**JX-3P (PG-200) SERVICE NOTES**

**SPECIFICATIONS**

**JX-3P**
- Keyboard: 61 keys, 5 octaves, C scale
- Power consumption: 20 W
- Dimensions: 912(W) x 325(D) x 115(H) mm
- Weight: 9.8 kg, 21 lb, 9 oz.

**JX-3P**
- Keyboard: SK-36IF (7612720000)
- DIP switch (087H0318)
- MIDI socket (087H0318)
- Bank buttons (A - D)
- Tone selector buttons (1 - 16)
- Edit Map switch
- Bender range switch

**PG-200**
- Dimensions: 244(W) x 172(D) x 1-3/4(H) mm
- Weight: 1.4 kg, 3 lb, 9 oz.

**EDIT MAP**
- Bend assembly PB-7 (3273271000)
- Slide switch SSB-033/DN (13159327), Knob (016H114)
- Push switch SPO-000F (13292327), Button (016H092), LED GL-9HD-2 (150209147)
- Push pot S3010P4CB185 100k (13339442), Knob (016H113)
- Rotary pot EWJS-4AP104A 10k x 2 (123217958), Knob (016H112)
- Slide pot S3010P40515 10k (13339431), Knob (016H113)
- Slide pot S3010P405A15 1MA (13339422), Knob (016H113)

**PANEL BOARD**
- Switch board (2261581100)
- Jack board (7612713000)
- Side panel holder L (064H188)
- Side panel holder R (054H187)
- Power transformer 100V (022H6522) 117V (022H6532)
- 220/240V (022H6523)
- Power supply board 100/117V (7612707000) 220/240V (7612707400)
- Heat sink (048H037A)
- MAIN board (7612704000)
- FUSE board 100/117V (7612706100) 220/240V (7612706400)
- DIN board (146H0119) W/O MIDI THRU (7612714020/W MIDI THRU)
- MIDI sockets OUT IN (072H1478)
- MIDI sockets THRU OUT IN (072H1478)
- Cabinet (087H029A)
- Pot EY/H-O T5A10341 10k (12219401)
- Jack HIL-931031-100 (13449122)
- Jack HIL-931031-020 (13449121)
**PARTS LIST**

**PG-200**

<table>
<thead>
<tr>
<th>CASE</th>
<th>Rubber</th>
</tr>
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<tbody>
<tr>
<td>072H148A</td>
<td>Top panel</td>
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<tr>
<td>016H148A</td>
<td>Chassis</td>
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<td>Side panel</td>
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<tr>
<td>172H005</td>
<td>Magnetic foot</td>
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<tr>
<td>064H032</td>
<td>Hard case</td>
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<td>015H029</td>
<td>Slide switch</td>
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<td>13159106</td>
<td>Push switch</td>
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<tr>
<td>13119201</td>
<td>Rotary, DCO-2 Waveform</td>
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<tr>
<td>13119301</td>
<td>Rotary</td>
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<tr>
<td>13129327</td>
<td>Push</td>
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<tr>
<td>13429620</td>
<td>TCS-2260-01-0101</td>
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<tr>
<td>053H192</td>
<td>6p, 650mm</td>
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<tr>
<td>7932803000</td>
<td>CONTROL BOARD (legend 149H217) (pcb 052H4448)</td>
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<tr>
<td>13219242</td>
<td>EVHSXAP20B15 100kB</td>
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<tr>
<td>15179150</td>
<td>CPU WITH PROGRAMMABLE ROM</td>
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<tr>
<td>15159112B0</td>
<td>HEX BUFFER</td>
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<tr>
<td>15159113B0</td>
<td>ANALOG MULTIPLEXER/DEMULTIPLEXER</td>
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<td>15189118</td>
<td>OP AMP</td>
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<tr>
<td>15189111</td>
<td>COMPARATOR</td>
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<td>15119016</td>
<td>2GA733-0</td>
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<td>0525.6</td>
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<td>15029147</td>
<td>GL-9HD-2</td>
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<tr>
<td>12389800</td>
<td>KMFC1005T1 6MHz</td>
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<td>13919310</td>
<td>Ceramic</td>
</tr>
<tr>
<td>13919118</td>
<td>R-2R, D/A</td>
</tr>
</tbody>
</table>

