

MANUAL 174

ap 3533 UHF

Nordic Mobile Telephone

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Operation of ap 3000 NMT

GENERAL

Introduction

The Nordic Mobile Telephone System (NMT) is developed jointly by the Telecommunications Administrations of Denmark, Finland, Norway and Sweden in order to establish a compatible automatic public mobile telephone system in the Nordic countries.

The mobile stations of the system are fully compatible with the landbased part of the system, regardless of which Nordic country the mobile station happens to be in at the moment. All mobile stations are given full roaming capability in all the participating countries.

System concepts

The interface between the system and the fixed telephone network is contained in the mobile telephone exchange (MTX). The base stations (BS) are connected to the MTX which controls the traffic to and from the mobile stations. The switching functions are performed by the MTX.

The base stations are grouped into traffic areas. An MTX may control one or more traffic areas.

At every base station, one channel is used as calling channel and is marked with a special identification signal. One or several of the other channels, when free, are marked with a free traffic channel identification signal. Stand by mobile stations in an area under a base station are locked to the calling channel.

Radio frequencies

The radio frequencies available consist of the bands 453-457.5 MHz and 463-467.5 MHz, which will be used for the paths mobile station to base station and base station to mobile station, respectively. With a channel separation of 25 kHz, these bands accommodate 180 channels.

In order to reduce the inconvenience of having a conversation interrupted when moving from one base station coverage area to another, the system is designed to switch calls in progress from one base station to another base station, controlled by the same MTX.

A mobile station will upon command from the MTX reduce its transmitter output power in the neighbourhood of a base station in order to reduce interference.

Call set-up procedures

Call to mobile station

Calls to mobile stations are transmitted simultaneously from all base stations in the traffic area in which the mobile station is operating. When a mobile station has received a calling signal containing its identification, it returns a call acknowledgement on the return frequency of the calling channel, whereupon MTX allocates a traffic channel at the base station where the mobile station has answered the call. The mobile station then switches to the allocated channel. The calling channel, on which all other mobile stations remain, is immediately available for the next call to a mobile station.

Call from mobile station

When an ordinary mobile subscriber initiates a call, the mobile station automatically hunts for and locks to a free marked traffic channel, on which all signals are exchanged and the conversation takes place.

Switching call in progress

During a call a continuous out of band supervisory signal (Ø-signal) is generated at the BS (on order from MTX) and sent to the MS, where it is looped back to the BS. The returned Ø-signal is detected and evaluated by the BS which decides if the transmission quality (signal to noise ratio integrated over a certain period of time) necessitates switch-over to another BS.

The MTX orders the BS and also the surrounding BS's to perform signal strength measurements on the radio channel on which the MS is transmitting. For signal strength measuring all BS are equipped with an all-channel monitor receiver (SR). Information about the measurement results enables the MTX to decide to which BS (if any) the call shall be transferred.

The measuring action is also performed by the BS at the beginning of a call in order to determine whether the used BS is suitable.

This measurement is also used to determine whether the received signal from MS is above a certain high level in which case the MTX orders the MS to change to low transmitter output power level.

OPERATIONAL PROCEDURES

In the following operational procedures it is presumed that the MS has gone from "power off" to "power on" condition.

Call from MS to MTX

State: Power "on", on-hook.

User Action	MS-Response
Dial digits on push-button set	Digits stored in dialed digits memory and shown on display
Lift handset or press "Hands-Free" button	Service indicator "off" (if activated) MS hunts for free traffic channel - when found, digits are transmitted to MTX (Answer)
(Conversation)	(Conversation)

Answer call from MTX to MS

State: Power "on", on-hook, service indicator "off", ringing signal, call received indicator "on".

User Action	MS-Response
Lift handset or press "Hands-Free" button	Ringing signal stopped Call received indicator "off" Speech path through-connected for conversation
(Conversation)	(Conversation)

or

State: Power "on", off-hook, service indicator "off", ringing signal, call received indicator "on", malfunction alarm

User Action	MS-Response
Replace handset	Malfunction alarm stopped
Lift handset or press "Hands-Free" button	Ringing signal stopped Call received indicator "off" Speech path through-connected for conversation
(Conversation)	(Conversation)

Call clearing

State: Power "on", off-hook, service indicator "off", speech path through-connected

User Action	MS-Response
Replace handset or press "Hands-Free" button	Audio path disconnected - MS back to standby

Unsuccessfull call attempt or interrupted call

State: Power "on", off-hook, service indicator "on", malfunction alarm

User Action	MS-Response
Replace handset or press "Hands-Free" button	Malfunction alarm stopped MS ready for new call attempt

Manual roaming updating

State: Power "on", on-hook, roaming alarm

User Action	MS-Response
Lift handset or press "Hands-Free" button	Service indicator "off" (if activated). Roaming alarm turned off (when roaming updating confirmation is received from MTX)
Replace handset or press "Hands-Free" button	MS back to standby

"Handset" and "Hands-Free" Operation

State	User's Action	MS Action
Handset "on-hook" (MS standby) no roaming alarm	Handset "off-hook" or "Hands-Free" button pressed	Call MS → MTX initiated
Handset "on-hook" (call MTX → MX received)	Handset "off-hook" or "Hands-Free" button pressed	Call MTX → MS answered
Handset mode Handset "off-hook" (conversation)	Handset "on-hook" "Hands-Free" button pressed	Call cleared Transfer to "Hands-Free" mode
"Hands-free" mode Handset "off-hook" (conversation)	Handset "on-hook" "Hands-Free" button pressed	No action Call cleared
"Hands-Free" mode Handset "on-hook" (conversation)	Handset "off-hook" "Hands-Free" button pressed	Transfer to handset mode Call cleared

"Hands-Free" mode is conversation by means of the fixed mounted microphone and loudspeaker utilizing the "Push-to-talk button.

"Handset" mode is conversation by means of the handset.

Country selection

User Action	MS-Response
Select country on country selector	MS accepts only traf- fic areas Y ₁ Y ₂ of that country

Abbreviated dialing

State: Power "on", on-hook

User Action

MS-Response

Programming

Dial $-*X_1X_2*S_1S_2\ldots S_n \#\#$
 $-*$

Digits stored in
dialed digits memory.
The telephone number
 $S_1S_2\ldots S_n$ is stored in
the abbreviated number
store. Dialed digits
memory is cleared.

Cancellation

Dial $- \#\# X_1X_2 \#\#$
 $-*$

Digits stored in
dialed digits memory.
Cancellation is done
for this abbreviated
number in the abbrevi-
ated number store.
Dialed digits is
cleared.

Check

Dial $-X_1X_2$
 $- \#\#$
 $- \#\#$

Digits X_1X_2 is shown
on the display.
The corresponding te-
lephone number is
shown on the display.
The display is cleared

Activation of the abbreviated number store

Dial the abbreviated number
 X_1X_2

Dial $\#\#$

Lift handset or press
"Hands-Free" button

(Conversation)

Digit X_1X_2 are stored
in dialed digits memo-
ry.

The actual telephone
number corresponding
to the abbreviated
number is stored in
dialed digits memory.

Service indicator
"off". MS hunts for a
free traffic channel -
when found, digits are
transmitted to MTX.

(Answer)

(Conversation)

 X_1X_2 (or only X_1) is the abbreviated number, and $S_1S_2\ldots S_n$ is
the corresponding telephone number.

The code $\#\# *$ indicates that a programming/cancellation in the
abbreviated number store shall be done.

Cancellation of wrong dialed information shall be done by dialing
 $\#\# \#\#$.

Duplexfilter (80136-4E3) N19

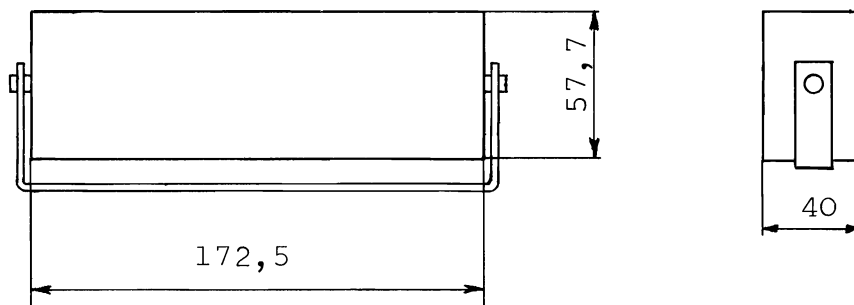
The duplex filter consists of 4 sections in each branch, interconnected with $7/4$ microstrips.

The resonators are helical coils inductively coupled in the branch with the low frequency passband and capacitively coupled in the branch with high frequency passband. For adjustment see drawing 80134-4E3.

AP 3000 dimensions and weight

Control unit (only when passive handset is used)

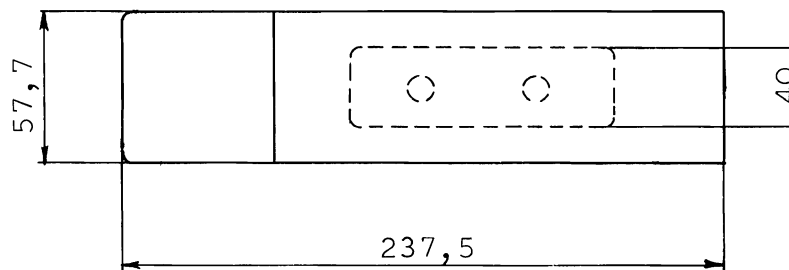
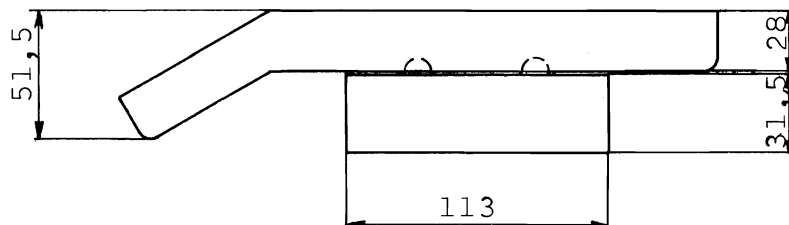
Weight 500 g.



Handset (active handset used as control unit)

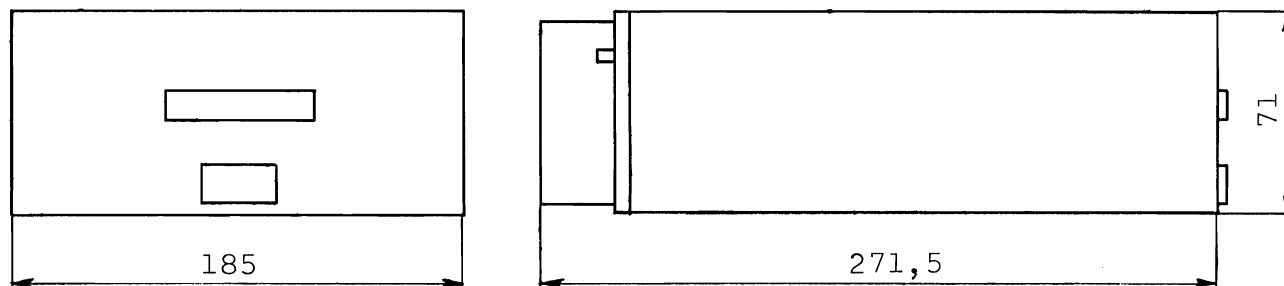
Weight passive inclusive cradle 400 g

Weight active inclusive cradle 600 g



Radio unit without suspension

Weight 3,5 kg.



Suspension

Weight 0,9 kg.

Technical data AP 3000 UHF

General:

Frequency range:	400 to 470 MHz.
Principle:	Digital frequency synthesizer
RF - Bandwidth:	Max. 4,5 MHz.
Channel spacing:	10, 12,5, 20 and 25 kHz.
For the NMT - version:	180 channels 25 kHz spacing.
Channel switching time:	40 ms for 180 channels.
Mode of operation:	Duplex, internal filter.
Min. duplex separation:	10 MHz with 4,5 MHz RF - bandwidth.
Supply voltage:	12 V DC chassis neg. nom. 13,2
Supply voltage variations:	10,8 to 15,6 V.
Operation temperature:	-25°C to +55°C -30°C to +60°C but specifica- tions not guaranteed.
Frequency stability:	Better than ± 5 ppm for the above specified temperature and supply voltage variations.
Vibration test:	According to the IEC publica- tion 68-2-6.
<u>For "hands free" operation:</u>	
Loudspeaker:	external 4 Ω
Audio output (regulated from control unit):	Max. 3,5 W at 5 % distortion, 13,2 V supply voltage.
Microphone:	1 k Ω condenser microphone.
Input level:	2 mV RMS for ± 3 kHz dev. at 1 kHz tone.

Voyl. 12. 10. 1964

For "handset" operation:

Output from earpiece: (25 Ω earpiece with built in amplifier and filter)	Max. 115 dB above 2×10^{-5} Pascal at 1 kHz tone ± 3 kHz deviation. Nominal 90 dB above 2×10^{-5} Pascal at 1 kHz tone ± 3 kHz deviation.
Vol. regulated from control unit(nominal level adjusted internal in radio):	-10 dB and +15 dB from nominal level.
Line level from radio unit:	200 mV RMS at 1 kHz tone ± 3 kHz deviation. 560 mV RMS at max. vol.
The Deemphasis is located in the radio unit.	
Handset microphone sensitivity: (1 kHz condenser microphone with amplifier and filter)	94 dB above 2×10^{-5} Pascal free field sound pres- sure at 1 kHz will produce a Tx deviation between ± 3 and $\pm 4,5$ kHz.
Line level from handset:	100 mV RMS at 1 kHz tone ± 3 kHz deviation on transm.
The preemphasis is located in the radio unit.	
A 5 Ω alarm loudspeaker is located in the handset.	
Aerial impedance:	50 Ω
Power consumption for NMT:	Standby : 13,2 V 0,7 A for E- Prom version 0,55 A for mask programmed. Tx 15 W : 13,2 V 5 A.

Receiver:

Sensitivity: Typ 0,3 μ V ($\frac{1}{2}$ EMF) for 20 dB
sinad psophometric.

Squelch level internal adjusted: 0,4 μ V ($\frac{1}{2}$ EMF)

CO - channel rejection: Cept method: -7,5 dB
NMT " : -6,5 dB

Adjacent channel rej. : Cept " : 72 dB normal test conditions
NMT " : 74 dB " " "

Surious and image rej.: Cept " : >70 dB in duplex. Image 90 dB
NMT " : >70 dB in duplex. " " "

Intermodulation rej. : Cept " : >70 dB
NMT " : >67 dB

Blocking : Cept " : >100 dB
NMT " : >100 dB

Surious emissions : Aerial : <2 nW
Cabinet : <2 nW

Deemphassis: Following 6 dB per octave
curve from 0,3 to 3 kHz
within +1 -3 dB relative
level at 1 kHz.

Harmonic distortion : NMT method: 2 %

Audio frequency

Intermodulation : NMT " : -25 dB

Hum and noise : Cept " : -50 dB RMS Psophometric
NMT " : -50 dB " "
NMT " : -30 dB Peak

AM suppression : NMT " : 34 dB

Function of limiter : NMT " : <0,5 dB

Transmitter:

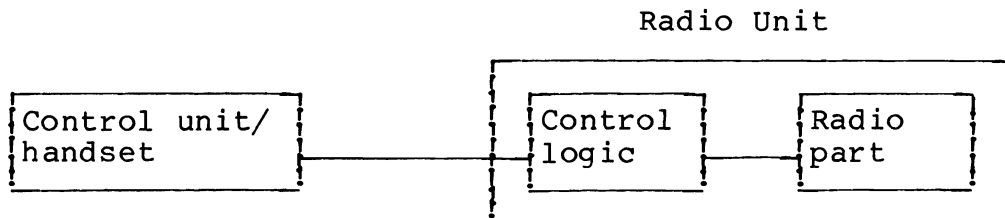
Power output: AP 3000 general:	25 W + 0 - 2dB from -25°C to +55°C and supply voltages between 10,8 and 15,6 V.
AP 3000 NMT :	15 W \pm 1 dB from -25°C to +55°C and between 10,8 and 15,6 V.
Power reduction for NMT:	Power reduced to 1,5 W \pm 3 dB.
Carrier rise time:	<1 mS
Carrier fall time:	<1 mS
Spurious emissions: Aerial :	<0,25 μ W
Cabinet :	<2,5 μ W
Adjacent cahnnél power:	76 dB below carrier power at \pm 25 kHz.
Frequency deviation:	Max. \pm 4,7 kHz. (supervisory \pm 300 Hz)
Preemphassis:	Following 6 dB per octave curve from 0,3 to 3 kHz within + 1 - 3 dB relative level at 1 kHz.
Harmonic distortion:	2 % at \pm 3 kHz deviation and 1 kHz mod. frequency
Audio intermodulation: NMT method :	-24 dB
Hum and noise in "handset" operation (residual mod.) : Cept method:	-48 dB RMS psophometric
: NMT "	-48 dB " "
: NMT "	-24 dB Peak
RF - intermodulation in PA-stage:	

Technical Description of Basic Principles in ap 3000

The ap 3000 is a remote controlled mobile radiophone with built-in duplex filter.

The radio can be controlled from a separate control console or from a handset (drawing 80109-4E3 and 80128-4E3).

The system can be looked at in three separate blocks:



The logic circuit can be made in different ways dependent on system facilities. Microprocessor circuit, modem circuit and tone systems could be contained in this part of the radio.

The control unit will in complicated systems contain a microprocessor too.

For the NMT version the following concept is used:

The control unit/handset contain a microprocessor and some memory circuit in order to do the local job (scanning keyboard and display, remember numbers and so on), and to make the conversation with the radio.

The radio unit is microprocessor controlled too.

The processor controls the channel code, the RF power, the AF and modulation amplifier, and makes the conversation with the modem circuit which contains datatransmitter and receiver (1200 baud).

The radio part consists of several modules which together make a direct synthesizer controlled duplex radio.

The synthesizer contains a directly programmed receiver loop generating the Rx injection signal and a transmitter slave loop, where the duplex separation is set by a crystal. This crystal oscillator is used for modulation too. By changing six modules: RF amplifier and mixer, Rx-VCO, Tx-VCO, PA stage, harmonic filter and duplexfilter, the operation band is changed between UHF (400-470 MHz), VHF (146-174 MHz), and VHF (68-88 MHz).

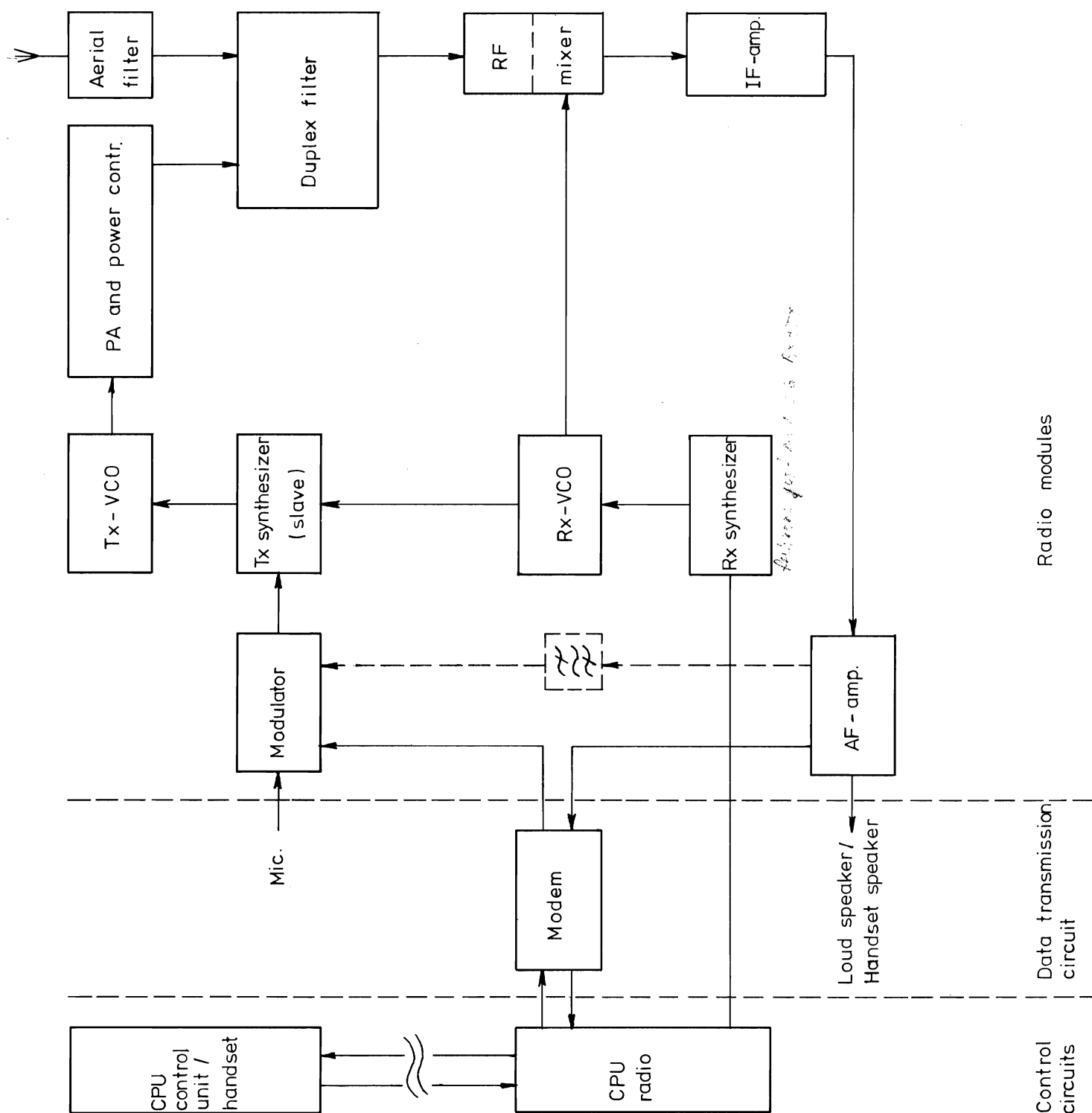
Drawing 80124-3E3 and 80125-3E3 show the interior of the NMT version of the UHF radio.

