ⁺⁰ _{-.1} V
4	-6.5V power supply	"	Between -6.5 (-V) terminal on KBC board and GND tie point: DVM	VR724, SVU board	"	-6.5 ⁺¹ ₋₀ V
5	+10.6V power supply	"	Between +10.6 terminal on BA board and GND tie point: DVM	VR725, SVU board	"	+10.60 ± .01V

[Caution]

When you carry out inspection on Power Supply Unit, be sure to make complete connection of the connector or Short Circuit both +15 ↔ +15S and -15 ↔ -15S. Otherwise, the circuit can break with the power on.

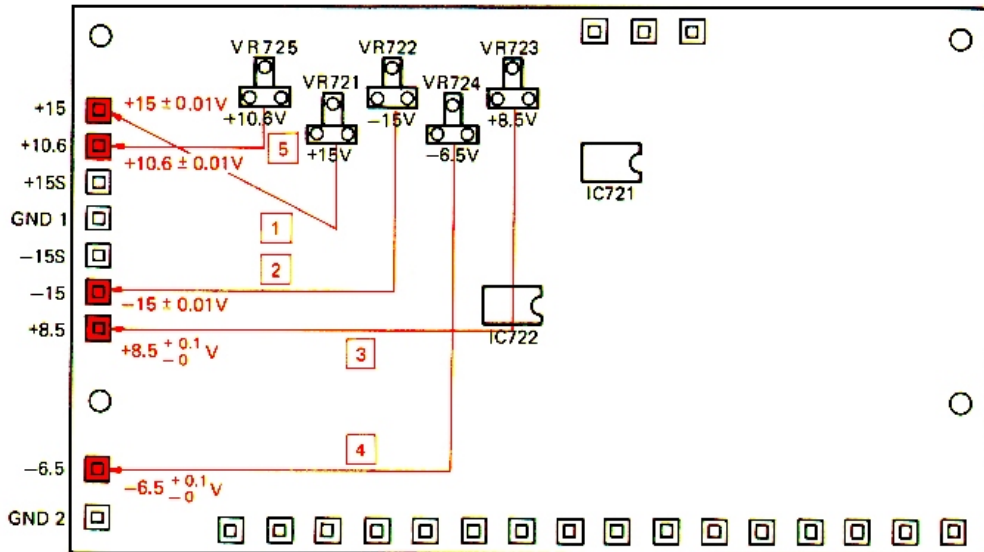
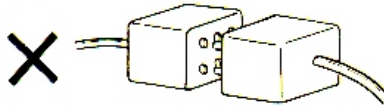


FIGURE 1. SVU BOARD

TUNING Notes) 1. Unit should be allowed to warm up at least 30 minutes before any final tuning adjustments are performed.
 2. If tuning is the only complaint from the customer perform steps 8 thru 12 of this procedure first.
 If the results are not satisfactory after performing steps 8 thru 12 go back and start at step 1.

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Reference voltage	PITCH . . . centered	TU, KAS board: DVM	VR3, BA board (Refer to Fig. 19.)	Adjust to specs.	+4.000V \pm .1%
2	Octave ladder network	"	Pin #13, IC2, KAS board: DVM	VR1, KAS board	"	+125.0mV \pm .1%
3	Voltage follower	"	Pin #6, IC3, KAS board: DVM	VR3, KAS board	Depressing C1 (lowest C) key, adjust to specs.	+125.0mV \pm .1%
4	Note ladder network	"	Pin #38, IC2, KAS board: DVM	VR2, KAS board	Depressing C1# key, adjust to specs.	+132.4mV \pm .1%
5	Buffer offset	PORTAMENTO lever . . . SHORT	K1 – K8, KAS board: DVM	VR6 – VR13, KAS board	Depressing C1 key, adjust to specs.	+125.0mV \pm .1%
6	S/H offset	SUSTAIN tab . . . II SUSTAIN lever . . . SHORT	K1 – K8, SH board: DVM	VR1 – VR8, SH board	"	+125.0mV \pm .1%

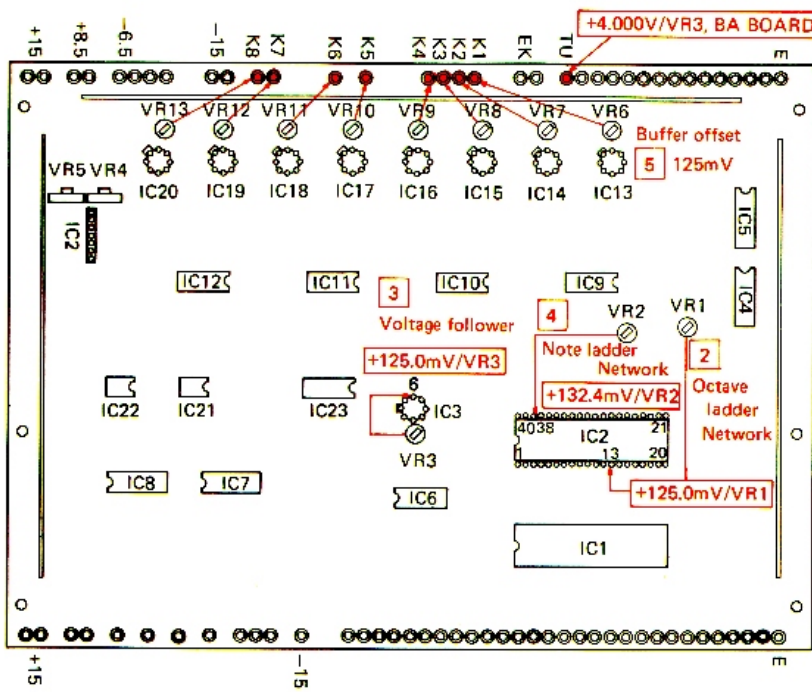


FIGURE 2. KAS BOARD

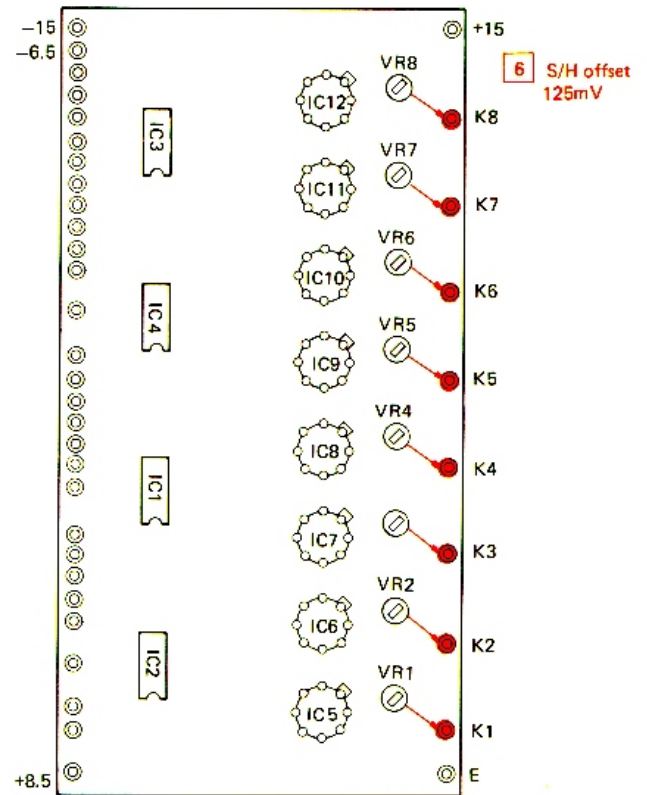


FIGURE 3. SH BOARD

TUNING (Continued)

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
7	Transposition gate zeroing	FEET ... 2'	Between CP6 and EK terminals, M board: DVM	VR1, M board	Adjust to specs.	$0 \pm .120\text{mV}$
8	2' transposition overall pitch	PITCH ... centered DETUNE CH II ... centered FEET ... 2' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ~ ... 10 S ... 10 LEVEL ... 10	Connect an amplifier/speaker system and tuning device to any of the outputs of the CS-80.	VR3, M board	Depressing A4 key, tune to specs.	Within ± 1 cent
9	Keyboard offset	"	"	VR2, M board	Depressing A1 key, tune to specs. <u>Repeat steps 8 & 9.</u>	Within ± 1 cent
10	4' transposition overall pitch	With the above settings, FEET ... 4'	"	VR4, M board	Depressing A4 key, tune to specs.	Within ± 1 cent
11	8' transposition overall pitch	With the above settings, FEET ... 8'	"	VR5, M board	"	Within ± 1 cent
12	16' transposition overall pitch	With the above settings, FEET ... 16'	"	VR6, M board	"	Within ± 1 cent