**DIODE**

- 15019103: 1S2473
- 15019613: 0525.6
- 15029147: GL-9HD-2

**RESISTOR**

- 13919310: RM-8-103 10k x 8
- 13919118: RK60601611
JX-3P

KEYBOARD
7617200000 SK-361PR

CASE
072H1478 Top panel
072H1476 Top panel (SH340702-up with MIDI THRU socket hole)
072H158 Blind
066H031 Side panel (LJK set)
064B186 Side panel holder L
064B187 Side panel holder R
087H029A Cabinet
12359103 Rubber foot G-7
092H011 Music rack
092H017 Music rack stopper
06BHS056 Music rack holder bushing
064H188 Music rack holder

KNOB BUTTON
0168112 Knob Rotary pot
0168113 Knob Slide pot
0168114 Knob Slide switch
0168092 Button Push switch

SWITCH
13194102 1801-0121 Power
1319318 HSW-0372-01-030 Slide, Output, Ext select
1319327 SSU-023-9PN Slide, Bender
1319327 SFQ-009F Push

JACK
1349121 HLJ-0316-01-020 Stereo, Phones
1349121 HLJ-0316-01-100 Mono

DIN SOCKET
1346915 TCS-5350-01-111 5p, MIDI
1346921 TCS-5360-01-111 6p, PG-100

BENDER ASSEMBLY
2372731000 PB-7

POWER TRANSFORMER
022B0523 100V
022B052C 117V
022B052D 220/240V

COIL
12449221 40M-067-018 10H

RESONATOR
12598719 EMFC1007T1 12Hz Ceramic

FUSE
(100/117V)
12559936 GGS 2A/250V UL, CSA

(220/240V)
1255951 GEE TIA 1A/250V time lag Prim.
1255954 GEE TZA 2A/250V time lag Sec.

FUSE HOLDER
12199515 TF-758

PCB
761704000 MAIN BOARD (legend 149H213) (pcb 052H440C)
7617121000 PANEL BOARD (legend 149H214) (pcb 052H441C)
7617131000 CLOCK BOARD (legend 149H215) (pcb 052H442B)
14918216 DSD BOARD
7617140000 DIN BOARD (legend 149H216) (pcb 2791531001)

(No P. No.) SWITCH BOARD (less parts)

761706100 FUSE BOARD 100/117V (pcb 052H44A)
761706400 FUSE BOARD 220/240V (pcb 052H44A)
761707010 POWER SUPPLY BOARD 100/117V (legend 146H107) (pcb 052H44B)
761707000 POWER SUPPLY BOARD 220/240V (legend 146H107) (pcb 052H44B)

POTENTIOMETER
(rotary)
13219759 ENJ3JAF20B14 10k x 2 Volume
13219941 EVTH0151B14 10k

(pot)
1339421 S301BF4051 100k Edit Sens
1339422 S301BF4051 10kA Sequence Rate
1339444 S301BF4051 100k brilliance

(Trimmer)
1329916 RVFHP15052 5k
1329913 RVFHP15013 10k
1329916 RVFHP15053 50k

IC
15179142 18031 cr 18051 CPU
15179110 WSLA253P-3 PROGAMMABLE COUNTER
15179624 MM2975+30 (EPROM) or 8K BYTE FROM TM2936SP-62 (NOS ROM) compatible
15179317 TC5517APL 28K BYTE CROSS EAN
15159503 TC40H805P Q-INPUT MAIN GATE
15159511 TC40H814P HEX D-TYPE FLIP-FLOP
15159524 TC40H825P 8 DIFRACT BUS BUFFER
15169301RO HD74LS50P Q-INPUT MAIN GATE
15169304AO HD74LS52P HEX INVERTER
15169339HI HD74LS32P Q-INPUT MAIN GATE
15169310BO HD74LS42P BCD TO DECIMAL DECODER
15169330HO HD74LS138P 3 TO 8 DEMULTIPLIER
15169322HO HD74LS14P 4-BIT BINARY COUNTER
15169323HO HD74LS14P HEX D Flip-Flop
15169355 HD74LS373P OCTAL 3-STATE D-LATCH
15159104BO HD14011BP QUAD 2-INPUT NAND GATE
15159128HO HD14050BP HEX BUFFER
15159113BO HD14051BP ANALOG MULTIPLEXER/DEMULTIPLIER
15189111 NJM7111 COMPRESSOR
15189103 NJM755BP OP AMP
15189162 NJM752SP BFET OP AMP (SINGLE INVERT)
15189144 NJM738DP (DUAL INVERT)

