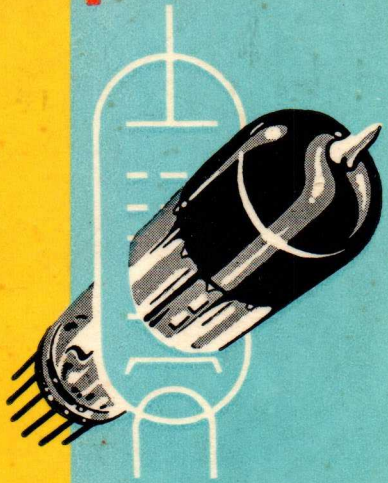
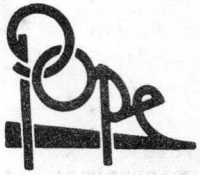


ELECTRONIC VALVE POCKETBOOK



Electronic valve Pocketbook

(FOURTH IMPROVED IMPRESSION)

ISSUED BY THE TECHNICAL DEPARTMENT OF
"POPE'S DRAAD- & LAMPENFABRIEKEN",
HOFWEG 7, DEN HAAG, HOLLAND

PERSONAL MEMORANDA

Owner:

Name: .....

Address: .....

Telephone: .....

Passport .....
Driving license .....
Motorcar (Motorcycle):
Chassisnumber: .....
Motornumber : .....
Radio set: .....

Business address:

Firm: .....

Address: .....

Telephone: .....

In case of accident please notify:

Name: .....

Address: .....

Telephone: .....

In case I loose this pocketbook I shall be very grateful to the finder if he would be so kind as to return it to one of the above mentioned addresses.

FOREWORD

This pocketbook contains the technical data of an extensive range of Pope valves. Besides the data of the newer and most recent valves the characteristics of older types have been inserted, which may be very useful in the case of replacement and does not mean, of course, that they are now available again.

For the sake of simplicity no difference has been made between valves normally used in receiving sets and those for more special applications e.g. television valves and, therefore, all these valves have been classified in numerical alphabetical order in the first part of the booklet.

The more special valves as Thyratrons, cathode ray tubes, transmitting valves, etc. have been separately inserted in small groupings.

In order to make this pocketbook as complete as possible we have also included useful formulae, circuit diagrams as wel as a replacement guide.

We hope that this booklet meets the requirements of all-those engaged in the various branches of the electronic technics.

The fact that a tube is listed in this booklet does not imply that it can always be supplied.

Technical Department,
Electronic valves

TABLE OF CONTENTS

	Page
Personal memoranda	2
Foreword	3
Table of contents	4
Explanation of the symbols	5
Data of electronic valves	35
Voltage stabilisers	177
Picture tubes	179
Thyratrons	187
Transmitting valves	191
Rectifying valves for transmitters	195
Formulae	197
Circuit diagrams	207
Interchangeability list and Replacement guide	221
Summary of the types	255

SYMBOLS

The symbols used in this pocketbook are tabulated below. Equivalent electrodes of a valve are distinguisted by means of accents; e.g. the anodes of a double diode valve are indicated by d and d!
Similar electrodes of a valve are distinguished by means of an additional numeral; e.g. the grids of a hexode valve are indicated by g1, g2, g3 and g4.
In multiple valves, electrodes of the different sections may be distinguished by adding one of the following letters:

Diode	D	Heptode	H
Triode	T		
Tetrode	Q	Hexode	
Pentode	P	Octode	

SYMBOLS USED FOR ELECTRODES AND ELECTRODE CONNECTIONS

Anode	a
Auxiliary anode	ah
Anode of a detection diode	d
Electrostatic deflection plate	D
Filament	f
Filament tap	fc
Grid	g
Valve pin which must not be connected externally	i.c.
Cathode	k
Fluorescent screen	l
External conducting coating	m
Internal shield	S

SYMBOLS USED FOR VOLTAGES

Anode voltage	Va
Auxiliary anode voltage	Vah
Peak value of an inverse anode voltage	Va inv
Arc voltage	Varc
Supply voltage	Vb
Voltage range of a current regulator	Vcontr
Diode voltage	Vd
R.M.S. value of a voltage	Veff
Filament voltage	Vf
Grid voltage	Vg
Input A.C. voltage (each valve in push-pull circuits)	Vi
Ignition voltage	Vign
Voltage between cathode and filament	Vfk
Fluorescent screen voltage	Vl
D.C. voltage supplied by a rectifier or A.C. output voltage	Vo
Oscillator voltage	Vosc
Peak value of a voltage	Vp
Stabilized voltage of a voltage stabilizer	Vreg
Secondary transformer voltage	Vtr

SYMBOLS USED FOR CURRENTS

Anode current	Ia
Auxiliary anode current	Iah
Dark current of photocells	Iao
Current range of a voltage stabilizer	Icontr
Current of a detection diode	Id
R.M.S. value of a current	Ieff
Filament current	If
Grid current	Ig

Cathode current	Ik
Current to a fluorescent screen	Il
D.C. current supplied by a rectifier	Io
Peak value of a current	Ip
Stabilized current of a current regulator	Ireg
Saturation current	Isat.

SYMBOLS USED FOR POWERS

Anode dissipation	Wa
Grid dissipation	Wg
Input power	Wi
Modulation power	Wmod
Output power	Wo

SYMBOLS USED FOR RESISTANCES

Matching resistance or external resistance in anode lead	Ra
Matching resistance of a push-pull amplifier (anode to anode)	Raa
Equivalent noise resistance	Req
External resistor in a grid circuit	Rg
Internal resistance of a valve	Ri
Resistor in a cathode lead	Rk
External resistor between cathode and filament	Rfk
Protecting resistor in the anode lead of a rectifying valve	Rt

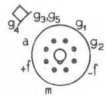
SYMBOLS USED FOR CAPACITANCES

Capacitance between grid and anode.	Cag
Capacitance between anode and cathode of a detection diode	Cd
Input capacitor of a smoothing filter	Cfilt

SYMBOLS USED FOR VARIOUS MAGNITUDES

Distortion factor	d
Frequency	f
Sensitivity of a cathode ray tube or photocell	N
Phase angle	Q
Mutual conductance	S
Conversion conductance	Sc
Heating-up time of a valve	Th
Ambient temperature	t amb
Voltage gain	$\frac{Vo}{Vi}$
Shadow sector on a fluorescent screen	α
Wavelength	λ
Efficiency	η
Gain factor	μ
x smaller than y	$x < y$
x larger than y	$x > y$

DATA OF RECEIVING VALVES AMERICAN TYPES

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
1 A 3 U.H.F. diode		Vf = 1.4 V If = 0.15 A Indirect	Detector	Vd invp = 330 V Id = max 0.5 mA Idp = max 5 mA	Fres = 1000 Mcs Cdk = 0.4 pF Vfk = max 140 V
1 A 7-GT Heptode		Vf = 1.4 V If = 50 mA Direct	Frequency changer	Va = 90 V Vg3 + g5 = 45 V Vg2 = 90 V Rg1 = 0.2 MOhm Vg4 = 0 V Ia = 0.6 mA	Ig3 + g5 = 0.7mA Ig2 = 1.2 mA Ig1 = 35 µA Ri = 0.6 MOhm Sc = 250 µA/V Sc (Vg4= -3V)= 5 µA/V
				Cag4 < 0.5 pF	
1 AC 6 Heptode		Vf = 1.4 V If = 50 mA Direct	Frequency changer	Vb = 90 V Va = 85 V Vg4 = 60 V Vg3 = 0 V Vg2 = 30 V Vosc = 4 Veff Rg4 = 0.18 MOhm Rg2 = 0.033 MOhm	Rg1 = 0.027 MOhm Ia = 0.65 mA Ig4 = 0.14 mA Ig2 = 1.65 mA Ig1 = 130 µA Sc = 325 µA/V Ri = 1 MOhm Sc (Vg3= -6V)=3.25 µA/V
				Vb = 67.5 V Va = 63.5 V	Ia = 0.7 mA Ig4 = 0.15 mA

1 AC 6

				Vg4	= 63.5 V	Ig2	= 1.55 mA
				Vg3	= 0 V	Ig1	= 130 µA
				Vg2	= 30 V	Sc	= 300 µA/V
				Vosc	= 4 Veff	Ri	= 0.9 MOhm
				Rg2	= 0.022 MOhm	Sc (Vg3= -4V)	=- 3 µA/V
				Rg1	= 0.027 MOhm		
				Cag3 ∠	0.35 pF		

1 C 5-GT

Output pentode

Vf = 1.4 V
If = 0.1 A
Direct

Output amplifier Class A

Vb	= 90 V	S	= 1.5 mA/V
Va = Vg2	= 83 V	Ri	= 0.11 MOhm
Vg1	= -7 V	Ra	= 9000 Ohms
Ia	= 7 mA	Wo (d=10%)	= 200 mW
Ig2	= 1.6 mA	Vi	= 5 Veff

1 H 5-GT

Diode triode

Vf = 1.4 V
If = 50 mA
Direct

Typical characteristics

Triode section

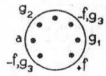
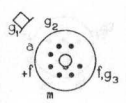
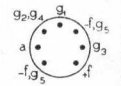
Va	= 90 V	Ri	= 9.24 MOhm
Vg	= 0 V	S	= 0.275 mA/V
Ia	= 0.16 mA	µ	= 65

A.F. amplifier
Detector A.V.C.

Vb	= 90 V	Ra	= 0.5 MOhm
Vg	= 0 V	Vo/Vi	= 35
Ia	= 0.06 mA		

Diode section

Vdp	=max 110 V	Id	=max 0.2 mA

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
1 L 4 Pentode		VF = 1.4 V If = 50 mA Direct	R.F. or I.F. amplifier	Va = Vg2 = 90 V Vg1 = 0 V Ia = 4.5 mA	Ig2 = 2 mA S = 1025 µA/V Ri = 0.35 MOhm
				Va = 90 V Vg2 = 67.5 V Vg1 = 0 V Ia = 2.9 mA	Ig2 = 1.2 mA S = 925 µA/V Ri = 0.6 MOhm
				Cag1	0.008pf
1 N 5-GT Variable mu pentode		Vf = 1.4 V If = 50 mA Direct	R.F, or I.F. amplifier	Va = Vg2 = 90 V Vg1 = 0 V Ia = 1.2 mA Ig2 = 0.3 mA	S = 750 µA/V Ri = 1.5 MOhm S (Vg1= -4V)= 5 µA/V Ri (Vg1= -4V)>10 MOhms
				Cag 1 < 0.007 pF	
1 R 5 Heptode		Vf = 1.4 V If = 50 mA Direct	Frequency changer	Va = 90 V Vg2 + g4 = 67.5 V Rg1 = 0.1 MOhm Ig1 = 250 µA Vg3 = 0 V Ia = 1.6 mA	Ig2 + g4 = 3.2 mA Sc = 300 µA/V Ri = 0.6 MOhm Req = 0.195 MOhm Sc(Vg3= -14V)= 5 µA/V Ri(Vg3= -14V)= 10 MOhms

1R5

Va = 90 V	Ig2 + g2 = 1.9 mA		
Vg2 + g4 = 45 V	Sc = 250 µA/V		
Rg1 = 0.1 MOhm	Ri = 0.8 MOhm		
Ig1 = 150 µA	Sc(Vg3= -9V)= 5 µA/V		
Vg3 = 0 V	Ri(Vg3= -9V) > 10 MOhms		
Ia = 0.8 mA			
Va = 67.5 V	Ig2 + g4 = 3.2 mA		
Vg2 + g4 = 67.5 V	Sc = 280 µA/V		
Rg1 = 0.1 MOhm	Ri = 0.5 MOhm		
Ig1 = 250 µA	Req = 0.185 MOhm		
Vg3 = 0 V	Sc(Vg3= -14V)= 5 µA/V		
Ia = 1.4 mA	Ri(Vg3= -14V) > 10 MOhms		
Va = 45 V	Ig2 + g4 = 1.9 mA		
Vg2 + g4 = 45 V	Sc = 235 µA/V		
Rg1 = 0.1 MOhm	Ri = 0.6 MOhm		
Vg3 = 0 V	Sc(Vg3= -9V) = 5 µA/V		
Ia = 0.7 mA	Ri(Vg3= -9V) > 10 MOhms		
Ig1 = 150 µA			
Cag3 < 0.4 pF			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
1S5 Diode pentode		Vf = 1.4 V If = 50 mA Direct	Typical characteristics	Pentode section Va = Vg2 = 90 V, Ig2 = 0.6 mA Vg1 = 0 V, S = 720 µA/V Ia = 2.7 mA, Ri = 0.5 MOhm Va = Vg2 = 67.5 V, Ig2 = 0.4 mA Vg1 = 0 V, S = 625 µA/V Ia = 1.6 mA, Ri = 0.5 MOhm
			A.F. amplifier	Vb = 90 V, Ra = 1 MOhm, Rg2 = 4.7 MOhms, Rg1 = 10 MOhms Ia + Ig2 = 80 µA, Vo/Vi = 54 Vb = 67.5 V, Ra = 1 MOhm, Rg2 = 4.7 MOhms, Rg1 = 10 MOhms Ia + Ig2 = 55 µA, Vo/Vi = 55 Vb = 45 V, Ra = 1 MOhm, Rg2 = 3.3 MOhms, Rg1 = 10 MOhms Ia + Ig2 = 40 µA, Vo/Vi = 42
			Detector, A.V.C.	Diode section Vd invp = max 100 V, Id = max 0.2 mA

1T4

Variable mu pentode

Vf = 1.4 V
If = 50 mA
Direct

R.F. or I.F. amplifier

Va	=	90	V	S	=	750	µA/V
Vg2	=	45	V	Ri	=	0.8	MOhm
Vg1	=	0	V	S (Vg1= -10V)	=	10	µA/V
Ia	=	1.8	mA	Ri(Vg1= -10V)	>	10	MOhms
Ig2	=	0.65	mA				

Va	=	67.5	V	S	=	725	µA/V
Vg2	=	45	V	Ri	=	0.25	MOhm
Vg1	=	0	V	Req	=	0.02	MOhm
Ia	=	1.75	mA	S (Vg1= -16V)	=	10	µA/V
Ig2	=	0.68	mA	Ri(Vg1= -16V)	>	10	MOhms

Va = Vg2	=	45	V	S	=	700	µA/V
Vg1	=	0	V	Ri	=	0.35	MOhm
Ia	=	1.7	mA	S (Vg1= -10V)	=	10	µA/V
Ig2	=	0.7	mA	Ri(Vg1= -10V)	>	10	MOhms

Cag1 < 0.01 pF

1U4

Pentode

Vf = 1.4 V
If = 50 mA
Direct

R.F. amplifier

Va = Vg2	=	90	V	Ig2	=	0.45	mA
Vg1	=	0	V	S	=	0.9	mA/V
Ia	=	1.6	mA	Ri	=	1.5	MOhm
				S (Vg1= -4.5V)	=	10	µA/V

Cag1 < 0.008 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
3 A 4 Output pentode		Vf = 1.4 V If = 0.2 A Direct	Output amplifier class A	Va = 150 V Vg2 = 90 V Vg1 = -8.4 V Ia = 13.3 mA Ig2 = 2.2 mA	S = 1.9 mA/V Ri = 0.1 MOhm Ra = 8000 Ohms Wo(d = 6%) = 700 mW Vi = 5.9 Veff
				Va = 135 V Vg2 = 90 V Vg1 = -7.5 V Ia = 14.8 mA Ig2 = 2.6 mA	S = 1.9 mA/V Ri = 0.09 MOhm Ra = 8000 Ohms Wo(d = 5%) = 600 mW Vi = 5.3 Veff
		Vf = 2.8 V If = 0.1 A	R.F. output amplifier (intermittent operation)	Va = 150 V Vg2 = 135 V Rg1 = 0.2 MOhm Ia = 18.3 mA	Ig2 = 6.5 mA Ig1 = 0.13 mA Wo = 1.2 W f = 50 Mc/s
				Cag1 < 0.34 pF	
3 A 5 Double triode		Vf = 1.4 V If = 0.22 A Direct	Typical characteristics (each system)	Va = 90 V Vg = -2.5 V Ia = 3.7 mA	S = 1.8 mA/V μ = 15 Ri = 8300 Ohms
		Vf = 2.8 V If = 0.11 A Direct	R.F. push-pull amplifier or oscillator	Va = 135 V Vg = -20 V Vip = 2 x 45 V Ia = 2 x 15 mA	Ig = 2 x 2.5 mA Wgi = 0.2 W Wo = 2 W f = 40 Mc/s
				Cag = 3.2 pF	

3 Q 4

Output pentode

Vf = 1.4 V
If = 0.1 A
Direct

Output amplifier class A

Va = Vg2 =	86	V	Ri =	0.11	MOhm
Vg1 =	-4.5	V	Ra =	8000	Ohms
Ia =	8	mA	Wo(d = 10%) =	280	mW
Ig2 =	1.8	mA	Vi =	4	Veff
S =	2	mA/V			

Vf = 2.8 V
If = 50 mA
Direct

Va = Vg2 =	86	V	Ri =	0.12	MOhm
Vg1 =	4.3	V	Ra =	0.01	MOhm
Ia =	7	mA	Wo(d = 10%) =	250	mW
Ig2 =	1.5	mA	Vi =	3.7	Veff
S =	1.9	mA/V			

3 Q 5-GT

Beam pentode

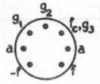
Vf = 1.4 V
If = 0.1 A
Direct

Output amplifier class A

Va = Vg2 =	90	V	Ri =	0.09	MOhm
Vg1 =	-4.5	V	Ra =	8000	Ohms
Ia =	9.5	mA	Wo(d = 6%) =	270	mW
Ig2 =	1.3	mA	Vi =	3.2	Veff
S =	2.2	mA/V			

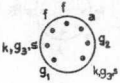
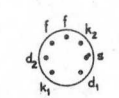
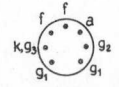
Vf = 2.8 V
If = 50 mA
Direct

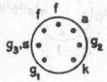
Vb =	90	V	S =	1.95	mA/V
Va = Vg2 =	85	V	Ri =	0.07	MOhm
Vg1 =	-5	V	Ra =	9000	Ohms
Ia =	7	mA	Wo(d = 5.5%) =	250	mW
Ig2 =	0.8	mA	Vi =	3.5	Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
3S4 Output pentode		Vf = 1.4 V If = 0.1 A Direct	Output amplifier class A	Va = 90 V Vg2 = 67.5 V Vg1 = -7 V Ia = 7.4 mA Ig2 = 1.4 mA	S = 1.57 mA/V Ri = 0.1 MOhm Ra = 8000 Ohms Wo(d = 12%)= 270 mW Vi = 5.1 Veff
				Va = 67.5 V Vg2 = 67.5 V Vg1 = -7 V Ia = 7.2 mA Ig2 = 1.5 mA	S = 1.55 mA/V Ri = 0.1 MOhm Ra = 5000 Ohms Wo(d = 10%)= 180 mW Vi = 5.5 Veff
				Va = Vg2 = 45 V Vg1 = -4.5 V Ia = 3.8 mA Ig2 = 0.8 mA	S = 1.25 mA/V Ri = 0.1 MOhm Ra = 8000 Ohms Wo(d = 10%)= 65 mW Vi = 3.5 Veff
		Vf = 2.8 V If = 50 mA Direct	Output amplifier class A	Va = 90 V Vg2 = 67.5 V Vg1 = -7 V Ia = 6.1 mA Ig2 = 1.1 mA	S = 1.24 mA/V Ri = 0.1 MOhm Ra = 8000 Ohms Wo(d = 13%)= 235 mW Vi = 4.7 Veff

3S4			Output amplifier class A	Va = Vg2 = 67.5 V Vg1 = -7 V Ia = 6 mA Ig2 = 1.2 mA	S = 1.4 mA/V Ri = 0.1 MOhm Ra = 5000 Ohms Wo(d = 12%) = 160 mW Vi = 5.5 Veff
				Va = Vg2 = 45 V Vg1 = -4.5 V Ia = 3 mA Ig2 = 0.7 mA	S = 1.1 mA/V Ri = 0.1 MOhm Ra = 8000 Ohms Wo(d = 12.5%) = 50 mW Vi = 3.5 Veff
		Vf = 1.4 V If = 0.1 A Direct	Push - pull output amplifier class B	Vba = 90 V Vbg2 = 67.5 V Va = 80 V Vg2 = 57.5 V Raa = 0.016 MOhm Iao = 2 x 1.5 mA	Ia max = 2 x 4.4 mA Ig2o = 2 x 0.3 mA Ig2max = 2 x 1.35 mA Wo(d = 5%) = 325 mW Vi = 7.3 Veff
		Vf = 2.8 V If = 50 mA Direct	Push-pull output amplifier class B	Vba = 90 V Vbg2 = 67.5 V Va = 81 V Vg2 = 58.5 V Raa = 0.018 MOhm Iao = 2 x 1.5 mA	Ia max = 2 x 4.2 mA Ig2o = 2 x 0.3 mA Ig2max = 2x 1.25 mA Wo(d = 4.7%) = 315 mW Vi = 7 Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
3 V 4 Output pentode		Vf = 1.4 V If = 0.1 A Direct	Output amplifier class A	Va = Vg2 = 86 V Vg1 = -4.5 V Ia = 8 mA Ig2 = 1.8 mA S = 2 mA/V	Ri = 0.11 MOhm Ra = 8000 Ohms Wo(d = 10%) = 280 mW Vi = 4 Veff
		Vf = 2.8 V If = 50 mA	Output amplifier class A	Va = Vg2 = 86 V Vg1 = -4.3 V Ia = 7 mA Ig2 = 1.5 mA S = 1.9 mA/V	Ri = 0.12 MOhm Ra = 0.01 MOhm Wo(d = 10%) = 250 mW Vi = 3.7 Veff
5 U 4-G Full-wave rectifier		Vf = 5 V If = 3 A Direct	Condensor input	Vtr = 2 x 550 Veff Io = 156 mA	Cfilt = 10 µF Rt = 2 x 230 Ohms
			Choke input	Vtr = 2 x 550 Veff Io = 225 mA	Lfilt = 10 H
5 Y 3 GT Full-wave rectifier		Vf = 5 V If = 2 A Direct	Condenser input	Vtr = 2 x 500 Veff Io = 84 mA	C filt = 10 µF Rt = 2 x 140 Ohms
				Vtr = 2 x 350 Veff Io = 125 mA	C filt = 10 µF Rt = 2 x 50 Ohms
			Choke input	Vtr = 2 x 500 Veff Io = 125 mA	L filt = 10 H
				Vtr = 2 x 350 Veff Io = 150 mA	L filt = 10 H

6 AK 5 Pentode		Vf = 6.3 V If = 0.175 A Indirect	R.F. or I.F. amplifier	Va = 180 V Vg2 = 120 V Vg1 = -2 V Ia = 7.7 mA	Ig2 = 2.4 mA S = 5.1 mA/V Ri = 0.69 MOhm Req = 2000 Ohms
				Va = Vg2 = 120 V Vg1 = -2 V Ia = 7.5 mA	Ig2 = 2.5 mA S = 5 mA Ri = 0.34 MOhm Req = 2000 Ohms
				Cag1 < 0.02 pF	
6 AL 5 Double diode		Vf = 6.3 V If = 0.3 V Indirect	Half wave rectifier (per system)	Vtr = Max 150 Veff Io = 9 mA C filt = 8 µF	Rt = max 300 Ohms Vfkp = 330 V
			Detector, A.V.C.	Vd1 invp = Vd2 invp = max 420 V Id = max 9 mA Idp = max 54 mA	Vfk = max 150 V Vfkp (k = pos) = max 330 V Rkf = max 0.02 MOhm
6 AQ5 Output pentode		Vf = 6.3 V If = 0.45 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Vg1 = -12.5 V Ia = 45 mA Ig2 = 4.5 mA	S = 4.1 mA/V Ri = 0.052 MOhm Ra = 5000 Ohms 2o (d = 8%) = 4.5 W
			Push-pull output amplifier Class A.B.	Va = Vg2 = 250 V Vg1 = -15 V Iao = 2 x 35 mA Ia max = 2 x 39.5 mA	Ig2o = 2 x 2.5 mA Ig2 max = 2 x 6.5 mA Raa = 0.01 MOhm Wo (d = 5%) = 10 W

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
6 AT 6 Double diode triode		Vf = 6.3 V If = 0.3 A Indirect	Typical characteristics	Triode section Va = 250 V, Vg = -3 V, Ia = 1 mA: S = 1.2 mA/V, μ = 70, Ri = 0.058 MOhm Va = 100 V, Vg = -1 V, Ia = 0.8 mA: S = 1.3 mA/V, μ = 70, Ri = 0.054 MOhm
			A.F. amplifier	Vb = 250 V, Ra = 0.22 MOhm, Rk = 1800 Ohms: Ia = 0.7 mA, Vo/Vi = 51
			Detector, A.V.C.	Diode section Please refer to type A B 2 Vfk = max 100 V
6 AU 6 Variable mu pentode		Vf = 6.3 V If = 0.3 A Indirect	R.F. or I.F. amplifier	Va = 250 V, Vg3 = 0 V, Vg2 = 150 V, Vg1 = -1 V, Ia = 10.8 mA: Ig2 = 4.3 mA, Ia(Vg1 = -6.2V) = 10 μA, S = 5.2 mA/V, Ri = 1 MOhm

6 AU 6

Vf = 6.3 V
If = 0.3 A
Indirect

R.F. or I.F. amplifier

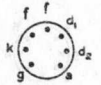
Va	=	250	V	Ig2	= 3 mA
Vg3	=	0	V	Ia(Vg1= -5.2V)	= 10 µA/V
Vg2	=	125	V	S	= 4.45 mA/V
Vg1	=	-1	V	Ri	= 1.5 MOhms
Ia	=	7.3	mA		

Va = Vg2	=	100	V	Ig2	= 2 mA
Vg3	=	0	V	Ia(Vg1= -4.2V)	= 10 µA
Vg1	=	-1	V	S	= 3.9 mA/V
Ia	=	5.2	mA	Ri	= 0.5 MOhm

Cag1 < 0.004 pF

6 AV 6

Double diode triode



Vf = 6.3 V
If = 0.3 A
Indirect

Typical characteristics

Triode section

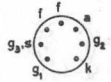
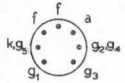
Va	=	250	V	S	= 1.6 mA/V
Vg	=	-2	V	µ	= 100
Ia	=	1.2	mA	Ri	= 0.0625 MOhm

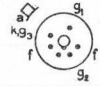
Va	=	100	V	S	= 1.25 mA/V
Vg	=	-1	V	µ	= 100
Ia	=	0.5	mA	Ri	= 0.08 MOhm

Detector A.V.C. etc.

Diode section

Id1 = Id2 = max 1 mA

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
6 BA 6 EF 93 Variable mu pentode		Vf = 6.3 V If = 0.3 A Indirect	R.F. or I.F. amplifier	Va = 250 V Vg3 = 0 V Rg2 = 0.033 MOhm Vg1 = -1 V Ia = 11.6 mA Ig2 = 4.45 mA	S = 4.5 mA/V Ri = 1 MOhm S(Vg1= -46V)= 45 µA/V Ri(Vg1= -46V)> 5 MOhms Req = 4000 Ohms
				Va = Vg2 = 100 V Vg3 = 0 V Vg1 = -1 V Ia = 10.8 mA Ig2 = 4.4 mA	S = 4.3 mA/V Ri = 0.25 MOhm S(Vg1= -18V)=43 µA/V Ri(Vg1= -18V)> 5 MOhms Req = 4300 Ohms
				Cag1 < 0.0035 pF	
6 BE 6 Heptode		Vf = 6.3 V If = 0.3 A Indirect	Frequency changer (separate excitation)	Va = 250 V Vg2 + g4 = 100 V Vg3 = -1.5 V Rg1 = 0.02 MOhm Sc = 475 µA/V	Sc(Vg3= -30V)=4 µA/V Ia = 3 mA Ig2 + g4 = 7.1 mA Ig1 = 0.5 mA Ri = 1 MOhm
				Va = 100 V Vg2 + g4 = 100 V Vg3 = -1.5 V Rg1 = 0.02 MOhm Sc = 455 µA/V	Sc(Vg3= -30V)=4 µA/V Ia = 2.8 mA Ig2 + g4 = 7.3 mA Ig1 = 0.5 mA Ri = 0.5 MOhm
				Cag3 < 0.3 pF	

6 BG 6-G Beam pentode		Vf = 6.3 V If = 0.9 A Indirect	Line output amplifier	Va = Vg2 = 250 V Vg1 = -15 V	Ia = 72 mA Ig2 = 9.7 mA S = 6 mA/V
6 BQ 7-A Double triode		Vf = 6.3 V If = 0.4 A Indirect	R.F. amplifier	Va = 150 V Vg = -10 V Rk = 220 Ohms Ri = 6100 Ohms	Ia = 9 mA S = 6.4 mA/V μ = 39
6 J 6 Double triode		Vf = 6.3 V If = 0.45 A Indirect	Typical characteristics	Va = 100 V Ia = 8.5 mA Rk = 100 Ohms	S = 5.3 mA/V μ = 38 Ri = 7100 Ohms
			Telegraphy push-pull amplifier class C at 80 Mc/s	Va = 150 V Vg = -10 V Rg = 625 Ohms Rk = 220 Ohms Cag = Ca'g' = 1.5 pF	Ia = 2 x 15 mA Ig = 2 x 8 mA Wig = 0.35 W Wo = 3.5 W
6 L 6-G Beam pentode		Vf = 6.3 V If = 0.9 A Indirect	Output amplifier class A (continued)	Va = 300 V Vg2 = 200 V Rk = 220 Ohms Ia = 51 mA Ia max = 54.5 mA	Ig2 = 3 mA Ig2 max = 4.6 mA Ra = 4500 Ohms Wa(d = 11%)=6.5 W Vi = 12.5 Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
6 L 6-G (continued)				Va = Vg2 = 250 V Rk = 170 Ohms Ia = 75 mA Ia max = 78 mA	Ig2 = 5.4 mA Ig2 max = 7.2 mA Ra = 2500 Ohms Wa(d = 10%) = 6.5 W Vi = 14 Veff
			Output amplifier class A B	Va = Vg2 = 270 V Rk = 125 Ohms Ia = 2 x 57 mA Ia max = 2 x 72.5 mA	Ig2 = 2 x 5.5 mA Ig2 max = 2 x 8.5 mA Raa = 5000 Ohms Wa(d = 2%) = 18.5 W Vi = 40 V
6 SA7-GT Heptode		Vf = 6.3 V If = 0.3 A Indirect	Frequency changer (seperate exitation)	Va = 250 V Vg2 + g4 = 100 V Vg3 = -2 V Rg1 = 0.02 MOhm Sc = 450 µA/V	Ia = 3.5 mA Ig2 + g4 = 8.5 mA Ig1 = 0.5 mA Sc(Vg1= -25V) = 10 µA/V Ri = 1 MOhm
				Va = 100 V Vg2 + g4 = 100 V Vg3 = -2 V Rg1 = 0.02 MOhm Sc = 425 µA/V	Ia = 3.3 mA Ig2 + g5 = 8.5 mA Ig1 = 0.5 mA Sc(Vg1= -25V) = 10 µA/V Ri = 0.5 MOhm
				Cag3 = max 11 pF	

6 SK7-GT

Variable mu pentode

Vf = 6.3 V
If = 0.3 A
Indirect

R.F. or I.F. amplifier

Va	=	250	V	S(Vg1= -35V)	=	10	μA/V
Vg2	=	100	V	Ri	=	0.8	MOhm
Vg3	=	0	V	Ia	=	9.2	mA
Vg1	=	-3	V	Ig2	=	2.6	mA
S	=	2	mA/V				
Va = Vg2 =		100	V	S(Vg1=-35V)	=	10	uA/V
Vg3	=	0	V	Ri	=	0.12	MOhm
Vg1	=	-1	V	Ig2	=	13	mA
S	=	2.35	mA/V	Ig2	=	4	mA

Cag1 = max 0.005 pF

6 SN7-GT

Double triode

Vf = 6.3 V
If = 0.6 A
Indirect

A.F. amplifier

Va	=	250	V	Ri	=	7700	Ohms
Vg	=	-8	V	S	=	2.6	mA/V
Ia	=	9	mA	Vo/Vi	=	20	
Va	=	90	V	Ri	=	6700	Ohms
Vg	=	0	V	S	=	3	mA/V
Ia	=	10	mA	Vo/Vi	=	20	

6 SQ7-GT

Double triode

Vf = 6.3 V
If = 0.3 A
Indirect

Typical characteristics

Triode section

Va	=	250	V	S	=	1.1	mA/V
Vg	=	-2	V	μ	=	100	
Ia	=	0.9	mA	Ri	=	0.091	MOhm
Va	=	100	V	S	=	0.9	mA/V
Vg	=	-1	V	μ	=	100	
Ia	=	0.4	mA	Ri	=	0.11	MOhm

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
6 V 6-GT Output pentode		Vf = 6.3 V If = 0.45 A Indirect	Output amplifier class A	Va = 315 V Vg2 = 225 V Vg1 = -13 V Ia = 34 mA Ig2 = 2.2 mA	S = 3.75 mA/V Ri = 0.087 MOhm Ra = 8500 Ohms Wo(d = 12%)=max 5.5 W
				Va = Vg2 = 250 V Vg1 = -12.5 V Ia = 45 mA Ig2 = 4.5 mA	S = 4.1 mA/V Ri = 0.05 MOhm Ra = 5000 Ohms Wo(d = 8%)=max 4.5 W
			Push-pull output amplifier class A.B.	Va = Vg2 = 285 V Vg1 = -19 V Iao = 2 x 35 mA Ia max = 2 x 46 mA	Ig2o = 2 x 2 mA Ig2 max = 2 x 6.7 mA Raa = 8000 Ohms Wo(d = 3.5%)=14 W
				Va = Vg2 = 250 V Vg = -15 V Iao = 2 x 35 mA Ia max = 2 x 39.5 mA	Ig2o = 2 x 2.5 mA Ig2 max = 2 x 6.5 mA Raa = 0.01 MOhm Wo(d = 5%)= 10 W
6 X 4 Full-wave rectifier		Vf = 6.3 V If = 0.6 A Indirect	Full-wave rectifier (condenser input)	Vtr = 2 x 325 Veff Io = 70 mA Vfkp = 450 V	C filt = 4 µF Rt = 2 x 150 Ohms
			Full-wave rectifier (choke input)	Vtr = 2 x 450 Veff Io = 70 mA Vfkp = 450 V	L = 8 H

12 AT 6 Double diode triode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 AT 6			
12 AT 7 Double triode		Vf = 12.6 V If = 0.15 A Vf = 6.3 V If = 0.3 A Indirect	Typical characteristics	Va = 250 V Vg = -2 V Ia = 10 mA	S- = 5.5 mA/V μ = 60 Ri = 0.011 MOhm		
				Va = 200 V Vg = -1 V Ia = 11.5 mA	S = 6.7 mA/V μ = 70 Ri = 0.01 MOhm		
				Va = 170 V Vg = -1 V Ia = 8.5 mA	S = 5.9 mA/V μ = 66 Ri = 0.011 MOhm		
				Va = 100 V Vg = -1 V Ia = 3 mA	S = 3.75 mA/V μ = 62 Ri = 0.0165 MOhm		
				Cag = Ca¹g¹ = 1.7 pF			
12 AU 6 Pentode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 AU 6			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
12 AU 7 Double triode		Vf = 12.6 V If = 0.15 A Vf = 6.3 V If = 0.3 A Indirect	Typical characteristics (per system)	Va = 250 V Vg = -8.5 V Ia = 10.5 mA Va = 100 V Vg = 0 V Ia = 11.8 mA	S = 2.2 mA/V μ = 17 Ri = 7700 Ohms S = 3.1 mA/V μ = 19.5 Ri = 6250 Ohms Cag = Ca'g' = 1.5 pF
12 AV 6 Double diode triode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 AV 6	
12 AX 7 Double triode		Vf = 12.6 v If = 0.15 A Vf = 6.3 V If = 0.3 A Indirect	Typical characteristics (per system)	Va = 250 V Vg = -2 V Ia = 1.2 mA Va = 100 V Vg = -1 V Ia = 0.5 mA	S = 1.6 mA/V μ = 100 Ri = 0.0625 MOhm S = 1.25 mA/V μ = 100 Ri = 0.08 MOhm
12 BA 6 Pentode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 BA 6	

12 BE 6 Heptode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 BE 6	
12 BY 7 Pentode		Vf = 12.6 V If = 0.3 A Vf = 6.3 V If = 0.6 A Indirect	Line output amplifier	Va = 250 V Vg2 = 150 V Rk = 68 Ohms	Ia = 25 mA Ig2 = 6 mA Ri = 0.11 MOhm S = 12 mA/V
12 SA 7 -GT Heptode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 SA 7-GT	
12 SK 7 -GT Variable mu pentode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 SK 7-GT	
12 SN 7 -GT Double triode		Vf = 12.6 V If = 0.3 A Indirect		For further data please refer to type 6 SN 7-GT	

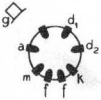
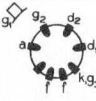
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
12 SQ 7 -GT Double diode triode		Vf = 12.6 V If = 0.15 A Indirect		For further data please refer to type 6 SQ 7-GT	
25 L 6-GT Output amplifier		Vf = 25 V If = 0.3 A Indirect	Output amplifier class A	Va = 200 V Vg2 = 125 V Rk = 180 Ohms Ia = 46 mA Ig2 = 2.2 mA	S = 8 mA/V Ri = 0.028 MOhm Ra = 4000 Ohms Wo(d = 10%) = 3.8 W
				Va = Vg2 = 110 V Vg1 = -7.5 V Ia = 49 mA Ig2 = 4 mA	S = 8 mA/V Ri = 0.013 MOhm Ra = 2000 Ohms Wo(d = 10%) = max 2.1 W
35 W 4 Half-wave rectifier		Vf = 35 V If = 0.15 A Indirect	Half-wave rectifier	Vtr = 117 Veff Io = 100 mA	C filt = 40 µF Rt = 15 Ohms
35 Z 5-GT Half-wave rectifier		Vf1,2 = 35 V Vf1,3 = 7.5 V If = 0.15 A Indirect	Rectifier (without panel lamp)	Vtr = 235 V Io = max 100 mA	C filt = 40 µF Rt = 100 Ohms
				Vtr = 117 V Io = max 100 mA	C filt = 40 µF Rt = 15 Ohms

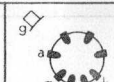
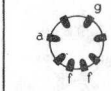
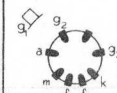
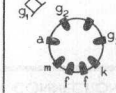
50 C 5 Beam pentode		Vf = 50 V If = 0.15 A Indirect	Output amplifier	Va = Vg2 = 110 V Vg1 = -7.5 V Ra = 2500 Ohms Ia = 49 mA	Ig2 = 4 mA Ri = 0.01 MOhm S = 7.5 mA/V Wo = 1.9 W
50 L 6-GT Output amplifier		Vf = 50 V If = 0.15 A Indirect	Output amplifier	For further data please refer to type 25 L 6-GT	
80 Full-wave rectifier		Vf = 5 V If = 2 A Indirect		For further data please refer to type 5 Y 3-GT	

DATA OF

ELECTRONIC

VALVES

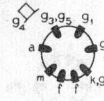
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
AB 2 Double diode		Vf = 4 V If = 0.65 A Indirect	Detector, A.V.C. and other purposes	Vd1 = Vd2 = max 200 V Id1 = Id2 = max 0.8 mA Vfk = max 50 V	Rfk = max 0.02 MOhm Vd1=Vd2= (Id1=Id2= + 3 µA) = max - 1.3V
ABC 1 Double diode triode		Vf = 4 V If = 0.65 A Indirect	Typical characteristics	Triode section Va = 250 V Vg = -7 V Ia = 4 mA	S = 2 mA/V Ri = 0.0135 MOhm µ = 27
			A.F. amplifier	Vb = 250 V Rk = 5000 Ohms Ia = 0.57 mA	Ra = 0.32 MOhm Vo/Vi = 20
			Detector, A.V.C.	Diode section Please refer to type A B 2	
ABL 1 Double diode output pentode		Vf = 4 V If = 2.4 A Indirect	Detector, A.V.C. and output amplifier	For further data please refer to type E B L 1	
AC 2 Triode		Vf = 4 V If = 0.65 A Indirect	Typical characteristics	Va = 250 V Vg = -5.5 V Ia = 6 mA	S = 2.5 mA/V µ = 30 Ri = 12000 Ohms

