AVANT-GARDE IN TECHNOLOGY

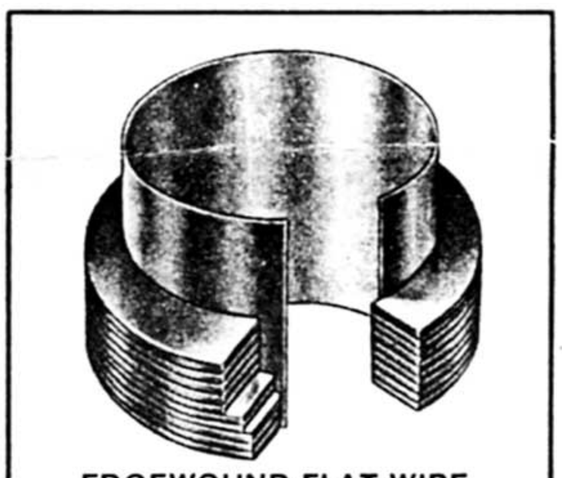
Focal drivers which are made individually by hand respond to the most advanced technological standards. Each component is inspected, chosen and tested separately. The drivers are built and then assembled by one artisane who also assures the final acoustic testing.

5 N 402 - DB TWIN COIL 5"

A realism without compromise, Focal's philosophy is founded upon the union of new technologies and "savoir-faire". An object of creative genius.

Focal has developed a new design concept with small-sized twin coil units. The Focal range incorporates some new drive units fitted with two concentric but separate voice coils. They have been specially designed for a specific application. Both voice coils work in different frequency ranges; one operates over the full range of the unit whilst the other only operates over the lower bass range, being rolled off at higher frequencies. In this way, it is now possible to modify the lower mid-range and bass levels as required and adjust the frequency response in an area not previously possible. The voice coils work together in the lower bass range but have different roll-off frequencies using two cross-over sections. This design increases the total efficiency and simplifies the crossover networks. As it is not necessary to use many elements to obtain a linear response, the phase shift is reduced and the bass performance is quite outstanding for small units.

Focal manufactures its larger voice coils (>25 mm) with copper or aluminium flat wire, edgewound in a single layer. This sophisticated technique,



EDGEWOUND FLAT WIRE VOICE COIL

mastered only by a limited number of manufacturers, permits a 25% increase in force and dynamics.

Focal has developed a new synthetic isotropic material for loudspeaker cones, NEOFLEX, which combines at last both rigidity and lightness. NEOFLEX gives excellent dispersion patterns, very linear response curves and gradual roll-off slopes at high frequencies without any peaking. Good sensitivity (much better than Bextrene and slightly higher than polypropylene), low colouration and extended bass response enable NEOFLEX units to be used with low rated power.

10 N 501: NEOFLEX CONE 10"

FOCAL has designed a very specific technical solution in order to increase drive-units efficiency without any change in their internal structure.

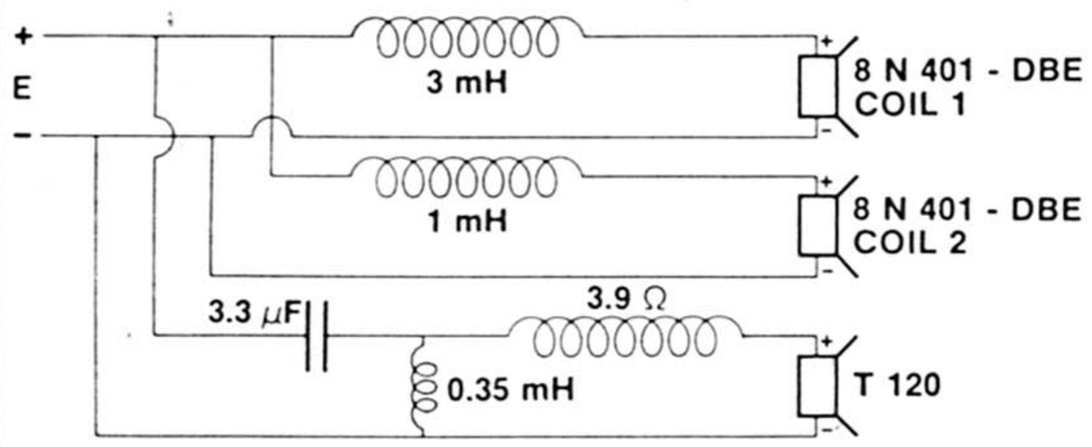
In fact, the rear part of the primary circuit has been fitted with a second magnetic circuit which proves to be an original device insofar it is magnetized reverse to the first one.

So, the different magnetic losses of the primary circuit are repulsed and concentrated within the gap. The force factor grows by 15% and, for exemple, the efficiency may gain up to 1.5 dB on double-coil drive-units.

8 N 401-DBE/2

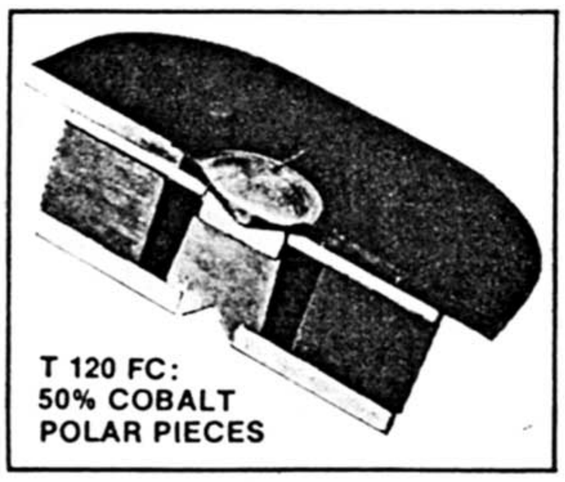
TWIN COIL DOUBLE MAGNET

CROSSOVER SECTION OF A TWIN COIL 8" AND A TWEETER



3 WAY SYSTEM WITH ONLY 2 DRIVERS

The Focal tweeter technology is revolutionary. The magnetic fields is one of the most powerful ever developed: more than 2 Teslas attained by a superactive magnet and polar pieces containing 50% cobalt. The cone is a fiberglass inverted dome which maintains a constant energy of up to 15 KHZ. The entire tweeter weighs not less than 1.4 Kg.



T 120 FC:
50% COBALT
POLAR PIECES

Because of countinuing design improvements, FOCAL reserves the right to modify, or replace any products listed herein.

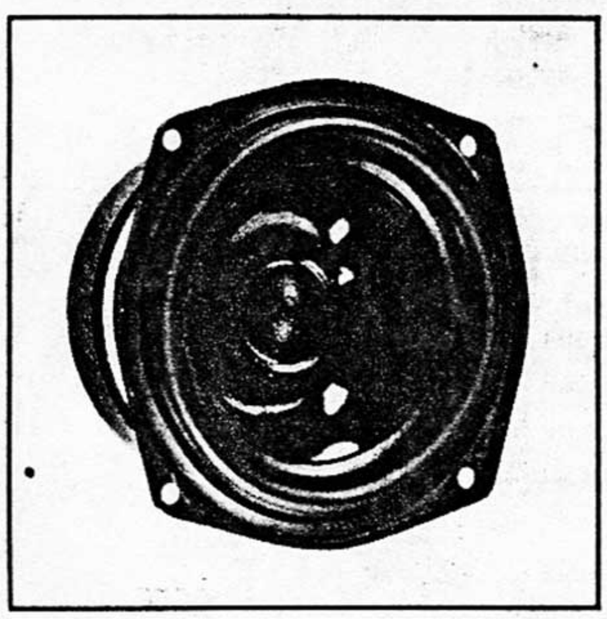
FRANCE-FILIÈRES

B.P. 201
42013 SAINT-ETIENNE Cedex
TÉL. 77/32.46.44.
Télex: 330683 CHAMCO

DISTRIBUTORS

U.S.A.: FOCAL N.A., 210 Eighth street Lewiston, New-York 14092, U.S.A.
CANADA: BRITISH ACOUSTICS, 1011 Meyerside drive, Mississauga, Ontario L5T 1K8 - Tel. 416.457.3001.
BELGIUM: CLOFIS, 29, avenue René Stevens, 1160 Bruxelles - Tel. 26.57.18.05.
HOLLAND: CLOFIS, Rijklof Van Goensstraat 35, 2593 EE Den Haag - Tel. 70.47.17.54.
DENMARK: F3-Lyd, St. Kongensgade 110-F3, DK 1264 Kobenhavn K - Tel. 01.14.50.51.
FINLAND: LOUNAMAA, Vimarinpolku 27A, F.I. 00330, Helsinki 33 - Tel. 90.488.566.
W. GERMANY: FOCAL VERTRIEB, Karlsruher Str. 51, 69 Heidelberg - Tel. 06221.37.36.37.
AUSTRIA: I.E.K. AKUSTIK, Bruckner Strasse 2, A 4490 St. Florian Linz - Tel. 07224.582.
ITALY: BETA HI FI, via Plinio n° 43, 20129 Milano - Tel. 20.45.150.
SWITZERLAND: ACR AG, Heinrichstrasse 248, 8005 Zurich - Tel. 01.42.12.22.
GREAT BRITAIN: FALCON TABOR HOUSE, Norwich road, Mulbarton, Near Norwich Norfolk NR 14 8JT - Tel. (0508)78272.

