RCA-6136 is a sharp-cutoff pentode of the 7-pin miniature type intended particularly for use as an intermediate-frequency or rf amplifier in high-gain, wide-band circuits of vhf communications receivers. Constructed to give dependable performance under conditions of shock and vibration, this "premium" tube, which is similar to the 6AU6, is especially suited for use in critical industrial and military applications.

Featured in the design of the 6136 is a structure utilizing tube parts which are precisely made and accurately fitted to minimize variations in electrical characteristics due to mechanical movement and to minimize microphonic effects. In addition, the design incorporates a pure-tungsten heater having high mechanical strength to give long life under conditions of frequent "on-off" switching.

The 6136 is manufactured under rigid control and undergoes rigorous tests to insure its "premium" quality as follows: test readings at the end of 1 hour, 100 hours, and 500 hours to insure that tubes fall within the established tight characteristic limits and that early failures are held to a low percentage.

**GENERAL DATA**

**Electrical:**
- Heater, for unipotential Cathodes:
  - Voltage (AC or DC)........... 6.3 ± 10% volts
  - Current...................... 0.3 amp
- Direct Interelectrode Capacitance (Without external Shield):
  - Grid No.1 to plate........ 0.0035 max. \( \mu F \)
  - Grid No.1 to cathode, heater, grid No.2 and grid No.3 & internal shield........ 6 \( \mu F \)
  - Plate to cathode, heater, grid No.2 and grid No.3 & internal shield........ 5 \( \mu F \)

**Mechanical:**
- Operating Position.................. Any
- Maximum Overall Length........ 2-1/8"
- Maximum Seated Length........ 1-7/8"
- Length, Base Seat to Bulb Top (Excluding tip)........ 1-1/2" ± 3/32"
- Maximum Diameter........ 3/8"
- Bulb.................. T5-1/2
- Base......... Small-Button Miniature 7-Pin (JETEC No.E-7-1)

**AMPLIFIER -- Class A1**

**Maximum Ratings, Absolute Values:**
- PLATE VOLTAGE.................. 330 max. volts
- GRID-No.3 (SUPPRESSOR-GRID) VOLTAGE........ 0 max. volts
- GRID-No.2 (SCREEN-GRID) VOLTAGE........ 165 max. volts
- GRID-No.1 (CONTROL-GRID) VOLTAGE:
  - Positive bias value........ 0 max. volts
  - GRID-No.2 INPUT........ 0.7 max. watt
- PLATE DISSIPATION........ 3.3 max. watts
- PEAK HEATER-CATHODE VOLTAGE:
  - Heater negative with respect to cathode........ 100 max. volts
  - Heater positive with respect to cathode........ 100 max. volts
- BULB TEMPERATURE (At hottest point on bulb surface)........ 165 max. °C

**Characteristics:**
- Plate Supply Voltage........ 100 250 volts
- Grid No.3........ Connected to cathode at socket
- Grid-No.2 Supply Voltage........ 100 150 volts
- Cathode Resistor........ 150 ± 10 ohms
- Plate Resistance (Approx.)........ 0.5 1 megohm
- Transconductance........ 3900 5200 \( \mu \)mos
- Plate Current........ 5 10.6 ma
- Grid-No.2 Current........ 2.1 4.3 ma
- Grid-No.1 Voltage (Approx.) for plate current of 10 \( \mu \)A........ -4.2 to -6.5 volts

**Typical Operation as Resistance-Coupled Amplifier:**
See Chart on Page 3.

**Maximum Circuit Values:**
- Grid-No.1 Circuit Resistance:
  - For cathode-bias operation........ 0.5 max. megohm
  - For fixed-bias operation........ 0.25 max. megohm

**CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN**

Values are Initial, Unless Otherwise Specified

<table>
<thead>
<tr>
<th>Note</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heater Current.................. 0.275</td>
<td>0.325</td>
<td>amp</td>
</tr>
</tbody>
</table>

**Direct Inter electrode Capacitance (Without external shield):**
- Grid No.1 to plate........ - | - | \( \mu F \)
- Grid No.1 to cathode, heater, grid No.2 and grid No.3 & internal shield........ - | 4.8 | 7.2 | \( \mu F \)
- Plate to cathode, heater, grid No.2, and grid No.3 & internal shield........ - | 3.9 | 5.9 | \( \mu F \)
- Plate Current [1] ........ 1.2 | 2 | 13.5 | ma
- Plate Current [2] ........ 1.3 | - | 35 | \( \mu \)a
- Grid-No.2 Current........ 1.2 | 2.6 | 6 | ma
- Transconductance........ 4150 | 6250 | \( \mu \)mos
- Grid No.1 to Plate:
  - With heater volts = 6.3........ 1.2 | 4150 | 6250 | \( \mu \)mos
  - With heater volts = 5.5........ 2 | 3900 | - | \( \mu \)mos
- At end of 500 hours
  - With heater volts = 6.3........ 1.2 | 3600 | 6250 | \( \mu \)mos
Difference between average transconductance initially, and average after 500 hours, expressed as a percentage of the initial average.