The block schematic is shown on drawing 80106-2E3.

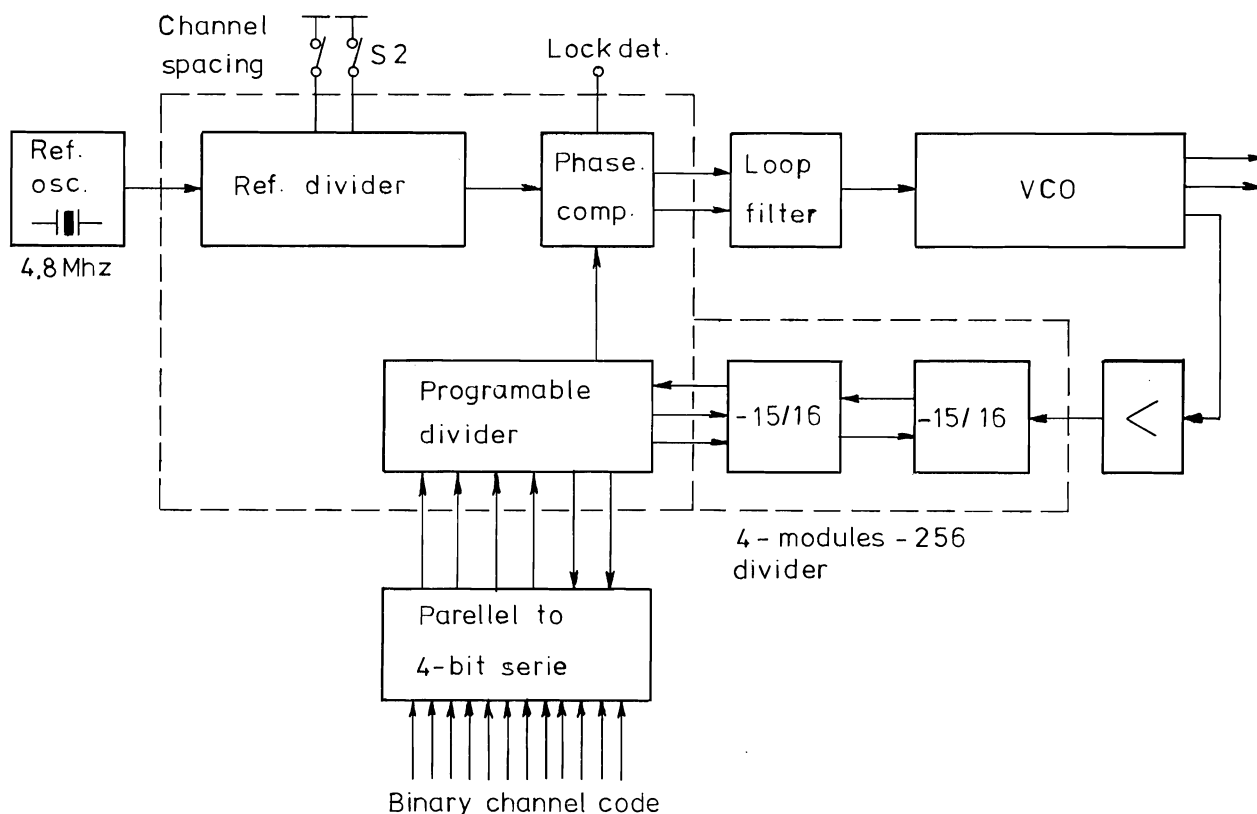
TECHNICAL DESCRIPTION OF THE RADIO MODULES IN AP3000 UHF.

Looking at the blockschematic 80106-2E3 the interconnection between all the radio modules can be seen in detail.

The principles are shown on fig. 1. below



Block schematic: Fig 2



The circuit is separated on two printboards: one for the VCO and one for the rest.

The Voltage controlled oscillator (81184-3E3) N08 is made by an oscillator directly working on the wanted frequency, followed by some bufferstages to provide the needed output power and isolation. The oscillator which can be an LC or a quaterwave type, can be adjusted over the wanted frequency range by a trimmer. The supply voltage is filtered by an "electrolyte amplifier", in order to prevent modulation from noise on the supply line.

Rx-Synthesizer (81183-2E3)

The ref frequency is produced by dividing a 4.8 Mhz crystal oscillator (X1 and Q1) by a number set by S2 depending on the required channel spacing.

The channel code is a 16-bit binary number, where the four most important bits are set by the internal switch S1. Formula for the channel is found on the drawing.

The 16-bit number is multiplexed as 4 words of 4 bits and fed to the programmable divider in IC2. The multiplexing circuits IC3 IC4 are controlled by the dataselector in IC2 (DS1, DS2), fig 3.

The synthesizer circuit IC2 is a NMOS IC.

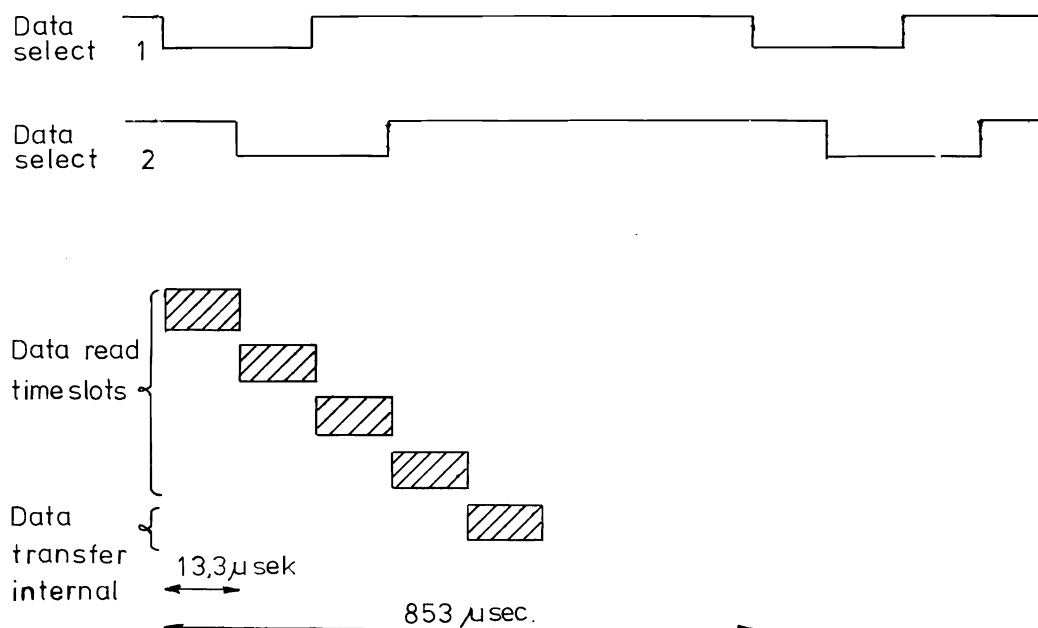


Figure 3 Multiplexing the channel number

In front of the programmable divider the VCO-signal is prescaled by the four modules divider IC1 which is an ECL IC, controlled by the programmable divider. The VCO signal is fed to IC1 via an isolation amplifier Q1.

The phase/frequency comparator in IC2 has 3 open drain outputs ØD, ØU and a lock detector LD.

Fig 4 shows the waveforms on the outputs for different input frequencies.

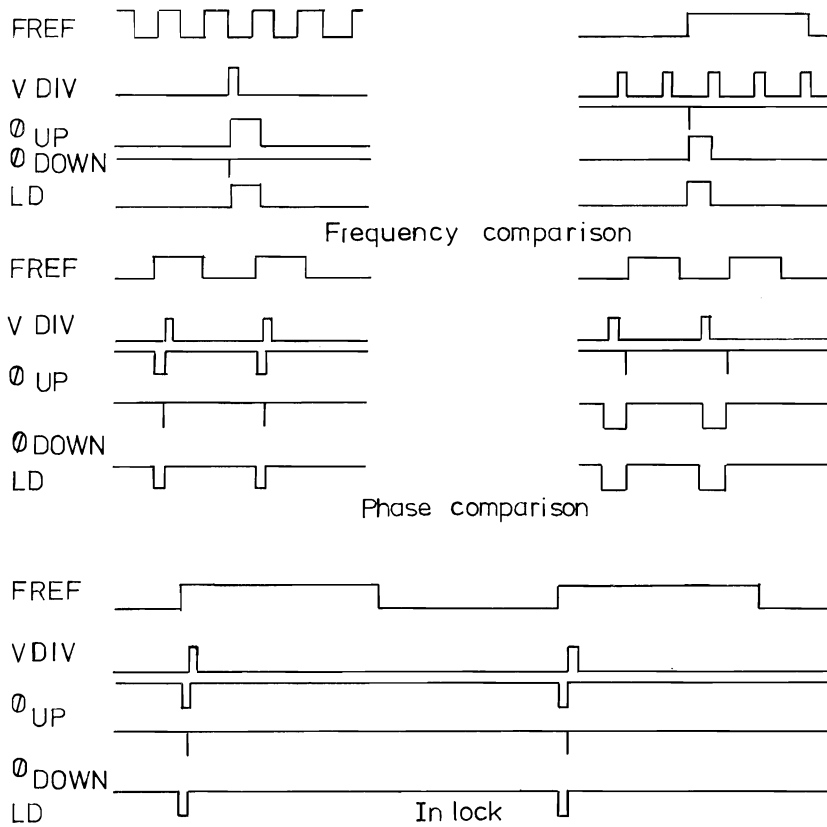


Fig.4 waveforms on phasecomp. outputs.

The comparator is followed by an active loopfilter, which includes a MOS-feet inverter at ØD.

The loopfilter provides a channelswitch time of about 30 mS for 180 channels in the NMT version. The active filter is followed by a 25 kHz notch filter in order to obtain the necessary attenuation of adjacent channel power.

IF-amplifier (81185-3E3) N12, N09

The input frequency is 21.4 MHz, decided by a crystalfilter. The filter is matched to a cascode amplifier Q1, Q2 (adjusted by C1).

The mixer Q3 converts to 455 kHz by help of the local oscillator Q6. Next comes a ceramic filter and an amplifier Q4 which drives the quadrature detector IC1 and the AGC amplifier. The coil L1 is the detectorphase shift network. The AF output passes an emitter follower Q5.

The AGC-amplifier which is used for field strength measurement consists of IC1 and Q1 after which comes a detector. The output DC voltage regulates IC2 in order to obtain a high dynamic range for the field strength measurement.

The whole AGC-amplifier and detector is located on a separate printboard and can be removed with no influence to the IF-amplifier.

RF-amplifier (81186-3E3) N10

The RF-amplifier consists of two complementary DC-coupled transistors with 6 tuned helical coils which give a bandwidth of about 5 MHz in the UHF-band.

The mixer Q3 converts to 21.4 MHz. Matching of the mixer output impedance to the IF-amplifier is done by the tuned circuit L11.

The VCO injection signal is coupled to the mixer via L9, L10, L8. The injection power will give a DC level shift at TP2.

TP3 can be used when adjusting the helical filters by help of a sweepgenerator.

TP1 is used when adjusting L11 and the IF-amplifier.

AF and Modulation amplifier NMT-version (81187-2E3) N02

The printboard N02 contains several circuits:

AF-amplifier for loudspeaker and handset speaker, volume control and deemphasis circuit, squelch circuit, alarmgenerators, blocking functions, modulation amplifier and supervisory filters.

The input signal passes an amplifier which together work as a high-pass filter to remove very low frequencies. This amplifier supplies the supervisory bandpass filter IC1, IC2, the notch filter IC3 in front and the AF-amplifier and the squelch highpass filter Q3, Q4. The supervisory filter consists of two staggetuned state-variable filters adjusted by R5 and R13. The supervisory signal (4kHz tone modulated to + 300 Hz deviation) is fed to the modulation output via IC8. (The 3kHz lowpass filter made by IC8 will not attenuate the supervisory signal). Grounding pin 12 the supervisory modulation will be blocked. R105 sets the modulation level (+ 300 Hz).

The notch filter IC3 prevents the supervisory signal from reaching the AF-amplifier, IC4 provides volume regulation controlled at pin 4 by DC-voltage and the deemphasis. Q1 blocks the receiver speech path when pin 5 is grounded. Q2 blocks only the loudspeaker when pin 6 is grounded. IC5 is the loudspeaker amplifier while Q6 and Q7 work as handset speaker amplifier where the level is adjusted by R58. IC6 works as noisedetector and comparator. The squelch level can be set by R52.

The ringing tone oscillator and the mal function tone oscillator is made by IC7. Grounding pin 7 and pin 20 will activate these generators.

The modulation amplifier has two inputs: mike 1 for "handsfree operation" and mike 2 for "handset operation". Pin 15 is used for changing operation.

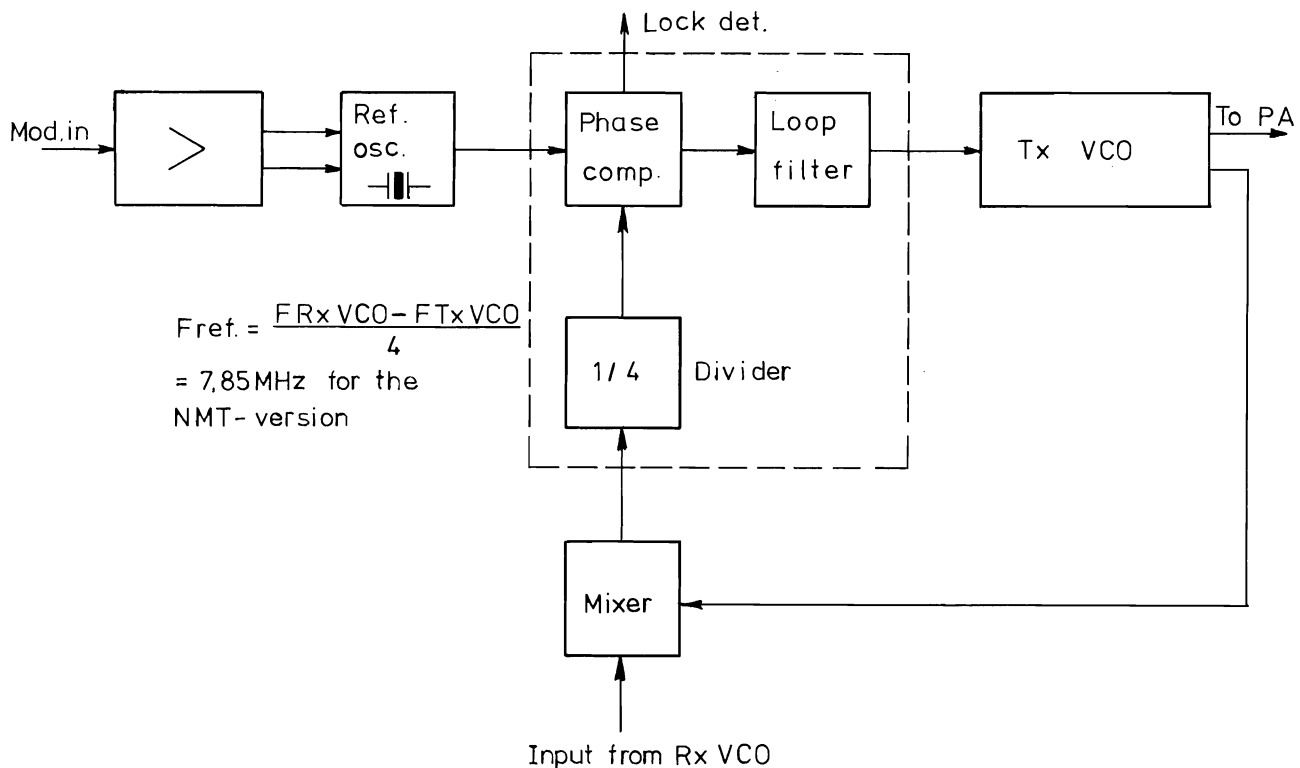
The preemphasis is done by C53, and the following amplification by IC8, after which comes the deviation adjustment and the low pass filter IC8.

Data or tone input is fed to the linear input at pin 18.

Q9 and Q10 work as loop amplifier and detector and Q8 as voltage controlled attenuator. Totally this circuit makes a compressor in order to limit the modulation level.

Transmitter synthesizer loop (81188-2E3) N18, (81189-3E3) N07

Blockshcematic: Fig 5



The Tx-VCO (81189-3E3) N07 is much like the Rx-VCO previously described, but has a gatefunction Q1, Q2 which makes it possible to key the VCO by grounding pin 3.

Tx-Synthesizer (81188-2E3) N18

The two VCO frequencies are fed to the mixer Q2 on the synthesizer printboard via the isolation-amplifiers Q1 and Q3. The difference frequency, filtered by RFC1 and C10 is fed to the divider which divides by 4. The phase comparator compares this frequency with the reference frequency coming from the reference oscillator.

The reference oscillator decides the duplex separation, and provides the modulation too.

The reference frequency is adjusted at L1 before the deviation is adjusted in the modulation amplifier!

The loop filter has a fast response with a bandwidth about 200 kHz.

The lock detector is together with the Rx-synthesizer lock detector fed to the PA-stage in order to prevent transmitting when one of the loops is not locked.

Q4 makes a blocking function and the synthesizer is keyed via pin 7 together with the Tx-VCO.

After keying the loop is locked in less than 1 mS.

PA-stage (82147-2E3) N05

The PA-stage which is mounted on a heatsink consists of 4 stages and is able to deliver 25W to the antenna. The Tx-VCO directly drives the PA-stage.

The power is stabilized by a power sense circuit and a loop amplifier which regulate the DC power supplied to the first and second stage.

The power level is adjusted with R 9 (15W for the NMT version). Grounding pin 4 regulates the power 10 dB down adjusted by R 10. Grounding pin 2 the PA-stage will be blocked. The settling time for the stabilizing loop is less than 0.5 mS.

All trimming capacitors are adjusted for max output power. The bandwidth will be about 10 MHz totally.

Aerial filter (81191-4E3) N21

The aerial filter is mounted on the heatsink close to the aerial connector.

It is a 5-pole low pass filter.

TECHNICAL DESCRIPTION

MODEM N14

1) Transmitter Part - see drawing no 81193-2E3

The data transmitter is designed to work in connection with a microcomputer, and transforms the coded data to a FFSK signal. FFSK means Fast Frequency Shift Keying.

The unit transforms a 1200 baud serial data stream in such a way that a logical "1" corresponds to a full wave with frequency 1200 Hz, while a logical "0" is 1 1/2 wave of the frequency 1800 Hz.

The basic timing originates from a crystal derived 144 kHz signal which clocks the ripplecounter IC17.

When the microprocessor initiates a datatransmission by pulling the "Tx data reset" line low, the counter IC23 will give an output signal of 18 kHz on pin 9 and a 72 kHz signal on pin 12. The 18 kHz signal is via IC25 used to clock the decimalcounter IC21. The 72 kHz signal is divided by 3 in the first part of IC22 which is a dual decade counter.

Here on pin 7 appears output pulses with a repetition frequency of 24 kHz, used to clock the second divider. Output pin 11 (Q) feeds output pulses of 12 kHz to the decimal-counter IC21. In this way IC 21 can be clocked by either the 18 kHz signal on the enable input pin 13 (forming a staircase wave with frequency 1800 Hz), or by the 12 kHz signal on clock input pin 14 (forming a staircase wave of 1200 Hz).

The selection of clock frequency depends on the contents of the lower part of IC20 which contains the data informations to be transmitted.

If the data is logic "1", the staircase wave will be 1200 Hz while a logic "0" will give 1800 Hz.

Each time the right hand counter in IC22 reaches the state zero, pin 1 on IC25 feeds a pulse (repetition frequency 2.4 kHz) to the clock input on the upper part of IC20.

Divided by two, the output pin 1 is a square wave signal with frequency 1200 Hz. This signal goes to the microprocessor "Tx read data". The processor presents a new data bit on the data input line shortly after the negative edge of the read signal, and the following positive edge reads the data into the data flip-flop in IC20.

The staircase wave approx 200 mV RMS from the resistor network goes through the active low-pass filter IC7 to the output terminal "FFSK output".

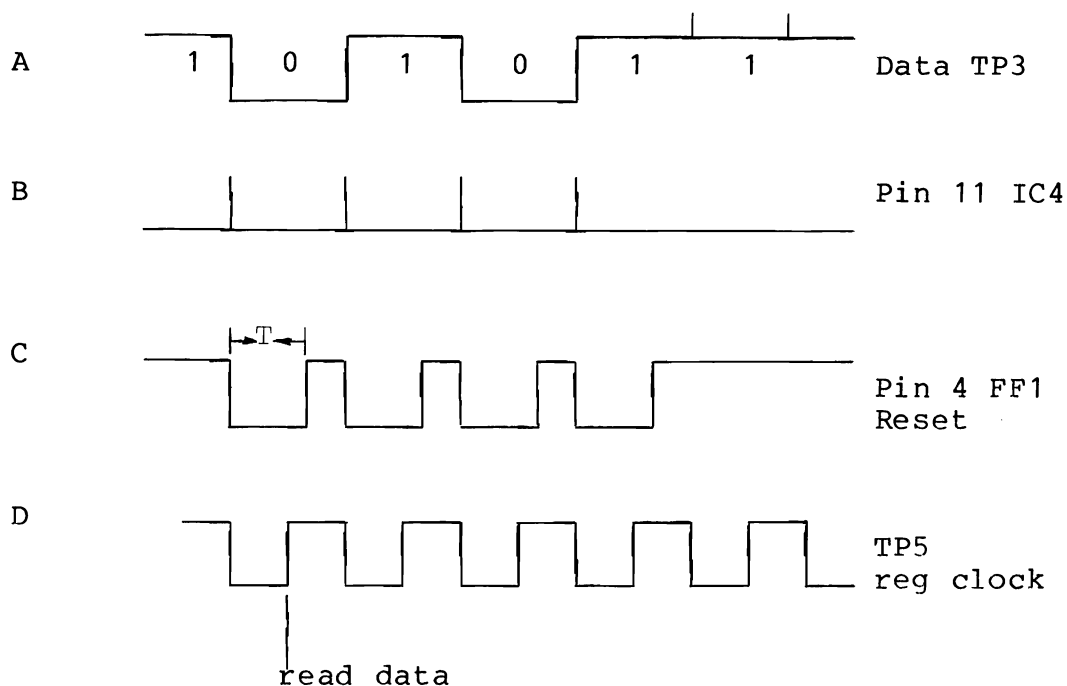
2) Receiver Part

IC1 forms an active high-pass filter followed by a low-pass section. The resulting band-pass filter removes some of the noise from the input FFSK signal. The analogous phase-locked loop IC2 transforms a full wave with frequency 1200 Hz to a logical "1", while 1 1/2 wave 1800 Hz results in a logical "0" on TP3.

