RAYTHEON

TECHNICAL INFORMATION SERVICE

# Technical Information

# 5725/ 6AS6W

## MINIATURE DUAL-CONTROL PENTODE

The 5725/6AS6W is a heater-cathode type pentode of miniature construction capable of operation in the UHF region. The control grid and suppressor grid may be used as independent control electrodes for circuits such as gated amplifiers, mixers, and gain controlled amplifiers. This tube is characterized by long life and stable performance. It is designed for service where severe conditions of high temperature and mechanical shock or vibration are encountered.

MECHANICAL RATINGS: (Maximum)

| | |
|---|---|
| Impact Acceleration | 450 G |
| Fatigue (Vibrational Acceleration for Extended Periods) | 2.5 G |
| Bulb Temperature | 165 °C |
| Altitude | 80,000 ft. |

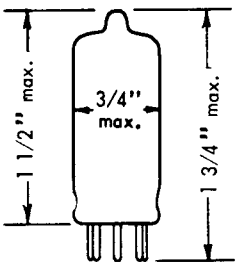
## ELECTRICAL DATA

| Ratings and Normal Operation | MIL-E-1 Symbol | Test Limit or Design Minimum | Normal Test Conditions | Test Limit or Design Maximum | MIL-E-1 Units |
|---|---|---|---|---|---|
| Heater Voltage | Ef | 5.7 | 6.3 | 6.9 | V |
| Plate Voltage | Eb | --- | 120 | 200 | Vdc |
| D.C. Grid Voltage | Ec1 | -55 | -2.0 | 0 | Vdc |
| Screen Grid Voltage | Ec2 | --- | 120 | 155 | Vdc |
| Grid #3 Voltage | Ec3 | -55 | 0 | 30 | Vdc |
| Heater-Cathode Voltage | Ehk | -100 | 0 | +100 | v |
| Grid Resistance | Rg1 | --- | --- | 0.1 | Meg. |
| Cathode Current | Ik | --- | --- | 18 | mAdc |
| Plate Dissipation | Pp | --- | --- | 1.5 | Watts |
| Grid Current | Ic1 | --- | --- | 0.9 | mAdc |
| Screen Dissipation | Pg2 | --- | --- | 0.5 | Watts |
| Grid #3 Current | Ic3 | --- | --- | 0.18 | mAdc |
| | | | Tests | | |
| Heater Current | If | 160 | 175 | 190 | mA |
| Plate Current | Ib | 2.5 | 5.2 | 9.0 | mAdc |
| Transconductance (1) | Sm | 2500 | 3200 | 4500 | μmhos |
| Heater-Cathode Leakage Ehk = ± 100 Vdc | Ihk | --- | --- | 10 | μAdc |
| Plate Current Ec1 = -3 Vdc Ec3 = -10 Vdc | Ib | --- | --- | 200 | μAdc |
| Plate Current Ec1 = -3 Vdc Ec3 = -6 Vdc | Ib | 5 | --- | --- | μAdc |
| Plate Current Ec1 = -8 Vdc | Ib | --- | --- | 200 | μAdc |

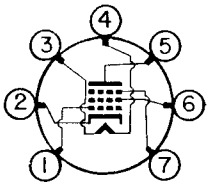
## MECHANICAL DATA

ENVELOPE ..... Glass T5½
OUTLINE ..... 6-1
BASE ... Miniature Button 7-Pin
BASING ..... 7CM
MOUNTING POSITION ..... Any
CATHODE ..... Coated Unipotential

### PHYSICAL DIMENSIONS




### BASING




BOTTOM VIEW

TERMINAL CONNECTIONS:

Pin 1 Grid #1
Pin 2 Cathode, Shield
Pin 3 Heater
Pin 4 Heater
Pin 5 Plate
Pin 6 Grid #2
Pin 7 Grid #3

| Ratings and Normal Operation | MIL-E-1 Symbol | Test Limit or Design Minimum | Normal Test Conditions | Test Limit or Design Maximum | MIL-E-1 Units |
|---|---|---|---|---|---|
| | | | Tests | | |
| Plate Current Ec1 = -6 Vdc | Ib | 5 | --- | --- | μAdc |
| Screen Grid Current | Ic2 | 1.5 | 3.5 | 5.5 | mAdc |
| Transconductance (2) | ΔEf/Sm | --- | --- | 15 | % |
| Transconductance (3) Ec3 = -3 Vdc | Sm (g3-p) | 350 | 700 | 1050 | μmhos |
| Transconductance (4) Ec3 -5 Vdc | Sm (g1-p) | 700 | 1000 | 1700 | μmhos |
| Interelectrode | Cg1-p | --- | --- | .02 | μμf |
| Capacitances (Shield #316) | Cin<br>Cout | 3.5<br>2.6 | 4.0<br>3.0 | 4.5<br>3.4 | μμf<br>μμf |
| Vibration Rp = 10K; G = 10; f = 40 cps | Ep | --- | --- | 150 | mVac |

## SPECIAL TESTS AND RATINGS TO INSURE RELIABILITY.

**Randomly selected statistical samples are subjected to the following tests.**

**Shock Test –** 450 G. 30° hammer angle in Navy high impact shock machine. Sample subjected to twenty (20) impact accelerations, five impact accelerations in each of four different positions.

**Fatigue Test –** 2.5 G. Sample subjected to vibrational acceleration of 2.5 G for 96 hours (32 hours in each of three positions). The sinusoidal vibration is applied at a fixed frequency between 25 and 60 cycles per second.

**Glass Strain –** A sample is subjected to a forty-eight hour holding period at room temperature. The sample is immersed in water at 97–100°C for 15 seconds and immediately immersed in water at not more than 5°C for 5 seconds. The sample is then dried at room temperature for 48 hours and inspected for evidence of air leaks.

**Heater Cycling Life Test –** A sample is subjected to 2000 on–off heater cycles at the following conditions: Ef=7.5V; Ehk=+135 Vdc with all other elements floating. At the conclusion of this test, the tubes will not show open heater or cathode circuits or heater to cathode shorts.

**Stability Life Test –** Sample is operated for 2 + 20 hours to assure initial electrical stability. ($\Delta_t$ Sm < 10%). Tubes are operated with Eb = 180 Vdc, Ec2 = 125, Ec1 = 0, Ehk =+135 Vdc, Rk = 130 Ω and Rg1 = .1 meg.

