1. SPECIFICATIONS

1-1. INPUT

<table>
<thead>
<tr>
<th>Impédance</th>
<th>Sensitivity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>−50dB</td>
<td>3KΩ</td>
</tr>
<tr>
<td>−35dB</td>
<td>56KΩ</td>
</tr>
<tr>
<td>−20dB</td>
<td>56KΩ</td>
</tr>
</tbody>
</table>

*With 1KHz sine wave input, to obtain 0 VU, slightly over which Peak Level Lamp lights up. Figures in parenthesis indicate sensitivity for Serial No. Up to 621849.

1-2. OUTPUT

<table>
<thead>
<tr>
<th>Level</th>
<th>Impédance (Approx.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Connected to both A and B Jacks</td>
</tr>
<tr>
<td>H: −15dB</td>
<td>88mVrms</td>
</tr>
<tr>
<td>M: −25dB</td>
<td>27mVrms</td>
</tr>
<tr>
<td>L: −35dB</td>
<td>9mVrms</td>
</tr>
</tbody>
</table>

*Input: 1KHz sine wave, 3.2mVrms, with Input Level switch at −50dB.
Setting: All effects – off, Direct signal – on
Output: No load, from A Jack

1-3. TONE CONTROL

<table>
<thead>
<tr>
<th>Input</th>
<th>3.2mVrms sine wave, Input Level at −50dB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>600Hz</td>
</tr>
<tr>
<td>BASS</td>
<td>MAX</td>
</tr>
<tr>
<td>TREBLE</td>
<td>CENTER</td>
</tr>
<tr>
<td>Output</td>
<td>240mV</td>
</tr>
<tr>
<td></td>
<td>No load, from A Jack</td>
</tr>
</tbody>
</table>

1-4. DELAY TIME

<table>
<thead>
<tr>
<th>Repeat Rate</th>
<th>Mode 1 PH-1</th>
<th>Mode 2 PH-2</th>
<th>Mode 3 PH-3</th>
<th>Sound on Sound PH-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECHO</td>
<td>Max.</td>
<td>40ms</td>
<td>80ms</td>
<td>210ms</td>
</tr>
<tr>
<td></td>
<td>Center</td>
<td>60ms</td>
<td>120ms</td>
<td>320ms</td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>130ms</td>
<td>260ms</td>
<td>720ms</td>
</tr>
<tr>
<td>CHORUS</td>
<td>Intensity</td>
<td>Delay Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Min.</td>
<td>2ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Max.</td>
<td>12ms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1-5. OTHERS

- Power consumption .................................................. 22W
- Dimensions .......................................................... 415(W) x 190(H) x 300(D)mm
- Weight .............................................................. 10kg
WAVEFORM CHART .... WITH 3.8mV (approx. 9mVp-p), 1KHz SQUARE WAVE INPUT

A

B

C

D

E

F

G

H

I (ECHO/SOUND ON SOUND)

J

K

L

M

N

O

P

Q
RE-301 produces (1) Direct sound, (2) Echo and Sound on Sound sounds by tape mechanism, (3) Chorus sound by BBD and (4) Reverb sound by spring. The unit comprises circuits to produce the above sounds and auxiliary circuits like motor circuit and power supply circuit. Most of the control of these circuits and switching of signals are processed by DC voltage, which serves to reduce the number of signal wiring, resulting in great improvement in signal-to-noise ratio and hum level.

1ST PREAMPLIFIER (AP-58)
The input signal is attenuated by changing the feedback in IC1, IC2 and IC3 and also by changing the input impedance. At -20dB and -35dB input level switch positions, impedance is high and at -50dB, impedance is low.

MIXER & DIRECT SOUND AMPLIFIER (IC6)
Output signal from AP-58 is mixed by Mixer IC6b and the mixed signal is amplified by IC6a to become Direct sound signal. The mixed signal is also fed to successive effect circuits. When EFFECT is cancelled through EFFECTS CANCEL REMOTE jack, Input No.3 is connected to Direct Sound Amplifier IC6a alone. Q11 reduces Direct Level when Chorus is ON.