Refer to MAIN BOARD Circuit diagram for change.
15229803 BA6628 VCA
15229801 IB3109 VCP
15219203 MM309 BDD
15169504 MM3101 TRACKING REGULATOR
15191127 MS230L VRF REGULATOR
1519106 CP7050 5V 3-TERMINAL REGULATOR
15189136 MS218L HEAD PHONE AMP

PHOTO COUPLER
15259271 PC-900

TRANSISTOR
15119106 2SA734-3 2SB372-3
15129108 2SC954-1 2SD220-1
15129108A 2SC595-1 selected for noise
1512910700 2SC594-1 selected ORN for VCA
1512910700 2SC595-1 YEL GEN use one color in a unit
1512910703 2SC954-1
15129136 2SC878A
15119802 2SB596-Y
15129186 2SD680-Y
15129103 2SK30A-GR FET

DIODE
15029147 GL-9HD-2 LED
15019103 1S2437
15019201 1N4002 Rectifier bridge
15019236 1N4002 Rectifier bridge
15019612 052-5,1 Zener

POSISTOR
15219909 ERS8330561

CAPACITOR (polystyrene)
15369091 CQ995287480U035 47pF
15369167 CQ9951108083J05 100pF

RESISTOR ARRAY
13919301 RM-4-472 4.7k x 8
13919310 RM-4-103 10k x 8
13919051 RM-4-223 22k x 8
13919118 RK60060161 R-2R , D/A

OTHERS
048B037A Heat sink
12569111 CR-1/3N Li battery
13429520 1C-99-24/2 28pin IC socket
JX-3P CIRCUIT DESCRIPTIONS

CPU
The JX-3P is a 6-voice (12 VCOs) polyphonic synthesizer consisting of devices centering around the CPU.

In the following description, each part will have a number with a letter prefix as an identification to show the board on which it is installed:

m = Main Board, p = Panel Board, j = Jack Board, d = DIN Board, and s = Power Board.

CPU and its peripherals
CPU (mIC43) is either 8031 or 8051. Though 8051 has an internal programable ROM, JX-3P makes no use of it at all, making both CPUs compatible with each other. Programs are all stored in mIC25 (2794), P-ROM. As an external RAM, mIC51 (TC517A0) is used.

Since the data of different timbres and sequencer patterns are all stored in the RAM, it is accompanied with a lithium battery as back-up. Memory protection is achieved by gating the lineWR. Some of the RAM memories are outside the protection screen since they are used for data scratch-pad. mIC43 (LS373) is the device for address latching off the data bus.

Program Steps
The CPU cycles steps 1 to 6 within approx. 10μS in consecutive order in time as follows:

1. Read the current state of the keyboard.
2. Refresh the Envelope and LFO data.
3. Read the current state of the panel switches.
4. Read the voltage from Bender and EDIT.
5. Write the control voltage data into DCO, VCF, VCA.
6. Write the data into the programmable counter in DCO section.

The program interrupts itself to perform extra steps as needed:

7. Access to TAPE for saving or loading a memory.
8. Read Serial Input (MIDI or Programmer PG-200).
9. Drive LED.

READING THE KEYBOARD AND THE SWITCHES
Reading of the keyboard and the panel switches are conducted through the matrixes.

Reading the Keyboard
The keyboard bus is divided into 8 sections with 8 notes per bus section (except the highest bus – only 5 notes). The CPU puts one of the buses low through decoder mIC45. On/off of the notes are read by the CPU through mIC46 buffer. This is repeated 8 times, once for each bus section in turn. Once the CPU has accepted and understood a keypress, it immediately grans over 6 modules (channels) to find out the most suitable module to be assigned to that key. Assigned module is not engaged from the key even the key has been released. The module is kept assigned until it is stolen by a new key.

Reading the Panel Controls
The same as with the Keyboard. The state of Panel switches can be read through the matrix of 5 x 8 and through mIC43 Decoder and mIC46. Some switches are connected to the matrix through transistors (mTR10, 12, 13, 14, 23) and diode. Of these, mTR12 informs the CPU the position of Bender lever, that is, polarity of bender control voltage. (Detailed under Bender Interface.)