NEOFLEX CONE

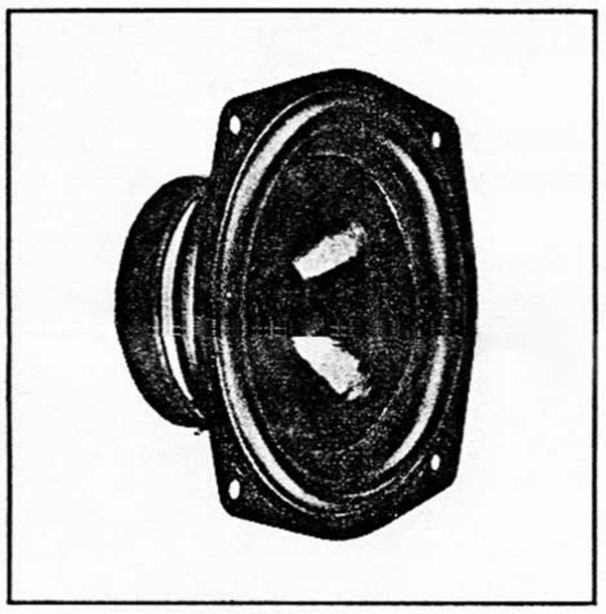


5"

5 N 401

coil
diam. 25 mm

Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6.5\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$f_S = 40.7$ Hz	Dust cap treatment	: LATEX + PLASTIFLEX
Efficiency 1 W/1 m	= 86.5 dB	Surround material	: NEOPREN
Power handling	= 45 W	Voice coil diameter	= 25.5 mm
Total Q factor	$Q_{TS} = 0.335$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.37$	Voice coil height	= 13 mm
Mechanical Q factor	$Q_{MS} = 3.57$	Voice coil layers	= 2
Suspension compliance	$C_{MS} = 1.51\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$S_d = 0.866\ 10^{-2} m^2$	Force factor	$BL = 8.2\ NA^{-1}$
Moving mass	$M_{md} = 10.2\ 10^{-3} kg$	Acceleration factor	$Fa = 804\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.73\ kg/s^{-1}$	Gap volume	= 567 mm^3
Equivalent volume of suspension	$V_{AS} = 15.8$ l	Gap height	= 6 mm
Load type	= CLOSED	Magnetic energy	= 0.375 Ws
Recommended volume of enclosure	$V_B = 7.5$ l	Magnet diameter	= 100 mm
-3 dB cut. off freq.	$F_3 = 60$ Hz	Magnet weight	= 0.56 kg
Speaker weight	= 1.52 kg	Flux density	= 1.29 T

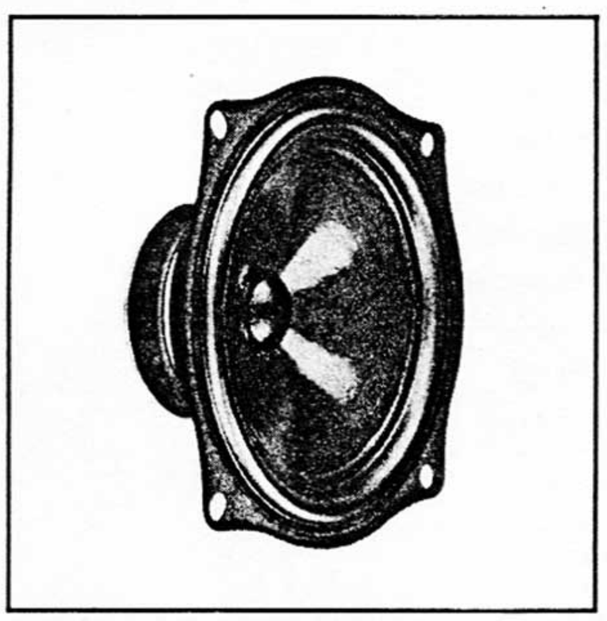


7"

7 N 401

coil
diam. 25 mm

Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6.5\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$f_S = 30$ Hz	Dust cap treatment	: —
Efficiency 1 W/1 m	= 87.6 dB	Surround material	: NEOPREN
Power handling	= 50 W	Voice coil diameter	= 25.5 mm
Total Q factor	$Q_{TS} = 0.35$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.37$	Voice coil height	= 13 mm
Mechanical Q factor	$Q_{MS} = 5.95$	Voice coil layers	= 2
Suspension compliance	$C_{MS} = 1.75\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$S_d = 1.54\ 10^{-2} m^2$	Force factor	$BL = 8.2\ NA^{-1}$
Moving mass	$M_{md} = 16.3\ 10^{-3} kg$	Acceleration factor	$Fa = 503\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.51\ kg/s^{-1}$	Gap volume	= 567 mm^3
Equivalent volume of suspension	$V_{AS} = 58.1$ l	Gap height	= 6 mm
Load type	= CLOSED	Magnetic energy	= 0.375 Ws
Recommended volume of enclosure	$V_B = 12$ l	Magnet diameter	= 100 mm
-3 dB cut. off freq.	$F_3 = 58$ Hz	Magnet weight	= 0.56 kg
Speaker weight	= 1.62 kg	Flux density	= 1.29 T

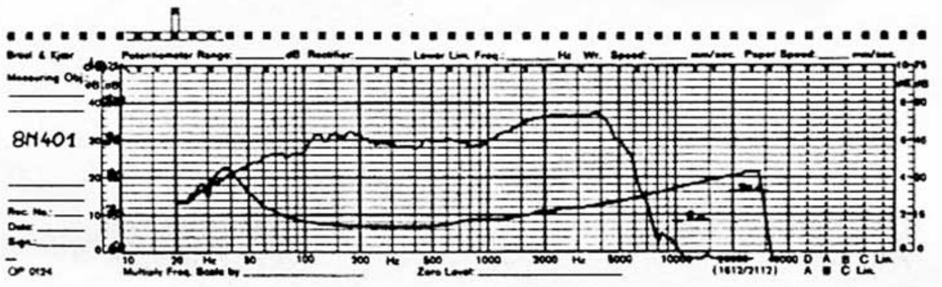


8"

8 N 401

coil
diam. 25 mm

125,000



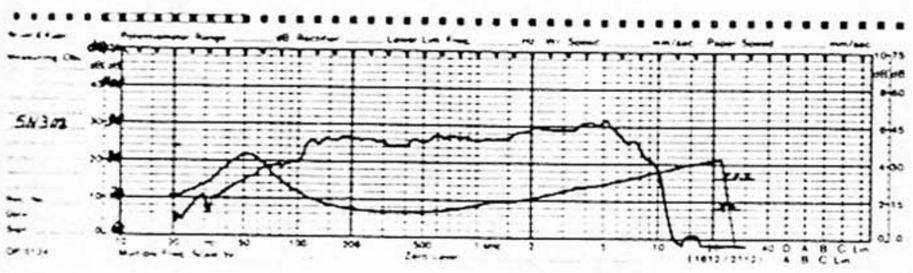
Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6.5\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$f_S = 31.5$ Hz	Dust cap treatment	: LATEX + PLASTIFLEX
Efficiency 1 W/1 m	= 89 dB	Surround material	: NEOPREN + PVC
Power handling	= 60 W	Voice coil diameter	= 25.5 mm
Total Q factor	$Q_{TS} = 0.45$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.53$	Voice coil height	= 6 mm
Mechanical Q factor	$Q_{MS} = 3.0$	Voice coil layers	= 2
Suspension compliance	$C_{MS} = 1.30\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$S_d = 2.15\ 10^{-2} m^2$	Force factor	$BL = 8.2\ NA^{-1}$
Moving mass	$M_{md} = 19.4\ 10^{-3} kg$	Acceleration factor	$Fa = 423\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.19\ kg/s^{-1}$	Gap volume	= 567 mm^3
Equivalent volume of suspension	$V_{AS} = 84.1$ l	Gap height	= 6 mm
Load type	= CLOSED	Magnetic energy	= 0.375 Ws
Recommended volume of enclosure	$V_B = 32$ l	Magnet diameter	= 100 mm
-3 dB cut. off freq.	$F_3 = 49$ Hz	Magnet weight	= 0.56 kg
Speaker weight	= 1.66 kg	Flux density	= 1.29 T

NEOFLEX CONE MIDRANGE

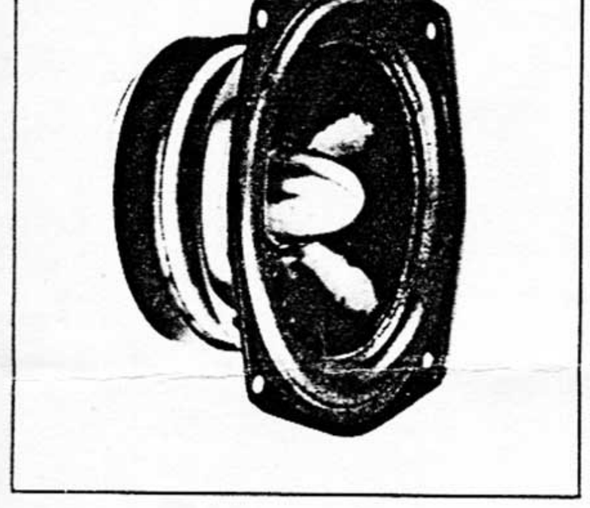
5"