PEAK LEVEL INDICATOR
Comparator Q2 and Q3 operates with sine wave of the level where VU meter indication exceeds 0, making LED conductive to light up.

CHORUS CIRCUIT
Automatic Gain Control & Low-Pass Filter
In order to prevent excessive amplitude signal from being applied on BBD (IC8) that may cause distortion, Automatic Gain Control IC5a controls the signal below the permissible input level of BBD.
Low-pass filter comprises Q5 and C & R’s, and attenuates the frequencies of input signal which may cause beating by interference with clock frequency.

BBD CLOCK GENERATOR
Clock leakage in the output signal of BBD IC8 is decreased by VR13 and subsequent low-pass filter comprising Q7 and C & R’s.
Clock generator IC9a, 9c and 9d generates 45K – 250KHz frequency, while being modulated by LFO IC11c. And the output is frequency-divided to approximately 20K – 130KHz, by the subsequent Flip Flop IC10, to become clock pulses of opposite polarity to operate BBD.

ECHO CIRCUIT
Recording Amplifier & Equalizer
In order to improve signal-to-noise ratio, higher frequency is pre-emphasized in recording amplifier IC5b.
On the other hand, recording frequency response changes in accordance with the change in tape speed. To compensate for this change, the capacitance of IC7 which demonstrates capacitor character is changed by the voltage that is proportional to motor speed, causing change in equalizer curve.
Playback equalization (de-emphasis) is made by IC13a.
But equalization for sound-on-sound playback is made exclusively by IC15a.

MOTOR DRIVE
Motor drive circuit comprises Q100 – 10B and IC4b on PS-30. Output voltage from IC11a on ET-13 is changed by Repeat Rate control VR5. This voltage is compared by IC4b with the voltage proportional to motor speed. The difference is applied on Q108 to control the power applied on the motor.
In order to obtain natural echo effect through adequate motor revolution, LFO outputs are mixed by IC11a and added on the control voltage. The voltage differs for each of playback head. At Chorus effect, outputs from two LFO’s are added to IC11a.
IC4a produces DC voltage that is proportional to motor speed and it is applied to the recording equalizer control circuit mentioned above.

NOISE CANCEL CIRCUIT
Q27 and Q28 conduct when input signal is very low and any noise that is generated in the preceding circuits are grounded.
With signal exceeding the noise level, the minus voltage from IC14 is cut off to pass the signal.
PARTS attached on foil side:

- R166
- R167
- C82
- C92
- C93
- C86
- C87
- C88
- C89
- C85
- C81
- C90
- C91

NOTE:
For Serial No. 611400 and higher, Non-Polar Capacitors (formerly Electrolytic) are used for:
C2, 4, 22, 41, 43, 44, 54, 59, 64, 65, 68, 69, 70,
73, 80.

- OP-61
- VR15
- P1 level
- VR16
- P2 level
- VR17
- P3

WAFFER TERMINAL:
A-2461-4C
(010-030)

- TOP VIEW
- NC
- BA662
- pins
- CA3080A
- connection
- BA662
- see page 9

IC7: CA3080A

- SW-6
- SW7, a
- SW7, b
- SW8
- SW9
- SW4, No. 2
- SW6, No. 2

A-2461-3C
(010-035)

- GND

BIAS TRAP CHECK POINT

- REVERB UNIT OUTPUT
- CLOCK BALANCE
- BBD BIAS ADJ

Can be replaced by ET-13A.
When VR-20 is left effective, R132 on ET-13A should be the same as is on ET-13 (in value, in connection).
Circuit improvements and Component changes

Serial No. 764800

PCB Assy change,- ET-13 to ET-13A
interchangeable, but care should be
taken if NOISE CANCEL, VR20 is needed -
refer to below.