AC 2			A.F. amplifier	Vb = 250 V Rk = 8000 Ohms Ia = 0.48 mA	Ra = 0.32 MOhm $\frac{Vo}{Vi}$ = 20
AD 1 Output triode		Vf = 4 V If = 0.95 A Direct	Output amplifier class A	Va = 250 V Vg = -45 V Ia = 60 mA S = 6 mA/V	Ri = 670 Ohms Ra = 2300 Ohms Wo (d = 5%) = 4.2W Vi = 30 Veff
			Push - pull output amplifier class A B	Va = 250 V Rk = 375 Ohms Iao = 2x60 mA Ia max = 2x64 mA	Raa= 4000 Ohms Wo (d = 1.5%) = 9.5 W Vi = 30 Veff
AF 3 Variable mu pentode		Vf = 4 V If = 0.65 A Indirect	R.F. or I.F. amplifier	Va = 250 V Vg3 = 0 V Vg2 = 100 V Vg1 = - 3 V Ia = 8 mA Cag1 < 0.003 pF	Ig2= 2.6 mA S = 1.8 mA/V Ri = 1.2 MOhms S (Vg1= -55V) = < 2uA/V Ri (Vg1= -55V) = > 10MOhm
AF 7 Pentode		Vf = 4 V If = 0.65 A Indirect	R.F. amplifier continued	Va = 250 V Vg3 = 0 V Vg2 = 100 V Vg1 = - 2 V Cag1 < 0.003 pF	Ia = 3 mA Ig2= 1.1 mA S = 2.1 mA/V Ri = 2 MOhms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
AF 7 Continued			A.F. amplifier	Vb = 250 V Vg3 = 0 V Ra = 0.32 MChm Rg2 = 0.8 MOhm Rk = 4000 Ohms	Ia = 0.5 mA Ig2 = 0.2 mA $\frac{Vo}{Vi}$ = 157
AH 1 Variable mu hexode		Vf = 4 V If = 0.65 A Indirect	R.F. or I.F. amplifier	Va = 250 V Vg2 + g4 = 80 V Vg1 + g3 = -2 V Ia = 3 mA Ig2 + g4 = 1.1 mA S = 1.8 mA/V	Ri = 2 MChms S (Vg1 = Vg3 = -20V) = = 2 µA/V Ri (Vg1 = Vg3 = -20V) = > 10 MOhms
			Modulator with separated oscillator	Va = 250 V Vg2 + g4 = 80 V Vg3 = -12 V Vosc = 9 Veff Vg1 = -2 V Ia = 1.7 mA	Ig2 + g4 = 2.6 mA Sc = 550 µA/V Ri = 2 MOhms Sc (Vg1 = -24V) = = 2 µA/V Ri (Vg1 = -24V) = = > 10 MOhms
					Cag1 < 0.003 pF

AK 2

Octode



Vf = 4 V
If = 0.65 A
Indirect

Frequency changer

Va	=	250	V	Ig3 + g5 =	3.8 mA
Vg3 + g5	=	70	V	Ig2 =	2 mA
Vg2	=	90	V	Sc =	600 µA/V
Vg1 (Ig1 = 190 µA)	=	-11	V	Ri =	1.6 MOhms
Rg1k	=	0.05	MOhm	Sc (Vg4= -25V)	= < 2 µA/V
Vg4	=	-1.5	V	Ri (Vg4= -25V)	= > 10 MOhms
Ia	=	1.6	mA		

Cag4 < 0.06 pF

AL 1

Output pentode

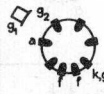
Vf = 4 V
If = 1.1 A
Direct

Output amplifier class A

Va = Vg2	=	250	V	S =	2.8 mA/V
Vg1	=	-15	V	Ri =	0.043 MOhm
Rk	=	350	Ohms	Ra =	7000 Ohms
Ia	=	36	mA	Wo (d = 6 %)	= 3.1 W
Ig2	=	6.8	mA	Vi =	9.7 Veff

AL 2

Output pentode



Vf = 4 V
If = 1 A
Indirect

Output amplifier class A

Va = Vg2	=	250	V	S =	2.6 mA/V
Vg1	=	-25	V	Ri =	0.06 MOhm
Rk	=	625	Ohms	Ra =	7000 Ohms
Ia	=	36	mA	Wo (d = 10%)	= 3.8 W
Ig2	=	5	mA	Vi =	14 eff

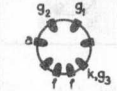
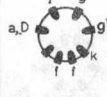
AL 4

Output pentode

Vf = 4 V
If = 1.75 A
Indirect

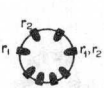
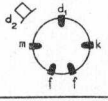
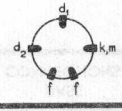
Output amplifier

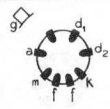
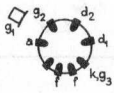
For further data please refer to type E L 3 N

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
AL 5 Output pentode		Vf = 4 V If = 2 A Indirect	Output amplifier	For further data please refer to type E L 5
AM 1 Tuning indicator		Vf = 4 V If = 0.3 A Indirect	Tuning indicator	Vb = Vl = 250 V Ra = 2 MOhms Vg = 0 / -5 V α = 16^{o} / 90^{o} Ia = 95 / 21 µA Il = 0.13 / 0.14 mA
AM 2 Tuning indicator		Vf = 4 V If = 0.32 A Indirect	Typical characteristics	Triode section Va = 250 V; Ia = 3 mA; Vg = -3.5 V S = 2 mA/V; µ = 50; Ri = 0.025 MOhm
			Tuning indicator	Indicator section Va = Vl = 250 V Vg1 = +3 / 0 / -6 V α = 160^{o} / 150^{o} / 0^{o}

AX 1 Gasfilled full wave rectifier		Vf = 4 V If = 2.4 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 125 mA Varc = max 15 V	Rt = min 2 x 200 Ohms C = max 64 µF Rt = min 2 x 150 Ohms C = max 32 µF Rt = min 2 x 100 Ohms C = max 16 µF
AX 50 Gasfilled full wave rectifier		Vf = 4 V If = 3.75 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 275 mA Varc = max 15 V	Rt = min 2 x 200 Ohms C = max 64 µF Rt = min 2 x 150 Ohms C = max 32 µF Rt = min 2 x 100 Ohms C = max 16 µF
AZ 1 Full wave rectifier		Vf = 4 V If = 1.1 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 60 mA	Rt = min 2 x 100 Ohms C = max 60 µF
				Vtr = max 2 x 400 Veff Io = max 75 mA	Rt = min 2 x 80 Ohms C = max 60 µF
				Vtr = max 2 x 300 Veff Io = max 100 mA	Rt = min 60 Ohms C = max 60 µF
AZ 4 Full wave rectifier		Vf = 4 V If = 2.3 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 120 mA	Rt = min 2 x 100 Ohms C = max 60 µF
				Vtr = 2 x 400 Veff Io = max 150 mA	Rt = min 2 x 80 Ohms C = max 60 µF
				Vtr = 2 x 300 Veff Io = max 200 mA	Rt = min 2 x 60 Ohms C = max 60 µF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
AZ 11 Full wave rectifier		Vf = 4 V If = 1.1 A Direct	Rectifier	For further data please refer to type A Z 1	
AZ 12 Full wave rectifier		Vf = 4 V If = 2.3 A Direct	Rectifier	For further data please refer to type A Z 4	
AZ 31 Full wave rectifier		Vf = 4 V If = 1.1 A Direct	Rectifier	For further data please refer to type A Z 1	
AZ 41 Full wave rectifier		Vf = 4 V If = 0.72 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 60 mA	Rt = min 2 x 200 Ohms C = max 50 µF
				Vtr = max 2 x 400 Veff Io = max 60 mA	Rt = min 2 x 150 Ohms C = max 50 µF
				Vtr = max 2 x 300 Veff Io = max 70 mA	Rt = min 2 x 100 Ohms C = max 50 µF
AZ 50 Full wave rectifier		Vf = 4 V If = 3 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 250 mA	Rt = min 2 x 200 Ohms C = max 64 µF
				Vtr = 2 x 400 Veff Io = max 275 mA	Rt = min 2 x 150 Ohms C = max 32 µF

AZ 50				Vtr = max 2 x 300 Veff Io = max 300 mA	Rt = min 2 x 100 Ohms C = max 16 µF
C 8 Current regulator			Current regulator	Ireg = 200 mA Vcontr = 80 - 200 V	Vf tot = min 52 V
C 10 Current regulator			Current regulator	Ireg = 200 mA Vcontr = 35 - 100 V	Vftot = min 74 V
C 12 Current regulator			Current regulator	R1 + R2 : Ireg = 200 mA Vcontr = 50 - 200 V R1 : Ireg = 200 mA Vcontr = 35 - 100 V	Vf tot = min 52 V Vf tot = min 74 V
CB 1 Double diode		Vf = 13 V If = 0.2 A Indirect	Detector, A.V.C.	For further data please refer to type A B 2 Vfk = max 125 V	
CB 2 Double diode		Vf = 13 V If = 0.2 A Indirect	Detector, A.V.C.	For further data please refer to type A B 2 Vfk = max 125 V	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
CBC 1 Double diode triode		Vf = 13 V If = 0.2 A Indirect	Typical characteristics	**Triode section** Va = 250 V, Vg = 7 V, Ia = 4 mA; S = 2 mA/V, Ri = 0.0135 MOhm, μ = 27 Va = 100 V, Vg = -2.5 V, Ia = 2 mA; S = 1.8 mA/V, Ri = 0.015 MOhm, μ = 27
			A.F. amplifier	Vb = 200 V, Rk = 0.016 MOhm, Ia = 0.29 mA; Ra = 0.32 MOhm, Vo/Vi = 18 Vb = 100 V, Rk = 0.016 MOhm, Ia = 0.15 mA; Ra = 0.32 MOhm, Vo/Vi = 18
			Detector, A.V.C.	**Diode section** Please refer to type A B 2 Vfk = max 125 V
CBL 1 Double diode output pentode		Vf = 44 V If = 0.2 A Indirect	Output amplifier class A	**Pentode section** Va = Vg2 = 200 V, Vg1 = -8.5 V, Rk = 170 Ohms, Ia = 45 mA, Ig2 = 6 mA; S = 8 mA/V, Ri = 0.04 MOhm, Ra = 4500 Ohms, Wo (d = 10%) = 4 W, Vi = 5 Veff

CBL 1

Output amplifier class A

Va = Vg2 =	100	V	S =	6.5	mA/V
Vg1 =	-4	V	Ri =	0.048	MOhm
Rk =	170	Ohms	Ra =	4500	Ohms
Ia =	21	mA	Wo (d = 7 %)=	0.85	W
Ig2 =	3	mA	Vi =	2.4	Veff

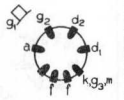
Diode section

Detector, A.V.C.

Please refer to type A B 2

Vfk = max 175 V Rfk = max 5000 Ohms

CBL 6



Double diode output pentode

Vf = 44 V
If = 0.2 A
Indirect

Output amplifier class A

Pentode section

Va =	200	V	S =	6.2	mA/V
Vg2 =	100	V	Ri =	0.037	MOhm
Vg1 =	-9.2	V	Ra =	5000	Ohms
Rk =	190	Ohms	Wo =	3.8	W
Ia =	40	mA	Vi =	7.3	Veff
Ig2 =	9	mA	d =	10 %	

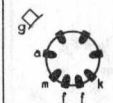
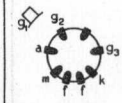
Va = Vg2 =	100	V	S =	6.5	mA/V
Vg1 =	-8	V	Ri =	0.02	MOhm
Rk =	140	Ohms	Ra =	2200	Ohms
Ia =	45	mA	Wo (d = 10%)=	1.8	W
Ig2 =	12	mA	Vi =	7	Veff

Diode section

Detector, A.V.C.

Please refer to type A B 2

Vfk = max 175 V Rfk = max 5000 Chms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
CC 2 Triode		Vf = 13 V If = 0.2 A Indirect	Typical characteristics	Va = 200 V Vg = -4 V Ia = 6 mA	S = 2.5 mA/V Ri = 0.012 MOhm μ = 30
				Va = 100 V Vg = -2.5 V Ia = 2 mA	S = 1.8 MA/V Ri = 0.016 MOhm μ = 30
			A.F. amplifier	Vb = 200 V Rk = 0.016 MOhm Ia = 0.28 mA	Ra = 0.320 MOhm $\frac{Vo}{Vi}$ = 13
				Vb = 100 V Rk = 0.016 MOhm Ia = 0.15 mA	Ra = 0.320 MOhm $\frac{Vo}{Vi}$ = 15
CF 3 Variable mu pentode		Vf = 13 V If = 0.2 A Indirect	R.F. or I.F. amplifier	Va = 200 V Vg3 = 0 V Vg2 = 100 V Vg1 = -3 V Ia = 8 mA	Ig2 = 2.6 mA S = 1.8 mA/V Ri = 0.9 MOhm S (Vg1= -55V) < 2 uA/V Ri (Vg1=-55V) >10 MOhms
				Va = 100 V Vg3 = 0 V Vg2 = 100 V Vg1 = -3 V Ia = 8 mA	Ig2 = 2.6 mA S = 1.8 mA/V Ri = 0.25 MOhm S (Vg1= -55V)< 2 uA/V Ri (Vg1= -55V)>10 MOhms
				Cag1 < 0.003 pF	

CF 7

Pentode

Vf = 13 V
If = 0.2 A
Indirect

R.F. amplifier

Va	= 200	V	Ia	= 3	mA
Vg3	= 0	V	Ig2	= 1.1	mA
Vg2	= 100	V	S	= 2.1	mA/V
Vg1	= -2	V	Ri	= 2	MOhms

Va	= 100	V	Ia	= 3	mA
Vg3	= 0	V	Ig2	= 1.1	mA
Vg2	= 100	V	S	= 2.1	mA/V
Vg1	= -2	V	Ri	= 0.7	MOhm

Cag1 < 0.003 pF

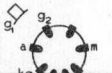
A.F. amplifier

Vb	= 200	V	Ra	= 0.2	MOhm
Rk	= 4000	Ohms	Rg2	= 0.25	MOhm
Ia	= 1	mA	Vo/Vi	= 135	
Ig2	= 0.3	mA			

Vb	= 100	V	Ra	= 0.2	MOhm
Rk	= 4000	Ohms	Rg2	= 0.25	MOhm
Ia	= 0.5	mA	Vo/Vi	= 110	
Ig2	= 0.15	mA			

CF 50

Microphone pre-amplifier pentode



P

Vf = 30 V
If = 0.2 A
Indirect

Typical characteristics

(continued)

Va	= 250	V	Ig2	= 0.3	mA
Vg2	= 100	V	S	= 3.3	mA/V
Vg1	= -2	V	Ri	= 2.5	MOhms
Ia	= 1.5	mA	Req	= 2500	Ohms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
CF 50 Continued		Vf = 30 V If = 0.2 A Indirect	Typical characteristics	Va = 100 V Vg2 = 100 V Vg1 = -2 V Ia = 1.5 mA	Ig2 = 0.3 mA S = 3.3 mA/V Ri = 2 MOhms
			A.F. amplifier	Vb = 200 V Rk = 3000 Ohms Ia = 0.5 mA Ig2 = 0.15 mA	Ra = 0.3 MOhm Rg2 = 0.8 MOhm Vo/Vi = 260
				Vb = 100 V Rk = 7000 Ohms Ia = 0.2 mA Ig2 = 0.07 mA	Ra = 0.3 MOhm Rg2 = 0.4 MOhm Vo/Vi = 150
CH 1 Variable mu hexode		Vf = 13 V If = 0.2 A Indirect	R.F. amplifier	Va = 200 V Vg4 = 50 V Vg2 = 100 V Vg1 + g3 = -2 V Ia = 4 mA Ig4 = 0.25 mA Ig2 = 2 mA	S = 2 mA/V Ri = 2 MOhms S (Vg1 + g3 = -24 V) = 2 µA/V Ri (Vg1 + g3 = -24 V) > 10 MOhms

CH 1

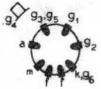
Modulator with separated oscillator

Va	=	200	V	Ig4 =	0.1 mA
Vg4	=	50	V	Ig2 =	4 mA
Vg3	=	-12	V	Sc =	0.55 mA/V
Vg2	=	100	V	Ri =	2 MOhms
Vosc	=	9	Veff	Sc (Vg1 = 24 V)	< 2 µA/V
Vg1	=	-2	V	Ri (Vg1 = 24 V) =	
Ia	=	2.2	mA		> 10 MOhms

Cag1 < 0.003 pF

CK 1

Octode



Vf = 13 V
If = 0.2 A
Indirect

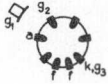
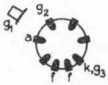
Frequency changer

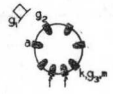
Va	=	200	V	Rg1k =	0.05 MOhm
Vg3 + g5	=	70	V	Sc =	600 µA/V
Vg4	=	-1.5	V	Ri =	1.5 MOhms
Vg2	=	90	V	Sc (Vg4 = -25 V) =	
Vg1 (Ig1 = 190 µA)	=	-9V			< 0.002 µA/V
Ia	=	1.6	mA	Ri (Vg4 = -25 V) =	
Ig3 + g5	=	3.8	mA		> 10 MOhms
Ig2	=	2	mA		

Va	=	100	V	Rg1k =	0.05 MOhm
Vg3 + g5	=	70	V	Sc =	550 µA/V
Vg4	=	-1.5	V	Ri =	1 MOhm
Vg2	=	90	V	Sc (Vg4 = -25 V) =	
Vg1 (Ig1 = 190 µA)	=	-9V			< 0.002 µA/V
Ia	=	1.6	mA	Ri (Vg4 = -25 V) =	
Ig3 + g5	=	3.8	mA		> 10 MOhms
Ig2	=	2	mA		

Cag4 < 0.06 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
CK 3 Octode		Vf = 19 V If = 0.2 A Indirect	Frequency changer	Va = 200 V Vg3 + g5 = 100 V Vg4 = -2.5 V Vg2 = 100 V Ia = 2.5 mA Ig3 + g5 = 5.5 mA Ig2 = 5 mA Ig1 = 300 µA	Rk = 190 Ohms Rg1 = 0.05 MOhm Sc = 650 µA/V Ri = 1.7 MOhms Sc (Vg4 = -38 V) = = 6.5 µA/V Ri (Vg4 = -38 V) = > 10 MOhms
				Va = 100 V Vg3 + g5 = 100 V Vg4 = -2.3 V Vg2 = 100 V Ia = 2.5 mA Ig3 + g5 = 5.5 mA Ig2 = 5 mA Ig1 = 300 µA	Rk = 175 Ohms Rg1 = 0.05 MOhm Sc = 650 µA/V Ri = 0.7 MOhm Sc (Vg4 = -38 V) = = 6.5 µA/V Ri (Vg4 = -38 V) = > 10 MOhms
				Cag < 0.1 pF	
CL 1 Output Pentode		Vf = 13 V If = 0.2 A Indirect	Output amplifier class A	Va = Vg2 = 200 V Vg1 = -14 V Rk = 510 Ohms Ia = 25 mA Ig2 - 2.5 mA	S = 2.5 mA/V Ri = 0.05 MOhm Ra = 8000 Ohms Wo (d = 10%) = 1.8 W Vi = 9 Veff

CL 2 Output pentode		Vf = 24 V If = 0.2 A Indirect	Output amplifier class A	Va = 200 V Vg2 = 100 V Vg1 = -19 V Ia = 40 mA Ig2 = 5 mA	S = 3.1 mA/V Ri = 0.023 MOhm Ra = 5000 Ohms Wo (d = 10%) = 3 W Vi = 8.8 Veff
				Va = Vg2 = 100 V Vg1 = -15 V Ia = 50 mA Ig2 = 8 mA S = 3.8 mA/V	Ri = 0.016 MOhm Ra = 2000 Ohms Wo (d = 10%) = 1.7 W Vi = 9.7 Veff
CL 4 Output pentode		Vf = 33 V If = 0.2 A Indirect	Output amplifier class A	Va = Vg2 = 200 V Vg1 = -8.5 V Rk = 170 Ohms Ia = 45 mA Ig2 = 6 mA	S = 8 mA/V Ri = 0.035 MOhm Ra = 4500 Ohms Wo (d = 10%) = 4 W Vi = 5 Veff
			Push-pull output amplifier class AB	Va = Vg2 = 200 V Rk = 135 Ohms Iao = 2 x 33 mA Ia max = 2 x 40 mA Ig2o = 2 x 3.5 mA	Ig2 max = 2 x 6 mA Raa = 4500 Ohms Wo (d = 1.5%) = 8 W Vi = 14.1 Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
CL 6 Output pentode		Vf = 35 V If = 0.2 A Indirect	Output amplifier class A	Va = 200 V Vg2 = 100 V Vg1 = -9.5 V Rk = 190 Ohms Ia = 45 mA Ig2 = 5.5 mA	S = 8 mA/V Ri = 0.022 MOhm Ra = 4500 Ohms Wo (d = 10%) = 4 W Vi = 5.6 Veff
				Va = Vg2 = 100 V Vg1 = -8.3 V Rk = 140 Ohms Ia = 50 mA Ig2 = 9 mA	S = 8.5 mA/V Ri = 0.012 MOhm Ra = 2000 Ohms Wo (d = 10%) = 2.1 W Vi = 5.6 Veff
			Push-pull output amplifier class A B	Va = 200 V Vg2 = 125 V Rk = 250 Ohms Iao = 2 x 45 mA Ia max = 2 x 51 mA	Ig2o = 2 x 5 mA Ig2 max = 2 x 11.7 mA Raa = 4400 Ohms Wo (d = 1.8%) = 12.1 W Vi = 11 Veff
				Va = 100 V Vg2 = 100 V Rk = 190 Ohms Iao = 2 x 42 mA Ia max = 2 x 45 mA	Ig2o = 2 x 7.5 mA Ig2 max = 2 x 12.5 mA Raa = 3000 Ohms Wo (d = 5.6%) = 4 W Vi = 6.7 Veff

CY 1 Half wave rectifier		Vf = 20 V If = 0.2 A Indirect	Rectifier	Vtr = 170-max 250 Veff Io = max 80 mA Vfkp = max 450 V	C = 32/16/8 µF Rt = 125/75/0 Ohms
				Vtr = 127 - 170 Veff Io = max 80 mA Vfkp = max 450 V	C = 32/16/8 µF Rt = 75/30/0 Ohms
				Vtr = 127 Veff Io = max 80 mA	C = max 64 µF Rt = 0 Ohm
CY 2 Voltage doubler		Vf = 30 V If = 0.2 A Indirect	Half wave rectifier Cathodes and anodes inter-connected	Vtr = max 240 Veff Io = max 120 mA Vfkp = max 450 V	C = 32/16/8 µF Rt = 125/75/0 Ohms
			Voltage doubler	Vtr = max 127 Veff Io = max 60 mA Vfkp = max 450 V	C = max 32 µF Rt = 0 Ohm
DA 90 U.H.F. diode				Please refer to type 1 A 3	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
DAC 21 Diode triode		Vf = 1.4 V If = 25 mA Direct	Typical characteristics	Triode section Va = 120 V, Vg = 0 V, Ia = 0.75 mA — S = 0.4 mA/V, Ri = 0.1 MOhm, μ = 40 Va = 90 V, Vg = 0 V, Ia = 0.45 mA — S. = 0.3 mA/V, Ri = 0.13 MOhm, μ = 40
			A.F. amplifier Detector, A.V.C.	Vb = 120 V, Vg = 0 V, Ia = 0.12 mA — Ra = 0.5 MOhm, Vo/Vi = 25 Vb = 90 V, Vg = 0 V, Ia = 0.08 mA — Ra = 0.5 MOhm, Vo/Vi = 23 Diode section Vd invp = max 100 V — Id = max 0.2 mA
DAC 32 Diode triode				Please refer to type 1 H 5-GT

DAF 40

Variable mu pentode diode

Vf = 1.4 V
If = 2 5 mA
Direct

R.F. or I.F. amplifier

Pentode section

Va	=	120	V	S = 700	µA/V
Rg2	=	0. 27	MOhm	Ri = 2. 6	MOhms
Vg1	=	0	V	S (Vg1= -6. 8V)= 7	µA/V
Ia	=	0. 85	mA	Ri(Vg1= -6. 8V) > 10	MOhms
Ig2	=	0. 2	mA		

Va	=	90	V	S = 700	µA/V
Rg2	=	0. 12	MOhm	Ri = 2. 2	MOhms
Vg1	=	0	V	S (Vg1= -5 V)= 7	µA/V
Ia	=	0. 85	mA	Ri(Vg1= -5 V) > 10	MOhms
Ig2	=	0. 2	mA		

Va	=	67. 5	V	S = 700	µA/V
Vg2	=	67. 5	V	Ri = 1. 6	MOhms
Vg1	=	0	V	S (Vg1= -3. 7V)= 7	µA/V
Ia	=	0. 85	mA	Ri(Vg1= -3. 7V) > 10	MOhms
Ig2	=	0. 2	mA		

Cag < 0.007 pF

Diode section

Vd invp - max 100 V Id = max 0. 2 mA

Detector, A. V. C.

DAF 41

Diode pentode

Vf = 1. 4 V
If = 25 mA
Direct

A.F. amplifier

(continued)

Pentode section

Vb	=	150	V	Ia = 0. 24	mA
Ra	=	0. 47	MOhm	Ig2 = 0. 05	mA
Rg2	=	2. 2	MOhms	Vo / Vi = 112	
Rg1	=	3	MOhms		

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
DAF 41 Continued		Vf = 1.4 V If = 25 mA Direct	A.F. amplifier	Pentode section Vb = 120 V, Ra = 0.47 MOhm, Rg2 = 2.2 MOhms, Rg1 = 3 MOhms, Ia = 0.18 mA, Ig2 = 0.04 mA, Vo/Vi = 100 Vb = 90 V, Ra = 0.47 MOhm, Rg2 = 2.2 MOhms, Rg1 = 3 MOhms, Ia = 0.13 mA, Ig2 = 0.03 mA, Vo/Vi = 83 Vb = 67.5 V, Ra = 0.22 MOhm, Rg2 = 0.82 MOhm, Rg1 = 3 MOhms, Ia = 0.17 mA, Ig2 = 0.04 mA, Vo/Vi = 90 Diode section Vd invp = max 50 V, Id = max 0.2 mA
DAF 91 Diode pentode				Please refer to type 1S 5

DAF 96

Diode pentode

Vf = 1.4 V
If = 25 mA
Direct

A.F. amplifier

Vb	=	85	V	Ia	=	64	µA
Ra	=	1	MOhm	Ig2	=	21	µA
Rg2	=	2.7	MOhms	Vo/Vi	=	70	
Rg1	=	10	MOhms				
Vb	=	64	V	Ia	=	42	µA
Ra	=	1	MOhm	Ig2	=	13	µA
Rg2	=	2.7	MOhms	Vo/Vi	=	63	
Rg1	=	10	MOhms				

Diode section

Detector A.V.C.

Vd invp = max 100 V | Id = max 0.2 mA

DC 70

U.H.F. triode

Vf = 1.25 V
If = 0.2 A
Direct

Typical characteristics

Va	=	150	V	S	=	3.4	mA/V
Ia	=	12	mA	µ	=	14	
Vg1	=	-4.5	V	Ri	=	4000	Ohms

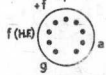
U.H.F. oscillator

Va	=	150	V	f	=	500	Mc/s
Ik	=	20	mA	Wo	=	450	mW

Cag = 1.4 pF

DC 80

U.H.F. triode



Vf = 1.25 V
If = 0.2 A
Direct

Typical characteristics

Va	=	150	V	S	=	3.5	mA/V
Vg1	=	-3.5	V	µ	=	14	
Ia	=	20	mA	Ri	=	4000	Ohms

U.H.F. oscillator

Va	=	150	V	f	=	500	Mc/s
Ik	=	20	mA	Wo	=	0.45	W
Ig	=	1.5	mA	f max	=	750	Mc/s

Cag = 1.5 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
DC 90 U.H.F. triode		Vf = 1.4 V If = 50 A	Typical characteristics	Va = 90 V Vg = -3 V Ia = 3 mA	S = 1.1 mA/V μ = 11.5
				Va = 67.5 V Vg = 0 V Ia = 4.2 mA	S = 1.2 mA/V μ = 11.6
			Frequency changer	Va = 90 V Vosc = 5.5 Veff	Rg = 1 MOhm Ig = 6 μA
DCC 90 Double triode				Please refer to type 3 A 5	
DF 21 Pentode		Vf = 1.4 V If = 25 mA Direct	R.F. or I.F. amplifier	Va = Vb = 120 V Vg3 = 0 V Rg2 = 0.12 MOhm Vg1 = 0 V Ia = 1.2 mA	Ig2 = 0.25 mA S = 700 μA/V Ri = 2.5 MOhms S(Vg1= -4.5V)= 7 μA/V Ri(Vg1= -4.5V) 10 MOhms
				Va = Vg2 = 90 V Vg3 = 0 V Vg1 = 0 V Ia = 1.2 mA Ig2 = 0.25 mA	S = 700 μA/V Ri = 2 MOhms S (Vg1= -3.5V)= 7 μA/V Ri(Vg1= -3,5V) 10 MOhms
				Cag1< 0.006 pF	

DF 21

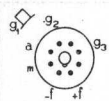
Continued

A.F. amplifier

Vb	=	120	V	Ia =	0.15 mA
Vg1	=	- 0.5	V	Ig2 =	32 µA
Ra	=	0.5	MOhm	Vo/Vi =	85
Rg2	=	2	MOhms		
Vb	=	90	V	Ia =	0.1 mA
Vg1	=	-0.5	V	Ig2 =	20 µA
Ra	=	0.5	MOhm	Vo/Vi =	69
Rg2	=	2	MOhms		

DF 22

Variable mu pentode



Vf = 1.4 V
If = 50 mA
Direct

R.F. or I.F. amplifier

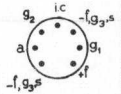
Va = Vb	=	120	V	Ig2 =	0.3 mA
Vg3	=	0	V	S =	1.1 mA/V
Rg2	=	0.1	MOhm	Ri =	2.5 MOhms
Vg1	=	-1.5	V	S (Vg1= -8 V) =	11 µA/V
Ia	=	1.4	mA	Ri (Vg1= -8 V) >	10 MOhms
Va	=	90	V	Ig2 =	0.3 mA
Vg3	=	0	V	S =	1.1 mA/V
Vg2	=	90	V	Ri =	1.5 MOhms
Vg1	=	-1.5	V	S (Vg1= -6 V) =	11 µA/V
Ia	=	1.4	mA	Ri (Vg1= -6 V) >	10 MOhms

Cag1 < 0.005 pF

DF 33

Variable mu pentode

Please refer to type 1 N 5-GT

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
DF 91 Variable mu pentode				Please refer to type 1 T 4
DF 92 Pentode				Please refer to type 1 L 4
DF 96 Pentode		Vf = 1.4 V If = 25 mA Direct	R.F or I.F. amplifier	Va* = 85 V, Vg2* = 64 V, Vg1 = 0 V, Ia = 1.65 mA, Ig2 = 0.55 mA S = 850 µA/V, Ri = 1 MOhm, Req = 0.014 MOhm, S (Vg1= -5.5V)=10 µA/V, Ri(Vg1= -5.5V)>10 MOhms Va* = Vg2 = 64 V, Vg1 = 0 V, Ia = 1.65 mA, Ig2 = 0.55 mA S = 850 uA/V, Ri = 0.7 MOhm, Req = 0.014 MOhm, S (Vg1= -4.1V)=10 µA/V, Ri(Vg1= -4.1V)>10 MOhms Cag1 = 0.01 pF

DK 21

Octode

Vf = 1.4 V
If = 50 mA
Direct

Frequency changer

Va = Vb =	120	V	Ia =	1.5	mA
Rg5 =	0.12	MOhm	Ig5 =	0.25	mA
Rg2 =	0.025	MOhm	Ig2 =	2.4	mA
Rg1 + g3 =	0.035	MOhm	Sc =	500	µA/V
Ig1 + g3 =	200	µA	Ri =	1.5	MOhm
Vg4 =	0	V	Sc(Vg4= -8V)=	5	µA/V
Vg2 =	60	V	Ri(Vg4= -8V) >	10	MOhms
Vg5 =	90	V			

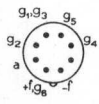
Va = Vg5 =	90	V	Ig5 =	0.25	mA
Rg2 =	0.0125	MOhm	Ig2 =	2.4	mA
Rg1 + g3=	0.035	MOhm	Sc =	500	µA/V
Ig1 + g3 =	200	µA	Ri =	1.25	MOhms
Vg4 =	0	V	Sc(Vg4= -6V)=	5	µA/V
Vg2 =	60	V	Ri(Vg4= -6V) >	10	MOhms
Ia =	1.5	mA			

Cag4 < 0.1 pF

DK 32

Heptode

Please refer to type 1 A 7-GT

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
DK 40 Octode		Vf = 1.4 V If = 50 mA Direct	Frequency changer	Va = 120 V Rg5 = 0.21 MOhm Rg2 = 0.02 MOhm Rg1 + g3 = 0.035 MOhm Vosc = 8 Veff Vg4 = 0 V Ia = 1 mA Ig5 = 0.25 mA I g2 = 2.6 mA Sc = 425 µA/V Ri = 1 MOhm Sc(Vg4= -16.5V)=4.2 µA/V Ri(Vg4= -16.5V) > 10 MOhms
				Va = 90 V Rg5 = 0.09 MOhm Rg2 = 8500 Ohms Rg1 + g3 = 0.035 MOhm Vosc = 8 Veff Vg4 = 0 V Ia = 1 mA Ig5 = 0.25 mA Ig2 = 2.6 mA Sc = 425 µA/V Ri = 1 MOhm Sc(Vg4= -12.5V)=4.3 uA/V Ri(Vg4= -12.5V)>10 MOhms
				Va = Vg5 = Vg2 = 67.5 V Rg1 + g3 = 0.035 MOhm Vosc = 8 Veff Vg4 = 0 V Ia = 1 mA Ig5 = 0.25 mA Ig2 = 2.6 mA Sc = 425 µA/V Ri = 0.9 MOhm Sc(Vg4= -9.5V)= 4 µA/V Ri(Vg4= -9.5V) 10 MOhms Cag4 < 0.125 pF

DK 91

Heptode

Please refer to type 1 R 5

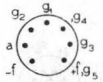
DK 92

Heptode

Please refer to type 1 AC 6

DK 96

Heptode



Vf = 1.4 V
If = 25 mA
Direct

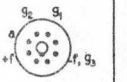
Frequency changer

Vb* = Va =	85	V	Ia =	0.6	mA
Vg4 =	64	V	Ig4 =	0.14	mA
Vg3 =	0	V	Ig2 =	1.5	mA
Vg2 =	35	V	Ig1 =	85	µA
Vosc =	4	Veff	Sc =	300	µA/V
Rg2 =	0.033	MOhm	Ri =	0.8	MOhm
Rg1 =	0.027	MOhm	Sc(Vg3= -6.5V)=3 µA/V		

Vb* = Va =	64	V	Ia =	0.55	mA
Vg4 =	64	V	Ig4 =	0.12	mA
Vg3 =	0	V	Ig2 =	1.6	mA
Vg2 =	35	V	Ig1 =	85	µA
Vosc =	4	Veff	Sc =	275	µA/V
Rg2 =	0.018	MOhm	Ri =	0.75	MOhm
Rg1 =	0.027	MOhm	Sc(Vg3= -4.5V)=2.75 µA/V		

Cag3 < 0.35 pF

* Based on a battery voltage of 90 or 67.5 V reduced by the negative bias for the output valve.

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
DL 21 Output pentode		Vf = 1.4 V If = 50 mA Direct	Output amplifier class A	Va = Vg2 = 120 V Vg1 = -4.8 V Ia = 5 mA Ig2 = 0.9 mA S = 1.4 mA/V	Ri = 0.35 MOhm Ra = 0.024 MOhm Wo(d = 10%) = 270 mW Vi = 3.2 Veff
				Va = Vg2 = 90 V Vg1 = -3 V Ia = 4 mA Ig2 = 0.7 mA S = 1.3 mA/V	Ri = 0.3 MOhm Ra = 0.0225 MOhm Wo(d = 10%) = 160 mW Vi = 2.1 Veff
DL 33 Output pentode				Please refer to type 3 Q 5-GT	
DL 35				Please refer to type 1 C 5-GT	
DL 36 Output pentode		Vf = 1.4 V If = 0.1 A Direct	Output amplifier classA	Va = Vg2 = 90 V Vg1 = -4.5 V Ia = 9.5 mA Ig2 = 1.3 mA S = 2.2 mA/V	Ri = 0.09 MOhm Ra = 8000 Ohms Wo(d = 6%) = 270 mW Vi = 3.2 Veff

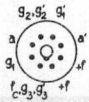
DL 41

Output pentode

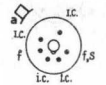
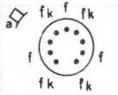
Vf = 1.4 V If = 0.1 A Direct	Output amplifier class A	Va = Vg2 = 120 V Vg1 = -5.6 V Ia = 10 mA Ig2 = 1.65 mW S = 2.55 mA/V	Ri = 0.08 MOhm Ra = 0.012 MOhm Wo(d = 10%) = 550 mW Vi = 3.8 Veff	
		Va = Vg2 = 90 V Vg1 = -3.6 V Ia = 8 mA Ig2 = 1.3 mA S = 2.45 mA/V	Ri = 0.09 MOhm Ra = 0.0113 MOhm Wo(d = 10%) - 330 mW Vi = 3.1 Veff	
Vf = 2.8 V If = 50 mA Direct	Output amplifier class A	Va = Vg2 = 120 V Vg1 = -5.45 V Ia = 9 mA Ig2 = 1.45 mA S = 2.45 mA/V	Ri = 0.095 MOhm Ra = 0.0135 MOhm Wo(d = 10%) = 490 mW Vi = 3.5 Veff	
		Va = Vg2 = 90 V Vg1 = -3.6 V Ia = 6 mA Ig2 = 0.95 mA S = 2.2 mA/V	Ri = 0.1 MOhm Ra = 0.015 MOhm Wo(d = 10%) = 235 mW Vi = 2.6 Veff	
Vf = 1.4 V If = 0.1 A Direct	Push-pull output amplifier class B	Vb = 90 V Va = Vg2 = 83.6 V Vg1 = -6.4 V Raa = 0.018 MOhm Iao = 2 x 1.5 mA	Ia max = 2 x 5.3 mA Ig2o = 2 x 0.25 mA Ig2 max = 2 x 1.5 mA Wo(d = 5%) = 475 mW Vi = 5 Veff	

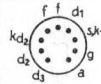
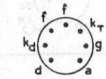
(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
DL 41 Continued		Vf = 1.4 V If = 50 mA Direct	Push-pull output amplifier class B	Vb = 90 V Va = Vg2 = 84.2 V Vg1 = -5.8 V Raa = 0.018 MOhm Iao = 2 x 1.5 mA	Ia max = 2 x 4.9 mA Ig2o = 2 x 0.25 mA Ig2 max= 2 x 1.25 mA Wo(d = 3.6%)= 420 mW Vi = 4.8 Veff
DL 92 output pentode				Please refer to type 3 S 4	
DL 93 output pentode				Please refer to type 3 A 4	
DL 94 Output pentode				Please refer to type 3 V 4	
DL 95 Output pentode				Please refer to type 3 Q 4	

DL 96 Output pentode		Vf = 1.4 V If = 50 mA Direct	Output amplifier class A	Va* = Vg2 = 85 V Vg1 = -5.2 V Ia = 5 mA Ig2 = 0.9 mA	S = 1.4 mA/V Ri = 0.15 MOhm Ra = 13000 Ohms Wo(d = 10%) = 200 mW Vi(d = 10%) = 3.5 Veff
				Va* = Vg2 = 94 V Vg1 = -3.3 V Ia = 3.5 mA Ig2 = 0.65 mA	S = 1.3 mA/V Ri = 0.17 MOhm Ra = 15000 Ohms Wo(d = 10%) = 100 mW Vi(d = 10%) = 2.6 Veff
			Push-pull output amplifier class B	Va = Vg2 = 81.5 V Vg1 = -8.5 V Ia = 2 x 5.0 mA Ig2 = 2 x 1.3 mA	Raa = 16000 Ohms Wo(d = 2.6%) = 440 mW Vi(d = 2.6%) = 7.9 Veff
				Va = Vg2 = 61.5 V Vg1 = -5.8 V Ia = 2 x 3.4 mA Ig2 = 2 x 0.95 mA	Raa = 20000 Ohms Wo(d = 3%) = 220 mW Vi(d = 3%) = 5.7 Veff
DLL 21 Double output pentode		Vf - 1.4 V If - 0.2 A Direct	Push-pull output amplifier class B (continued)	Va = Vg2 = 120 V Vg1 = -8.2 V Raa = 0.015 MOhm Iao = 2 x 2 mA Ia max = 2 x 7.5 mA	Ig2o = 2 x 0.35 mA Ig2 max = 2 x 2 mA Wo(d = 5%) = 1.2 W Vi = 7 Veff

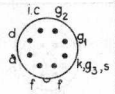
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
DLL 21 Double output pentode (continued)		Vf = 2.8 V If = 0.1 A Direct	Push-pull output amplifier class B	Va = Vg2 = 120 V Vg1 = -8.1 V Raa = 0.015 MOhm Iao = 2 x 1.5 mA Ia max = 2 x 7.1 mA	Ig2o = 2 x 0.25 mA Ig2 max = 2 x 1.9 mA Wo(d = 2.8%) = 1.1 W Vi = 6.4 Veff
				Va = Vg2 = 90 V Vg1 = -5.9 V Raa = 0.02 MOhm Iao = 2 x 1 mA Ia max = 2 x 4.4 mA	Ig2o = 2 x 0.2 mA Ig2 max = 2 x 1.3 mA Wo(d = 2.9%) = 0.5 W Vi = 4.9 Veff
DM 70 Tuning indicator		Vf = 1.4 V If = 25 mA Direct	Tuning indicator	Pin 4 negative Va = 90 V Vg = 0 V (for full alight)	Vg = -13.5 V (for complete extinction) Ia(Vg = 0V) = 0.25 mA
				Pin 4 positive Va = 60 V Vg = 0 V (for full alight)	Vg = -8 V (for complete extinction) Ia(Vg = 0V) = 0.12 mA

DM 71 Tuning indicator		Vf = 1.4 V If = 25 mA Direct	Tuning indicator	Please refer to type DM 70	
DY 30 Half wave rectifier		Vf = 1.25 V If = 0.2 A Direct	H.T. rectifier	Va invp = 30.000 V Ia = 2 mA	Iap = max 17 mA f = max 300 kc/s
DY 86 E.H.T. rectifier for T.V.		Vf = 1.4 V If = 0.53 A Indirect	E.H.T. rectifier	Vo = 18000 V Io = 0.15 mA	Va invp = 22000 V
EA 50 Diode		Vf = 6.3 V If = 0.15 A Indirect	Detector for T.V. purposes	Vd = 200 V If = 5 mA Vfk = 50 V	Rfk = 20 kOhm Vd(Id= +0.3 μA) = -1.3 V Cdk = 2.1 pF
EAA 91 Double diode		Vf = 6.3 V If = 0.3 A Indirect	Detector A.V.C. and other purposes	Please refer to type 6 AL 5	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EABC 80 Triple diode triode		Vf = 6.3 V If = 0.45 A Indirect	Typical characteristics	Triode section Va = 250 V, Vg = -3 V, Ia = 1 mA, S = 1.2 mA/V, μ = 70, Ri = 0.058 MOhm Va = 100 V, Vg = -1 V, Ia = 0.8 mA, S = 1.3 mA/V, μ = 70, Ri = 0.054 MOhm
			Diodes for AM/FM, video and audio detection	Diode section Cd1 = 0.9 pF, Cd2 = 4.5 pF, Cd3 = 4.5 pF Id1 = max 1 mA, Id2 = max 10 mA, Id3 = max 10 mA Vd1 invp = Vd2 invp = Vd3 invp = max 400 V Rid1 (Vd1 = + 10V) = 5000 Ohms Rid2 = Rid3 (Vd = +5V) = 200 Ohms
EAC 91 Diode triode (U.H.F. mixer)		Vf = 6.3 V If = 0.3 V Indirect	Typical characteristics	Triode section Va = 200 V, Vg = -4 V, Ia = 5.5 mA, S = 2.5 mA/V, Ri = 12.400 Ohms, μ = 31 Diode section Vd invp = max 350 V, Id = max 5 mA Cdk = 1.7 pF

EAF 41

Diode variable mu pentode



Vf = 6.3 V
If = 0.2 A
Indirect

R.F. or I.F. amplifier

Pentode section

Va	=	250	V	S	=	1800 µA/V
Rg2	=	0.095	MOhm	Ri	=	1.2 MOhms
Rk	=	300	Ohms	S (Vg1= -40V)=		18 µA/V
Vg1	=	-2	V	Ri(Vg1= - 40V)>		10 MOhms
Ia	=	5	mA	Req	=	9000 Ohms
Ig2	=	1.6	mA			

Cag1 < 0.002 pF

A.F. amplifier

Vb	=	250	V	Ia	=	0.86 mA
Ra	=	0.2	MOhm	Ig2	=	0.28 mA
Rg2	=	0.8	MOhm	Vo/Vi	=	105
Rk	=	1600	Ohms			

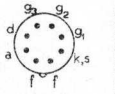
Detector, A.V.C.