- Reverse Grid Current: 1.4 μA
- Reverse Grid Current at 500 hours: 1.4 μA
- Grid-Emission Current: 5 μA

Heater-Cathode Leakage Current:
- Heater 100 volts negative with respect to cathode: 10 μA
- Heater 100 volts positive with respect to cathode: 10 μA

Leakage Resistance:
- Grid No.1 to all other electrodes: 1.6, 100 Ω, megohms
- Plate to all other electrodes: 1.7, 50 Ω, megohms

Note 1: With 6.3 volts ac or dc on heater.
Note 2: With plate supply voltage of 250 volts, grid voltage of -0.6 volts. Plate load resistor of 0.1 megohms and grid No.3 tied to cathode.

Low-Frequency Vibration Performance:
- RMS output voltage: 0.000 mV
- This test is performed on a sample lot of tubes from each production run under the following conditions:
  - Heater voltage: 6.3 volts, plate supply voltage of 250 volts, grid voltage of -0.6 volts, plate load resistor of 0.1 megohms, and grid No.3 tied to cathode.
  - Grid-No.2 supply voltage of 150 volts, cathode resistor of 80 ohms, cathode-bypass capacitor of 10 μF, plate load resistor of 2000 ohms and vibrational acceleration of 2.5 g at 25 cps.

Heater-Cycling Life Performance:
- Cycles of intermittent operation: 2000 min., cycles under the following conditions:
  - Heater voltage: 7.5 volts, cycles one minute on and one minute off, heater 135 volts positive with respect to cathode, and all other elements grounded.

Shorts and Continuity Test:
- This test is performed on a sample lot of tubes from each production run to test a tube is considered inoperable if it shows a permanent or temporary short or open circuit.

1-Hour Stability Life Performance:
- This test is performed on a sample lot of tubes from each production run to insure the tubes have been properly stabilized. Tubes are checked for transconductance under conditions specified under 500-Hour Intermittent Life Performance. The variation in transconductance from the 0-hour reading will not exceed 10%.

100-Hour Survival Life Performance:
- This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tubes run to ground against grid or grid failures of any of the characteristics indicated below.

500-Hour Intermittent Life Performance:
- This test is performed on a sample lot of tubes from each production run to insure high quality of the individual tubes run to ground against grid or grid failures of any of the characteristics indicated below.

SPECIAL RATINGS AND PERFORMANCE DATA

Shock Rating:
- Acceleration: 450 max. g
- This test is performed on a sample lot of tubes from each production run. Tubes are held rigid and are tested in four different positions. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, reverse grid current, and transconductance.

Fatigue Rating:
- Acceleration: 2.5 max. g
- This test is performed on a sample lot of tubes from each production run. Tubes are rigidly mounted and subjected to a dynamic load of 2.5 g vibrational acceleration at 60 cycles per second for 32 hours. At the end of this test, tubes will not show permanent or temporary shorts or open circuits, and are required to meet established limits for low-frequency vibration, heater-cathode leakage current, reverse grid current, and transconductance.

OPERATING CONSIDERATIONS
- The maximum ratings in the tabulated data for the 6136 are limiting values above which the serviceability of the 6136 may be impaired from the viewpoint of life and satisfactory performance. Therefore, in order not to exceed these absolute ratings, the equipment designer must determine an average design value below each absolute rating by an amount such that the absolute values will never be exceeded under any usual condition of supply voltage variation, load variation, or manufacturing variation in the equipment itself.
## Operating Conditions as Resistance-Coupled Amplifier (Each Unit)

<table>
<thead>
<tr>
<th>Plate Supply Voltage</th>
<th>90</th>
<th>100</th>
<th>300</th>
<th>volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate Load Resistor</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.47</td>
</tr>
<tr>
<td>Grid-No.2 Resistor</td>
<td>0.09</td>
<td>0.15</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>Grid-No.1 Resistor</td>
<td>0.22</td>
<td>0.22</td>
<td>0.22</td>
<td>0.47</td>
</tr>
<tr>
<td>Cathode Resistor</td>
<td>2100</td>
<td>900</td>
<td>600</td>
<td>3200</td>
</tr>
<tr>
<td>Peak Output Voltage</td>
<td>32</td>
<td>32</td>
<td>82</td>
<td>32</td>
</tr>
<tr>
<td>Voltage Gain</td>
<td>72</td>
<td>116</td>
<td>145</td>
<td>99</td>
</tr>
</tbody>
</table>

O Obtained across grid-No.1 resistor of following stage and is for the condition where the signal level is adequate to swing the grid of the resistance-coupled amplifier tube to the point where its grid starts to draw current.

At 5 volts (RMS) output.

Note: Coupling capacitors should be selected to give desired frequency response. Cathode and grid-No.2 resistors should be adequately bypassed.

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**Fig. 1 - Average Characteristics for Each Unit of Type 6136.**

**Fig. 2 - Average Characteristics for Each Unit of Type 6136.**
Fig. 3 - Average Characteristics for Each Unit of Type 6136.

**DIMENSIONAL OUTLINE**

![Diagram of a miniature 7-pin base socket connection](image)

*Measured from base seat to bulb-top line as determined by ring gauge of 7/32" I.D.*

Fig. 4 - Average Characteristics for Each Unit of Type 6136.

**SOCKET CONNECTIONS**

Bottom View

- **PIN 1**: GRID NO. 1
- **PIN 2**: GRID NO. 3, INTERNAL SHIELD
- **PIN 3**: HEATER
- **PIN 4**: HEATER
- **PIN 5**: PLATE
- **PIN 6**: GRID NO. 2
- **PIN 7**: CATHODE

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