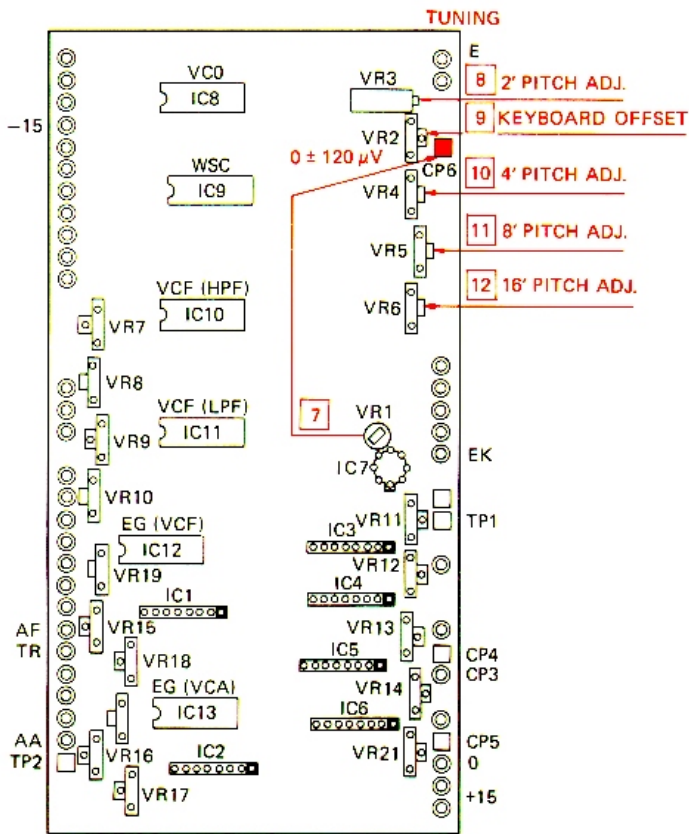


FIGURE 4. M BOARD

The CS-80's 16 master oscillators are divided into two groups 8 (M11 – M18 boards) for CH I and 8 (M21 – M28) for CH II. The MIX control determines which group is being heard.

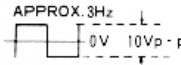
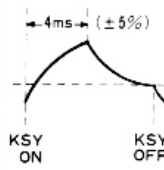
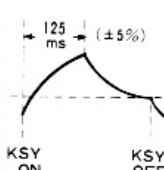
However, the digital key assigner circuit selects boards in pairs. For example M11 board in CH I and M21 board in CH II will be turned on together. In other words, whatever board is on in CH I the corresponding board will also be on in CH II. To determine which master oscillator is on proceed as follows –

- Depress one key and hold the key down.
- Touch master boards (#1 – 7) lightly on the foil side of the boards in the area of the blue pot (VR3) at the upper front side of the circuit board. (See Fig. 4)
- This will alter the pitch of one of the boards, that will be the board turned on at this time.
- This method in reverse, touching the board first then depressing the key repeatedly, will allow you to select a desired master board – except #8 board.
- To turn on #8 board depress the key on either side of the desired key 4 or more times and then hold down. While holding that key depressed, depress the desired key and release the first key. The #8 board should now be on. (If not repeat step "e".)



FIGURE 5. CS-80 KEYBOARD

VCF ENVELOPE GENERATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Attack time	<p>TONE SELECTOR ... PANEL VCF section</p> <p>IL ... -5 AL ... +5 D ... SHORT R ... SHORT A ... Set for a voltage of +8.0V at AF terminal on M board.</p> <p>With the above settings, VCF section</p> <p>A ... Set for a voltage of +3.0V at AF terminal on M board.</p>	<p>AF, M board: DVM TP1, M board: Oscilloscope</p>	<p>VR15, M board</p> <p>VR19, M board</p>	<p>Depressing keys, adjust to specs.</p> <p>– Alternative trigger method – Unsolder trigger wire from TR terminal on M board and connect a function gen. in its place.</p> <p>APPROX. 3Hz</p>  <p>Depressing keys, adjust VR19 to the direction the time is lengthened if the attack time is longer than 125ms and vice versa.</p> <p><u>Repeat steps until specs are accomplished.</u></p>	 
2	Sustain level	As desired	TP1, M board: DVM	VR18, M board	Depressing keys, adjust to specs.	$0 \pm .01V$

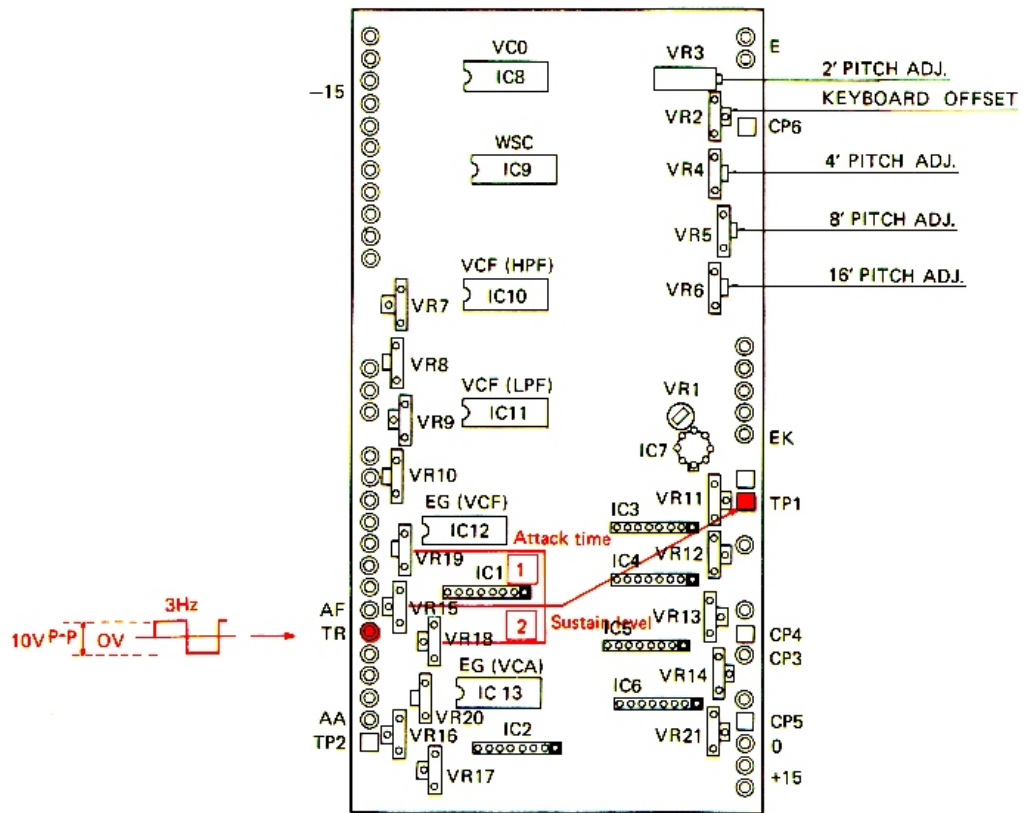

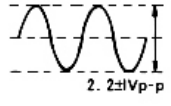


FIGURE 6. M BOARD

VCF — When only some of VCF ICs are changed —

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	HPF cutoff freq. & resonance	Remove one good M board in the same channel for comparison, FEET ... 2' BRILLIANCE ... centered RESONANCE ... max. TONE SELECTOR ... PANEL VCO section <input type="checkbox"/> ... ON VCF section RESH ... HIGH LPF ... HIGH RESL ... HIGH HPF ... Set for max. signal amplitude on good M board.	CP3, M board: Oscilloscope	VR7 & VR8, M board	Depressing C1 key, adjust VR7 of repaired board to achieve max. amplitude, then VR8 for same level as seen on good M board CP3 terminal.	 4.3 ± 1Vp-p
2	LPF cutoff freq. & resonance	With the above settings, VCF section HPF ... LOW RESH ... LOW RESL ... HIGH LPF ... Set for max. signal amplitude on good M board.		VR9 & VR10, M board	Depressing C1 key, adjust VR9 of repaired board to achieve max. amplitude, then VR10 for same level as seen on good M board CP3 terminal.	 2.2 ± 1Vp-p