Diode section

Please refer to type A B 2

EAF 42

Diode variable mu pentode



Vf = 6.3 V
If = 0.2 A
Indirect

R.F. or I.F. amplifier

Pentode section

Va	=	250	V	S	=	2 mA/V
Rg2	=	0.11	MOhm	Ri	=	1.4 MOhm
Rk	=	310	Ohms	S (Vg1= -43V)=		20 µA/V
Vg1	=	-2	V	Ri(Vg1= -43V)>		10 MOhms
Ia	=	5	mA	Req	=	7500 Ohms
Ig2	=	1.5	mA			

Cag1 < 0.002 pF

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EAF 42 Diode variable mu pentode (continued)		Vf = 6.3 V If = 0.2 A Indirect	A.F. amplifier	Vb = 250 V Ra = 0.22 MOhm Rg2 = 0.82 MOhm Rk = 1500 Ohms	Ia = 0.8 mA Ig2 = 0.26 mA Vo/Vi = 120
				Diode section	
			Detector, A.V.C.	Please refer to type AB 2	Vfk = max 100 V
EB 4 Double diode		Vf = 6.3 V If = 0.2 A Indirect	Detector, A.V.C. and other purposes	Please refer to type A B 2	Vfk1 = max 75 V Vfk2 = max 75 V
EB 34 diode		Vf = 6.3 V If = 0.2 A Indirect	Detector, A.V.C. and other purposes	Please refer to type E B 4	
EB 41 Double diode		Vf = 6.3 V If = 0.3 V Indirect	Half wave rectifier (per system) Detector, A.V.C.	For further data please refer to type 6 A L 5	

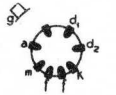
EB 91

Double diode

Please refer to type 6 A L 5

EBC 3

Double diode triode



Vf = 6.3 V
If = 0.2 A
Indirect

Typical characteristics

Triode section

Va	=	275	V	S	=	2	mA/V
Ia	=	5	mA	μ	=	30	
Vg	=	-6.25	V	Ri	=	0.015	MOhm
Va	=	200	V	S	=	2	mA/V
Ia	=	4	mA	μ	=	30	
Vg	=	-4.3	V	Ri	=	0.015	MOhm
Va	=	100	V	S	=	1.6	mA/V
Ia	=	2	mA	μ	=	30	
Vg	=	-2.1	V	Ri	=	0.019	MOhm

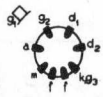
A.F. amplifier

Vb	=	300	V	Ia	=	0.9	mA
Ra	=	0.2	MOhm	$\frac{Vo}{Vi}$	=	26	
Rk	=	4000	Ohms				
Vb	=	250	V	Ia	=	0.75	mA
Ra	=	0.2	MOhm	$\frac{Vo}{Vi}$	=	26	
Rk	=	4000	Ohms				

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EBC 3 (continued)			Detector, A.V.C.	Vb = 200 V; Ra = 0.2 MOhm; Rk = 0.0125 MOhm; Ia = 0.35 mA; Vo/Vi = 22 Vb = 100 V; Ra = 0.2 MOhm; Rk = 0.0125 MOhm; Ia = 0.2 mA; Vo/Vi = 19 Diode section Please refer to type A B 2 Vfk = max 100 V
EBC 33 Double diode triode		Vf = 6.3 V If = 0.2 A Indirect	A.F. amplifier detector, A.V.C.	For further data please refer to type E B C 3
EBC 41 Double diode triode		Vf = 6.3 V If = 0.23 A indirect	Typical characteristics	Triode section Va = 250 V; Vg = -3 V; Ia = 1 mA; S = 1.2 mA/V; μ = 70; Ri = 0.058 MOhm

EBC 41			A.F. amplifier	Vb = 250 V Ra = 0.22 MOhm Rk = 1800 Ohms	Ia = 0.7 mA Vo/Vi = 51
				Diode section Please refer to type A B 2	
			Detector, A.V.C.	Vfk = max 100 V	
EBC 81 Duo diode triode		Vf = 6.3 V If = 0.23 A indirect	Detector and A.F. amplifier	For further data please refer to type E B C 41	
EBC 90 Double diode				Please refer to type 6 A T 6	
EBC 91 Double diode triode				Please refer to type 6 A V 6	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EBF 2 Double diode variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	R.F. or I.F. amplifier	pentode section Va = 250 V, Ig2 = 1.6 mA Rg2 = 0.095 MOhm, S = 1.8 mA/V Rk = 300 Ohms, Ri = 1.3 MOhm Vg1 = -2 V, S (Vg1= -38V)= 18 µA/V Ia = 5 mA, Ri(Vg1= -38V)> 10 MOhms Va = 200 V, Ig2 = 1.6 mA Rg2 = 0.06 MOhm, S = 1.8 mA/V Rk = 300 Ohms, Ri = 1 MOhm Vg1 = -2 V, S (Vg1= -32.5V)= 18 µA/V Ia = 5 mA, Ri(Vg1= -32.5V)> 10 Ohms Va = Vg2 = 100 V, S = 1.8 mA/V Rk = 300 Ohms, Ri = 0.4 MOhm Vg1 = -2 V, S (Vg1= -16.5V)= 18 µA/V Ia = 5 mA, Ri(Vg1= -16.5V)> 10 MOhms Ig2 = 1.6 mA Cag1 < 0.002 pF
			A.F. amplifier	Vb = 250 V, Ia = 0.8 mA Ra = 0.2 MOhm, Ig2 = 0.24 mA Rg2 = 0.8 MOhm, Vo/Vi = 98 Rk = 2000 Ohms
			Detector, A.V.C.	Diode section Please refer to type A B 2 Vfk = max 100 V

EBF 32

Double diode pentode

Vf = 6.3 V
If = 0.2 A
Indirect

R.F., I.F., A.F. amplifier detector, A.V.C.

For further data please refer to type E B F 2

EBF 80

Double diode variable mu pentode

Vf = 6.3 V
If = 0.3 A
Indirectr

Pentode section

R.F. or I.F. amplifier

Va	=	250	V	Ig2	=	1.75	mA
Vg3	=	0	V	S	=	2.2	mA/V
Rg2	=	0.095	MOhm	Ri	=	1.4	MOhm
Rk	=	300	Ohms	S (Vg1= -41.5V)	=	22	µA/V
Vg1	=	-2	V	Ri (Vg1= -41.5V)	=	10	MOhms
Ia	=	5	mA	Req	=	6800	Ohms

A.F. amplifier

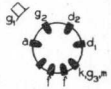
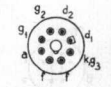
Vb	=	250	V	Ia	=	0.75	mA
Ra	=	0.22	MOhm	Ig2	=	0.3	mA
Rg2	=	0.82	MOhm	Vo/Vi	=	110	
Rk	=	1800	Ohms				

Cag1 < 0.0025 pF

Diode section

Detector, A.V.C.

Vd1 invp = Vd2 invp = max		350	V	Rfk = max		0.02	MOhm
				Vfk = max		100	V
Id1 = Id2 = max		0.8	mA				
Id1p = Id2p = max		5	mA				

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EBL 1 Double diode output pentode		Vf = 6.3 V If = 1.18 A Indirect	Output amplifier class A	Pentode section Va = Vg2 = 250 V — S = 9 mA/V Rk = 150 Ohms — Ri = 0.05 MOhm Vg1 = -6 V — Ra = 7000 Ohms Ia = 36 mA — Wo(d = 10%) = 4.5 W Ig2 = 4 mA — Vi = 4.2 Veff
			Output amplifier class A B	Va = Vg2 = 250 V — Ig2o = 2 x 2.8 mA Rk = 140 Ohms — Ig2 max = 2 x 4.6 mA Raa = 0.01 MOhm — Wo(d = 3.1%) = 8.2 W Iao = 2 x 24 mA — Vi = 6.7 Veff Ia max = 2 x 28.5 mA
			Detector, A.V.C.	Diode section Please refer to type A B 2 Rfk = Max 5000 Ohms
EBL 21 Double diode output pentode		Vf = 6.3 V If = 0.8 A Indirect	Output amplifier class A	Pentode section Va = Vg2 = 250 V — S = 9 mA/V Rk = 150 Ohms — Ri = 0.05 MOhm Vg1 = -6 V — Ra = 7000 Ohms Ia = 36 mA — Wo(d = 10%) = 4.5 W Ig2 = 4.5 mA — Vi = 4.2 Veff

EBL 21			Puch-pull output amplifier class A B	Va = Vg2 = 300 V Rk = 130 Ohms Raa = 9000 Ohms Iao = 2 x 30 mA Ia max = 2 x 36 mA Diode section Please refer to type A B 2 Rkf = max 5000 Ohms	Ig2o = 2 x 3.8 mA Ig2 max = 2 x 6.5 mA Wo (d = 1.8%) = 13.2 W Vi = 7 Veff
EC 2 Triode		Vf = 6.3 V If = 0.4 A Indirect	Typical characteristics	Va = 250 V Vg = -5.5 V Ia = 6 mA	S = 2.5 mA/V μ = 30 Ru = 0.012 MOhm
			A.F. amplifier	Vb = 250 V Ra = 0.32 MOhm Ia = 0.48 mA	Rk = 8000 Ohms Vo / Vi = 20
EC 55 U.H.F. triode		Vf = 6.3 V If = 0.4 A Indirect	Typical characteristics	Va = 250 V Vg = -3.5 V Ia = 20 mA Cag < 1.1 pF	S = 6 mA/V μ = 30 F up to 3000 Mc/s
EC 80 U.H.F. triode		Vf = 6.3 V If = 0.48 A Indirect	Typical characteristics	Va = 250 V Vg = -1.5 V Ia = 15 mA Cag = 3.4 pF	S = 12 mA/V μ = 80 F up to 500 Mc/s

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EC 81 U. H. F. triode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	A resistor of 3 Ohms must be connected in series with the filament Va = 150 V, Vg = -2 V, Ia = 30 mA, S = 5.5 mA/V, μ = 16 Va = 120 V, Vg = -2 V, Ia = 20 mA, S = 4 mA/V, μ = 15 Cag = 1.6 pF
EC 91 U. H. F. triode		Vf = 6.3 V If = 0.3 A Indirect	Typical characteristics	Va = 250 V, Vg = -1.5 V, Rk = 150 Ohms, Ia = 10 mA, S = 8.5 mA/V μ = 100, Ri = 0.012 MOhm, Req = 400 Ohms, F up to 250 Mc/s Cag = 2.5 pF
EC 92 U. H. F. triode		Vf = 6.3 V If = 0.15 A Indirect	Typical characteristics	Va = 250 V, Vg = -2 V, Ia = 10 mA, S = 5 mA/V Ri = 0.012 MOhm, μ = 60, F = max 300 Mc/s Cag = 1.5 pF

EC 93

U.H.F. triode

Vf = 6.3 V
If = 0.225 A
Indirect

Typical characteristics	Va	=	100	V	S	=	8 mA/V
	Vg	=	-4	V	μ	=	15
	Ia	=	16	mA	f	= max	1400 Mc/s
					Cag	=	1.7 pF
U.H.F. oscillator	Va	=	75	V	Rg1	=	10000 Ohms
	Ia	=	16	mA	Ig1	=	0.4 mA

ECC 31

Double triode

Vf = 6.3 V
If = 0.95 A
Indirect

Typical characteristics (per system)	Va	=	250	V	S	=	2.3 mA/V
	Vg	=	-4.6	V	Ri	=	0.014 MOhm
	Ia	=	6	mA	μ	=	32
A.F. amplifier (per system)	Vb	=	250	V	Rk	=	3900 Ohms
	Ra	=	0.22	MOhm	Vo/Vi	=	27
	Ia	=	0.7	mA			

ECC 32

Double triode

Vf = 6.3 V
If = 0.95 A
Indirect

A.F. amplifier

For further data please refer to type E C C 31

ECC 33

Double triode

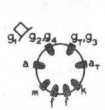
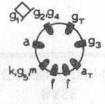
Vf = 6.3 V
If = 0.4 A
Indirect

Typical characteristics (per system)	Va	=	250	V	S	=	3.6 mA/V
	Vg	=	-4	V	μ	=	35
	Ia	=	9	mA	Ri	=	9700 Ohms
A.F. amplifier (per system)	Vb	=	250	V	Rk	=	3900 Ohms
	Ra	=	0.22	MOhm	Vo/Vi	=	27.5
	Ia	=	0.7	mA			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS						
ECC 34 Double triode		Vf = 6.3 V If = 0.95 A Indirect	Typical characteristics (per system)	Va = 250 V Vg = -16 V Ia = 10 mA			S = 2.2 mA/V μ = 11.5 Ri = 5200 Ohms			
ECC 35 Double triode		Vf = 6.3 V If = 0.4 A Indirect	Typical characteristics (per system)	Va = 250 V Vg = -2.5 V Ia = 2.3 mA			S = 2 mA/V μ = 68 Ri = 0.034 MOhm			
			A.F. amplifier (per system)	Vb = 250 V Ra = 0.22 MOhm Ia = 0.45 mA			Rk = 4700 Ohms Vo / Vi = 45			
ECC 40 Double triode		Vf = 6.3 V If = 0.6 A Indirect	Typical characteristics (per system)	Va = 250 V Vg = -5.2 V Ia = 6 mA			S = 2.7 mA/V μ = 30 Ri = 0.011 MOhm			
			A.F. amplifier (per system)	Vb = 250 V Ra = 0.1 MOhm Ia = 1.5 mA			Rk = 2000 Ohms Vo / Vi = 26			
			Output amplifier class A (1 system)	Va = 250 V Ia = 6 mA Vg = -5.6 V Rk = 920 Ohms S = 2.9 mA/V			Ri = 0.011 MOhm Ra = 0.015 MOhm Wo(d = 8.5%) = 280 mW Vi = 3.9 Veff			

ECC 40			Push-pull output amplifier (2 systems)	Va = 250 V Rk = 560 Ohms Raa = 0.03 MOhm Iao = 2 x 5.2 mA	Ia max = 2 x 5.6 mA Wo(d = 1%) = 520 mW Vi = 4.1 Veff
ECC 81 Double triode				Please refer to type 12 AT 7	
ECC 82 Double triode				Please refer to type 12 AU 7	
ECC 83 Double triode				Please refer to type 12 AX 7	
ECC 84 Double triode for T.V.		Vf = 6.3 V If = 0.23 A Indirect	Detector and A.F. amplifier	For further data please refer to type P C C 84	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
ECC 85 Double triode		Vf = 6.3 V If = 0.435 A	Typical characteristics	Va = 250 V, Vg = -2.3 V, Ia = 10 mA, S = 6 mA/V, μ = 57 Cag = Ca'g' = 1.5 pF
			R.F. amplifier	Vb = 250 V, Va = 230 V, Ia = 10 mA, Vg = -2 V, S = 6 mA/V, Ri = 9700 Ohms
			Self-oscillating mixer	Vb = 250 V, Ra = 12000 Ohms, Rg = 1 MOhm, Vosc = 3 Veff, Ia = 5.2 mA, Sc = 2.3 mA/V, Ri = 0.02 MOhm
ECC 91 Double triode				Please refer to type 6 J 6
ECF 1 Triode variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Triode section Va = 150 V, Vg = -3 V, Ia = 8 mA, S = 2.2 mA/V, Ri = 9000 Ohms, μ = 20

ECF 1			R.F. or I.F. amplifier	Va = 250 V Vg3 = 0 V Rg2 = 0.075 MOhm Vg1 = -2 V Ia = 5 mA	Ig2 = 2 mA S = 2 mA/V Ri = 1.6 MOhms Sc(Vg1= -40V)=20 µA/V Ri(Vg1= -40V)>10 MOhms Cag1 < 0 004 pF
ECF 80 Triode pentode		Vf = 6.3 V If = 0.45 A Indirect	Frequency changer	For further data please refer to type P C F 80	
ECH 3 Triode hexode		Vf = 6.3 V If = 0.2 A Indirect	Frequency changer	Va = 250 V R1 = 0.024 MOhm* R2 = 0.033 MOhm* Rk = 215 Ohms RgT + g3 = 0.05 MOhm IgT + g3 = 200 µA RaT = 45 kOhm IaT = 3.3 mA	Vg1 = -2 V Vg2 + g4 = 100 V Ia = 3 mA Ig2 + g4 = 3 mA Sc = 650 µA/V Ri = 1.3 MOhms Sc(Vg1= -23.5V)=6.5 µA/V Ri(Vg1= -23.5V)>3 MOhms Cag2 < 0.003 pF
ECH 4 Triode heptode		Vf = 6.3 V If = 0.35 A Indirect	Frequency changer	For further data please refer to type E C H 21	

*R, between + Vb and screen grids; R2 between screen grids and chassis

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
ECH 21 Triode heptode	 	Vf = 6.3 V If = 0.33 A Indirect	Frequency changer	Va = 250 V Rg2 + g4 = 0.024 MOhm Rk = 150 Ohms Rg3 + gT = 0.05 MOhm Ig3 + gT = 190 µA RaT = 0.02 MOhm IaT = 4.5 mA Vg1 = -2 V	Vg2 + g4 = 100 V Ia = 3 mA Ig2 + g4 = 6.2 mA Sc = 750 µA/V Ri = 1.4 MOhm Sc (Vg1 = -24.5V) = 7.5 µA/V Ri (Vg1 = -24.5V) > 3 MOhms Req = 0.055 MOhm
			I.F. amplifier	Heptode section Va = 250 V Vg3 = 0 V Rg2 + g4 = 0.045 MOhm Vg1 = -2 V Vg2 + g4 = 90 V Ia = 5.3 mA Cag1 < 0.002 pF	Ig2 + g4 = 3.5 mA S = 2.2 mA/V Ri = 0.9 MOhm S (Vg1 = -36V) = 22 µA/V Ri (Vg1 = -36V) > 10 MOhms Req = 7500 Ohms
			A.F. amplifier	Triode section Vb = 250 V Ra = 0.1 MOhm Vg = -4 V	Ia = 1.7 mA $\frac{Vo}{Vi}$ = 13

ECH 35

Triode hexode

Vf = 6.3 V
If = 0.2 A
Indirect

Frequency changer

For further data please refer to type E C H 3

ECH 41

Triode hexode

Vf = 6.3 V
If = 0.225 A
Indirect

Frequency changer

Va	= 250	V	Vg2 + g4 = 105	V
R1	= 0.033	MOhm*	Ia = 3	mA
R2	= 0.047	MOhm*	Ig2 + g4 = 2.2	mA
Rk	= 200	Ohms	Sc = 500	µA/V
RgT + g3	= 0.02	MOhm	Ri = 2	MOhms
IgT + g3	= 350	µA	Sc(Vg1= -28V) = 5	µA/V
RaT	= 0.03	MOhm	Ri(Vg1= -28V) => 5	MOhms
IaT	= 4.9	mA	Req = 0.17	MOhm
Vg1	= -2	V		

Cag1 < 0.1 pF

ECH 42

Triode hexode

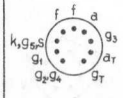
Vf = 6.3 V
If = 0.23 A
Indirect

Frequency changer

Va	= 250	V	Vg2 + g4 = 85	V
R1	= 0.027	MOhm*	Ia = 3	mA
R2	= 0.027	MOhm*	Ig2 + g4 = 3	mA
Rk	= 180	Ohms	Sc = 750	µA/V
RgT + g3	= 0.022	MOhm	Ri = > 1	MOhm
IgT + g3	= 350	µA	Sc(Vg1= -29V) = 7.5	µA/V
RaT	= 0.033	MOhm	Ri(Vg1= -29V) > 5	MOhms
IaT	= 5.1	mA	Req = 0.075	MOhm
Vg1	= -2	V		

Cag1 < 0.1 pF

*R1 between + Vb and screen grids; R2 between screen grids and chassis

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
ECH 81 Triode heptode		Vf = 6.3 V If = 0.3 A Indirect	Frequency changer	Va = 250 V Rg2 + g4 = 0.022 MOhm RgT + g3 = 0.047 MOhm IgT + g3 = 200 µA RaT = 0.033 MOhm IaT = 4.5 mA Vg1 = -2 V Vg2 + g4 = 103 V Ia = 3.25 mA Ig2 + g4 = 6.7 mA Sc = 775 µA/V Ri = 1 MOhm Sc(Vg1 = -28.5V) = 7.75 µA/V Ri(Vg1 = -28.5V) > 3 MOhms Req = 0.07 MOhm
			R.F. or I.F. amplifier	Heptode section Va = 250 V Vg3 = 0 V Rg2 + g4 = 0.039 MOhm Vg1 = -2 V Vg2 + g4 = 100 V Ia = 6.5 mA Ig2 + g4 = 3.8 mA S = 2.4 mA/V Ri = 0.7 MOhm S (Vg1 = -42V) = 24 µA/V Ri(Vg1 = -42V) > 10 Ohms Req = 8500 Ohms Cag1 < 0.01 pF
			Typical characteristics	Triode section Va = 100 V Vg = 0 V Ia = 13.5 mA S = 3.7 mA/V µ = 22 Ri = 5950 Ohms Cag = 1 pF

ECL 11

Triode output Tetrode

Vf = 6.3 V
If = 1 A
Indirect

Typical characteristics						
Triode section						
Va	= 250	V	S	= 2	mA/V
Vg	= -2.5	V	μ	= 70	
Ia	= 2	mA	Ri	= 0.035	MOhm
Output amplifier						
Va = Vg2 =	250	V	Ri	= 0.025	MOhm
Vg1 =	-6	V	Ra	= 7000	Ohms
Ia =	36	mA	Wo(d = 10%)	= 3.8	W
Ig2 =	4	mA	Vi	= 4.2	Veff
S =	9	mA/V			

ECL 80

Triode pentode

Vf = 6.3 V
If = 0.3 A
Indirect

Output amplifier class A

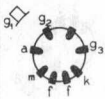
Pentode section						
Va =	250	V	S	= 2.6	mA/V
Vg3 =	0	V	Ri	= 0.2	MOhm
Rg2 =	4700	Ohms	Ra	= 0.0175	MOhm
Vg1 =	-12.2	V	Wo(d = 10%)	= 1.55	W
Ia =	14	mA	Vi	= 5.3	Veff
Ig2 =	2.6	mA			
Va = Vg2 =	200	V	S	= 3.3	mA/V
Vg3 =	0	V	Ri	= 0.15	MOhm
Vg1 =	-8	V	Ra	= 0.011	MOhm
Ia =	17.5	mA	Wo(d = 10%)	= 1.4	W
Ig2 =	3.3	mA	Vi	= 4.1	Veff
Va = Vg2 =	170	V	S	= 3.2	mA/V
Vg3 =	0	V	Ri	= 0.15	MOhm
Vg1 =	-6.7	V	Ra	= 0.011	MOhm
Ia =	15	mA	Wo(d = 10%)	= 1	W
Ig2 =	2.8	mA	Vi	= 3.7	Veff

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
ECL 80 (continued)				Triode section
			Typical characteristics	Va = 100 V; Vg = 0 V; Ia = 8 mA; S = 1.9 mA/V; μ = 20; Ri = 0.0105 MOhm
			A.F. amplifier	Vb = 250 V; Vg = -5.5 V; Ia = 0.75 mA; Ra = 0.22 MOhm; Vo/Vi = 11
				Vb = 200 V; Vg = -4.2 V; Ia = 0.6 mA; Ra = 0.22 MOhm; Vo/Vi = 11
				Vb = 170 V; Vg = -3.5 V; Ia = 0.5 mA; Ra = 0.22 MOhm; Vo/Vi = 11
EEP 1 Secondary emission tetrode		Vf = 6.3 V; If = 0.6 A; Indirect	Typical characteristics	Va = 250 V; Vk2 = 150 V; Vg2 = 150 V; Vg1 = -2.5 V; Ia = 8 mA; Ik2 = -6.5 mA; Ig2 = 0.45 mA; S = 17 mA/V; μg2g1 = 65; Ri = 0.05 MOhm; Cag1 < 0.006 pF

EF 5

Variable mu pentode



Vf = 6.3 V
If = 0.2 A
Indirect

R.F. or I.F. amplifier

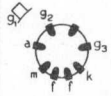
Va	=	250	V	Ig2	=	2.45	mA
Vg3	=	0	V	S	=	1.8	mA/V
Vg2	=	85	V	Ri	=	1.2	MOhms
Rk	=	200	Ohms	S (Vg1= -29V)	=	18	μA/V
Vg1	=	-2	V	Ri(Vg1= -29V)	>	10	MOhms
Ia	=	7.5	mA				

Va	=	250	V	Ig2	=	2.6	mA
Vg3	=	0	V	S	=	1.7	mA/V
Vg2	=	100	V	Ri	=	1.2	MOhms
Rk	=	180	Ohms	S (Vg1= -34V)	=	17	μA/V
Vg1	=	-3	V	Ri(Vg1= -34V)	>	10	MOhms
Ia	=	8	mA				

Cag1 < 0.003 pF

EF 6

Pentode



Vf = 6.3 V
If = 0.2 A
Indirect

R.F. amplifier

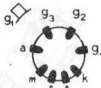
Va	=	250	V	Ia	=	3	mA
Vg2	=	100	V	Ig2	=	0.8	mA
Vg3	=	0	V	S	=	1.8	mA/V
Vg1	=	-2	V	Ri	=	2.5	MOhms

Va	=	200	V	Ia	=	3	mA
Vg2	=	100	V	Ig2	=	0.8	mA
Vg3	=	0	V	S	=	1.8	mA/V
Vg1	=	-2	V	Ri	=	2	MOhms

Va	=	100	V	Ia	=	3	mA
Vg2	=	100	V	Ig2	=	0.8	mA
Vg3	=	0	V	S	=	1.8	mA/V
Vg1	=	-2	V	Ri	=	1	MOhm

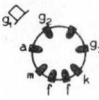
(continued)

Cag1 < 0.003 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EF 6 (continued)			A.F. amplifier	Vb = 250 V Ra = 0.2 MOhm Rg2 = 0.4 MOhm Rk = 3000 Ohms	Ia = 0.9 mA Ig2 = 0.35 mA $\frac{Vo}{Vi}$ = 140
				Vb = 200 V Ra = 0.2 MOhm Rg2 = 0.4 MOhm Rk = 5000 Ohms	Ia = 0.6 mA Ig2 = 0.23 mA $\frac{Vo}{Vi}$ = 115
				Vb = 100 V Ra = 0.2 MOhm Rg2 = 0.4 MOhm Rk = 5000 Ohms	Ia = 0.3 mA Ig2 = 0.12 mA $\frac{Vo}{Vi}$ = 100
EF 8 Variable mu hexode		Vf = 6.3 V If = 0.2 A Indirect	R.F. amplifier	Va = Vg3 = 250 V Vg2 = Vg4 = 0 V Rk = 305 Ohms Vg1 = -2.5 mA Ia = 8 mA Ig3 = 0.2 mA	S = 1.8 mA/V Ri = 0.45 MOhm S (Vg1= -34V)= 18 µA/V Ri(Vg1= -34V) > 10 MOhms Req = 3200 Ohms
				Va = Vg3 = 250 V Vg4 = 0 V Rk = 265 Ohms Vg1 = Vg2=-2.2 V Ia = 8 mA Ig3 = 0.2 mA	S = 1.8 mA/V Ri = 0.45 MOhm S (Vg1= -22V)= 18 µA/V Ri(Vg1= -22V) > 10 MOhms Req = 3200 Ohms
				Cag1 < 0.007 pF	

EF 9

Variable mu pentode



Vf = 6.3 V
If = 0.2 A
Indirect

R.F. or I.F. amplifier

Va	=	250	V	Ia	=	6	mA
Vg3	=	0	V	Ig2	=	1.7	mA
Rg2	=	0.09	MOhm	S	=	2.2	mA/V
Rk	=	325	Ohms	Ri	=	1.2	MOhms
Vg1	=	-2.5	V	S (Vg1= -49V)	=	4.5	µA/V
Vg2	=	100	V	Ri(Vg1= -49V)	>	10	MOhms

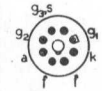
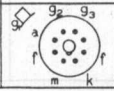
Va	=	200	V	Ia	=	5	mA
Vg3	=	0	V	Ig2	=	1.7	mA
Rg2	=	0.06	MOhm	S	=	2.2	mA/V
Rk	=	325	Ohms	Ri	=	0.9	MOhm
Vg1	=	-2.5	V	S (Vg1= -39V)	=	5.5	µA/V
Vg2	=	100	V	Ri(Vg1= -39V)	>	10	MOhms

Va	=	100	V	Ig2	=	1.7	mA
Vg2	=	100	V	S	=	2.2	mA/V
Vg3	=	0	V	Ri	=	0.4	MOhm
Rk	=	325	Ohms	S (Vg1= -19V)	=	7	µA/V
Vg1	=	-2.5	V	Ri(Vg1= -19V)	>	10	MOhms
Ia	=	6	mA				

Cag1 < 0.002 pF

A.F. amplifier

Vb	=	250	V	Ia	=	0.87	mA
Ra	=	0.2	MOhm	Ig2	=	0.26	mA
Rg2	=	0.8	MOhm	Vo/Vi	=	106	
Rk	=	1750	Ohms				

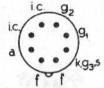
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EF 22 Variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	R.F. or I.F. amplifier	Va = 250 V; Vg3 = 0 V; Vg2 = 100 V; Rk = 325 Ohms; Vg1 = -2.5 V; Ia = 6 mA Ig2 = 1.7 mA; S = 2.2 mA/V; Ri = 1.2 MOhms; S (Vg1= -19V)= 22 µA/V; Ri(Vg1= -19V) > 10 MOhms; Req = 6200 Ohms
				Va = 250 V; Vg3 = 0 V; Rg2 = 0.09 MOhm; Rk = 325 Ohms; Vg1 = -2.5 V; Ia = 6 mA Ig2 = 1.7 mA; S = 2.2 mA/V; Ri = 1.2 MOhms; S (Vg1= -46V)= 22 µA/V; Ri(Vg1= -46V) > 10 MOhms; Req = 6200 Ohms Cag1 < 0.002 pF
			A.F. amplifier	Vb = 250 V; Ra = 0.2 MOhm; Rg2 = 0.8 MOhm; Rk = 1750 Ohms Ia = 0.87 mA; Ig2 = 0.26 mA; Vo/Vi = 106
				Vb = 250 V; Ra = 0.1 MOhm; Rg2 = 0.4 MOhm; Rk = 1000 Ohms Ia = 1.6 mA; Ig2 = 0.45 mA; Vo/Vi = 85
EF 36 Pentode		Vf = 6.3 V If = 0.2 A Indirect	R.F. and A.F. amplifier	For further data please refer to type E F 6

EF 37 A Non-microphonic pre-amplifier pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Va = 250 V Vg2 = 100 V Vg3 = 0 V Vg1 = -2 V Cag1 < 0.002 pF	Ia = 3 mA Ig2 = 0.8 mA S = 1.8 mA/V Ri = 2.5 MOhm
			A.F. amplifier	Vb = 300 V Ra = 0.22 MOhm Rg2 = 0.68 MOhm Rk = 2200 Ohms	Ia + g2 = 1.3 mA Vo/Vi = 170
				Vb = 250 V Ra = 0.22 MOhm Rg2 = 0.68 MOhm Rk = 2200 Ohms	Ia + g2 = 1.1 mA Vo/Vi = 163
				Vb = 200 V Ra = 0.22 MOhm Rg2 = 0.68 MOhm Rk = 2200 Ohms	Ia + g2 = 0.9 mA Vo/Vi = 152
EF 39 Variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	R.F., I.F. and A.F. amplifier	For further data please refer to type E F 9	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EF 40 Pre-amplifier pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Va = 250 V Vg3 = 0 V Vg2 = 140 V Vg1 = -2 V	Ia = 3 mA Ig2 = 0.55 mA S = 1.85 mA/V Ri = 2.5 MOhms
			A.F. amplifier	Vb = 250 V Ra = 0.22 MOhm Rg2 = 1.2 MOhm Rk = 0 Ohms Ik = 0.26 mA	Rg1' = 0.68 MOhm Rg1 = 10 MOhms Vo/Vi = 200
				Vb = 250 V Ra = 0.22 MOhm Rg2 = 1.0 MOhm Rk = 2200 Ohms Ik = 0.95 mA	Rg1 = 1 MOhm Rg1' = 0.68 MOhm Vo/Vi = 180
				Vb = 100 V Ra = 0.22 MOhm Rg2 = 1.2 MOhm Rk = 0 Ohms Ik = 0.36 mA	Rg1' = 0.68 MOhm Rg1 = 10 MOhm Vo/Vi = 130

EF 41

Variable mu pentode



Vf = 6.3 V
If = 0.2 A
Indirect

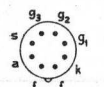
R.F. or I.F. amplifier

Va =	250	V	S =	2.2	mA/V
Rg2 =	0.09	MOhm	Ri =	1.1	MOhm
Rk =	325	Ohms	S (Vg1= -39V) =	22	µA/V
Vg1 =	-2.5	V	Ri(Vg1= -39V) >	10	MOhms
Ia =	6	mA	Req =	6500	Ohms
Ig2 =	1.7	mA			

Cag1 < 0.002 pF

EF 42

Pentode



Vf = 6.3 V
If = 0.33 A
Indirect

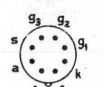
Wide-band amplifier

Va =	250	V	Ig2 =	2.4	mA
Vg3 =	0	V	S =	9	mA/V
Vg2 =	250	V	Ri =	0.5	MOhm
Vg1 =	-2	V	F =	100	Mc/s
Ia =	10	mA	Req =	840	Ohms

Cag1 < 0.006 pF

EF 43

Variable mu pentode



Vf = 6.3 V
If = 0.33 A
Indirect

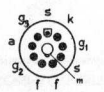
Wide-band amplifier

Va =	250	V	Ig2 =	3.5	mA
Vg3 =	0	V	S =	6.4	mA/V
Rg2 =	0.033	MOhm	Ri =	0.5	MOhm
Rk =	105	Ohms	S (Vg1= -28V) =	64	µA/V
Vg1 =	-2	V	Req =	1700	Ohms
Ia =	15	mA			

Cag1 < 0.006 pF

EF 50

Pentode

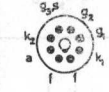


Vf = 6.3 V
If = 0.3 A
Indirect

Wide-band amplifier

Va = Vg2 =	250	V	Ig2 =	3	mA
Vg3 =	0	V	S =	6.5	mA/V
Vg1 =	-2	V	Ri =	1	MOhm
Ia =	10	mA	Req =	1400	Ohms

Cag1 < 0.007 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EF 51 Variable mu pentode for U.H.F.		Vf = 6.3 V If = 0.35 A Indirect	Wide-band amplifier	Va = Vg2 = 250 V Vg3 = 0 V Vg1 = -2 V Ia = 14 mA Ig2 = 2.6 mA	S = 9.5 mA/V Ri = 0.5 MOhm S (Vg1 = -8V) = 0.1 mA/V Ri (Vg1 = -8V) > 5 MOhms Req = 1000 Ohms
				Cag1 < 0.007 pF	
EF 54 Pentode		Vf = 6.3 V If = 0.3 A Indirect	Wide-band amplifier	Va = Vg2 = 250 V Vg1 = -1.7 V Ia = 10 mA Ig2 = 1.45 mA	S = 7.7 mA/V Ri = 0.5 MOhm F = max 250 Mc/s Req = 700 Ohms
				Cag1 < 0.02 pF	
EF 55 Television pentode		Vf = 6.3 V If = 1 A Indirect	Video amplifier	Va = Vg2 = 250 V Vg1 = -4.5 V Vg3 = 0 V Ia = 40 mA	Ig2 = 5.5 mA Rk = 100 Ohms S = 12 mA/V Ri = 0.055 MOhm
				Va = 250 V Vg2 = 150 V Vg3 = 0 V Vg1 = -4 V Ia = 10 mA	Ig2 = 1 mA Rk = 360 Ohms S = 7 mA/V Ri = 0.1 MOhm
				Cag1 < 0.15 pF	

EF 80

Television pentode

Vf = 6.3 V
If = 0.3 A
Indirect

Wide band amplifier

Va	=	250	V	Ig2	=	2.8	mA
Vg3	=	0	V	S	=	6.8	mA/V
Vg2	=	250	V	Ri	=	0.65	MOhm
Vg1	=	-3.5	V	Req	=	1200	Ohms
Ia	=	10	mA	rg1	=	0.015	MOhm*
Va	=	200	V	Ig2	=	2.6	mA
Vg3	=	0	V	S	=	7.1	mA/V
Vg2	=	200	V	Ri	=	0.55	MOhm
Vg1	=	-2.55	V	Req	=	1100	Ohms
Ia	=	10	mA	rg1	=	0.012	MOhm*
Va	=	170	V	Ig2	=	2.5	mA
Vg3	=	0	V	S	=	7.4	mA/V
Vg2	=	170	V	Ri	=	0.5	MOhm
Vg1	=	-2	V	Req	=	1000	Ohms
Ia	=	10	mA	rg1	=	0.01	MOhm*

*Input resistance at 50 Mc/s

Cag1 < 0.007 pF

EF 85

Variable mu pentode

Vf = 6.3 V
If = 0.3 A
Indirect

Wide band amplifier

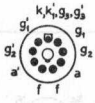
Va	=	250	V	S	=	6	mA/V
Vg3	=	0	V	Ri	=	0.6	MOhm
Rg2	=	0.06	MOhm	S (Vg1= -35V) =		60	µA/V
Rk	=	160	Ohms	Ri(Vg1= -35V) >		5	MOhms
Vg1	=	-2	V	Req	=	1400	Ohms
Ia	=	10	mA	rg1	=	9000	Ohms*
Ig2	=	2.5	mA				