S.on. S. add,- FBT switch Q29, 2SK30A-Y
change,- Q22, 2SK68 to 2SK30A-Y
change,- R3 circuit (RC constant)

OUTPUT add,- LPF

IC7 change,- 3080A to BA662
3080 is not in production
interchangeable with proper connection
of pins.

2SC100GR replace,- by 2SC732TM-GR
interchangeable

Serial No. 764950 - 805699

NOISE CANCEL
Variable to Fix resistor VR20 to R168, 18k-ohm
S/N No.805700 -
R168(obs.) to R132(1k to 2.2k)

LEVEL METER
S/N No. 785450 -
change,- BK-560(SK-50) to EMT-2410
compatible

IC CD4001BE
change,- to CD4001UBB or TC4001UBP
CD4001BE with internal buffer for
output gate
CD4001UBB without buffer
Using CD4001BE in CLOCK GENERATOR
may result in no oscillation.

NOTE: To replace ET-13 with ET-13A,
R132 (2.2K) should be changed
to 1k with one end connected
to pin 22 if VR-20 left
effective.
9. HEAD AMPLIFIER AP-58 (141-058)

NOTE:
For Serial No. 611400 and higher,
Non-Polar Capacitors (formerly Electrolytic)

For serial No. 621849 and higher,
R200, 208, 215: 4.7K → 3.9K
R201, 209, 216: 1K → 680Ω
Seal No. 764800 and higher
Etch mask 052-202G (compatible, slight shift of pattern)

<table>
<thead>
<tr>
<th>AC LINE VOLTAGE – FUSE RATING</th>
<th>100-120V</th>
<th>220-240V (DNS)</th>
<th>220-240V</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1 1.0A SGA 008-026 400mAAT</td>
<td>008-062</td>
<td>1.0A SGA 008-026</td>
<td></td>
</tr>
<tr>
<td>F2 1.0A SGA 008-026 400mAAT</td>
<td>008-062</td>
<td>1.0A SGA 008-026</td>
<td></td>
</tr>
<tr>
<td>F3 2.0A SGA 008-028 1.6AAT</td>
<td>008-069</td>
<td>2.0A SGA 008-028</td>
<td></td>
</tr>
<tr>
<td>F4 1.0A SGA 008-026 400mAAT</td>
<td>008-062</td>
<td>0.5A SGA 008-024</td>
<td></td>
</tr>
</tbody>
</table>

IC
IC4 ............ JRC4558D (NJM) μC4558C (NEC)
ADJUSTMENT AND CHECKING

1. MECHANICAL ADJUSTMENT

1-1. TAPE CHASSIS POSITION
Adjust the tape chassis position so that the clearance from the motor shaft is 1mm. See Fig.1. Secure it by tightening 2 screws at the rear section of the chassis.

![Fig. 1](image)

1-2. TAPE CHASSIS HEIGHT (TEMPORARY)
Adjust the tape chassis height so that it is 10.5±0.5mm above the main chassis. See Fig.2.
(Make sure that Frame No.8 is not deformed.)

1-3. LEAF SPRING PRESSURE
Adjust position of Frame No.10 so that the tension to separate the leaf spring from the bearing roller is 25 – 30g. See Fig.3.

![Fig. 3](image)

1-4. POSITION OF FRAMES NOS. 7, 8 AND 9
Secure the frames as illustrated in Fig.4.
CAUTION:
Make adjustment of position of Frames Nos. 7 and 8 accurately with the pinch roller in contact with the motor shaft.

1-5. PINCH ROLLER PRESSURE
Plug in the power cord and turn switch on. Adjust the solenoid position so that the tension to separate the pinch roller from the motor shaft is 1.0 – 1.4kg, using a spring balance. See Fig.5.
CAUTION: Make sure that pinch roller surface is perfectly parallel with the motor shaft.

1-6. TAPE PACK HEIGHT (FINAL)
a) Thread the tape and run it.
b) Consulting Fig.6, visually adjust the head alignment. (This alignment must be made first, otherwise tape cannot run stably.) Then proceed to electrical adjustment.