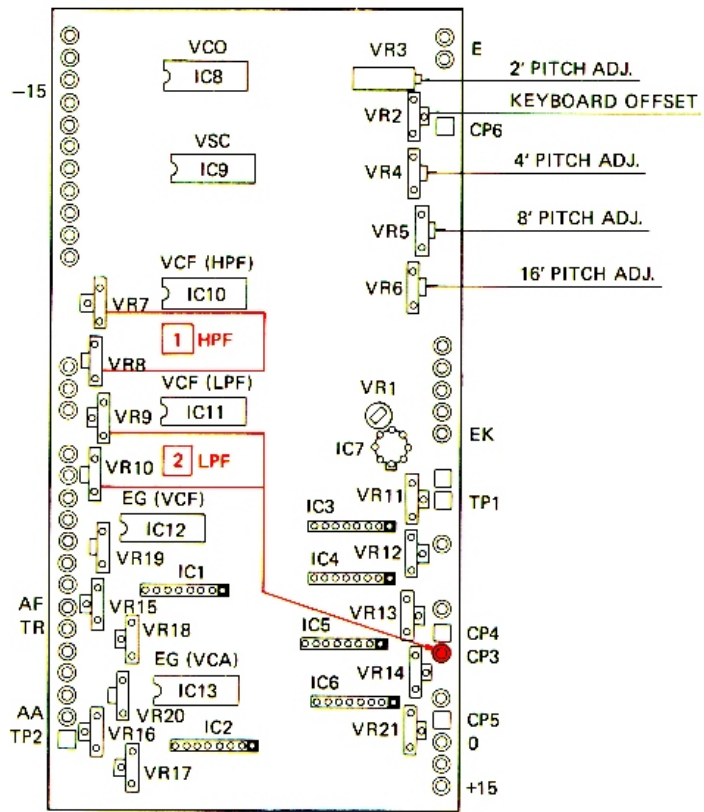
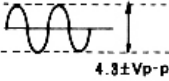
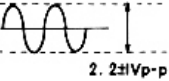


FIGURE 7. M BOARD

VCF — Complete VCF alignment —

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	HPF cutoff freq. & resonance	FEET ... 2' BRILLIANCE ... centered RESONANCE ... max. TONE SELECTOR ... PANEL VCO section <input type="checkbox"/> ... ON VCF section RESH ... HIGH LPF ... HIGH RESL ... HIGH HPF ... Set for a voltage of +4.0V at FH terminal on R51 (CH I) or R52 (CH II) board.	FH, R51 (CH I) or R52 (CH II) board: DVM CP3, M board: Oscilloscope	VR7 & VR8, M board	Depressing C1 key, adjust VR7 to achieve max. amplitude, then VR8 to specs.	 4.3 ± Vp-p
2	LPF cutoff freq. & resonance	With the above settings, VCF section HPF ... LOW RESH ... LOW RESL ... HIGH LPF ... Set for a voltage of +3.3V at FL terminal on R51 (CH I) or R52 (CH II) board.	FL, R51 (CH I) or R52 (CH II) board: DVM CP3, M board: Oscilloscope	VR9 & VR10, M board	Depressing C1 key, adjust VR9 to achieve max. amplitude, then VR10 to specs.	 2.2 ± Vp-p

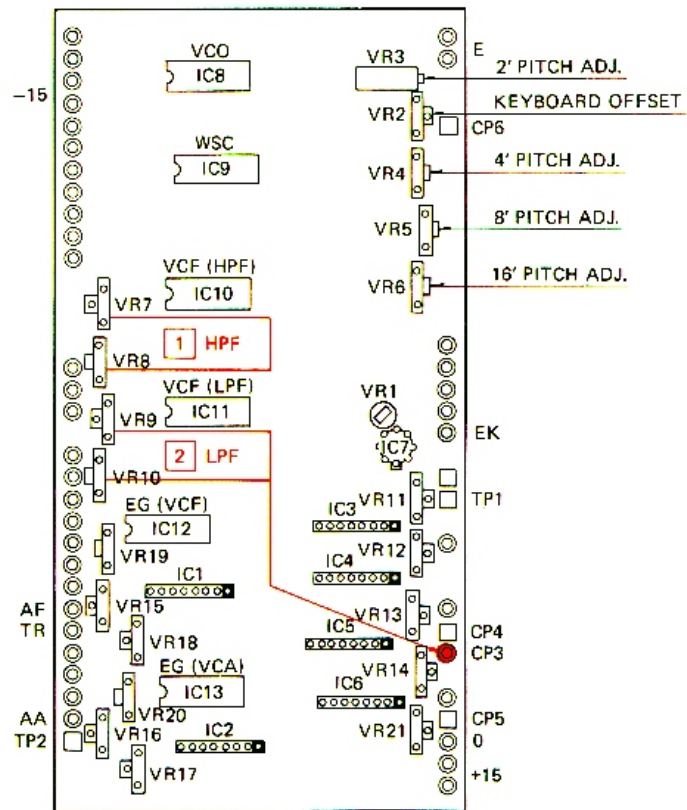
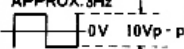
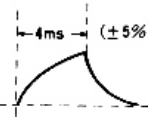
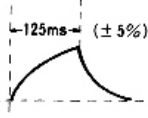


FIGURE 8. M BOARD

VCA ENVELOPE GENERATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Initial level	TONE SELECTOR ... PANEL VCA section A ... SHORT D ... SHORT S ... 0 R ... SHORT	TP2, M board: DVM	VR17, M board	Depressing keys, adjust to specs.	$-200 \pm 20\text{mV}$
2	Attack time	TONE SELECTOR ... PANEL VCA section A ... Set for a voltage of +8.0V at AA terminal on M board. With the above settings, VCA section A ... Set for a voltage of +3.0V at AA terminal on M board.	AA, M board: DVM TP2, M board: Oscilloscope	VR16, M board VR20, M board	Depressing keys, adjust to specs. — Alternative trigger method — Unsolder trigger wire from TR terminal on M board and connect a function gen. in its place. APPROX. 3Hz  Depressing keys, adjust VR20 to the direction the time is lengthened if the attack time is longer than 125ms and vice versa. <u>Repeat steps until specs are accomplished.</u>	 KSY ON  KSY ON

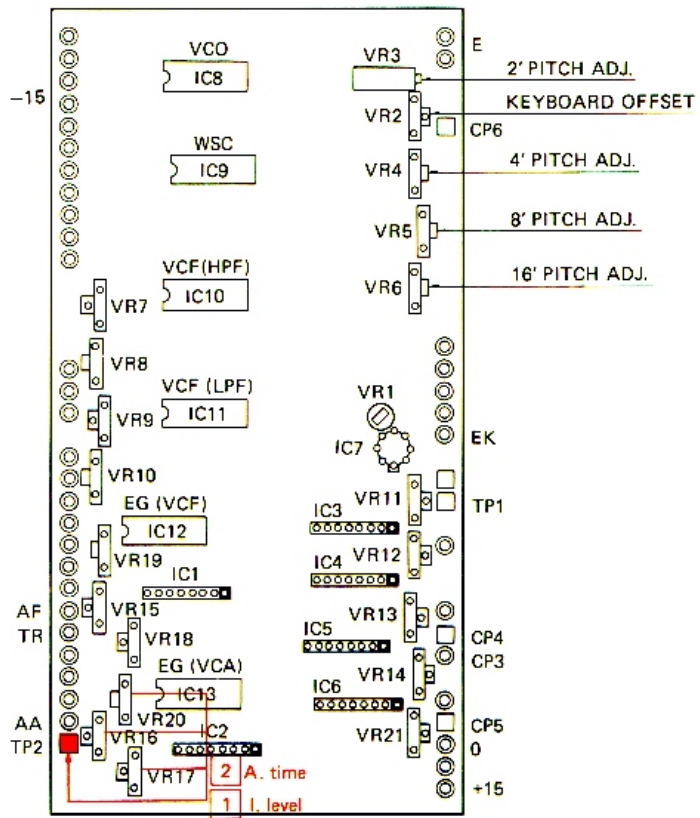
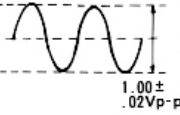
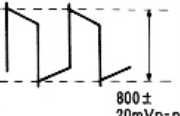
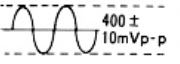
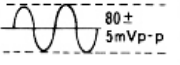