**Survival Rate Life Test –** Sample is operated 100 hours to assure electrical stability (Sm > 2200 μmhos) and freedom from inoperatives. Tubes are operated under stability Life Test conditions.

**Intermittent Life Test –** 1000 hours. Sample is operated under Survival Rate Conditions with a minimum envelope temperature of 165°C.

**Altitude –** Sample is subjected to a pressure =21 ±2 mmHg (80,000 ft.) at 500 Vac to insure freedom from flashover or corona at the pins of the tube.

## APPLICATION NOTES

CAUTION – – – To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions those than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

## ACCEPTANCE CRITERIA

For purposes of acceptance inspection, use applicable reliable paragraphs.

| Par. No. | Test | Conditions | AQL (Percent Defective) | Inspection Level or Code | Symbol | LIMITS (See Note 1) | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | LAL | Bogie | UAL | Max | ALD | |
| **GENERAL** | | | | | | | | | | | | |
| 3.1 | Qualification | Required for JAN marking | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3.6 | Performance | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **QUALIFICATION INSPECTION (see note 2)** | | | | | | | | | | | | |
| --- | Cathode | Coated unipotential | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3.4.3 | Base Connections | E7-1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.20.3 | Variable frequency vibration (1) | Rp = 10,000 | --- | --- | Ep | --- | --- | --- | --- | 200 | --- | mVac |
| **ACCEPTANCE INSPECTION, PART 1 (production) (see note 3)** | | | | | | | | | | | | |
| 4.7.5 | Continuity and short test (for reliable tubes) | | 0.4 | II | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.1 | Mechanical-production tests | Outline 6-1 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.10.4.1 | Plate Current (1) | | --- | --- | Ib | --- | 4.2 | 5.2 | 6.2 | --- | 2.3 | mAdc |
| 4.10.4.1 | † Plate Current (1) | | 0.4 | II | Ib | 2.5 | --- | --- | --- | 9.0 | --- | mAdc |
| 4.10.6.1 | † Total Grid Current | Rg1 = 0.1 Meg (see note 4) | 0.4 | II | Ic1 | 0 | --- | --- | --- | -0.1 | --- | μAdc |
| 4.10.8 | Heater Current | | --- | --- | If | --- | 168 | 175 | 182 | --- | 14 | mA |
| 4.10.8 | Heater Current | | 0.4 | II | If | 160 | --- | --- | --- | 190 | --- | mA |
| 4.10.9 | Transconductance (1) | | --- | --- | Sm | --- | 2900 | 3200 | 3500 | --- | 750 | μmhos |
| 4.10.9 | Transconductance (1) | | 0.4 | II | Sm | 2500 | --- | --- | --- | 4500 | --- | μmhos |
| 4.10.15 | Heater-Cathode Leakage | Ehk = + 100 Vdc<br>Ehk = -100 Vdc | 0.4 | II | Ihk<br>Ihk | ---<br>--- | ---<br>--- | ---<br>--- | ---<br>--- | 10<br>10 | ---<br>--- | μAdc<br>μAdc |
| **ACCEPTANCE INSPECTION, PART 2 (design)** | | | | | | | | | | | | |
| 4.8 | Insulation of electrodes | g1 - all<br>g3 - all<br>p - all | 2.5 | L6 | R<br>R<br>R | 100<br>100<br>100 | ---<br>---<br>--- | ---<br>---<br>--- | ---<br>---<br>--- | ---<br>---<br>--- | ---<br>---<br>--- | Meg<br>Meg<br>Meg |
| 4.9.12.1 | Low-pressure voltage breakdown | Pressure = 21 ± 2 mmHg; voltage = 500 Vac (see note 5) | 6.5 | (See note 6) | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.19.1 | Low-frequency vibration (2) | Rp = 10,000; G = 10; F = 40 cps | 6.5 | Code I | Ep | --- | --- | --- | --- | 150 | --- | mVac |
| 4.10.3.1 | Radio-frequency noise (other than shot-effect noise) | Ecal = 15.0 mVac; Ec1 = 0; Rk = 200; Ck = 0.2 μf (see note 7) | 2.5 | I | --- | --- | --- | --- | --- | --- | --- | --- |

| Par. No. | Test | Conditions | AQL (Percent Defective) | Inspection Level or Code | Symbol | LIMITS (See Note 1) | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | LAL | Bogie | UAL | Max | ALD | |
| **ACCEPTANCE INSPECTION, PART 2 (design) (cont.)** | | | | | | | | | | | | |
| 4.10.3.4 | Noise and microphonics (for reliable receiving tubes) | Ef = 6.3 Vac; Ebb = 200 Vdc; Ecc2 = 200 Vdc; Ec1 = 0; Ecal = 175 mVac; Rk = 1,000; Rp = 0.1 Meg; Rg2 = 0.5 Meg; Cg2 = 2 μf; Ck = 1,000 μf min (see note 8) | 2.5 | I | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.10.4.1 | Plate Current (2) | Ec1 = −3 Vdc; Ec3 = −10 Vdc | 2.5 | I | Ib | --- | --- | --- | --- | 200 | --- | μAdc |
| 4.10.4.1 | Plate Current (3) | Ec1 = −3 Vdc; Ec3 = −6 Vdc | 2.5 | I | Ib | 5 | --- | --- | --- | --- | --- | μAdc |
| 4.10.4.1 | Plate Current (4) | Ec1 = −8 Vdc | 2.5 | I | Ib | --- | --- | --- | --- | 200 | --- | μAdc |
| 4.10.4.1 | Plate Current (5) | Ec1 = −6 Vdc | 2.5 | I | Ib | 5 | --- | --- | --- | --- | --- | μAdc |
| 4.10.4.3 | Screen-Grid Current | | 2.5 | I | Ic2 | 1.5 | --- | --- | --- | 5.5 | --- | mAdc |
| 4.10.6.2 | Grid Emission | Ef = 7.5 V; Ec1 = −10 Vdc; Rg1 = 0.1 Meg; (see note 9) | 2.5 | I | Isc | 0 | --- | --- | --- | −1.0 | --- | μAdc |
| 4.10.9 | Transconductance (2) | Ef = 5.7 V | 2.5 | I | ΔSm Ef | --- | --- | --- | --- | 15 | --- | % |
| 4.10.9 | Transconductance (3) | Ec3 = −3 Vdc | 6.5 | L6 | Sm (g3-p) | 350 | --- | --- | --- | 1050 | --- | μmhos |
| 4.10.9 | Transconductance (4) | Ec3 = −5 Vdc | 6.5 | L6 | Sm (g1-p) | 700 | --- | --- | --- | 1700 | --- | μmhos |
| 4.10.14 | Direct Interelectrode capacitance | Shield No. 316 | | | Cg1p | --- | --- | --- | --- | 0.02 | --- | μμf |
| | | Shield No. 316 | 6.5 | Code E | Cin | 3.5 | --- | --- | --- | 4.5 | --- | μμf |
| | | Shield No. 316 | | | Cout | 2.6 | --- | --- | --- | 3.4 | --- | μμf |
| **ACCEPTANCE INSPECTION, PART 3 (degradation rate) (see note 10)** | | | | | | | | | | | | |
| 4.9.6.1 | Miniature-tube base-strain | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.6.3 | Glass strain (for receiving tubes) | | 2.5 | I | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.20.5 | Shock test | Hammer angle = 30°; Ehk = +100 Vdc (see note 11) | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.9.20.6 | Fatigue test | G = 2.5; fixed frequency; F = 25 min. 60 max. | 6.5 | (See Note 6) | --- | --- | --- | --- | --- | --- | --- | --- |
| --- | Post shock and fatigue test end points | Vibration (2) | --- | --- | Ep | --- | --- | --- | --- | 300 | --- | mVac |
| | | Heater-cathode leakage | | | | | | | | | | |
| | | Ehk = +100 Vdc | --- | --- | Ihk | --- | --- | --- | --- | 30 | --- | μAdc |
| | | Ehk = −100 Vdc | --- | --- | Ihk | --- | --- | --- | --- | 30 | --- | μAdc |
| | | Transconductance (1) | --- | --- | Sm(1) | 2200 | --- | --- | --- | --- | --- | μmhos |
| | | Grid Current | --- | --- | Ic1 | 0 | --- | --- | --- | −0.4 | --- | μAdc |

