

Philips Technologie geschiedenis

Pieter Hooijmans, maart 2026

Na 30 jaar bij Philips en NXP, inclusief twee keer 7 jaar op het NatLab, voelde ik een grote behoefte om de geschiedenis van de vele technologieën waaraan ik heb meegewerkt op te schrijven. Dit omdat ik moest constateren dat heel veel zaken waaraan wij werkten onderhand uit het collectieve geheugen verdwijnen. Als RF-specialist heb ik een groot deel van mijn carrière direct of indirect met de TV tuner te maken gehad. Een prachtig stukje techniek, dat in grote hoeveelheden werd geproduceerd en waar Philips een van de marktleiders was. Maar de functie bestaat nog amper, en kost op z'n hoogst nog 0,20€, en wie weet (over een paar jaar) nog wat een tuner was?

Daarom heb ik met de TV tuner als rode draad de technologiegeschiedenis geschreven over dit domein. Met daaronder alle hoogwaardige technologieën die we in-huis ontwikkelden: RF buizen, varicaps, de RF transistoren en mosfets, en later natuurlijk vele generaties (RF) IC technologie. En daarboven de (consumer electronics) applicaties. Als eerste natuurlijk de TV, maar later ook kabelnetwerken, de VCR (met drie standaarden), de satelliet set top box en outdoor units, cable modems en PCs. Oh ja, en dan ook nog info over het Philips management en de organisatie, en wat die allemaal beslisten. Dat werd al met al heel veel, en is dus gesplitst in drie kloeke delen zoals dat een goede historicus betaamt.

Volume1: 1950-1980 ISBN 978-90-833590-1-4
<https://lecturis.nl/product/philips-television-tuners-1950-1980/>

Volume2: 1980-2000 ISBN 978-90-833590-2-1
<https://lecturis.nl/product/philips-television-tuners-volume-2-1980-2000/>

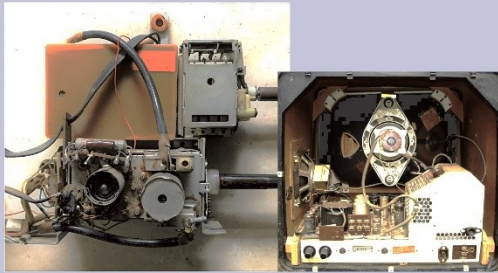
Volume3: 2000-2015

Deel 1 en 2 zijn nu gepubliceerd en zijn te koop. Direct bij de uitgever Lecturis hier in Eindhoven (zie bovenstaande links), hopelijk ook snel bij van Piere en het Philips Museum.

Vermeldenswaard is dat Volume2 een flink hoofdstuk bevat over wat toendertijd letterlijk een mega-project was binnen Research, en daarna – nadat het was mislukt – effectief doodgezwegen: de Weinerth-tuner, waar van 1968 tot 1977 vele tientallen Researchers aan hebben gewerkt. Toen ik zelf groepsleider werd van de groep Integrated Transceivers, een nazaat van het project, werd er slechts fluisterend over gesproken bij de koffieautomaat. Het heeft me altijd mateloos geïnteresseerd wat dat hele Weinerth-project nu precies was, want in alle NatLab-geschiedenissen zul je het niet terugvinden. Het is dus met enige trots dat ik een gedetailleerde geschiedenis van dit prestigieuze NatLab project kan presenteren, inclusief unieke fotos van de wafers (2 inch!) en zelfs een sample van de tuner. Met veel dank aan Ronald Dekker.

Maar verder staan door alle volumes heen heel veel technologieën die op de een of andere manier waren gelieerd aan Research: de eerste televisies, transistoren, prille IC technologie, video processing, en later (in deel3) natuurlijk de integrated tuner. Alles voorzien van vele fotos, ieder deel heeft er zo'n 700! In echte gebonden hard cover boeken, bijna 300 pagina's per deel. Op de volgende twee pagina's details over de eerste twee volumes. Deel drie komt er aan!

Ik wens iedereen veel leesplezier en hoor graag wat jullie er van vinden.



The tuner, or more formally the channel selector, was a key component in the television set, and one of the most complex ones. Operating at the VHF and UHF frequencies of the transmitted TV signals, until the emergence of the mobile phone the tuner was the most high-frequency consumer device! The tuner function was therefore very critical for the overall television performance, but also closely related to one of the primary user interfaces of the television: channel selection. The tuner and television development were therefore tightly connected, especially when increasingly advanced channel selection mechanisms were introduced. From the original large rotating knobs, to push buttons, tip touch buttons, and finally the remote control: first ultrasonic, later using infrared technology. In parallel the tuner was a major driver of advanced technology development, from radio valves to germanium transistors, silicon transistors, and varicaps. Mechanical constructions were also very complex.