FIGURE 9. M BOARD

VCA

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	VCA #1 gain	FEET ... 8' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ∩ ... 10 S ... 10 LEVEL ... 10	CP4, M board: Oscilloscope	VR11, M board	Depressing C4 key, adjust to specs.	 1.00 ± .02Vp-p
2	VCA #2 gain	FEET ... 8' TONE SELECTOR ... PANEL VCO section □ ... ON VCF section HPF ... LOW RESH ... LOW LPF ... HIGH RESL ... LOW VCA section VCA LEVEL ... 10 ∩ ... 0		VR12, M board	"	 800 ± 20mVp-p
3	VCA #3 gain	Same as step 1	CP5, M board: Oscilloscope	VR13, M board	"	 400 ± 10mVp-p
4	VCA #4 gain	"	0, M board: Oscilloscope	VR14, M board	"	 80 ± 5mVp-p
5	VCA #4 zeroing	With the above settings, VCA section LEVEL ... 0	Unsolder wire from 0 terminal on M board, and connect oscilloscope in its place.	VR21, M board	Repeatedly depress any keys, and adjust for minimum deflection	Min. deflection

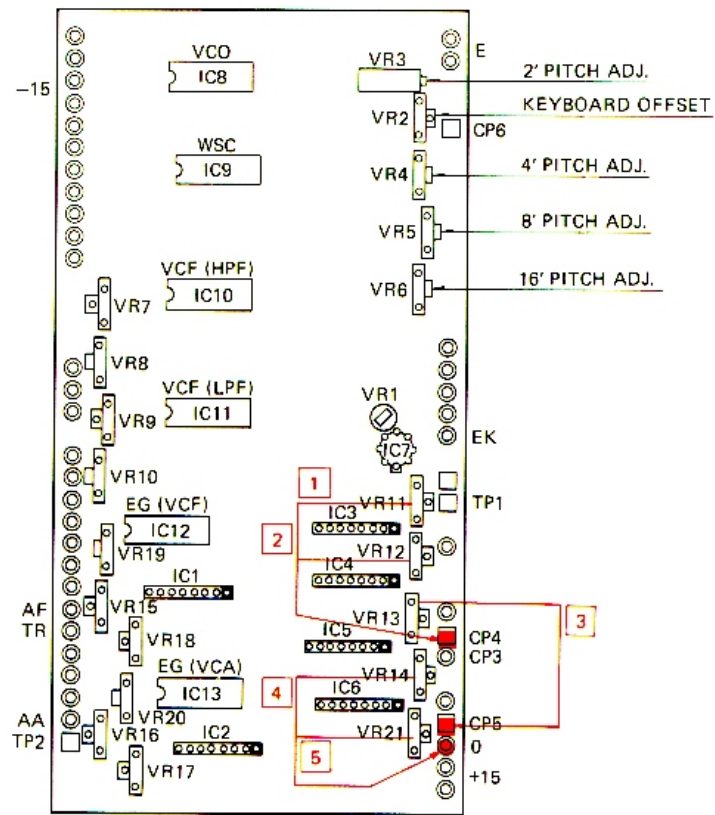
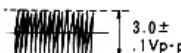
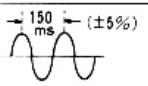
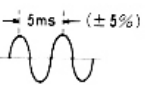
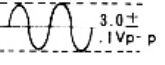


FIGURE 10. M BOARD

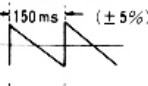
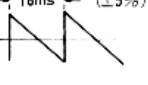
NOISE GENERATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Noise output level	TONE SELECTOR ... PANEL VCO section NOISE ... 10	NO1 (CH I) or NO2 (CH II), SUB board: Oscilloscope	VR1 (CH I) or VR2 (CH II), SUB board	Adjust to specs.	

PULSE WIDTH MODULATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Speed	TONE SELECTOR ... PANEL VCO section PWM ... 10 SPEED ... Set for a voltage of +5.0V at VC1 (CH I) or VC2 (CH II) terminal on SUB board.	VC1 (CH I) or VC2 (CH II), SUB board: DVM P1 (CH I) or P2 (CH II), SUB board: Oscilloscope	VR4 (CH I) or VR7 (CH II), SUB board	Adjust to specs.	
		With the above settings, VCO section PWM SPEED ... FAST	"	VR5 (CH I) or VR8 (CH II), SUB board	Adjust to specs. <u>Repeat steps until specs are accomplished.</u>	
2	LFO output level	"	"	VR3 (CH I) or VR6 (CH II), SUB board	Adjust to specs.	

SUB OSCILLATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Speed	SUB OSCILLATOR section SPEED ... Set for a voltage of +5.0V at VC3 terminal on SUB board.	VC3, SUB board: DVM SO, SUB board: Oscilloscope	VR9, SUB board	Adjust to specs.	
		SUB OSCILLATOR section SPEED ... FAST	"	VR10, SUB board	Adjust to specs. <u>Repeat steps until specs are accomplished.</u>	

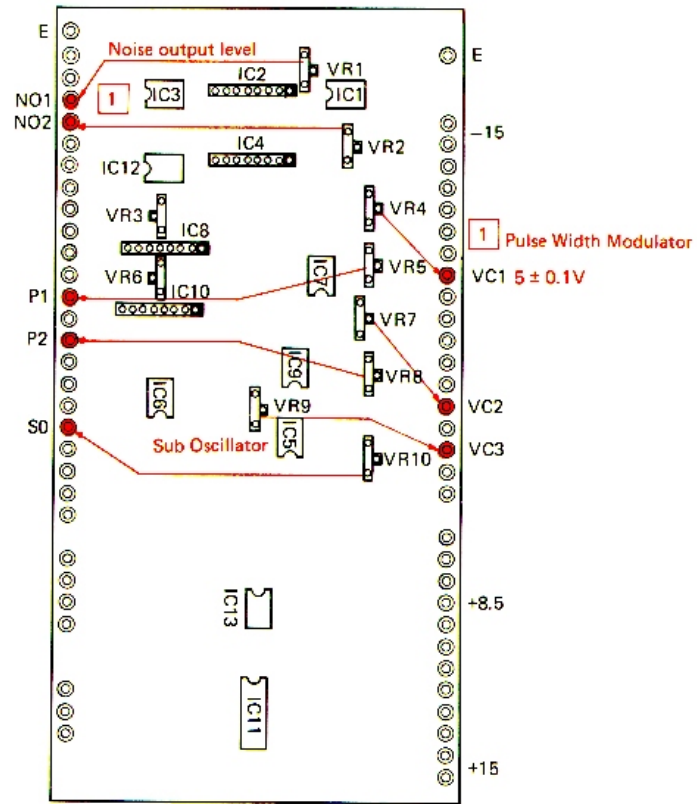
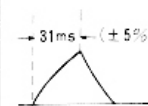
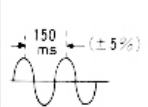
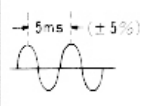


FIGURE 11. SUB BOARD

RING MODULATOR

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Envelope generator zeroing	RING MODULATOR section ATTACK TIME ... min. DECAY TIME ... min.	EO, PRA board: DVM	VR9, PRA board	Depressing any key, adjust to specs.	$0 \pm .01V$
2	Attack time	RING MODULATOR section ATTACK TIME ... Set for a voltage of +5.0V at A terminal on PRA board.	A, PRA board: DVM EO, PRA board: Oscilloscope	VR10, PRA board	Depressing any key, adjust to specs. — Alternative trigger method — Unsolder trigger wire from TR terminal on PRA board and connect a function gen. in its place. APPROX. 5Hz	 KEY ON
3	Speed	RING MODULATOR section DEPTH ... off SPEED ... Set for a voltage of +5.0V at VC1 terminal on PRA board.	VC1, PRA board: DVM TP, PRA board: Oscilloscope	VR5, PRA board	Adjust to specs.	
		With the above settings, RING MODULATOR section SPEED ... max.	"	VR4, PRA board	Adjust to specs. Repeat steps until specs are accomplished.	
4	Ring mod. balance	"	RMO, PRA board: Oscilloscope	VR3, PRA board	Adjust to specs.	Minimum leakage signal level