*Input resistance at 50 Mc/s

Cag1 < 0.007 pF

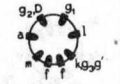
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EF 86 Pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Va = 250 V, Vg2 = 140 V, Vg3 = 0 V, Vg1 = -2 V Ia = 3 mA, Ig2 = 0.55 mA, S = 1.85 mA/V, Ri = 2.5 MOhms Cag1 = < 0.04 pF
			A.F. amplifier	Vb = 250 V, Ra = 0.22 MOhm, Rg2 = 1 MOhm, Rk = 2200 Ohms Rg1 = 1 MOhm, Ik = 0.95 mA, Vo/Vi = 180
				Vb = 250 V, Ra = 0.1 MOhm, Rg2 = 0.39 MOhm, Rk = 1000 Ohms Rg1 = 1 MOhm, Ik = 2.05 mA, Vo/Vi = 112
EF 89 Variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Va = 250 V, Vg2 = 100 V, Vg3 = 0 V, Vg1 = -2 V Ia = 9 mA, Ig2 = 3 mA, S = 3.6 mA/V, Ri = 1 MOhm Cag1 - < 0.002 pF
			R.F. or I.F. amplifier	Va = Vb = 250 V, Vg3 = 0 V, Rg2 = 0.05 MOhm, Rk = 165 Ohms, Vg1 = -2 V Ia = 9 mA, Ig2 = 3 mA, S = 3.6 mA/V, Ri = 1 MOhm, S(Vg1 = -40V) = 36 µA/V

EF 91 pentode		Vf = 6.3 V If = 0.3 A Indirect	R.F. amplifier	Va = 250 V Vg3 = 0 V Vg2 = 250 V Vg1 = -2 V Ia = 10 mA Ig2 = 2.55 mA S = 7.65 mA/V Ri = 1 MOhm Req = 1200 Ohms rg1 = 7500 Ohms* *Input resistance at 50 Mc/s Cag1 < 0.01 pF	
EF 92 Variable mu pentode		Vf = 6.3 V If = 0.2 A Indirect	Typical characteristics	Va = 250 V Vg2 = 200 V Vg3 = 0 V Vg1 = -2.5 V Ia = 8 mA Ig2 = 2.1 mA S = 2.5 mA/V Ri = 0.5 MOhm S (Vg1= -28V)= 5 µA/V	
				Va = 250 V Vg2 = 150 V Vg3 = 0 V Vg1 = -0.65 V Ia = 8 mA Ig2 = 2 mA S = 2.5 mA/V Ri = 0.5 MOhm Cag1 < 0.007 pF	
EF 93 Variable mu pentode				Please refer to type 6 B A 6	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
EF 94 Variable mu pentode				Please refer to type 6 A U 6
EF 95 Pentode				Please refer to type 6 A K 5
EFF 51 Double pentode for U.F.H.		Vf = 6.3 V If = 0.75 A Indirect	Typical characteristics (per system)	Va = 300 V, Rg2 = 0.042 MOhm, Vg1 = -2 V, Ia = 10 mA; Ig2 = 1.8 mA, S = 9 mA/V, Ri = 0.25 MOhm, Req = 750 Ohms Va = 250 V, Rg2 = 0.042 MOhm, Vg1 = -2 V, Ia = 6 mA; Ig2 = 1.2 mA, S = 7.5 mA/V, Ri = 0.35 MOhm, Req = 800 Ohms Cag = Ca'g' = 0.04 pF

EFM 1

Variable mu pentode and tuning indicator



Vf = 6.3 V
If = 0.2 A
Indirect

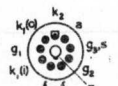
A.F. amplifier and tuning indicator

Vb = V1 = 250 V
Ra = 0.13 MOhm
Rg2 = 0.35 MOhm
Rk = 980 Ohms

Vg1 =	-2	-20 V
Ia =	0.8	0.5 mA
Ig2 =	0.6	0.2 mA
I1 =	0.65	0.8 mA
Vo/Vi =	60	13
∝ =	70°	5°

EFP 60

Secondary emission pentode



Vf = 6.3 V
If = 0.37 A
Indirect

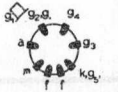
Typical characteristics

Va =	250	V	Ia =	20	mA
Vk3 =	150	V	Ik3 =	-15.6	mA
Vg3 =	0	V	Ig2 =	1.5	mA
Vg2 =	250	V	S =	25	mA/V
Vg1 =	-2	V	Ri =	0.07	MOhm

Cag < 0.004 pF

EH 2

Variable mu pentode

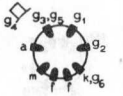


Vf = 6.3 V
If = 0.2 A
Indirect

R.K. or I.F. amplifier

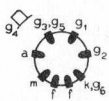
(continued)

Va =	250	V	Ig2 + g4 =	2.5	mA
Vg2 = Vg4 =	80	V	S =	1.4	mA/V
Rk =	310	Ohms	Ri =	1	MOhm
Vg1 = Vg3 =	-2	V	S (Vg1= -20V) < 2		µA/V
Ia =	4	mA	Ri(Vg1= -20V)>10		MOhms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EH 2 (continued)			Modulator with separated oscillator	Va = 250 V Vg2 = Vg4 = 80 V Rg3 = 0.5 MOhm Vosc = 10 Veff Rk = 380 Ohms Vg1 = -2 V	Ia = 1.8 mA Ig2 + g4 = 3.5 mA Sc = 400 µA/V Ri = 2 MOhms Sc(Vg1=-20V) <10 µA/V Ri(Vg1=-20V) >10 MOhms
				Cag1 < 0.0015 pF	
EK 2 Octode		Vf = 6.3 V If = 0.2 A Indirect	Frequency changer (all waves)	Va = 200 = 250 V Vg3 + g5 = 50 V Vg2 = 200 V Rg1 = 0.05 MOhm Ig1 = 300 µA Vg4 = -2 V	Ia = 1 mA Ig3 + g5 = 1.1 mA Ig2 = 2.5 mA Sc = 550 µA/V Ri = 2 MOhms Sc(Vg4= -25V)< 2 µA/V Ri(Vg4= -25V)>10 MOhms
				Va = 100 V Vg3 + g5 = 50 V Vg2 = 100 V Rg1 = 0.5 MOhm Ig1 = 200 µA Vg4 = -2 V	Ia = 1 mA Ig3 + g5 = 1 mA Ig2 = 1.5 mA Sc = 550 µA/V Ri = 1.2 MOhm Sc(Vg4= -25V)< 2 µA/V Ri(Vg4= -25V)>10 MOhms
				Cag4 < 0.07 pF	

EK 3

Octode



Vf = 6.3 V
If = 0.6 A
Indirect

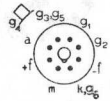
Frequency changer

Va	=	250	V	Ia	= 2.5 mA
Vg3 + g5	=	100	V	Ig3 + g5	= 5.5 mA
Vg2	=	100	V	Ig2	= 5 mA
Rg1	=	0.05	MOhm	Sc	= 650 µA/V
Vosc	=	12	Veff	Ri	= 2 MOhms
Ig1	=	300	µA	Sc(Vg4= -38V)	= 6.5 µA/V
Rk	=	190	Ohms	Ri(Vg4= -38V)	> 10 MOhms
Vg4	=	-2.5	V		

Cag4 < 0.07 pF

EK 32

Octode



Vf = 6.3 V
If = 0.2 A
Indirect

Frequency changer

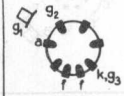
Va	=	250	V	Ia	= 1 mA
Vg2	=	200	V	Ig3 + g5	= 0.8 mA
Vg3 + g5	=	50	V	Ig2	= 2.5 mA
Rg1	=	0.05	MOhm	Sc	= 550 µA/V
Ig1	=	300	µA	Ri	= 2 MOhms
Vg1	=	15	Veff	Sc(Vg4= -25V)	< 2 µA/V
Vg4	=	-2	V	Ri(Vg4= -25V)	>10 MOhms

Cag4 < 0.1 pF

EK 90

Heptode

Please refer to type 6 BE 6

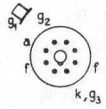
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 2 Output pentode		Vf = 6.3 V If = 0.2 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Rk = 485 Ohms Vg1 = -18 V Ia = 32 mA Ig2 = 5 mA	S = 2.8 mA/V Ri = 0.07 MOhm Ra = 8000 Ohms Wo(d = 10%) = 3.6 W Vi = 10 Veff
				Va = Vg2 = 200 V Rk = 480 Ohms Vg1 = -14 V Ia = 25 mA Ig2 = 4 mA	S = 3 mA/V Ri = 0.07 MOhm Ra = 8000 Ohms Wo(d = 10%) = 2.3 W Vi = 8.5 Veff
			Push-pull output amplifier class A B	Va = Vg2 = 250 V Rk = 305 Ohms Iao = 2 x 27.5 mA Ia max = 2 x 32.5 mA Ig2o = 2 x 4.5 mA	Ig2 max = 2 x 8 mA Ra = 8000 Ohms Wo(dt = 1.4%) = 8 W Vi = 17 Veff
				Va = Vg2 = 200 V Rk = 320 Ohms Iao = 2 x 21 mA Ia max = 2 x 24.5 mA Ig2o = 2 x 3.5 mA	Ig2 max = 2 x 6 mA Ra = 9000 Ohms Wo(d = 1.5%) = 5 W Vi = 14 Veff

EL 3 N Output pentode		Vf = 6.3 V If = 0.9 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Vg1 = -6 V Rk = 150 Ohms Ia = 36 mA Ig2 = 4 mA	S = 9 mA/V Ri = 0.05 MOhm Ra = 7000 Ohms Wo(d = 10%) = 4.5 W Vi = 4.2 Veff
			Push-pull output amplifier class A B	Va = Vg2 = 250 V Rk = 140 Ohms Iao = 2 x 24 mA Ia max = 2 x 28.5 Veff Ig2o = 2 x 2.8 mA	Ig2 max = 2 x 4.6 mA Raa = 0.01 MOhm Wo(d = 3.1%) = 8.2 W Vi = 6.7 Veff
EL 5 Output pentode		Vf = 6.3 V If = 1.3 A Indirect	Output amplifier class A	Va = 250 V Vg2 = 275 V Vg1 = -14 V Rk = 175 Ohms Ia = 72 mA Ig2 = 7 mA	S = 8.5 mA/V Ri = 0.022 MOhm Ra = 3500 Ohms Wo(dt = 10%) = 8.8 W Vi = 9.1 V
			Push-pull output amplifier class A B	Va = 250 V Vg2 = 275 V Rk = 120 Ohms Iao = 2 x 58 mA Ia max = 2 x 65 mA	Ig2o = 2 x 6.25 mA Ig2 max = 2 x 10.5 mA Ra = 4500 Ohms Wo(d = 5.1%) = 19.5 W Vi = 12.5 Veff
EL 6 Output pentode		Vf = 6.3 V If = 1.2 A Indirect	Output amplifier class A (continued)	Va = Vg2 = 250 V Vg1 = -7 V Rk = 90 Ohms Ia = 72 mA Ig2 = 8 mA	S = 14.5 mA/V Ri = 0.02 MOhm Ra = 3500 Ohms Wo(d = 10%) = 8 W Vi = 4.8 Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 6 (continued)			Push-pull amplifier class A B	Va = Vg2 = 250 V Rk = 90 Ohms Iao = 2 x 45 mA Ia max = 2 x 53 mA Ig2o = 2 x 5.1 mA	Ig2 max = 2 x 8.5 mA Raa = 5000 Ohms Wo(d = 2.2%) = 14.5 W Vi = 7.3 Veff
EL 11 Output amplifier		Vf = 6.3 V If = 0.9 A Indirect	Output amplifier	For further data please refer to type E L 3 (N)	
EL 12 Output amplifier		Vf = 6.3 V If = 1.2 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Vg1 = -7 V Rk = 90 Ohms Ia = 72 mA Ig2 = 8 mA	S = 15 mA/V Ri = 0.025 MOhm Ra = 3500 Ohms Wo(d = 10%) = 8 W Vi = 4.5 Veff
			Push-pull output amplifier class A B	Va = Vg2 = 250 V Rk = 90 Ohms Iao = 2 x 45 mA Ia max = 2 x 53 mA Ig2o = 2 x 5.1 mA	Ig2 max = 2 x 8.5 mA Raa = 5000 Ohms Wo = 14.5 W Vi(d = 2.2%) = 7.3 Veff

EL 32

Output amplifier



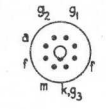
Vf = 6.3 V
If = 0.2 A
Indirect

Output amplifier

For further data please refer to type E L 2

EL 33

Output amplifier



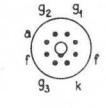
Vf = 6.3 V
If = 0.9 A
Indirect

Output amplifier

For forther data please refer to type E L 3

EL 34

Output pentode



Vf = 6.3 V
If = 1.5 A
Indirect

Output amplifier class A

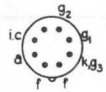
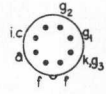
Vb	=	265	V	Ig2 =	10 mA
Va	=	250	V	S =	9 mA/V
Rg2	=	2000	Ohms	Ri =	0.018 MOhm
Vg3	=	0	V	Ra =	3000 Ohms
Vg1	=	-14.5	V	Wo(d = 10%) =	8 W
Ia	=	70	mA	Vi =	9.3 Veff
Vb = Vg2	=	265	V	S =	11 mA/V
Va	=	250	V	Ri =	0.015 MOhm
Vg3	=	0	V	Ra =	2000 Ohms
Vg1	=	-13.5	V	Wo(d = 10%) =	11 W
Ia	=	100	mA	Vi =	8.7 Veff
Ig2	=	14.9	mA		

(continued)

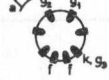
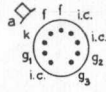
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 34			Push-pull output amplifier class A B	Vb = 375 V Rk = 130 Ohms Rg2 = 470 Ohms* Iao = 2 x 75 mA Ia max = 2 x 95 mA	Ig2o = 2 x 11.5 mA Ig2 max = 2 x 22.5 mA Raa = 3400 Ohms Wo(d = 5 %) = 35 W Vi = 21 Veff
			Push-pull output amplifier class B	Vb = 425 V Vg1 = -38 V Rg2 = 1000 Ohms* Iao = 2 x 30 mA Ia max = 120 mA	Ig2o = 2 x 4.4 mA Ig2 max = 2 x 25 mA Raa = 3400 Ohms Wo(d = 5 %) = 55 W Vi = 27 Veff
continued				Vba = 800 V Vbg2 = 400 V Vg1 = -39 V Rg2 = 750 Ohm* Iao = 2 x 25 mA Ia max = 2 x 91 mA	Ig2o = 2 x 3 mA Ig2 max = 2 x 19 mA Raa = 0.011 MOhm Wo(d = 5 %) = 100 W Vi = 23.4 Veff
EL 35 Output pentode		Vf = 6.3 V If = 1.35 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Rk = 180 Ohms Vg1 = -15.5 V Ia = 72 mA Ig2 = 8 mA	S = 5 mA/V Ri = 0.0155 MOhm Ra = 2500 Ohms Wo(d = 10%) = 6 W Vi = 13 Veff

EL 35			Push-pull output amplifier class A B	Va = Vg2 = 270 V Rk = 135 Ohms Iao = 2 x 67 mA Ia max = 2 x 70 mA Ig2o = 2 x 8 mA	Ig2 max = 2 x 12.5 mA Raa = 5000 Ohms Wo(d = 6 %) = 17 W Vi = 31 Veff
				Va = 360 V Vg2 = 270 V Rk = 250 Ohms Iao = 2 x 44 mA Ia max = 2 x 53 mA	Ig2o = 2 x 4.3 mA Ig2 max = 2 x 8.8 mA Raa = 7000 Ohms Wo(d < 3 %) = 21 W Vi = 46 Veff
EL 37 Output pentode		Vf = 6.3 V If = 1.4 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Vg1 = -13.5 V Rk = 120 Ohms Ia = 100 mA Ig2 = 13.5 mA	S = 11 mA/V Ri = 0.0135 MOhm Ra = 2500 Ohms Wo(d = 10%) = 10.5 W
			Push-pull output amplifier class A B	Va = Vg2 = 325 V Rk = 130 Ohms Iao = 2 x 77 mA Ia max = 2 x 90 mA Ig2o = 2 x 9.75 mA	Ig2 max = 2 x 30 mA Raa = 4000 Ohms Wo(d = 4.4%) = 35 W Vi = 21.5 Veff
				Va = Vg2 = 250 V Rk = 130 Ohms Iao = 2 x 59 mA Ia max = 2 x 68 mA Ig2o = 2 x 7.5 mA	Ig2 max = 2 x 18 mA Raa = 4000 Ohms Wo(d = 2.25%) = 20 W Vi = 14.5 Veff

*Common screen grid resister

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 38 Line time base output pentode		Vf = 6.3 V If = 1.4 A Indirect	Typical characteristics	Va = 600 V Vg2 = 400 V Vg3 = 0 V Vg1 = -22 V	Ia = 42 mA Ig2 = 5 mA S = 7 mA/V Ri = 0.043 MOhm
				Va = 250 V Vg3 = 0 V Vg2 = 250 V Vg1 = -7 V	Ia = 100 mA Ig2 = 13 mA S = 14.3 mA/V Ri = 0.021 MOhm
EL 41 Output pentode		Vf = 6.3 V If = 0.71 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Rk = 170 Ohms Ia = 36 mA Ig2 = 5.2 mA S = 10 mA/V	Ri = 0.04 MOhm Ra = 7000 Ohms Wo(dt = 10%) = 3.9 W Vi = 3.8 Veff
			Push-pull amplifier class A B	Va = Vg2 = 250 V Rk = 85 Ohms Raa = 7000 Ohms Iao = 2 x 36 mA Ia max = 2 x 39.5 mA	Ig2o = 2 x 5.2 mA Ig2 max = 2 x 8 mA Wo(d = 4.6%) = 9.4 W Vi = 5.6 Veff
EL 42 Output pentode		Vf = 6.3 V If = 0.2 A Indirect	Output amplifier class A	Va = Vg2 = 225 V Rk = 360 Ohms Ia = 26 mA Ig2 = 4.1 mA S = 3.2 mA/V	Ri = 0.09 MOhm Ra = 9000 Ohms Wo(d = 12%) = 2.8 W Vi = 8 Veff

EL 42			Output amplifier class A	Va = Vg2 = 200 V Rk = 360 Ohms Ia = 22.5 mA Ig2 = 3.5 mA S = 3.2 mA/V	Ri = 0.09 MOhm Ra = 9000 Ohms Wo(d = 11%) = 2.1 W Vi = 6.8 Veff
			Push-pull amplifier class A B	Va = Vg2 = 250 V Rk = 310 Ohms Raa = 0.015 MOhm Iao = 2 x 20 mA Ia max = 2 x 21.5 mA	Ig2o = 2 x 3.2 mA Ig2 max = 2 x 6.7 mA Wo(dt = 5.5%) = 7 W Vi = 12.5 Veff
				Va = Vg2 = 200 V Rk = 310 Ohms Raa = 0.015 MOhm Iao = 2 x 16 mA Ia max = 2 x 17 mA	Ig2o = 2 x 2.6 mA Ig2 max = 2 x 5.6 mA Wo(dt = 5.5%) = 4.1 W Vi = 9.6 Veff
EL 50 Output pentode		Vf = 6.3 V If = 1.35 A Indirect	Push-pull output amplifier class A B	Va = 400 V Vg2 = 425 V Vg3 = 0 V Rk = 315 Ohms Iao = 2 x 45 mA Ia max = 2 x 52.5 mA	Ig2o = 2 x 5.5 mA Ig2 max = 2 x 19 mA Raa = 9000 Ohms Wo(d = 10%) = 30 W Vi = 25 V
			Push-pull output amplifier class B (continued)	Va = 800 V Vg2 = 400 V Vg3 = 0 V Vg1 = -40 V Iao = 2 x 15 mA Ia max = 2 x 70 mA	Ig2o = 2 x 1 mA Ig2 max= 2 x 24 mA Raa = 18000 Ohms Wo(d = 6.6%) = 80 W Vi = 28 V

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 50 (continued)			Push-pull output amplifier class B	Va = 400 V Vg2 = 425 V Vg3 = 0 V Vg1 = -35 V Iao = 2 x 25 mA Ia max = 2 x 95 mA	Ig2o = 2 x 2.5 mA Ig2 max = 2 x 22 mA Raa = 5000 Ohms Wo(d = 3.4%) = 50 W Vi = 25 Veff
EL 51 Output pentode		Vf = 6.3 V If = 1.9 A Indirect	Push-pull output amplifier class AB	Va = Vg2 = 500 V Rk = 100 Ohms Iao = 2 x 87 mA Ia max = 2 x 110 mA Ig2o = 2 x 13 mA	Ig2 max = 2 x 23 mA Raa = 4800 Ohms Wo(d = 5 %) = 67.5 W Vi = 19 Veff
			Push-pull output amplifier class B	Va = 750 V Rg2 = lamp 550V/68 W Vg1 = -40 V Iao = 2 x 40 mA Ia max = 2 x 145 mA	Ig2o = 2 x 7.5 mA Ig2 max = 2 x 30 mA Wo(d = 5 %) = 140 W Vi = 28.5 Veff
EL 60 Output pentode		Vf = 6.3 V If = 1.5 A Indirect	Output amplifier	For further data please refer to type E L 34.	
EL 81 Line time base output pentode		Vf = 6.3 V If = 1.05 A Indirect	Typical characteristics	Va = Vg2 = 250 V Vg3 = 0 V Vg1 = -38.5 V Ia = 32 mA	Ig2 = 2.4 mA S = 4.6 mA/V Ri = 0.015 MOhm

EL 82

Frame and audio output pentode

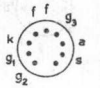
Vf = 6.3 V
If = 0.8 A
Indirect

Output amplifier class A

For further data please refer to type PL 82

EL 83

Video output pentode



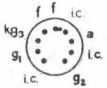
Vf = 6.3 V
If = 0.71 A
Indirect

Typical characterictics

Va = Vg2 =	250	V	Ig2 =	5	mA
Vg3 =	0	V	S =	10	mA/V
Vg1 =	-5.5	V	Ri =	0.13	MOhm
Ia =	36	mA			

EL 84

Output pentode



Vf = 6.3 V
If = 0.76 A
Indirect

Output amplifier class A

Va = Vg2 =	250	V	Ig2o =	5.5	mA
Vg1 =	-7.3	V	Ig2 max=	10.8	mA
Rk =	135	Ohms	Wo(d = 10%)=	5.7	W
Ra =	5200	Ohms	Vi =	4.3	Veff
Iao =	48	mA			
Ia max =	49.5	mA			

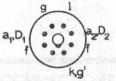
Va = Vg2 =	250	V	Ig2o =	4.1	mA
Vg1 =	-8.4	V	Ig2 max=	8.5	mA
Rk =	210	Ohms	Wo(d = 10%)=	4.2	W
Ra =	7000	Ohms	Vi =	3.5	Veff
Iao =	36	mA			
Ia max =	36.8	mA			

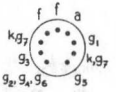
Output amplifier class B

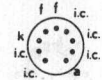
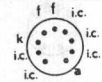
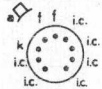
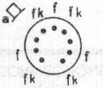
(continued)

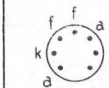
Va = Vg2 =	250	V	Ig2o =	2 x 1.1	mA
Vg1 =	-11.6	V	Ig2 max =	2 x 7.5	mA
Raa =	8000	Ohms	Wo(d = 3%) =	11	W
Iao =	2 x 10	mA	Vi =	8	Veff
Ia max =	2 x 37.5	mA			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EL 84 (continued)			Output amplifier class A.B.	Va = Vg2 = 250 V Rk = 130 Ohms Raa = 8000 Ohms Iao = 2 x 31 mA Ia max = 2 x 37.5 mA	Ig2o = 2 x 3.5 mA Ig2 max = 2 x 7.5 mA Wo(d = 3%) = 11 W Vi = 8 Veff
EL 90 Output pentode				Please refer to type 6 AQ 5	
EL 91 Output pentode		Vf = 6.3 V If = 0.2 A Indirect	Output amplifier class A	Va = Vg2 = 250 V Rk = 680 Ohms Ia = 16 mA Ig2 = 2.4 mA S = 2.6 mA/V	Ri = 0.13 MOhm Ra = 0.016 MOhm Wo(d = 10%) = 1.4 W Vi = 5.3 Veff
			Push-pull amplifier class A B	Va = Vg2 = 250 V Rk = 600 Ohms Iao = 2 x 11 mA Ia max = 2 x 12.8 mA Ig2o = 2 x 1.6 mA	Ig2 max = 2 x 4.1 mA Raa = 0.024 MOhm Wo(d = 3.2%) = 4 W Vi = 12 Veff

EM 1 Tuning indicator		Vf = 6.3 V If = 0.2 A Indirect	Tuning indicator	Vb = V1 = 250 V Ra = 2 MOhm I1(Vg = 0V)=0.13 mA	Ia(Vg = 0V)=95 µA Vg = 0 V (∝ = 16°) Vg = -5 V(∝ = 90°)
				Vb = V1 = 200 V Ra = 2 MOhms I1(Vg = 0V)=0.13 mA	Ia(Vg = 0V)= 75 µA Vg = 0 V (∝ = 16°) Vg = -4 V(∝ = 90°)
EM 4 Tuning indicator with two sensitivities		Vf = 6.3 V If = 0.2 A Indirect	Tuning indicator	Vb = V1 = 250 V Ra1 = Ra2 = 1 MOhm I1(Vg = 0 V)= 25 mA	Vg = 0 V (∝ 1= ∝2= 90°) Vg = -5V(∝ 1= 5°) Vg = -16V (∝ 2= 5°)
				Vb = V1 = 200 V Ra1 = Ra2 = 1 MOhm I1(Vg = 0V)= 1.4 mA	Vg = 0 V (∝ 1=∝2= 90°) Vg = -4.2 V (∝ 1 = 5°) Vg = -12.5(∝ 2 = 5°)
				Vb = V1 = 100 V Ra1 = Ra2 = 1 MOhm I1(Vg = 0 V)=0.4 mA	Vg = 0 V (∝ 1- 2= 90°) Vg = -2.5 V (∝ 1 = 0°) Vg = -8 V (∝ 2 = 0°)
EM 34 Tuning indicator with two sensitivities		Vf = 6.3 V If = 0.2 A Indirect	Tuning indicator	For further data please refer to type E M 4	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EM 80 Tuning indicator		Vf = 6.3 V If = 0.3 A Indirect	Tuning indicator	Vb = Vl = 250 V Ra = 0.5 MOhm Rg = 3 MOhms Il = 2.0 mA	Vg = -1V (∝ = 5°) Vg = -16V(∝ = 50°) Ia (Vg= -1V) = 0.4 mA Ia (Vg= -16V) =0.01 mA
EQ 80 Enneode		Vf = 6.3 V If = 0.2 A Indirect	F.M. detector and limiter	Vb = 250 V Vg2 + g4 + g6 = 20 V Vg3 = -4 V Vig3 = 12 Veff Vg5 = -4 V Vig5 = 12 Veff Q (Vig3 = Vig5)=90°	Ra = 0.47 MOhm Ia = 0.28 mA Ig2 + g4 + g6 = 1.5 mA Ig3 = 0.09 mA Ig5 = 0.03 mA Ri = 5 MOhms
				Cag1 < 0.4 pF Cag3 < 0.15 pF Cag5 < 0.35 pF	
EY 51 High tension rectifier		Vf = 6.3 V If = 0.09 A Indirect	Rectifier at 50c/s with sinusoidal input voltages	Vtr = max 5000 Veff Io = max 3 mA	C filt = max 0.1 µF Rt = 0.1 MOhm
			Rectifier at 10 to 500 Kc/s with sinusoidal input voltages	Va invp = max 17 kV Io = max 3 mA	C filt = max 0.01 µF Rt = min 0.1 MOhm
			E.H.T. pulse rectifier	Va invp = max 17 kV Io = max 0.35 mA	Iop = max 80 mA* C filt = max 5000 pF
				*Max pulse duration ½ % of the time between 2 pulses with a max of 5 µ sec	

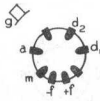
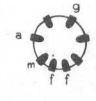
EY 80 Diode		Vf = 6.3 V If = 0.9 A Indirect	Booster diode	Va inv = max 4 kV* Ia = max 180 mA Iap = max 400 mA C filt = 4 µF	Vfkp = max 650 V (100 veff + 500 VDC) cathode positive *Max pulse duration 18 % of a cycle with a maximum of 18 µ sec
EY 81 Booster diode		Vf = 6.3 V If = 0.8 A Indirect	Booster	For further data please refer to type P Y 81	
EY 82 Half-wave rectifier		Vf = 6.3 V If = 0.9 A Indirect	Rectifier two tubes in a full-wave circuit	Vtr = 2 x 280 Veff Io = 300 mA Vo = 280 V	C filt = 60 µF Rt = 2 x 53 Ohms
EY 84 Half wave rectifier		Vf = 6.3 V If = 1.0 A Indirect	Rectifier two tubes in a full wave circuit	Vtr = 2 x 625 Veff Vo = 635 V Io = max 250 mA Vtr = 2 x 500 Veff Vo = 500 V Io = max 300 mA	C filt(f= 50c/s) =16 µF C filt(f=1600c/s)=0.5 µF Rt = 2 x 250 Ohms C filt(f = 50c/s) =16 µF C filt(f=1600c/s)=0.5 µF Rt = 2 x 150 Ohms
EY 86 Single anode rectifier for T.V. receivers		Vf = 6.3 V If = 90 mA	Limiting values	Vf = min 5.5 V Vf = max 7,5 V	Va invp = max 27.5 kV Io = max 1 mA Iop = max 25 mA

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EY 91 Half-wave rectifier		Vf = 6.3 V If = 0.42 A Indirect	Half-wave rectifier	Vtr = max 250 Veff Io = max 75 mA Vfk = max 300 V	C filt = max 32 µF Rt = min 100 Ohms C filt = 16 µF Rt = min 50 Ohms
				Vtr = max 200 Veff Io = max 75 mA Vfk = max 300 V	C filt = max 32 µF Rt = min 70 Ohms C filt = 16 µF Rt = min 30 Ohms
EZ 2 Full wave rectifier		Vf = 6.3 V If = 0.4 A Indirect	Full-wave rectifier	Vtr = 2 x 350 Veff Io = max 60 mA Vfkp = max 500 V	C filt = max 16 µF Rt = 2 x 500 Ohms
				Vtr = 2 x 300 Veff Io = max 60 mA Vfkp = max 500 V	C filt = max 32 µF Rt = 2 x 500 Ohms
EZ 4 Full-wave rectifier		Vf = 6.3 V If = 0.9 A Indirect	Full-wave rectifier	Vtr = 2 x 400 Veff Io = max 175 mA Vfk = 0 V	C filt = max 16 µF Rt = 2 x 300 Ohms
				Vtr = 2 x 350 Veff Io = max 175 mA Vfk = 0 V	C filt = max 16 µF Rt = 2 x 250 Ohms
				Vtr = 2 x 300 Veff Io = max 175 mA Vfk = 0 V	C filt = max 32 µF Rt = 2 x 200 Ohms

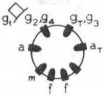
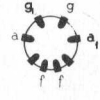
EZ 35 Full-wave rectifier		Vf = 6.3 V If = 0.6 A Indirect	Full-wave rectifier	Vtr = max 2 x 325 Veff Io = max 70 mA Vfkp = 350 V	C filt = max 16 µF Rt = 2 x 350 Ohms
EZ 40 Full-wave rectifier		Vf = 6.3 V If = 0.6 A Indirect	Full-wave rectifier	Vtr = max 2 x 350 Veff Io = max 90 mA Vfkp= max 500 V	C filt = max 50 µF Rt= min 2 x 300 Ohms
				Vtr = max 2 x 300 Veff Io = max 90 mA Vfkp= max 500 V	C filt = max 50 µF Rt = min 2 x 215 Ohms
				Vtr = max 2 x 250 Veff Io = max 90 mA Vfkp= max 500 V	C filt = max 50 µF Rt = min 2 x 125 Ohms
EZ 41 Full-wave rectifier		Vf = 6.3 V If = 0.4 A Indirect	Full-wave rectifier	Vtr = max 2 x 250 Veff Io = max 60 mA Vfk = max 350 V	C filt = 32 µF Rt = 2 x 300 Ohms C filt = 16 µF Rt = 2 x 250 Ohms C filt = 8 µF Rt = 2 x 150 Ohms
EZ 80 Full-wave rectifier		Vf = 6.3 V If = 0.6 A Indirect	Full-wave rectifier	For further data please refer to type E Z 40	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
EZ 90 Full-wave rectifier				Please refer to type 6 X 4	
GZ 32 Full-wave rectifier		Vf = 5 V If = 2 A Indirect	Full-wave rectifier (condenser input)	Vtr = 2 x 500 Veff Io = max 125 mA	C filt = 60 µF Rt = min 2 x 150 Ohms
				Vtr = 2 x 350 Veff Io = max 250 mA	C filt = 32 µF Rt = min 2 x 100 Ohms
				Vtr = 2 x 300 Veff Io = max 300 mA	C filt = 16 µF Rt = min 2 x 50 Ohms
			Full-wave rectifier (choke input)	Vtr = 2 x 400 Veff Io = max 250 mA	L = 10 H
				Vtr = 2 x 400 Veff Io = max 300 mA	L = 10 H
GZ 34 Full-wave rectifier		Vf = 5 V If = 1.9 A Indirect	Full-wave rectifier (condensor input)	Vtr = 2 x 500 Veff Io = max 200 mA	C filt = max 60 µF Rt = min 2 x 150 Ohms
				Vtr = 2 x 400 Veff Io = max 250 mA	C filt = max 60 µF Rt = min 2 x 100 Ohms
				Vtr = 2 x 350 Veff Io = max 250 mA	C filt = max 50 µF Rt = min 2 x 75 Ohms
				Vtr = 2 x 300 Veff Io = max 250 mA	C filt = max 60 µF Rt = min 2 x 50 Ohms

GZ 34			Full-wave rectifier (choke input)	Vtr = 2 x 500 Veff Io = max 250 mA	L filt = 10 H Rt = 0 Ohm
				Vtr = 2 x 400 Veff Io = max 250 mA	
				Vtr = 2 x 350 Veff Io = max 250 mA	
				Vtr = 2 x 300 Veff Io = max 250 mA	
HCH 81 Triode heptode		Vf = 12.6 V If = 150 mA Indirect	Frequency changer	Please refer to type U C H 81	
HL 94 Output pentode		Vf = 30 V If = 150 mA Indirect	Typical characteristics	Va = Vg2 = 100 V Vg1 = -7 V Ia = 43 mA	Ig2 = 2.5 mA S = 9 mA/V Ri = 0.02 MOhm
			Output amplifier class A	Va = Vg2 = 100 V Vg1 = -7 V Ia = 43 mA Ig2 = 2.8 mA	Ra = 2400 Ohms Wo(d = 10%) = 1.9 W Ri = 4 Veff
KB 2 Double diode		Vf = 2 V If = 95 mA Indirect	Detector, A.V.C.	Vd max = 125 V Id max = 0.5 mA	Vfk = max 50 V Rfk = max 0.02 MOhm

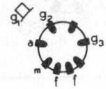
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
KBC 1 Double diode triode		Vf = 2 V If = 0.115 A Direct	Typical characteristics	Triode section Va = 135 V, Vg = -4.5 V, Ia = 2.5 mA: S = 1 mA/V, Ri = 0.016 MOhm, μ = 15 Va = 90 V, Vg = -3.4 V, Ia = 1 mA: S = 0.7 mA/V, Ri = 0.023 MOhm, μ = 16
			A.F. amplifier	Vb = 135 V, Vg = -2 V, Ra = 0.2 MOhm: Ia = 0.35 mA, Vo/Vi = 12.5 Vb = 90 V, Vg = -2 V, Ra = 0.2 MOhm: Ia = 0.19 mA, Vo/Vi = 11
			Detector and A.V.C.	Diode section Vd1 = Vd2 = max 125 V, Id1 = Id2 = max 0.2 mA Vd1 = Vd2 (Id1 = Id2 = + 0.3 μA) = max -0.4 V)
KC 1 Triode		Vf = 2 V If = 65 mA Direct	Typical characteristics	Va = 135 V, Vg = -1.5 V, Ia = 1.2 mA: S = 0.6 mA/V, Ri = 0.04 MOhm, μ = 24 Va = 90 V, Vg = -1.5 V, Ia = 0.3 mA: S = 0.4 mA/V, Ri = 0.06 MOhm, μ = 24

KC 1			A.F. amplifier	Vb = 135 V Vg = -0.75 V Ra = 0.2 MOhm	Ia = 0.32 mA Vo/Vi = 18.5
				Vb = 90 V Vg = -0.75 V Ra = 0.2 MOhm	Ia = 0.17 mA Vo/Vi = 16.2
KC 3 Triode		Vf = 2 V If = 210 mA Direct	Typical characteristics	Va = 135 V Vg = -2.8 V Ia = 3 mA	S = 2.5 mA/V Ri = 0.0115 MOhm μ = 25
				Va = 90 V Vg = -1.6 V Ia = 2 mA	S = 2.2 mA/V Ri = 0.01 MOhm μ = 25
KC 4 Triode		Vf = 2 V If = 0.1 A Direct	Typical characteristics	Va = 135 V Vg = -1.5 V Ia = 2.2 mA	S = 1.4 mA/V Ri = 0.0215 MOhm u = 30
				Va = 90 V Vg = -1.5 V Ia = 0.5 mA	S = 0.8 mA/V Ri = 0.0375 MOhm μ = 30
			A.F. amplifier	Vb = 135 V Vg = -1.5 V Ra = 0.2 MOhm	Ia = 0.32 mA Vo/Vi = 21.5
				Vb = 90 V Vg = -1.5 V Ra = 0.2 MOhm	Ia = 0.15 mA Vo/Vi = 18.5

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
KCH 1 Triode hexode		Vf = 2 V If = 0.18 A Direct	Frequency changer	Va = 135 V Vg2 + g4 = 55 V Rg3 + gT = 0.025 MOhm Ig3 = 280 µA RaT = 0.022 MOhm IaT = 3 mA Vg1 = -0.5 V	Ia = 1 mA Ig2 + g4 = 1.2 mA Sc = 325 µA/V Ri = 1.5 MOhm Sc (Vg1 = -8V) = 3 µA/V Ri (Vg1 = -8V) > 10 MOhms
				Va = 90 V Vg2 + g4 = 55 V Rg3 + gT = 0.025 MOhm Ig3 = 280 µA RaT = 0.022 MOhm IaT = 2 mA Vg1 = -0.5 V	Ia = 1 mA Ig2 + g4 = 1.2 mA Sc = 320 µA/V Ri = 0.7 MOhm Sc (Vg1 = -8V) = 3 µA/V Ri (Vg1 = -8V) > 4 MOhms
				Cag1 < 0.05 pF	
KDD 1 Twin output triode		Vf = 2 V If = 0.22 A Direct	Push-pull output amplifier class B	Va = 135 V Vg = 0 V Iao = 2 x 1.5 mA	Ia max = 2 x 14 mA Raa = 0.01 MOhm Wo max (d = 10%) = 2 W
				Va = 90 V Vg = 0 V Iao = 2 x 0.8 mA	Ia max = 2 x 8.5 mA Raa = 0.01 MOhm Wo max (d = 10%) = 0.72 W

KF 3

Variable mu pentode



Vf = 2 V
If = 45 mA
Direct

R.F. or I.F. amplifier

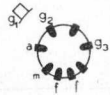
Va = Vg2 =	135	V	S =	650	µA/V
Vg3 =	0	V	Ri =	1.3	MOhm
Ia =	2	mA	S (Vg1= -13.5V) =	6.5	µA/V
Ig2 =	0.6	mA	Ri(Vg1= -13.5V) >	10	MOhms
Vg1 =	-0.5	V			

Va = Vg2 =	90	V	S =	500	µA/V
Vg3 =	0	V	Ri =	2	MOhms
Ia =	1	mA	S (Vg1= -9V) =	5	µA/V
Ig2 =	0.3	mA	Ri(Vg1= -9V) >	10	MOhms
Vg1 =	-0.5	V			

Cag1 < 0.006 pF

KF 4

Pentode



Vf = 2 V
If = 65 mA
Direct

R.F. or I.F. amplifier

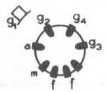
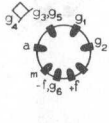
Va = Vg2 =	135	V	Ig2 =	1	mA
Vg3 =	0	V	S =	0.8	mA/V
Vg1 =	-0.5	V	Ri =	0.8	MOhm
Ia =	2.6	mA			

Va = Vg2 =	90	V	Ig2 =	0.4	mA
Vg3 =	0	V	S =	0.7	mA/V
Vg1 =	-0.5	V	Ri =	0.9	MOhm
Ia =	1.2	mA			

Cag1 < 0.008 pF

A.F. amplifier

Vb =	135	V	Ia =	0.3	mA
Vg1 =	-1.5	V	Ig2 =	0.11	mA
Ra =	0.32	MOhm	Vo/Vi =	72	
Rg2 =	0.64	MOhm			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
KF 4			A.F. amplifier	Vb = 90 V Vg1 = -1.5 V Ra = 0.32 MOhm Rg2 = 0.4 MOhm	Ia = 0.18 mA Ig2 = 0.1 mA Vo/Vi = 52
KH 1 Variable mu hexode		Vf = 2 V If = 0.135 A Direct	Modulator with oscillator	Va = 135 V Vg2 = Vg4 = 60 V Rg3 = 0.5 MOhm Vosc = 10 Veff Vg1 = -1.5 V Ia = 1 mA	Ig2 + g4 = 1.1 mA Sc = 450 µA/V Ri = 1 MOhm Sc(Vg1= -8V)=4.5 µA/V Ri(Vg1= -8V) > 10 MOhms
			R.F. or I.F. amplifier	Va = 135 V Vg2 = Vg3 = 60 V Vg4 = 0 V Vg1 = -1.5 V Ia = 2 mA Cag1 < 0.002 pF	Ig2 + g3 = 0.95 mA S = 1.4 mA/V Ri = 1.3 MOhms S (Vg1= -7.5V)=14 µA/V Ri(Vg1= -7.5V)>10 MOhms
KK 2 Octode		Vf = 2 V If = 0.13 A Direct	Frequency changer	Va = Vg2 = 135 V Vg3 + g5 = 45 V Vg1 = 0 V Vosc = 8.5 Veff Rg1 = 0.050 MOhm Vg4 = -0.5 V Ia = 0.7 mA	Ig2 = 2.2 mA Ig3 + g5 = 1 mA Sc = 0.27 mA/V Ri = 2.5 MOhms Sc(Vg1= -11V)=2.7 µA/V Ri(Vg4= -11V) > 10 MOhms

KK 2

Frequency changer

Va = Vg2	90	V	
Vg3 + g5 =	45	V	
Vg1 =	0	V	
Vosc =	8.5	Veff	
Rg1 =	0.05	MOhm	
Vg4 =	-0.5	V	
Ia =	0.7	mA	
Ig2 =	1.6	mA	
Ig3 + g5 =	1	mA	
Sc =	0.27	mA/V	
Ri =	2	MOhms	
Sc(Vg4= -11V)	< 2.7	µA/V	
Ri(Vg1= -11V)	> 10	MOhms	

Cag4 < 0.07 pF

KL 4

Output pentode

Vf = 2 V
If = 0.15 A
Direct

Output amplifier class A

Va = Vg2 =	135	V	Ri =	0.13	MOhm
Vg1 =	-5	V	Ra =	0.019	MOhm
Ia =	6.5	mA	Wo(d = 10%) =	0.44	W
Ig2 =	1.1	mA	Vi =	3.3	Veff
S =	2.1	mA/V			

Va = Vg2 =	90	V	Ri =	0.150	MOhm
Vg1 =	-2.6	V	Ra =	0.019	MOhm
Ia =	4.7	mA	Wo(d = 10%) =	0.16	W
Ig2 =	0.8	mA	Vi =	1.9	Veff
S =	1.8	mA/V			

KL 5

Output pentode

Vf = 2 V
If = 0.1 A
Direct

Output amplifier class A

(continued)

Va = Vg2 =	135	V	Ri =	0.135	MOhm
Vg1 =	-6.5	V	Ra =	0.016	MOhm
Ia =	8.5	mA	Wo(d = 10%) =	0.52	W
Ig2 =	1.5	mA	Vi =	4.8	Veff
S =	1.7	mA/V			

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
KL 5			Output amplifier class A	Va = Vg2 = 90 V Vg1 = -4 V Ia = 4.8 mA Ig2 = 0.9 mA S = 1.4 mA/V	Ri = 0.180 MOhm Ra = 0.019 MOhm Wo(d = 10%) = 0.2 W Vi = 2.6 Veff
			Push-pull output amplifier class B	Va = Vg2 = 135 V Vg1 = -12 V Iao = 2 x 2 mA Ia max = 2 x 6.25 mA Ig2o = 2 x 0.35 mA	Ig2 max = 2 x 2.4 mA Ra = 0.025 MOhm Wo(d = 7%) = 1.05 W Vi = 8.7 Veff
				Va = Vg2 = 90 V Vg1 = -8.5 V Iao = 2 x 1 mA Ia max = 2 x 3.6 mA Ig2o = 2 x 0.1 mA	Ig2 max = 2 x 1 mA Ra = 0.025 MOhm Wo(d = 3.8%) = 0.35 W Vi = 6.5 Veff
PABC 80 Triple diode triode		Vf = 9.5 V If = 0.3 A Indirect	Typical characteristics	Triode section Please refer to type UABC 80	
			Diodes for AN/FM, video and audio detection	Please refer to type EABC 80	

PC 93

U.H.F. triode

Vf = 5 V
If = 0.3 A
Indirect

Typical characteristics

Va	=	100	V	S	=	8	mA/V
Vg	=	-4	V	μ	=	15	
Ia	=	16	mA				

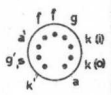
Cag = 1.7 pF

U.H.F. oscillator

Va	=	75	V	Rg1	=	10.000	Ohms
Ia	=	16	mA	Ig1	=	400	μA

PCC 84

Double triode for T.V.