5 N 302.

coil
diam. 25 mm



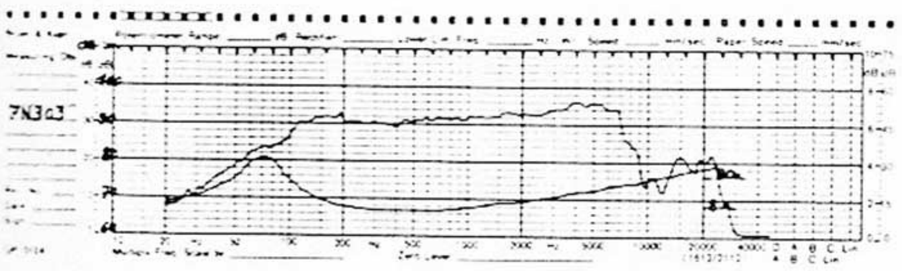
Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6.5\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$f_S = 50$ Hz	Dust cap treatment	: LATEX + PLASTIFLEX
Efficiency 1 W/1 m	in Mid. = 88.5 dB	Surround material	: NEOPREN + PVC
Power handling	in Mid. = 100 W	Voice coil diameter	= 25.5 mm
Total Q factor	$Q_{TS} = 0.31$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.34$	Voice coil height	= 13 mm
Mechanical Q factor	$Q_{MS} = 3.57$	Voice coil layers	= 2
Suspension compliance	$C_{MS} = 1.04\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$S_d = 0.866\ 10^{-2} m^2$	Force factor	$BL = 8.2\ NA^{-1}$
Moving mass	$M_{md} = 9.8\ 10^{-3} kg$	Acceleration factor	$Fa = 837\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.86\ kg/s^{-1}$	Gap volume	$= 567\ mm^3$
Equivalent volume of suspension	$V_{AS} = 10.9$ l	Gap height	= 6 mm
Load type	= —	Magnetic energy	= 0.375 Ws
Recommended volume of enclosure in (M)	$V_B = 4/5$ l in Mid.	Magnet diameter	= 100 mm
-3 dB cut. off freq.	$F_3 =$ —	Magnet weight	= 0.56 kg
Speaker weight	= 1.52 kg	Flux density	= 1.29 T



7"

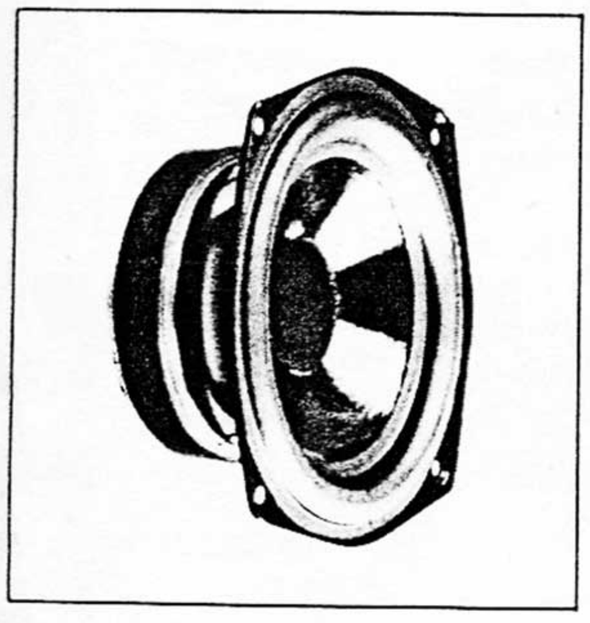
7 N 303

Aluminium
flat wire
diam. 40 mm



Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6.3\ \Omega$	Dust cap material	: ACOUSTIC DIFFUSER PIECE OF METAL OF diam. 40 mm
Resonant frequency	$f_S = 69.7$ Hz	Dust cap treatment	:
Efficiency 1 W/1 m	in Mid. = 93 dB	Surround material	: FOAM TREATED WITH PLASTIFLEX
Power handling	in Mid. = 150 W	Voice coil diameter	= 40 mm
Total Q factor	$Q_{TS} = 0.45$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.54$	Voice coil height	= 7 mm
Mechanical Q factor	$Q_{MS} = 2.81$	Voice coil layers	= 1
Suspension compliance	$C_{MS} = 0.49\ 10^{-3} mN^{-1}$	Wire	: EDGEWOUND ALUMINIUM FLAT WIRE
Emissive piston area	$S_d = 1.58\ 10^{-2} m^2$	Force factor	$BL = 11.3\ NA^{-1}$
Moving mass	$M_{md} = 10.6\ 10^{-3} kg$	Acceleration factor	$Fa = 10660\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.66\ kg/s^{-1}$	Gap volume	$= 963\ mm^3$
Equivalent volume of suspension	$V_{AS} = 17.1$ l	Gap height	= 6 mm
Load type	= —	Magnetic energy	= 0.698 Ws
Recommended volume of enclosure in (M)	$V_B = 10$ l in Mid.	Magnet diameter	= 120 mm
-3 dB cut. off freq.	$F_3 =$ —	Magnet weight	= 0.87 kg
Speaker weight	= 2.65 kg	Flux density	= 1.35 T

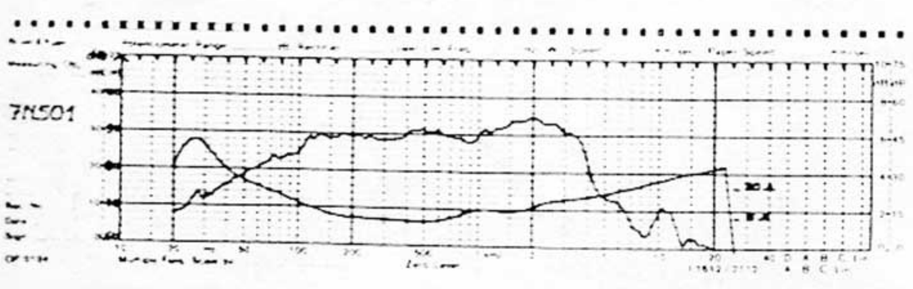
NEOFLEX CONE BASS-MIDRANGE



7"

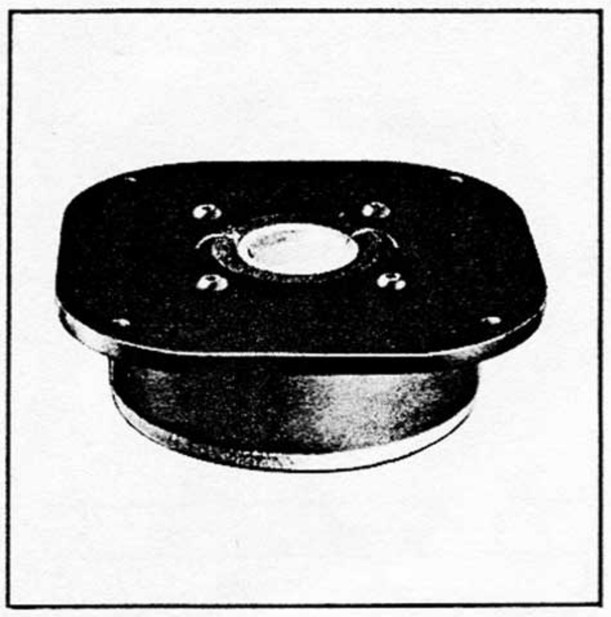
7 N 501

Copper
flat wire
diam. 40 mm



Nominal impedance	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance	$R_{CC} = 6\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$f_S = 27.2$ Hz	Dust cap treatment	: —
Efficiency 1 W/1 m	= 89.6 dB	Surround material	: NEOPREN
Power handling	= 75 W	Voice coil diameter	= 40 mm
Total Q factor	$Q_{TS} = 0.18$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.19$	Voice coil height	= 13 mm
Mechanical Q factor	$Q_{MS} = 5.03$	Voice coil layers	= 1
Suspension compliance	$C_{MS} = 2.07\ 10^{-3} mN^{-1}$	Wire	: EDGEWOUND COPPER FLAT WIRE
Emissive piston area	$S_d = 1.54\ 10^{-2} m^2$	Force factor	$BL = 13.4\ NA^{-1}$
Moving mass	$M_{md} = 16.5\ 10^{-3} kg$	Acceleration factor	$Fa = 812\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.56\ kg/s^{-1}$	Gap volume	$= 963\ mm^3$
Equivalent volume of suspension	$V_{AS} = 68.7$ l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.698 Ws
Recommended volume of enclosure	$V_B =$ SEE TABLE	Magnet diameter	= 120 mm
-3 dB cut. off freq.	$F_3 =$ SEE TABLE	Magnet weight	= 0.87 kg
Speaker weight	= 2.5 kg	Flux density	= 1.35 T

TWEETERS (FIBERGLASS INVERTED DOME)