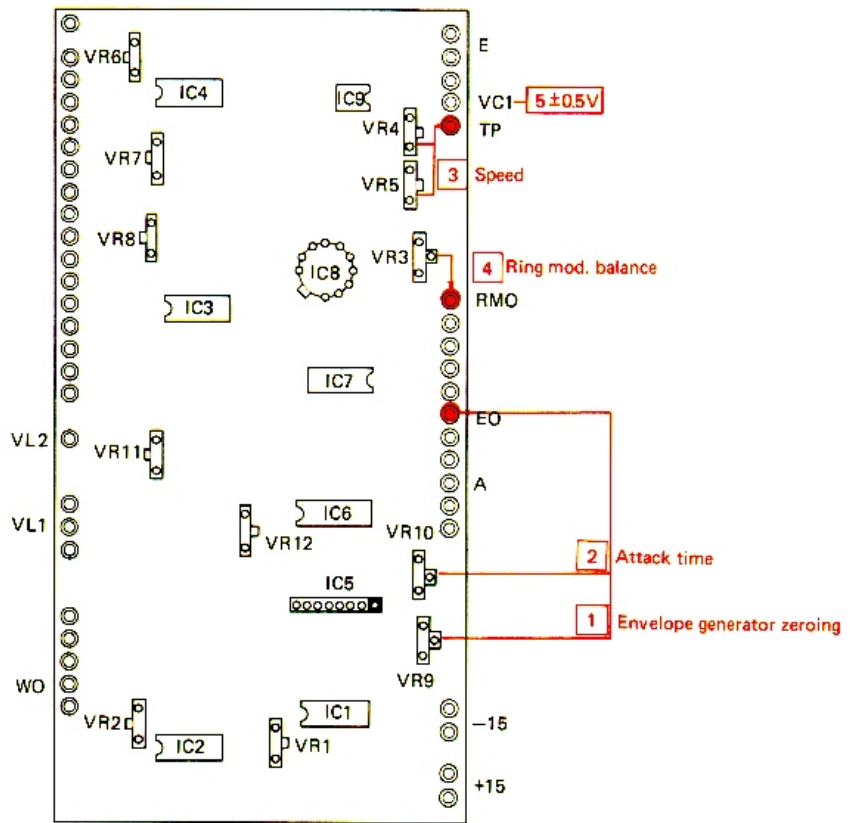
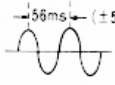
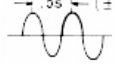
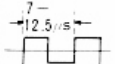
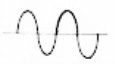
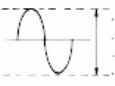


FIGURE 12. PRA BOARD

TREMOLO/CHORUS

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Speed	TREMOLO/CHORUS section SPEED ... max. TREMOLO tab ... on "	DO1, OE1 board: Oscilloscope DO2, OE1 board: Oscilloscope	VR1, OE1 board VR2, OE1 board	Adjust to specs. "	 → 56ms (±5%)  → .5s (±5%)
2	Clock osc.	TREMOLO/CHORUS section TREMOLO & CHORUS tabs ... off ON/OFF tab ... ON	TP1, OE2 board: Oscilloscope Output jack: Amp/speaker	VR1, OE2 board	Adjust VR1 between 7 – 12.5μs to obtain minimum noise at speaker output by ear.	 7 – → 12.5μs
3	Analog delay	FEET ... 8' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ∩ ... 10 S ... 10 LEVEL ... 10 MIX lever ... I or II TREMOLO & CHORUS tabs ... off	Pin #13, IC5, OE2 board: Oscilloscope	VR2, OE2 board	Depressing B4 key, adjust for good sine wave.	 SINE WAVE
4	Mod. VCA gain	"	O1, OE2 board: Oscilloscope O2, " : " O3, " : " O4, " : "	VR3, OE2 board VR4, " VR5, " VR6, "	Depressing B4 key, adjust to specs.	 .65Vp-p .58Vp-p .58Vp-p
5	Mod. VCA zeroing	With the above settings, TREMOLO tab ... on	"	VR7, OE2 board VR8, " VR9, " VR10, "	Adjust to specs.	Minimum leakage signal level

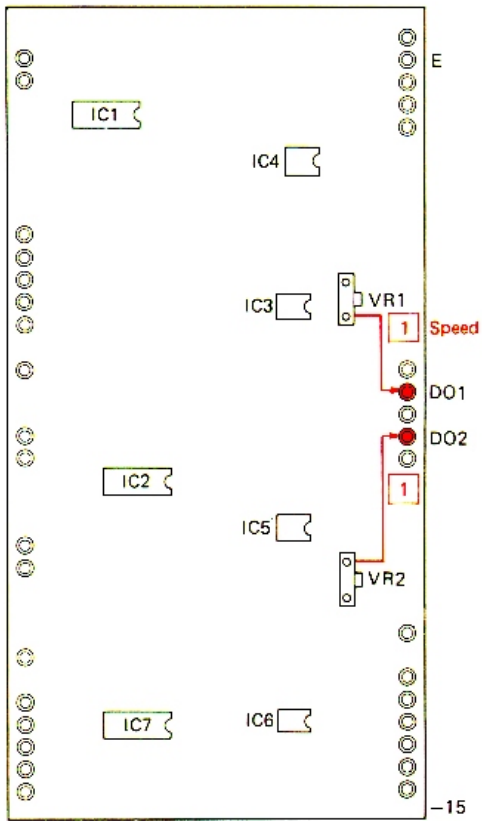


FIGURE 13. OE1 BOARD

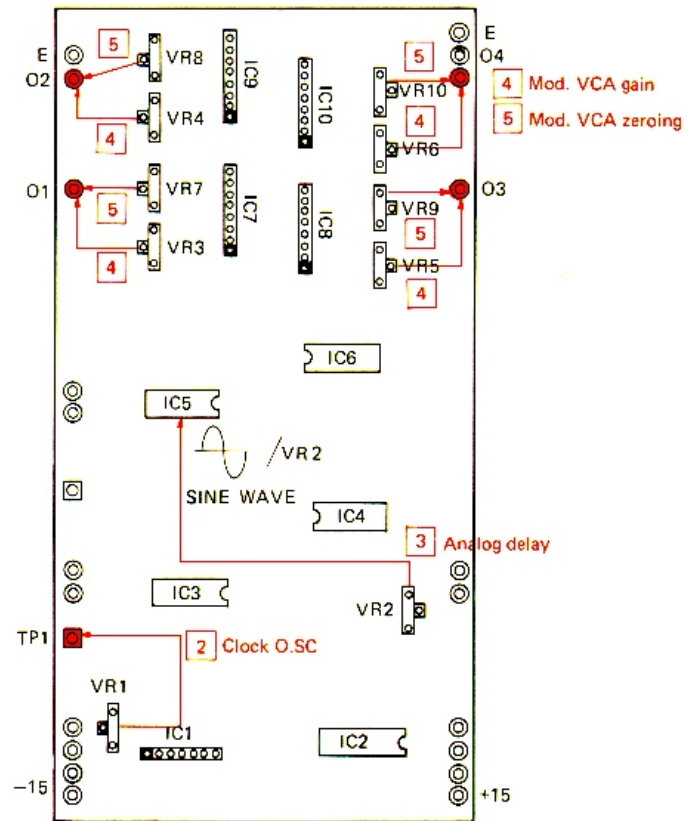


FIGURE 14. OE2 BOARD

TOUCH RESPONSE

- Notes) 1. When adjusting steps 1 thru 4 which are initial & after-touch brilliance/level effects, only the lever for the function being adjusted should be up, all other levers in touch response section, channels one and two should be down.
2. When adjusting steps 3, 4, 7 and 8 which are after-touch effects, remember that VCA's are sequentially turned on, and you must be on the correct one before adjustment can be made.