Border and EDIT
On the Panel Board, Bender and EDIT signals undergo selection through pIC4 multiplexer, then the signal selected is fed to A/D converter. A/D conversion is achieved through software in the form of successive-approximation using a D/A converter mIC22, 24, 28 and a comparator mIC20 (D/A and comparator will be discussed later).

Bender Interface
Bender output can vary from negative to positive, exceeding the coverage range of A/D converter –3 to +5V. Thus the Bender voltage is read in two ways:

 Polarity – through pIS0, pTR113 and switch matrix.
 Absolute value (positive) – negative voltage is inverted at pIC3 whose pin 3 being shorted to ground through conducting FET switch pTR111. pIC3 output is voltage divided to fall within 0 to +5V.

DATA OUTPUT

Data Distribution
Having obtained various data concerning a note being or to be generated, from RAM, Keyboard, GMT, Panel Controls, Serial Input, Bender, EDIT, HOLD, etc., the CPU delivers processed data, in digital format, through three routes, to JX-3P sound processing stages.

 To Programmable Counters – note information
 To D/A Converter (DCO, VCF, VCA, etc.) – tone parameters
 To switch Control Interface (DCO, VCF, NOISE, CHORUS) – function selection information

DCO (Digital Controlled Oscillator)

Master Oscillator
mTR10(111) generate a frequency of approx. 6MHZ. Master Tune (DCO-1 and DCO-2) and Fine Tune(DCO-2) are achieved by changing the bias at these transistors. The master oscillation is divided by either 1/2, 1/4 or 1/8 at mIC27(1IC39) which in turn receives footage selection data from the CPU through mIC30. This will give the programmable counters the greater frequency resolution capabilities (16 bits = 2 bits).

Programmable Counters
Programmable counter 8253 containing three 16-bit counters is capable of dividing high frequency signals. Assume that the master oscillator runs at 6MHZ and divisor is 6000, the counter develops 1kHz rectangular signals. Besides keyboard note information, divisor signal contains the following:

 For DCO-1 – LFO, ADSR and BENDER
 For DCO-2 – Above plus TUNING

This is a feature distinguishable from the conventional design using this type of generator.

In SYNC mode, pulses from DCO-1 are applied to the gate of gated counter in DCO-2 section as RESET pulses.

D/A & VCA
Parameters that determine the timbre of audio signal flowing from Programmable Counter to Synthesizer module are converted into analog equivalent (0 to 4.7V) through D/A Converter consisting of mIC21, 22, 23, 940 ladder resistors R A1 and RA2 and mIC24. Buffers (mIC21) in MSB 2 bit lines significantly reduce the effects of output impedances of mIC22, 25. The D/Aed parameters are then applied commonly to Demultiplexers mIC23, 26, 27 and 28 are sampled into correct channel in individual stages. Detailed parameters not shown in the Block Diagram are as follows:

DCO CV – KCV, LFO, ADSR, BENDER
VCF CV – KCV, ADSR, CUTOFF, LFO
VCA CV – ADSR, LEVEL, MUTE

NOTES:
To accommodate negative going VCF CV (inverted at mIC24), -5V bias is applied to pin 7 of mIC23 as well as the remaining DMUX (having no ill effect to them. They can swing ±5V).

ADSR and LFO to software-generated in the computer.

D/A system is introduced into A/D conversion when BENDER or EDIT control is applied to comparator mIC26.

Switch Control Interface
ON and OFF and selection between circuit functions in the Modules and successive stages are performed by electronic switches named as DCO WAVE- FORM, SYNC, METAL, NOISE and CHORUS. Switch Control signals from Latch mIC31 are fed to switch gears either directly or through Level controllers. NOISE ON signal is also routed to pin 1 of mIC27 to block DCO-2 master frequency.

Wavesform Conversion
Output from Programmable Counter 8253 is a rectangular. So there is a need to convert it to sawtooth when mTR4 is ON. The conversion is carried out on the constant-current integrating-circuit (C115) making use of mIC104. Current flowing into C115 is determined by the output from the S/H circuit of DCO CV. Pulse at mTR108 base (differentiated mIC50 output) discharges C115 at the rectangular rate.