The output pin no 5 from IC2 is a lock indication which is low during lock. When FFSK data are present, the output pin 11 is high. R20 and C8 prevent noise input (resulting in a sporadic indication from IC2) to give a false "Data present" signal on pin 11.

Each data transition on TP3 gives a short pulse on IC4 pin 11. This pulse is used to control the phase of the regenerated clock signal on TP5.

In the programmable divider IC6 the 144 kHz crystal derivated signal can be divided by 11, 12, and 13. The divider IC5 devides by 10. In this way the signal on TP5 (clock) is 144 kHz divided by 110, 120, or 130. The division ratio 120 is the nominal value, resulting in a clock frequency of 1200 Hz with 50% duty cycle. The digital loop for clock-regeneration should give an output signal on TP5 where the trailing edge corresponds to a data transition. In this way the leading edge of the clock will have a position in the expected middle of a data bit.



The D flip-flop FF1 is used to measure the phase difference between the regenerated clock on TP5 and the data transitions. In a period after each data transition the reset on FF1 (signal C) is low. If the regenerated clock signal on D input (signal D) is high when clocking occurs (signal B), the Q output will be logical 1.

The input to the programmable counter IC6 will in the time "T" be 1011 giving a total division ratio of 110 (min). This will pull the next reg clock transition closer to the desired position. After the time "T" or in a period with no data transitions FF1 is reset giving a nominal division ratio (120). If FF1 reads a "0" when a data transition occurs, the division ratio will be maximum (130) in the time "T", and in this way pull the next reg clock transition closer to the desired position.

The time "T" in which the division ratio is either maximum or minimum is set by R18 and C17. The chosen value represents a compromise between "pull in" time and jitter on the regenerated clock.

IC10, 11, 12, and 13 is a detection circuit for the frame synchronizing word of 11 bits (111000100 10). The data are clocked into the shift registers IC10 and 11 by the regenerated clock, and the word detected in the gates IC12 and IC13.

A frame synchronizing word results in a clock pulse to the flip-flop FF2 IC8.

If "Data present" (pin 11) is high, \overline{Q} will be "0" and Q will be "1" on FF2 IC8, and the convolutional decoder circuit is activated.

\overline{Q} on FF1 IC26 will be clocked low from the frame detector (was only high if there has been a reset pulse from the microprocessor through pin 7), while Q on FF2 IC26 gives a short reset pulse to the bit counter IC9. Now IC9 starts counting the clock pulses in the message after the frame sync word.

When the bit counter IC9 has reached the desired number, it will reset FF2 and the decoder circuit.

The data part of an NMT frame contains 140 bit (1200 baud), but the bit counter should be coded to 148. This is necessary, because the data present in the decoder shift registers IC17 and 18 must be clocked to the output after the 1200 baud frame has finished.

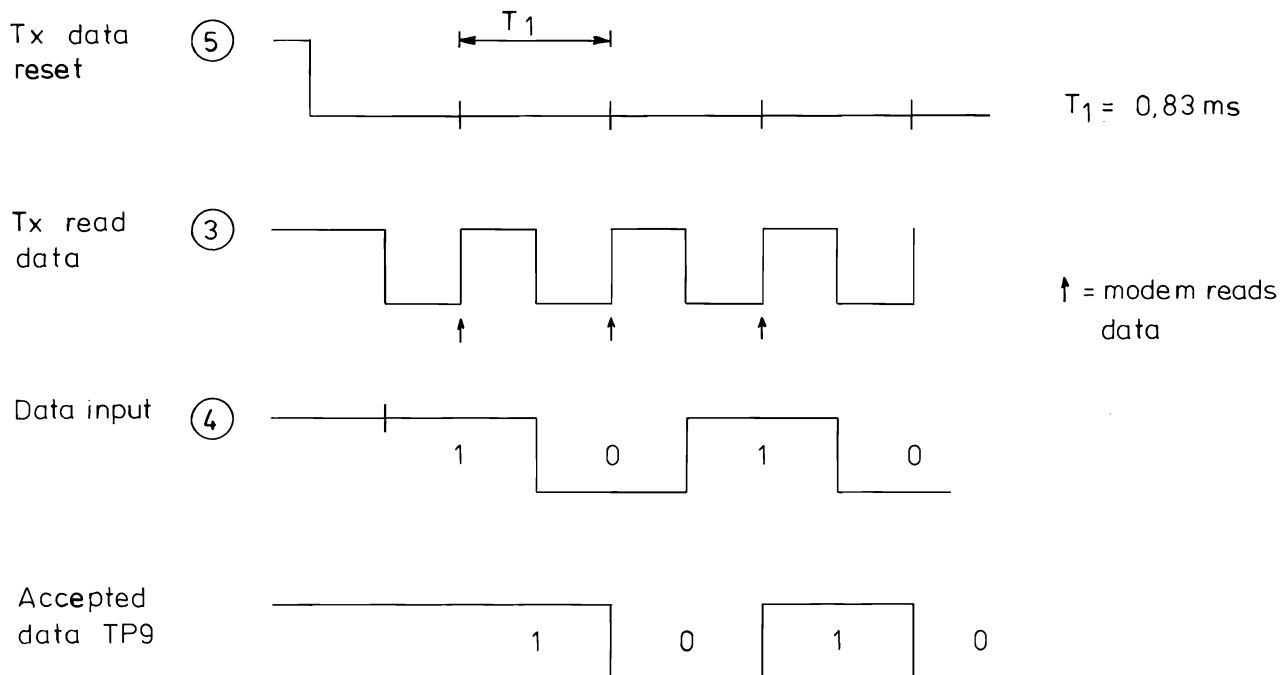
The counter IC9 continues to count the clock pulses in the bit sync and frame sync period of the next frame in order to produce an artificial frame sync pulse to be used if some transmission noise should disturb the received frame sync bits. The counter will be reset after each frame sync through FF2 IC26 whether it is an artificial or a natural frame sync.

The reset pin 7 is used to reset the decoder and bit counter if the data frame contains a "false" frame synchronizing word. In this case the microprocessor will read non-valid data in the beginning of a frame, reject the data and give a reset pulse to the data receiver.

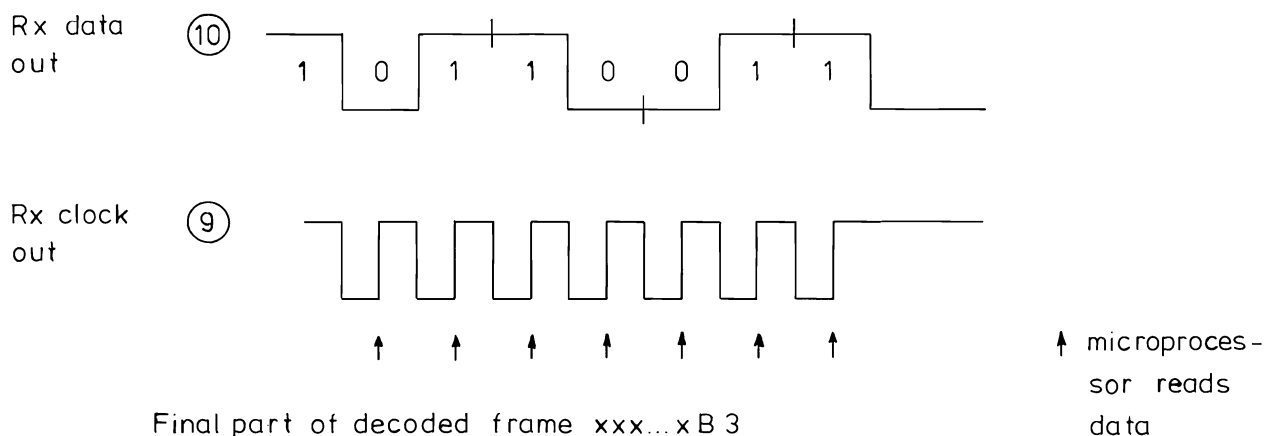
The Rx data out has the speed 600 baud because of the convolutional coding.

Every second bit in the 1200 baud FFSK data is a parity bit. Accordingly the Rx clock output pin 10 is 600 Hz and it appears only when a frame synchronizing word has been received.

1. Timing for modem transmitter (encoded data 1200 band)



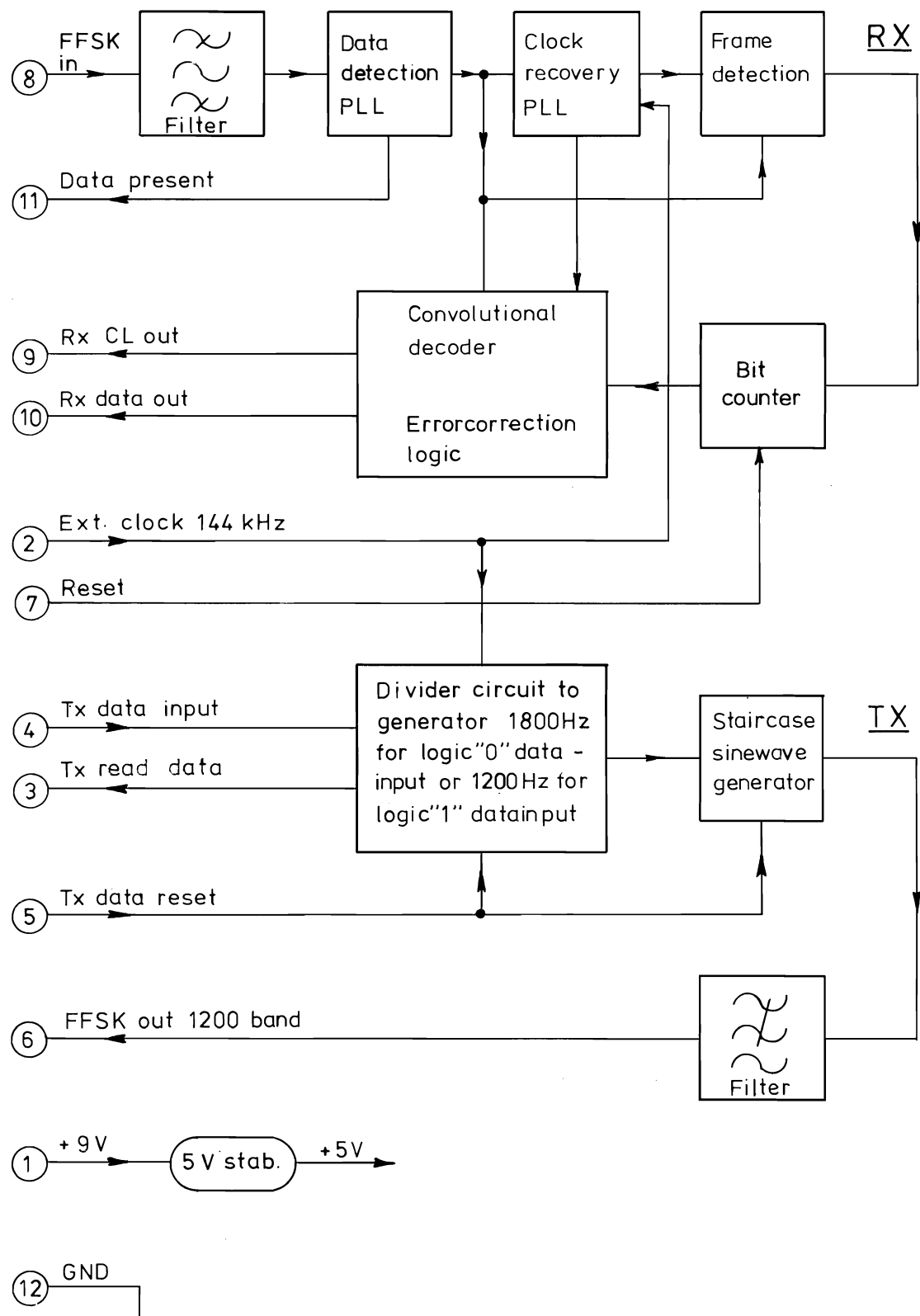
2. Timing for modem receiver (decoded data 600 band)



Final part of decoded frame xxx...xB3

The Rx clock out is logic „1” in stand by state.

Rettet:		Tegn.:	Kontr.:
		Stykl. nr.:	
		Tegn. nr.:	80168 -4E3
			Page 5
	PHILIPS		



Rettet:

Simplified blockschematic

Modem circuit N14

PHILIPS

Tegn.: B.C.
11-11-80

Kontr.: B.J.
11-11-80

Stykl. nr.:

Tegn. nr.: 80168 - 4E3
Page 6

Technical description of the control circuit NMT
CPU.radio 80171-1E3

This unit, printboard N 15 is build around an 8048-type microcomputer and 3 input/output-expanders.

The computer takes care of all control of the radio, and communicates with the outside world through a 1200 baud FFSK-datatransmissionlink. At the same time it is loosely coupled to the control unit by means of two asynchrone 600-baud paths. Both connections can operate full duplex and the computer can manage datatransmission in full duplex on both lines at the same time.

The computer is clocked from a 6,048 MHz crystal for easy derivation of the correct baud-rates. Out of the computer comes a divide-by-3-clock (2,016 MHz) which is divided by 14 to generate a 144 kHz, 50 % duty-cycle-clock to the modem and this clock is futher divided to provide a 30 sec. pulse to the fail-timer output. 8 outputs from this divider-chain are used by the CPU to generate random-channels.

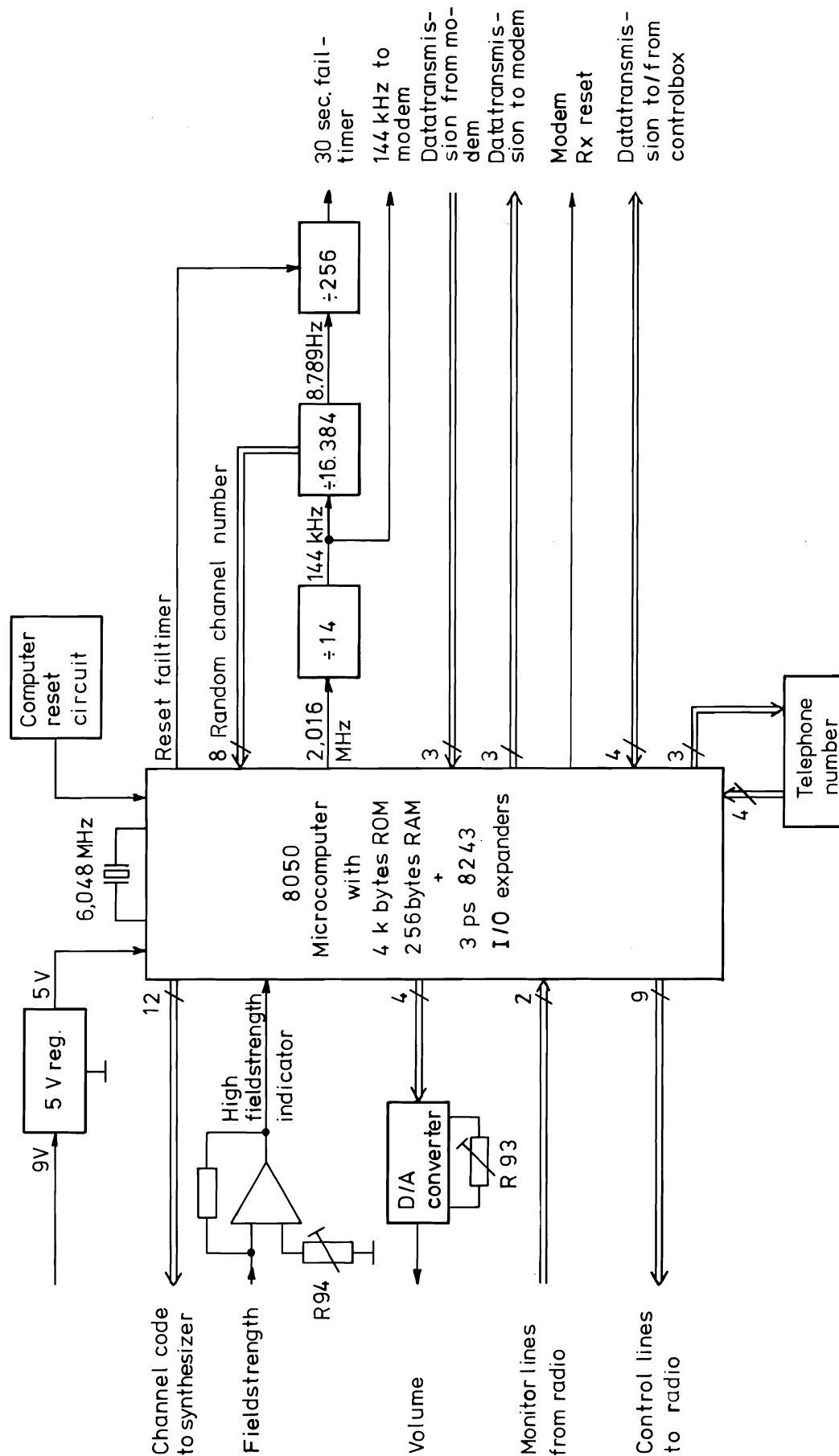
If the radio is functioning correctly, the fail-timer is reset in between, but when an error-condition arises, this reset-pulse is stopped and after 30 sec. the radio turns it self off.

On the print board is mounted a reset circuit, that resets the CPU whenever power is applied or when the voltage falls below a certain limit.

An area of N 15 is reserved as strap-area for the telephone-number and whenever the computer is reset, it starts by reading this number into the memory. The CPU controls the channel-scanning and finds the best channel by means of 2 fieldstrength-detectors, a build-in comparator and the squelch condition.

Additionally it controls the PA-stage and the audiopath; when power is switched on, volume setting is on a mean-level, dici- ded by trimmer R 93. A D/A-converter transforms a 4 bit code to a volume-voltage and this level can be regulated up or down 8 steps from mean-value, independently for both handset or handsfree operation, and the settings are remembered as long as the radio is turned on.

Generally speaking, the CPU performs all the handshaking with the MTX when a call is set up, and when it is cleared. It takes care of the roaming and remembers the present traffic area when power is turned off. During conversation it controls the audio-path and mutes and activates loudspeakers and microphones according to the present mode.



Rettet:

Blockschematic of N15
(main computerboard).

AP-RADIOTELEFON A/s

Tegn.:

Kontr.:

Stykl. nr.:

Tegn. nr.:

81026-4E3
Page 3

Computer Board N13

The ON/OFF bistable consists of one half of IC7 driving the starting relay via Q9. IC7 is fed permanently from 5 V regulator IC8. The ON-condition can be achieved only by pushing the button on N16. The OFF-condition, however, is obtained in one of the following ways:

- a. Activating the OFF-button
- b. Time-out from main computer
- c. Supply voltage above 16 V (2 mS delay)
- d. Supply voltage below 9 V (1 S delay)

The high voltage sensing circuit consists of D12, D13, and Q12. The low voltage sensing circuit consists of D12, Q10, and Q11.

Capacitor C11 and pull-up resistor R42 make the computer reset time. The reset signal is activated:

- a. Within 100 mS after power on
- b. At supply voltage below 9 V
- c. In case of 5 V supply failure (Q13, Q14)

The reset signal:

- a. Resets the microprocessor IC1 pin 4
- b. Turns all indicators off
- c. Inhibits write enable on IC3 via Q8
- d. Inhibits key-board beep via D8 and IC5, D22 on N22

The computer consists of microprocessor IC1, program memory IC6, data memory IC3, and address latch IC4, IC5. Data memory IC3 is normally fed with supply voltage through D7, but in case of supply failure, the 3 V lithium cell overtakes the RAM supply, thereby retaining data information.

Q3, Q4, Q5, Q6, Q7, and surrounding components form a voltage regulator controlled by ambient light via photo transistor Q17 on N22. The voltage is 9 V at maximum light condition, and 4.5 V in complete darkness, the result of which is a ten-to-one current ratio in all LED indicators.

Q1 and Q2 form a triggerable constant current generator with hysteresis, turning key-board light on at a near dark condition.

Display Board N22

The 16-digit display is multiplexed by the computer. IC1 drives the seven segments through current limiting resistors R1-R7. Peak current is approximately 100 mA. Expander (IC4) port 4 scans the digits via BCD to decimal decoder IC2 and Darlington transistors Q1-Q16.

The computer performs key-board scanning and debouncing via IC4 port 5 and 6. Port 6 is also used to transfer country code information from data memory to latch IC3. This information is displayed in a combination of 5 LED's D7-D11 driven by transistors Q18-Q21. The diodes D5, D6 and D1, D2, D3 help to match light intensity of steady current LED's to that of the multiplexed display.

Oscillator IC5, R32, C5 feeds alarm speaker with a beep tone whenever one of the keys is properly activated. Tone duration is determined by monostable IC5, C3, R82, D17 and time delay C4, R29 is supposed to match computer debouncing time.

Code Lock

The handset is provided with an electronic lock facility which prevents unwanted phone calls to be made by strangers.

The lock must always be programmed in order to avoid a permanent disablement. Programming of the lock is performed at the factory or any qualified service level to the customer's specification. The procedure depends on whether the handset is locked from the start or not.