Vf = 9 V
If = 0.3 A

Typical characteristics

Va	=	90	V	S	=	6	mA/V
Vg1	=	-1.5	V	μ	=	24	
Ia	=	12	mA				

Cag = 1.2 pF Ca'g' = 2.3 pF

PCC 85

Double triode for T.V.

Vf = 9 V
If = 0.3 A
Indirect

Typical characteristics

Va	=	200	V	S	=	5.8	mA/V
Vg	=	-2.1	V	μ	=	48	
Ia	=	10	mA				
Va	=	170	V	S	=	6.2	mA/V
Vg	=	-1.5	V	μ	=	50	
Ia	=	10	mA				
Va	=	100	V	S	=	4.6	mA/V
Vg	=	-1.1	V	μ	=	50	
Ia	=	4.5	mA				

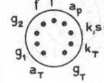
Cag = Ca'g' = 1.5 pF

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
PCC 85			Additive mixer	Vb = 200 V Ra = 8200 Ohms Rg = 1 MOhm Vosc = 2.8 Veff	Ia = 5.2 mA Sc = 2.3 mA/V Ri = 15000 Ohms
				Vb = 170 V Ra = 4700 Ohms Rg = 1 MOhm Vosc = 2.8 Veff	Ia = 4.8 mA Sc = 2.2 mA/V Ri = 16000 Ohms
				Vb = 100 V Ra = 4700 Ohms Rg = 1 MOhm Vosc = 1.8 Veff	Ia = 2.2 mA Sc = 1.7 mA/V Ri = 20000 Ohms
			Oscillator	Vosc = 180 V Ra = 4400 Ohms R g1 = 0.022 MOhm	Vosc = 9 Veff Ia = 8 mA Wa = 1.2 W
PCF 80			Typical characteristics	Pentode section Va = Vg2 = 170 V Vg1 = -2 V Ia = 10 mA Ig2 = 2.8 mA	S = 6.2 mA/V Ri = 0.4 MOhm Req = 1500 Ohms
				Cag1 = < 0.025 pF	

PCF 80

Triode pentode



Vf = 9 V
If = 0.3 A
Indirect

Triode section

Va	= 100	V	S	= 5	mA/V
Vg	= -2	V	μ	= 20	
Ia	= 14	mA			

Cag = 1.5 pF

Frequency changer

Va = Vg2	= 170	V	Ig2	= 1.5	mA
Rg1	= 0.1	MOhm	Ig1	= 0	mA
Rk	= 820	Ohms	Sc	= 2.1	mA/V
Vosc	= 3.5	Veff	Ri	= 0.87	MOhm
Ia	= 5.2	mA			

PL 36

Output pentode for T.V.

Vf = 25 V
If = 0.3 A
Indirect

Typical characteristics

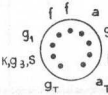
Va = Vg2	= 170	V	Ig2	= 7	mA
Vg1	= -25	V	S	= 10	mA/V
Ia	= 100	mA	Ri	= 10000	Ohms

Horizontal output

Va	= 70	V	Vg1	= -1	V
Vg2	= 170	V	Ia	= 500	mA

PCL 82

Triode output pentode for T.V.



Vf = 16 V
If = 0.3 A
Indirect

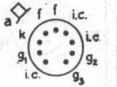
Typical characteristics

Pentode section

Va = Vg2	= 170	V	Ig2	= 2.7	mA
Vg1	= -14.5	V	S	= 5.8	mA/V
Ia	= 41	mA	Ri	= 40000	Ohms

(continued)

Va = Vg2	= 100	V	Ig2	= 1.7	mA
Vg1	= -7.5	V	S	= 4.8	mA/V
Ia	= 26	mA	Ri	= 30000	Ohms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
PCL 82				Triode section	
				Va = 100 V Vg = 0 V Ia = 4 mA	S = 3 mA/V μ = 60
			Output amplifier class A	Vg = Vg2 = 170 V Vg1 = -14.5 V Ia = 41 mA Ig2 = 2.7 mA	Ra = 4000 Ohms Wa = 3.5 W Vi(Wa=50 mW)=0.65 Veff
				Va = Vg2 = 100 V Vg1 = -7.5 V Ia = 26 mA Ig2 = 1.7 mA	Ra = 4000 Ohms Wa = 1.3 W Vi(Wa=50 mW)=0.85 Veff
PL 81 Line time base output valve		Vf = 21.5 V If = 300 mA Indirect	Typical characteristics	Va = Vg2 = 200 V Vg3 = 0 V Vg1 = -28 V Ia = 40 mA	Ig2 = 2.8 mA S = 6 mA/V Ri = 0.011 MOhm
				Va = Vg2 = 170 V Vg3 = 0 V Vg1 = -22 V Ia = 45 mA	Ig2 = 3 mA S = 6.2 mA/V Ri = 0.010 MOhm

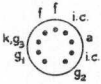
PL 81

Push-pull amplifier class B	Va = Vg2 = 200 V Vg3 = 0 V Rg2 = 1000 Ohms* Vg1 = -31.5 V Iao = 2 x 25 mA Ia max = 2 x 87 mA
	Ig2o = 2 x 2 mA Ig2 max = 2 x 12.5 mA Raa = 2500 Ohms Vi = 22.5 Veff Wo(d = 5.5 %) = 20 W
Push-pull output amplifier class B	Va = Vg2 = 170 V Vg3 = 0 V Rg2 = 1000 Ohms* Vg1 = -27 V Iao = 2 x 20 mA Ia max = 2 x 73 mA
	Ig2o = 2 x 1.5 mA Ig2 max = 2 x 10 mA Raa = 2500 Ohms Vi = 19 Veff Wo(d = 5.5%) = 13.5 W

*Common sereen grid resister

PL 82

Frame and audio output pentode



Vf = 16.5 V
If = 0.3 A
Indirect

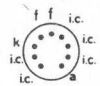
Output amplifier class A	Va = 200 V Rg2 = 680 Ohms Vg1 = -13.9 V Ia = 45 mA Ig2 = 8.5 mA
	S = 7.6 mA/V Ri = 0.024 MOhm Ra = 4000 Ohms Wo(d = 10%) = 4.2 W Vi = 7 Veff
	Va = Vg2 = 170 V Vg1 = -10.4 V Ia = 53 mA Ig2 = 10 mA S = 9 mA/V
	Ri = 0.020 MOhm Ra = 3000 Ohms Wo(d = 10%) = 4 W Vi = 6 Veff

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
PL 82 (continued)			Push-pull output amplifier	Va = Vg2 = 200 V Rk = 135 Ohms Raa = 4000 Ohms Iao = 2 x 45 mA Ia max = 2 x 52 mA	Ig2o = 2 x 8.5 mA Ig2 max = 2 x 19 mA Wo(d = 5 %) = 12 W Vi = 13.5 Veff
				Va = Vg2 = 170 V Rk = 100 Ohms Raa = 4000 Ohms Iao = 2 x 46 mA Ia max = 2 x 50 mA	Ig2o = 2 x 8.7 mA Ig2 max = 2 x 17 mA Wo(d = 5 %) = 9 W Vi = 9.3 Veff
PL 83 Video output pentode		Vf = 15 V If = 0.3 A Indirect	Typical characteristics	Va = Vg2 = 200 V Vg3 = 0 V Vg1 = -3.5 V Ia = 36 mA	Ig2 = 5 mA S = 10.5 mA/V Ri = 0.1 MOhm
				Va = Vg2 = 170 V Vg3 = 0 V Vg1 = -2.3 V Ia = 36 mA	Ig2 = 5 mA S = 10.5 mA/V Ri = 0.1 MOhm
				Cag2 < 0.1 pF	

PY 80

Booster diode



Vf = 19 V
If = 0.3 A
Indirect

Booster

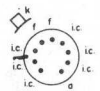
Va invp = 4000 V*
Ia = 180 mA
Iap = 400 mA

Vkfp = max 650 V
(160 Veff + 450 V.D.C.)
C filt = max 4 µF

*Max pulse duration 18 % of a cycle with a maximum of 18 µ sec.

PY 81

Booster diode



Vf = 17 V
If = 0.3 A
Indirect

Booster

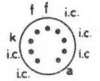
Ia = max 150 mA
Iap = max 450 mA

C filt = max 4 µF
Cfkp = max 900 V*

*Cathode positive with respect to the filament.

PY 82

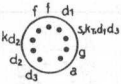
Half-wave rectifier



Vf = 19 V
If = 0.3 A
Indirect

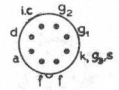
Rectifier

Vtr = 250 Veff	Io = 180 mA	C filt = 60 µF	Rt = 125 Ohms
Vtr = 240 Veff	Io = 180 mA	C filt = 60 µF	Rt = 105 Ohms
Vtr = 220 Veff	Io = 180 mA	C filt = 60 µF	Rt = 65 Ohms
Vtr = 200 Veff	Io = 180 mA	C filt = 60 µF	Rt = 30 Ohms
Vtr = 127 Veff	Io = 180 mA	C filt = 60 µF	Rt = 0 Ohm

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
U 30 Current regulator			Current regulator	Vcontr = 70 -122.5 V Ireg = 100 mA Imin(V= 70V) =87 mA	Imax(V=122.5V) = 108 mA Vtr = max 260 V min 170 V
UABC 80 Triple diode triode		Vf = 28 V If = 0.1 A Indirect	Typical characteristics	Triode section Va = 170 V, Vg = 1.85 V, Ia = 1 mA; S = 3 mA/V, μ = 70, Ri = 0.054 MOhm Va = 100 V, Vg = -1 V, Ia = 0.8 mA; S = 1.3 mA/V, μ = 70, Ri = 0.054 MOhm	
			Diodes for AM/FM, video and audio detection	Diode section For further data please refer to type EABC 80	

UAF 41

Diode
Variable
mu
pentode



Vf = 12.6 V
If = 0.1 A
Indirect

H.F. or I.F. amplifier

Va	=	200	V	S	=	1.9	mA/V
Rg2	=	0.044	MOhm	Ri	=	1.3	MOhm
Rk	=	300	Ohms	S (Vg1= -34V)	=	19	µA/V
Vg1	=	-2.4	V	Ri(Vg1= -34V)	=>	10	MOhms
Ia	=	6	mA	Req	=	9600	Ohms
Ig2	=	1.9	mA				

Va	=	170	V	S	=	1.8	mA/V
Rg2	=	0.044	MOhm	Ri	=	1.2	MOhms
Rk	=	300	Ohms	S (Vg1= -28V)	=	18	µA/V
Vg1	=	-2	V	Ri(Vg1= -28V)	=>	10	MOhms
Ia	=	5	mA	Req	=	9000	Ohms
Ig2	=	1.6	mA				

Va	=	100	V	S	=	1.65	mA/V
Rg2	=	0.044	MOhm	Ri	=	1	MOhm
Rk	=	300	Ohms	S (Vg1= -17V)	=	16	µA/V
Vg1	=	-1.1	V	Ri(Vg1= -17V)	=>	10	MOhms
Ia	=	2.8	mA	Req	=	7000	Ohms
Ig2	=	0.9	mA				

Cag1 < 0.002 pF

A.F. amplifier

Vb	=	170	V	Ia	=	0.58	mA
Ra	=	0.2	MOhm	Ig2	=	0.18	mA
Rg2	=	0.73	MOhm	$\frac{Vo}{Vi}$	=	78	
Rk	=	2700	Ohms				

Vb	=	100	V	Ia	=	0.34	mA
Ra	=	0.2	MOhm	Ig2	=	0.1	mA
Rg2	=	0.73	MOhm	$\frac{Vo}{Vi}$	=	73	
Rk	=	2700	Ohms				

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UAF 42 Diode Variable mu pentode		Vf = 12.6 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Va = 200 V Vg3 = 0 V Rg2 = 0.076 MOhm Rk = 310 Ohms Vg1 = -2 V Ia = 5 mA	Ig2 = 1.5 mA S = 2 mA/V Ri = 1 MOhm S (Vg= -34V) = 20 µA/V Ri(Vg= -34V) => 10 Ohms Req = 7500 Ohms
				Va = 170 V Vg3 = 0 V Rg2 = 0.056 MOhm Rk = 310 Ohms Vg1 = -2 V Ia = 5 mA	Ig2 = 1.5 mA S = 2 mA/V Ri = 0.9 MOhm S (Vg= -28V) = 20 µA/V Ri(Vg= -28V) => 10 MOhms Req = 7500 Ohms
				Va = 100 V Vg3 = 0 V Rg2 = 0.056 MOhms Rk = 310 Ohms Vg1 = -1.2 V Ia = 2.8 mA	Ig2 = 0.9 mA S = 1.7 mA/V Ri = 0.85 MOhm S (Vg= -16V) = 17 µA/V Ri(Vg= -16V) => 10 MOhms Req = 5800 Ohms
				Cag1 < 0.002 pF	
			A.F. amplifier	Vb = 170 V Ra = 0.22 MOhm Rg2 = 0.82 MOhm Rk = 2700 Ohms	Ia = 0.5 mA Ig2 = 0.17 mA $\frac{Vo}{Vi}$ = 80

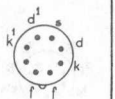
UAF 42

A.F. amplifier

Vb	= 100	V	Ia	= 0.29	mA
Ra	= 0.22	MOhm	Ig2	= 0.09	mA
Rg2	= 0.82	MOhm	Vo/Vi	= 75	
Rk	= 2700	Ohms			

UB 41

Double diode



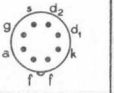
Vf = 19 V
If = 0.1 A
Indirect

Detector
A.V.C., and
other purposes

Vd invp	= max 420	V	Vkf	= max 330	V
Id	= max 9	mA	Rfk	= max 0.020	MOhm
Idp	= max 54	mA			

UBC 41

Double diode triode



Vf = 14 V
If = 0.1 A
Indirect

Typical characteristics

Triode section

Va	= 170	V	S	= 1.65	mA/V
Vg	= -1.55	V	μ	= 70	
Ia	= 1.5	mA	Ri	= 0.042	MOhm

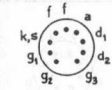
Va	= 100	V	S	= 1.4	mA/V
Vg	= -1	V	μ	= 70	
Ia	= 0.8	mA	Ri	= 0.05	MOhm

A.F. amplifier

Vb	= 170	V	Ia	= 0.28	mA
Ra	= 0.22	MOhm	Vo/Vi	= 44	
Rk	= 5600	Ohms			

Vb	= 100	V	Ia	= 0.18	mA
Ra	= 0.22	MOhm	Vo/Vi	= 41	
Rk	= 5600	Ohms			

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
UBC 41 (continued)			Detector, A.V.C. and other purposes	Diode section Vd invp = max 350 V; Id = max 0.8 mA; Idp = max 5 mA Vfk = max 150 V; Rfk = max 0.02 MOhm
UBC 81		If = 14 V If = 0.1 A Indirect		For further data please refer to type E B C 81
UBF 80 Double diode variable mu pentode		Vf = 17 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Pentode section Va = 200 V; Vg3 = 0 V; Rg2 = 0.068 MOhm; Rk = 295 Ohms; Vg1 = -2 V; Ia = 5 mA Ig2 = 1.75 mA; S = 2.2 mA/V; Ri = 1 MOhm; S (Vg1= -31.5V)= 22 µA/V; Ri(Vg1= -31.5V)=>10 MOhms; Req = 6200 Ohms Va = 170 V; Vg2 = 0 V; Rg2 = 0.047 MOhm; Rk = 295 Ohms; Vg1 = -2 V; Ia = 5 mA Ig2 = 1.75 mA; S = 2.2 mA/V; Ri = 0.9 MOhm; S (Vg1= -26.5V)= 22 µA/V; Ri(Vg1= -26.5V)=>10 MOhms; Req = 6200 Ohms

UBF 80

R.F. or I.F. amplifier

Va	=	100	V	Ig2	= 1 mA
Vg3	=	0	V	S	= 1.9 mA/V
Rg2	=	0.047	MOhm	Ri	= 0.9 MOhm
Rk	=	295	Ohms	S (Vg1= -15.5V)	= 19 µA/V
Vg1	=	-1.15	V	Ri(Vg1= -15.5V)	=>10 MOhms
Ia	=	2.8	mA	Req	= 4600 Ohms

Cag1 < 0.0025 pF

A.F. amplifier

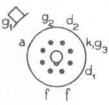
Vb	=	170	V	Ia	= 0.56 mA
Ra	=	0.22	MOhm	Ig2	= 0.2 mA
Rg2	=	0.68	MOhm	$\frac{Vo}{Vi}$	= 85
Rk	=	2700	Ohms		

Vb	=	100	V	Ia	= 0.32 mA
Ra	=	0.22	MOhm	Ig2	= 0.12 mA
Rg2	=	0.68	MOhm	$\frac{Vo}{Vi}$	= 82
Rk	=	2700	Ohms		

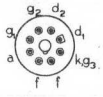
Detector, A.V.C. and other purposes

Diode section

Vd invp	= max	350	V	Idp	= max 5 mA
Id	= max	0.8	mA	Rfk	= max 0.02 MOhm

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
UBL 1 Double diode output pentode		Vf = 55 V If = 0.1 A Indirect	Output amplifier class A	Pentode section Va = Vg2 = 200 V; S = 8.5 mA/V Ia = 55 mA; Ri = 0.02 MOhm Ig2 = 11 mA; Ra = 3500 Ohms Rk = 175 Ohm; Wo(d = 10%) = 5.2 W Vg1 = -11.5 V; Vi = 7 Veff Va = Vg2 = 185 V; S = 8.8 mA/V Ia = 59 mA; Ri = 0.023 MOhm Ig2 = 11.3 mA; Ra = 3000 Ohms Rk = 140 Ohms; Wo(d = 10%) = 5 W Vg1 = -10 V; Vi = 7 Veff Va = Vg2 = 100 V; S = 7 mA/V Ia = 28.5 mA; Ri = 0.025 MOhm Ig2 = 5.25 mA; Ra = 3000 Ohms Rk = 145 Ohms; Wo(d = 6.8%) = 1.05 W Vg1 = -5 V; Vi = 3.3 Veff
			Detector, A.V.C. and other purposes	Diode section Please refer to type AB2; Vfk = max 150 V

UBL 21



Vf = 55 V
If = 0.1 A
Indirect

Double diode output pentode

	Output amplifier class A		Output amplifier class A
	Pentode section		
Va = Vg2 =	200 V	S =	8 mA/V
Ia =	55 mA	Ri =	0.025 MOhm
Ig2 =	9.5 mA	Ra =	3500 Ohms
Rk =	200 Ohms	Wo(d = 10%) =	4.8 W
Vg1 =	-13 V	Vi =	6.2 Veff
Va = Vg2 =	180 V	S =	9 mA/V
Ia =	61 mA	Ri =	0.022 MOhm
Ig2 =	10 mA	Ra =	3000 Ohms
Rk =	140 Ohms	Wo(d = 10%) =	4.8 W
Vg1 =	-10 V	Vi =	6.2 Veff
Va = Vg2 =	100 V	S =	7.5 mA/V
Ia =	32.5 mA	Ri =	0.025 MOhm
Ig2 =	5.5 mA	Ra =	3000 Ohms
Rk =	140 Ohms	Wo(d = 10%) =	1.35 W
Vg1 =	-5.3 V	Vi =	3.8 Veff
	Push-pull output amplifier class AB (continued)		
Va = Vg2 =	200 V	Ig2 max =	2 x 14 mA
Rk =	116 Ohms	Raa =	4000 Ohms
Iao =	2 x 50 mA	Wo(d = 3.9%) =	12.5 W
Ia max =	2 x 56 mA	Vi =	12 Veff
Ig2o =	2 x 7.8 mA		

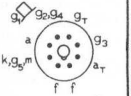
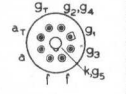
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UBL 21 (continued)				Va = Vg2 = 100 V Rk = 170 Ohms Iao = 2 x 17.5 mA Ia max=2 x 19.6 mA Ig2o = 2 x 2.8 mA	Ig2 max = 2 x 5 mA Raa = 5500 Ohms Wo(d = 4 %) = 2.2 W Vi = 6.2 Veff
			Detector, A.V.C. and other purposes	Diode section Please refer to type AB2	Vfk = max 150 V
UC 92 Grounded grid triode for U.H.F.		Vf = 9.5 V If = 0.1 A Indirect	Typical characteristics	Va = 200 V Vg = -1 V Ia = 11.5 mA	S = 6.4 mA/V μ = 66 Ri = 0.0103 MOhm
				Va = 170 V Vg = -1 V Ia = 8.5 mA	S = 5.5 mA/V μ = 66 Ri = 0.012 MOhm
				Va = 100 V Vg = -1 V Ia = 3 mA	S = 3.5 mA μ = 58 Ri = 0.0165 MOhm
				Cag = 1.5 pF	

UCC 85

Double triode

Vf = 26 V
If = 0.1 A
Indirect

Typical characteristics	Va	=	200	V	S	=	5.8	mA/V
	Vg	=	-2.1	V	μ	=	48	
	Ia	=	10	mA				
	Va	=	170	V	S	=	6.2	mA/V
	Vg	=	-1.5	V	μ	=	50	
	Ia	=	10	mA				
	Va	=	100	V	S	=	4.6	mA/V
	Vg	=	-1.1	V	μ	=	50	
	Ia	=	4.5	mA				
R.F. amplifier (system a, g, k)	Vb	=	170	V	Vg	=	-2	V
	Va	=	160	V	S	=	4.5	mA/V
	Ia	=	6	mA	Ri	=	10500	Ohms
Selfoscillating mixer (system a', g', k')	Vb	=	200	V	Ia	=	5.2	mA
	Ra	=	8200	Ohms	Sc	=	2.3	mA/V
	Rg	=	1	MOhm	Ri	=	15000	Ohms
	Vosc	=	2.8	Veff				
	Vb	=	170	V	Ia	=	4.8	mA
	Ra	=	4700	Ohms	Sc	=	2.2	mA/V
	Rg	=	1	MOhm	Ri	=	16000	Ohms
	Vosc	=	2.8	Veff				
	Vb	=	100	V	Ia	=	2.2	mA
	Ra	=	47000	Ohms	Sc	=	1.7	mA/V
	Rg	=	1	MOhm	Ri	=	20000	Ohms
	Vosc	=	1.8	Veff				

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UCH 4 Triode heptode		Vf = 20 V If = 0.1 A Indirect		See U C H 21	
UCH 21 Triode heptode		Vf = 20 V If = 0.1 A Indirect	Frequency changer	Va = 200 V Ia = 3.5 mA Rg2 + g4 = 0.0155 MOhm Ig2 + g4 = 6.5 mA RaT = 0.02 MOhm IaT = 4.1 mA RgT + g3 = 0.05 MOhm Rk = 150 Ohms	IgT + g3 = 190 µA Vg1 = -2 V Sc = 750 µA/V Ri = 1 MOhm Sc(Vg1= -28V)=7.5 µA/V Ri(Vg1= -28V)=>10 MOhms Req = 0.055 MOhm
				Va = 100 V Ia = 1.5 mA Rg2 + g4 = 0.0155 MOhm Ig2 + g4 = 3 mA RaT = 0.020 MOhm RgT + g3 = 0.05 MOhm Rk = 150 Ohms	IgT + g3 = 95 µA Vg1 = -1 V Sc = 580 µA/V Ri = 1 MOhm Sc(Vg1= -14V)=5.8 µA/V Ri(Vg1= -14V)=>10 MOhms Req = 0.04 MOhms

UCH 21

Heptode section

I.F. amplifier

Va	= 200	V	S	= 2.2	mA/V
Vg3	= 0	V	Ri	= 0.7	MOhm
Rg2 + g4	= 0.03	MOhm	S (Vg1	= -28V) = 22	µA/V
Ig2 + g4	= 3.5	mA	Ri (Vg1	= -28V) > 10	MOhms
Ia	= 5.2	mA	Req	= 9000	Ohms

Va	= 100	V	S	= 2	mA/V
Vg3	= 0	V	Ri	= 0.7	MOhm
Rg2 + g4	= 0.03	MOhm	S (Vg1	= -15V) = 20	µA/V
Ig2 + g4	= 1.9	mA	Ri (Vg1	= -15V) > 10	MOhms
Ia	= 2.6	mA	Req	= 4900	Ohms

Cag1 < 0.002 pF

Triode section

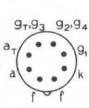
Typical characteristics

Va	= 100	V	S	= 3.2	mA/V
Vg	= 0	V	µ	= 19	
Ia	= 12	mA			

A.F. amplifier

Vb	= 200	V	Ia	= —0.8	mA
Ra	= 0.2	MOhm	Vo		
Vg	= -2	V	Vi	= 10	

Vb	= 100	V	Ia	= 0.37	mA
Ra	= 0.2	MOhm	Vo		
Vg	= -1	V	Vi	= 10	

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UCH 41 Triode hexode		Vf = 14 V If = 0.1 A Indirect	Frequency changer	Va = 200 V Ri = 0.022 MOhm* R2 = 0.047 MOhm* Rk = 225 Ohms Ia = 3 mA Ig2 + g4 = 2.1 mA RgT + g3 = 0.02 MOhm IgT + g3 = 360 µA	RaT = 0.02 MOhm IaT = 4.6 mA Vg1 = -2.2 V Sc = 500 µA/V Ri = 1 MOhm Sc(Vg1= -27V) = 5 µA/V Ri(Vg1= -27V) > 5 MOhms Req = 0.220 MOhm
				Va = 170 V R1 = 0.022 MOhm* R2 = 0.047 MOhm* Rk = 200 Ohms Ia = 2.2 mA Ig2 + g4 = 1.9 mA RgT + g3 = 0.02 MOhm IgT + g3 = 320 µA	RaT = 0.01 MOhm IaT = 4.9 mA Vg1 = -1.8 V Sc = 450 µA/V Ri = 1.2 MOhms Sc(Vg1= -22V)= 4.5 µA/V Ri(Vg1= -22V) > 5 MOhms Req = 0.145 MOhm
				Va = 100 V R1 = 0.022 MOhm* R2 = 0.047 MOhm* Rk = 200 Ohms Ia = 1 mA Ig2 + g4 = 1 mA RgT + g3 = 0.02 MOhm IgT + g3 = 200 µA	RaT = 0.01 MOhm IaT = 2.8 mA Vg1 = -1 V Sc = 320 µA/V Ri = 1.4 MOhms Sc(Vg1= -14V)= 3.2 µA/V Ri(Vg1= -14V)> 5 MOhms Req = 0.115 MOhm
				Cag1 < 0.1 pF	

UCH 42

Triode
hexode

Vf = 14 V
If = 0.1 A
Indirect

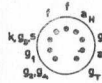
Frequency changer

Va	=	200	V	RaT =	0.022 MOhm
R1	=	0.018	MOhm*	IaT =	5.5 mA
R2	=	0.027	MOhm*	Vg1 =	-2 V
Rk	=	180	Ohms	Sc =	750 µA/V
Ia	=	3	mA	Ri =	> 1 MOhm
Ig2 + g4	=	3	mA	Sc(Vg1= -27.5V)=	7.5 µA/V
RgT + g3	=	0.022	MOhm	Ri(Vg1= -27.5V) >	5 MOhms
IgT + g3	=	350	µA	Req =	0.075 MOhm

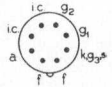
Va	=	170	V	RaT =	0.01 MOhm
R1	=	0.018	MOhm*	IaT =	6.5 mA
R2	=	0.027	MOhm*	Vg1 =	-1.85 V
Rk	=	180	Ohms	Sc =	670 µA/V
Ia	=	2.1	mA	Ri =	> 1 MOhm
Ig2 + g4	=	2.6	mA	Sc(Vg1= -25V)=	6.7 µA/V
RgT + g3	=	0.022	MOhm	Ri(Vg1= -25V) >	5 MOhms
IgT + g3	=	350	µA	Req =	0.065 MOhm

Va	=	100	V	RaT =	0.01 MOhm
R1	=	0.018	MOhm*	IaT =	3.4 mA
R2	=	0.027	MOhm*	Vg1 =	-1 V
Rk	=	180	Ohms	Sc =	530 µA/V
Ia	=	1.2	mA	R1 =	> ,1 MOhm
Ig2 + g4	=	1.46	mA	Sc(Vg1= -13.5V)=	5.3 V
RgT + g3	=	0.022	MOhm	Ri(Vg1= -13.5V) >	5MOhms
IgT + g3	=	175	µA	Req =	0.06 MOhm

* R1 between + Vf and screen grids, R2 between screen grids and chassis

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS
UCH 81 Triode heptode		Vf = 19 V If = 0.1 A Indirect	Frequency changer	Va = 170 V Rg2 + g4 = 12 kOhms RaT = 15 kOhms RgT + g3 = 47 kOhms Vg1 = -2 V Ia = 2.9 mA Ig2 + g4 = 6 mA IaT = 4.5 mA IgT + g3 = 200 µA Sc = 725 µA/V Ri = 0.9 MOhm Sc(Vg1= -24V)=7.25 µA/V Ri(Vg1= -24V)> 3 MOhms Req = 70 kOhms Cag1 < 0.006 pF
UCL 11 Triode output tetrode		Vf = 60 V If = 0.1 A Indirect	Typical characteristics	Triode section Va = 200 V Vg = -2 V Ia = 2 mA S = 2.1 mA/V Ri = 0.03 MOhm µ = 65
			Output amplifier class A	Tetrode section Va = Vg2 = 200 V Vg1 = -8.5 V Ia = 45 mA Ig2 = 6 mA S = 9 mA/V Ri = 0.018 MOhm Ra = 4500 Ohms Wo(d = 10%) = 4 W Vi = 5 Veff
UF 9 Variable mu pentode		Vf = 12.6 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Va = 200 V Vg3 = 0 V Rg2 = 0.06 MOhm Rk = 325 Ohms Vg1 = -2.5 V Ia = 6 mA Ig2 = 1.7 mA S = 2.2 mA/V Ri = 1.2 MOhms S (Vg1= -32V)= 22 µA/V Ri(Vg1= -32V) 10 MOhms

UF 9			R.F. or I.F. amplifier	Va = 100 V Vg3 = 0 V Rg2 = 0.06 MOhm Rk = 325 Ohms Vg1 = -1.3 V Ia = 3.2 mA Cag1 < 0.002 pF	Ig2 = 0.85 mA S = 2 mA/V Ri = 1 MOhm S (Vg1= -16.5V)= 20 µA/V Ri(Vg1= -16.5V) > 10MOhms
			A.F. amplifier	Vb = 200 V Ra = 0.2 MOhm Rg2 = 0.8 MOhm Rk = 2500 Ohms	Ia = 0.65 mA Ig2 = 0.17 mA Vo/Vi = 88
				Vb = 100 V Ra = 0.2 MOhm Rg2 = 0.8 MOhm Rk = 2500 Ohms	Ia = 0.33 mA Ig2 = 0.08 mA Vo/Vi = 82
UF 21 Variable mu pentode		Vf = 12.6 V If = 0.1 A Indirect	R.F. or I.F. amplifier (continued)	Va = 200 V Vg3 = 0 V Rg2 = 0.06 MOhm Rk = 325 Ohms Vg1 = -2.5 V Ia = 6 mA	Ig2 = 1.7 mA S = 2.2 mA/V Ri = 1 MOhm S (Vg1= -37V)= 22 µA/V Ri(Vg1= -37V)=>10 MOhms

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UF 21 (continued)			R.F. or I.F. amplifier	Va = 100 V Vg3 = 0 V Rg2 = 0.06 MOhm Rk = 325 Ohms Vg1 = -1.3 V Ia = 3.2 mA	Ig2 = 0.85 mA S = 2 mA/V Ri = 1 MOhm S (Vg1= -19V)= 20 µA/V Ri(Vg1= -19V)=>10 MOhms
				Cag1 < 0.002 pF	
			A.F. amplifier	Vb = 200 V Ra = 0.2 MOhm Rg2 = 0.8 MOhm Rk = 2500 Ohms	Ia = 0.65 mA Ig2 = 0.17 mA Vo/Vi = 88
				Vb = 100 V Ra = 0.2 MOhm Rg2 = 0.8 MOhm Rk = 2500 Ohms	Ia = 0.33 mA Ig2 = 0.08 mA Vo/Vi = 82
UF 41 Variable mu pentode		Vf = 12.6 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Va = 200 V Rg2 = 0.04 MOhm Rk = 325 Ohms Vg1 = -3 V Ia = 7.2 mA Ig2 = 2.1 mA	S = 2.3 mA/V Ri = 1 MOhm S (Vg1= -34V)= 23 µA/V Ri(Vg1= -34V) > 10 MOhms Req = 7000 Ohms

UF 41

Variable mu pentode

Vf = 12.6 V
If = 0.1 A
Indirect

R.F. or I.F. amplifier

Va	=	170	V	S	=	2.2	mA/V
Rg2	=	0.04	MOhm	Ri	=	1	MOhm
Rk	=	325	Ohms	S (Vg1= -28V)	=	22	µA/V
Vg1	=	-2.5	V	Ri(Vg1= -28V)	=	10	MOhms
Ia	=	6	mA	Req	=	6500	Ohms
Ig2	=	1.75	mA				

Va	=	100	V	S	=	1.9	mA/V
Rg2	=	0.04	MOhm	Ri	=	0.8	MOhm
Rk	=	325	Ohms	S (Vg1= -17V)	=	19	µA/V
Vg1	=	-1.4	V	Ri(Vg1= -17V)		10	MOhms
Ia	=	3.3	mA	Req	=	5500	Ohms
Ig2	=	1	mA				

Cag < 0.002 pF

UF 42

Pentode

Vf = 21 V
If = 0.1 A
Indirect

Wide band amplifier

Va	=	170	V	Ig2	=	2.8	mA
Vg3	=	0	V	S	=	8	mA/V
Vg2	=	170	V	Ri	=	0.3	MOhm
Vg1	=	-2	V	Req	=	1060	Ohms
Ia	=	10	mA	f	=	100	Mc/s

Cag1 < 0.006 pF

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UF 43 Variable mu pentode		Vf = 21 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Va = 170 V Vg3 = 0 V Rg2 = 0.01 MOhm Rk = 105 Ohms Vg1 = -2 V Ia = 15 mA	Ig2 = 3.5 mA S = 6.3 mA/V Ri = 0.3 MOhm S (Vg1= -19V)= 63 µA/V Req = 1800 Ohms
				Va = 100 V Vg3 = 0 V Rg2 = 0.01 MOhm Rk = 105 Ohms Vg1 = 1.05 V Ia = 7.5 mA	Ig2 = 2.5 mA S = 5.8 mA/V Ri = 0.3 MOhm S (Vg1= -11V)= 58 µA/V Req = 1500 Ohms
				Cag1 < 0.006 pF	
UF 80 Pentode		Vf = 19 V If = 0.1 A Indirect	R.F. or I.F. amplifier	Va = Vg2 = 170 V Vg3 = 0 V Vg1 = -2 V Ia = 10 mA	Ig2 = 2.5 mA S = 7.4 mA/V Ri = 0.4 MOhm Req = 1000 Ohms

UF 85

Variable mu pentode

Vf = 19 V
If = 0.1 A
Indirect

Wide band amplifier

Va	=	200	V	Ig2	=	3.1	mA
Vg3	=	0	V	S	=	6.15	mA/V
Rg2	=	27	kOhms	Ri	=	0.2	MOhm
Rk	=	160	Ohms	S (Vg1= -28V)=		61.5	µA/V
Vg1	=	-2.3	V	Ri(Vg1= -28V)>		5	MOhms
Ia	=	11.4	mA	Req	=	1500	Ohms

Cag1 < 0.007 pF

UF 89

Variable mu pentode

Vf = 12.6 V
If = 0.1 A
Indirect

Typical characteristics

Va	=	170	V	Vg1	=	-1	V
Vg2	=	100	V	Ig2	=	4.4	mA
Vg3	=	0	V	S	=	4.4	mA/V
Ia	=	12	mA	Ri	=	0.3	MOhm

Cag1 = <0.002 pF

R.F. or I.F. amplifier

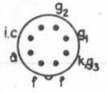
Va = Vb =		200	V	Ia	=	11.1	mA
Vg3	=	0	V	Ig2	=	3.8	mA
Rg2	=	0.024	MOhm	S	=	3.85	mA/V
Rk	=	130	Ohm	S (Vg1= -20V)=		0.16	mA/V
Vg1	=	-1.95	V	Req	=	4200	Ohms

A.F. amplifier

Vb	=	170	V	Rg1	=	1	MOhm
Ra	=	0.22	MOhm	Ia	=	0.63	MOhm
Rg2	=	0.62	MOhm	Ig2	=	0.20	mA
Rk	=	1800	Ohm	Vo/Vi	=	95	

Vo (d = 1.1%)= 8 Veff

(continued)

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UF 89 (continued)			A.F. amplifier	Vb = 170 V Ra = 0.1 MOhm Rg2 = 0.47 MOhm Rk = 0 Ohm	Rg1 = 10 MOhms Ia = 1 mA Ig2 = 0.33 mA Vo/Vi = 135 Vo (d = 2.15%) = 8 Veff
UL 41 Output pentode		Vf = 45 V If = 0.1 A Indirect	Output amplifier class A	Va = Vg2 = 170 V Vg1 = 10.4 V Ia = 53 mA Ig2 = 10 mA S = 9.5 mA/V	Ri = 0.02 MOhm Ra = 3000 Ohms Wo(d = 10%) = 4.25 W Vi = 6 Veff
				Va = Vg2 = 110 V Vg1 = -6.4 V Ia = 32 mA Ig2 = 6 mA S = 8.5 mA/V	Ri = 0.018 MOhm Ra = 3000 Ohms Wo(d = 10%) = 1.7 W Vi = 4.2 Veff
				Va = Vg2 = 100 V Vg1 = -5.7 V Ia = 29 mA Ig2 = 5.5 mA S = 8 mA/V	Ri = 0.018 MOhm Ra = 3000 Ohms Wo(d = 10%) = 1.35 W Vi = 3.75 Veff

UL 41

Push-pull amplifier class A B

Va = Vg2 = 170 V	Ig2o = 2 x 8.8 mA
Rk = 100 Ohms	Ig2 max = 2 x 16.5 mA
Raa = 4000 Ohms	Wo(d = 4 %) = 9 W
Iao = 2 x 44 mA	Vi = 9.3 Veff
Ia max = 2 x 49 mA	
Va = Vg2 = 100 V	Ig2o = 2 x 4/6 mA
Rk = 100 Ohms	Ig2 max = 2 x 6.8 mA
Raa = 4000 Ohms	Wo(d = 3.5%) = 2.2 W
Iao = 2 x 24 mA	Vi = 4.6 Veff
Ia max = 2 x 27 mA	

UL 44

Line time base output pentode

Vf = 45 V
If = 0.1 A
Indirect

Typical characteristics

Vaop = 3000 V*	Vg1 = -13.5 V
Va = 175 V	Ia = 28.5 mA
Vg3 = 0 V	Ig2 = 4.7 mA
Vg2 = 175 V	S = 7 mA/V

*Max pulse time 15% of a cycle with a maximum of 15 μ sec.