As already mentioned, DCO CV contains amounts of ADSR, LFO, RANGE etc. controls whatever relates to note pitch, which keeps the sawtooth amplitude constant over the frequency range.

The CPU will add a bias to DCO CV to exessively increase charging current when the program needs a pulse-like sawtooth.

When rectangular is selected, it is allowed to pass NAND gate mIC105, while mTR109 is kept conducting by Switch Interface to bypass charging current into C115.

NOTE: with sawtooth selected pin 4 of NAND mIC106 stays high (+5V).

SYNC
With positive voltages at pins 1 and 13, mIC105 develops and applies reset pulses to DCO-2 programmable counter and to TR107 base at a DCO-1 rate.

METAL
METAL being selected, DCO-2 programmable counter does not sync to DCO-1 and its output cannot gate through mIC105. Then mTR107 is choked on every negative edge of both DCO-1 and 2 rectangulars. This gives DCO-2 sawtooth waveform a quite interesting tone characteristics – something like what ring modulation offers.

VCF
This is a 4-pole LPF composed of mIC102 and associated components. Feedback amount and the amplitude of resonance is controlled by mTR103, 104 which can transfer signal in both directions. With control seems to be unnecessary and is omitted in this application. Control voltage at pin 9 of mIC102 is a negative going (inverted at mIC24) and a combination of KCV, CUTOFF, LFO and ADSR controls.
JX-3P ADJUSTMENT

**Test Mode**
The JX-3P has the built-in test program. When selected while the unit is in the TEST mode, the program will offer various facilities as listed in the table below.

To have the JX-3P enter the TEST mode, two ways are provided:
1. While pressing one of 7 TONE SELECTORs (see the table below), turn on the power on.
2. (During the user's mode) Depress TAP MEMORY. While holding down one of the 7 TONE SELECTORs depress TAP MEMORY again.
   - When in TEST mode, particular LED(s) stays blinking until further buttons are pressed. (Except TONE 8)

<table>
<thead>
<tr>
<th>TONE SELECTOR</th>
<th>KEY ACTION</th>
<th>TO COLOR</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Same as user's level</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Reverb</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Delay, built-in echo</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Same as 1 echo time</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>Same as 1 echo time</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>6</td>
<td>Same as 1 echo time</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>Same as 1 echo time</td>
<td>12</td>
<td>13</td>
</tr>
</tbody>
</table>

**NOTES:**
In test mode 3, pressing Sequencer-Note-Reset button will advance a number of channels which is the first to be assigned.
Other key assignings are self-explanatory when viewing TONE LEDs. BANK and TONE can freely selected even in the test mode.
EDIT feature is effective in the test mode as it is in the user's mode.

In the following paragraphs TEST mode, TONE buttons and EDIT often appear as adjustment steps, like below.

**TEST MODE** Turn the JX-3P on while holding down TONE SELECTOR button 4.

- A5 Select a TONE through BANK A and TONE 2 buttons.
- Group A15 Depress Group A button, then TONEEDIT15.

In this manual A4 refers to the A key above middle C, i.e., A4 = 442Hz.

**1. Reference Voltage**
1-1. Connect the digital voltmeter between TPR1/VREF and GND on Main board.
1-2. Adjust VREF (VREF) for 4,700V.

**2. Master Oscillators**
2-1. Connect the tuner or frequency counter to OUTPUT (mono) JACK.
2-2. TEST MODE 3, A5 will be automatically.
2-3. Confirm that TUNER on the rear panel is centered.
2-4. Depress A4 key, and adjust L1 on Main board until the output becomes 442Hz.
2-5. Unplug the meter and plug in the amplifier with speaker or headphones.
2-6. GROUP A15 (Source Mix) Set Sense 3 for equal BBC0 and BBC3 levels.
2-7. Listening to the two voices, adjust L2 on Main board for zero deviation.

**3. D/A Offset**
3-1. Connect the scope between TP-3P/OUT (TARD) and GND on Main board.
3-2. TEST MODE 3, A5 will be set automatically.
3-3. Depress C3 key twice, and find the sawtooth waveform with the lowest amplitude.
3-4. Displaying the waveform on the screen, adjust VR1/20V OFFSET on Main board for the maximum amplitude without clipping. Waveforms of other channels may be clipped, but this is a sacrifice for stabilizing tone generation in the low end.