This book traces the first 30 years of Philips TV tuner development, its critical technologies, as well as its main application: Philips television sets. All this in the context of the Philips organisation and its factories. From the very first commercial small-screen valve-based television sets in 1950, to the introduction of UHF reception, the transistor, digital and remote control, the first integrated circuits, and finally colour TV. In other words, the period that both Philips Television and its Philips Tuner businesses grew to become world leaders in their markets. Illustrated with hundreds of often unique pictures, circuit diagrams, and special sections explaining the fundamental theories of RF reception, tuner characteristics, and the underlying technologies, this book is a must-have for all those interested in (Philips) technology history.



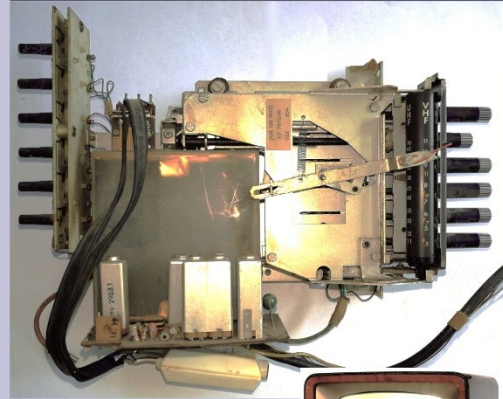
PHILIPS Technology History



PHILIPS Television Tuners Vol.1 1950-1980

Pieter Hooijmans

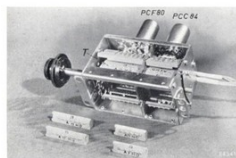
1



PHILIPS Television Tuners Volume 1 1950-1980 Valves, transistors, and varicaps

Pieter Hooijmans

PHILIPS Technology History



To the reader:

This history of the Philips Television Tuners was first published as an on-line story on the Maximus R&D website. Over time, based on the many comments and feedback received, it has grown to the story that is now in print. Where the on-line version was the starting point, but has been complemented by additional pictures and illustrations, while the text has been updated.

Content

Content	viii
Preface	1
1. Valve VHF Tuners	5
Tuner basics 1 - Down conversion	6
First generation non-tuning television receivers, 1945-1950	7
Tuner basics 2 - Channel selection	10
The first 4-channel tuner, 1951	11
AT7501, 10-channel superheterodyne tuner, 1952	14
French and British four and five channel tuners, 1951-1954	17
Tuner basics 3 - Choice of intermediate frequency	20
Circuit basics 1 - the cascade pre-amplifier	23
AT7530, introduction of the drum tuner, 1953	24
Tuner basics 4 - Automatic Gain Control (AGC)	26
AT7520, drum tuner introduction to the UK	30
Philips 4-wave television, 1953-1962	33
Tuner basics 5 - French and Belgian multi-wave reception	34
Philips Television organisation, 1950-1960	41
The Radio-Union's Lab or Thomson's Lab	43
Philips TV coding scheme 1953-1965	43
The Radio-Union's Lab or Thomson's Lab	43
PCC84, the first frame grid valve, 1956	46
K8, 361 52 family with the PCC84, 1956	49
Philips Tuner naming and coding, 1953-1965	50
Tuner basics 6 - Automatic Frequency Control (AFC)	52
AT7536, new mechanics, 1959	54
2. Valve UHF Tuners	63
Tuner basics 7 - UHF reception	64
Tuner basics 8 - Lock-in line tuning	66
AT5121, the first UHF tuner, 1959	67
UHF Tuner naming	67
The NT5112 set-top converter, 1961	68
UHF standards and service solutions	71
AT5121, the first valve UHF tuner, 1960	73
Tuner basics 9 - Image rejection	76
Tuner basics 10 - Cross-modulation	77