UL 84

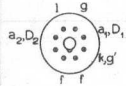
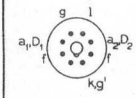
Output pentode

Vf = 45 V
If = 0.1 A
Indirect

Typical characteristics

(continued)

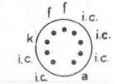
Va = Vg2 = 165 V	Ig2 = 4.5 mA
Vg1 = -12 V	S = 10.5 mA/V
Ia = 73 mA	Ri = 0.02 MOhm
Va = Vg2 = 100 V	Ig2 = 2.8 mA
Vg1 = -7 V	S = 9 mA/V
Ia = 43 mA	Ri = 0.02 MOhm

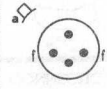
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UL 84 (continued)		Vf = 45 V If = 0.1 A Indirect	Output amplifier class A	Va = Vg2 = 165 V Vg1 = -12 V Ia = 73 mA Ig2 = 4.5 mA	Ra = 2400 Ohms Wo(d = 10%) = 5.6 W Vi = 6.5 Veff
				Va = Vg2 = 100 V Vg1 = -7 V Ia = 43 mA Ig2 = 2.8 mA	Ra = 2400 Ohms Wo(d = 10%) = 1.9 W Vi = 4 Veff
UM 4 Tuning indicator with two sensitivities		Vf = 12.6 V If = 0.1 A Indirect	Tuning indicator	Vb = Vl = 200 V Ra1 = Ra2 = 1 MOhm I1(Vg = 0 V) = 1.4 mA	Vg= 0 V($\propto$ 1= $\propto$ 2-90°) Vg= -4.2V($\propto$ 1 = min) Vg= -12.5V($\propto$ 2 = min)
				Vb = Vl = 100 V Ra1 = Ra2 = 1 MOhm I1(Vg = 0 V) = 0.4 mA	Vg= 0 V($\propto$ 1= $\propto$ 2-90°) Vg= -2.5V($\propto$ 1 = min) Vg= -8 V($\propto$ 2 = min)
UM 34 Tuning indicator with two sensitivities		Vf = 12.6 V If = 0.1 A Indirect	Tuning indicator	For further data please refer to type U M 4	

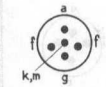
UM 80 Tuning indicator		Vf = 19 V If = 0.1 A Indicator	Tuning indicator	Vb = Vl = 200 V Ra = 0.5 MOhm Rg = 3 MOhm Vg = -1 V(d-4°) Vg = -14 V(d-50°)	Il(Vg= - 1V)=5.7 mA Il(Vg= -14V)=7.0 mA Ia(Vg= - 1V)=0.35 mA Ia(Vg= -14V)=0.01 mA
				Vb = Vl = 170 V Ra = 0.5 MOhm Rg = 3 MOhm Vg = -1 V(d-5°) Vg = -12 V(d-50°)	Il(Vg= - 1V)=4.5 mA Il(Vg= -12V)=5.7 mA Ia(Vg= - 1V)=0.3 mA Ia(Vg= -12V) =0.01 mA
				Vb = Vl = 100 V Ra = 0.5 MOhm Rg = 3 MOhm Vg = -1V(d-8°) Vg = -7V(d-50°)	Il(Vg= -1V)=2.1 mA Il(Vg= -7V)=2.5 mA Ia(Vg= -1V)=0.18 mA Ia(Vg= -7V)=0.01 mA
UY 1 N Half-wave rectifier		Vf = 50 V If = 0.1 A Indirect	Half-wave rectifier (continued)	Vtr = max 250 Veff Io = max 140 mA Vfkp = 550 V C = max 60 µF	C filt = 60 µF Rt = min 175 Ohms C filt = 32 µF Rt = min 125 Ohms C filt = 16 µF Rt = min 75 Ohms

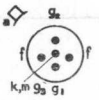
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UY 1 N (continued)		Vf = 50 V If = 0.1 A Indirect	Half-wave rectifier	Vtr = 170 V Io = max 140 mA Vfkp = 500 V	C filt = 60 µF Rt = min 100 Ohms C filt = 32 µF Rt = min 75 Ohms C filt = 16 µF Rt = min 30 Ohms
				Vtr = 127 V Io = max 140 mA Vfkp = 500 V	C filt = 60 µF Rt = 0 Ohm
UY 11 Half-wave rectifier		Vf = 50 V If = 0.1 A Indirect	Half-wave rectifier	For further data please refer to type U Y I N	
UY 21 Half-wave rectifier		Vf = 50 V If = 0.1 A Indirect	Rectifier	For further data please refer to type U Y I N	

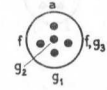
UY 41 Half-wave rectifier		Vf = 31 V If = 0.1 A Indirect	Rectifier	Vtr = max 250 Veff Io = max 100 mA Vfkp = max 550 V	C filt = max 50 µF Rt = min 210 Ohms
				Vtr = 220 Veff Io = max 100 mA Vfkp = max 550 V	C filt = max 50 µF Rt = min 160 Ohms
				Vtr = 127 Veff Io = max 100 mA Vfkp = max 550 V	C filt = max 50 µF Rt = 0 Ohm
UY 42 Half-wave rectifier				Please refer to type U Y 41	
UY 82 Half-wave rectifier		Vf = 55 V If = 0.1 A Indirect	Rectifier (continued)	Vtr = 250 Veff Io = 180 mA Vo = 195 V	C filt = 60 µF Rt = 125 Ohms
				Vtr = 220 Veff Io = 180 mA Vo = 195 V	C filt = 60 µF Rt = 65 Ohms

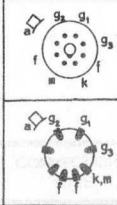
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
UY 82 (continued)			Rectifier	Vtr = 127 Veff Io = 180 mA Vo = 127 V	C filt = 60 µF Rt = 0 Ohm
UY 85		Vf = 38 V If = 0.1 A Indirect	Rectifier	Vtr = 250 Veff Io = 110 mA Vo = 245 V	C filt = 100 µF Rt = 100 Ohms
				Vtr = 220 Veff Io = 110 mA Vo = 215 V	C filt = 100 µF Rt = 90 Ohms
Half-wave rectifier				Vtr = 127 Veff Io = 110 mA Vo = 135 V	C filt = 100 µF Rt = 0 Ohm
1561		Vf = 4 V If = 2 A Direct	Rectifier	Vtr = max 2 x 500 Veff Io = max 120 mA Vtr = max 2 x 400 Veff Io = max 140 mA Vtr = max 2 x 300 Veff Io = max 160 mA	C filt = max 60 µF Rt = min 2 x 100 Ohms C filt = 32 µF Rt = min 2 x 50 Ohms
Full-wave rectifier					

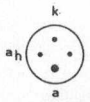
1805 Full-wave rectifier		Vf = 4 V If = 1 A Direct	Rectifier	For further data please refer to type A Z 1	
1832 Half-wave rectifier		Vf = 4 V If = 1.3 A Direct	Rectifier	Vtr = max 800 Veff Io = max 100 mA Vtr = max 700 Veff Io = max 120 mA	C filt = max 12 uF Rt = min 200 Ohms
1875 Half-wave rectifier		Vf = 4 V If = 2.3 A Direct	Rectifier	Vtr = max 5000 Veff Vinv = max 14000 V Io = max 5 mA	C filt = max 0.5 uF Rt = min 0.01 MOhm
1876 Half-wave rectifier		Vf = 4 V If = 0.3 A Direct	Rectifier	Vtr = 350 Veff V inv = max 3500 V Io = max 5 mA	C filt = max 0.5 uF Rt = 0 Ohm
1877 Half-wave rectifier		Vf = 4 V If = 0.65 V Indirect	Rectifier	Vtr = max 5000 Veff Vinv = max 15000 V Io = max 3 mA	C filt = max 0.5 uF Rt = 0.02 MOhm

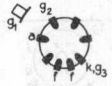
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
1878 Half-wave rectifier		Vf = 4 V If = 0.7 A Indirect	Rectifier	Vtr = max 10500 Veff	Io = max 2 mA
4613 Output triode		Vf = 4 V If = 1 A Direct	Output amplifier class A	Va = 500 V Vg = -68 V Ia = 24 mA S = 3 mA/V μ = 6	Ri = 2000 Ohms Ra = 0.0115 MOhm Wo(d = 5 %) = 5.3 W Vi = 46 Veff
				Va = 250 V Vg = -22 V Ia = 48 mA S = 3.5 mA/V μ = 6	Ri = 1700 Ohms Ra = 1600 Ohms Wo(d = 5 %) = 1.5 W Vi = 14.5 Veff
			Push-pull output amplifier class B	Va = 500 V Vg = -70 V Raa = 0.012 MOhm Iao = 2 x 20 mA	Ia max = 2 x 37.5 mA Wo(d = 1 %) = 15 W Vi = 48 Veff
4614 Output triode		Vf = 4 V If = 1 V Indirect	Output amplifier class A	Va = 200 V Vg = -16 V Ia = 12 mA S = 1.3 mA/V Ri = 7000 Ohms	μ = 9 Ra = 0.027 MOhm Wo = 0.22 W Vi = 10.5 Veff

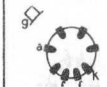
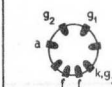
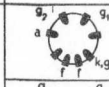
4624 Output triode		Vf = 7.2 V If = 1.1 A Direct	Output amplifier class A	Va = 800 V Vg = -90 V Ia = 35 mA S = 2.3 mA/V μ = 7	Ri = 3000 Ohms Ra = 0.011 MOhm Wo(d = 5 %) = 9 W Vi = 60 Veff
			Push-pull class A B	Va = 800 V Rk = 1100 Ohms Raa = 0.015 MOhm Iao = 2 x 40 mA	Ia max = 2 x 44 mA Wo(d = 1.1 %)=25 W Vi = 63 Veff
			Push-pull class B	Va = 800 V Vg = -92 V Raa = 0.01 MOhm Iao = 2 x 30 mA	Ia max = 2 x 59 mA Wo(d = 1.1 %) = 30 W Vi = 60 Veff
4636 Pentode		Vf = 4 V If = 1.1 A Indirect	Typical characteristics	Va = 200 V Vg2 = 100 V Vg1 = -2 V Ia = 3 mA	Ig2 = 1.2 mA S = 2.3 mA/V Ri = 2.2 MOhms
				Cag1 < 0.006 pF	
4641 Output triode		Vf = 4 V If = 2.1 A Direct	Push-pull output amplifier class A B	Va = 1000 V Rk = 1700 Ohms Raa = 0.035 MOhm Iao = 2 x 25 mA	Ia max = 2 x 28 mA Wo(d = 4.5%) = 29 W Vi = 58 Veff
			(continued)		

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
4641 (continued)			Push-pull class B	Va = 1500 V Vg = -144 V Raa = 0.04 MOhm Iao = 2 x 10 mA	Ia max = 2 x 41 mA Wo(d = 1.9%) = 68 W Vi = 105 Veff
				Va = 1000 V Vg = -93 V Raa = 20 kOhm Iao = 2 x 10 mA	Ia max = 2 x 45 mA Wo(d = 2.4%) = 41 W Vi = 65 Veff
4646 Half-wave rectifier		Vf = 4 V If = 1.3 A Direct	Rectifier	Vtr = max 1000 Veff Io = max 75 mA	Rt = min 200 Ohms C = max 12 µF
4650 Output pentode		Vf = 4 V If = 2 A Direct	Output amplifier class A	Va = 550 V Vg2 = 200 V Vg1 = -30 V Rk = 650 Ohms Ia = 45 mA Ig2 = 1.4 mA	S = 3.2 mA/V Ri = 0.030 MOhm Ra = 0.012 MOhm Wo(d = 10%) = 12 W Vi = 15.5 Veff
				Va = Vg2 = 300 V Vg1 = -40 V Rk = 455 Ohms Ia = 83 mA Ig2 = 4.6 mA	S = 3.9 mA/V Ri = 0.02 MOhm Ra = 3600 Ohms Wo(d = 10%) = 10.3 W Vi = 20 Veff

4650			Push-pull output amplifier class A B	Va = 550 V Vg2 = 250 V Rk = 445 Ohms Raa = 0.012 MOhm Iao = 2 x 45 mA Ia max= 2 x 53 mA	Ig2o = 2 x 0.8 mA Ig2 max = 2 x 7.4 mA Wo(d = 4.3%) = 41 W Vi = 37 Veff
			Push-pull output amplifier class B	Va = Vg2 = 300 V Vg1 = -63 V Raa = 4500 Ohms Iao = 2 x 15 mA Ia max = 2 x 72.5 mA	Ig2o = 2 x 0.4 mA Ig2 max = 2 x 14.3 mA Wo(d = 4.5%) = 26.5 W Vi = 46 Veff
4652 Full-wave rectifier		Vf = 4 V If = 2.4 A Direct	Rectifier	For further data please refer to type A X 1	
4654 K Output pentode **4654 P**		Vf = 6.3 V If = 1.35 A Indirect	Output amplifier class A (continued)	Va = 250 V Vg3 = 0 V Vg2 = 275 V Rk = 175 Ohms Ia = 72 mA Ig2 = 8 mA	S = 8.5 mA/V Ri = 0.022 MOhm Ra = 3500 Ohms Wo(d = 11.4%) = 9.2 W Vi = 11.5 Veff

TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
K 4654 P			Push-pull output amplifier class A B	Vb = 375 V Rg2 = 500 Ohms Vg3 = 0 V Rk = 195 Ohms Iao = 2 x 53 mA	Ia max = 2 x 66.5 mA Ig2o = 2 x 6.5 mA Ig2 max= 2 x 15.5 mA Wo(d = 3.5%) = 26 W Vi = 22.5 Veff
(continued)			Push-pull output amplifier class A B	Vb = 375 V Rg2 = 500 Ohms Vg3 = 0 V Vg1 = -32 V Iao = 2 x 20 mA	Ia max = 2 x 79 mA Ig2o = 2 x 2.2 mA Ig2 max= 2 x 17 mA Wo(d = 2.5%) = 35 W Vi = 22.4 Veff
4657 Triode		Vf = 4 V If = 1 A Indirect	Typical characteristics	Va = 200 V Vg = -1.5 V Ia = 1 mA	S = 2.2 mA/V μ = 99 Ri = 0.045 MOhm
4662 Neon tuning indicator			Tuning indicator	Va = 150 - 170 V	Ia = max 2 mA Iah = 40 - 50 μA

4682 Output pentode		Vf = 4 V If = 1 A Indirect	Push-pull output amplifier class A B	Va = 375 V Vg2 = 250 V Rk = 540 Ohms Raa = 0.015 MOhm Iao = 2 x 24 mA Ia max = 2 x 29 mA	Ig2p = 2 x 3.5 mA Ig2 max = 2 x 4 mA Wo(dt = 5.2%) = 14 W Vi = 25 Veff
			Push-pull output amplifier class B	Va = 375 V Vg2 = 250 V Vg1 = -32 V Raa = 9000 Ohms Iao = 2 x 20 mA Ia max = 2 x 45 mA	Ig2o = 2 x 3 mA Ig2 max = 2 x 5.5 mA Wo(d = 1.5%) = 19 W Vi = 22 Veff
4683 Output triode		Vf = 4 V If = 0.95 A Direct	Push-pull output amplifier class A B	Va = 350 V Rk = 850 Ohms Raa = 8000 Ohms Iao = 2 x 43 mA	Ia max = 2 x 46 mA Wo(d = 2.3%) = 15.6 W Vi = 51 Veff
			Push-pull output amplifier class B	Va = 350 V Vg = -75 V Raa = 5000 Ohms Iao = 2 x 35 mA	Ia max = 2 x 70 mA Wo(d = 2.1%) = 20 W Vi = 49 Veff

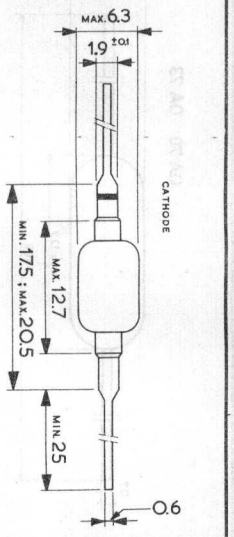
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
4686 Gas-filled triode		Vf = 4 V If = 1.2 A Indirect	H.F. time base oscillator	Vakp = 300 V Vagp = 350 V Ia = max 3 mA Iap = max 300 mA	Varc = 17 V Vfk = 100 V F = max 50 kc/s
4688 Output pentode		Vf = 4 V If = 2 A Indirect	Push-pull output amplifier class A B	Va = 375 V Vg2 = 275 V Rk = 165 Ohms Raa = 6500 Ohms Iao = 2 x 48 mA Ia max = 2 x 62 mA	Ig2o = 2 x 5 mA Ig2 max= 2 x 9 mA Wo(d = 2.3%) = 28.5 W Vi = 16 Veff
4689 K Output pentode **4689 P**		Vf = 6.3 V If = 1.35 A Indirect	Push-pull output t amplifier class A B	For further data please refer to type 4688	
4690 Gas-filled triode		Vf = 4 V If = 1.3 A Indirect	H.F. time base oscillator	Va = 500 V Vagp = 600 V Ia = 10 mA Iap = 750 mA	Rg min = 1000 Ohm/V Rg = max 0.5 MOhm Varc = 50 V F = max 150 kc/s

4694 Output pentode		Vf = 6.3 V If = 0.9 A Indirect	Typical characteristics	Va = 400 V Vg2 = 425 V Vg1 = -15.6 V Ia = 22 mA	Ig2 = 2.8 mA S = 7 mA/V Ri = 0.075 MOhm
				Va = 375 V Vg2 = 250 V Vg1 = 7.7 V Ia = 24 mA	Ig2 = 2.5 mA S = 8 mA/V Ri = 0.070 MOhm
			Push-pull output amplifier class A B	Va = 400 V Vg2 = 425 V Ri = 315 Ohms Ia = 0.02 MOhm Iao = 2 x 22 mA Ia max = 2 x 25 mA	Ig2o = 2 x 2.8 mA Ig2 max = 2 x 6.2 mA Wo(d = 5 %) = 13 W Vi = 9 Veff
				Va = 375 V Vg2 = 250 V Rk = 145 Ohms Raa = 0.013 MOhm Iao = 2 x 24 mA	Ia max = 2 x 30 mA Ig2o = 2 x 2.5 mA Ig2 max= 2 x 5 mA Wo(d = 2.3%) = 12 W Vi = 6.9 Veff
4699 Output pentode		Vf = 6.3 V If = 1 A Indirect	Output amplifier class A (continued)	Va = Vg2 = 250 V Rk = 90 Ohms Ia = 72 mA Ig2 = 8 mA S = 14.5 mA/V	Ri = 0.020 MOhm Ra = 3500 Ohms Wo(d = 10%) = 8 W Vi = 5.3 Veff

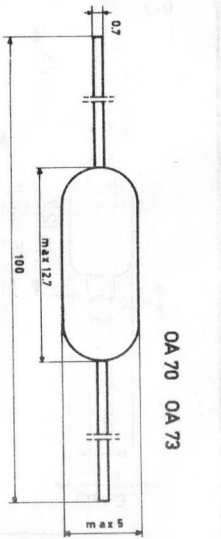
TYPE	BASE CONNECTIONS	HEATER DATA	APPLICATIONS	OPERATING CHARACTERISTICS	
4699 (continued)			Push-pull output amplifier class A B	Vb = 425 V Rg2 = 0.022 MOhm Rk = 170 Ohms Raa = 8000 Ohms Iao = 2 x 46 mA	Ia max = 2 x 58 mA Ig2o = 2 x 5 mA Ig2 max = 2 x 14.5 mA Wo(d = 5 %) = 29 W Vi = 17 Veff
				Vb = 375 V Rg2 = 700 Ohms Rk = 125 Ohms Raa = 6000 Ohms Iao = 2 x 52 mA	Ia max = 2 x 64 mA Ig2o = 2 x 6.5 mA Ig2 max = 2 x 16.5 mA Wo(d = 4 %) = 27.5 W Vi = 14 Veff

G E R M A N I U M D I O D E S

TYPE	APPLICATIONS	OPERATING CHARACTERISTICS	
OA 50 (1 N 34 A)	General purpose diode	Id (Vd= - 1V)= 5 mA -Id(Vd= -10V)= 30 µA -Id(Vd= -50V)=500 µA	Vd inv = max 60 V Id = max 50 mA tamb = max + 75° C min -50° C
		Cdk = 1 pF	
OA 51 (1 N 54 A)	High back resistance diode	Id (Vd= +1V)= 5 mA -Id(Vd= -10V)= 70 µA -Id(Vd= -50V)=100 µA	Vd inv = max 50 V Id = max 50 mA tamb = max + 75° C min - 50° C
		Cdk = 1 pF	

TYPE	APPLICATIONS	OPERATING CHARACTERISTICS		DIMENSIONS
OA 52 (1 N 57 A)	General purpose diode	Id (Vd= + 1V)= 4 mA -Id(Vd= -10V) < 50 µA -Id(Vd= -75V) < 500 µA	Vd inv = max 80 V Id = max 40 mA tamb = max+ 75° C min -50° C	
		Cdk = 1 pF		
OA 53 (1 N 58 A)	100 volt diode	Id (Vd= + 1V)= 4 mA -Id(Vd= -10V)< 50 µA -Id(Vd= -100V)<600 µA	Vd inv = max 100 V Id = max 50 mA tamb = max+ 75° C min -50° C	
		Cdk = 1 pF		
OA 55 (1 N 38 A)	100 volt diode	Id (Vd= + 1V)= 4 mA -Id(Vd= -3V) < 5 µA Id (Vd= -100V)< 500 µA	Vd inv = max 100 V Id = max 50 mA tamb = max+ 75° C min -50° C	
		Cdk = 1 pF		
OA 56 (1 N 86)	General purpose diode	Id (Vd= + 1V) > 4 mA -Id(Vd= -10V) < 50 µA -Id(Vd= -50V) < 833 µA	Vd inv = max 70 V Id = max 50 mA tamb = max+ 75° C min -50° C	
		Cdk = 1 pF		

TYPE	APPLICATIONS	OPERATING CHARACTERISTICS	DIMENSIONS
OA 60 **(1 N 87)**	Video detector diode	V invp = 30 V Id = max 5 mA t amb = max + 60° C = min -60° C Cdk = 1 pF	
OA 61 **(1 N 88)**	D.C. restorer diode	Id (Vd= + 1V)>2.5 mA -Id (Vd= -50V)=max 100 µA Id = max 5 mA V inv = max 85 V Idp = max 15 mA Isurge = max 500 mA max + 60° C t amb = min -50° C Cdk = 1 pF	
OA 70	Video detector diode	Vd inv = max 22.5 V Id = max 50 mA t amb = max+ 75° C = min -50° C Cdk = 1 pF	
OA 73	Video detector diode	Vd inv = max 22.5 V Id = max 50 mA t amb = max + 75° C = min -50° C Cdk = 1 pF	



VOLTAGE STABILIZERS

INDUSTRIAL RECTIFIERS

VOLTAGE STABILIZERS

Type	Base connections	Stabilized voltage at stated quiescent current (V)	Ignition voltage (V)	Quiescent current (mA)	Upper current limit for stabilization (mA)	Lower current limit for stabilization (mA)	Limit value of the A.C. resistance (Ohms)
85 A1		83 - 87	125	4	8	1	430
85 A2		83 - 87	125	4	6	1	400

INDUSTRIAL RECTIFIERS

Type	Base connections	Heater data	Vtr max (Veff)	Vtr min (Veff)	Vinv p max (V)	Vign (V)	Varc (V)	Io (A)	Iap (A)	Ra min (Ohms)
1163 Half-wave rectifier		Vf = 2.25 V If = 17 A Th = 3 sec	90	20	250	16	11	6	36	0.5
1164 Half-wave rectifier		Vf = 2.5 V If = 25 A Th = 15 sec	60	20	225	16	9	15	90	0.3

PICTURE TUBES

PICTURE TUBES
TYPE NOMENCLATURE

The type nomenclature for our picture tubes consists of two letters followed by two sets of figures.

These symbols provide information concerning the methode of deflecting and focusing the electron beam, the type of luminescent screen and the diameter of the screen.

The first letter indicates the method of deflection and focusing.

M Magnetic focusing and deflection.

The second letter indicates the properties of the luminescent screen.

W Medium persistence. White fluorescence

The first group of figures, immediately following, the letters, indicates the diameter of the luminescent screen in cm:

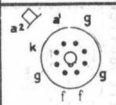
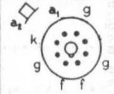
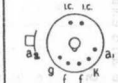
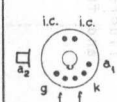
Thus 13 represents a 13 cm screen
31 represents a 31 cm screen

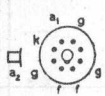
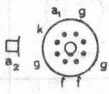
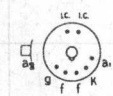
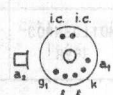
The second group of figures is a serial number indicating a particular design or development.

Example:

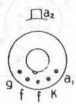
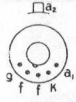
MW 31 - 16 Cathode ray tube of 31 cm screen diameter having a medium persistance fluorescence and employing magnetic deflection and focusing.

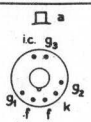
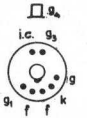
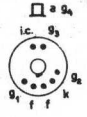
PICTURE TUBES

TYPE	BASE CONNECTIONS	HEATER DATA	DEFLECTION DATA	OPERATING CHARACTERISTICS
MW 22—7		Vf = 6.3 V If = 0.6 A Indirect		For further data please refer to type MW 22-17
MW 22—14				For further data please refer to type MW 22-17
MW 22—16		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va2 = 9000 V, Va1 = 160 V, -Vg = 20 - 50 V, Vfk = max 150 V Va2 = 7000 V, Va1 = 160 V, -Vg = 20 - 50 V, Vfk = max 150 V Cg = 8 pF
MW 22—17		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic	Va2 = 7000 V, Va1 = 160 V, -Vg = 20 - 50 V, Vfk = max 150 V Cg = 6 pF

MW 22—18				Please refer to type MW 22-17	
MW 31—7		Vf = 6.3 V If = 0.6 A Indirect		For further data please refer to type MW 31-17	
MW 31—14				For further data please refer to type MW 31-17	
MW 31—16		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va2 = 9000 V Va1 = 160 V -Vg = 20 - 50 V Vfk = max 150 V Va2 = 7000 V Va1 = 160 V -Vg = 20 - 50 V Vfk = max 150 V Cg = 8 pF	
MW 31—17		Vf = 6.3 V If = 0.3 A	Double magnetic	Va2 = 7000 V Va1 = 160 V -Vg = 20 - 50 V Vfk = max 150 V Cg = 6 pF	

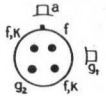
PICTURE TUBES

TYPE	BASE CONNECTIONS	HEATER DATA	DEFLECTION DATA	OPERATING CHARACTERISTICS
MW 31—18				Please refer to type MW 31-17
MW 31—74				Please refer to type MW 31-16
MW 36—22		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va2 = 10.000 V Va1 = 250 V -Vg = 33 - 72 V Vfk = max 125 V Cg = 6 pF
MW 36—24				Please refer to type MW 36-22
MW 41—1		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va2 = 12.000 V Va1 = 250 V -Vg = 33 - 72 V Vfk = max 125 V Cg = 6 pF

MW 43—43		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va = 14000 V Vg2 = 300 V Cg = 7 pF	-Vg = 40 - 86 V Vfk = max 125 V
MW 43—64		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Vg4 = 14000 V Vg2 = 300 V Cg = 7 pF	-Vg1 = 40 - 86 V Vfk = max 125 V
MW 53—20		Vf = 6.3 V If = 0.3 A Indirect	Double magnetic with ion trap	Va = 14000 V Vg2 = 300 V Cg = 7 pF	-Vg1 = 40 - 80 V Vfk = max 125 V

THYRATRONS

THYRATRONS

TYPE		PL 17	PL 2D21	PL 57	PL 105
Base connections					
Heater data:					
Filament voltage	Vf	2.5 V	6.3 V	5 V	5 V
Filament current	If	5 A	0.6 A	4.5 A	10 A
Cathode type		Direct	Indirect	Indirect	Indirect
Heating-up time	Th	5 sec	10 sec	300 sec	300 sec
Arc voltage	Varc	16 V	8 V	16 V	16 V
Ionisation time	Tion	10 μ sec	0.5 μ sec	10 μ sec	10 μ sec
Deionisation time	Tdion	1000 μ sec	35 - 75 μ sec	1000 μ sec	1000 μ sec
Control characteristic		neg	neg	neg	neg/pos
Peak anode voltages					
inverse (max)	Va inv p	5000	1300	1500	2500
forward	Va p	2500	650	1000	2500

Shield grid voltage Before conduction during conduction	 Vg2 ign p Vg2 arc	 - -	 - 100 V - 10 V	 - -	 - 500 V - 10 V
Anode current instant. above 25c/s(max) instant. below 25c/s(max) average	 Ia p Ia p Ia	 2 1 0.5	 Ikp = 0.5 A - Ik = 0.1 A	 15 5 2.5	 40 12.8 6.4
Control grid current instantaneous (max) average (max)	 Ig1 p Ig1	 0.25 0.05	 - 0.01	 1 0.25	 1 0.25
Shield grid current instantaneous (max) average	 Ig2 p Ig2	 - -	 - 0.01	 - -	 2 0.5
Averaging time of currents Temperature limits Recommended temperature Overall dimensions	Tav	15 sec 40 to 80° C 40° C 62 x 169 mm	30 sec - 75 to + 90° C - 19 x 54 mm	15 sec 40 to 80° C 45° C 62 x 185 mm	15 sec 40 to 80° C 40° C 97 x 286 mm

TRANSMITTING VALVES

TRANSMITTING VALVES

Type	Base	Overall dimensions	Heater data	Va max	Vg2 max	Wa max	Class of service	Full ratings		
								up to	Wo	η
				V	V	W		Mc/s	W	%
PE 04/10 E (837)* Pentode	7-pin small	51 X 150	Vf = 12 V If =0.65 A Indirect	500	300	10	C telegr. B teleph. Cag2 mod Cg3 mod	20 20 20 20	15 4 10 2	60 31 62 33
PE 06/40 E (1625)* Pentode	7-pin small	51 x 146	Vf =12.6 V If =0.65 A Indirect	600	300	25	C telegr. B teleph Cag2 mod C fr. mult. B mod	20 20 20 2/4 -	45 11 40 27 100	69 31 70 52 71
QB 2/250 (813)* Pentode	Giant 7-pin	65 x 191	Vf = 10 V If = 5 A Direct	2250	800	100	C telegr. B teleph. Cag2 mod B mod. 1)	30 30 30	275 50 180 515	76 33 70 73
QB 3/300 (4—125A)* Tetrode	Giant 5-pin	62 x 130	Vf = 5 V If = 6.5 A Direct	3000	600	125	C telegr. B teleph. Cag2 mod B mod. 1)	120 120 120	375 58 300 550	75 32 79 72

* American type number 1) two valves

QB 3.5/750 (4—250A)* Tetrode	Giant 5-pin	87 x 151	Vf = 5 V If = 14.1 A Direct	4000	600	250	C telegr. B teleph. Cag2 mod. B mod.	75 75 75	1000 126 510 635	80 33 75 68
QE 06/50 (807)* Pentode	5-pin small	52.5 x 146	Vf = 6.3 V If = 0.9 A Indirect	600	300	25	C telegr. B teleph. Cag2 mod. B mod. 1)	60 60 60	40 12.5 27.5 80	66 33 70 66
QEL 1/150 (4 X—150A)*	8-pin Loctal	42 x 70	Vf = 6 V If = 2.6 A	1250	30	150	C telegr. Cag2 mod. B mod.	165 165 -	195 140 425	78 70 72
QQE 04/20 (832 A)* Double tetrode	Septar	51 x 84	Vf = 6.3 V If = 1.6 A Vf = 12.6 V If = 0.8 A Indirect	600	250	2 x 7.5	C telegr Cag2 mod.	200 200	26 17	71 76
QQE 06/40 (AX 9905)* (approx 829 B)* Double tetrode	Septar	49 x 122	Vf = 6.3 V If = 1.8 A Vf = 12.6 V If = 0.9 A Indirect	600	250	2 x 20	C telegr. Cag2 mod. C freq. mult. B mod. 1)	200 200 50/150	90 50 20 73	71 73 33 72
TB 1/60 G (834)* Triode	G	72 x 173.5	Vf = 7.5 V If = 3.25 A Direct	1250	-	50	C telegt. 1) B teleph. 1) Ca mod. 1) B mod. 1)	60 60 60 -	140 40 116 110	58 28 64 69

* American type number 1) two valves

RECTIFIERS FOR TRANSMITTING PURPOSES

SINGLE ANODE MERCURY VAPOUR-OR XENON FILLED RECTIFIERS FOR TRANSMITTING PURPOSES

Type and filling	Base	Overall dimensions (mm)	Heater data	Limiting values (max)	Rectifier circuit	Vtr kV	Vo kV	Io A	Wo_{tot} kW
DCG 4/1000 G (866 A)* Mercury vapour	Medium 4 pins	49.5 x 162	Vf = 2.5 V If = 4.8 A Direct	Va inv p =10kV Io = 0.25 A	single phase full-wave 3 phase half-wave 3 phase full-wave	3.5 4.1 7	3.2 4.8 9.6	0.5 0.75 0.75	1.6 3.6 7.2
DCG 5/5000 GB (872 A)* Mercury vapour	Jumbo 4 pins	52 x 213	Vf = 5 V If = 7 A Direct	Va inv p =12kV Io = 1.5 A	single phase full-wave 3 phase half-wave 3 phase full-wave	4.2 4.9 8.4	3.8 5.7 11.4	3 4.5 4.5	11.4 25.6 51.3
DCG 9/20 (869 B)* Mercury vapour (grid controlled)	3 pins spec	120 x 375	Vf = 5 V If = 12.5 A Direct	Va inv = 21 kV Io = 2.5 A	single phase full-wave 3 phase half-wave 3 phase full-wave	7.4 8.6 14.8	6.7 10 20	5 7.5 7.5	33.5 75 150
DCX 4/1000 (3 B 28)* Xenon	Medium 4 pins	53 x 156	Vf = 2.5 V If = 5 A Direct	Va inv p =10kV Io = 0.25 A	single phase full-wave 3 phase half-wave 3 phase full-wave	3.5 4.1 7.1	3.2 4.8 9.6	0.5 0.75 0.75	1.6 3.6 7.2
DCX 4/5000 (4 B 32)* Xenon	Jumbo 4 pins	59 x 216	Vf = 5 V If = 7.1 A Direct	Va inv p =10 kV Io = 1.25 A	single phase full wave 3 phase half-wave 3 phase full-wave	3.5 4.1 7.1	3.2 4.8 9.6	2.5 3.75 3.75	8 18 36

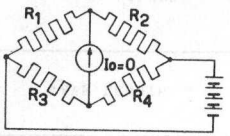
* American type number

USEFUL FORMULAE

USEFUL FORMULAE FOR D.C.

OHM'S LAW	$I = \frac{E}{R}$ I in amperes $E = I.R$ E in volts $R = \frac{E}{I}$ R in ohms
WATTS DISSIPATED	$W = E.I$ W in watts $W = I^2R$ E in volts $W = \frac{E^2}{R}$ I in amperes R in ohms
RESISTANCES IN SERIES	$R_t = R_1 + R_2 + R_3 + \ldots\ldots R_n$
RESISTANCES IN PARALLEL	$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots\ldots \frac{1}{R_n}$
TWO RESISTANCES IN PARALLEL	$R_t = \frac{R_1 \times R_2}{R_1 + R_2}$

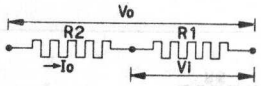
WHEATSTONE'S BRIDGE



$$I_o = 0 \qquad R_1 = \frac{R_3 \cdot R_2}{R_4}$$

$$\frac{R_1}{R_2} = \frac{R_3}{R_4}$$

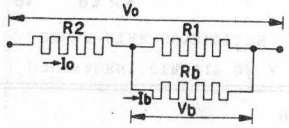
UNLOADED VOLTAGE DIVIDER



$$V_i = V_o \frac{R_1}{R_1 + R_2}$$

$$I_o = \frac{V_o}{R_1 + R_2}$$

LOADED VOLTAGE DIVIDER

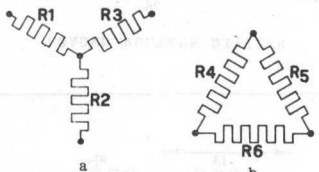


$$V_b = V_o \frac{R_1}{R_1 + R_2} - I_b \frac{R_1 \cdot R_2}{R_1 + R_2}$$

$$I_b = \frac{V_o \frac{R_1}{R_1 + R_2} - V_b}{\frac{R_1 \cdot R_2}{R_1 + R_2}}$$

USEFUL FORMULAE FOR D.C.

EQUIVALENT CIRCUIT OF A DELTA-STAR CONNECTION



b is equivalent to a, when

$$R_4 = \frac{R_1 . R_2}{R_3} + R_1 + R_2$$

a is equivalent to b, when

$$R_1 = \frac{R_4 . R_5}{R_4 + R_5 + R_6}$$

USEFUL FORMULAE FOR A.C.

$$e \text{ mom} = E \text{ max} \sin \omega t$$
$$i \text{ mom} = I \text{ max} \sin (\omega t + Q)$$
$$\omega = 2 \pi f$$

WAVE LENGTH

$$\lambda = \frac{3.10^8}{f} \text{ meters}$$

f = frequency in cycles/sec.