| Par. No. | Test | Conditions | AQL (Percent Defective) | Inspection Level or Code | Allowable Defects per Characteristic | | Symbol | LIMITS | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | First Sample | Combined Samples | | Min. | Max. | |
| **ACCEPTANCE INSPECTION, PART 3 (life) (see note 10)** | | | | | | | | | | |
| 4.11.7 | Heater-cycling life test | Ef = 7.5 V; Ehk = +135 Vdc; Ec1 = Ec2 = Ec3 = Eb = 0 (see note 12) | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.11.4 | Life-test end points (heater-cycling) | Heater-cathode leakage | | | | | | | | |
| | | Ehk = +100 Vdc | --- | --- | --- | --- | Ihk | --- | 20 | μAdc |
| | | Ehk = -100 Vdc | --- | --- | --- | --- | Ihk | --- | 20 | μAdc |
| 4.11.3.1(a) | Stability life test | Eb = 180 Vdc; Ec1 = 0; Ec2 = 125 Vdc; Ehk = +135 Vdc; Rk = 130; Rg1 = 0.1 meg; TA = room (see note 13) | 1.0 | Code I | --- | --- | --- | --- | --- | --- |
| 4.11.4 | Life-test end points (stability) (2 and 20 hours) | Change in transconductance (1) of individual tubes | --- | --- | --- | --- | $\Delta_t$Sm | --- | 10 | % |
| 4.11.3.1(b) | Survival-rate life test | Stability life test conditions, or equivalent (see notes 14 and 15) | --- | II | --- | --- | --- | --- | --- | --- |
| 4.11.4 | Life-test end points (survival rate) (100 hours) | Continuity and short (inoperatives) | 0.65 | --- | --- | --- | --- | --- | --- | --- |
| | | Transconductance(1) | 1.0 | --- | --- | --- | Sm | 2200 | --- | μmhos |
| 4.11.5 | Intermittent life-test operation | Stability life test conditions; TE = +165° C min. (see notes 16 and 17) | --- | --- | --- | --- | --- | --- | --- | --- |
| 4.11.4 | Life-test end points (intermittent) (500 hours) | (See note 18) | | | | | | | | |
| | | Inoperatives (see note 19) | --- | --- | 1 | 3 | --- | --- | --- | --- |
| | | Grid current | --- | --- | 1 | 3 | Ic1 | 0 | -0.1 | μAdc |
| | | Heater current | --- | --- | 1 | 3 | If | 160 | 190 | mA |
| | | Change in transconductance (1) of individual tubes | --- | --- | 1 | 3 | $\Delta_t$Sm | --- | 20 | % |
| | | Transconductance(2) | --- | --- | 1 | 3 | $\Delta_{Ef}$Sm | --- | 15 | % |
| | | Heater-cathode leakage | | | | | | | | |
| | | Ehk = +100 Vdc | --- | --- | 1 | 3 | Ihk | --- | 10 | μAdc |
| | | Ehk = -100 Vdc | | | | | Ihk | --- | 10 | μAdc |
| | | Insulation of electrodes | | | | | | | | |
| | | g1 - all | | | | | R | 50 | --- | Meg |
| | | g3 - all | --- | --- | 1 | 3 | R | 50 | --- | Meg |
| | | p - all | | | | | R | 50 | --- | Meg |
| | | Transconductance(1) average change | --- | --- | --- | --- | Avg$\Delta_t$Sm | --- | 15 | % |
| | | Total defectives | --- | --- | 3 | 6 | --- | --- | --- | --- |

| Par. No. | Test | Conditions | AQL (Percent Defective) | Inspection Level or Code | Allowable Defects per Characteristic | | Symbol | LIMITS | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | First Sample | Combined Samples | | Min. | Max. | |
| **ACCEPTANCE INSPECTION, PART 3 (life) (see note 10) (cont.)** | | | | | | | | | | |
| 4.11.4 | Life-test end points (*intermittent*) (1,000 hours) | (See note 18) *Inoperatives* (see note 19) | --- | --- | 1 | 3 | --- | --- | --- | --- |
| | | Grid current | --- | --- | 1 | 3 | Ic1 | 0 | -0.1 | μAdc |
| | | Heater current | --- | --- | 1 | 3 | If | 160 | 190 | mA |
| | | Change in transconductance(1) of individual tubes | --- | --- | 1 | 3 | $\Delta_t Sm$ | --- | 25 | % |
| | | Transconductance(2) | --- | --- | 1 | 3 | $\Delta_{Ef} Sm$ | --- | 20 | % |
| | | Heater-cathode leakage | | | | | | | | |
| | | Ehk = +100 Vdc | --- | --- | 1 | 3 | Ihk | --- | 10 | μAdc |
| | | Ehk = -100 Vdc | | | | | Ihk | --- | 10 | μAdc |
| | | Insulation of electrodes | | | | | | | | |
| | | g1 - all | | | | | R | 40 | --- | Meg |
| | | g3 - all | --- | --- | 1 | 3 | R | 40 | --- | Meg |
| | | p - all | | | | | R | 40 | --- | Meg |
| | | Total defectives | --- | --- | 4 | 8 | --- | --- | --- | --- |
| 4.9.18 | Container drop | Required | | | | | | | | |
| 5. | Preparation for delivery | (See note 20) | | | | | | | | |

Note 1: Variables sampling procedure: See 4.1.1.7

Note 2: All tests listed hereon shall be performed during qualification inspection; however, these three tests are normally performed during qualification inspection only.