Philips Television Tuners Volume 1

New VHF frame grid valves, PCC84, PCC89 and PCC86	78
AT7530, the last vacuum VHF tuner, 1961	80
The last tuner valves: PCC86, PCC89, PCC90	87
Tuner basics 11 - Noise Figure	88
AT5122-6422, the last valve UHF tuners, 1960-63	90
UHF Transistors	93
Tuner basics 12 - Vestigial sideband (VSB)	96
Minor controlled tuning	97
AT7530, the last valve VHF tuner, 1963	99
Philips' The code	100
IF and multi-standard valve UHF	103
AT7560, a first non-drum VHF tuner, 1963	108
Tuner manufacturing	111
Summary valve tuners, 1950-1965	118
3. Transistors and Varicaps	121
Tuner basics 13 - RF Transistors	122
Germanium RF Transistor development	123
AT5170 and AT5180, the first UHF transistor tuners, 1963	125
The UVC1 UHF converter, 1964	129
New channel pre-setting device, 1963	130
AT7562, the first transistor VHF tuner, 1964	132
Philips division structure and organisation	133
P1, the first VHF 4:3 UHF tuner, 1965	136
AT7572, the V11 tuner, 1967	141
The introduction of colour television	147
Varicap diodes, 1966	152
Philips TV and Tuner wave tuning conversions, 1958	153
K20 and K20, the first varicap tuners, 1969	154
Silicon bipolar transistors	158
The N4A-N4747 memory tuners, 1968	161
Channel pre-setting and selection mechanisms, 1966-1972	169
Antenna amplifiers, 1967-1970	174
Semiconductor Calculator and ELA	177
4. TV Remote Controls	179
The first wired remote control, 1951	179
The AT5129 with photo-infrared, 1958	180
Kerfoll remote controls, differentiation, 1960-1967	181
1231050, the first multi-channel controller, 1968	184
RC1, the Philips ultra-remote control, 1972	186
RC2, 12 program remote control, 1973	190

viii

Content

5. Electronic solutions	195
The Elcom tuners, 1970-1973	196
Elcom ELCO90 modular tuners, 1976	197
1231070-1231082 as V20-430, 1972	200
Tuner basics 14 - New French standards	209
Tuner basics 15 - New IF for UK CCB-I	211
The French V17 and V17S tuners, 1975	212
UK Tuner 1964-1984	214
The TV and Tuner factories, 1965-1975	217
Tuner basics 16 - Cable reception	223
Philips C1 and cable network equipment	223
The V300-4300 family, 1975	227
300-LD tuners, T80 and the first ELA, 1977	231
RC4, the first infrared remote control, 1979	236
RC5, the "world standard" remote control, 1982	240
Circuit basics 2 - The MOSFET input	243
The last 300 tuners, introducing the MOSFET, 1980	244
ELCO90 Tuners, 1972	246
V20-N, Experimental Block Film tuners, 1977	253
Summary and overview	255
Overview transistor tuners 1964-1983	255
Summary 1950-1980	258
References	261
About the Author	266
Philips Technology History	267

ix



By 1980 Philips was global top3 player in the television set and its key component the tuner, or channel selector. Both these domains were at the start of a major technology change: the introduction of integrated circuits (the IC or chip). After 15 years of technology development within Philips Research and Philips Elema, IC technologies were now such that they were replacing the discrete transistor, starting from the 1978 K12 television chassis. Because tuners required more advanced high-frequency IC technologies the first IC in a tuner was introduced in the 1982 UV400.

This second volume starts with the development of (RF-)IC technologies from the late 1960s and especially the secret Weinreb-tuner project at the Natlab during the 1970s. It follows the Tuners and Semiconductors technology and functional development, up to the MOPLL IC by the end of the 1990s. The TV platforms were now also entirely based on ICs, allowing advanced features like teletext, digital sound, and 100MHz with picture improvements. In parallel we see the Philips Tuners activities move into adjacent domains of MP modules: the new video recorder and its hectic history of VCR, Video2000, and VHS standards. The VLP, and the Set Top Box for satellite broadcast reception, the Tuners group producing both the very advanced 12GHz LNB outdoor receiver and the STB satellite frontend. In contrast, efforts to enter the cordless and mobile phone markets were less successful. All this in a period where the Japanese competition was fierce, with severe price pressure as a result, with many new (digital) applications, global expansions, and a Philips existential crisis resulting in Operation Centaurus. Following the same approach as Volume 1, also this book is a must-have for all those interested in (Philips) technology history.



PHILIPS Technology History

PHILIPS Television Tuners Vol.2 1980-2000

Pieter Hooijmans



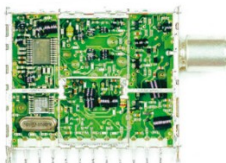
PHILIPS Television Tuners Volume 2 1980-2000 ICs and new products



Pieter Hooijmans

PHILIPS Technology History

Philips Television Tuners - Volume 2



To the reader:
The history of the Philips Television Tuners was first published as an on-line story on the Maximus-R&D website. Over time, based on the many comments and feedback received, it has grown to the story that is now in print. Where the on-line version was the starting point, but has been complemented by additional pictures and illustrations, while some new sections have been added and the text has been updated.