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Initial-touch brilliance	TONE SELECTOR . . . PANEL INITIAL, BRILLIANCE . . . 10	B11 – B18 (CH I) or B21 – B28 (CH II), TRG1 board: DVM Disconnect wire from terminal (b1 – b8) on TRG1 board. Connect jumper wire from +8.5 (+V) terminal on KBC board to terminal (b1 – b8), one at a time.	VR1 – VR8 (CH I) or VR9 – VR16 (CH (CH II), TRG1 board	Adjust proper pot to specs at (B11 – B18, B21 – B28).	+6.4 ± .3V
2	Initial-touch level	TONE SELECTOR . . . PANEL INITIAL LEVEL . . . 10	L11 – L18 (CH I), TRG1 board, or L21 – L28 (CH II), TRG4 board: DVM Disconnect wire from terminal (b1 – b8) on TRG1 or TRG4 board. Connect jumper wire from +8.5 (+V) terminal on KBC board to terminal (b1 – b8), one at a time.	VR17 – VR24 (CH I), TRG1 board, or VR1 – VR8 (CH II), TRG4 board	Adjust proper pot to specs at (L11 – L18, L21 – L28).	+6.4 ± .3V
3	After-touch brilliance	TONE SELECTOR . . . PANEL AFTER BRILLIANCE . . . 10	B11 – B18 (CH I) or B21 – B28 (CH II), TRG2 board: DVM	VR1 – VR8 (CH I) or VR9 – VR16 (CH II), TRG2 board	While firmly depressing C1 key, adjust proper pot to specs.	+6.4 ± .3V
4	After-touch level	TONE SELECTOR . . . PANEL AFTER LEVEL . . . 10	L11 – L18 (CH I), TRG2 board, or L21 – L28 (CH II), TRG5 board: DVM	VR17 – VR24 (CH I), TRG2 board, or VR1 – VR8 (CH II), TRG5 board, (Refer to Fig. 18.)	"	+6.4 ± .3V

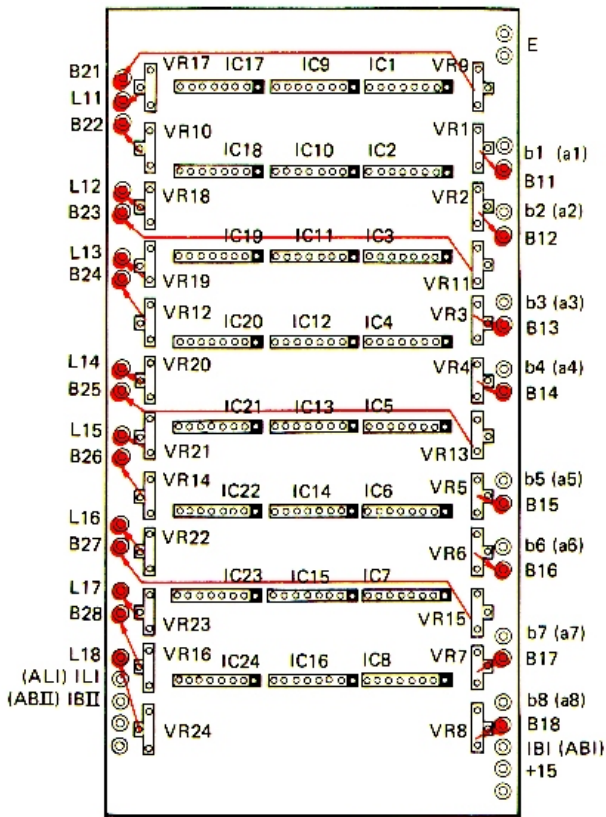


FIGURE 15. TRG1 & TRG2 BOARDS

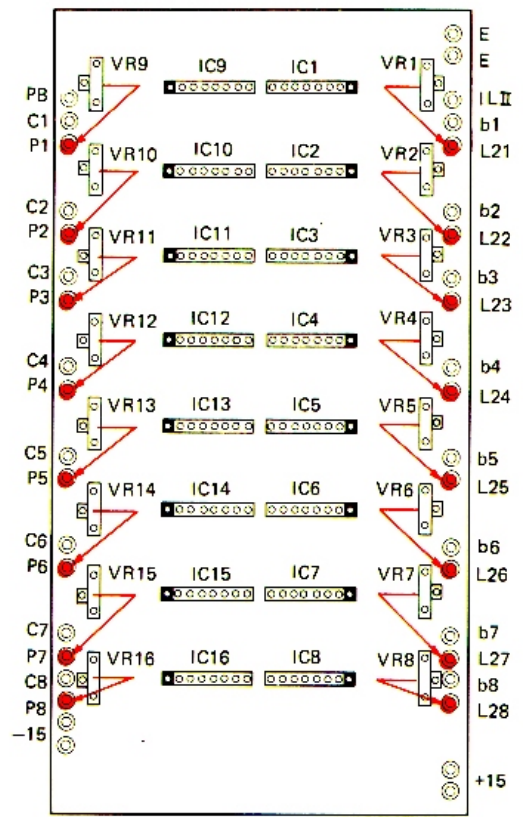

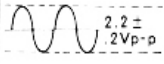

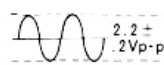


FIGURE 16. TRG4 BOARD

TOUCH RESPONSE (Continued)

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
5	Initial-touch pitchbend	PITCHBEND ... max.	P1 – P8, TRG4 board: DVM Disconnect wire from terminal (c1 – c8) on TRG4 board. Connect jumper wire from –6.5 (–V) terminal on KBC board to terminal (c1 – c8), one at a time.	VR9 – VR16, TRG4 board	Adjust proper pot to specs at (P1 – P8).	$-4.2 \pm .2V$
6	After-touch speed	SPEED ... max.	SP, TRG5 board: DVM	VR17, TRG5 board	While firmly depressing C1 key, adjust to specs.	$+6.0 \pm .3V$
7	After-touch VCO	VCO lever ... max.	O1 – O8, TRG3 board: DVM	VR1 – VR8, TRG3 board	While firmly depressing C1 key, adjust proper pot to specs.	$+6.0 \pm .3V$
		With the above setting, SUB OSCILLATOR section FUNCTION ...  SPEED ... max.	O1 – O8, TRG5 board: Oscilloscope	VR1 – VR8, TRG5 board	"	 $2.2 \pm .2V_{p-p}$
8	After-touch VCF	VCF lever ... max.	Pin #8, IC9 – IC16: DVM	VR9 – VR16, TRG3 board	"	$+6.0 \pm .3V$
		With the above setting, SUB OSCILLATOR section FUNCTION ...  SPEED ... max.	F1 – F8, TRG3 board: Oscilloscope	VR17 – VR24, TRG3 board	"	 $2.2 \pm .2V_{p-p}$

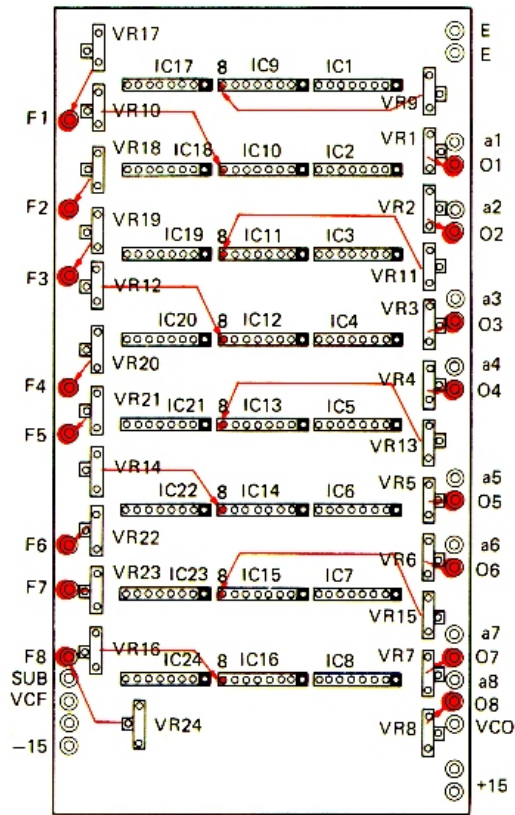


FIGURE 17. TRG3 BOARD

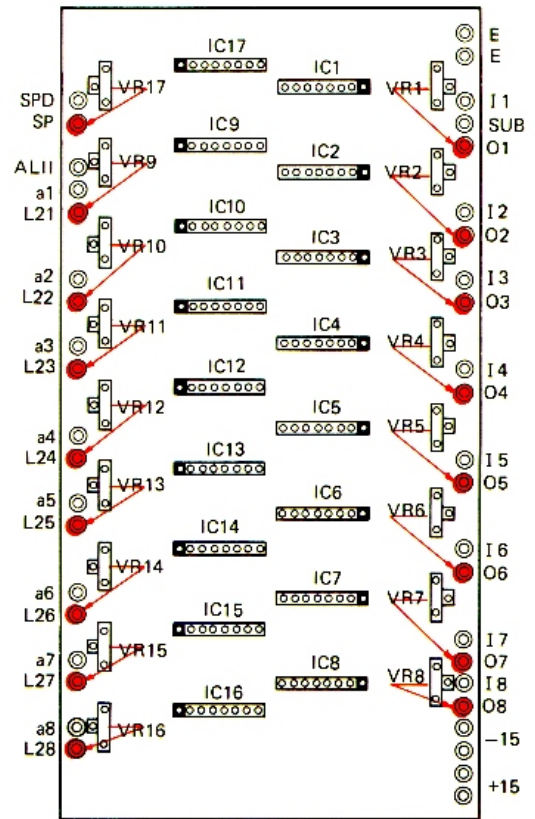


FIGURE 18. TRG5 BOARD

PORTAMENTO/GLISSANDO

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Clock osc.	PORTAMENTO/GLISSANDO lever ... SHORT	Pin #6, IC24, KAS board: Oscilloscope	VR4, KAS board	Adjust to specs.	
		PORTAMENTO/GLISSANDO lever ... LONG	"	VR5, KAS board	Adjust to specs. Repeat steps until specs are accomplished.	