R.M.S. VALUES

$$E_{rms(eff)} = \frac{E \text{ max}}{\sqrt{2}}$$

$$I_{rms(eff)} = \frac{I \text{ max}}{\sqrt{2}}$$

IMPEDANCE	$I = \frac{E}{Z}$ $Z = \frac{E}{I}$ $E = Z.I$
WATTS DISSIPATED	$W = I^2R$ $W = E.I \cos Q$ $W = I^2Z \cos Q$ $W = \frac{E^2}{Z} \cos Q$
REACTANCE OF A COIL	$Z = \omega L = 2 \pi fL$ f = frequency in c/s L = inductance in henrys
COILS IN SERIES	$L_t = L_1 + L_2 + L_3 + ... L_n$
TWO COILS IN SERIES WITH COUPLING BETWEEN THE COILS	$L_t = L_1 + L_2 \pm 2 m$
COILS IN PARALLEL	$\frac{1}{L_t} = \frac{1}{L_1} + \frac{1}{L_2} + \frac{1}{L_3} + ... \frac{1}{L_n}$
TWO COILS IN PARALLEL	$L_t = \frac{L_1.L_2}{L_1 + L_2}$
TWO COILS IN PARALLEL WITH COUPLING BETWEEN THE COILS	$L = \frac{L_1.L_2 - M^2}{L_1 + L_2 \pm 2 m}$
REACTANCE OF A CONDENSER	$Z = \frac{1}{\omega C} = \frac{1}{2 \pi fc}$ C = capacity in farads

CONDENSERS IN SERIES	$\frac{1}{C_t} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \ldots\ldots \frac{1}{C_n}$
TWO CONDENSERS IN SERIES	$C = \frac{C_1 . C_2}{C_1 + C_2}$
CONDENSERS IN PARALLEL	$C_t = C_1 + C_2 + C_3 + \ldots\ldots C_n$
CAPACITY OF A CONDENSER	$C = \frac{\varepsilon 0}{4 \pi d}$ cm or $\frac{\varepsilon 0}{3.6 \pi d} 10^{-12}$ farad 0 = surface of the plates in cm^2 d = distance between the condenser plates in cm ε = dielectric constant of the insulating material
IMPEDANCE OF A COIL AND RESISTANCE IN SERIES	$Z = \sqrt{R^2 + \omega^2 L^2}$ $\cos Q = \frac{R}{Z}$ $Q = \frac{\omega L}{R}$

IMPEDANCE OF A COIL AND RESISTANCE IN PARALLEL	$Z = \frac{R \omega L}{\sqrt{R^2 - \omega^2 L^2}}$ $\cos Q = \frac{Z}{R}$ $Q = \frac{R}{\omega L}$
IMPEDANCE OF A CAPACITANCE AND RESISTANCE IN SERIES	$Z = \sqrt{R^2 + \frac{1}{\omega C}^2}$ $\cos Q = \frac{R}{Z}$ $\operatorname{tg} \delta = \omega RC$
IMPEDANCE OF A CAPACITANCE AND RESISTANCE IN PARALLEL	$Z = \frac{R}{\sqrt{1 + \omega^2 R^2 C^2}}$ $\cos Q = \frac{Z}{R}$ $\operatorname{tg} \delta = \frac{1}{\omega RC}$
IMPEDANCE OF A COIL, CONDENSER AND RESISTANCE IN SERIES	$Z = \sqrt{(\omega L - \frac{1}{\omega C})^2 + R^2}$ $\operatorname{tg} \delta = -\frac{\omega L - \frac{1}{\omega C}}{R}$ at resonance $Z = R$
IMPEDANCE OF A COIL AND RESISTANCE IN SERIES, PARALLEL CONNECTED TO A CAPACITANCE	$Z = \sqrt{\frac{R^2 + \omega^2 L^2}{(1 - \omega^2 LC)^2 + \omega^2 C^2 R^2}}$ at resonance $Z = \frac{L}{RC}$

SELECTIVITY OF A TUNED CIRCUIT	Selectivity factors $S = 0.2 \frac{\omega L}{R}$ Band width $B = 1.6 \frac{R}{L}$
MUTUAL CONDUCTANCE	$S = \frac{\mu \times 1000}{Ri}$ mA/V Ri in Ohms
AMPLIFICATION FACTOR	$\mu = \frac{S \times Ri}{1000}$ S in mA/V; Ri in Ohms
INTERNAL RESISTANCE	$Ri = \frac{\mu \times 1000}{S}$ Ohms S in mA/V

STAGE GAIN OF A VALVE

$$V_a = - \mu V_g \frac{R_a}{R_i + R_a}$$

In the case of pentodes R_a is usually small compared with R_i and, therefore, we may write:

$$V_a = S . R_a$$

AUTOMATIC GRID BIAS

The value required for the cathode resistor:

$$R_k = \frac{V_g \times 1000}{I_k} \text{ Ohms}$$

I_k = total cathode current of the valve in mA.

V_g = required grid bias in volts.

DECIBEL TABLE

The relation between Voltage, Current and Decibels is:

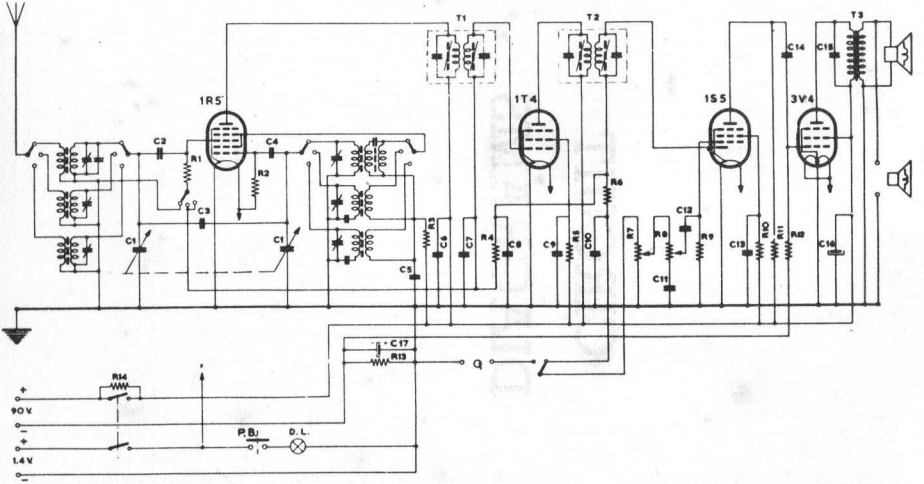
Voltage: $20 \log \frac{V1}{V2} = \ldots$ decibels

Current: $20 \log \frac{I1}{I2} = \ldots$ decibels

Db	0	10	20	30	40	50	60	70
0	$\frac{V1}{V2}$ or $\frac{I1}{I2} = 1$	3.16	10	31.6	100	316	1000	3162
1	1.12	3.55	11.2	35.5	112	355	1122	3548
2	1.26	3.98	12.6	39.8	126	398	1259	3981
3	1.41	4.47	14.1	44.7	141	447	1413	4469
4	1.59	5.01	15.9	50.1	159	501	1585	5012
5	1.78	5.62	17.8	56.2	178	562	1778	5623
6	2.00	6.31	20.0	63.1	200	631	1995	6310
7	2.24	7.08	22.4	70.8	224	708	2239	7080
8	2.51	7.94	25.1	79.4	251	794	2512	7943
9	2.82	8.91	28.2	89.1	282	891	2818	8912

CIRCUIT DIAGRAMS

BATTERY RECEIVER



CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

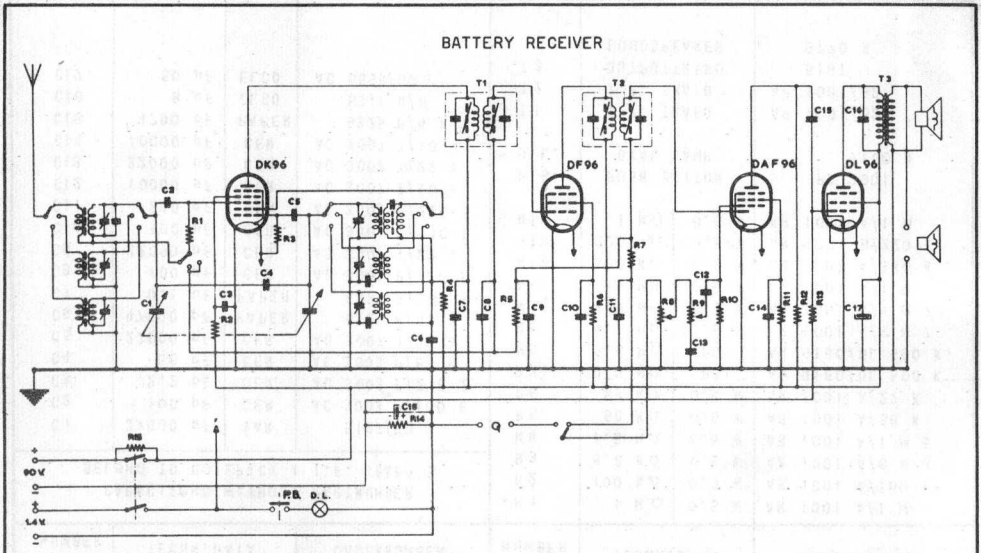
PB 154

LIST OF PARTS

BATTERY RECEIVER

PART NUMBER	TECHN. DATA		ORDERNUMBER
CAPACITORS WITHOUT PARTNUMBER BELONG TO COILPACK & I.F. TRAFO'S			
C1	2x500 pF	VAR	5127/50
C2	100 pF	CER	AC 3003 P/100 E
C3	2.2 pF	CER	AC 3003 P/2 E 2
C4	56 pF	CER	AC 3003 P/56 E
C5	22000 pF	CER	AC 3007 T/22 K
C6	47000 pF	PAPER	5324 P/47 K
C7	0.1 uF	PAPER	5324 P/100 K
C8	100 pF	CER	AC 3003 P/100 E
C9	22000 pF	CER	AC 3007 T/22 K
C10	100 pF	CER	AC 3003 P/110 E
C11	220 pF	CER	AC 3003 P/220 E
C12	10000 pF	CER	AC 3007 T/10 K
C13	22000 pF	CER	AC 3007 T/22 K
C14	10000 pF	CER	AC 3007 T/10 K
C15	4700 pF	PAPER	5325 P/4 K 7
C16	8 µF	ELCO	5311 K/8
C17	50 µF	ELCO	AC 5555/50

PART NUMBER	TECHN. DATA		ORDERNUMBER
R1	1 MΩ	0.5 W	AR 1001 A/1 M
R2	100 KΩ	0.5 W	AR 1001 A/100 K
R3	6.8 KΩ	0.5 W	AR 1001 A/6 K 8
R4	1.5 MΩ	0.5 W	AR 1001 A/1 M 5
R5	56 KΩ	0.5 W	AR 1001 A/56 K
R6	27 KΩ	0.5 W	AR 1001 A/27 K
R7	0.5 MΩ	POT	AR 9160/DL 500 K
R8	0.5 MΩ	POT	AR 9160/GL 500 K
R9	4.7 MΩ	0.5 W	AR 1001 A/4 M 7
R10	4.7 MΩ	0.5 W	AR 1001 A/4 M 7
R11	1 MΩ	0.5 W	AR 1001 A/1 M
R12	330 KΩ	0.5 W	AR 1001 A/330 K
R13	220 Ω	0.5 W	AR 1001 B/220 E
R14	1 MΩ	0.5 W	AR 1001 A/1 M
P.B.	PUSH BUTTON		PD 2001
D.L.	DIAL LAMP		7100 D
T1	I.F. TRAFO		AP 1001/52
T2	I.F. TRAFO		AP 1001/52
T3	OUTPUTTRAFO		5181
	LOUDSPEAKER		9770 X



CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

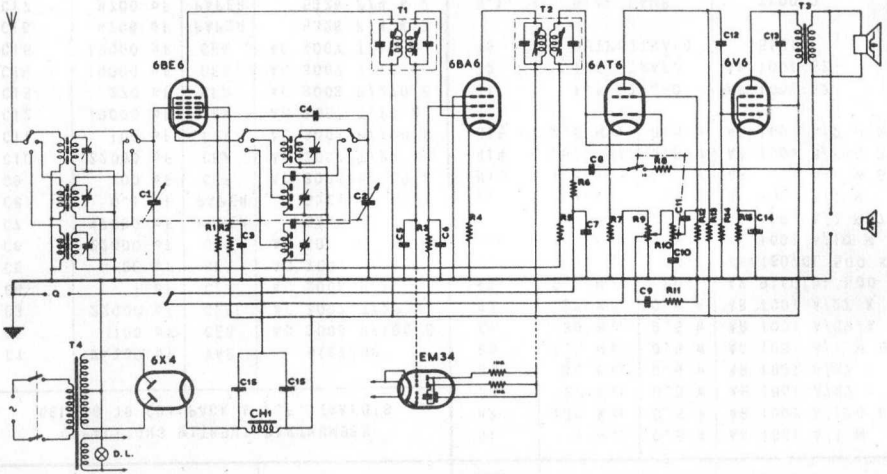
PB 154(96)

BATTERY RECEIVER

PART NUMBER	TECHN. DATA		ORDERNUMBER
CAPACITORS WITHOUT PARTNUMBER BELONG TO COILPACK & I.F. TRAFO'S			
C1	2x500 pF	VAR	5127/50
C2	100 pF	CER	AC 3003 P/100 E
C3	22000 pF	CER	AC 3007 T/22 K
C4	1 pF	CER	AC 3003 P/1E
C5	68 pF	CER	AC 3003 P/68 E
C6	22000 pF	CER	AC 3007 T/22 K
C7	47000 pF	PAPER	5324 P/47 K
C8	0.1 µF	PAPER	5324 P/100 K
C9	100 pF	CER	AC 3003 P/100 E
C10	22000 pF	CER	AC 3007 T/22 K
C11	100 pF	CER	AC 3003 P/100 E
C12	10000 pF	CER	AC 3007 T/10 K
C13	270 pF	CER	AC 3003 P/270 E
C14	10000 pF	CER	AC 3007 T/10 K
C15	10000 pF	CER	AC 3007 T/10 K
C16	4700 pF	PAPER	5325 P/4 K 7
C17	4700 pF	PAPER	5325 P/4 K 7
C18	50 µF	ELCO	AC 5555/50

PART NUMBER	TECHN. DATA		ORDERNUMBER
R1	1 MΩ	0.5 W	AR 1001 A/1 M
R2	120 KΩ	0.5 W	AR 1001 A/120 K
R3	27 KΩ	0.5 W	AR 1001 A/27 K
R4	33 KΩ	0.5 W	AR 1001 A/33 K
R5	1.5 MΩ	0.5 W	AR 1001 A/1 M 5
R6	39 KΩ	0.5 W	AR 1001 A/39 K
R7	27 KΩ	0.5 W	AR 1001 A/27 K
R8	0.5 MΩ	POT	AR 9160/DL 500 K
R9	0.5 MΩ	POT	AR 160/GL 500 K
R10	10 MΩ	0.5 W	AR 1001 A/10 M
R11	2.7 MΩ	0.5 W	AR 1001 A/2 M 7
R12	1 MΩ	0.5 W	AR 1001 A/1 M
R13	1.5 MΩ	0.5 W	AR 1001 A/1 M 5
R14	560 Ω	0.5 W	AR 1001 B/560 E
R15	2.2 MΩ	0.5 W	AR 1001 A/2 M 2
T1	I.F. TRAFO		AP 1001/52
T2	I.F. TRAFO		AP 1001/52
T3	OUTPUTTRAFO		5181
D.L.	DIAL LAMP		7100 D
P.B.	PUSH BUTTON		PD 2001
	LOUDSPEAKER		9770 X

A.C. RECEIVER



CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

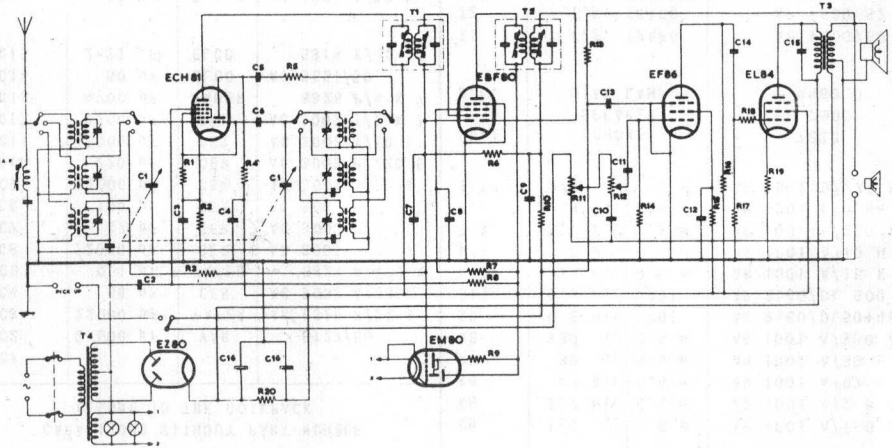
PA 153

A.C. RECEIVER

PART NUMBER	TECHN. DATA		ORDERNUMBER
CAPACITORS WITHOUT PART NUMBER BELONG TO THE COILPACK			
C1			
C2	2x500 pF	VAR	5127/50
C3	22000 pF	PAPER	AC 5325 P/22 K
C4	56 pF	CER	AC 3003 A/56 E
C5	0.1 µF	PAPER	5324 P/100 K
C6	22000 pF	CER	AC 3007 T/22 K
C7	47 pF	CER	AC 3003 P/47 E
C8	100 pF	CER	AC 3003 P/100 E
C9	22000 pF	CER	AC 3007 T/22 K
C10	220 pF	CER	AC 3003 P/220 E
C11	10000 pF	CER	AC 3007 T/10 K
C12	2700 pF	CER	AC 3007 T/2 K 7
C13	4700 pF	PAPER	5328 P/4 K 7
C14	50 µF	ELCO	AC 5551/50
C15	2x32 µF	ELCO	5314 K/32+32
R1	22 KΩ	0.5 W	AR 1001 A/22 K
R2	33 KΩ	1 W	AR 1002 A/33 K
R3	33 KΩ	1 W	AR 1002 A/33 K

PART NUMBER	TECHN. DATA		ORDERNUMBER
R4	150 Ω	0.5 W	AR 1001 A/150 E
R5	2.2 MΩ	0.5 W	AR 1001 A/2 M 2
R6	47 KΩ	0.5 W	AR 1001 A/47 K
R7	39 Ω	0.5 W	AR 1001 A/39 E
R8	330 Ω	0.5 W	AR 1001 A/330 E
R9	0.5 MΩ	POT	AR 9160/DL50+450K
R10	0.5 MΩ	POT	AR 9160/DL 500 K
R11	15 KΩ	0.5 W	AR 1001 A/15 K
R12	10 MΩ	0.5 W	AR 1001 A/10 M
R13	220 KΩ	0.5 W	AR 1001 A/220 K
R14	0.68 MΩ	0.5 W	AR 1001 A/0.68 M
T15	270 Ω	1 W	AR 1002 B/270 E
CH.1	CHOKE		7832
	SPEAKER		EL 7900
D.L.	DIAL LAMP		P 4460 D
T1	I.F. TRAFO		AP 1000/52
T2	I.F. TRAFO		AP 1000/52
T3	OUTPUT TRAFO		5181
T4	POWER TRAFO		T 1877 A

A.C. RECEIVER

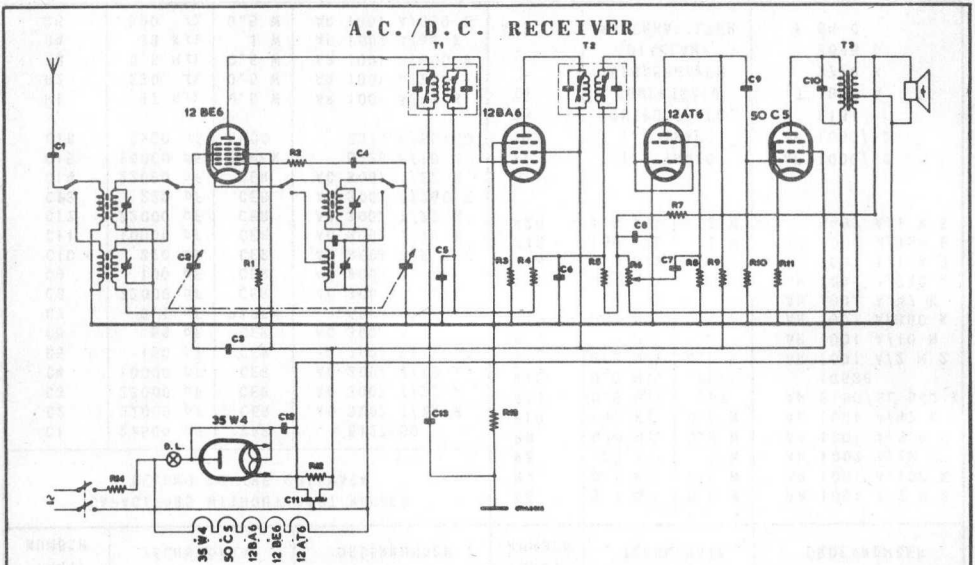


CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

PA 1164

A.C. RECEIVER

PART NUMBER	TECHN. DATA		ORDERNUMBER
CAPACITORS WITHOUT PART NUMBER BELONG TO THE COILPACK			
C1	2x500 pF	VAR	5127/50
C2	22000 pF	CER	AC 3007 T/22 K
C3	22000 pF	CER	AC 3007 T/22 K
C4	10000 pF	CER	AC 2007 T/10 K
C5	150 pF	CER	C 3003 P/150 E
C6	56 pF	CER	AC 3003 A/56 E
C7	0.1 µF	PAPER	5324 P/100 K
C8	22000 pF	CER	AC 3007 T/22 K
C9	100 pF	CER	AC 3003 P/100 E
C10	220 pF	CER	AC 3003 P/220 E
C11	10000 pF	CER	AC 3007 T/10 K
C12	22000 pF	CER	AC 3007 T/22 K
C13	220 pF	CER	AC 3003 P/220 E
C14	22000 pF	CER	AC 3007 T/22 K
C15	10000 pF	PAPER	5328 P/10 K
C16	2x50 µF	ELCO	5314 K/50+50
R1	47 KΩ	0.5 W	AR 1001 A/47 K
R2	220 Ω	0.5 W	AR 1001 A/220 E
R3	0.5 MΩ	0.5 W	AR 1001 A/500 K
R4	33 KΩ	1 W	AR 1002 A/33 K
R5	390 Ω	0.5 W	AR 1001 A/390 E
R6	2.2 MΩ	0.5 W	AR 1001 A/2 M 2
R7	0.1 MΩ	0.5 W	AR 1001 A/100 K
R8	22 KΩ	1 W	AR 1002 A/22 K
R9	0.56 MΩ	0.5 W	AR 1001 A/560 K
R10	47 KΩ	0.5 W	AR 1001 A/47 K
R11	0.5 MΩ	POT	AR 9190/GL 500 K
R12	0.5 MΩ	POT	10536
R13	2.2 MΩ	0.5 W	AR 1001 A/2 M 2
R14	10 MΩ	0.5 W	AR 1001 A/10 M
R15	0.39 MΩ	0.5 W	AR 1001 A/390 K
R16	47 KΩ	0.5 W	AR 1001 A/47 K
R17	0.33 MΩ	0.5 W	AR 1001 A/330 K
R18	1.2 KΩ	0.5 W	AR 1001 A/1 K 2
R19	150 Ω	1 W	AR 1002 B/150 E
R20	1.5 KΩ	3 W	5497 A/1 K 5
T1	I.F TRAFO		AP 1000/52
T2	I.F TRAFO		AP 1000/52
T3	OUTPUTTRAFO		5181
T4	POWERTRAFO		T 1877 A
	LOUDSPEAKER		9770 X
	DIALLAMP		8045 D
A.F.	ANTENNAFILTER		F 64 C



CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

PU 2134

LIST OF PARTS

A.C./D.C. RECEIVER

PART NUMBER	TECHN. DATA		ORDERNUMBER
CAPACITORS WITHOUT PARTNUMBER BELONG TO THE COILPACKS			
C1	1500 pF	PAPER	5325 P/1 K 5
C2	2x500 pF	VAR	5127/50
C3	10000 pF	CER	AC 3007 T/10 K
C4	56 pF	CER	AC 3003 A/56 E
C5	22000 pF	CER	AC 3007 T/22 K
C6	100 pF	CER	AC 3003 P/100 E
C7	10000 pF	CER	AC 3007 T/10 K
C8	100 pF	CER	AC 3003 P/100 E
C9	10000 pF	CER	AC 3007 T/10 K
C10	10000 pF	PAPER	5325 P/10 K
C11	2x50 µF	ELCO	5314 P/50+50
C12	22000 pF	PAPER	5325 P/22 K
C13	0.1 µF	PAPER	5325 P/100 K
R1	22 KΩ	0.5 W	AR 1001 A/22 K
R2	68 Ω	0.5 W	AR 1001 A/68 E
R3	150 Ω	0.5 W	AR 1001 A/150 E
R4	2.2 MΩ	0.5 W	AR 1001 A/2 M 2
R5	47 KΩ	0.5 W	AR 1001 A/47 K
R6	0.5 MΩ	POT	AR 9130/DL 500 K
R7	2.7 MΩ	0.5 W	AR 1001 A/2 M 7
R8	10 MΩ	0.5 W	AR 1001 A/10 M

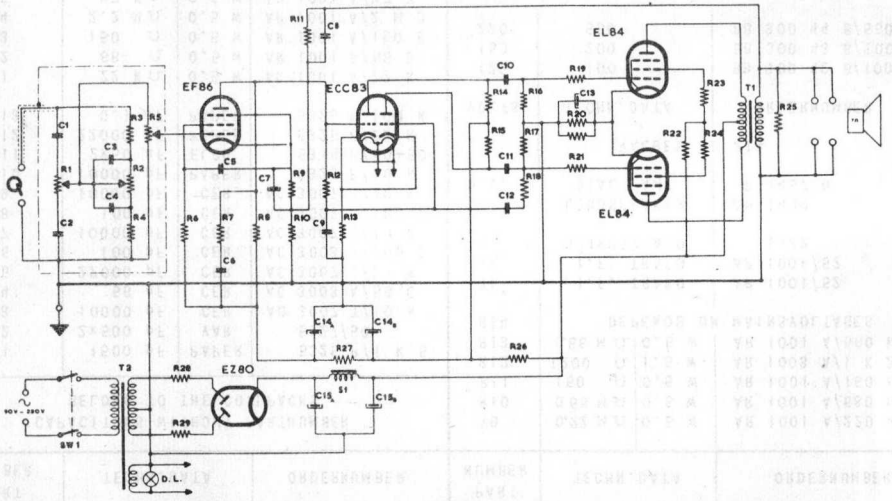
PART NUMBER	TECHN. DATA		ORDERNUMBER
R9	0.22 MΩ	0.5 W	AR 1001 A/220 K
R10	0.68 MΩ	0.5 W	AR 1001 A/680 K
R11	150 Ω	0.5 W	AR 1001 A/150 E
R12	1200 Ω	1.5 W	AR 1003 A/1 K 2
R13	0.56 MΩ	0.5 W	AR 1001 A/560 K
R14	DEPENDS ON MAINSVOLTAGES		
T1	I.F. TRAFO		AP 1001/52
T2	I.F. TRAFO		AP 1001/52
T3	OUTPUTTRAFO		5182
	LOUDSPEAKER		AD 1400
D.L.	DIAL LAMP		P 4457 D

VALUES OF R14

VOLTS	TECHN. DATA	ORDERNUMBER
125	100	B8 300 42 B/100 E
150	200	B8 300 43 B/200 E
220	550	B8 300 44 B/560 E

THESE RESISTORS ARE PROVIDED OF AN ADJUSTABLE TAP WHICH MAKE IT POSSIBLE TO ADJUST FOR VARIOUS MAINSVOLTAGES

SUPER HIFI AMPLIFIER 10 W



CONTENTS AND CIRCUIT DIAGRAM
WITHOUT ANY GUARANTEE TO PATENT RIGHTS

PA 1465

LIST OF PARTS

SUPER HIFI AMPLIFIER 10 W

PART NUMBER	TECHN.DATA		ORDERNUMBER
C1	33 pF	CER	AC 3003 A/33 E
C2	680 pF	CER	AC 3003 A/680 E
C3	270 pF	CER	AC 3003 A/270 E
C4	3300 pF	PAPER	5325 A/3 K 3
C5	47000 pF	PAPER	5325 P/47 K
C6	68 pF	CER	AC 3003 P/68 E
C7	100 µF	ELCO	AC 5555/100
C8	1500 pF	CER	AC 3007 T/1 K 5
C9	0.1 µF	PAPER	5325 P/100 K
C10	0.1 µF	PAPER	5325 P/100 K
C11	0.1 µF	PAPER	5325 P/100 K
C12	47000 pF	PAPER	5325 P/47 K
C13	100 µF	ELCO	AC 5556/100
C14	2x50 µF	ELCO	5314 K/50+50
C15	2x50 µF	ELCO	5314 K/50+50
R1	2 M	POT	AR 9130/GL 2 M
R2	2 M	POT	AR 9130/GL 2 M
R3	1.5 M	0.5 W	AR 1001 A/1 M 5
R4	150 K	0.5 W	AR 1001 A/150 K
R5	1 M	POT	AR 9130/GL 1 M
R6	1 M	0.5 W	AR 1001 A/1 M
R7	180 K	0.5 W	AR 1001 A/180 K
R8	180 K	1 W	AR 1002 A/180 K
R9	2.2 K	0.5 W	AR 1001 A/2 K 2
R10	10 Ω	0.5 W	AR 1001 B/10 E

PART NUMBER	TECHN.DATA		ORDERNUMBER
R11	2.2 KΩ	0.5 W	AR 1001 B/2 K 2
R12	1.2 MΩ	0.5 W	AR 1001 A/1 M 2
R13	68 KΩ	0.5 W	AR 1001 A/68 K
R14	0.1 MΩ	0.5 W	AR 1001 A/100 K
R15	0.1 MΩ	0.5 W	AR 1001 A/100 K
R16	0.33 MΩ	0.5 W	AR 1001 A/330 K
R17	0.33 MΩ	0.5 W	AR 1001 A/330 K
R18	2.2 MΩ	0.5 W	AR 1901 A/2 M 2
R19	1 KΩ	0.5 W	AR 1001 A/1 K
R20	135 Ω	2 W	2xAR 1002 B/270 E
R21	1 KΩ	0.5 W	AR 1001 A/1 K
R22	3.9 KΩ	1 W	AR 1002 A/3 K 9
R23	220 Ω	0.5 W	AR 1001 A/220 E
R24	220 Ω	0.5 W	AR 1001 A/220 E
R25	1 KΩ	0.5 W	AR 1001 A/1 K
R26	27 KΩ	0.5 W	AR 1001 A/27 K
R27	47 KΩ	0.5 W	AR 1001 A/47 K
R28	100 Ω	3 W	AR 1004 A/100 E
R29	100 Ω	3 W	AR 1004 A/100 E
S.W. 1	SWITCH		PD 2010
T1	OUTPUTTRAFO		AD 9000
T2	POWER TRAFO		T 2074 A
S1	CHOKE		7833
D.L.	SIGNAL LAMP		P 4460 D

REPLACEMENT GUIDE

IMPORTANT

In spite of the fact that every care has been taken in the compilation of this replacement guide, we cannot accept any responsibility for the accuracy thereof.

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
A 11 B	1561	-	-
A 11 C	1561	-	-
A 11 D	1561	-	-
A 20 B	-	AB 2	-
A 23 A	-	ABC 1	-
A 27 D	-	ABL 1	-
A 30 B	-	4657	-
A 30 D	-	-	ABC 1
A 36 A	-	-	AK 2
A 36 B	-	-	AK 2
A 36 C	-	-	AK 2
A 40 M	-	-	AF 3
A 50 A	-	AF 7	-
A 50 B	-	-	AF 7
A 50 M	-	-	AF 3
A 50 N	-	-	AF 3
A 50 P	-	-	AF 3
A 70 B	-	-	AL 4
A 70 C	-	AL 4	-
A 70 D	-	AL 4	-
A 70 E	-	4688	-
A 80 A	-	AK 2	-
AA 61	ECC 40	-	-
AB 1	-	AB 2	-
AC 2 DD	-	ABL 1	-
AC/DD (Hivac)	-	AB 2	-
AC/DD (Mazda)	-	AB 2	-
AC/DDT	-	ABC 1	-
AC/HL	-	-	ABC 1
AC/HL DD	-	ABC 1	-
AC/HP	-	AF 7	-
ACO 42	-	-	4683
ACO 44	-	4683	-
AC/P	-	4614	-
AC/PEN	-	-	AL 4

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
AC/S2	-	AF 7	-
AC/S2PEN	-	AF 7	-
AC/SG	-	AF 7	-
AC/SGVM	-	-	AF 3
AC/SH	-	AF 7	-
AC/SL	-	AF 7	-
AC/SIVM	-	-	AF 3
AC/THI	-	-	-
AC/VH	-	-	AF 3
AC/VP (5-pin)	-	-	AF 3
AC/VP (7-pin)	-	-	AF 3
AC/VPI	-	-	AF 3
AC/VP2	-	-	AF 3
AC/VPB	-	-	AF 3
AC/Y	-	-	AL 4
AC/Z	-	AL 4	-
AC 2	-	ABC I	-
AC2/PEN	-	AL 4	-
AC2/PENDD	-	ABL I	-
AC4/PEN	-	4688	-
ACH I	-	-	AK 2
AD I	-	4683	-
AF 2	-	-	AF 3
AH I	-	-	AK 2
AK I	-	AK 2	-
AL 2	4682	-	-
AL 5	4688	-	-
AL 60	-	4688	-
AM I	-	-	EM I
AM 2	-	-	C/EM 2
APP 4 A	-	-	AL 4
APP 4 As	-	4682	-
APP 4 B	-	AL 4	-
APP 4 Bs	AL 4	-	-
APP 4 E	-	4688	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
APV 4	1561	-	-
AR 21	EBC 33	-	-
ARP 34	EF 39	-	-
ARP 35	EF 50	-	-
AS 4120	-	AF 7	-
AS 4125	-	-	AF 3
AX 1	AX 50	-	-
AZ 2	-	1561	-
AZ 3	-	1561	-
AZ 21	-	AZ 1	-
AZ 32	-	1561	-
AZ 33	-	1561	-
B 36	-	-	ECC 40
B 65	-	ECC 33	ECC 40
B 152	ECC 81	-	-
B 228	-	KC 4	KBC 1
B 309	ECC 81	-	-
B 319	-	PCC 84	-
B 329	ECC 82	-	-
BVA 211	1561	-	-
BVA 214	1561	-	-
BVA 215	1561	-	-
BVA 216	1561	-	-
BVA 243	EF 39	EF 9	-
BVA 246	EF 39	EF 9	-
BVA 247	EF 39	EF 9	-
BVA 264	EL 33	EL 3	-
BVA 265	EL 33	EL 3	-
BVA 266	EL 33	EL 3	-
BVA 267	EL 33	EL 3	-
BVA 274	ECH 35	ECH 3	-
BVA 275	ECH 35	ECH 3	-
BVA 276	ECH 35	ECH 3	-
C 1	-	C 8	-
C 2	-	C 10	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
C 3	-	C 8	-
C 4	-	C 10	-
C 6	-	C 8	-
C 9	-	C 10	-
C 10 B	-	CY 1	CY 2
C 12 F	MW 31-16	-	-
C 20 C	-	CB 2	EB 4
C 23 B	-	CBC 1	EBC 3
C 27 D	-	CBL 1	-
C 30 B	-	-	EBC 3
C 36 A	-	-	ECH 3
C 36 C	-	-	ECH 3
C 50 B	-	-	CF 7
C 50 N	-	-	CF 3
C 70 D	-	CBL 1	-
C 80 B	-	CK 1	ECH 3
CB 1	-	-	EB 4
CB 2	-	-	EB 4
CB 215	-	-	DLL 21
CBC 1	-	-	EBC 3
CBL 6	-	-	CBL 1
CBL 31	-	CBL 1	-
CC 2	-	-	EBC 3
CCH 35	-	ECH 35	ECH 3
CE 226	1163	-	-
CE 235	1164	-	-
CF 1	CF 7	-	-
CF 2	-	CF 3	-
CK 1	-	-	ECH 3
CK 3	-	-	ECH 3
CL 1	-	-	EL 2
CL 2	-	-	CBL1/EL2
CL 4	-	CBL 1	-
CL 6	-	-	CBL 1
CL 33	-	CL 4	CBL 1

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
CY 1	-	CY 2	-
CY 1 C	-	CY 1	CY 2
CY 31	-	CY 1	CY 2
CY 32	-	CY 2	-
D 2 M 9	EAA 91	-	-
D 4	-	-	ABC 1
D 41	-	AB 2	-
D 63	-	EB 34	-
D 77	EAA 91	-	-
D 152	EAA 91	-	-
D 400	-	AB 2	-
D 1300	-	-	EB 4
DA	-	-	EBC 3
DAC 1	-	-	DAC 21
DAC 32	-	-	DAC 21
DD 4	-	AB 2	-
DD 4 s	AB 2	-	-
DD 6 Ferranti Cossor	EB 91	-	-
DD 6 (Tungsram)	-	EB 4	-
DD 6 ds	EB 4	-	-
DD 13	-	-	EB 4
DD 13 s	-	-	EB 4
DD 465	-	AB 2	-
DD 620	-	EB 4	-
DDA 1	-	AB 2	-
DDL 4	-	AB 2	-
DDPP 4 B	-	ABL 1	-
DDPP 4 Bs	ABL 1	-	-
DDPP 4 M	-	ABL 1	-
DDPP 6 B	-	EBL 1	-
DDPP 6 Bs	EBL 1	-	-
DDPP 39	-	CBL 1	-
DDPP 39 M	-	CBL 1	-
DDPP 39 s	CBL 1	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
DDR 2	EF 55	-	-
DDR 3	EY 91	-	-
DDR 7	EL 91	-	-
DDT	-	ABC 1	-
DDT 2	-	-	DLL 21
DDT 4	-	ABC 1	-
DDT 4 s	ABC 1	-	-
DDT 6 s	EBC 3	-	-
DDT 13	-	CBC 1	EBC 3
DDT 13 s	CBC 1	-	EBC 3
DDT 215	-	-	DLL 21
DDT 220	-	-	DLL 21
DET 22	EC 55	-	-
DF 1	-	-	DF 21
DF 11	-	DF 91	-
DF 33	-	DF 22	-
DH 42	-	ABC 1	-
DH 63	-	EBC 33	-
DH 63 M	-	EBC 33	EBC 3
DH 77	EBC 90	-	-
DH 142	UBC 41	-	-
DH 147	EBC 33	EBC 3	-
DH 149	-	EBC 21	-
DH 150	EBC 41	-	-
DK 1	-	-	DK 21
DK 32	-	DK 21	-
DK 192	-	DK 92	-
DL 32	-	-	DL 21
DL 63	-	EBC 33	EBC 3
DL 91	-	DL 92	-
DL 192	-	DL 92	-
DL 193	-	DL 94	-
DM 21	-	-	DM 70
DN 41	-	ABL 1	-
DN 143	EBL 21	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
DO 30	-	-	4650
DO 42	-	ABL 1	-
DP 6	-	OA 50	-
DP 6 C	-	OA 50	-
DP 61	EF 95	-	-
DP 495	-	ABL 1	-
DP 4480	-	CBL 1	-
DS 77	-	EAA 91	-
DT 3	-	1561	-
DT 30	-	1561	-
DT 41	-	ABC 1	-
DT 436	-	ABC 1	-
DT 1336	-	-	EBC 3
DTU 1	-	-	EBC 3
DW 2	1805	-	-
DW 3	1561	-	-
DW 4	AZ 50	-	-
DW 4 - 350	1561	-	-
DW 4 - 500	AZ 50	-	-
E 2 d III	AL 4	-	-
E 220 B	-	-	DLL 21
E 406 N	4613	-	-
E 408 N	4613	-	-
E 409	4614	-	-
E 424 N	-	ABC 1	-
E 428	-	ABC 1	-
E 438	-	-	ABC 1
E 442	-	4636	-
E 443 N	-	-	4682
E 445	-	-	AF 3
E 446	4636	-	-
E 447	-	-	AF 3
E 449	-	-	AK 2
E 452 T	-	AF 7	-
E 453	-	AL 4	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
E 455	--	-	AF 3
E 462	-	AF 7	-
E 463	-	-	E 443 H
E 499	-	4657	-
E 707	4624	-	-
E 2385	-	EY 86	-
EAB 1	-	-	EBC 3
EAF 41	-	EAF 42	-
EBC 33	-	EBC 3	-
EBF 171	-	EBF 80	-
EBL 31	-	EBL 1	-
EC 31	-	-	4614
EC 52	-	-	EC 80
EC 53	-	-	EC 92
ECC 31	-	ECC 40	-
ECC 32	-	ECC 40	-
ECC 33	-	ECC 40	-
ECC 34	-	-	ECC 82
ECC 35	-	-	ECC 40
ECH 2	-	ECH 4	ECH 21
ECH 33	-	ECH 3	-
ECH 35	-	ECH 3	-
ECH 41	-	ECH 42	-
EE 1	EEP 1	-	-
EE 50	-	-	EFP 60
EF 2	-	EF 9	-
EF 5	-	EF 9	-
EF 8	-	-	EF 9
EF 37	EF 37 A	-	-
EF 38	EF 39	-	-
EH 2	-	-	ECH 4
EK 3	-	EK 2	ECH 4
EK 32	-	EK 2	-
EL 5	4689	-	-
EL 6	4699	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
EL 32	-	EL 2	-
EL 35	-	4689	-
EL 36	-	4699	-
ELL 1	-	-	2 x EL 42
EM 11	-	-	EM 34
EN 31	-	EC 50	-
EZ 1	-	EZ 2	-
EZ 4	-	-	AZ 4
EZ 11	-	EZ 2	-
EZ 12	-	-	AZ 12
FC 2	-	-	KK 2
FC 2 A	-	KK 2	-
FC 4	-	AK 2	-
FC 13	-	-	ECH 3
FC 13 C	-	-	ECH 3
FG 17	POPE 17	-	-
FG 57	POPE 57	-	-
FG 105	POPE 105	-	-
FW 4 - 500	AZ 50	-	-
FW 4 - 800	-	-	2 x 1832
G 431	1805	-	-
G 470	1805	-	-
G 2080(5 pin)	-	CY 1	CY 2
G 2080(P base)	CY 1	-	CY 2
G 4120	AZ 50	-	-
G 4120 N	1561	-	-
GN 24	1561	-	-
GU 50	-	DCG 1/250	-
H 2	-	KC 4	KBC 1
H 2 D	-	-	DLL 21
H 4 D	-	ABC 1	-
H 210	-	KC 4	KBC 1
HAD	-	CBC 1	EBC 3
HD 14	DAC 32	-	DAC 21
HD 22	-	-	DLL 21