![Fig. 6](image)

Adjust head slit so that it is:
(1) vertical to chassis, and
(2) located at the center of the tape.
<table>
<thead>
<tr>
<th>NO.</th>
<th>PARTS NO.</th>
<th>PARTS NAME AND DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>120-036</td>
<td>Nut, Decoration, M3</td>
</tr>
<tr>
<td>02</td>
<td>123-004</td>
<td>Screw, Decoration, M3</td>
</tr>
<tr>
<td>03</td>
<td>092-004</td>
<td>Top cover No.4, pack lacrylic</td>
</tr>
<tr>
<td>04</td>
<td>079-004</td>
<td>Frame No.4</td>
</tr>
<tr>
<td>05</td>
<td>079-005</td>
<td>Frame No.5</td>
</tr>
<tr>
<td>06</td>
<td>079-006</td>
<td>Frame No.6</td>
</tr>
<tr>
<td>07</td>
<td>079-007</td>
<td>Frame No.7</td>
</tr>
<tr>
<td>08</td>
<td>079-008</td>
<td>Frame No.8</td>
</tr>
<tr>
<td>09</td>
<td>079-009</td>
<td>Frame No.9</td>
</tr>
<tr>
<td>10</td>
<td>079-010</td>
<td>Frame No.10</td>
</tr>
<tr>
<td>11</td>
<td>070-033</td>
<td>Leaf spring No.33</td>
</tr>
<tr>
<td>12</td>
<td>101-017</td>
<td>Felt No.17</td>
</tr>
<tr>
<td>13</td>
<td>061-063A</td>
<td>Chassis No.63A</td>
</tr>
<tr>
<td>14</td>
<td>065-113</td>
<td>Cover, Bearing</td>
</tr>
<tr>
<td>15</td>
<td>113-004</td>
<td>Bearing</td>
</tr>
<tr>
<td>16</td>
<td>063-011</td>
<td>Plate No.11</td>
</tr>
<tr>
<td>17</td>
<td>070-017</td>
<td>Spring No.17, Support for chassis</td>
</tr>
<tr>
<td>18</td>
<td>070-018</td>
<td>Spring No.18</td>
</tr>
<tr>
<td>19</td>
<td>*</td>
<td>Collar (plastic), M3 x 6mm</td>
</tr>
<tr>
<td>20</td>
<td>120-001</td>
<td>Sleeve Nut No.1, 10mm</td>
</tr>
<tr>
<td>21</td>
<td>*</td>
<td>Screw, B.H. M3 x 12mm, Nickel</td>
</tr>
<tr>
<td>22</td>
<td>*</td>
<td>Screw, B.H. M3 x 15mm, Chrome</td>
</tr>
<tr>
<td>23</td>
<td>*</td>
<td>Screw, B.H. M3 x 6mm,</td>
</tr>
<tr>
<td>24</td>
<td>*</td>
<td>Screw, O.H. M3 x 15mm, Nickel</td>
</tr>
<tr>
<td>25</td>
<td>*</td>
<td>Screw, B.H. M3 x 6mm,</td>
</tr>
<tr>
<td>26</td>
<td>*</td>
<td>Screw, T.H. M2.6 x 4mm,</td>
</tr>
<tr>
<td>27</td>
<td>*</td>
<td>Plain washer M3 x 8 x 0.5mm</td>
</tr>
<tr>
<td>28</td>
<td>121-035</td>
<td>Plain washer No.35, M3 x 8 x 0.3mm Phosphor bronze</td>
</tr>
<tr>
<td>29</td>
<td>*</td>
<td>Spring washer M3</td>
</tr>
<tr>
<td>30</td>
<td>*</td>
<td>Nut, Hex M3</td>
</tr>
<tr>
<td>31</td>
<td>070-005</td>
<td>Spring No.5</td>
</tr>
<tr>
<td>32</td>
<td>*</td>
<td>Screw, B.H. M3 x 18mm</td>
</tr>
<tr>
<td>33</td>
<td>101-008</td>
<td>Felt Chip No.8</td>
</tr>
<tr>
<td>34</td>
<td>101-026</td>
<td>Felt No.26</td>
</tr>
<tr>
<td>35</td>
<td>*</td>
<td>Screw, SEMS M3 x 8mm, Chrome (wire spring washer)</td>
</tr>
<tr>
<td>36</td>
<td>107-004</td>
<td>Cushion No.4</td>
</tr>
</tbody>
</table>