Note 3: The AQL for the combined defectives for attributes in acceptance inspection, part 1 (production), excluding inoperatives and mechanical, shall be 1 percent.

Note 4: Approved alternate test: The insertion of a 1.0-megohm resistor in the grid circuit shall change the plate current by not more than 0.5 mAdc.

Note 5: Socket need not be used in performing this test.

Note 6: This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. When one lot has passed, the 30-day rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes. Standard MIL-STD-105, sample size code letter F shall apply.

Note 7: In addition to the rejection criteria of 4.10.3.1, the output shall be read on a VU meter using a rejection limit of 5 VU. Five VU is the meter deflection obtained with a steady-state output of 3 mW from the amplifier.

Note 8: The rejection limit shall be set at the VU meter reading obtained during calibration.

Note 9: Prior to this test, the tube shall be preheated a minimum of 5 minutes at the conditions indicated below. The 3-minute test is not permitted. Test at specified conditions within 3 seconds after preheating. Grid emission shall be the last test performed on the sample selected for the grid emission test.

| Ef V | Ec1 Vdc | Ec2 Vdc | Ec3 Vdc | Eb Vdc | Rk ohms | Rg1 Meg |
|---|---|---|---|---|---|---|
| 7.5 | 0 | 125 | 0 | 180 | 130 | 0.1 |

Note 10: Destructive tests: Tubes subjected to the following destructive tests are not to be delivered on the contract or order:

4.9.20.5 Shock test
4.9.20.6 Fatigue test
4.11.7 Heater-cycling life test
4.11.5 Intermittent life-test operation.

Note 11: A grid No. 1 resistor of 0.1 megohm shall be added; however, this resistor shall not be used when a thyratron-type short indicator is employed.

Note 12: The no-load to steady-state full load regulation of the heater voltage supply shall be not more than 3.0 percent. This test shall be made on a lot-by-lot basis.

Note 13: Stability life test: See 20.2.5.1 of Appendix C.

Note 14: Survival-rate life test: The sampling and testing procedures for this test shall be as specified in 20.2.5.2 to 20.2.5.2.4, inclusive, of Appendix C, with the following exceptions:

20.2.5.2.3: Replace second sentence with the following: If such selection results in a sample containing one or more tubes which are defective as defined under 4.7.5, such tubes shall be replaced by randomly selected good tubes.

20.2.5.2.4(b): Replace with the following: Tubes shall be tested at 100 hours for continuity and short (inoperative) under the same conditions as for the initial test. When any tap-short indication is obtained, the test shall be repeated. When any short indication is again obtained, the tube shall be rejected as inoperable.

Note 15: For survival-rate life test, the equivalent stability life-test conditions shall be as specified in 20.2.5.2.5 of Appendix C.

Note 16: Intermittent life tests: See 20.2.5.3 of Appendix C.

Note 17: Envelope temperature is defined as the highest temperature indicated when using a thermocouple of No. 40 B & S or smaller diameter elements welded to a ring of 0.025-inch diameter phosphor bronze in contact with the envelope. The envelope temperature requirement will be satisfied if a tube, having bogie plate current (±5 percent) under normal test conditions, is determined to operate at or above the minimum specified temperature at any position on the life-test rack.

Note 18: Order for evaluation of life-test defects: See 4.11.3.1.2

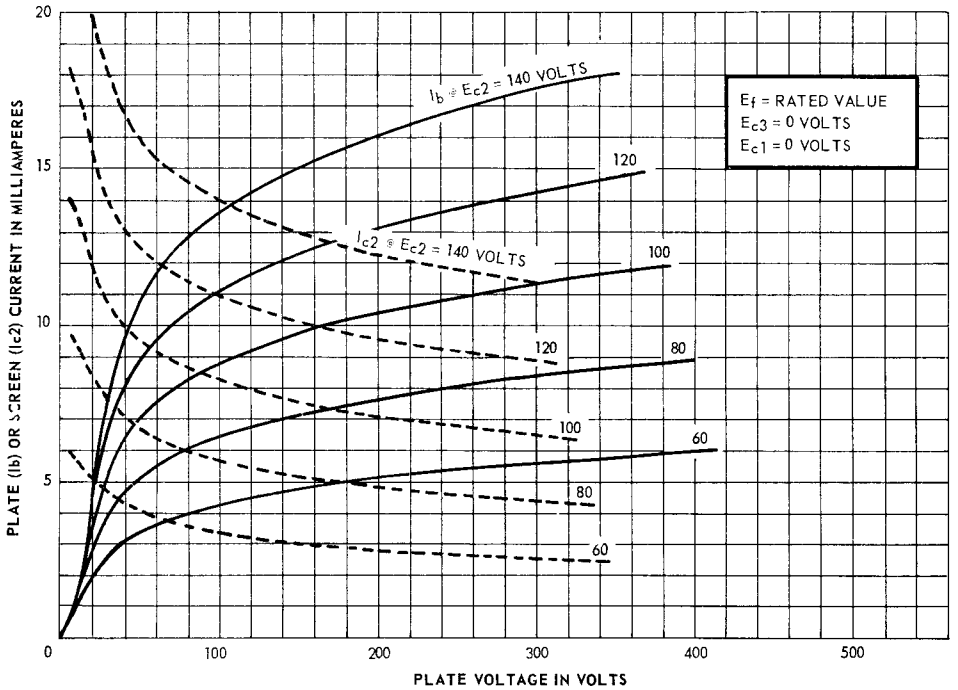
Note 19: An inoperative, as referenced in life test, is defined as a tube having one or more of the following defects: discontinuity or permanent short (see 4.7.5, except tube shall not be tapped); air leaks (see 4.7.6).