If the handset is already locked, use the following procedure:

1. Turn the set ON while shortcircuiting TP1 to ground. The letter L is shown in the display.
2. Remove the shortcircuit. The computer is now in a programming mode.
3. Write the 4-digit code on the key-board. By entry of the fourth digit, the letter L disappears. This confirms that the new code has been accepted by the computer, but the handset is still in programming mode, and it is still locked.
4. To re-enter normal operation mode, turn the set OFF and ON again. The L reappears because the handset is still locked.
5. In order to unlock the handset, enter the new code number in sequence while keeping the unlock-key depressed.

If the handset is not locked from the start, use the following procedure:

1. Turn the set ON while shortcircuiting TP1 to ground.
2. Remove the shortcircuit. The computer is now in a programming mode.
3. Write the 4-digit code on the keyboard. The first 3 digits are shown in the display, and by entry of the fourth digit they all disappear. This confirms that the new code has been accepted by the computer.
4. To re-enter normal operation mode, turn the set OFF and ON again.

IMPORTANT

After programming it should be checked that the back-up battery is functioning. This is done by completely removing DC-power to the handset for approx 5 secs (remove 14-pole connector from cradle) and then perform a lock/unlock procedure.

Note that no audible beep is heard during the unlock procedure. This is caused by the beep circuit being unable to detect two keys depressed simultaneously.

Rx Frequency List and Channel Code - NMT

Channel	1	0 1011 0000	463.000 MHz
-	2	0 1011 0001	463.025 -
-	3	0 1011 0010	463.050 -
-	4	0 1011 0011	463.075 -
-	5	0 1011 0100	463.100 -
-	6	0 1011 0101	463.125 -
-	7	0 1011 0110	463.150 -
-	8	0 1011 0111	463.175 -
-	9	0 1011 1000	463.200 -
-	10	0 1011 1001	463.225 -
-	11	0 1011 1010	463.250 -
-	12	0 1011 1011	463.275 -
-	13	0 1011 1100	463.300 -
-	14	0 1011 1101	463.325 -
-	15	0 1011 1110	463.350 -
-	16	0 1011 1111	463.375 -
-	17	0 1100 0000	463.400 -
-	18	0 1100 0001	463.425 -
-	19	0 1100 0010	463.450 -
-	20	0 1100 0011	463.475 -
-	21	0 1100 0100	463.500 -
-	22	0 1100 0101	463.525 -
-	23	0 1100 0110	463.550 -
-	24	0 1100 0111	463.575 -
-	25	0 1100 1000	463.600 -
-	26	0 1100 1001	463.625 -
-	27	0 1100 1010	463.650 -
-	28	0 1100 1011	463.675 -
-	29	0 1100 1100	463.700 -
-	30	0 1100 1101	463.725 -

Channel	31	0 1100 1110	463.750 MHz
-	32	0 1100 1111	463.775 -
-	33	0 1101 0000	463.800 -
-	34	0 1101 0001	463.825 -
-	35	0 1101 0010	463.850 -
-	36	0 1101 0011	463.875 -
-	37	0 1101 0100	463.900 -
-	38	0 1101 0101	463.925 -
-	39	0 1101 0110	463.950 -
-	40	0 1101 0111	463.975 -
-	41	0 1101 1000	464.000 -
-	42	0 1101 1001	464.025 -
-	43	0 1101 1010	464.050 -
-	44	0 1101 1011	464.075 -
-	45	0 1101 1100	464.100 -
-	46	0 1101 1101	464.125 -
-	47	0 1101 1110	464.150 -
-	48	0 1101 1111	464.175 -
-	49	0 1110 0000	464.200 -
-	50	0 1110 0001	464.225 -
-	51	0 1110 0010	464.250 -
-	52	0 1110 0011	464.275 -
-	53	0 1110 0100	464.300 -
-	54	0 1110 0101	464.325 -
-	55	0 1110 0110	464.350 -
-	56	0 1110 0111	464.375 -
-	57	0 1110 1000	464.400 -
-	58	0 1110 1001	464.425 -
-	59	0 1110 1010	464.450 -
-	60	0 1110 1011	464.475 -

Channel	61	0 1110 1100	464.500 MHz
-	62	0 1110 1101	464.525 -
-	63	0 1110 1110	464.550 -
-	64	0 1110 1111	464.575 -
-	65	0 1111 0000	464.600 -
-	66	0 1111 0001	464.625 -
-	67	0 1111 0010	464.650 -
-	68	0 1111 0011	464.675 -
-	69	0 1111 0100	464.700 -
-	70	0 1111 0101	464.725 -
-	71	0 1111 0110	464.750 -
-	72	0 1111 0111	464.775 -
-	73	0 1111 1000	464.800 -
-	74	0 1111 1001	464.825 -
-	75	0 1111 1010	464.850 -
-	76	0 1111 1011	464.875 -
-	77	0 1111 1100	464.900 -
-	78	0 1111 1101	464.925 -
-	79	0 1111 1110	464.950 -
-	80	0 1111 1111	464.975 -
-	81	1 0000 0000	465.000 -
-	82	1 0000 0001	465.025 -
-	83	1 0000 0010	465.050 -
-	84	1 0000 0011	465.075 -
-	85	1 0000 0100	465.100 -
-	86	1 0000 0101	465.125 -
-	87	1 0000 0110	465.150 -
-	88	1 0000 0111	465.175 -
-	89	1 0000 1000	465.200 -
-	90	1 0000 1001	465.225 -

Channel	91	1 0000 1010	465.250 MHz
-	92	1 0000 1011	465.275 -
-	93	1 0000 1100	465.300 -
-	94	1 0000 1101	465.325 -
-	95	1 0000 1110	465.350 -
-	96	1 0000 1111	465.375 -
-	97	1 0001 0000	465.400 -
-	98	1 0001 0001	465.425 -
-	99	1 0001 0010	465.450 -
-	100	1 0001 0011	465.475 -
-	101	1 0001 0100	465.500 -
-	102	1 0001 0101	465.525 -
-	103	1 0001 0110	465.550 -
-	104	1 0001 0111	465.575 -
-	105	1 0001 1000	465.600 -
-	106	1 0001 1001	465.625 -
-	107	1 0001 1010	465.650 -
-	108	1 0001 1011	465.675 -
-	109	1 0001 1100	465.700 -
-	110	1 0001 1101	465.725 -
-	111	1 0001 1110	465.750 -
-	112	1 0001 1111	465.775 -
-	113	1 0010 0000	465.800 -
-	114	1 0010 0001	465.825 -
-	115	1 0010 0010	465.850 -
-	116	1 0010 0011	465.875 -
-	117	1 0010 0100	465.900 -
-	118	1 0010 0101	465.925 -
-	119	1 0010 0110	465.950 -
-	120	1 0010 0111	465.975 -

Channel 121	1 0010 1000	466.000 MHz
- 122	1 0010 1001	466.025 -
- 123	1 0010 1010	466.050 -
- 124	1 0010 1011	466.075 -
- 125	1 0010 1100	466.100 -
- 126	1 0010 1101	466.125 -
- 127	1 0010 1110	466.150 -
- 128	1 0010 1111	466.175 -
- 129	1 0011 0000	466.200 -
- 130	1 0011 0001	466.225 -
- 131	1 0011 0010	466.250 -
- 132	1 0011 0011	466.275 -
- 133	1 0011 0100	466.300 -
- 134	1 0011 0101	466.325 -
- 135	1 0011 0110	466.350 -
- 136	1 0011 0111	466.375 -
- 137	1 0011 1000	466.400 -
- 138	1 0011 1001	466.425 -
- 139	1 0011 1010	466.450 -
- 140	1 0011 1011	466.475 -
- 141	1 0011 1100	466.500 -
- 142	1 0011 1101	466.525 -
- 143	1 0011 1110	466.550 -
- 144	1 0011 1111	466.575 -
- 145	1 0100 0000	466.600 -
- 146	1 0100 0001	466.625 -
- 147	1 0100 0010	466.650 -
- 148	1 0100 0011	466.675 -
- 149	1 0100 0100	466.700 -
- 150	1 0100 0101	466.725 -

Channel 151	1 0100 0110	466.750 MHz
- 152	1 0100 0111	466.775 -
- 153	1 0100 1000	466.800 -
- 154	1 0100 1001	466.825 -
- 155	1 0100 1010	466.850 -
- 156	1 0100 1011	466.875 -
- 157	1 0100 1100	466.900 -
- 158	1 0100 1101	466.925 -
- 159	1 0100 1110	466.950 -
- 160	1 0100 1111	466.975 -
- 161	1 0101 0000	467.000 -
- 162	1 0101 0001	467.025 -
- 163	1 0101 0010	467.050 -
- 164	1 0101 0011	467.075 -
- 165	1 0101 0100	467.100 -
- 166	1 0101 0101	467.125 -
- 167	1 0101 0110	467.150 -
- 168	1 0101 0111	467.175 -
- 169	1 0101 1000	467.200 -
- 170	1 0101 1001	467.225 -
- 171	1 0101 1010	467.250 -
- 172	1 0101 1011	467.275 -
- 173	1 0101 1100	467.300 -
- 174	1 0101 1101	467.325 -
- 175	1 0101 1110	467.350 -
- 176	1 0101 1111	467.375 -
- 177	1 0110 0000	467.400 -
- 178	1 0110 0001	467.425 -
- 179	1 0110 0010	467.450 -
- 180	1 0110 0011	467.475 -

SPECIFICATION
for Quartz Crystal Unit
ap 37

1. Holder:	MIL HC 42/U, BS style DQ
2. Mode:	AT-fundamental
3. Frequency range:	4.5 to 9 MHz
4. Resonance:	Parellel - 30 pF
5. Calibration tolerance:	\pm 10 ppm at 25°C
6. Temperature tolerance:	\pm 10 ppm
7. Temperature range:	-25 to + 70°C
8. Drive level:	1 mW
9. Activity:	4.5- 5.0 MHz - max 50 ohms 5.0- 7.0 MHz - max 40 ohms 7.0- 9.0 MHz - max 30 ohms
10. Static capacitance:	5 pF max
11. Spurious resonances:	MIL 3098-G
12. Labelling:	Frequency in MHz with 7 di- gits. ap 37, manufacturer and date.

SPECIFICATION
for Quartz Crystal Unit
ap 38

1. Holder:	MIL HC 42/U, BS style DQ
2. Mode:	AT-fundamental
3. Frequency range:	4.5 to 9 MHz
4. Resonance:	Parellel - 30 pF
5. Calibration tolerance:	\pm 10 ppm at 25°C
6. Temperature tolerance:	\pm 5 ppm
7. Temperature range:	-20 to + 70°C
8. Drive level:	1 mW
9. Activity:	4.5- 5.0 MHz - max 50 ohms 5.0- 7.0 MHz - max 40 ohms 7.0- 9.0 MHz - max 30 ohms
10. Static capacitance:	5 pF max
11. Spurious resonances:	MIL 3098-G
12. Labelling:	Frequency in MHz with 7 di- gits. ap 38, manufacturer and date.

SPECIFICATION
for Quartz Crystal Unit
ap 27

- | | |
|---------------------------|---|
| 1. Holder: | MIL HC 43/U BS style DP |
| 2. Mode: | AT-fundamental |
| 3. Frequency range: | 3 to 15 MHz |
| 4. Resonance: | Parellel - 30 pF |
| 5. Calibration tolerance: | \pm 15 ppm at 25°C |
| 6 Temperature tolerance: | \pm 15 ppm |
| 7. Temperature range: | -20 to + 70°C |
| 8. Drive level: | 1 mW |
| 9. Activity: | 3.0- 4.0 MHz - max 120 ohms
4.0- 7.0 MHz - max 50 ohms
7.0-10.0 MHz - max 30 ohms
10.0-15.0 MHz - max 25 ohms
15.0-20.0 MHz - max 20 ohms |
| 10. Labelling: | Frequency in MHz with 8 di-
gits. ap 27, manufacturer
and date. |

TUNING INSTRUCTION AP3000 UHF NMT

Tuning the modules in the NMT radio the microprocessor control must be overtaken by a manual control. This is done by help of a special control box via the test connector on the CPU printboard N15.

All test and adjustment points can be seen on drawing 80124-3E3 and 80125-3E3.

Adjustment procedure:

1. Rx synthesizer loop N03 and N08

Necessary instruments: DC-voltmeter, RF-counter.

- a) The reference frequency measured at TP 1 on N03 is set to 4.800,000 MHz by the trimmer C6. S2 is set to 25 kHz channel spacing.
- b) The channel selector on the control unit is set to channel 91 which gives the division ratio $N = 15.626$ or in the binary code:

0011	1101	0000	1010
set by	C	B	A
S1			

- c) Now the trimmer C5 in the Rx VCO N08 is adjusted until the loop voltage measured at pin 6 on N03 or pin 1 on N08 reaches the value 5 V.
- d) The frequency measured on one of the VCO outputs will now be 486.650 MHz which must be controlled.

Now the Rx-synthesizer and thereby the Rx-frequency works correctly.

2. Tx-synthesizer loop N18 and N07

Necessary instruments: DC voltmeter, RF counter

The transmitter must be keyed via the manual control.

- a) The reference frequency measured at TP1 on N18 is set to 7.850 MHz by the coil L1.
- b) With the channel selector to midchannel 91 the Tx-VCO trimmer C4 is adjusted until the loop voltage measured at pin 1 on N07 or pin 5 on N18 reaches 4.5V DC.

The output frequency must be controlled on the VCO output pin 4.

- c) Lock detector pin 4 will now be high, which must be controlled.

Given the Rx frequency is correct adjusted, the Tx frequency will be 455,250 MHz.

3. PA-stage NO 5.

Necessary instruments: UHF power meter.

It is necessary that the duplex filter is correct adjusted (or removed and pin 5 shortened to the aerial filter input by a 50 ohm cable).

When both synth. loops are locked (Tx on) pin 2 on the PA-stage goes high and it will take action.

- a) Turn potentiometer R9 anticlockwise and set the radio to high power which means that pin 4 on NO5 is high.
- b) Now tune all trimmers to max. output (the PA-stage and heatsink must be in mechanical closed position)
- c) Adjust R9 to 15 W. Check the power level at channel 1 and 180, which must be at least 12W at 13.2V (If necessary C2, C3, C4 in the duplex filter might be adjusted to max power on channel 180).
- d) Set the radio to low power and adjust R10 to 1,5 W.

4. IF-Amplifier N12 and N09.

The IF-amplifier will normally be factory adjusted in a test jig and no further tuning will be needed.

Necessary instruments for tuning:

- or
- 1) 21,4 MHz sweepgenerator
 - 2) distortionmeter and RF-generator.

- 1-a) A 21,4 MHz sweepgenerator is connected to TP1 on the RF and Mixer N10. (A 10,7 MHz generator normally contains sufficient second harmonics to be used on 21,4 MHz).

A RF-probe is connected to the AGC-Amplifier input or a DC-probe to the FS-output. (If a DC-probe is used the AGC-regulation voltage must be shortened to ground at pin 2 on IC1 printboard N09).

- 1-b) L11 on N10 and C1 on N12 are adjusted to min. ripple. Use lowest possible input level to prevent limiting.

- 1-c) Connect the DC-probe to the AF-output at pin 3 and adjust L1 to max. discriminator slope and the best linearity.

- 2-a) If a distortionmeter is used it must be connected to the AF-output at pin 3. A 21,4 MHz signal generator modulated with 1 kHz tone to +/- 3 kHz deviation is connected to TP1 on N10.

- 2-b) L11 and C1 shall be adjusted to min. distortion or max DC level at pin 4 and L1 to max output (3 % distortion measured at pin 3 where there is no deemphasis).

If the RF-module is in function the signal generator can be set to 465.250 MHz and be connected to the antenna input instead of TP1.

5. RF-Amplifier N10

Necessary instruments: DC-voltmeter, UHF-sweepgenerator
(ex. polyscope)
----- UHF-signalgenerator, distortionmeter

For the NMT radio the RF-Amplifier will be factory adjusted in the module test jig, and no further adjustments are needed.

- a) The adjustment of L11 is described previously.
- b) Set the radio to mid-channel and adjust C10 and C11 to max injection level measured as a DC voltage at TP2. The max point will be in the range 1.5 to 2.5 V.
- c) Because of the great bandwidth and the small duplex separation it is not easy to adjust the RF-band passfilters satisfactory without a sweepgenerator, with a logarithmic horizontal amplifier and at least 40 dB dynamic range.

The generator is connected to the antenna input and the RF-probe to TP3.

For the NMT radio the helical filters will be factory adjusted in the module test jig.

- d) The helical filters L1 to L6 are adjusted to follow the specifications given in fig 1.
- e) A signal generator at 465.250 MHz modulated with 1 kHz tone to + 3 kHz deviation is connected to the input and a distortionmeter to the loudspeaker or handset speaker output (speechpath and loudspeaker must be open).
- f) Now C10 must be fine tuned for max sensivity.

6. AF and modulation amplifier N02 incl squelch circuit

Necessary instruments: Tonegenerator, RF signalgenerator,
AC millivoltmeter, oscilloscope,
----- deviation meter.

Set radio to mid channel.

Modulation amplifier

- a) Connect a deviation meter to the Tx VCO output or via a power attenuator to the antenna output.

Connect a tonegenerator to mic. 1 input and set mic. switch to position: mic. 1 where pin 15 goes high. Set the generator to 1.000 Hz.

The 3 potentiometres R76, R72 and R101 are set to centre position.

The mic. block must be open, pin 2 high.

The supervisory signal must be turned off, pin 12 low.

- b) With the input level 10 mV potmeter R101 is adjusted to give +/- 4,5 kHz deviation.
- c) Reduce the level 20 dB to 1 mV and adjust R76 to give +/- 3 kHz. Repeat the procedure once.
- d) Connect the tonegenerator to mic. 2 input and set mic. switch to position: mic. 2.
- e) With the input level 100 mV potmeter R72 is adjusted to +/- 3 kHz.
- f) Remove tonegenerator and close the mic. block.

Squelch level and handset output level and fieldstrength level

- a) Connect the RF-signal generator to the antenna input.
F = 465,250 MHz, modulation 1.000 Hz tone +/- 3 kHz dev.
- b) Adjust the squelchpotmeter R52 until the squelch indicator on the test box just turns on at a RF-signal level of ~~0,8 uV EMF~~. *See app 23-310 RF signal (checked 2.0 4 dB lower signal)*
- c) Turn the signal generator up to 10uV EMF.

Turn to max. vol. control, pin 4 grounded. Turn off the loudspeaker.

- d) Now R58 is adjusted to 560 mV output (it must be controlled on the oscilloscope that there is no limiting/distortion).
- e) Turn to nominal volume and adjust R93 on N15 to 200 mV output for the handset.
- f) R94 on N15 must be turned clockwise until the voltage on TP1 just go high at the RF level 10uV.

Supervisory filters.

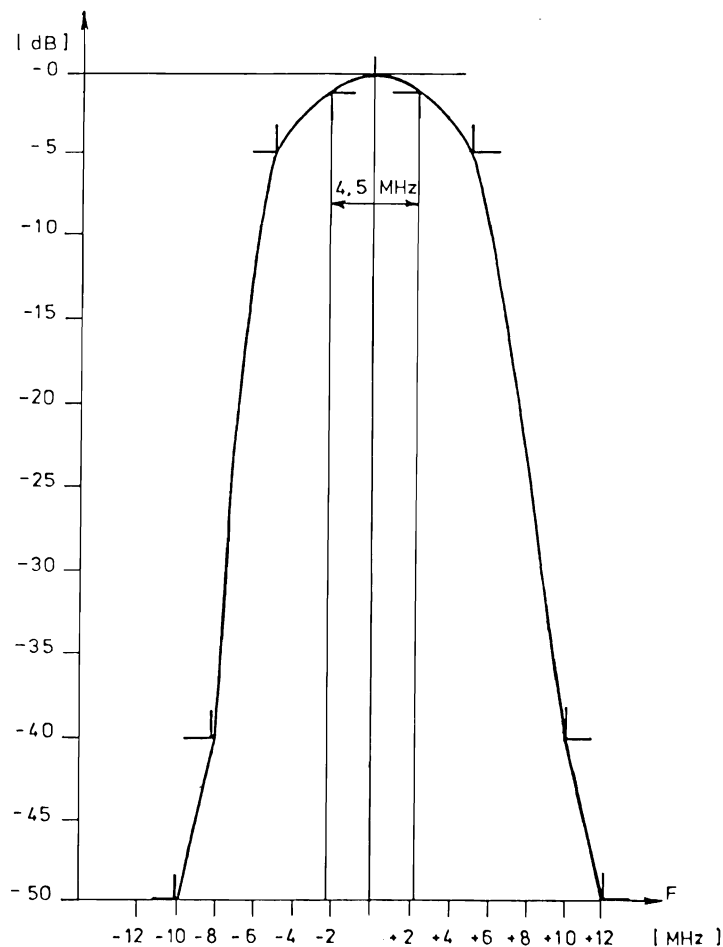
The supervisory filters will normally be factory adjusted in a test jig and need no further tuning. The way of tuning the filters when mounted in the radio is as follows:

- a) Connect an RF-signal generator to the antenna input and turn to a good S/N-ratio.
- b) Modulated with 3855 Hz to + 500 Hz deviation. R5 can be adjusted to max output at TP1.
- c) Modulated with 4145 Hz to + 500 Hz deviation. R 13 can be adjusted to max output at TP2.