Content

Content	vi
Foreword	1
6. UV400, the first IC Tuners	5
The Philips challenges, end 1960s	5
Philips TV organization, 1960-1990	10
Philips TV coding 1981-1992	14
Philips Tuner organization, 1973-1990	15
Allegretto and NV-Passive, 1976-1987	18
Introduction (RF) IC technology	22
The Weinreb Tuner project, 1968-1977	26
The first RF-IC technology: SBR&LO, 1978	33
UV400, the first IC tuner, 1980	36
Tuner naming convention 400-800 families	42
Tuner blocks: IT, DEM, and Antenna requirements	43
A single UV300, 1980	45
Conical aerial input assemblies, 1978-1990	49
7. Video Cassette Recorders	49
NV100, the first VCR, 1971	50
NV300 VCR RF Module, 1972	52
Video200 VCC, 1980	57
Video200 RF module	60
From Video2000 to VHS, 1983-1988	63
The last generation VCR RF module	67
Last Decade, 1978-1985	71
8. UV600 - UV800 IC Tuners	75
TD43003, the first MOS IC, 1982	75
UV600 and UV700, 1983	77
SMD components	79
IF developments 1975-1985	83
Tuner blocks: 10, SAW filters	87
F8000, the first Frontend, 1988	89
Philips Semiconductors, 1983-1993	93
Philips Semiconductors manufacturing centers	96
The TS4510 PLL IC, 1987	99
Tuner blocks 19: The FC box	101

Content

Philips Television Tuners - Volume 2

UV300, 1987	103
UV500A Automatic Alignment tuner, 1990	108
PQ900 front end, 1991	109
Secondary Tuner features 1975-1990	114
Satellite TV Broadcast	119
9. Satellite Reception	119
DSMAC, 1986	120
CR112, SF5212 and SF900 satellite Frontends, 1989-1990	122
The first LNBs, 1989-1990	128
Satellite Receiver LNB, 1991-1993	131
10. UV900 global tuners	137
Philips organization, 1980-2000	137
Philips TV and core business, 1980-2000	138
Philips TV naming convention 1982-2002	140
UV900, the new volume tuner, 1990	143
Tuner block 20: Three head stack head setup	144
Tuner block 21: Filtering and tracking	151
Tuner block 22: TIS	153
Vague development, 1980-2000	154
New MOSFETs, 1985-2000	156
UV900 high-end tuner, 1991-1993	163
F8000 and PQ900 TV Front ends, 1991-1993	163
The P8013 click-on PDP up-tuner, 1993	167
PQ900-M2, the last TV front end, 1993	168
The end of VCR production, 1990-2001	171
TP900, VCR tuner evolution, 1996	175
Circuit block 3: positive loop-through	177
Philips Tuner business end organization, 1990-2000	181
11. UV1200 Miniaturization	181
UV1200 Miniaturization and F82, 1992	186
SF1200 satellite front end, 1993	189
Telephone module, 1991-1995	193
Philips mobile phones, 1990-2001	196
F8000 and F81200 Multimedia Frontends, 1992-1995	198
F81200-M2 and F81200 with P82, 1996	204
DVB-S Digital satellite TV Broadcast, 1993	209
Tuner Block 23: Digital modules	212
SD900 & QP1200, the first digital satellite frontends, 1994-1999	214
SD1200 Digital Satellite Frontends, 1996	216
LNB microwave modules, 1993-1999	219

vi

12. UV1300, World Standard Pinning	225
The WSP standard, 1992	225
TD43003, the first MOS IC, 1993	227
UV1300 WSP tuner, 1994	229
Tuner Block 24: 3x2 interference	231
Tuner development, 1990-2000	233
Singapore Quality Award, 1998	243
UV1300-M2, technology consolidation, 1997	244
Tuner Block 25: Wideband AGC and LNA	246
The Philips M2 TV-chassis, 1998	251
RoCMOS technology: QM87 and P85, 1996	253
TV12000 and other MOSFETs, 1999	257
UV1300-M2 with MOSFET and radio, 2000	259
Summary and Overview	265
Tuner 1980-2000	265
Philips 1980-2000	268
Closing remarks	271
Acknowledgements	272
Singapore Inspiration	274
References	277
About the Author	285
Philips Technology History series	286

Content

vi