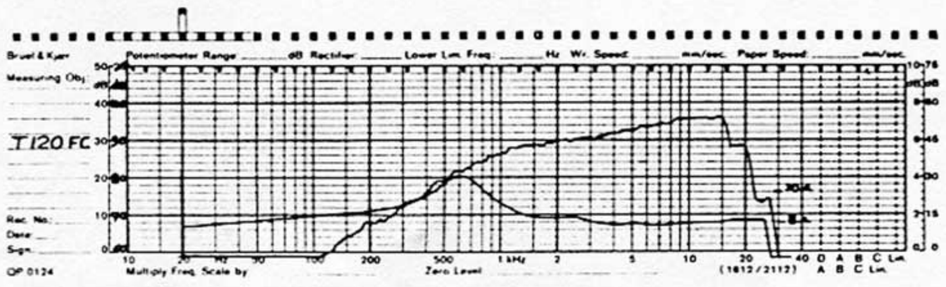


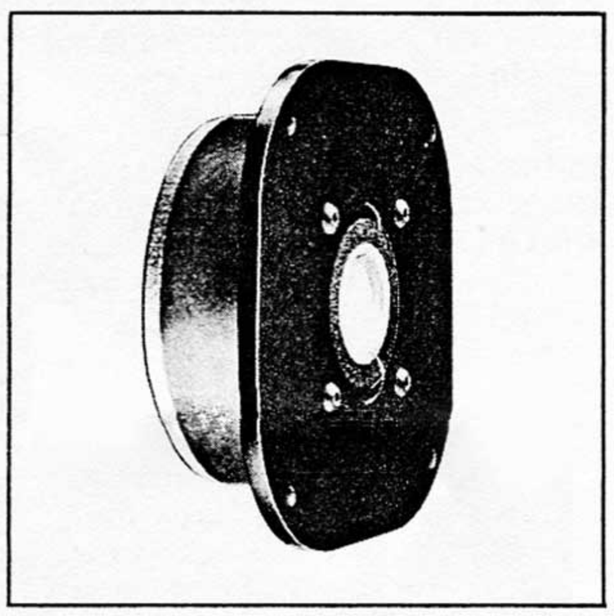
12 × 12 cm

T 120 FC

(95 dB)
(Iron-cobalt)

Nominal impedance	Z = 8 Ω	Cone material	: Fiberglass
Minimum impedance	ZMIN = 6.8 Ω	Voice coil diameter	= 20.4 mm
DC resistance	Rcc = 6 Ω	Surround	= Foam + Latex
Resonant frequency	fs = 580 Hz	Former	= Aluminium 0.4 mm
Efficiency 1 W/1 m	= 95 dB	Voice coil height	= 2.8 mm
Cut frequencies	= 3.5 → 4.5 KHz	Voice coil layers	= 2
Power handling:		Cone diameter	= 30 mm
DC	= 10 W	Force factor	BL = 3.64 NA^{-1}
4 KHz cut 6 dB/oct.	= 25 W	Acceleration factor	Fa = 14560 $ms^{-2}A^{-1}$
4 KHz cut 12 dB/oct.	= 75 W	Gap volume	= 84 mm^3
4 KHz cut 18 dB/oct.	= 100 W	Magnet energy	= 0.140 Ws
Moving mass	Mmd = 0.25 g	Gap height	= 2 mm
Speaker weight	= 1.400 kg	Weight	= 725 g
		Magnet diam.	= 96 mm
		Flux density	= 2.05 T



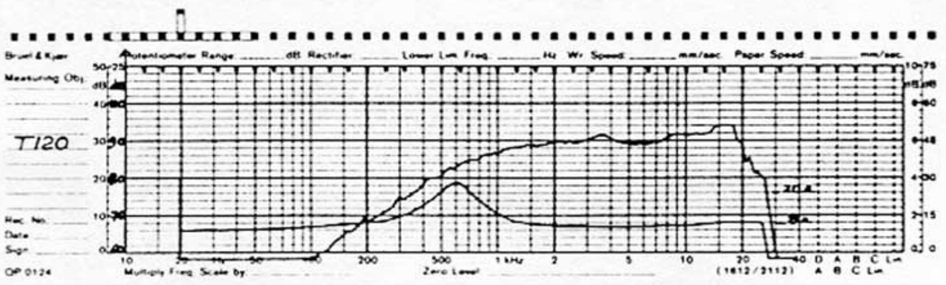


12 × 12 cm

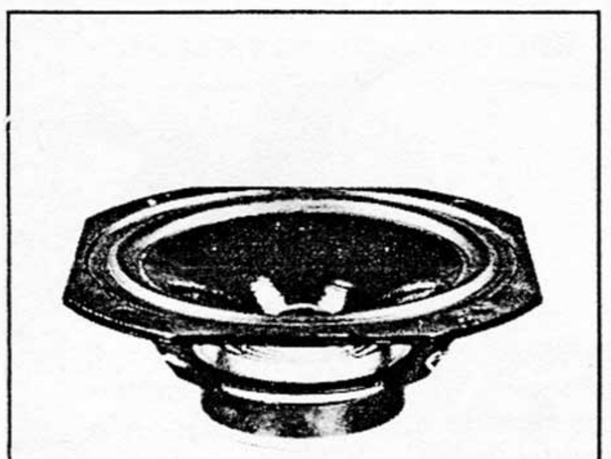
T 120

(92 dB)

Nominal impedance	Z = 8 Ω	Cone material	: Fiberglass
Minimum impedance	ZMIN = 6.8 Ω	Voice coil diameter	= 20.4 mm
DC resistance	Rcc = 6 Ω	Surround	= Foam + Latex
Resonant frequency	fs = 600 Hz	Former	= Aluminium 0.4 mm
Efficiency 1 W/1 m	= 92 dB	Voice coil height	= 2.8 mm
Cut frequencies	= 3.5 → 4.5 KHz	Voice coil layers	= 2
Power handling:		Cone diameter	= 30 mm
DC	= 10 W	Force factor	BL = 3.19 NA^{-1}
4 KHz cut 6 dB/oct.	= 25 W	Acceleration factor	Fa = 11392 $ms^{-2}A^{-1}$
4 KHz cut 12 dB/oct.	= 75 W	Gap volume	= 84 mm^3
4 KHz cut 18 dB/oct.	= 100 W	Magnet energy	= 0.108 Ws
Moving mass	Mmd = 0.28 g	Gap height	= 2 mm
Speaker weight	= 1.400 kg	Weight	= 725 g
		Magnet diam.	= 96 mm
		Flux density	= 1.75 T



NEOFLEX CONE WOOFER



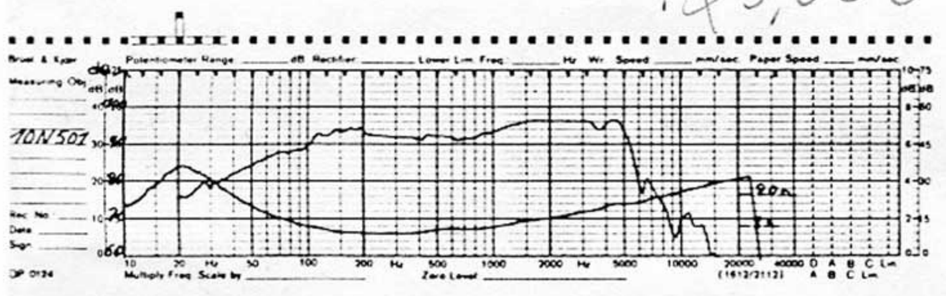
10"

10 N 501

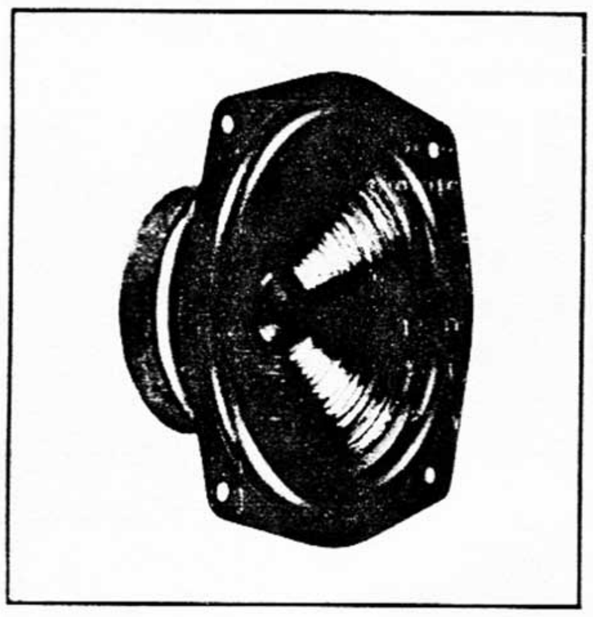
Copper
flat wire
diam. 40 mm

185,000

Nominal impedance	Z = 8 Ω	Cone material	: NEOFLEX
Minimum impedance	ZMIN = 7.4 Ω	Cone treatment	: PLASTIFLEX
DC resistance	Rcc = 6 Ω	Dust cap material	: POLYPROPYLEN diam. 56 mm
Resonant frequency	fs = 21.8 Hz	Dust cap treatment	: —
Efficiency 1 W/1 m	= 92 dB	Surround material	: NEOPREN + PVC
Power handling	= 85 W	Voice coil diameter	= 40 mm
Total Q factor	QTS = 0.231	Voice coil former	: NOMEX
Electrical Q factor	QES = 0.26	Voice coil height	= 13 mm
Mechanical Q factor	QMS = 2.05	Voice coil layers	= 1
Suspension compliance	CMS = 1.40 10^{-3} mN^{-1}	Wire	: EDGEWOUND COPPER FLAT WIRE
Emissive piston area	Sd = 3.3 10^{-2} m^2	Force factor	BL = 13.4 NA^{-1}
Moving mass	Mmd = 38 10^{-3} kg	Acceleration factor	Fa = 353 $ms^{-2}A^{-1}$
Mechanical resistance	RMS = 1.40 kg/s^{-1}	Gap volume	= 963 mm^3
Equivalent volume of suspension	VAS = 212.7 l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.698 Ws
Recommended volume of enclosure	VB = SEE TABLE	Magnet diameter	= 120 mm
-3 dB cut. off freq.	F3 = SEE TABLE	Magnet weight	= 0.87 kg
Speaker weight	= 2.9 kg	Flux density	= 1.35 T