Supervisory modulation level

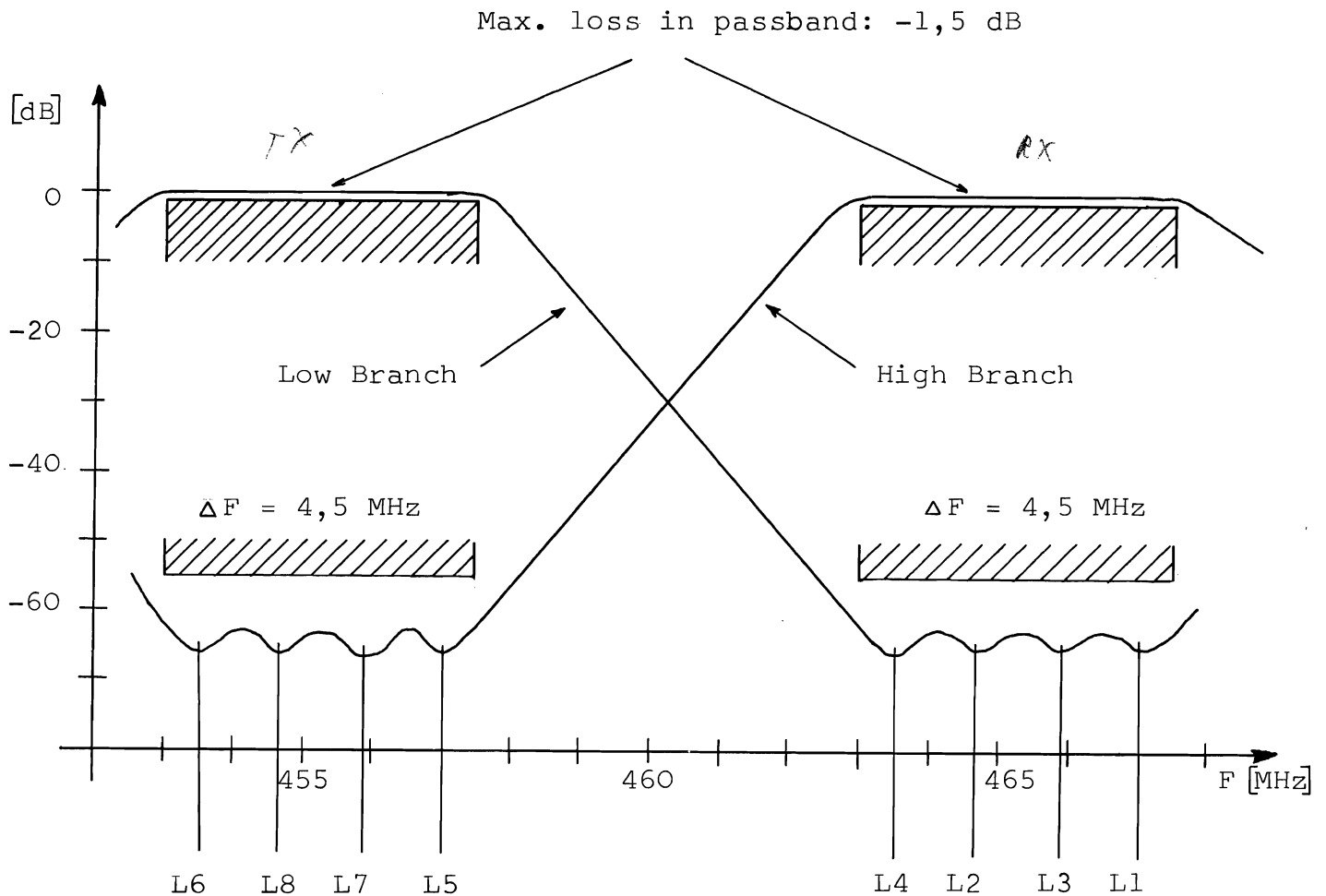
- a) The transmitter must be keyed (duplex operation). RF-signalgenerator modulated to 4000 Hz with +/- 500 Hz deviation and good S/N-ratio is connected to the Rx-input and a deviationmeter to the Tx-output. (Connection can be made directly to modules or to the antenna socket via some attenuation or a circulator).
- b) Supervisory path must be open, pin 12 high.
- c) R105 is now tuned to ± 550 Hz deviation.

Fig 1 - RF band pass filters:



Adjustment of Duplexfilter N 19 for NMT

The filter must be carefully adjusted, by means of a polyscope, to fullfill the specifications given by the figure below:



Adjustment frequencies for the NMT band:

L 1 : 468,5 MHz
L 2 : 464,4 "
L 3 : 467,0 "
L 4 : 463,2 "

L 5 : 457,5 MHz
L 6 : 452,8 "
L 7 : 457,0 "
L 8 : 454,5 "

Adjustment procedure

1. All 3 filter terminals must be terminated with 50 Ω .
2. C5, C7 and C8 are set to min value.
3. All coils are set to a frequency lying to the opposite side of the stopband than the pass band (L1 to L4 to a high frequency and L5 to L8 to a low frequency).
4. The coils of the high branch are now adjusted to the correct notch frequency starting with the notch lying closest to the pass band (L5, L7, L8 and L6). (The filter don't need to overcome 55 dB yet).
5. C2, C3 and C4 are set to min value.
6. The coils of the low branch are now adjusted to the correct notch frequencies starting with the notch frequency lying closest to the pass band (L4, L2 and L1).
7. The capacitors C2 to C4 are adjusted to min. loss and max. flatness in the low branch.
8. The capacitors C5 to C8 are adjusted to min. loss and max. flatness in the high branch. When adjusting C5 to C8, the following sequence is recommended:
 - a. C7 and C8 are adjusted to wide pass band with low insertion loss.
 - b. C5 is adjusted to min. loss.
 - c. Fine tuning of all capacitors.
9. Check the filters overall performance and fine adjust, if necessary.

Telephone number coding AP3000 NMT.

The coding is done by cutting the correct diodes on printboard N15.

The telephone number consists of 7 digits $ZX_1....X_6$ where Z is the country code and $X_1....X_6$ is the very number.

Every digit (0-9) is coded in hexadecimal:

0 = 1010

1 = 0001

2 = 0010

3 = 0011

Denmark = 0101

Sweden = 0110

and Z:

4 = 0100

Norway = 0111

5 = 0101

Finland = 1000

6 = 0110

7 = 0111

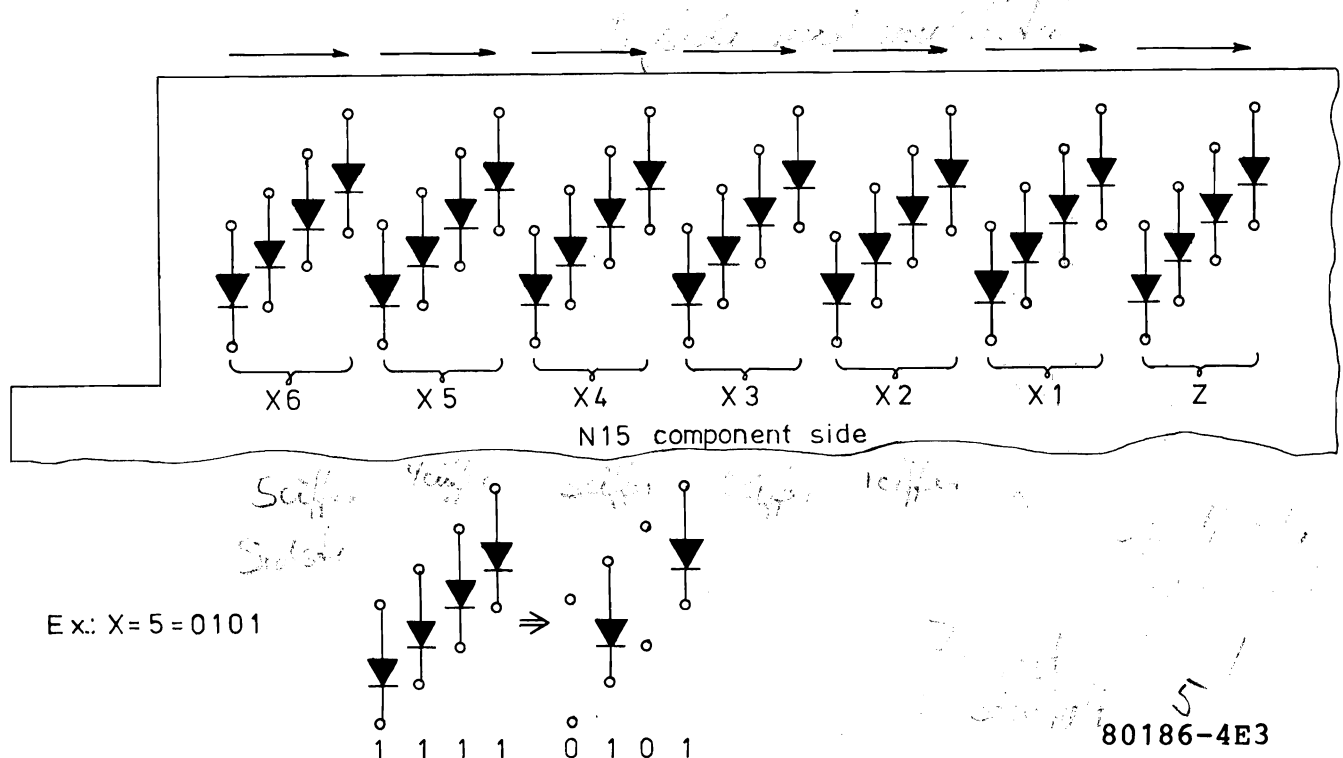
8 = 1000

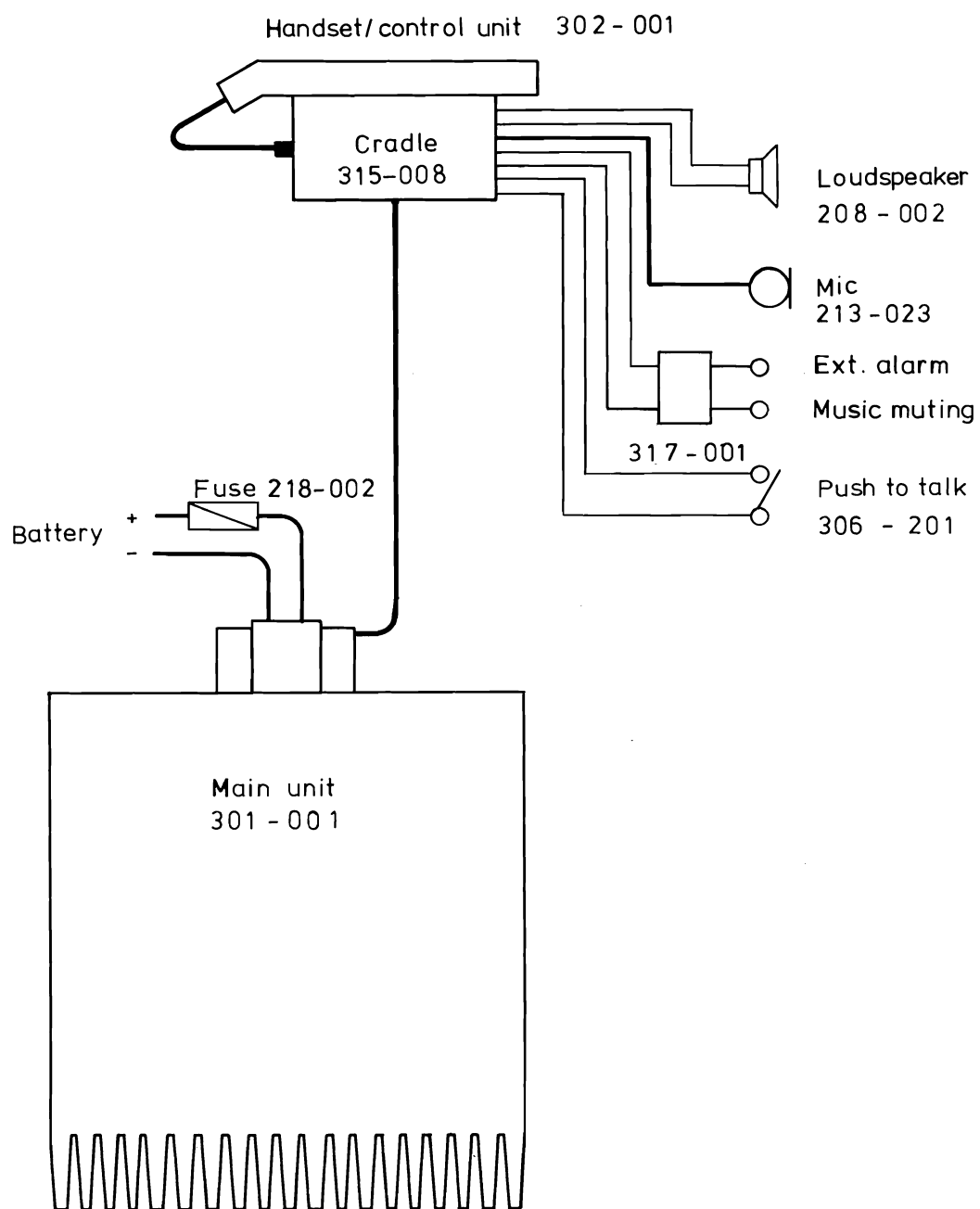
9 = 1001

Printboard N15 is normally delivered with diodes mounted in all positions which means that every digit (0-9) = 1111.

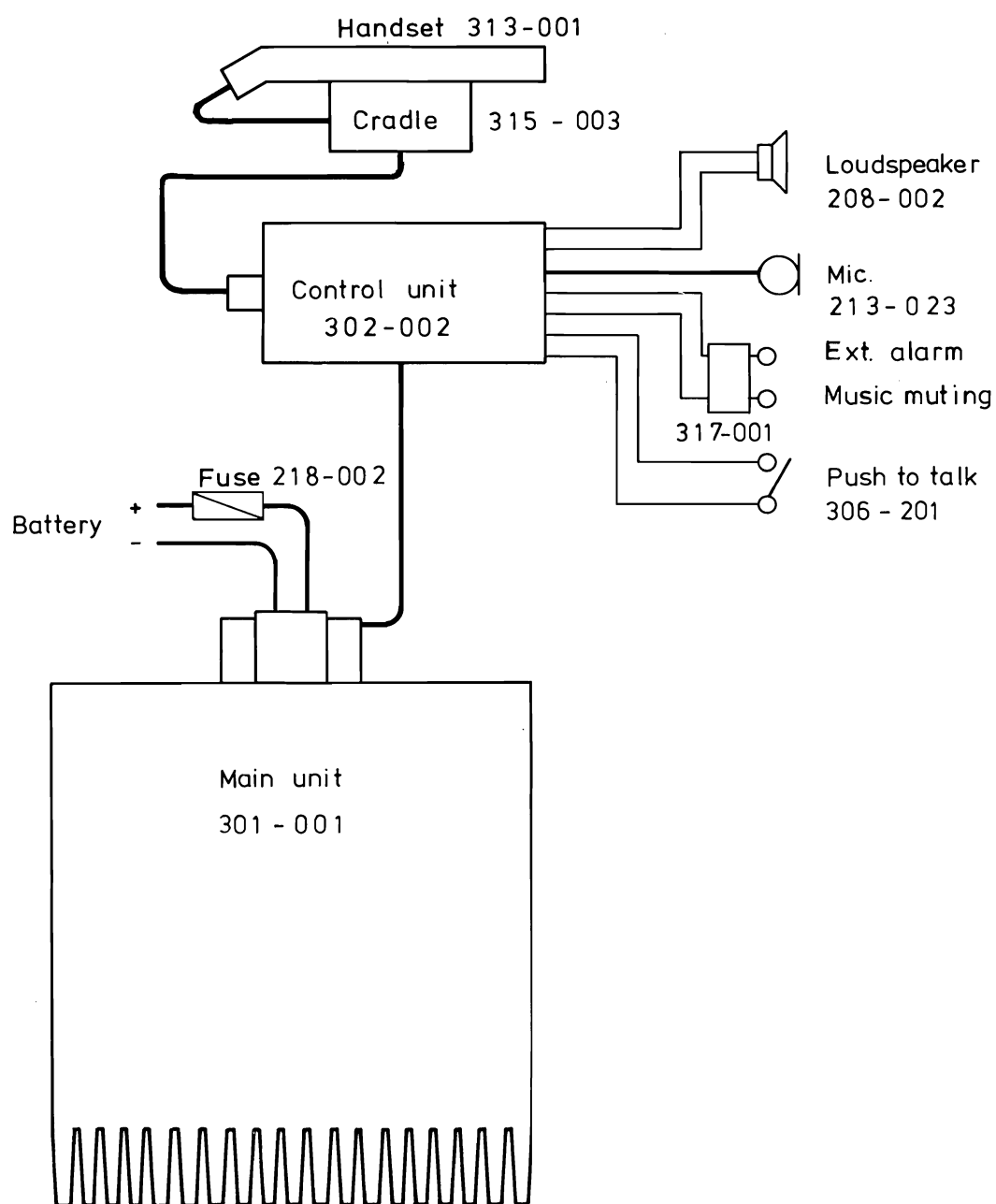
Cutting one diode replaces a 1 with a 0.

The diodes are mounted as shown below:

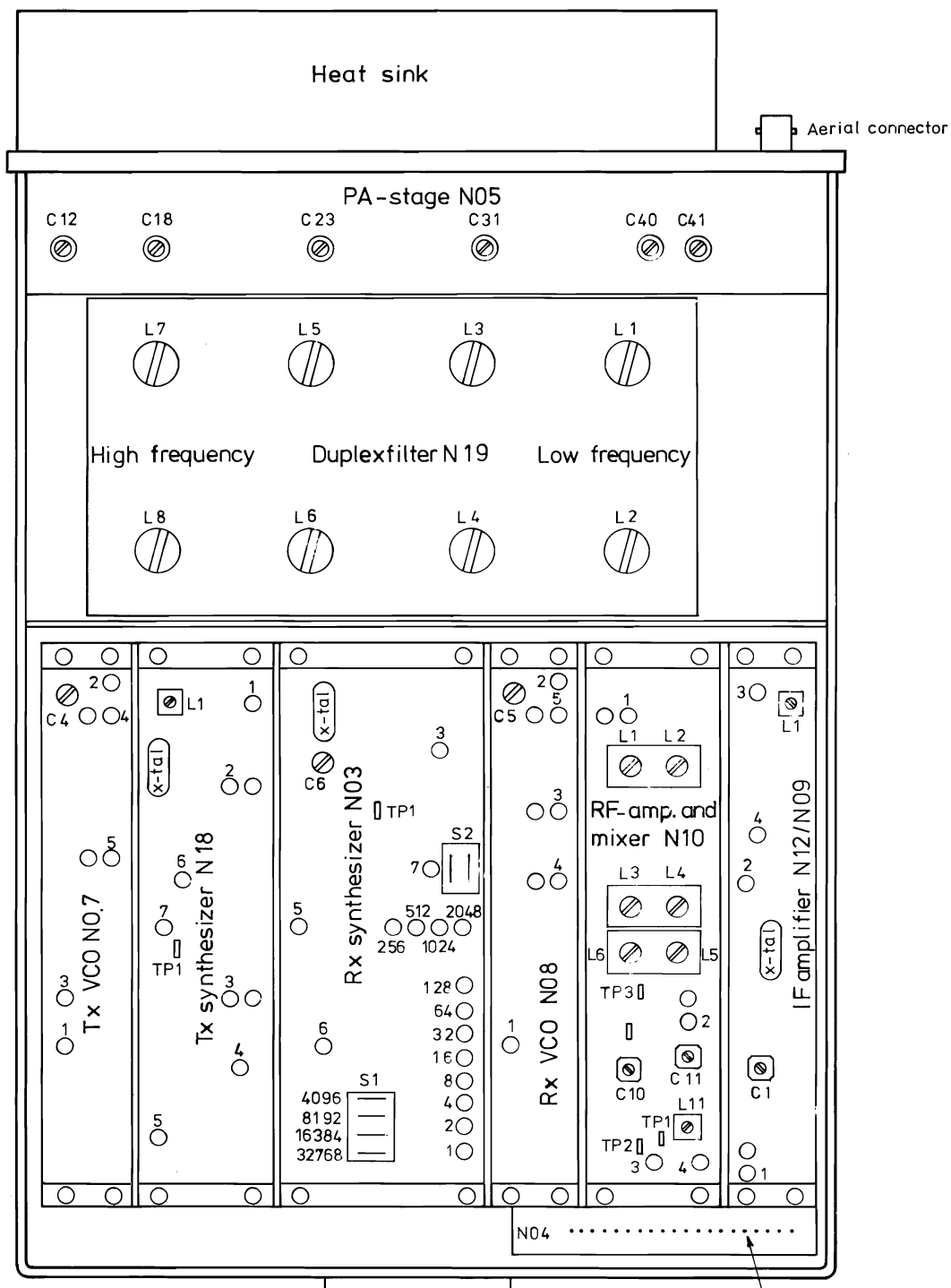




Rettet:	AP 3000 NMT 314-001 with active handset	Tegn.: BC	Kontr.: BJ
82-06-07 BJ		20-10-80	20-10-80
		Stykl. nr.:	
		Tegn. nr.:	
		80128 - 4E3	
		AP-RADIOTELEFON A/s	



Rettet:	AP 3000 NMT 314-002	Tegn.: BČ	Kontr.: BJ
82-06-07 BJ		27-8-80	20-10-80
		Stykl. nr.:	
	AP-RADIOTELEFON A/s	Tegn. nr.:	
			80109 - 4E3