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
HD 23	-	-	DLL 21
HD 24	-	-	DLL 21
HF 61	EF 41	-	-
HF 62	EF 42	-	-
HF 121	UF 41	-	-
HL 2	-	KC 4	KBC 1
HL 2 K	-	KC 4	KBC 1
HL 4 +	-	--	ABC 1
HL 4 g	-	-	ABC 1
HL 4 gs	-	-	ABC 1
HL 13 (Mullard)	-	CBC 1	EBC 3
HL 13 (Hivac)	-	CBC 1	EBC 3
HL 13 (Tungsram)	-	CBC 1	EBC 3
HL 13 s	-	CBC 1	EBC 3
HL 13 C	-	CBC 1	EBC 3
HL 21 DD	-	-	DLL 21
HL 22	-	KC 4	KBC 1
HL 23 DD	-	KBC 1	-
HL 41	-	-	ABC 1
HL 41 DD	-	ABC 1	-
HL 133 DD	-	CBC 1	EBC 3
HL 210	-	KC 4	KBC 1
HLA 2	-	-	ABC 1
HLB 1	-	KC 4	EBC 3
HL/DD 1320	-	CBC 1	EBC 3
HP 13	-	CF 3	-
HP 13 s	-	CF 3	-
HP 210 nc(7-pin)	-	-	KF 3
HP 210 nc(4-pin)	-	-	KF 3
HP 211 c	-	-	KF 3
HP 215 (Hivac)	-	-	KF 3
HP 4101 c	-	AF 7	-
HP 4105	-	-	AF 3
HP 4106 c	-	-	AF 3
HP 4115 c(5-pin)	-	-	AF 3

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
HP 4115 c(7-pin)	-	-	AF 3
HR 210	-	KC 4	KBC 1
HVR 2	1877	-	-
I W 3	1561	-	-
I W 4	1561	-	-
K 23 B	-	-	DLL 21
K 30 A	-	KC 4	KBC 1
K 30 B	-	KC 4	KBC 1
K 30 C	-	KC 4	KBC 1
K 30 D	-	KC 4	KBC 1
K 30 G	-	-	KL 4
K 30 K	-	KC 4	KBC 1
K 33 A	-	-	DLL 21
K 40 B	-	-	KF 3
K 40 N	-	-	KF 3
K 50 M	-	-	KF 3
K 50 N	-	-	KK 2
K 70 B	-	KL 4	-
K 70 D	-	-	KL 4
K 77 B	-	-	DLL 21
K 80 A	-	-	KK 2
K 80 B	-	KK 2	-
K 435/10	-	4683	-
KBC 32	-	KBC 1	-
KC 1	-	-	KBC 1
KC 3	-	KBC 1	-
KC 4	-	KBC 1	-
KCF 30	-	-	KK 2
KCH 1	-	-	KK 2
KDD 1	-	-	DLL 21
KF 1	-	-	KF 3
KF 2	-	-	KF 3
KF 4	-	KF 3	-
KF 35	-	-	KF 3
KH 1	-	-	KK 2

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
KK 32	-	KK 2	-
KL 5	-	KL 4	-
KL 35	-	KL 4	-
KLL 32	-	-	DLL 21
KT 2	-	KL 4	-
KT 24	-	KL 4	-
KT 32	25 L 6 G	-	-
KT 41	-	AL 4	-
KT 42	-	-	AL 4
KT 61	EL 33	EL 3	-
KT 63	-	EL 2	-
KT 66	EL 37	-	-
KT 71	50 L 6 GT	-	-
KTW 61	-	EF 9	-
KTW 61 M	-	EF 9	-
KTW 63	-	EF 9	-
KTZ 63	-	EF 37 A	-
L 2 (Ferranti)	-	-	KL 4
L 2 (Mazda)	-	KC 4	KBC 1
L 2/B	-	KC 4	KBC 1
L 2/DD	-	-	DLL 21
L 4	-	4614	-
L 21	-	KC 4	KBC 1
L 21/DD	-	-	DLL 21
L 77	EC 90	--	-
L 210	-	KC 4	KBC 1
LD 210	-	-	KBC 1
LL 2	-	KC 4	KBC 1
LL 2 s	KC 4	KBC 1	-
LN 152	ECL 80	-	-
LN 309	-	FCL 82	-
LP 2 (Osram)	-	-	KL 4
LP 4	-	4683	-
LP 220	-	-	KL 4
LZ 319	-	PCF 80	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
MAZ 41	AZ 41	-	-
ME 1001	EC 55	-	-
ME 6 s	EM 1	-	-
MH 4	-	-	ABC 1
MHD 4	-	ABC 1	-
MHL 4	-	-	AF 3
MKT 4	-	AF 7	-
ML 4	-	4614	-
MM 4 V	-	-	AF 3
MP 4106 c	-	-	AF 3
MP/PEN	-	-	AL 4
MPT 4	-	-	AL 4
MS 4 B	-	AF 7	-
MS 4 C	-	AF 7	-
MSG/HA	-	AF 7	-
MSG/LA	-	AF 7	-
MSP.4	-	AF 7	-
MS/PEN	-	AF 7	-
MS/PENA	-	AF 7	-
MU 12	1561	-	-
MU 12/14	1561	-	-
MU 14	1561	-	-
MV/SG	-	-	AF 3
MVS/PEN (5-pin)	-	-	AF 3
MVS/PEN (7-pin)	-	-	AF 3
MVS/PENB	-	-	AF 3
N 14	DL 35	-	-
N 15	-	DL 33	-
N 16	DL 33	-	-
N 17	DL 92	-	-
N 18	DL 95	-	-
N 19	DL 94	-	-
N 40	-	AF 7	-
N 41	-	AL 4	-
N 66	-	EL 2	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
N 77	EL 91	-	-
N 142	UL 41	-	-
N 144	EL 91	-	-
N 147	EL 33	EL 3	-
N 150	EL 41	-	-
N 151	EL 42	-	-
N 152	PL 81	-	-
N 153	PL 83	-	-
N 154	PL 82	-	-
N 309	-	PL 83	-
N 329	PL 82	-	-
N 709	EL 84	-	-
O 202	-	-	KK 2
O 406	-	AK 2	-
O 1307 (P-base)	-	-	ECH 3
O 1307 (7-pin)	-	-	ECH 3
OE 3	85 A 1	-	-
OM 1	-	CY 1	CY 2
OM 3	EB 34	EB 4	-
OM 4	EBC 33	EBC 3	-
OM 5	EF 36	EF 6	-
OM 5 A	EF 37	-	-
OM 5 B	EF 37 A	-	-
OM 6	EF 39	EF 9	-
OM 7	EF 39	EF 9	-
OM 9	-	EL 2	-
OM 10	-	ECH 35	-
OP 41	-	4688	-
OP 42	-	AL 4	-
P 12/250	-	4683	-
P 15	1164	-	-
P 220 Mazda Hivac	-	-	KL 4
P 225 (5-pin)	-	KL 4	-
P 435	E 443 H	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
P 440 N	-	-	AL 4
P 441 N	-	-	AL 4
P 495	-	AL 4	-
PA 20	-	-	4683
PB I	-	-	KL 4
PEN 4 DD	-	ABL I	-
PEN 4 V	-	-	AL 4
PEN 4 VA	-	-	AL 4
PEN 4 VB	-	AL 4	-
PEN 24	-	KL 4	-
PEN 25	-	KL 4	-
PEN 26	-	CBL I	-
PEN 36 c	-	CL 4	CBL I
PEN 40 DD	-	CBL I	-
PEN 220	-	KL 4	-
PEN 230	-	-	KL 4
PEN 231	-	-	KL 4
PEN 428	-	4688	-
PEN 3520	-	CL 4	CBL I
PEN A I	E 443 H	-	-
PEN A 4	-	AL 4	-
PEN B I	-	KL 4	-
PEN B 4	-	4688	-
PENDD 4020	-	CBL I	-
PL 33	-	-	PL 83
PM 05	EF 95	-	-
PM 07	EF 91	-	-
PM I A	-	KC 4	KBC I
PM I HF	-	KC 4	KBC I
PM I HL	-	KC 4	KBC I
PM I LF	-	-	KBC I
PM 2	-	-	KL 4
PM 2 A	-	-	KL 4
PM 2 B	-	-	DLL 21
PM 2 DL	-	KC 4	KBC I

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
PM 2 DX	-	KC 4	KBC 1
PM 2 HL	-	KC 4	KBC 1
PM 12	-	-	KF 3
PM 12 A	-	-	KF 3
PM 12 M	-	-	KF 3
PM 22	-	-	KL 4
PM 22 A	-	KL 4	-
PM 22 D	-	-	KL 4
PM 24	-	-	E 443 H
PM 24 A	-	-	E 443 H
PM 24 B	E 443 H	-	-
PM 24 C	-	E 443 H	-
PM 24 M	-	E 443 H	-
PM 252	-	-	KL 4
PP 2	-	KL 4	-
PP 2 s	KL 4	-	-
PP 3/250	-	4683	-
PP 4	E 443 H	-	-
PP 4 s	-	E 443 H	-
PP 6 As	EL 2	-	-
PP 6 BG	EL 33	EL 3	-
PP 6 Bs	EL 3	-	-
PP 34	-	CL 4	CBL 1
PP 34 s	CL 4	-	CBL 1
PP 35	-	CL 4	CBL 1
PP 36	-	CL 4	CBL 1
PT 2	-	KL 4	-
PT 4(Marconi)	E 443 H	-	-
PT 4(Ferranti)	-	AL 4	-
PT 4 D	-	ABL 1	-
PT 41	E 443 H	-	-
PTZ	-	CL 4	CBL 1
PV 4	1561	-	-
PV 29 s	-	CY 2	-
PV 30	-	CY 2	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
PV 30 s	CY 2	-	-
PV 495	1805	-	-
PV 4200	AZ 50	-	-
PVB 6 s	-	EZ 2	-
PX 4	-	4683	-
PY 31	-	PY 82	-
PZ 30	-	-	2 x PY 82
QP 22 B	-	-	DLL 21
QP 230	-	-	DLL 21
QP 240 (Mazda)	-	-	DLL 21
QP 240 (Hivac)	-	-	DLL 21
QPT 2	-	-	DLL 21
QS 83/3	85 A 2	-	-
R 1	1805	-	-
R 2	1561	-	-
R 3	1561	-	-
R 4	1561	-	-
R 4 A	AZ 50	-	-
R 12	EY 51	-	-
R 14	-	-	2 x PY 82
R 41	AZ 50	-	-
R 42	1561	-	-
R 52	GZ 32	-	-
R 121	-	EF 37 A	-
R 243	EC 55	-	-
RV 120/350	1561	-	-
RV 120/350 s	AZ 1	-	-
RV 120/500	AZ 50	-	-
RV 120/500 s	AZ 4	AZ 50	-
RV 200/600	-	-	2 x 1832
RZ	-	CY 1	CY 2
S 4 V	-	AF 7	-
S 4 VA	-	AF 7	-
S 4 VB	-	AF 7	-
S 11 A	1805	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
S 11 D	1561	-	-
S 21	-	-	KF 3
S 22	-	-	KF 3
S 23	-	-	KF 3
S 24	-	-	KF 3
S 30 c	-	4683	-
S 30 D	-	4683	-
S 213	-	-	KF 3
S 215	-	-	KF 3
S 215 A	-	-	KF 3
S 215 B	-	-	KF 3
S 215 VM	-	-	KF 3
S 217	-	-	KF 3
S 218	-	-	KF 3
S 420	-	-	AF 3
S 434 N(5-pin)	-	-	AF 3
S 434 N(7-pin)	-	-	AF 3
S 435 N	-	AF 7	-
S 1324	-	-	CF 7
S 1328	CF 7	-	-
SD 2	-	KC 4	KBC 1
SE 211 c	-	-	KF 3
SG 215	-	-	KF 3
SG 215 A	-	-	KF 3
SP 2	-	-	KF 3
SP 4(Tungsram)	-	AF 7	-
SP 4(Mullard)	-	AF 7	-
SP 4 B	-	AF 7	-
SP 4 c	-	AF 7	-
SP 4 s	AF 7	-	-
SP 6	EF 91	-	-
SP 6 s	EF 6	-	-
SP 13(Tungsram)	-	CF 7	-
SP 13(Mullard)	CF 7	-	-
SP 13 B	-	-	CF 7

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
SP 13 c	-	-	CF 7
SP 13 s	CF 7	-	-
SP 22	-	-	KF 3
SP 210	-	-	KF 3
SP 215	-	-	KF 3
SP 1320	-	-	CF 7
SPT 2	-	-	KF 3
SPT 5 A	-	-	AF 7
SS 210	-	-	KF 3
SU 61	EY 51	-	-
T 41 (Ekco)	-	-	ABC 1
TDD 2	-	-	DLL 21
TDD 2 A	-	-	DLL 21
TDD 4	-	ABC 1	-
TDD 13	CBC 1	-	EBC 3
TDD 13 C	-	CBC 1	EBC 3
TH 4	-	-	AK 2
TH 4 A	-	-	AK 2
TH 4 B	-	-	AK 2
TH 21 C	-	-	ECH 3
TH 22 C	-	-	ECH 3
TH 29	-	-	ECH 3
TH 30	-	-	ECH 3
TH 30 C	-	-	ECH 3
TH 41	-	-	AK 2
TH 62	-	-	ECH 3
TH 233	-	-	ECH 3
TH 2321	-	-	ECH 3
TP 25	-	-	KK 2
TT 4	-	4614	-
TV 4	-	EM 1	-
TV 6	EM 1	-	-
TX 4	-	-	AK 2
TX 21	-	-	ECH 3
TX 41	-	-	AK 2

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
U 10	1805	-	-
U 12/13	1561	-	-
U 14	AZ 50	-	-
U 18/20	AZ 50	-	-
U 31	-	PY 82	-
U 70	EZ 35	EZ 2	-
U 78	EZ 90	-	-
U 82	-	EZ 2	-
U 84	-	AZ 1	-
U 101	-	UY 1 N	-
U 142	UY 41	-	-
U 143	AZ 31	-	-
U 145	UY 41	-	-
U 147	EZ 35	-	-
U 149	-	EZ 2	-
U 150	EZ 40	-	-
U 151	EY 51	-	-
U 152	PY 80	-	-
U 201	-	CY 1	CY 2
U 403	-	CY 1	CY 2
U 404	UY 41	-	-
U 4020	-	CY 1	CY 2
UAF 41	-	UAF 42	-
UCH 41	-	UCH 42	-
UR 1	CY 1	-	CY 2
UR 1 C	-	CY 1	CY 2
UR 2	CY 2	-	-
UR 3	CY 2	-	-
UR 3 C	-	CY 2	-
UU 3	1561	-	-
UU 4	1561	-	-
UU 5	1561	-	-
UU 6	-	1561	-
UU 8	-	AZ 50	-
UU 9	EZ 40	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
UU 60/250	1561	-	-
UU 120/350	1561	-	-
UU 120/350 A	1561	-	-
UU 120/500(Mazda)	1561	-	-
UU 120/500	1561	-	-
UY 21	-	UY 1 N	-
UY 31	-	UY 1 N	-
V 20	-	CY 1	CY 2
V 20 s	CY 1	-	CY 2
V 30	-	CY 1	CY 2
V 914	-	AB 2	-
VHT 2	-	-	KK 2
VHT 2 A	-	KK 2	-
VHT 4	-	AK 2	-
VHTA	-	-	ECH 3
VM 4 V	-	-	AF 3
VMP 4	-	-	AF 3
VMP 4 G	-	-	AF 3
VMS 4	-	-	AF 3
VMS 4 B	-	-	AF 3
VO 2	-	KK 2	-
VO 2 s	KK 2	-	-
VO 4	-	AK 2	-
VO 4 s	AK 2	-	-
VO 6 s	EK 2	-	-
VO 13	-	-	ECH 3
VO 13 s	-	-	ECH 3
VP 2	-	-	KF 3
VP 2 B	-	-	KK 2
VP 4	-	-	AF 3
VP 4 A	-	-	AF 3
VP 4 B	-	-	AF 3
VP 4 C	-	-	AF 3
VP 6	EF 92	-	-
VP 13	-	CF 3	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
VP 13 A	-	CF 3	-
VP 13 B	-	-	CF 3
VP 13 C	-	-	CF 3
VP 22	-	-	KF 3
VP 41 (Mezda)	-	-	AF 3
VP 41 (Ekco)	-	-	AF 3
VP 133	-	-	CF 3
VP 120	-	-	KF 3
VP 215	-	-	KF 3
VP 1321	-	-	CF 3
VP 1322	-	-	CF 3
VPT 2	-	-	KF 3
VPT 4	-	-	AF 3
VPT 4 B	-	-	AF 3
VPU 1	-	-	CF 3
VR 53	EF 39	-	-
VR 55	EBC 33	-	-
VR 56	-	EF 37 A	-
VR 57	EK 32	-	-
VR 91	EF 50	-	-
VS 2	-	-	KF 3
VS 24	-	-	KF 3
VS 24 K	-	-	KF 3
VS 210	-	-	KF 3
VS 215	-	-	KF 3
VT 91 A	-	EF 37 A	-
VT 92	-	EBC 33	-
VT 92 A	-	EBC 33	-
VT 93	-	EBF 32	-
VT 93 A	-	EBF 32	-
VX 2	-	-	KK 2
VX 2 s	-	-	KK 2
W 17	DF 91	-	-
W 21	-	-	KF 3
W 42	-	-	AF 3

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
W 63	-	EF 39	-
W 77	EF 92	-	-
W 142	UF 41	-	-
W 143	EF 22	-	-
W 147	EF 39	-	-
W 150	EF 41	-	-
W 719	EF 85	-	-
WD 142	UAF 42	-	-
WD 150	EAF 42	-	-
WE 12	EM 4	-	-
X 14	DK 32	DK 21	-
X 17	DK 91	-	-
X 21	-	-	KK 2
X 22	-	-	KK 2
X 42	-	AK 2	-
X 61 M	ECH 35	ECH 3	-
X 65	-	ECH 35	-
X 142	UCH 42	-	-
X 143	ECH 21	-	-
X 147	ECH 35	ECH 3	-
X 150	ECH 42	-	-
Y 61	-	EM 34	-
Y 62	-	EM 34	-
Y 63	-	EM 34	-
Y 220	-	KL 4	-
Z 14	DF 33	DF 22	-
Z 21	-	-	KF 3
Z 22	-	-	KF 3
Z 77	EF 91	-	-
Z 90	EF 50	-	-
Z 142	UF 42	-	-
Z 150	EF 42	-	-
Z 152	EF 80	-	-
Z 719	EF 80	-	-
Z 729	EF 86	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
ZD 17	DAF 91	-	-
ZD 152	EBF 80	-	-
OA 4 G	PL 1267	-	-
OC 3	-	4687 K	-
OD 3	-	150 C 1 K	-
OE 3	85 A 1	-	-
OZ 4	-	-	EZ 35
OZ 4 A	-	-	EZ 35
OZ 4 G	-	-	EZ 35
1 A 3	DA 90	-	-
1 A 5 G/GT	-	DL 21	-
1 A 7 G/GT	DK 32	DK 21	-
1 A 7 VG	DK 32	DK 21	-
1 AB 6	DK 96	-	-
1 AC 6	DK 92	-	-
1 AH 5	DAF 96	-	-
1 AJ 4	DF 96	-	-
1 B 3 GT	DY 30	-	-
1 B 6	-	DF 91	-
1 B 7 G/GT	-	DK 32	DK 21
1 C 1 (Mazda)	DK 91	-	-
1 C 2	DK 92	-	-
1 C 3	DK 96	-	-
1 C 5 G/GT	DL 35	-	-
1 C 6	-	KK 32	KK 2
1 C 7 G	-	KK 32	KK 2
1 D 5	-	CY 1	CY 2
1 D 7 G	-	KK 32	KK 2
1 D 13	DA 90	-	-
1 E 3	DC 80	-	-
1 E 5 G	-	KF 35	KF 3
1 F 1	DF 96	-	-
1 F 2	DF 92	-	-
1 F 3	DF 91	-	-
1 F 4	-	KF 35	KF 3

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
I F-5 G	KL 35	KL 4	-
I FD I	DAF 96	-	-
I FD 9	DAF 91	-	-
I H 5 G/GT	DAC 32	-	DAC 21
I H 6 G	-	KBC 32	KBC 1
I L 4	DF 92	-	-
I LA 6	-	DK 32	DK 21
I LC 5	-	DF 33	DF 22
I LD 5	-	-	DAF 91
I LH 4	-	DAC 32	DAC 21
I LN 5	-	DF 33	DF 22
I M 1	DM 70	-	-
I M 3	DM 70	-	-
I N 5 G/GT	DF 33	-	DF 22
I N 5 VG	DF 33	-	DF 22
I N 34 A	OA 50	-	-
I N 38 A	OA 55	-	-
I N 54 A	OA 51	-	-
I N 57 A	OA 52	-	-
I N 58 A	OA 53	-	-
I N 60	-	OA 70	-
I N 64	-	OA 70	-
I N 86	OA 56	-	-
I N 87	OA 60	-	-
I N 88	OA 61	-	-
I P 1	DL 96	-	-
I P 10	DL 92	-	-
I P 11	DL 94	--	-
I Q 5 GT	DL 36	-	-
I R 5	DK 91	-	-
I S 4	-	DL 92	-
I S 5	DAF 91	-	-
I SA 6 GT	-	DF 33	DF 22
I T 4	DF 91	-	-
I U 4	-	DF 92	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
1 U 5	-	DAF 91	-
1 V 5	-	DL 72	-
1 X 2 (A)	-	-	DY 30
2 B 35	EA 50	-	-
2 D 4	-	AB 2	-
2 D 13 (A)	-	EB 34	-
2 D 13 C	-	EB 34	-
2 D 21	POPE 2D21	-	-
3 A 4	DL 93	-	-
3 A 5	DCC 90	-	-
3 B 5 GT	-	DL 92	-
3 C 5 GT	-	DL 33	-
3 B 28	DCX 4/1000	-	-
3 NP 4	MW 6 - 2	-	-
3 Q 4	DL 95	-	-
3 Q 5 GT/G	DL 33	-	-
3 S 4	DL 92	-	-
3 V 4	DL 94	-	-
4 B 32	DCX 4/5000	-	-
4 D 1	-	CBC 1	EBC 3
4 G/280 K	POPE 2D21	-	-
4 THA	-	-	AK 2
4 X P	-	4683	-
4/100 BU	AZ 50	-	-
5 CP 1 A	DG 13 - 2	-	-
5 CP 7 - A	DP 13 - 2	-	-
5 U 4 G	-	GZ 32	-
5 V 4 G	GZ 32	-	-
5 W 4	-	GZ 32	-
5 W 4 G/GT	-	GZ 32	-
5 X 3 GT	-	GZ 32	-
5 Y 3 G/GT	-	GZ 32	-
5 Y 4 G	-	GZ 32	-
5 Z 3	-	-	GZ 32
5 Z 4	-	GZ 32	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
5 Z 4 G/GT	-	GZ 32	-
6 A 7 (S)	-	EK 2	-
6 A 8 G/GT	-	EK 2	-
6 AB 4	-	-	EC 80
6 AB 5	-	-	EM 34
6 AB 7/1853	-	-	EF 80
6 AB 8	ECL 80	-	-
6 AC 7/1852	-	-	EF 80
6 AD 6 G	-	-	EM 34
6 AD 8	EBF 81	-	-
6 AF 4	-	EC 93	-
6 AF 6 G	-	-	EM 34
6 AG 5	-	EF 91	-
6 AG 6 G	EL 33	EL 3	-
6 AJ 8	ECH 81	-	-
6 AK 5 (W)	EF 95	-	-
6 AK 6	-	EL 91	-
6 AK 7	-	EL 33	-
6 AK 8	EABC 80	-	-
6 AL 5	EB 91	-	-
6 AL 6 G	-	4689 K	-
6 AM 5	EL 91	-	-
6 AM 6	EF 91	-	-
6 AN 7	ECH 80	-	-
6 AQ 4	EC 91	-	-
6 AQ 5	EL 90	-	-
6 AQ 8	ECC 85	-	-
6 AR 5	-	-	EL 41
6 AR 7 GS	-	EBF 2	-
6 AT 6	EBC 90	-	-
6 AU 6	EF 94	-	-
6 AV 6	EBC 91	-	-
6 AX 6	-	-	AX 50
6 B 8 (G)	-	EBF 32	-
6 BA 6	EF 93	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
6 BD 6	-	EF 41	-
6 BD 7	EBC 80	-	-
6 BE 6	EK 90	-	-
6 BE 7	EQ 80	-	-
6 BH 5	EF 81	-	-
6 BQ 5	EL 84	-	-
6 BQ 7 A	-	ECC 84	-
6 BR 5	EM 80	-	-
6 BT 6	-	EBC 41	-
6 BX 6	EF 80	-	-
6 BY 7	EF 85	-	-
6 C 4	EC 90	-	-
6 C 6	-	EF 37 A	-
6 C 10	ECH 42	-	-
6 CA 7	EL 34	-	-
6 CD 7	EM 34	-	-
6 CJ 6	EL 81	-	-
6 CK 6	EL 83	-	-
6 CN 6	EL 38	--	-
6 CQ 6	EF 92	-	-
6 CS 6	EH 90	-	-
6 D 1 (Mazda)	EA 50	-	-
6 D 2	EB 91	-	-
6 D 6	-	EF 39	-
6 DA 6	EF 89		-
6 E 8 G	-	ECH 35	-
6 F 6 G/GT	-	EL 33	-
6 F 12	EF 91	-	-
6 F 13	-	EF 42	-
6 F 16	EF 41	-	-
6 H 6 GT	-	EB 34	-
6 J 6	ECC 91	-	-
6 J 7 G/GT	-	EF 37 A	-
6 J 8 G	-	ECH 35	-
6 K 7 G/GT	-	EF 39	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
6 K 8 G/GT	-	ECH 35	-
6 L 6 G	-	4689 K	-
6 L 34	EC 91	-	-
6 LD 3	EBC 41	-	-
6 M 2	EM 34	-	-
6 M 5	EL 80	-	-
6 M 6 G	EL 33	-	-
6 M 7 G	-	EF 39	-
6 N 7 G/GT	-	ECC 33	-
6 N 8	EBF 80	-	-
6 P 8 G	-	ECH 35	-
6 P 28	-	EL 38	-
6 Q 4	EC 80	-	-
6 Q 7 G	-	EBC 3	-
6 Q 7 GT	-	EBC 3	-
6 R 3	EY 81	-	-
6 R 4	EC 81	-	-
6 R 6 G	-	EF 39	-
6 R 7	-	EBC 3	-
6 S 7	-	EF 39	-
6 S 7 G	-	EF 39	-
6 SC 7	-	ECC 35	-
6 SJ 7	-	EF 36	-
6 SK 7	-	EF 41	-
6 SL 7 GT	-	ECC 35	-
6 SN 7 GT	-	ECC 33	-
6 T 8		EABC 80	-
6 U 3	EY 80	-	-
6 U 5/6 G 5	-	-	EM 34
6 U 7 G	-	EF 39	-
6 U 8	-	ECF 80	-
6 V 3 (A)	-	EY 81	-
6 V 4	EZ 80	-	-
6 V 6 G	-	EL 33	-
6 W 2	-	EY 51	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
6 W 3	EY 80	-	-
6 W 7 G	-	EF 37 A	-
6 X 2	EY 51	-	-
6 X 4	EZ 90	-	-
6 X 5 G/GT	EZ 35	-	-
6 ZY 5 G	-	EZ 35	-
7 A 2	-	-	AL 4
7 A 3	-	AL 4	-
7 A 7	-	EF 22	-
7 AN 7	PCC 84	-	-
7 B 7	-	EF 22	-
7 C 5	-	EL 41	-
7 D 6	-	CL 4	CBL 1
7 D 9	EL 91	-	-
7 F 7	-	ECC 35	-
7 F 16	EF 41	-	-
7 K 7	-	EBC 41	-
7 S 7	-	ECH 21	-
7 Y 4	-	EZ 35	-
8 A 1	-	AF 7	-
8 A 8	PCF 80	-	-
8 D 2	-	-	CF 7
8 D 3	EF 91	-	-
9 A 1	-	-	AF 3
9 AK 8	PABC 80	-	-
9 AQ 8	PCC 85	-	-
9 D 2	-	-	CF 3
9 D 6	EF 92	-	-
10 D 1	-	EB 34	-
10 F 9	-	UF 41	-
10 LD 3	UBC 41	-	-
10 M 2	UM 4	-	-
11 A 2	-	ABC 1	-
12 AT 7	ECC 81	-	-
12 AU 7	ECC 82	-	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
12 AX 7	ECC 83	-	-
12 XP 4	MW 31 - 16	-	-
13 PGA	-	-	ECH 3
13 SPA	-	-	CF 7
13 VPA	-	-	CF 3
15	-	-	KF 3
15 A 2	-	AK 2	-
15 A 6	PL 83	-	-
15 D 1	-	-	ECH 3
16 A 5	PL 82	-	-
17 Z 3	PY 81	-	-
19 BD	PY 80	-	-
19 D 8	UCH 81	-	-
19 SU	PY 82	-	-
19 X 3	PY 80	-	-
19 Y 3	PY 82	-	-
20 A 1	-	-	AK 2
20 A 3	POPE 2D21	-	-
21 A 6	PL 81	-	-
30 C 1	PCF 80	-	-
30 L 1	PCC 84	-	-
36	-	EF 36	-
39/44	-	EF 39	-
40 SUA	-	CY 1	CY 2
41 E	-	EL 2	-
41 MHF	-	-	ABC 1
41 MHL	-	-	ABC 1
41 MPG	-	AK 2	-
41/MPL	-	-	ABC 1
41/MSG	-	AF 7	-
41/MTL	-	-	ABC 1
41/STH	-	--	AK 2
42/42 E	-	EL 2	-
42 MP/PEN	-	AL 4	-
42/OT	-	AL 4	-

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
53 KU	-	GZ 34	-
57	POPE 57	-	-
63 TP	ECL 80	-	-
105	POPE 105	-	-
43 IU	1561	-	-
44 IU	1561	-	-
45 IU	-	AZ 50	-
54 KU	GZ 32	-	-
62 DDT	EBC 41	-	-
62 TH	ECH 42	-	-
62 VP	EF 41	-	-
63 SPT	EF 50	-	-
64 ME	EM 34	-	-
64 SPT	EF 80	-	-
65 ME	EM 80	-	-
66 KU	EZ 40	-	-
67 PT	EL 41	-	-
77/77 E	-	EF 37 A	-
78/78 E	-	EF 39	-
80	-	GZ 32	-
84/6 Z 4	-	EZ 32	-
121 K	MW 31 - 16	-	-
121 VP	UF 41	-	-
141 DDT	UBC 41	-	-
141 TH	UCH 42	-	-
171 DDP	UBF 80	-	-
202 DDT	-	CBC 1	EBC 3
202 STH	-	-	ECH 3
210 DDT	-	-	DLL 21
210 DET	-	KC 4	KBC 1
210 HF	-	KC 4	KBC 1
210 LF	-	KC 4	KBC 1
210 PG	-	-	KK 2
210 SPG	-	-	KK 2
210 SPT	-	-	KF 3

TYPE	DIRECT EQUIVALENT	NEAR EQUIVALENT	RECOMMENDED REPLACEMENT TYPE
210 VPT(4-pin)	-	-	KF 3
210 VPT(7-pin)	-	-	KF 3
213 Pen	PL 81	-	-
215 P	-	-	KL 4
215 SG	-	-	KF 3
220 HPT	-	KL 4	-
220/OT	-	KL 4	-
220 P	-	-	KL 4
220 PA	-	-	KL 4
220 SG	-	-	KF 3
220 VS	-	-	KF 3
220 VSG	-	-	KF 3
230 PT	-	KL 4	-
240 QP	-	-	DLL 21
244 V	-	-	ABC 1
302 THA	-	-	ECH 3
311 SU	UY 41	-	-
332 PEN	-	CL 4	CBL 1
354 V	-	-	ABC 1
408 BU	1805	-	-
442 BU	1561	-	-
451 U	AZ 50	-	-
460 BU	AZ 50	-	-
484 V	-	-	ABC 1
506 BU	1805	-	-
807 (W)	QE 06/50(W)	-	-
813	QB 2/250	-	-
832 A	QQE 04/20	-	-
834	TB 1/60 G	-	-
837	PE 04/10 E	-	-
866 A	DCG 4/1000 G	-	-
872 A	DCG 5/5000 GB	-	-
2101	-	KL 4	-
2102	-	KBC 1	-
5557	POPE 57	-	-
5559	POPE 105	-	-
5861	EC 55	-	-
189049	1163	-	-
217282	1164	-	-

SUMMARY OF THE TYPES

ALPHABETICAL VALVE INDEX

TYPE	PAGE	TYPE	PAGE
AB 2	36	CL 2	51
ABC 1	36	CL 4	51
ABL 1	36	CL 6	52
AC 2	36	CY 1	53
AD 1	37	CY 2	53
AF 3	37	DA 90	53
AF 7	37	DAC 21	54
AH 1	38	DAC 32	54
AK 2	39	DAF 40	55
AL 1	39	DAF 41	55
AL 2	39	DAF 91	56
AL 4	39	DAF 96	57
AL 5	40	DC 70	57
AM 1	40	DC 80	57
AM 2	40	DC 90	58
AX 1	41	DCC 90	58
AX 50	41	DCG 4/1000 G	196
AZ 1	41	DCG 5/5000 GB	196
AZ 4	41	DCG 9/20	196
AZ 11	42	DCX 4/1000	196
AZ 12	42	DCX 4/5000	196
AZ 31	42	DF 21	58
AZ 41	42	DF 22	59
AZ 50	42	DF 33	59
C 8	43	DF 91	60
C 10	43	DF 92	60
C 12	43	DF 96	60
CB 1	43	DK 21	61
CB 2	43	DK 32	61
CBC 1	44	DK 40	62
CBL 1	44	DK 91	63
CBL 6	45	DK 92	63
CC 2	46	DK 96	63
CF 3	46	DL 21	64
CF 7	47	DL 33	64
CF 50	47	DL 35	64
CH 1	48	DL 36	64
CK 1	49	DL 41	65
CK 3	50	DL 92	66
CL 1	50	DL 93	66

ALPHABETICAL VALVE INDEX

TYPE	PAGE	TYPE	PAGE
DL 94	66	ECC 35	82
DL 95	66	ECC 40	82
DL 96	67	ECC 81	83
DLL 21	67	ECC 82	83
DM 70	68	ECC 83	83
DM 71	69	ECC 84	83
DY 30	69	ECC 85	84
DY 86	69	ECC 91	84
EA 50	69	ECF 1	84
EAA 91	69	ECF 80	85
EABC 80	70	ECH 3	85
EAC 91	70	ECH 4	85
EAF 41	71	ECH 21	86
EAF 42	71	ECH 35	87
EB 4	72	ECH 41	87
EB 34	72	ECH 42	87
EB 41	72	ECH 81	88
EB 91	73	ECL 11	89
EBC 3	73	ECL 80	89
EBC 33	74	EEP 1	90
EBC 41	74	EF 5	91
EBC 81	75	EF 6	91
EBC 90	75	EF 8	92
EBC 91	75	EF 9	93
EBF 2	76	EF 22	94
EBF 32	77	EF 36	94
EBF 80	77	EF 37 A	95
EBL 1	78	EF 39	95
EBL 21	78	EF 40	96
EC 2	79	EF 41	97
EC 55	79	EF 42	97
EC 80	79	EF 43	97
EC 81	80	EF 50	97
EC 91	80	EF 51	98
EC 92	80	EF 54	98
EC 93	81	EF 55	98
ECC 31	81	EF 80	99
ECC 32	81	EF 85	99
ECC 33	81	EF 86	100
ECC 34	82	EF 89	100

ALPHABETICAL VALVE INDEX

TYPE	PAGE	TYPE	PAGE
EF 91	101	EQ 80	118
EF 92	101	EY 51	118
EF 93	101	EY 80	119
EF 94	102	EY 81	119
EF 95	102	EY 82	119
EFF 51	102	EY 84	119
EFM 1	103	EY 86	119
EFP 60	103	EY 91	120
EH 2	103	EZ 2	120
EK 2	104	EZ 4	120
EK 3	105	EZ 35	121
EK 32	105	EZ 40	121
EK 90	105	EZ 41	121
EL 2	106	EZ 80	121
EL 3 (N)	107	EZ 90	122
EL 5	107	GZ 32	122
EL 6	107	GZ 34	122
EL 11	108	HCH 81	123
EL 12	108	HL 94	123
EL 32	109	KB 2	123
EL 33	109	KBC 1	124
EL 34	109	KC 1	124
EL 35	110	KC 3	125
EL 37	111	KC 4	125
EL 38	112	KCH 1	126
EL 41	112	KDD 1	126
EL 42	112	KF 3	127
EL 50	113	KF 4	127
EL 51	114	KH 1	128
EL 60	114	KK 2	128
EL 81	114	KL 4	129
EL 82	115	KL 5	129
EL 83	115	MW 22-7	182
EL 84	115	MW 22-14	182
EL 90	116	MW 22-16	182
EL 91	116	MW 22-17	182
EM 1	117	MW 22-18	183
EM 4	117	MW 31-7	183
EM 34	117	MW 31-14	183
EM 80	118	MW 31-16	183

ALPHABETICAL VALVE INDEX

TYPE		PAGE
MW 31-17	-	183
MW 31-18	-	184
MW 31-74	-	184
MW 36-22	-	184
MW 36-24	-	184
MW 41-1	-	184
MW 43-43	-	185
MW 43-64	-	185
MW 53-20	-	185
OA 50	-	174
OA 51	-	174
OA 52	-	175
OA 53	-	175
OA 55	-	175
OA 56	-	175
OA 60	-	176
OA 61	-	176
OA 70	-	176
OA 73	-	176
PABC 80	-	130
PC 93	-	131
PCC 84	-	131
PCC 85	-	131
PCF 80	-	132
PCL 82	-	133
PE 04/10 E	-	192
PE 06/40 E	-	192
PL 17	-	188
PL 21	-	188
PL 36	-	133
PL 57	-	188
PL 81	-	134
PL 82	-	135
PL 83	-	136
PL 105	-	188
PY 80	-	137
PY 81	-	137
PY 82	-	137
QB 2/250	-	192
QB 3/300	-	193
QB 3.5/750	-	193
QE 06/50	-	193
QEL 1/150	-	193
QQE 04/20	-	193
QQE 06/40	-	193
TB 1/60 G	-	193
U 30	-	138
UABC 80	-	138
UAF 41	-	139
UAF 42	-	140
UB 41	-	141
UBC 41	-	141
UBC 81	-	142
UBF 80	-	142
UBL 1	-	144
UBL 21	-	145
UC 92	-	146
UCC 85	-	147
UCH 4	-	148
UCH 21	-	148
UCH 41	-	150
UCH 42	-	151
UCH 81	-	152
UCL 11	-	152
UF 9	-	152
UF 21	-	153
UF 41	-	154
UF 42	-	155
UF 43	-	156
UF 80	-	156
UF 85	-	157
UF 89	-	157
UL 41	-	158
UL 44	-	159
UL 84	-	159
UM 4	-	160
UM 34	-	160
UM 80	-	161
UY 1 N	-	161
UY 11	-	162

ALPHABETICAL VALVE INDEX

TYPE	PAGE	TYPE	PAGE
UY 21	162	6 V 6 - GT	28
UY 41	163	6 X 4	28
UY 42	163	12 AT 6	29
UY 82	163	12 AT 7	29
UY 85	164	12 AU 6	29
1 A 3	10	12 AU 7	30
1 A 7-GT	10	12 AV 6	30
1 AC 6	10	12 AX 7	30
1 C 5-GT	11	12 BA 6	30
1 H 5-GT	11	12 BE 6	31
1 L 4	12	12 BY 7	31
1 N 5-GT	12	12 SA 7-GT	31
1 R 5	12	12 SK 7-GT	31
1 S 5	13	12 SN 7-GT	31
1 T 4	15	12 SQ 7-GT	32
1 U 4	15	25 L 6-GT	32
3 A 4	16	35 W 4	32
3 A 5	16	35 Z 5-GT	32
3 Q 4	17	50 C 5	33
3 Q 5-GT	17	50 L 6-GT	33
3 S 4	18	80	33
3 V 4	20	85 A 1	178
5 U 4-G	20	85 A 2	178
5 Y 3-GT	20	1163	178
6 AK 5	21	1164	178
6 AL 5	21	1561	164
6 AQ 5	21	1805	165
6 AT 6	22	1832	165
6 AU 6	22	1875	165
6 AV 6	23	1876	165
6 BA 6	24	1877	165
6 BE 6	24	1878	166
6 BG 6-G	25	4613	166
6 BQ 7-A	25	4614	166
6 J 6	25	4624	167
6 L 6-G	25	4636	167
6 SA 7-GT	26	4641	167
6 SK 7-GT	27	4646	168
6 SN 7-GT	27	4650	168
6 SQ 7-GT	27	4652	169

ALPHABETICAL VALVE INDEX

TYPE		PAGE
4654 K	-	169
4654 P	-	169
4657	-	170
4662	-	170
4682	-	171
4683	-	171
4686	-	172
4688	-	172
4689 K	-	172
4689 P	-	172
4690	-	172
4694	-	173
4699	-	173