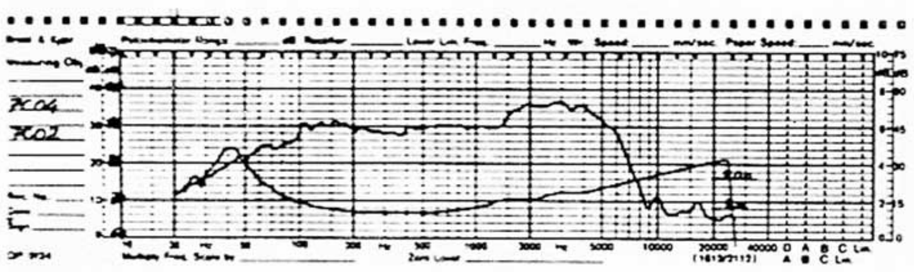
PAPER CONE BASS-MIDRANGE



7"

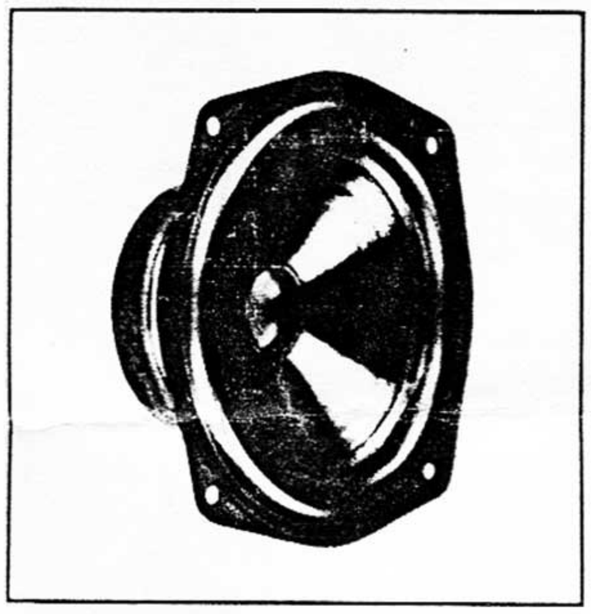
7 C 02

coil
diam. 25 mm



Nominal impedance	Z = 8 Ω	Cone material	: PAPER
Minimum impedance	Z_{MIN} = 7.4 Ω	Cone treatment	: LATEX
DC resistance	Rcc = 6.5 Ω	Dust cap material	: CLOTH
Resonant frequency	fs = 31.5 Hz	Dust cap treatment	: LATEX
Efficiency 1 W/1 m	= 89.5 dB	Surround material	: NEOPREN
Power handling	= 50 W	Voice coil diameter	= 25.5 mm
Total Q factor	Q_{TS} = 0.35	Voice coil former	: NOMEX
Electrical Q factor	Q_{ES} = 0.384	Voice coil height	= 13 mm
Mechanical Q factor	Q_{MS} = 3.94	Voice coil layers	= 2
Suspension compliance	$C_{MS} = 1.82\ 10^{-3} mN^{-1}$	Wire	:
Emissive piston area	$Sd = 1.63\ 10^{-2} m^2$	Force factor	$BL = 8.2\ NA^{-1}$
Moving mass	$Mmd = 14\ 10^{-3} kg$	Acceleration factor	$Fa = 626\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.703\ kg/s^{-1}$	Gap volume	$= 567\ mm^3$
Equivalent volume of suspension	V_{AS} = 67.7 l	Gap height	= 6 mm
Load type	= CLOSED	Magnetic energy	= 0.375 Ws
Recommended volume of enclosure	V_B = 13.8 l	Magnet diameter	= 100 mm
-3 dB cut. off freq.	F_3 = 63.6 Hz	Magnet weight	= 0.56 kg
Speaker weight	= 1.62 kg	Flux density	= 1.29 T

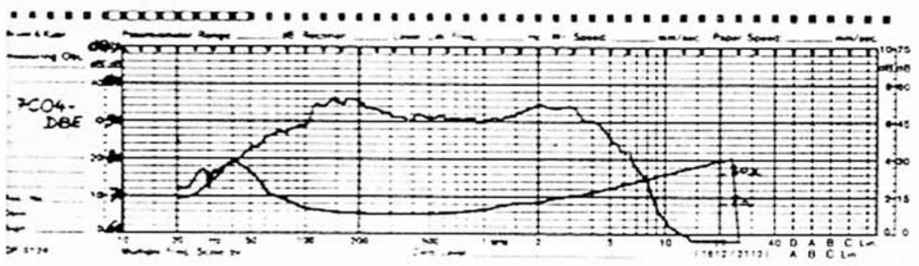
7 C04 still available. Same caracteristics but: fs = 40 Hz, Q_{TS} = 0.39, Q_{ES} = 0.45, $C_{MS} = 1.09\ 10^{-3}$, Mmd = 14.6 g, V_{AS} = 40.5 l.



7"

7 C 04 DBE

Twin coil
diam. 25 mm



A raised region appeared on the curve between 150 and 300 Hz due to the IEC Baffle.

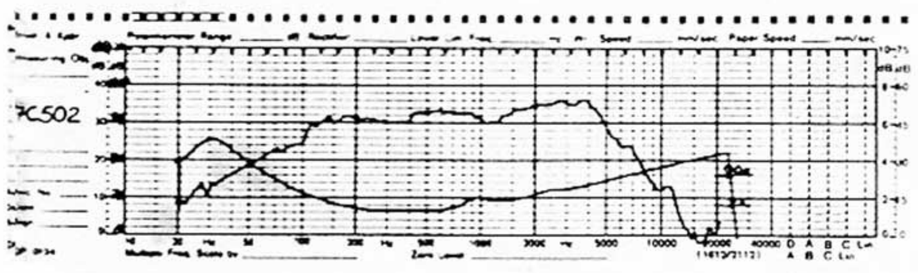
All measures are made with both coils in paralell and with 3 mH in serie with one coil.

Nominal Z of each coil	Z = 8 Ω	Cone material	: PAPER
Minimum Z of each coil	Z_{MIN} = 7 Ω	Cone treatment	: LATEX
DC resistance of each coil	Rcc = 6 Ω	Dust cap material	: PVC diam. 36 mm
Resonant frequency	fs = 38.8 Hz	Dust cap treatment	: —
Efficiency 2.8 V/1 m	= 91.5 dB	Surround material	: NEOPREN + PVC
Power handling	= 70 W	Voice coil diameters	= 25.5 + 26.3 mm
Total Q factor	Q_{TS} = 0.315	Voice coil former	: NOMEX
Electrical Q factor	Q_{ES} = 0.35	Voice coil height	= 6 mm
Mechanical Q factor	Q_{MS} = 3.03	Voice coil layers	= 2 × 2
Suspension compliance	$C_{MS} = 1.06\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$Sd = 1.63\ 10^{-2} m^2$	Force factor	$BL = 10.7\ NA^{-1}$
Moving mass	$Mmd = 15.8\ 10^{-3} kg$	Acceleration factor	$Fa = 677\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.27\ kg/s^{-1}$	Gap volume	$= 776\ mm^3$
Equivalent volume of suspension	V_{AS} = 39.4 l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.360 Ws
Recommended volume of enclosure	V_B = SEE TABLE	Magnet diameter	= 100 mm
Speaker weight	= 1.6 kg	Magnet weight	= 0.56 kg
		Flux density	= 1.08 T

7"

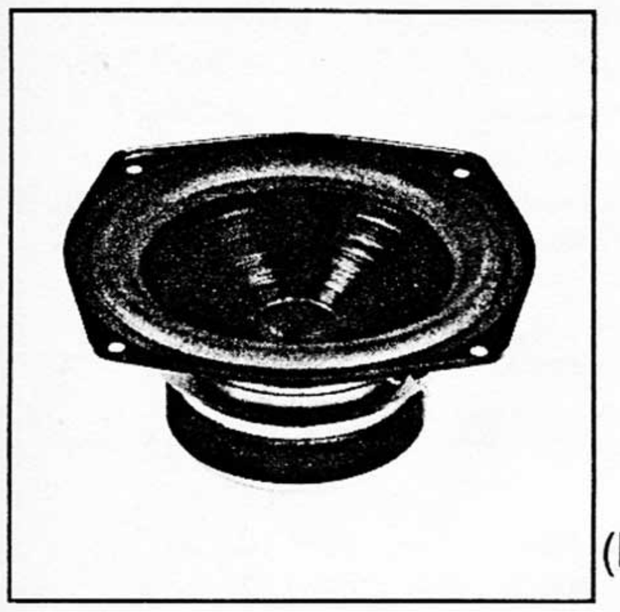
7 C 502

Copper
flat wire
diam. 40 mm



Nominal impedance	Z = 8 Ω	Cone material	: PAPER
Minimum impedance	Z_{MIN} = 7.4 Ω	Cone treatment	: LATEX
DC resistance	Rcc = 6 Ω	Dust cap material	: CLOTH
Resonant frequency	fs = 30.5 Hz	Dust cap treatment	: LATEX
Efficiency 1 W/1 m	= 91.2 dB	Surround material	: NEOPREN
Power handling	= 80 W	Voice coil diameter	= 40 mm
Total Q factor	Q_{TS} = 0.16	Voice coil former	: NOMEX
Electrical Q factor	Q_{ES} = 0.17	Voice coil height	= 13 mm
Mechanical Q factor	Q_{MS} = 1.84	Voice coil layers	= 1
Suspension compliance	$C_{MS} = 1.90\ 10^{-3} mN^{-1}$	Wire	: EDGEWOUND COPPER FLAT WIRE
Emissive piston area	$Sd = 1.63\ 10^{-2} m^2$	Force factor	$BL = 13.4\ NA^{-1}$
Moving mass	$Mmd = 14.3\ 10^{-3} kg$	Acceleration factor	$Fa = 937\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.49\ kg/s^{-1}$	Gap volume	$= 963\ mm^3$
Equivalent volume of suspension	V_{AS} = 70.7 l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.698 Ws
Recommended volume of enclosure	V_B = SEE TABLE	Magnet diameter	= 120 mm
-3 dB cut. off freq.	F_3 = SEE TABLE	Magnet weight	= 0.87 kg
Speaker weight	= 2.5 kg	Flux density	= 1.35 T