* R-280MR can be used for R-280MP

---

**Diagram:**

- **Cover No.19 (065-019)**
- **Guide Post No.5 (067-005)**
- **PCB Holder No.33 (LC55-4N 064-033)**
- **Spacer No.24 (2) (073-024) (not shown in photo)**
- **Spring No.5 (070-005)**
- **Pipe 3 x 6 x 20**
- **Guide No.25 (067-025)**
- **Head Cover No.114 (065-114)**
- **Felt No.1 (101-001)**
- **Pinch Roller No.1 (112-001)**
- **Pinch Roller Bushing No.8 (068-006)**
- **PB Head (R-280MP 049-004)**
- **Plate No.13**
- **Record Head R-280MR (049-003)**
- **Shield (065-116)**
- **Erase Head AE-8 (049-001)**
- **Platform No.127 (064-127)**

---

*Roland*
2. ELECTRICAL ADJUSTMENT

![Diagram of electrical adjustments](image)

**SETTING OF SWITCHES AND CONTROLS ON FRONT PANEL FOR ADJUSTMENT**

<table>
<thead>
<tr>
<th>Switch/Control</th>
<th>ECHO</th>
<th>CHORUS</th>
<th>SOUND ON SOUND</th>
<th>REVERB</th>
<th>DIRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Level Switch</td>
<td>-50dB</td>
<td>-50dB</td>
<td>-50dB</td>
<td>-50dB</td>
<td>-50dB</td>
</tr>
<tr>
<td>Output Level Switch</td>
<td>-15dB</td>
<td>-15dB</td>
<td>-15dB</td>
<td>-15dB</td>
<td>-15dB</td>
</tr>
<tr>
<td>Echo Switch</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Echo Mode Switch</td>
<td>as specified</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Echo Volume</td>
<td>Max.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Repeat Rate</td>
<td>as specified</td>
<td>-</td>
<td>as specified</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chorus Switch</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Chorus Intensity</td>
<td>-</td>
<td>as specified</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Direct Signal Switch</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>Sound on Sound Switch</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>Echo/Single Delay Switch</td>
<td>Single Delay</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tone Controls</td>
<td>Center</td>
<td>Center</td>
<td>Center</td>
<td>Center</td>
<td>Center</td>
</tr>
</tbody>
</table>

*Switches or controls marked — may be set to any position.
**When Direct Signal Switch is set to OFF with other controls at DIRECT setting, the output should be 0.
***For adjustment, output should be taken through Output Jack A.
INSTRUMENTS: Audio Generator
AC VTVM, 2 units
Oscilloscope

2-1. TRAP COIL ADJUSTMENT
Note: This adjustment is necessary only when repairing the unit which may cause the change in oscillation frequency.
The core is subject to breakage unless driver that fits closely is used.
Setting: Input — 0
Single Delay Switch — Single Delay
Measuring point:
BIAS-TRAP CHECK POINT on ET-13 Main Board
Measuring method:
Adjust trap coil on PS-30 to obtain minimum leakage of bias voltage. It should be not over than 20mVrms on AC VTVM.

2-2. HEAD AZIMUTH
Setting: Input — 1KHz square wave, 3.8mV
Set to obtain Echo
Repeat Rate — Center
Measuring point:
Output Jack, with Oscilloscope and AC VTVM
Measuring method:
a) Adjust each head so that it is vertical to the chassis and the head gap is positioned at the center of the tape.
b) Fine adjust so that level from each head is maximum and treble is produced best.
c) The alignment should be made in the order of Recording Head, Playback Head 1, 2, and 3, and Sound on Sound Head.