Note 20: Tubes shall be prepared for domestic or overseas shipment, as specified in the contract or order, in accordance with Specification MIL-E-75 and appendix thereto.

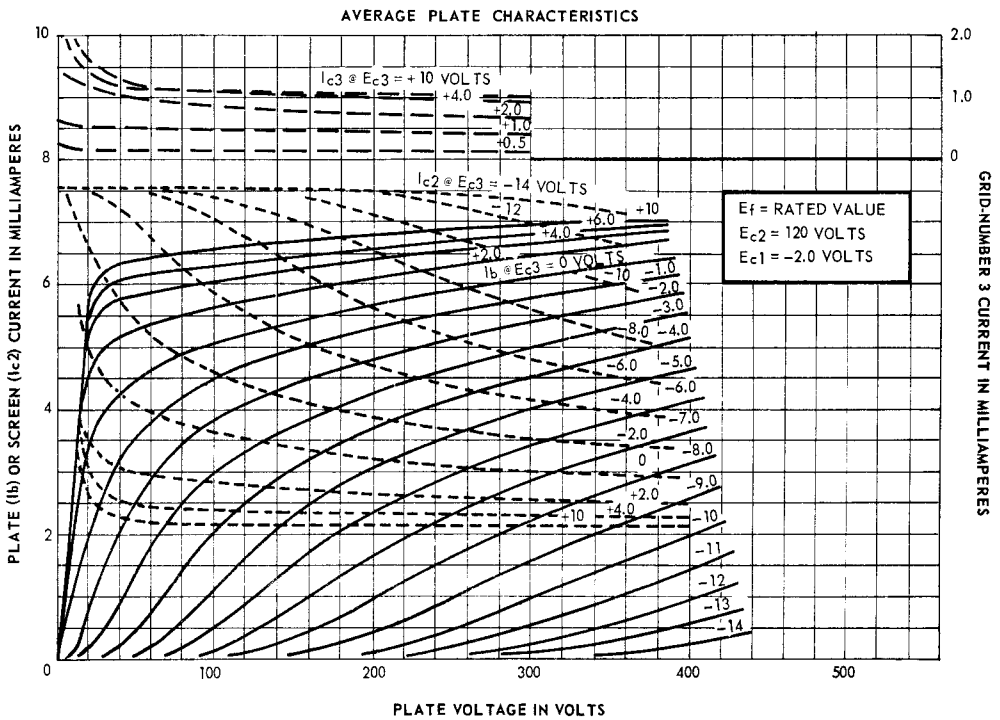
Note 21: All production lots shall be suitably identified.