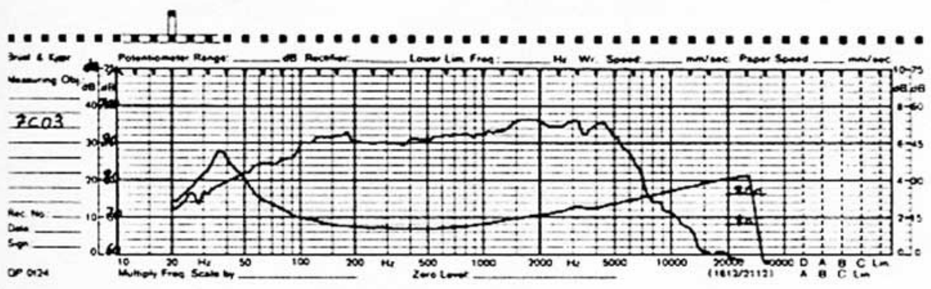
HIGH EFFICIENCY PAPER CONE UNITS



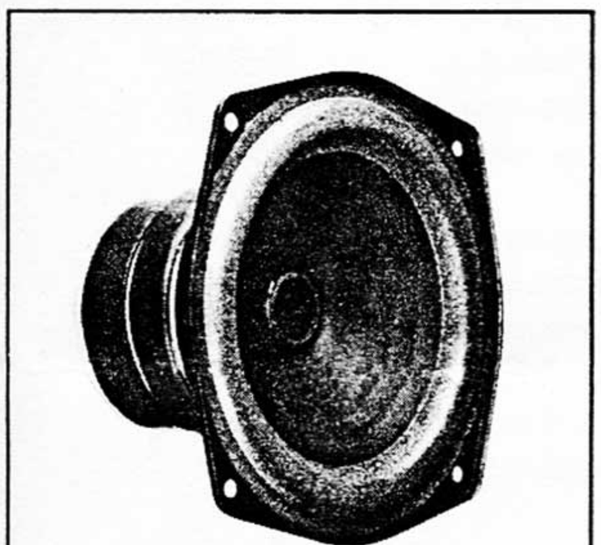
7"

7 C 03

coil
diam. 25 mm
(Bass-midrange)



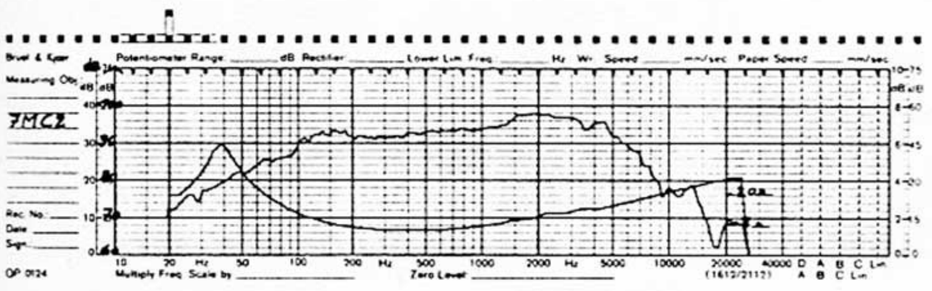
Nominal impedance	$Z = 8\ \Omega$	
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	
DC resistance	$R_{CC} = 6.5\ \Omega$	
Resonant frequency	$f_S = 37.1$ Hz	
Efficiency 1 W/1 m	$= 91.5$ dB	
Power handling	$= 55$ W	
Total Q factor	$Q_{TS} = 0.30$	
Electrical Q factor	$Q_{ES} = 0.325$	
Mechanical Q factor	$Q_{MS} = 4.05$	
Suspension compliance	$C_{MS} = 1.70\ 10^{-3} mN^{-1}$	
Emissive piston area	$S_d = 1.58\ 10^{-2} m^2$	
Moving mass	$M_{md} = 10.8\ 10^{-3} kg$	
Mechanical resistance	$R_{MS} = 0.622\ kg/s^{-1}$	
Equivalent volume of suspension	$V_{AS} = 59.4$ l	
Load type	$=$ BASS REFLEX	
Recommended volume of enclosure	$V_B =$ SEE TABLE	
-3 dB cut. off freq.	$F_3 =$ SEE TABLE	
Speaker weight	$= 1.62$ kg	
Cone material	: PAPER	
Cone treatment	: LATEX	
Dust cap material	: CLOTH	
Dust cap treatment	: LATEX	
Surround material	: FOAM	
Voice coil diameter	$= 25.5$ mm	
Voice coil former	: NOMEX	
Voice coil height	$= 13$ mm	
Voice coil layers	$= 2$	
Wire	: COPPER/ ROUND	
Force factor	$BL = 8.2\ NA^{-1}$	
Acceleration factor	$F_a = 759\ ms^{-2}A^{-1}$	
Gap volume	$= 567\ mm^3$	
Gap height	$= 6$ mm	
Magnetic energy	$= 0.375$ Ws	
Magnet diameter	$= 100$ mm	
Magnet weight	$= 0.56$ kg	
Flux density	$= 1.29$ T	



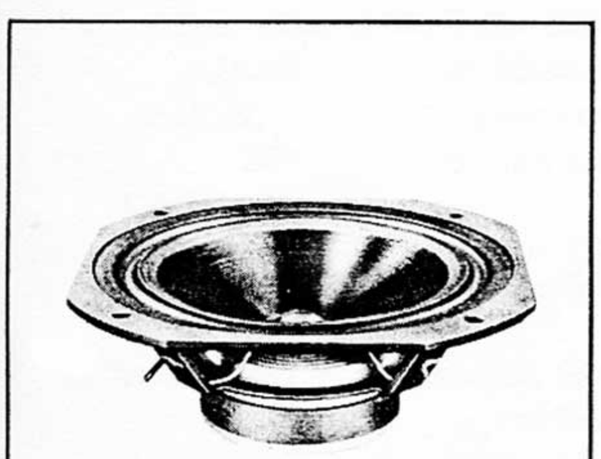
7"

7 M C2

coil
diam. 25 mm
(Midrange)



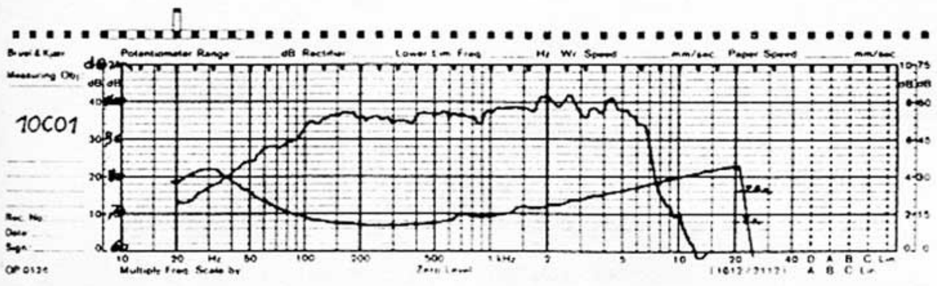
Nominal impedance	$Z = 8\ \Omega$	
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	
DC resistance	$R_{CC} = 6.5\ \Omega$	
Resonant frequency	$f_S = 38.1$ Hz	
Efficiency 1 W/1 m	in Mid. $= 96.5$ dB	
Power handling	in Mid. $= 120$ W	
Total Q factor	$Q_{TS} = 0.27$	
Electrical Q factor	$Q_{ES} = 0.29$	
Mechanical Q factor	$Q_{MS} = 4.23$	
Suspension compliance	$C_{MS} = 1.70\ 10^{-3} mN^{-1}$	
Emissive piston area	$S_d = 1.58\ 10^{-2} m^2$	
Moving mass	$M_{md} = 10.3\ 10^{-3} kg$	
Mechanical resistance	$R_{MS} = 0.566\ kg/s^{-1}$	
Equivalent volume of suspension	$V_{AS} = 59.4$ l	
Load type	$=$ —	
Recommended volume of enclosure	$V_B = 10$ l in Mid.	
-3 dB cut. off freq.	$F_3 =$ —	
Speaker weight	$= 2.5$ kg	
Cone material	: PAPER	
Cone treatment	: —	
Dust cap material	: PAPER diam. 25 mm	
Dust cap treatment	: —	
Surround material	: FOAM	
Voice coil diameter	$= 25.5$ mm	
Voice coil former	: NOMEX	
Voice coil height	$= 13$ mm	
Voice coil layers	$= 2$	
Wire	: COPPER/ CIRCULAR	
Force factor	$BL = 9.05\ NA^{-1}$	
Acceleration factor	$F_a = 879\ ms^{-2}A^{-1}$	
Gap volume	$= 567\ mm^3$	
Gap height	$= 6$ mm	
Magnetic energy	$= 0.454$ Ws	
Magnet diameters	$= 100+96$ mm	
Magnet weights	$= 0.56+0,725$ kg	
Flux density	$= 1.42$ T	