**VCF TUNE**
4-1. Connect the scope to TP-3P/OUT (TARD) on Main board.
4-2. TEST MODE 3, A5 will be set automatically.
4-3. Depress a key (not this key XL), and adjust VR1/20V TUNE on Main board for 14Hz. (One cycle full over the scale.)
4-4. Holding down X, depress a key (all this key XL). Waveforms of CH-1 and new channel appear at the same time. Adjust VCF TUNE (VR002/VR080) on the left channel so that the last waveform is in phase with that of CH-1.
4-5. Repeat the step 4-4 for the remaining channels.

**5. VCF RESONANCE**
5-1. Connect the scope to TP-3P/OUT (TARD) on Main board.
5-2. TEST MODE 3, A5 will be set automatically.
5-3. Depress a key, and adjust VR-1/0RES on so that the sine wave is 800mV/10y.
5-4. Repeat the step 4-3 for the remaining channels by adjusting RESO (VR003/VR060) of the assigned channel.
5-5. Repeat HI with other channels, and every time adjust RESO for 800mV/20y.

**6. VCA DC BALANCE**
6-1. Connect the scope or amplifier with speaker to OUTPUT jack.
6-2. TEST MODE 3, A2 Group B4 (resistance).
6-3. Set Sense to G.
6-4. Adjust VR1/10DC BAL on Main board for the minimum transient or thump when a key is depressed.
6-5. Press SEQUENCER-NOTE to select CH-2, and adjust VR201 for the same as in the step 6-4.
6-6. Repeat for CH-3 to CH4 (VR1X01/VR001).

**7. BBD BIAS**
7-1. TEST MODE 3, A5 will be set automatically.
7-2. Connect the scope to TP-1 on Panel board.
7-3. Press C3.
7-4. Depress 3 keys with HOLD on.
7-5. Adjust VR-BB01 BBG on Panel board so that the positive and negative peaks of the 3 waveforms are almost equally clipped.
7-6. Reconnect the scope to TP-2, and adjust VR-9 in the same manner as in 7-5.

**8. Bender**
This adjustment can be done in User's mode with audio method.

**9. **

**CIRCUIT DESCRIPTIONS**

**DATA TRANSMISSION**
The CPU IC1 continuously reads the contents (bits and switched) on the PG-200 Programmer. The CPU compares the reading data with the previous ones and transmits the latest data immediately after a predetermined period. The CPU transmits the data stream in serial format with an Asynchronous method called Start/Stop system which is handled through software rather than UART.

The unit of information is transmitted either as two frame chain (Rut information) or three chain (Switch information).

**Switch Information**

Since each switch requires only 1 or 2 bits to represent the state, the switches in the CPU port line such as P10 are grouped and sent together with the same address assigned. To distinguish a particular switch to be transferred, a second frame is interleaved with Address and Data frames.

**First frame** - Switch group designation (address).
**Second frame** - MASK (logical), Bit except for the switch to be transmitted are blanked out (0).
**Third frame** - Switches status data in the group. The JX-3P recognizes only the bit that has not been marked in the second frame.

**PG-200**

<table>
<thead>
<tr>
<th>Frame</th>
<th>Data or Address bits</th>
<th>Address bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>START bit</td>
<td>Data or Address bits</td>
<td>Address bits</td>
</tr>
</tbody>
</table>

**Port Information**

First frame - Port designation (address).
Second frame - Control voltage data from the port.
Early products

Later products

Difference between two PCBs: IC4-IC18—Single inline or Dual inline.
Although both PCBs are compatible, substituting new PCB to old one needs top panel replacement.
FUSE BOARD
100/117V  7612706100  (pcb 052H414A)
220/240V  7612706400  (pcb 052H414A)

POWER SUPPLY BOARD
100/117V  7612707100  (146H107)  (pcb 052H443B)
220/240V  7612707400  (146H108)  (pcb 052H443B)
THE MIDI

MIDI stands for Musical Instrument Digital Interface designed to enable interconnecting synthesizers, sequencers, rhythm machines, home computers, etc. Copies of publications concerning MIDI hardware and data format will be obtained from MIDI committee or through Roland distributors.