## MINIATURE DUAL-CONTROL PENTODE

AVERAGE PLATE CHARACTERISTICS




AVERAGE PLATE CHARACTERISTICS

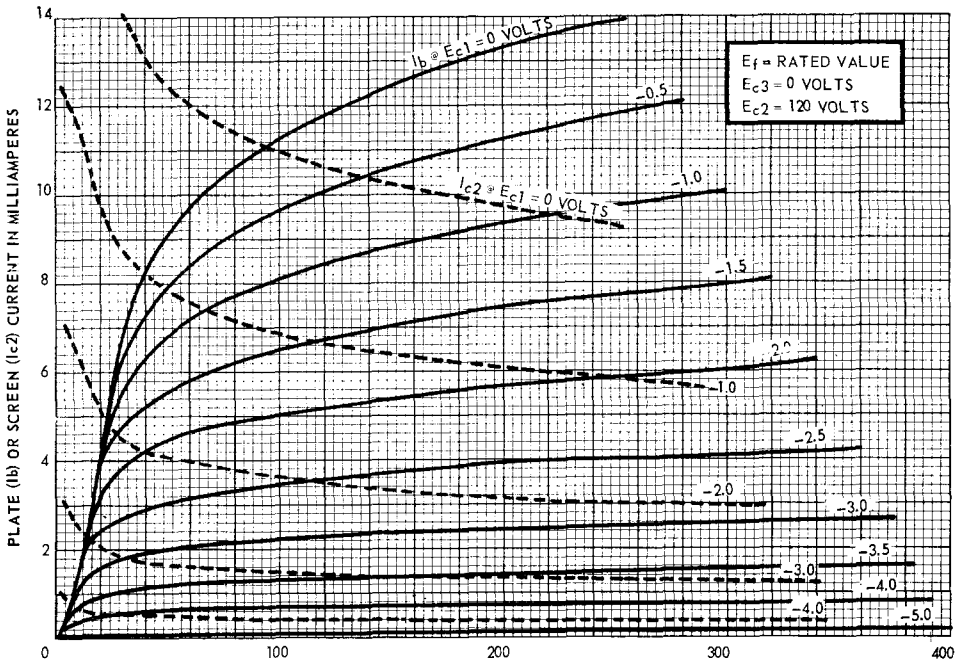




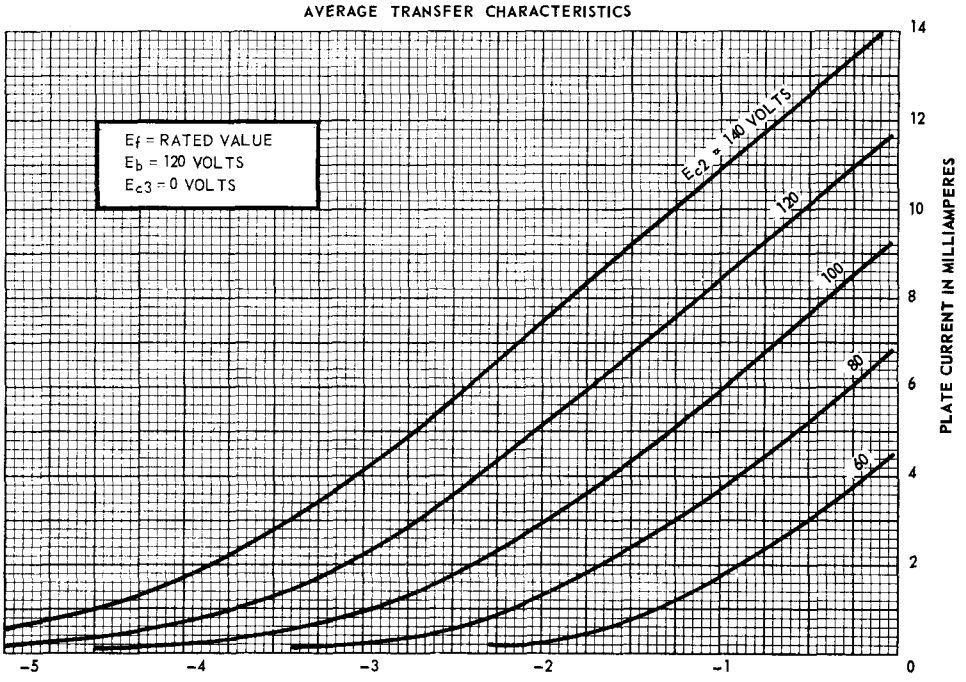

RAYTHEON COMPANY · 55 Chapel Street · Newton 38, Massachusetts

## MINIATURE DUAL-CONTROL PENTODE

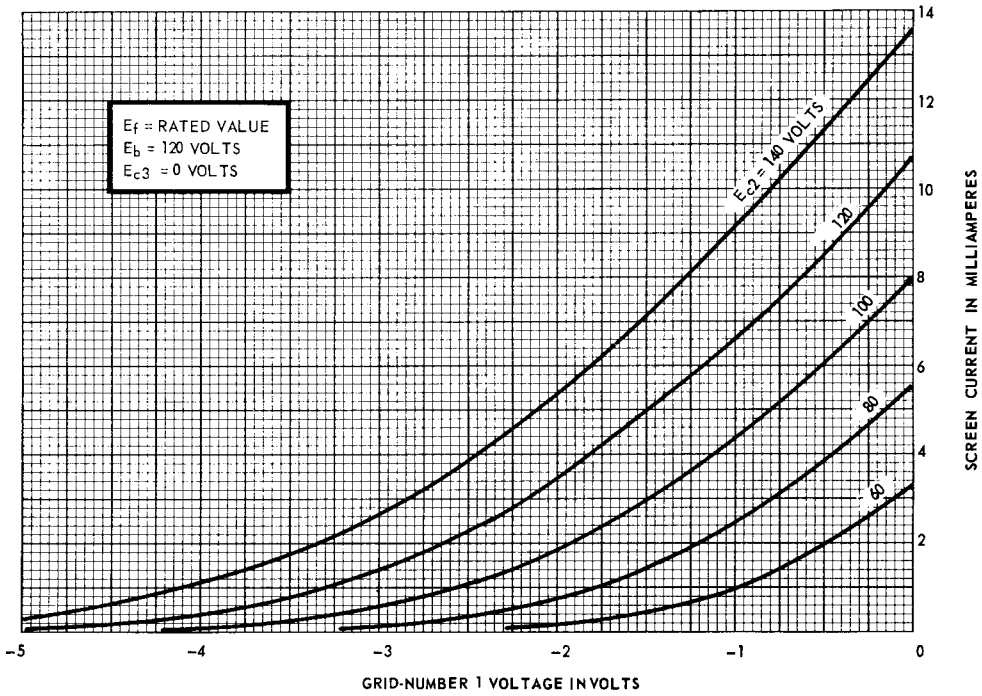