Size 1:1

Rettet:
30 - 3 - 81 BJ
27 - 4 - 81 BJ
13 - 1 - 82 LBU

Interior view of AP 3000 NMT
RF-side

AP - RADIOTELEFON

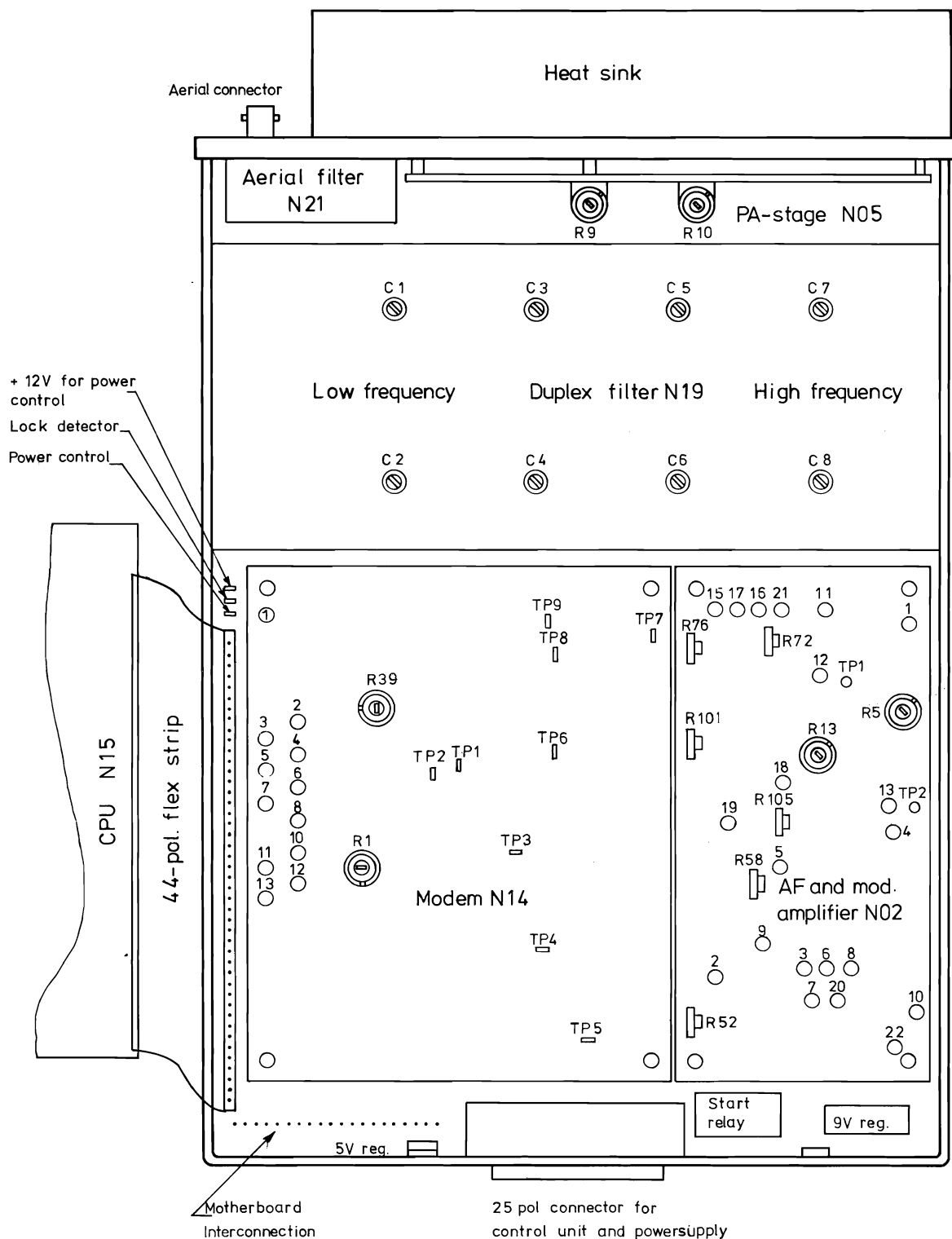
Tegn.: BC
2-12-80

Kontr.: BJ
2-12-80

Stykl. nr.:

Tegn. nr.:

80124 - 3E3



Size 1:1

Rettet: 11-2-81BJ
24-4-81 BJ
19-10-81 BJ
13-1-82 LBu

Interior view of AP 3000 NMT

System side

AP-RADIOTELEFON

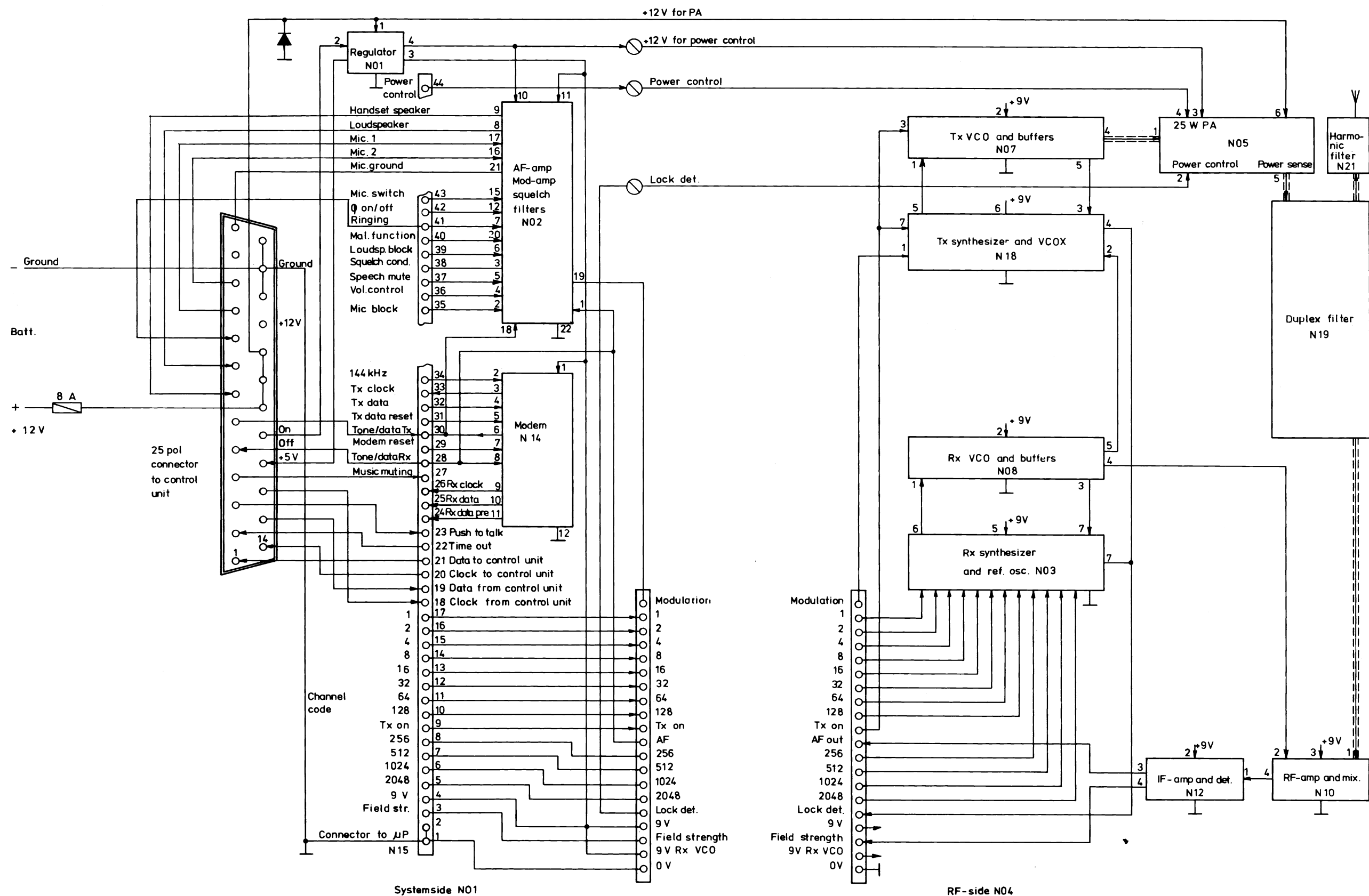
Tegn.: BC
2-12-80

Kontr.: BJ
2-12-80

Stykl. nr.:

Tegn. nr.:

80125 - 3E3



Ändr. nr.:	Revisi:	Tegn. nr.: BC	
	16-2-81 BC/BJ	Kontroll: 26-8-80	
	17-2-81 BC/LT		
	23-4-81 BJ		
	26-8-81 BJ		
	19-10-81 BJ		
	13-1-82 LB		
Blochschematic N01/N04		Tegn. nr.: 80106-2E3	
AP 3000 NMT			
AP-RADIOTELEFON 4/s			

PARTS LIST

Date: 82-06-23

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Prod. mod.no: _____

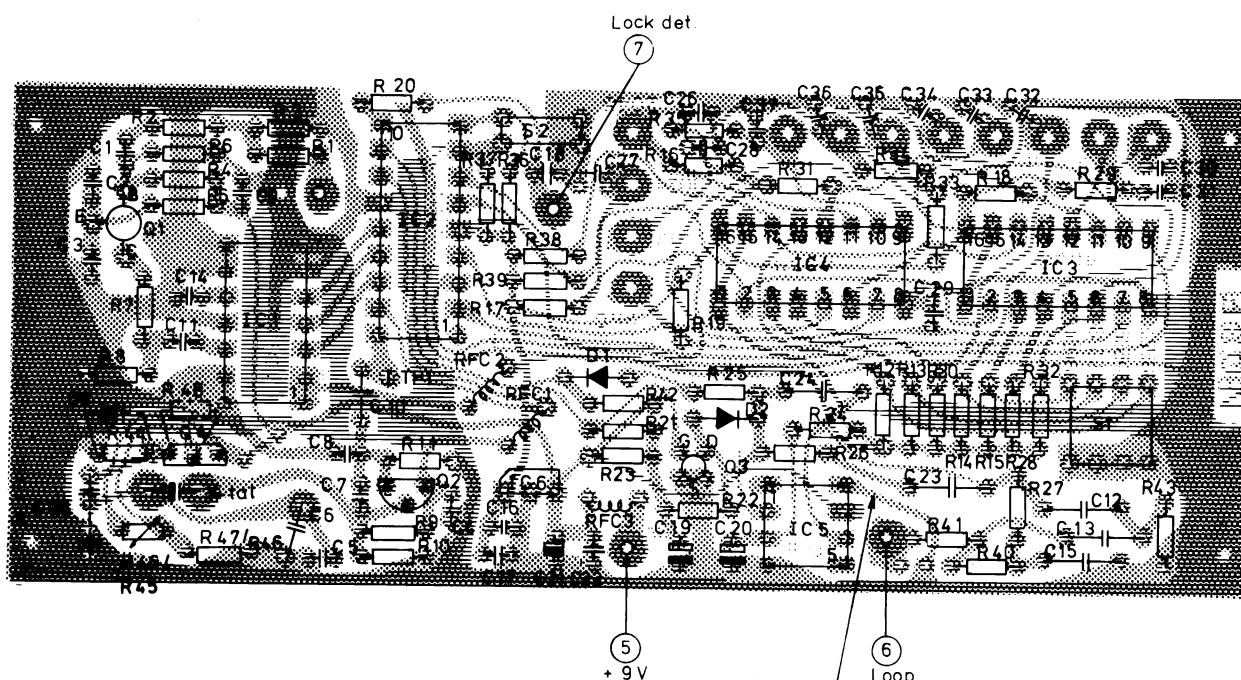
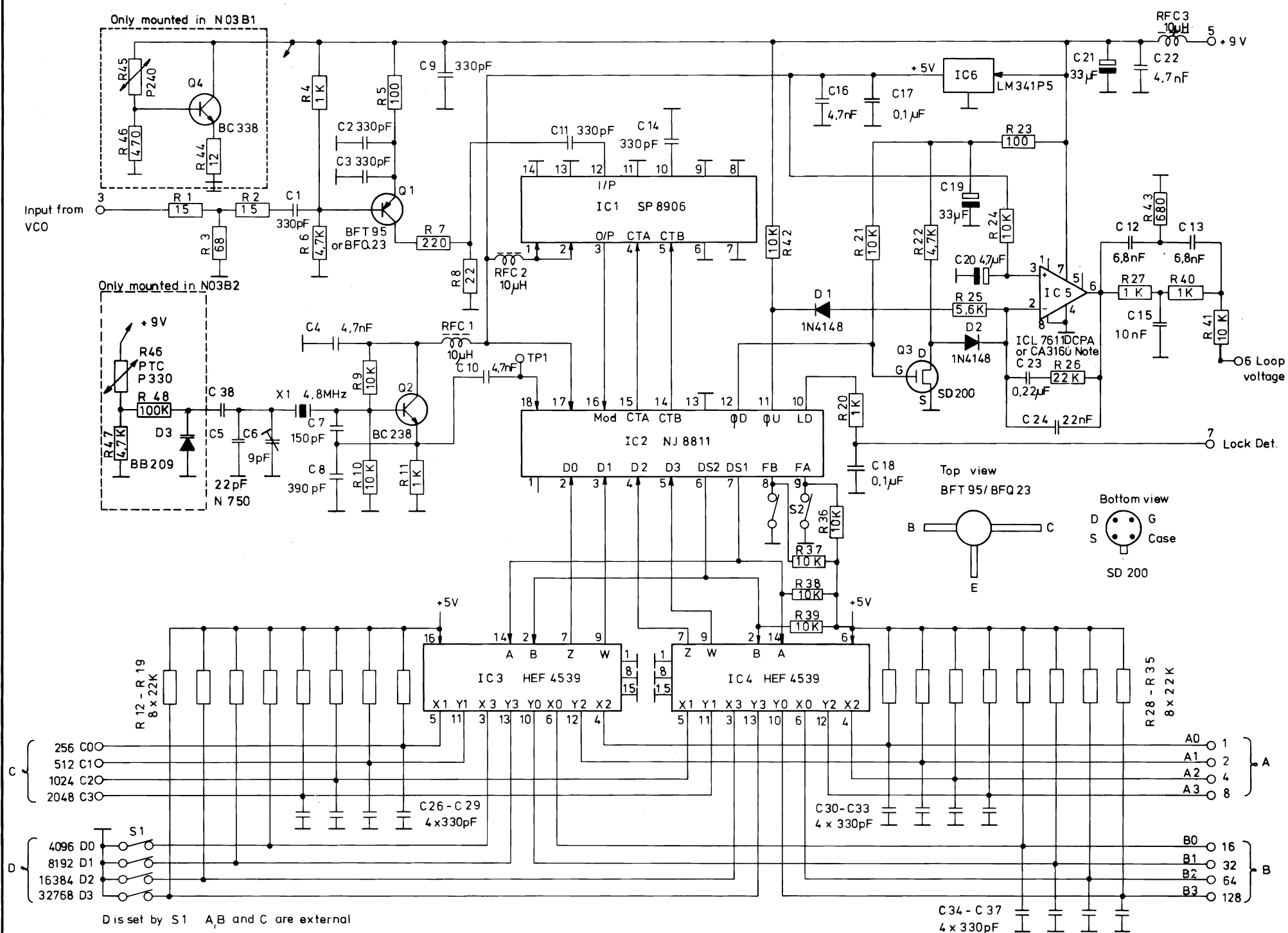
AP type: 3000

Code no	no	Component		Pos.	Rem.
04-011	1	Diode, zener	BZX79-D6V8	D1	
07-083	2	Gummifødder	GF-11		
09-223	1	IC	LM723CN	IC1	
09-224	1	"	LM7805CT	IC2	
11-406	6	Ker.kond.	330pF.	C4-5-6-7	
11-409	1	"	1nF.	C9	
11-502	1	Tantal	1µF.35V.	C8	
11-504	1	"	4,7µF.10V.	C2	
11-506	1	"	10µF.25V.	C1	
11-507	2	"	22µF.16V.	C3-10	
11-749	2	Kontaktstrip	D4336-01-22 22pol.		
13-217	1	Multifatning	2422 606 82501 25pol.		
13-261	1	Modstand	15Ω. CR16 1/8W.	R4	
13-275	1	"	220Ω. "	R1	
13-280	1	"	560Ω. "	R2	
13-289	2	"	3,3KΩ. "	R3-5	
13-296	1	"	12KΩ. "	R6	
16-501/5	1	Printplade	N01E.		
17-061	1	Relæ	HB2-DC12V.	Rel.1	
19-176	1	Transistor	2N4918	Q1	
12-007	1	Loddeflig	3,2x6,5x18mm. 6886.		
12-030	3	Loddespyd	12610		
11-744			141577-2.AMP		
11-768e11	20	Kontakt	85861-4. "		
11-796	30	Kontaktstift	229-1802-001- 99-0		
14-024	9	Eye-lett nitter	1,5x0,2x3mm. 7340.		
19-501	2	Tandskive	3,2mm.		
24-153	2	Skrue	M3x8mm.CHJ.		
24-305	2	Møtrik	M3x5x2mm.		

Unit name: System motherboard.For NMT.

Unit: Print.N01E1.

Diagram: 79133-4E3



Channel spacing ΔF set by S2 in kHz

FB/FA	0	1
0	20	10
1	25	12,5

Channel code set by S1 and control circuit (CPU)

$$N = \frac{F_{VCO}}{\Delta F} - 3840$$

	C 38	X 1
N03C1	8,2 pF	4,8 MHz
	N 750	AP 38
N03C2	22 pF	4,8 MHz
	N 150	AP 39

Ændr. nr.:	Rettet:	Rx synthesizer AP3633	Tegn.: BC	Kontr.: BJ
	82-03-10 BJ/AS	N03E 1,2	7-5-80	7-5-80
	82-04-23 BJ/BC			
	82-06-07 BJ			
		PHILIPS	Tegn. nr.:	81183-2E3

PARTS LIST

Prod. mod. no: _____

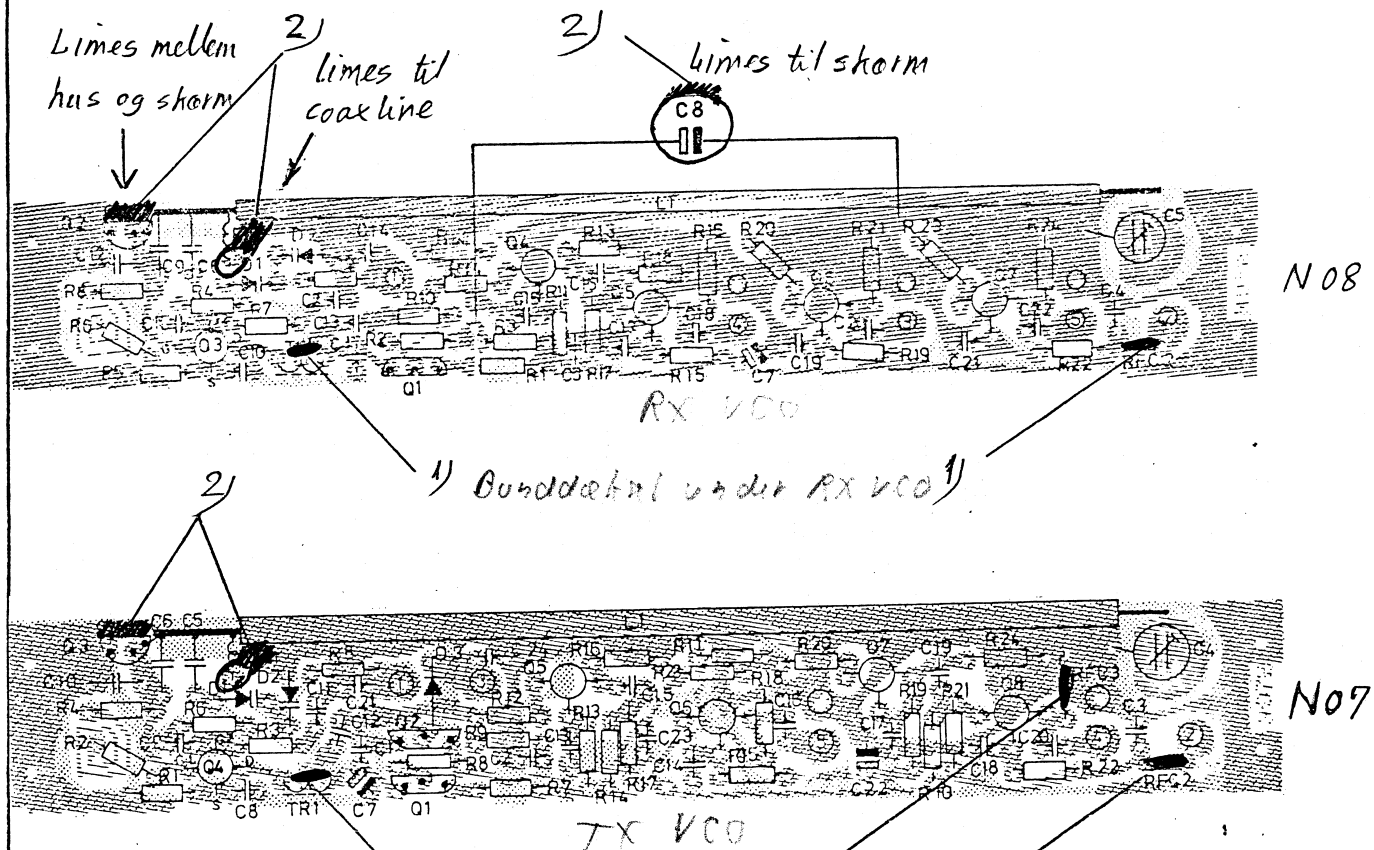
AP type: 3000

Code no.	no.	Component		Pos.	Rem.
04-062	2	Diode	1N4148	D1-2	
04-115	3	Drosselspole	10 μ H.	RFC1-2-3	
05-039	1	Elektrolyt	4,7 μ F. 35V.	C20	
05-041	2	"	33 μ F. 16V.	C19-21	
09-134	1	Isolation for krystalovn.	81090-4M3		
09-219	1	IC	SP8906	IC1	
09-220	1	"	NJ8811	IC2	
09-221	2	"	HEF4539BP	IC3-4	
09-244	1	"	LM341-P5	IC6	
09-247	1	"	ICL7611DCPA	IC5	
11-404	1	Ker.kond.	150pF.	C7	
11-406	6	"	330pF.	C1-2-3-9-11-14	
11-415	1	"	4,7nF. 2modul.	C10	
11-427	1	"	390pF. N1500	C8	
11-469	1	"	8,2pF. N750	C38	
11-488	2	Kondensator, MKT	6,8nF.	C12-13	
11-489	1	" , "	22nF.	C24	
11-495	1	" , "	10nF.	C15	
11-497	1	" , "	0,22 μ F.	C23	
11-528	2	Ker.kond.	0,1 μ F. 50V.	C17-18	
11-532	18	"	330pF.	C26-27-28-29-	
"		"	"	30-31-32-33-34- -35-36-37	
11-536	3	"	4,7nF.	C4-16-22	
11-443	1	"	22pF. N750.	C5	
11-795	17	Kontaktbøsning	006-4819-000- 99-0		
11-805	1	Krystal	4,8Mc. AP38.	Xtal.1	
11-825	2	Krystalfatning	2-332070-3. AMP.		
13-261	2	Modstand	15 Ω . CR16 1/8W.	R1-2	
13-263	1	"	22 Ω . "	R8	
13-269	1	"	68 Ω . "	R3	
13-271	2	"	100 Ω . "	R5-23	

Unit name: Rx-synthesizer.NMT.