RIBBON CONTROLLER

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Reference voltage	As desired	S1, BA board: DVM	VR4, BA board	Adjust to specs.	+11.2 ± .2V
2	Inverter offset	"	TP1, BA board: DVM	VR1, BA board	"	0 ± .02V
3	S/H	"	Between TP1 and TP2, BA board: DVM	VR2, BA board	Depress the middle of ribbon controller and adjust to specs.	0 ± .02V

KEYBOARD CONTROL

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Brilliance-low	BRILLIANCE-LOW ... min.	O1, KBC1 board: DVM	VR1, KBC1 board	Depressing C2 key, adjust to specs.	-2.76 ± .14V
2	Brilliance-high	BRILLIANCE-HIGH ... max.	"	VR2, KBC1 board	Depressing C5# key, adjust to specs.	+2.76 ± .14V
3	Level-low	LEVEL-LOW ... min.	O1, KBC2 board: DVM	VR1, KBC2 board	Depressing C2 key, adjust to specs.	-2.76 ± .14V
4	Level-high	LEVEL-HIGH ... max.	"	VR2, KBC2 board	Depressing C5# key, adjust to specs.	+2.76 ± .14V

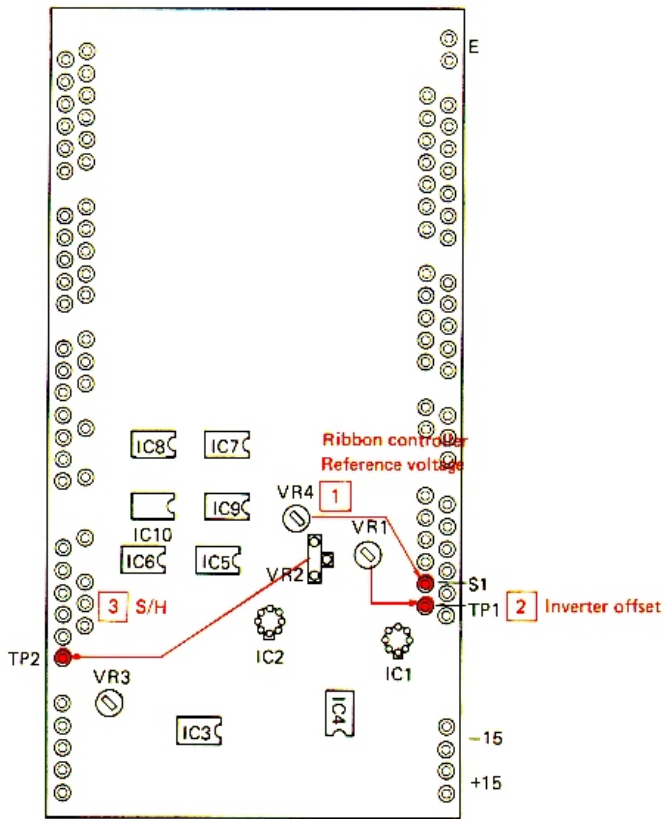


FIGURE 19. BA BOARD

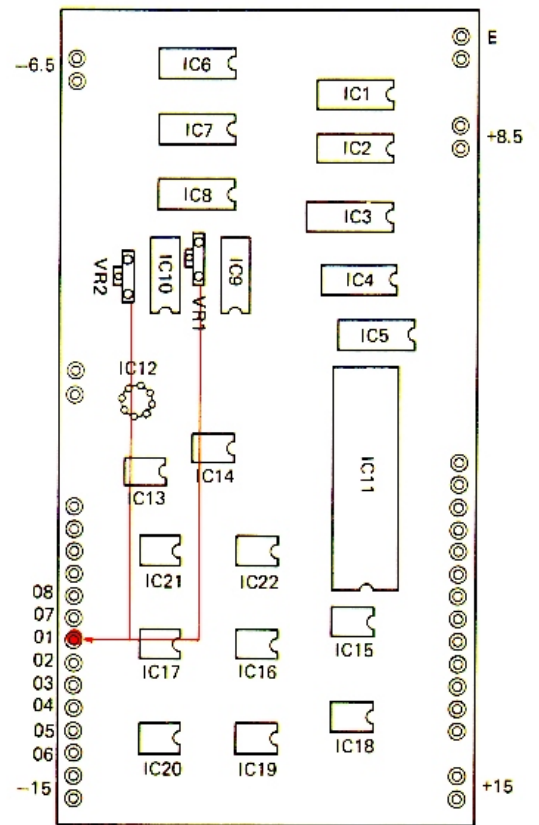
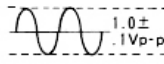
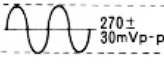


FIGURE 20. KBC1 & KBC2 BOARDS

EXP WAH CIRCUIT

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Cutoff freq. & level	FEET ... 8' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ~ ... 10 S ... 10 LEVEL ... 10 MIX lever ... I or II EXP WAH button ... on Foot pedal ... max.	W0, PRA board: Oscilloscope	VR1 & VR2, PRA board	Depressing G5# key, adjust VR1 for max. amplitude then VR2 to specs.	 1.0 ± 0.1 V _{p-p}

EXP CIRCUIT

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Level	FEET ... 8' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ~ ... 10 S ... 10 LEVEL ... 10 MIX lever ... I or II EXP button ... on Foot pedal ... max.	VL1 (CH I) or VL2 (CH II), PRA board	VR11 (CH I) or VR12 (CH II), PRA board	Depressing B4 key, adjust to specs.	 270 ± 30 mV _{p-p}

OUTPUT AMPLIFIER

STEP	ADJUSTMENT	CONTROL SETTING	TERMINAL TO BE CONNECTED AND EQUIPMENT REQUIRED	ADJUST	HOW TO ADJUST	SPECIFICATIONS
1	Overall output level	FEET ... 8' TONE SELECTOR ... PANEL VCA section VCF LEVEL ... 0 ~ ... 10 S ... 10 LEVEL ... 10 MIX lever ... centered EXP button ... on HIGH/LOW output switch ... HIGH Foot pedal ... max.	Output jack (Load 10 kohm): AC voltmeter	VR6 (LEFT), VR7 (GENERAL), VR8 (RIGHT), PRA board	Depressing C4, D4, E4, F4, G4, A4, B4 & C5 keys, adjust to specs.	.78 V _{rms} (0 ± 3dB)