10"

10 C 01

copper
flat wire
diam. 40 mm
(Woofer)



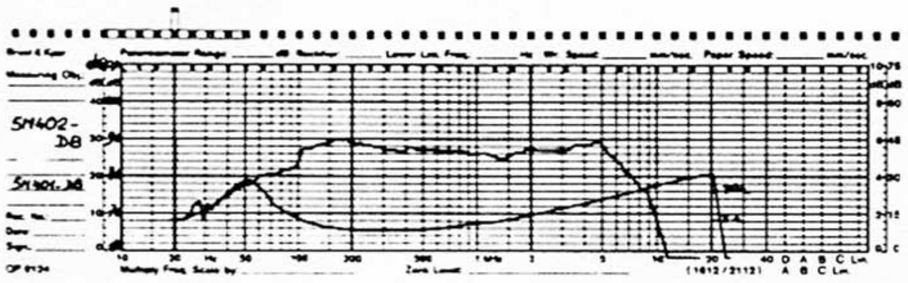
Nominal impedance	$Z = 8\ \Omega$	
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$	
DC resistance	$R_{CC} = 6\ \Omega$	
Resonant frequency	$f_S = 25.7$ Hz	
Efficiency 1 W/1 m	$= 96$ dB	
Power handling	$= 100$ W	
Total Q factor	$Q_{TS} = 0.2$	
Electrical Q factor	$Q_{ES} = 0.222$	
Mechanical Q factor	$Q_{MS} = 2.054$	
Suspension compliance	$C_{MS} = 1.75\ 10^{-3} mN^{-1}$	
Emissive piston area	$S_d = 3.43\ 10^{-2} m^2$	
Moving mass	$M_{md} = 21.9\ 10^{-3} kg$	
Mechanical resistance	$R_{MS} = 1.72\ kg/s^{-1}$	
Equivalent volume of suspension	$V_{AS} = 288$ l	
Load type	$=$ BASS REFLEX	
Recommended volume of enclosure	$V_B =$ SEE TABLE	
-3 dB cut. off freq.	$F_3 =$ SEE TABLE	
Speaker weight	$= 2.9$ kg	
Cone material	: PAPER	
Cone treatment	: LATEX	
Dust cap material	: CLOTH	
Dust cap treatment	: LATEX	
Surround material	: PVC	
Voice coil diameter	$= 40$ mm	
Voice coil former	: NOMEX	
Voice coil height	$= 13$ mm	
Voice coil layers	$= 1$	
Wire	: EDGEWOUND COPPER FLAT WIRE	
Force factor	$BL = 13.4\ NA^{-1}$	
Acceleration factor	$F_a = 612\ ms^{-2}A^{-1}$	
Gap volume	$= 963\ mm^3$	
Gap height	$= 6$ mm	
Magnetic energy	$= 0.698$ Ws	
Magnet diameter	$= 120$ mm	
Magnet weight	$= 0.87$ kg	
Flux density	$= 1.35$ T	

BASS-MIDRANGE

5"

5 N
402-DB

Twin coil
diam. 25 mm



A raised region appeared on the curve between 150 and 300 Hz due to the IEC Baffle.

All measures are made with both coils in paralell and with 3 mH in serie with one coil.

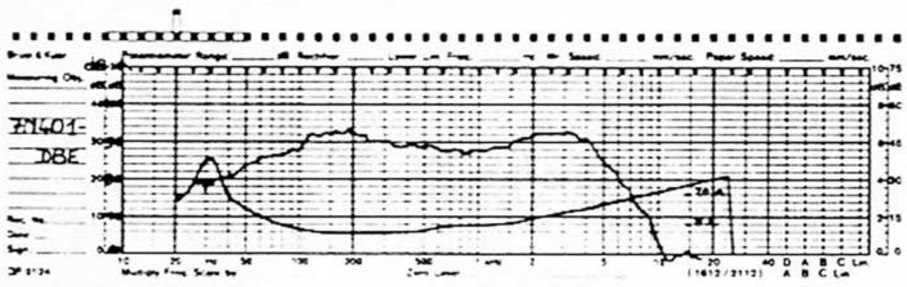
Nominal Z of each coil	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum Z of each coil	$Z_{MIN} = 7\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance of each coil	$Rcc = 6\ \Omega$	Dust cap material	: CLOTH
Resonant frequency	$fs = 45$ Hz	Dust cap treatment	: LATEX + PLASTIFLEX
Efficiency 2.8 V/1 m	$= 88.3$ dB	Surround material	: NEOPREN + PVC
Power handling	$= 55$ W	Voice coil diameters	= 25.5 +26.3 mm
Total Q factor	$Q_{TS} = 0.23$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.25$	Voice coil height	= 11.5 mm
Mechanical Q factor	$Q_{MS} = 2.92$	Voice coil layers	$= 2 \times 2$
Suspension compliance	$C_{MS} = 1.16\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$Sd = 0.866\ 10^{-2} m^2$	Force factor	$BL = 10.7\ NA^{-1}$
Moving mass	$Mmd = 10.8\ 10^{-3} kg$	Acceleration factor	$Fa = 991\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.05\ kg/s^{-1}$	Gap volume	$= 776\ mm^3$
Equivalent volume of suspension	$V_{AS} = 12.2$ l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.360 Ws
Recommended volume of enclosure	V_B = SEE TABLE	Magnet diameter	= 100 mm
Speaker weight	= 1.52 kg	Magnet weight	= 0.56 kg
		Flux density	= 1.08 T

5N401-DB still available. Same caracteristics but fs = 39 Hz, P = 45 W, $Q_{TS} = 0.27$, $Q_{ES} = 0.285$, $Q_{MS} = 4.55$, $C_{MS} = 1.51\ 10^{-3}$, $V_{AS} = 15.8$ l, recommended for OPEN BOX, SEE TABLE.

7"

7 N
401-DBE

Twin coil
diam. 25 mm



A raised region appeared on the curve between 150 and 300 Hz due to the IEC Baffle.

All measures are made with both coils in paralell and with 3 mH in serie with one coil.

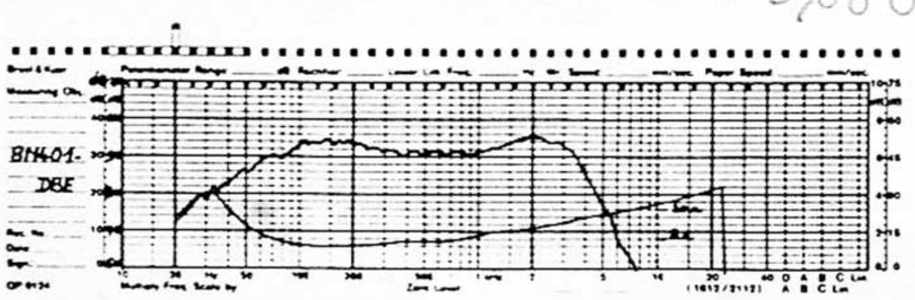
Nominal Z of each coil	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum Z of each coil	$Z_{MIN} = 7\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance of each coil	$Rcc = 6\ \Omega$	Dust cap material	: PVC diam. 36 mm
Resonant frequency	$fs = 28.8$ Hz	Dust cap treatment	: —
Efficiency 2.8 V/1 m	$= 89.6$ dB	Surround material	: NEOPREN
Power handling	$= 55$ W	Voice coil diameters	= 25.5 +26.3 mm
Total Q factor	$Q_{TS} = 0.258$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.27$	Voice coil height	= 11.5 mm
Mechanical Q factor	$Q_{MS} = 5.95$	Voice coil layers	$= 2 \times 2$
Suspension compliance	$C_{MS} = 1.75\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$Sd = 1.54\ 10^{-2} m^2$	Force factor	$BL = 10.7\ NA^{-1}$
Moving mass	$Mmd = 17.4\ 10^{-3} kg$	Acceleration factor	$Fa = 615\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 0.529\ kg/s^{-1}$	Gap volume	$= 776\ mm^3$
Equivalent volume of suspension	$V_{AS} = 58.1$ l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.360 Ws
Recommended volume of enclosure	V_B = SEE TABLE	Magnet diameter	= 100 mm
Speaker weight	= 1.60 kg	Magnet weight	= 0.56 kg
		Flux density	= 1.08 T

8"

8 N
401-DBE

Twin coil
diam. 25 mm

79,000

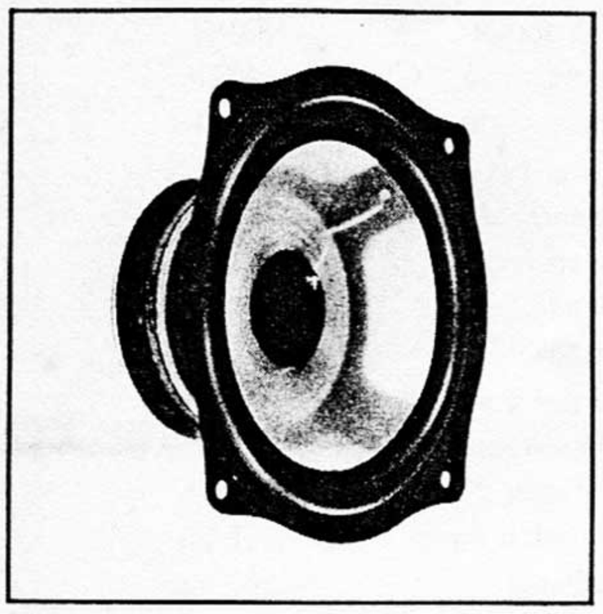


A raised region appeared on the curve between 150 and 300 Hz due to the IEC Baffle.