In the following table are data formats and data handling capabilities of MIDI systems of the JX-3P and other Roland models now on the market for reference.

NOTE: Availability of MIDI effects at slave equipment depends on its MIDI operation scheme.

JX-3P MIDI IMPLEMENTATION

<table>
<thead>
<tr>
<th>TRANSMITTED DATA</th>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 0000</td>
<td>0kkk</td>
<td>000</td>
<td>0</td>
<td>Note On (=40H) / (=0)</td>
</tr>
<tr>
<td>1001 0000</td>
<td>000</td>
<td>000</td>
<td>0</td>
<td>Hold Off from rear panel jack, if enabled.</td>
</tr>
<tr>
<td>1001 0000</td>
<td>000</td>
<td>0100</td>
<td>0</td>
<td>Hold On from rear panel jack.</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0111</td>
<td>1111</td>
<td>0</td>
<td>POLY Mode Select (All notes off) Program Change from front panel, if enabled.</td>
</tr>
<tr>
<td>1110 0000</td>
<td>0000</td>
<td>0000</td>
<td>0</td>
<td>Bank A-1 (0) = Bank D-16 (63) Pitch Bend if enabled.</td>
</tr>
<tr>
<td>1110 0000</td>
<td>0000</td>
<td>0000</td>
<td>0</td>
<td>MSB LSb MAX (high) 127 96 CENTER 04 0 MIN (low) 0 0</td>
</tr>
</tbody>
</table>

Notes:
1. HOLD switch on the front panel does not send the signal to MIDI OUT.
2. Pitch Range (0kkk kkkk) is 36(C0) - 96(C6).
3. The transmitter sends All Notes Off (POLY Select) when all of the keys are released.

RECOGNIZED RECEIVE DATA

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 0000</td>
<td>0kkk</td>
<td>000</td>
<td>Note On (=0) / (=0) Velocity ignored.</td>
</tr>
<tr>
<td>1000 0000</td>
<td>000</td>
<td>000</td>
<td>Off, Velocity ignored. Hold Off, if enabled.</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100</td>
<td>000</td>
<td>Hold On, if enabled.</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100</td>
<td>0100</td>
<td>OMNI Select (All notes off).</td>
</tr>
<tr>
<td>1111 0000</td>
<td>0125</td>
<td>0000</td>
<td>POLY Select (All notes off).</td>
</tr>
<tr>
<td>1111 0000</td>
<td>127</td>
<td>0000</td>
<td>Program Change if enabled.</td>
</tr>
<tr>
<td>1111 0000</td>
<td>0000</td>
<td>0000</td>
<td>Pitch Bend if enabled.</td>
</tr>
<tr>
<td>1111 0000</td>
<td>0000</td>
<td>0000</td>
<td>MSB LSb MAX 127 96 CENTER 04 0 MIN 0 0 LS 8 bits ignored.</td>
</tr>
</tbody>
</table>

JP-6 MIDI IMPLEMENTATION

<table>
<thead>
<tr>
<th>TRANSMITTED DATA</th>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 0000</td>
<td>0kkk</td>
<td>000</td>
<td>0</td>
<td>Note On (=40H) / (=0)</td>
</tr>
<tr>
<td>1011 0000</td>
<td>127</td>
<td>0000</td>
<td>0</td>
<td>POLY Mode Select (All notes off) Program Change p=0 - 31 (1FH)</td>
</tr>
<tr>
<td>1111 0110</td>
<td>0000</td>
<td>0000</td>
<td>0</td>
<td>Tune</td>
</tr>
</tbody>
</table>

RECOGNIZED RECEIVE DATA

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 0000</td>
<td>0kkk</td>
<td>000</td>
<td>Note On (=0) / (=0) Velocity ignored.</td>
</tr>
<tr>
<td>1000 0000</td>
<td>000</td>
<td>000</td>
<td>Off, Velocity ignored.</td>
</tr>
<tr>
<td>1011 0000</td>
<td>125</td>
<td>127</td>
<td>Mode Select</td>
</tr>
<tr>
<td>1110 0000</td>
<td>0000</td>
<td>0000</td>
<td>Program Change</td>
</tr>
<tr>
<td>1111 1110</td>
<td>0000</td>
<td>0000</td>
<td>Tune</td>
</tr>
</tbody>
</table>