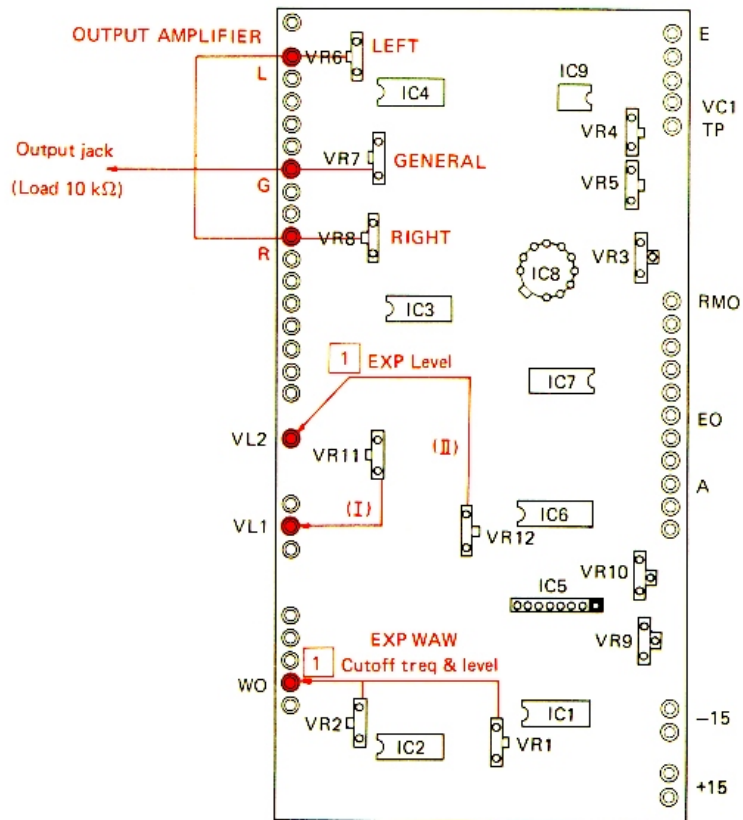


FIGURE 21. PRA BOARD

CS-50 • CS-60
CS-80

BULLETIN NO. E-46

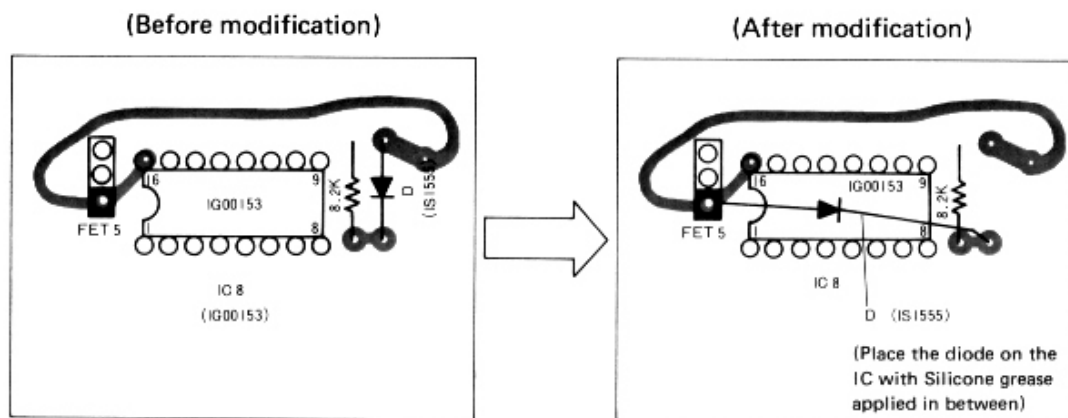
DATE: JAN, 1978

COUNTERMEASURES FOR STABILIZING THE PITCH IN COMBO SYNTHESIZER SERIES

We hereby announce that the undermentioned modifications have been made to stabilize the pitch in the Polyphonic Synthesizer.

(Countermeasures)

- The IC IG00153 (VCOIII) on each "M" circuit board (VCO circuit) is ranked by temperature characteristics and therefore, the applicable ranges of each IG00153 used for an instrument should not exceed 2 ranks.
- The location of the temperature compensated diode IS1555 on each "M" circuit board (VCO circuit) is changed as illustrated below;



- (Note) · The "M" circuit board is not changed.
- Bring the diode IS1555 into contact with the IC IG00153 by applying silicone grease etc., between them.

**CS-50 • CS-60
CS-80**

BULLETIN NO.

DATE:

(Serial numbers of the applicable models)

- CS-80 : # 1169 and later models (October and later production)
- CS-60 : # 1326 and later models (Mid-October and later production)
- CS-50 : # 1546 and later models (November and later production)

(Note) In addition to the above models, the countermeasures are also applicable to the following models which were produced prior to October, 1977.

CS-80	U.S. model	1116 ~ 1122, 1124, 1133 ~ 1147
	Canadian model	1148 ~ 1155
	Northern European model	1033, 1128, 1131, 1132, 1159 ~ 1168
CS-60	U.S. model	1294 ~ 1310
	Canadian model	1275
	Northern European model	1159, 1185, 1204, 1229, 1246, 1247, 1243, 1281 ~ 1293, 1316 ~ 1325
	South African model	1149, 1279
	Australian model	1029, 1030, 1090
	General export model	1280, 1150
CS-50	U.S. model	1398 ~ 1414
	Canadian model	1420, 1440, 1445 ~ 1448, 1450 ~ 1452, 1455 ~ 1464, 1439
	Northern European model	1067, 1362, 1371, 1376, 1385, 1388, 1386, 1361, 1370, 1367, 1390 ~ 1395
	Australian model	1031, 1034, 1118, 1168
	South African model	1169, 1119
	General export model	1170, 1120, 1215, 1360, 1465



**YAMAHA
ELECTONE**

SERVICE NEWS

**CS-50 • CS-60
CS-80**

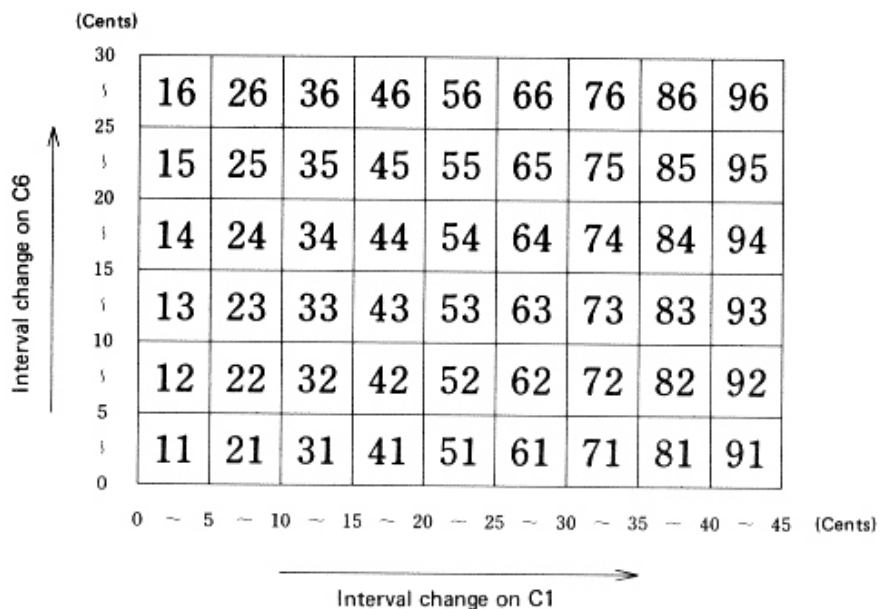
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• **Ranking of the IC IG00153 (VCOIII) by temperature characteristics.**

Each IC IG00153 built into the "M" circuit board is ranked and labelled every 5°C, according to the degree of change in the musical interval on C1 and C6 affected by the ambient temperature change from 25 to 50°C.

[IG00153 ranking table by temperature characteristics]





**YAMAHA
ELECTONE**

SERVICE NEWS

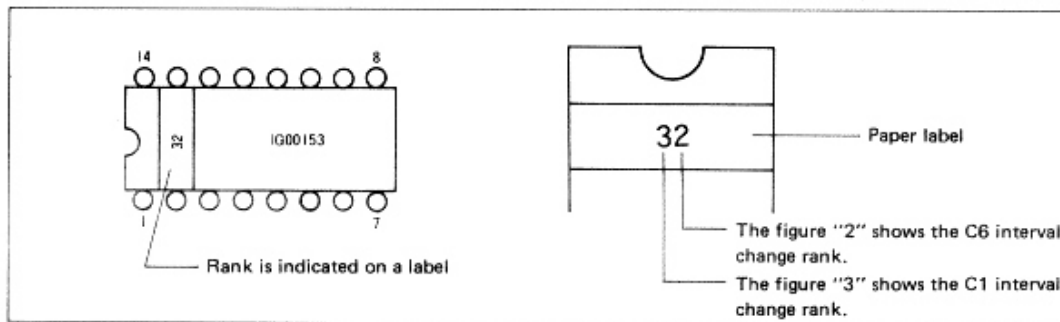
**CS-50 • CS-60
CS-80**

BULLETIN NO.

DATE:

• **Example of rank indication**

An IC IG00153 which shows an interval change of 12°C on C1 and 6°C on C6 by temperature change from 25 to 50°C is ranked as "32" and labelled as shown below;



(Note) The label is color coded by the C6 rankings.

C6 rank	1	2	3	4	5	6	...
Color code	White	Orange	Pink	Yellow	Green	Blue	...

(The lower digit of rank indication)

• **Applicable range of each IG00153 to an instrument:**

- Only the same figure representing the interval change on C6 can be used.
- Only the neighboring figure representing the interval change on C1 can be used in pairs at the same time for an instrument.

For example, an instrument can have;

- IC IG00153 of "54" and "64". (Label color is yellow)
- IC IG00153 of "23" and "13". (Label color is pink)

Therefore, ICs with different label color can not be used together at the same time for an instrument.