All measures are made with both coils in paralell and with 3 mH in serie with one coil.

Nominal Z of each coil	$Z = 8\ \Omega$	Cone material	: NEOFLEX
Minimum Z of each coil	$Z_{MIN} = 7\ \Omega$	Cone treatment	: PLASTIFLEX
DC resistance of each coil	$Rcc = 6\ \Omega$	Dust cap material	: PVC diam. 36 mm
Resonant frequency	$fs = 30.9$ Hz	Dust cap treatment	: —
Efficiency 2.8 V/1 m	$= 91$ dB	Surround material	: NEOPREN + PVC
Power handling	$= 65$ W	Voice coil diameters	= 25.5 +26.3 mm
Total Q factor	$Q_{TS} = 0.33$	Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.37$	Voice coil height	= 11.5 mm
Mechanical Q factor	$Q_{MS} = 2.97$	Voice coil layers	$= 2 \times 2$
Suspension compliance	$C_{MS} = 1.30\ 10^{-3} mN^{-1}$	Wire	: COPPER/ CIRCULAR
Emissive piston area	$Sd = 2.15\ 10^{-2} m^2$	Force factor	$BL = 10.7\ NA^{-1}$
Moving mass	$Mmd = 20.4\ 10^{-3} kg$	Acceleration factor	$Fa = 525\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.33\ kg/s^{-1}$	Gap volume	$= 776\ mm^3$
Equivalent volume of suspension	$V_{AS} = 84.1$ l	Gap height	= 6 mm
Load type	= BASS REFLEX	Magnetic energy	= 0.360 Ws
Recommended volume of enclosure	V_B = SEE TABLE	Magnet diameter	= 100 mm
Speaker weight	= 1.66 kg	Magnet weight	= 0.56 kg
		Flux density	= 1.08 T

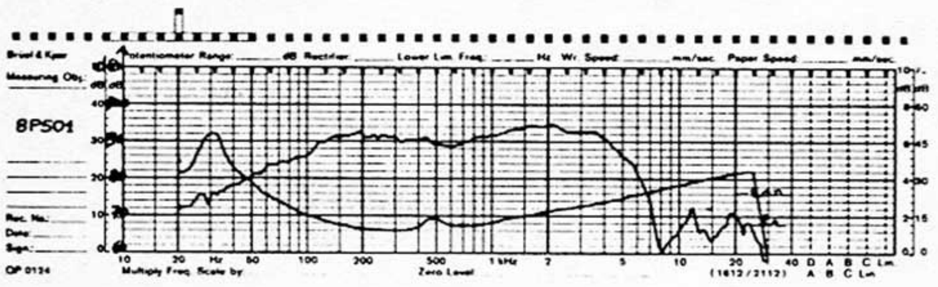
POLYPROPYLEN CONE BASS-MIDRANGE



8"

8 P 501-

Copper
flat wire
diam. 40 mm



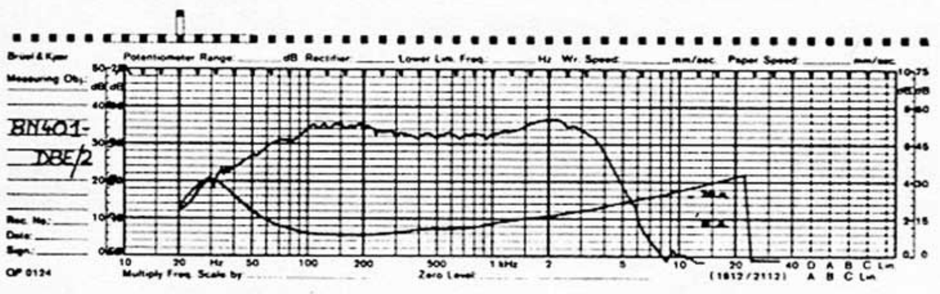
Nominal impedance	$Z = 8\ \Omega$		Cone material	: POLYPROPYLEN
Minimum impedance	$Z_{MIN} = 7.4\ \Omega$		Cone treatment	: —
DC resistance	$R_{CC} = 6\ \Omega$		Dust cap material	: CLOTH
Resonant frequency	$f_S = 29.1$ Hz		Dust cap treatment	: —
Efficiency 1 W/1 m	= 92 dB		Surround material	: NEOPREN
Power handling	= 85 W		Voice coil diameter	= 40 mm
Total Q factor	$Q_{TS} = 0.214$		Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.23$		Voice coil height	= 13 mm
Mechanical Q factor	$Q_{MS} = 3.75$		Voice coil layers	= 1
Suspension compliance	$C_{MS} = 1.59\ 10^{-3} mN^{-1}$		Wire	: EDGEWOUND COPPER FLAT WIRE
Emissive piston area	$S_d = 2.21\ 10^{-2} m^2$			
Moving mass	$M_{md} = 18.3\ 10^{-3} kg$		Force factor	$BL = 13.4\ NA^{-1}$
Mechanical resistance	$R_{MS} = 0.91\ kg/s^{-1}$		Acceleration factor	$Fa = 732\ ms^{-2}A^{-1}$
Equivalent volume of suspension	$V_{AS} = 109$ l		Gap volume	= 963 mm^3
Load type	= BASS REFLEX		Gap height	= 6 mm
Recommended volume of enclosure	V_B = SEE TABLE		Magnetic energy	= 0.698 Ws
-3 dB cut. off freq.	F_3 = SEE TABLE		Magnet diameter	= 120 mm
Speaker weight	= 2.5 kg		Magnet weight	= 0.87 kg
			Flux density	= 1.35 T

NEOFLEX CONE, DOUBLE MAGNETIC CIRCUIT

8"

8 N 401-DBE/2

Twin coil
diam. 25 mm



A raised region appeared on the curve between 150 and 300 Hz due to the IEC Baffle.

All measures are made with both coils in paralell and with 3 mH in serie with one coil.

Nominal Z of each coil	$Z = 8\ \Omega$		Cone material	: NEOFLEX
Minimum Z of each coil	$Z_{MIN} = 7\ \Omega$		Cone treatment	: PLASTIFLEX
DC resistance of each coil	$R_{CC} = 6\ \Omega$		Dust cap material	: PVC diam. 36 mm
Resonant frequency	$f_S = 30.9$ Hz		Dust cap treatment	: —
Efficiency 2.8 V/1 m	= 92.5 dB		Surround material	: NEOPREN + PVC
Power handling	= 65 W		Voice coil diameters	= 25.5+26.3 mm
Total Q factor	$Q_{TS} = 0.275$		Voice coil former	: NOMEX
Electrical Q factor	$Q_{ES} = 0.305$		Voice coil heights	= 11.5 mm
Mechanical Q factor	$Q_{MS} = 2.70$		Voice coil layers	= 2 × 2
Suspension compliance	$C_{MS} = 1.30\ 10^{-3} mN^{-1}$		Wire	: COPPER/CIRCULAR
Emissive piston area	$S_d = 2.15\ 10^{-2} m^2$		Force factor	$BL = 11.8\ NA^{-1}$
Moving mass	$M_{md} = 20.4\ 10^{-3} kg$		Acceleration factor	$Fa = 578\ ms^{-2}A^{-1}$
Mechanical resistance	$R_{MS} = 1.47\ kg/s^{-1}$		Gap volume	= 776 mm^3
Equivalent volume of suspension	$V_{AS} = 84.1$ l		Gap height	= 6 mm
Load type	= BASS REFLEX		Magnetic energy	= 0.437 Ws
Recommended volume of enclosure	V_B = SEE TABLE		Magnet diameters	= 100+96 mm
Speaker weight	= 2.6 kg		Magnet weights	= 0.56+0.725 kg
			Flux density	= 1.19 T

RECOMMENDED VOLUMES AND PORTS FOR 3rd ORDER BASS-REFLEX

Reference	$V_{AS}\ Q_{TS}^2$	Thiele alignment	Volume (V_B)	Helmolz Freq. (F_b)	Cut. off Freq. (F_3)	Port area (S_p)	Port length (L_p)
	l	n	l	Hz	Hz	cm^2	cm
5 N 401-DB	1.15	8	9.2	56.3	51.1	14.1	11.1
5 N 402-DB	0.65	10	6.5	76.3	61.9	14.1	8.1
7 N 401-DBE	3.87	4	15.5	43.5	55.8	14.1	11.05
		5.7	22.0	43.5	46.7	14.1	7.2
8 N 401-DBE	9.15	4	36.6	36.5	46.8	25.15	11.4
7 N 501	2.23	8	17.8	58.9	53.4	25.15	8.4
10 N 501	10.92	5.7	62.2	36.8	36.8	42.50	10.2
7 C 03	5.34	4	21.4	48.2	61.8	25.15	11.0
7 C 04-DBE	3.91	4	15.6	48.0	61.6	14.10	8.7
		5.7	22.3	48.0	51.6	25.15	10.6
7 C 502	1.81	10	18.1	74.3	60.3	42.50	8.1
10 C 01	11.52	5.7	65.7	50.1	53.8	72.40	7.3
8 P 501	4.99	5.7	28.4	53.0	56.9	25.15	5.8
		8	39.9	53.0	48.1	42.50	6.8
8 N 401-DBE/2	6.36	4	25.4	43.8	56.2	25.15	11.4
		5.7	36.2	43.8	47.1	25.15	7.2