AVERAGE PLATE CHARACTERISTICS



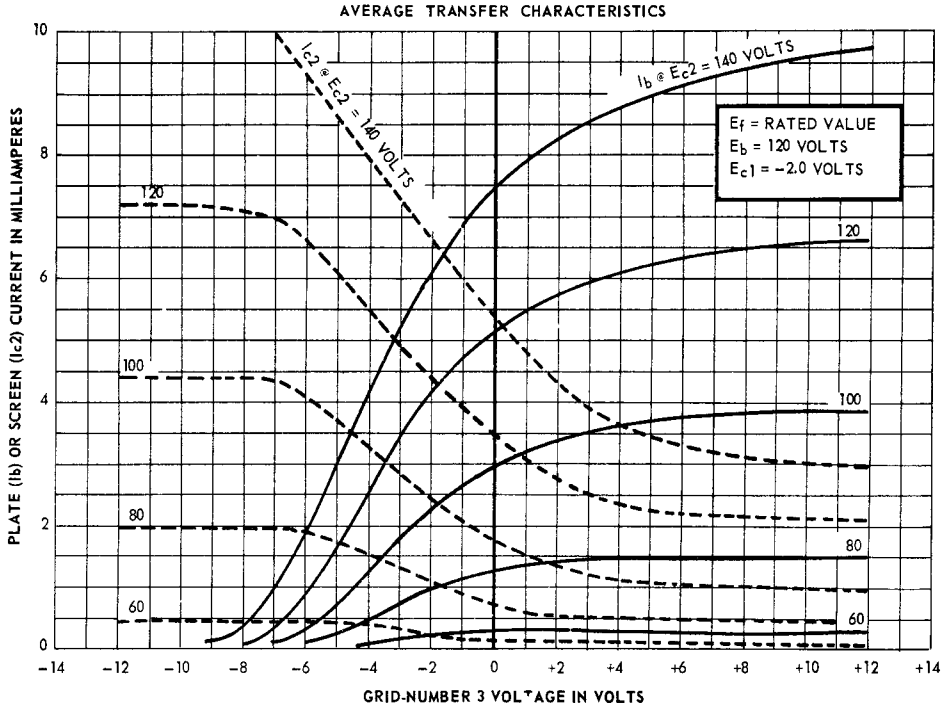

AVERAGE TRANSFER CHARACTERISTICS



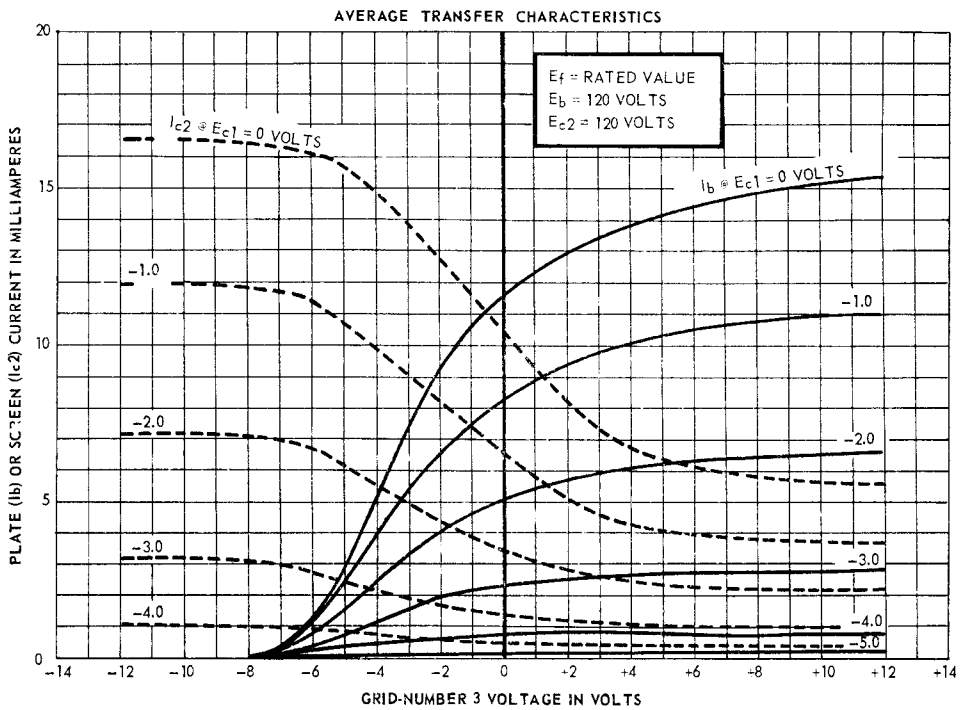
AVERAGE TRANSFER CHARACTERISTICS

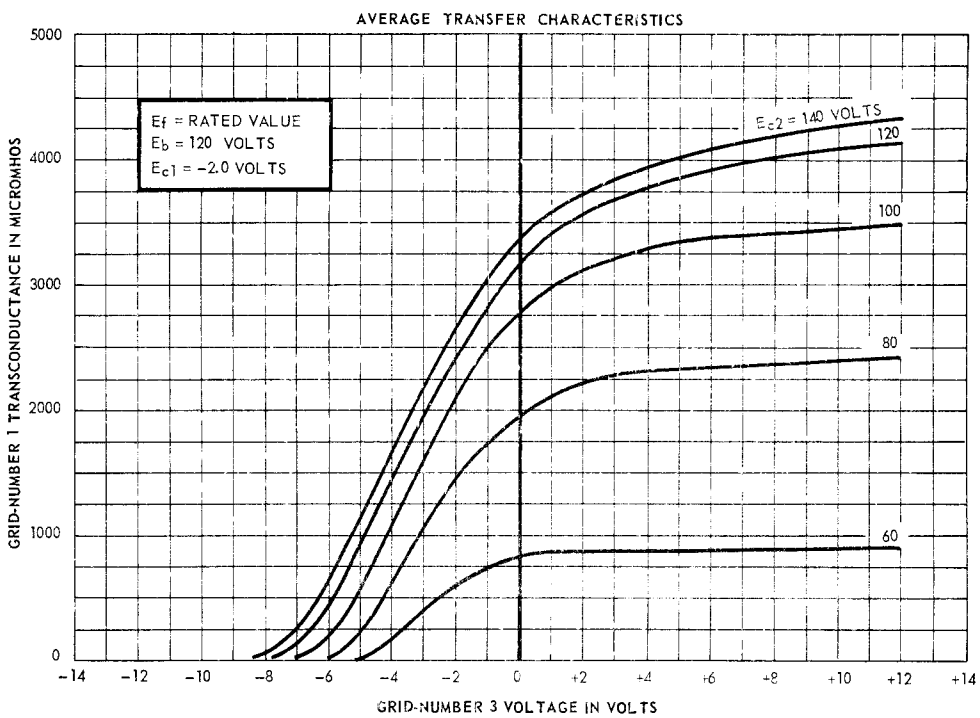



AVERAGE TRANSFER CHARACTERISTICS