2-3. BIAS CURRENT ADJUSTMENT
Setting: The same as above, 9-2-2.
Echo mode — 1
Measuring point:
The same as above, 9-2-2.
Measuring method:
Adjust bias potentiometer VR19 on PS-30 to obtain maximum output.

2-4. DIRECT OUTPUT LEVEL
Setting: Input — 1KHz sine wave, 3.2mV
Set to obtain only Direct sound.
Measuring point:
Output Jack, with Oscilloscope and AC VTVM
Measuring method:
Make sure the output level is 89mV, for each of Input Jacks 1, 2 and 3.
2.5. ECHO OUTPUT LEVEL
Setting: Input — 1KHz sine wave, 3.2mV
Set to obtain Echo sound.
Repeat rate — Center
Measuring point:
Output Jack, with Oscilloscope and AC VTVM.
Measuring method:
Adjust VR15 to obtain the same output level as Direct output level with Echo Mode Switch at 1; VR16 with the switch at 2; and VR17 with the switch at 3.

2.6. SOUND ON SOUND OUTPUT LEVEL
Setting: Input — 1KHz sine wave, 3.2mV
Set to obtain Sound on Sound sound
Repeat Rate — Center
Measuring point:
Output Jack, with Oscilloscope and AC VTVM
Measuring method:
Adjust VR14 to obtain the same output level as Direct output level.

2.7. EQUALIZER
Setting: Input — 1KHz, square wave, 3.8mV
Set to obtain Echo sound.
Mode Selector — 1
Tone control — BASS, Center
TREBLE, 1 graduation up from Center
Measuring point:
Output Jack, with Oscilloscope
Measuring method:
Adjust equalizer potentiometer VR11 so that the higher frequency response with Repeat Rate at Center equals that with Repeat Rate at Minimum. Turning VR11 counterclockwise lifts higher frequency response.

2.8. INTENSITY
Setting: Input — 0
Set to obtain Echo sound.
Single Delay Switch — Echo
Mode Selector — 1
Measuring point:
Output Jack, with Oscilloscope and AC VTVM, and also connect to an amplifier/speaker.
Measuring method:
Adjust Intensity Potentiometer VR18 so that oscillation occurs with Intensity Control on Panel at Point A and the level is the same as Direct output level.
2-9. BBD BIAS OF CHORUS CIRCUIT
Setting: Input — 1KHz square wave, over 3.8mV
Set to obtain Chorus sound.
Chorus Intensity — Maximum
Measuring point:
Output Jack, with Oscilloscope and AC VTVM
Measuring method:
Adjust BBD Bias Potentiometer VR12 so that output waveform is clipped neither at top nor bottom, that the level is 65mV and also that the waveform swings horizontally.

2-10. BBD CLOCK BALANCE
Setting: Input — 0
Set to obtain Chorus sound.
Chorus Intensity — Maximum
Measuring point:
Base of Transistor Q6, Oscilloscope
Measuring method:
Adjust Balance Potentiometer VR13 to obtain waveform of Fig.B, in the illustration below.

A

WRONG

B

GOOD

2-11. REVERB OUTPUT LEVEL
Setting: Input — 1KHz sine wave, 3.2mV
Set to obtain Reverb sound alone.
Reverb Volume (VR8) — Maximum
Measuring point:
Output Jack, with Oscilloscope and AC VTVM
Measuring method:
Make sure that output waveform is not clipped and the level is approximately 80mV.

2-12. NOISE CANCEL CIRCUIT (needless serial no. 764950 and higher)
Setting: Input — 0
Set to obtain Echo sound.
Measuring point:
Output Jack, connect to an amplifier/speaker with gain set at maximum.
Measuring method:
Adjust Noise Cancel Potentiometer VR20 so that noise at spliced part of tape is not heard.