Notes:
1. In WHOLE KEY mode, the JP-6 sends and receives on Channel 1 only. In SPLIT KEY mode, channels 1 and 2 are allocated to the upper half and the lower half of the keyboard respectively. In OMNI mode, any channel will be accepted.
2. The receiver accepts both OMNI and POLY Select.
3. When MONO Select is received, the receiver switches to OMNI mode.
4. The key signal received from MIDI IN is mixed with self contained key signal.
5. The JP-6 accepts Program Changes not as the number of the tone program but as the number of a combination of Key Mode (WHOLE/SPLIT) and a tone Program Number.
6. The receiver reads Program Changes when PATCH PRESET on the control panel is turned on.
7. The notes outside the JP-6 keyboard range will be shifted by octave(s) to fall within the range.
**HP-300/400 MIDI IMPLEMENTATION**

**TRANSMITTED DATA**

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1001 0000</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>Note On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kkk kkkk = 29-103 (HP-300)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21-108 (HP-400)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vvv vvv = 1-127</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100 0000</td>
<td>0111 1111</td>
<td>Damper On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Damper Off</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100 0000</td>
<td>0111 1111</td>
<td>Soft On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soft Off</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0111 1111</td>
<td>0000 0000</td>
<td>All Notes Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>POLY Mode Select</td>
</tr>
</tbody>
</table>

**RECOGNIZED RECEIVE DATA IN OMNI MODE**

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 xxxx</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>Note Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kkk kkkk = 0-127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vvv vvv = 0-127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>xxxx = 0-15</td>
</tr>
<tr>
<td>1001 xxxx</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>Note On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kkk kkkk = 0-127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vvv vvv = 1-127</td>
</tr>
<tr>
<td>1011 xxxx</td>
<td>0100 0000</td>
<td>0111 1111</td>
<td>Damper On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Damper Off</td>
</tr>
<tr>
<td>1011 xxxx</td>
<td>0100 0001</td>
<td>0111 1111</td>
<td>Soft On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soft Off</td>
</tr>
<tr>
<td>1011 xxxx</td>
<td>0111 1111</td>
<td>0000 0000</td>
<td>All Notes Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>POLY Mode Select</td>
</tr>
<tr>
<td>0111 1110</td>
<td>0000 0000</td>
<td>0000 0000</td>
<td>All Notes Off</td>
</tr>
<tr>
<td>0111 1101</td>
<td>0000 0000</td>
<td>0000 0000</td>
<td>MONO Mode Select</td>
</tr>
<tr>
<td>1000 0000</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>All Notes Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OMNI Mode Select</td>
</tr>
</tbody>
</table>

**RECOGNIZED RECEIVE DATA IN POLY MODE**

<table>
<thead>
<tr>
<th>Status</th>
<th>Second</th>
<th>Third</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 0000</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>Note Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kkk kkkk = 0-127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vvv vvv = 0-127</td>
</tr>
<tr>
<td>1001 0000</td>
<td>0kkk kkkk</td>
<td>0vvvv</td>
<td>Note On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Note Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>kkk kkkk = 0-127</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>vvv vvv = 1-127</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100 0000</td>
<td>0111 1111</td>
<td>Damper On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Damper Off</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0100 0001</td>
<td>0111 1111</td>
<td>Soft On</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Soft Off</td>
</tr>
<tr>
<td>1011 0000</td>
<td>0111 1111</td>
<td>0000 0000</td>
<td>All Notes Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>POLY Mode Select</td>
</tr>
<tr>
<td>0111 1110</td>
<td>0000 0000</td>
<td>0000 0000</td>
<td>All Notes Off</td>
</tr>
<tr>
<td>0111 1101</td>
<td>0000 0000</td>
<td>0000 0000</td>
<td>MONO Mode Select</td>
</tr>
</tbody>
</table>
| Notes: 1. The transmitter sends All Notes Off code when all the keys are released.
2. The received notes outside the HP-300 (400) keyboard range will be shifted by octave(s) to fall within the range.

**IC DATA**

**14051B**

8-Channel Analog Multiplexer/Demultiplexer

**2764**

**1R3109**

**Engaging MIDI IN disconnects some of the interconnections for optimum operation when linking sequencer.**

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**Pin Configuration**

**Logic Symbol**

**Block Diagram**

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