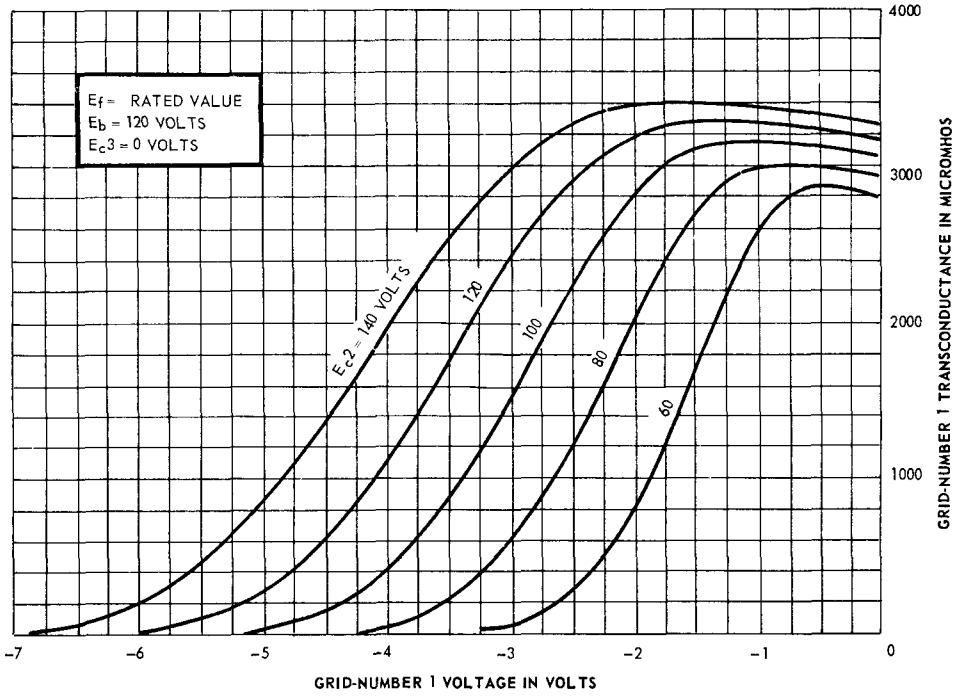


## MINIATURE DUAL-CONTROL PENTODE

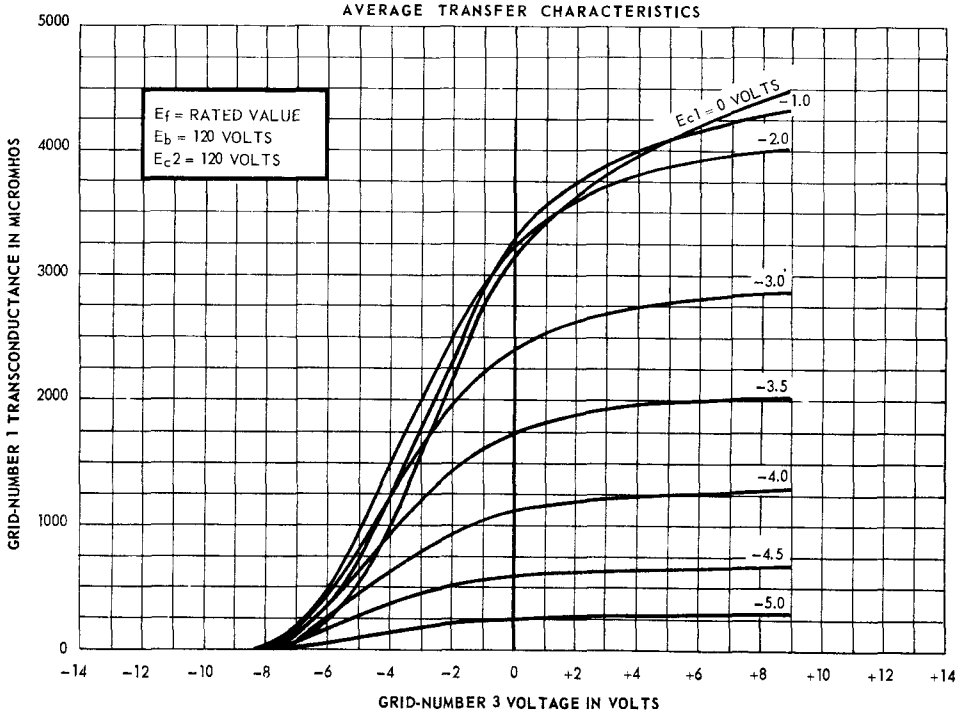
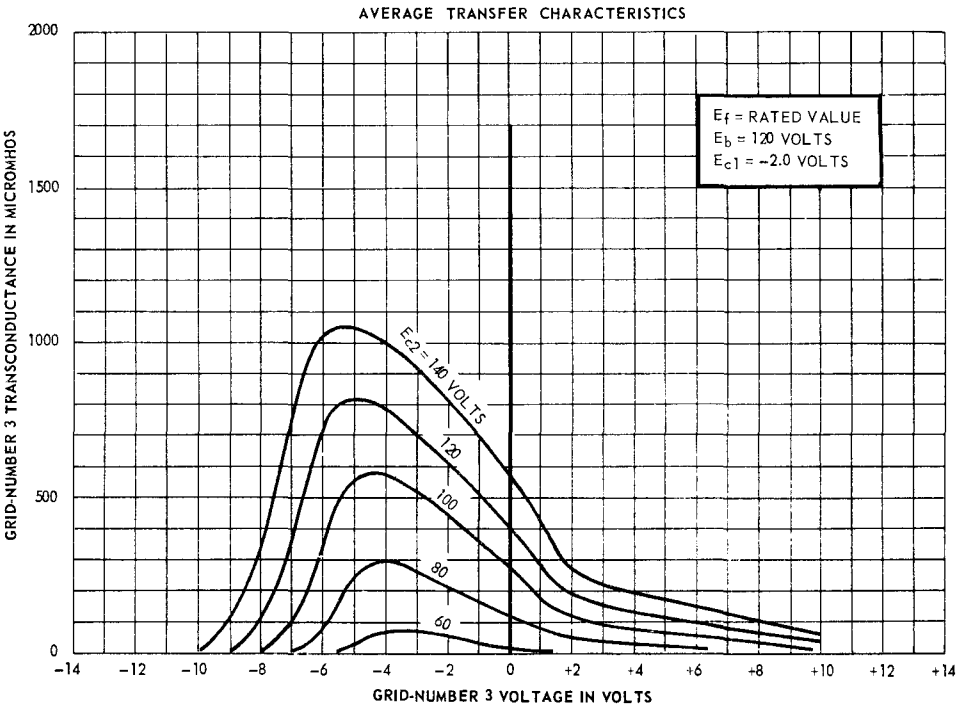
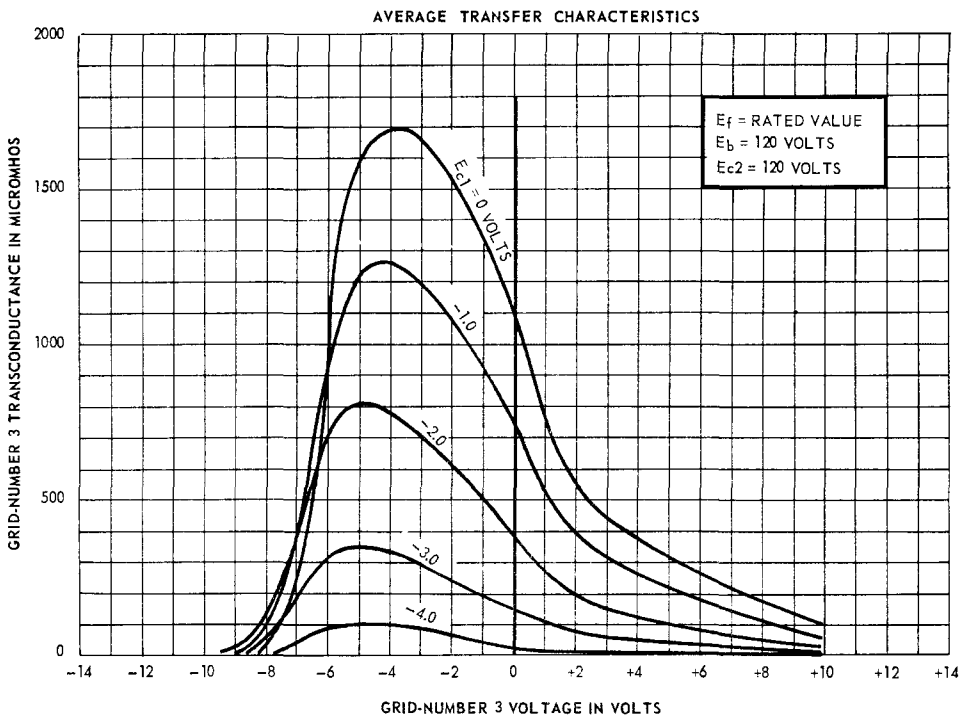


AVERAGE TRANSFER CHARACTERISTICS




AVERAGE TRANSFER CHARACTERISTICS



## MINIATURE DUAL-CONTROL PENTODE