Unit: Print. NO3E1.

Diagram: 81183-2E3



For at sikre, at lavfrekvens-oscillation ikke forekommer, selvom højttaler er på max volumen, skal følgende modifikation være indført, når NMT monteres i baretaske:

På printkort N07, Tx VCO, skal oscillator-transistor Q3 limes til skærmvæggen. Diode D1 limes til coaxline, og spolerne TR1, RFC2 og 3 limes til printkortet.

På printkort N08, Rx VCO, skal oscillator-transistor Q2 og kondensator C8 limes til skærmvæggen. Diode D1 limes til coaxline, og spolerne TR1 og RFC2 limes til printkortet.

Skærmvæg og bundskærm skal være sikret god kontakt.

På printkort N03, Rx synthesizer, skal filterdrossel RFC3 være limet til printkortet.

1) Limtype : 1322 506 69701 lager nr 12-c52

2) Limtype : pistolvoks 3779TE lager nr 21-032 -

Vedrører:

Limning af komponenter på N07, N08, N30
for AP 3533/3633

DATO:
82-10-11

Produktionsstart nr.:

Produktionsændr. nr.:

Udgivet af sign.:

B. Juus

NR.

PF 3029

Ejendoms nr. af 82-09-13 ReHet 2/11-82 Limtype 2

PARTS LIST

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Date: 82-04-23

Page: 2.2

Prod. mod. no:

AP type: 3000

Code no.	no	Component	CR16 1/8W.	Pos.	Rem.
13-275	1	Modstand	220Ω.	R7	
13-279	1	"	470Ω.	R46	
13-281	1	"	680Ω.	R43	
13-283	5	"	1KΩ.	R4-11-20-27-40	
13-291	2	"	4,7KΩ.	R6-22	
13-292	1	"	5,6KΩ.	R25	
13-295	10	"	10KΩ.	R9-10-21-24-36 -37-38-39-41-	
"		"	"	42	
13-299	17	"	22KΩ.	R12-13-14-15- 16-17-18-19-26	
"		"	"	-28-29-30-31- 32-33-34-35	
13-351	1	"	12Ω.	CR25 1/4W.	R44
13-682	1	" ,PTC	P240	R45	
15-091	6	Dual in line omsk.	0-91	S1-2	Lgd. 6 24stk.
16-503/5	1	Printplade	NO3E.		
19-085	1	Transistor	BC338B.E-line	Q4	
19-086	1	"	SD200	Q3	
19-093	1	"	BC238B	Q2	
19-110	1	"	BFT95	Q1	
19-328	1	Trimmer	Tecelec 9pF.AT5273.	C6	
22-656	1	Skærmåse	80008-4M3		
12-031	1	Loddespyd	4022 007 45420		
18-092		Siliconecompound	RS 2340		

Unit name: Rx-synthesizer.NMT.

Unit: Print.NO3E1.

Diagram: 81183-2E3

PARTS LIST

Date: **82-05-05**

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Prod. mod.no: _____

AP type: **3000**

Code no	no	Component	Pos	Rem.
04-017	2	Diode BB209	D1-2	
04-108	1	Drosselspole 2,2μH.	RFC1	
05-030	1	Elektrolyt 1000μF.16V.	C8	
05-038	1	" 1μF.50V.	C7	
11-406	15	Ker.kond. 330pF.	C1-2-3-4-10-11 13-15-16-17-	
"		" "	18-19-20-21-22	
11-416	1	" 4,7nF.	C14	
11-453	1	" 2,2pF.NPO.400V	C9	
11-468	1	" 500V. 2,7pF.N750.	C6	
11-469	1	" 400V. 8,2pF.N750.	C12	
11-795	8	Kontaktbøsning 005-4800-000-99-0		
13-259	1	Modstand 10Ω. CR16 1/8W.	R1	
13-263	1	" 22Ω. "	R15	
13-267	4	" 47Ω. "	R2-11-19-22	
13-271	3	" 100Ω. "	R5-8-14	
13-273	2	" 150Ω. "	R20-23	
13-275	4	" 220Ω. "	R13-16-21-24	
13-277	1	" 330Ω. "	R3	
13-283	2	" 1KΩ. "	R10-17	
13-287	2	" 2,2KΩ. "	R4-9	
13-291	2	" 4,7KΩ. "	R12-18	
13-302	1	" 47KΩ. "	R6	
13-313	1	" 27KΩ. "	R7	
16-508/3	1	Printplade NO8C.		
19-081	1	Transistor BF960	Q3	
19-085	1	" BC338B.E-line	Q1	
19-090 19-136 ^{el} .	1	" MPF820	Q2	
19-110	4	" BFT95	Q4-5-6-7	
19-328	1	Trimmer Tecelec. 9pF.AT5273	C5	

Unit name: **UHF.Rx-VCO.NMT.**

Unit: **Print.NO8C1.**

Diagram: **81184-3E3**

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Date: 82-05-05

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Prod. mod. no:

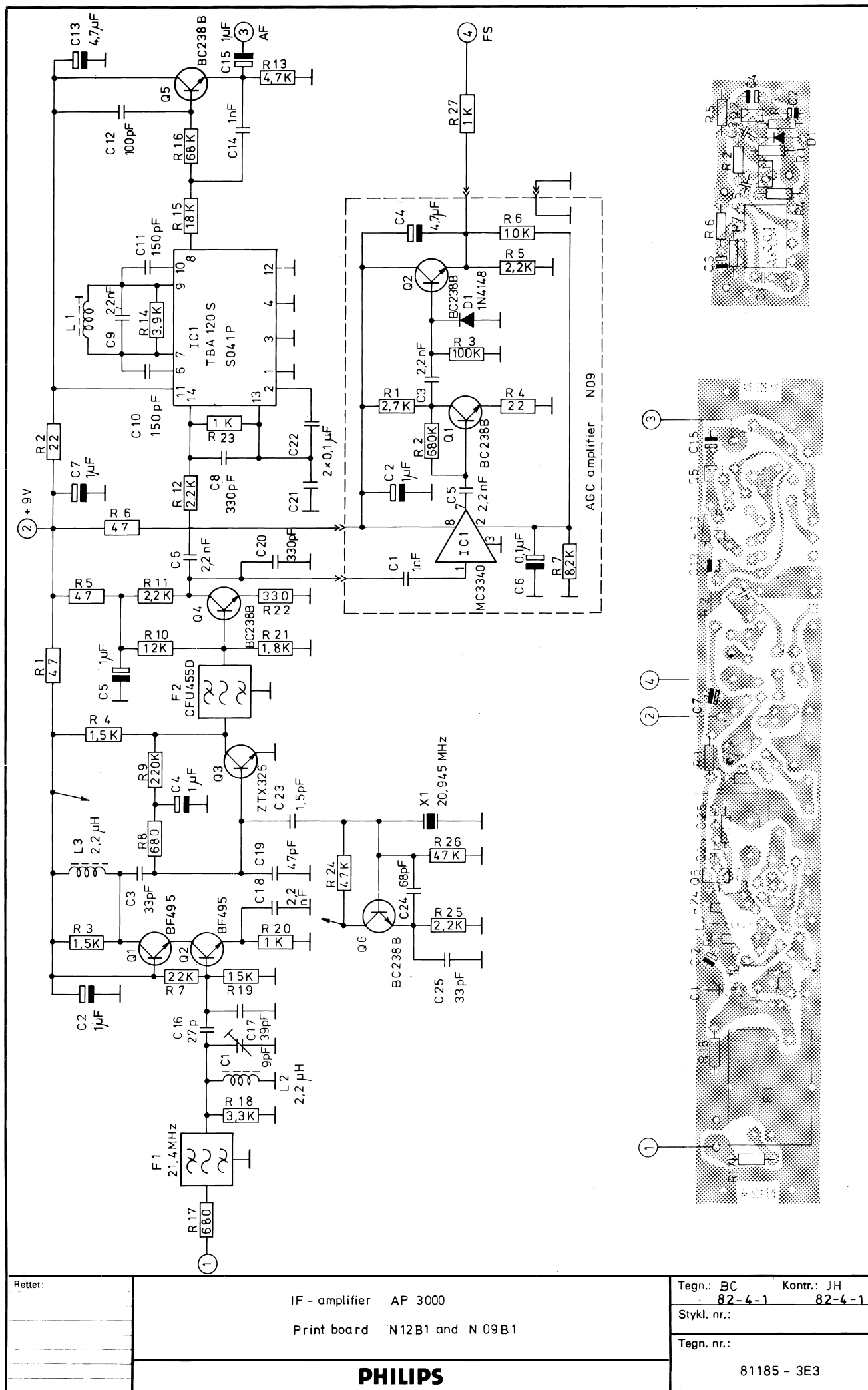
AP type: 3000

[illegible]

Unit name: UHF.Rx-VCO.NMT.

Unit: Print.NO8C1.

Diagram: 81184-3E3



PARTS LIST

Date: 82-05-06

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Prod. mod. no:

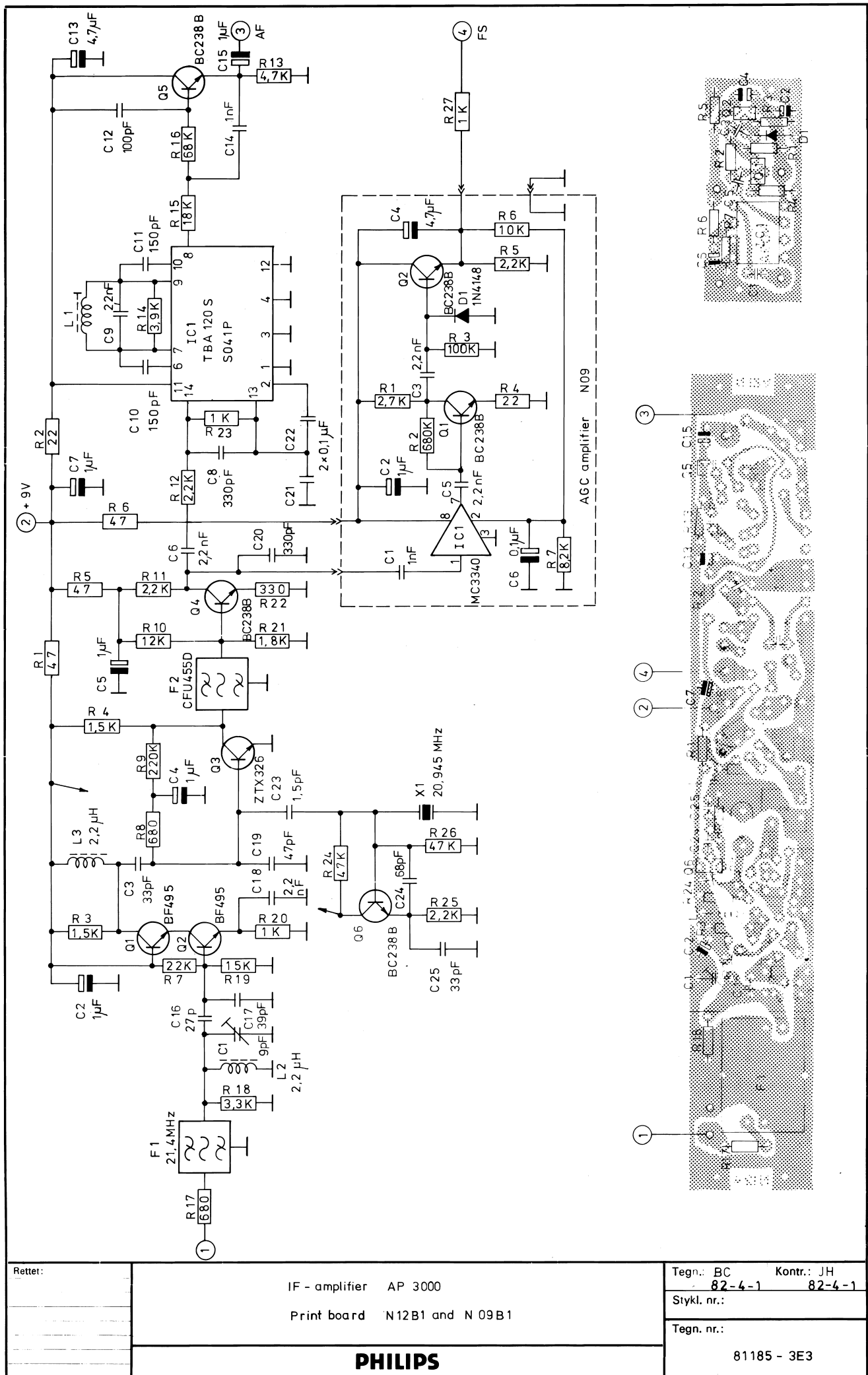
AP type: 3000

[illegible]

Unit name: IF amplifier.

Unit: Printb.N09B1.

Diagram: 81185-3E3



AP type: 3000

[illegible]

Diagram: 81185-3E3

PARTS LIST

Date: 82-05-06

Page: 1.2

Prod. mod. no: _____

AP type: 3000

Code no.	no	Component		Pos.	Rem.
04-108	2	Choke	2, 2 μ H.	L2-3	
09-248	1	IC	S041P	IC1	
11-362	1	Capacitor, ceramic	1, 5pF.	C23	
11-388	1	" , "	27pF.	C16	
11-390	2	" , "	33pF.	C3-25	
11-393	1	" , "	39pF.	C17	
11-394	1	" , "	47pF.	C19	
11-397	1	" , "	68pF.	C24	
11-401	1	" , "	100pF.	C12	
11-413	2	" , "	150pF. N750.	C10-11	
11-486	1	" , MKC	2, 2nF.	C9	
11-502	5	Tantal	1 μ F. 35V.	C2-4-5-7-15	
11-505	1	"	4, 7 μ F. 25V.	C13	
11-528	2	Capacitor, ceramic	0, 1 μ F. 50V.	C21-22	
11-406	2	" , "	330pF.	C8-20	
11-533	1	" , "	1nF.	C14	
11-412	2	" , "	2, 2nF.	C6-18	
11-786	4	Contact pin	12, 5mm.		
11-795	5	Connector socket	006-4800-000-99-0		
11-815	1	Crystal	20.945Mc. AP22.	X1	
11-825	2	Crystal socket	2-332070-3.		
11-854	1	Crystal filter	25Kc.	F1	
11-870	1	Ceramic filter	CFU455D. Murata	F2	
13-263	1	Resistor	22 Ω . 1/8W. CR16	R2	
13-267	3	"	47 Ω . "	R1-5-6	
13-277	1	"	330 Ω . "	R22	
13-281	2	"	680 Ω . "	R8-17	
13-283	3	"	1K Ω . "	R20-23-27	
13-285	2	"	1, 5K Ω . "	R3-4	

Unit name: IF amplifier.

Unit: Printb. N12B1.

Diagram: 81185-3E3

PARTS LIST

Date: 82-05-06

Page: 2.2

Prod. mod. no: _____

AP type: 3000

Code no.	no.	Component		Pos.	Rem.
13-286	1	Resistor	1,8K Ω . CR16 1/8W.	R21	
13-287	3	"	2,2K Ω . "	R11-12-25	
13-289	1	"	3,3K Ω . "	R18	
13-290	1	"	3,9K Ω . "	R14	
13-291	1	"	4,7K Ω . "	R13	
13-296	1	"	12K Ω . "	R10	
13-297	1	"	15K Ω . "	R19	
13-298	1	"	18K Ω . "	R15	
13-299	1	"	22K Ω . "	R7	
13-302	2	"	47K Ω . "	R24-26	
13-304	1	"	68K Ω . "	R16	
13-309	1	"	220K Ω . "	R9	
16-512/2	1	Printboard	N12B.		
19-115	1	Transistor	ZTX326	Q3	
19-117	3	"	BC238B.E-line	Q4-5-6	
19-132	2	"	BF495	Q1-2	
19-335	1	Trimmer	105 1101 008 8pF.DAU.	C1	
25-001	1	Coil, Neosid	75279-4E2	L1	
22-143	2	Dividingplate	75089-4M2		
22-398	1	Shielding	77159-4M2		
NO9B1	1	Printboard	Comple		

Unit name: IF amplifier.

Unit Printb. N12B1.

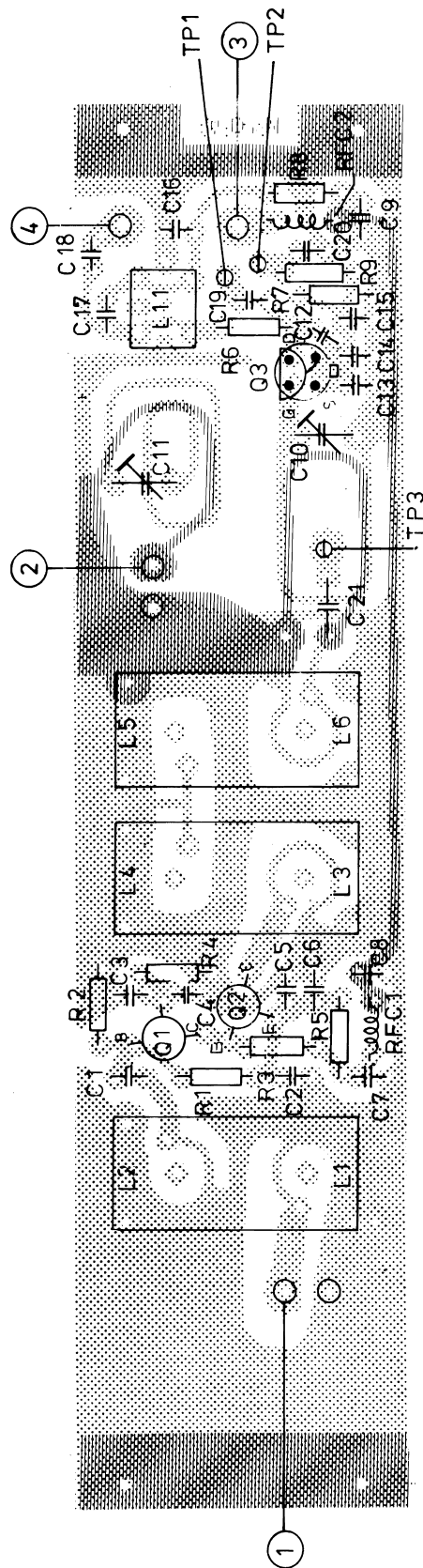
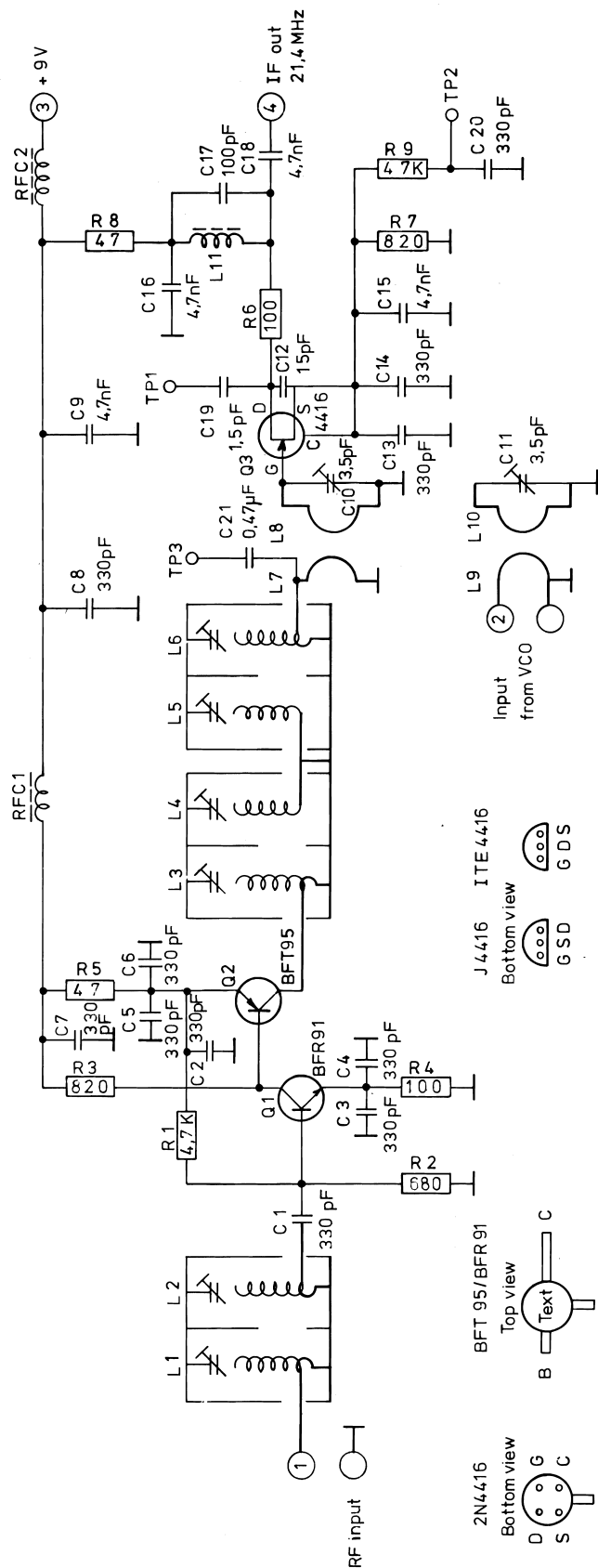
Diagram: 81185-3E3

Rettet:	

RF and mixer UHF N10 B 1, 2, 3

PHILIPS

Tegn.:	Kontr.:
82-4 -1 BC	
Stykl. nr.:	
Tegn. nr.:	
81186 - 3E3	



PARTS LIST

Date: 82-01-12

Page: 1.1

Prod. mod. no:

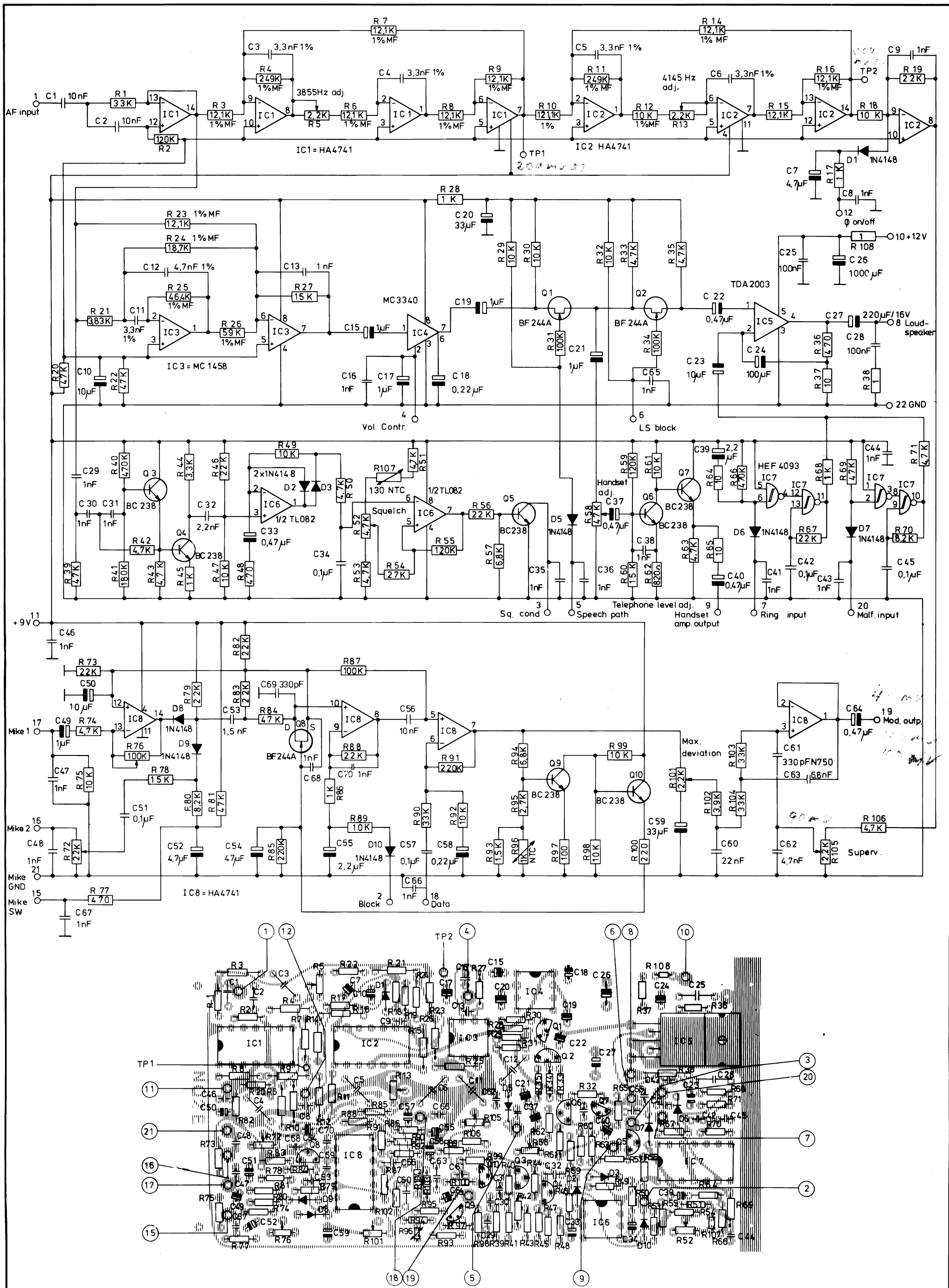
AP type: 3000

Code no	no	Component		Pos	Rem.
11-360	1	Capacitor, ceramic	0,47pF.	C21	
11-362	1	" , "	1,5pF.	C19	
11-381	1	" , "	15pF.	C12	
11-401	1	" , "	100pF.	C17	
11-406	11	" , "	330pF.	C1-2-3-4-5-6- 7-8-13-14-20	
11-536	4	" , "	4,7nF.	C9-15-16-18	
11-795	6	Connector socket	006-4800-000- 99-0		
13-267	2	Resistor	47Ω. CR16 1/8W.	R5-8	
13-271	2	"	100Ω. "	R4-6	
13-281	1	"	680Ω. "	R2	
13-282	2	"	820Ω. "	R3-7	
13-291	1	"	4,7KΩ. "	R1	
13-302	1	"	47KΩ. "	R9	
16-510/2	1	Printboard	N10B.		
19-089	1	Transistor	2N4416	Q3	
19-116	1	"	BFR91	Q1	
19-138	1	"	Telefunken BFT95	Q2	
19-346	2	Trimmer	3,5pF.	C10-11	
25-009	2	Choke	75290-4E2	RFC1-2	
25-012	1	Coil, Neosid	75293-4E2	L11	
25-083	6	" , helix	80089-4E2	L1-2-3-4-5-6	
22-655	1	Shielding	80007-4N3		
22-675	1	Helix, shield	80046-4N2	L1-2	
22-676	2	" , "	80047-4N2	L3-4-5-6	
12-031	4	Testpin	4022 007 45420		
24-210	12	Platescrew	5/16".no.2.Tin.		

Unit name: RF and mixer. All UHF bands.

Unit: Printb. N10B1-2-3

Diagram: 81186-3E3



Ændr. nr.:	Rettet:	AF and mod. amplifier Print board N02 E1	Tegn.: BC	Kontr.: JH
				82-3-26
		PHILIPS	Tegn. nr.:	
				81187 - 2E3

PARTS LIST

Date: 82-04-14

Page: 1.4

Prod. mod.no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
04-062	9	Diode 1N4148	D1-2-3-5-6-7-8-9-10	
05-009	2	Electrolytic 2,2 μ F.25V.	C39-55	
05-017	1	" 47 μ F.25V.	C54	
05-022	1	" 100 μ F.10V.	C24	
05-024	1	" 220 μ F.16V.	C27	
05-037	5	" 0,47 μ F.50V.	C22-33-37-40-64	
05-038	5	" 1 μ F.50V.	C15-17-19-21-49	
05-039	2	" 4,7 μ F.35V.	C7-52	
05-040	3	" 10 μ F.16V.	C10-23-50	
05-041	2	" 33 μ F.16V.	C20-59	
05-042	1	" 1000 μ F.16V.	C26	
09-075	1	IC (SN72558P) MC1458CP.	IC3	
09-092	3	" A1-4741-5	IC1-2-8	
09-210	1	" TDA2003H	IC5	
09-225	1	" MC3340D	IC4	
09-242	1	" TL082CP	IC6	
09-266	1	" HEF4093B	IC7	
11-430	1	Capacitor,ceramic 330pF.N750	C61	
11-463	5	" ,styroflex 3,3nF.1%.	C3-4-5-6-11	
11-464	1	" , " 4,7nF.1%.	C12	
11-475	1	" ,polyester 1,5nF.	C53	
11-478	1	" , " 6,8nF.	C63	
11-479	1	" , " 22nF.	C60	
11-481	3	" , " 10nF.	C1-2-56	
11-490	2	" ,MKT 100nF.	C25-28	
11-513	2	Tantal 0,22 μ F.35V.	C18-58	
11-528	5	Capacitor,ceramic 0,1 μ F.	C34-42-45-51-57	
11-532	1	" , " 330pF.	C69	
11-533	21	" , " 1nF.	C8-9-13-16-29-30-31-35-36-	

Unit name: AF and modulation amplifier.

Unit: Printb.NO2E1.

Diagram: 81187-2E3

PARTS LIST

Date: 82-04-14

Page: 2.4

Prod. mod. no: _____

AP type: 3000

Code no	no	Component	Pos.	Rem.
11-533		Capacitor, ceramic 1nF.	38-41-43-44 -46-47-48-65- 66-67-68-70	
"		" , " "		
11-534	1	" , " 2, 2nF.	C32	
11-536	1	" , " 4, 7nF.	C62	
11-795		Connector socket 006-4800-000-99-0		
13-259	3	Resistor 10Ω. CR16 1/8W.	R37-64-65	
13-271	1	" 100Ω. "	R97	
13-275	1	" 220Ω. "	R100	
13-279	3	" 470Ω. "	R36-48-77	
13-282	1	" 820Ω. "	R62	
13-283	5	" 1KΩ. "	R17-28-45-68-86	
13-285	1	" 1, 5KΩ. "	R93	
13-288	1	" 2, 7KΩ. "	R95	
13-289	1	" 3, 3KΩ. "	R44	
13-290	1	" 3, 9KΩ. "	R102	
13-291	11	" 4, 7KΩ. "	R33-35-42-43-50-51-53-63-71-74-106	
"		" " "		
13-293	2	" 6, 8KΩ. "	R57-94	
13-294	2	" 8, 2KΩ. "	R70-80	
13-295	12	" 10KΩ. "	R18-29-30-32-47-49-61-75-89-92-98-99	
"		" " "		
13-297	3	" 15KΩ. "	R27-60-78	
13-299	9	" 22KΩ. "	R19-46-56-67-73-79-82-83-88	
13-300	4	" 33KΩ. "	R1-90-103-104	
13-302	6	" 47KΩ. "	R20-22-39-69-81-84	
13-306	3	" 100KΩ. "	R31-34-87	
13-307	3	" 120KΩ. "	R2-55-59	
13-309	2	" 220KΩ. "	R85-91	

Unit name: AF and modulation amplifier.

Unit: Printb.NO2E1.

Diagram: 81187-2E3

PARTS LIST

Date: 82-04-14

Page: 3.4

Prod. mod.no:

AP type: 3000

Code no.	no	Component			Pos	Rem.
13-313	1	Resistor	27K Ω .	CR16 1/8W.	R54	
13-314	1	"	180K Ω .	"	R41	
13-315	2	"	470K Ω .	"	R40-66	
13-346	1	"	1 Ω .	CR25 1/4W.	R38	
13-409	1	"	1 Ω .	CR37 1/2W.	R108	
13-664	1	" , NTC	1K Ω .		R96	
13-695	1	" , metalfilm	3,83K Ω .1%.		R21	
13-696	1	" , "	10K Ω .	"	R12	
13-697	9	" , "	12,1K Ω .	"	R3-6-7-8-9-14 -15-16-23	
13-698	1	" , "	18,7K Ω .	"	R24	
13-699	1	" , "	46,4K Ω .	"	R25	
13-700	1	" , "	59K Ω .	"	R26	
13-701	1	" , "	121K Ω .	"	R10	
13-702	2	" , "	249K Ω .	"	R4-11	
13-707	1	" , NTC	150 Ω .		R107	
16-502/5	1	Printboard	NO2E.			
19-093	7	Transistor	BC238B.		Q3-4-5-6-7-9-10	
19-106	3	"	BF244A		Q1-2-8	
19-269	1	Potentiometer	22K Ω .	T7YA	R72	
19-273	1	"	100K Ω .	"	R76	
19-275	1	"	4,7K Ω .	"	R52	
19-279	4	"	2,2K Ω .	"	R5-13-101-105	
19-282	1	"	47K Ω .	"	R58	
22-669	1	Heatsink	80028-4M2			
06-106		Teflonflex	7mm. 0831 105 02027			
19-500	1	Lockwash	2,5mm.			

Unit name: AF and modulation amplifier.

Unit: Printb.NO2E1.

Diagram: 81187-2E3

PARTS LIST

Date: 82-04-14

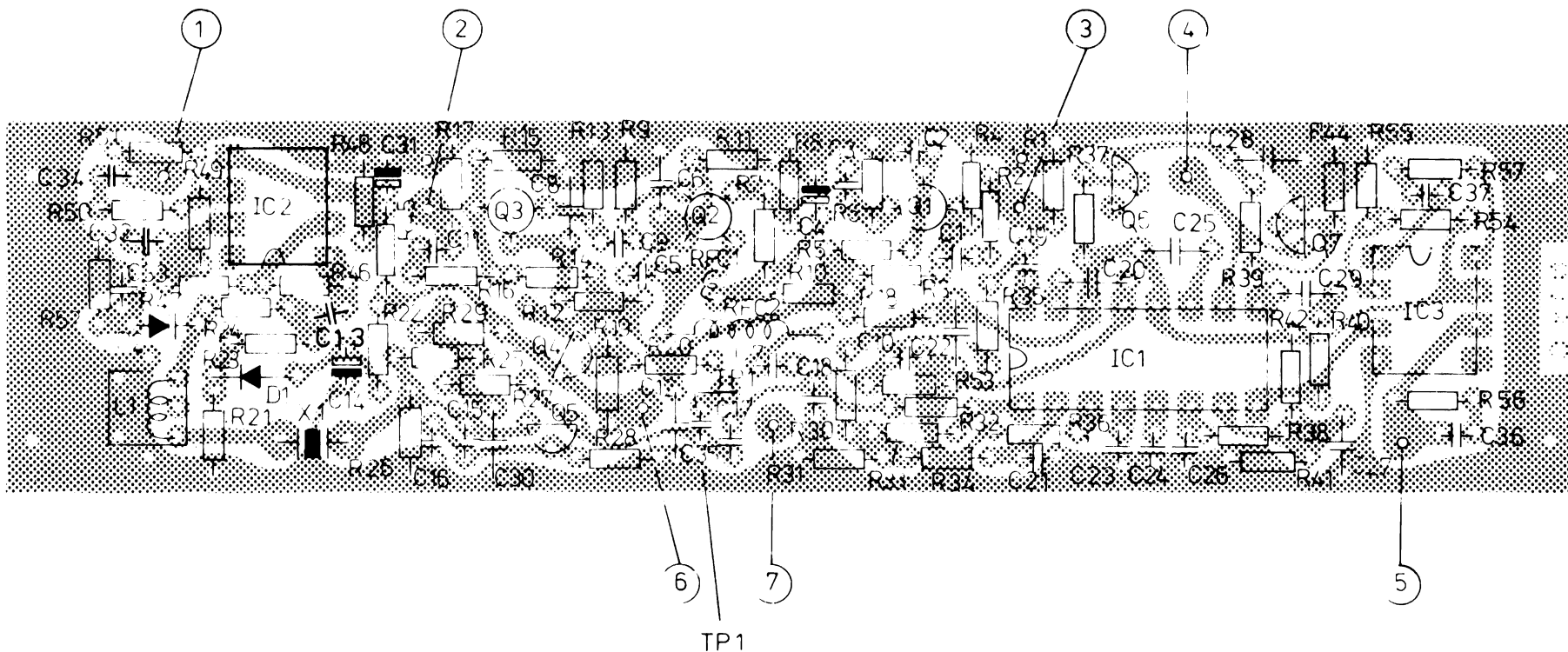
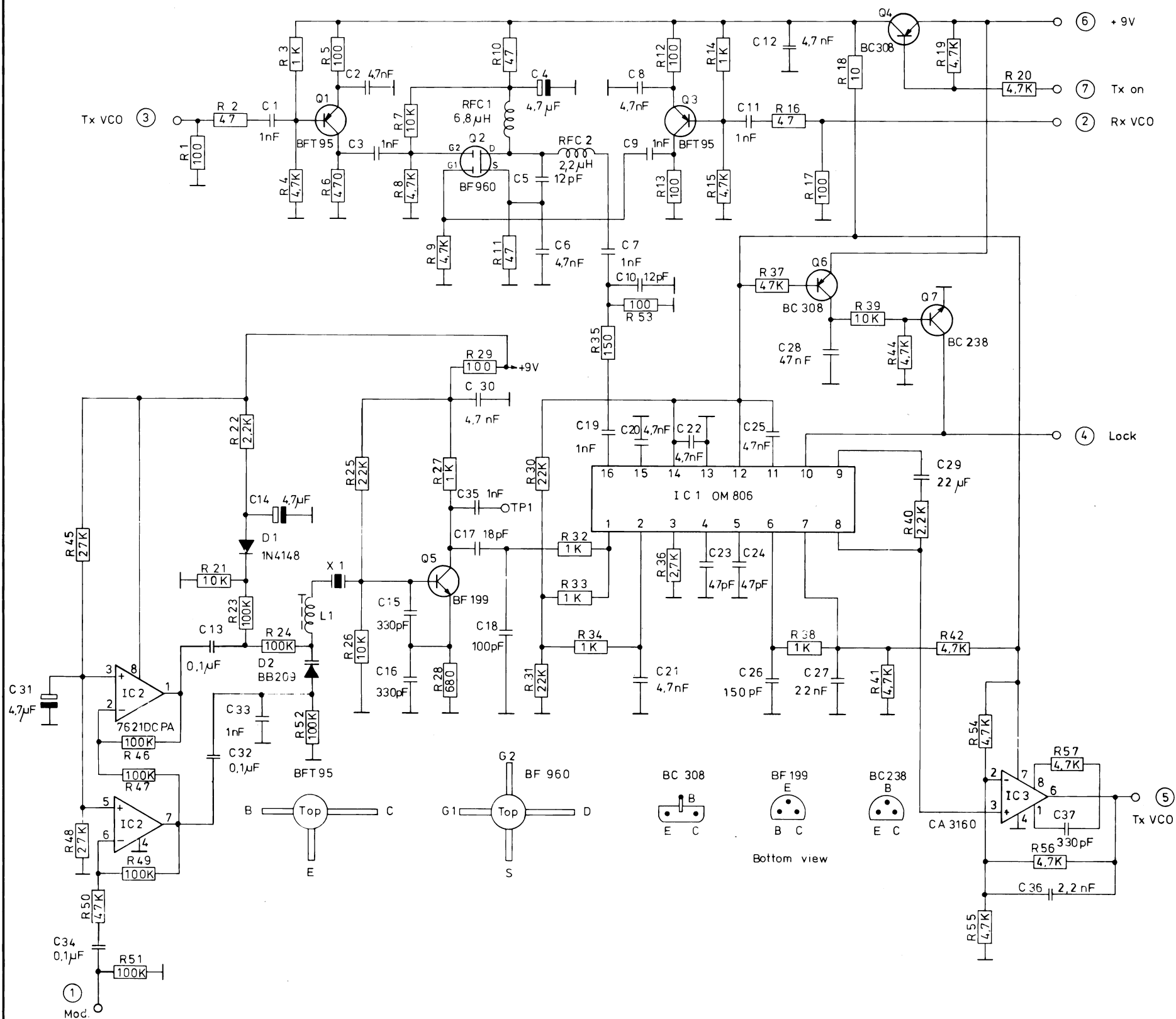
Page: 4.4

Prod. mod. no: _____

AP type: 3000

[illegible]Unit name: **AF and modulation amplifier.**Unit: **Printb.NO2E1.**

Diagram: 81187-2E3



Endr nr	Revised	Tx synthesizer AP 3000 N 18D1	Tegn Kontr
PHILIPS			Tegn nr 81188-2E3

PARTS LIST

Date: 82-01-13

Page: 1.2

Prod. mod. no: _____

AP type: 3000

Code no.	ng	Component	Pos.	Rem.
04-017	1	Diode	BB209	D2
04-062	1	"	1N4148	D1
04-111	1	Choke	2,2μH.	RFC2
04-114	1	"	74016-4.6,8μH.	RFC1
09-215	1	IC	01806	IC1
09-251	1	"	7621DCPA	IC2
09-271	1	"	CA3160	IC3
11-379	2	Capacitor, ceramic	12pF.	C5-10
11-394	2	" , "	47pF.	C23-24
11-401	1	" , "	100pF.	C18
11-404	1	" , "	150pF.	C26
11-406	1	" , "	330pF.	C37
11-409	8	" , "	1nF.	C1-5-7-9-11-12-33-35
11-412	1	" , "	2,2nF.	C36
11-415	6	" , "	4,7nF. 2modul	C6-8-12-20-22-30
11-416	2	" , "	4,7nF.	C2-21
11-430	2	" , "	330pF. N750.	C15-16
11-434	1	" , "	10pF.	C17
11-479	2	" , Polyester	22nF.	C27-29
11-482	2	" , "	47nF.	C25-28
11-505	3	Tantal	4,7μF. 25V.	C4-14-31
11-528	3	Capacitor, ceramic	0,1μF. 50V.	C13-32-34
11-795	9	Connector socket	009-4800-000-00-0	
11-821	1	Crystal	7.85Mc. AP37	X1
11-825	2	Crystal connector	2-332070-3	
13-259	1	Resistor	10Ω. CR16 1/8W.	R10
13-267	4	"	47Ω. "	R2-10-11-16
13-271	7	"	100Ω. "	R1-5-12-13-17-29-53
13-273	1	"	150Ω. "	R35

Unit name: Tx-synthesizer.

Unit: Printb.N12D1.

Diagram: 81188-2E3

PARTS LIST

Date: **82-01-13**

Page: **2.2**

Prod. mod. no:

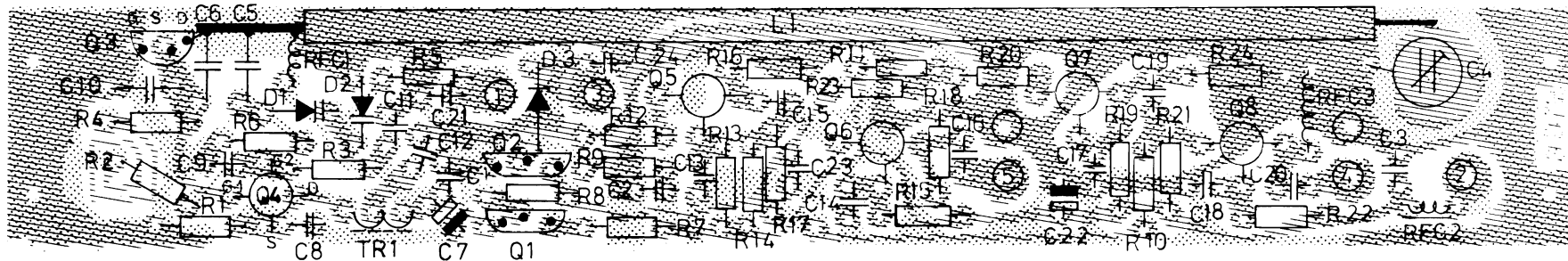
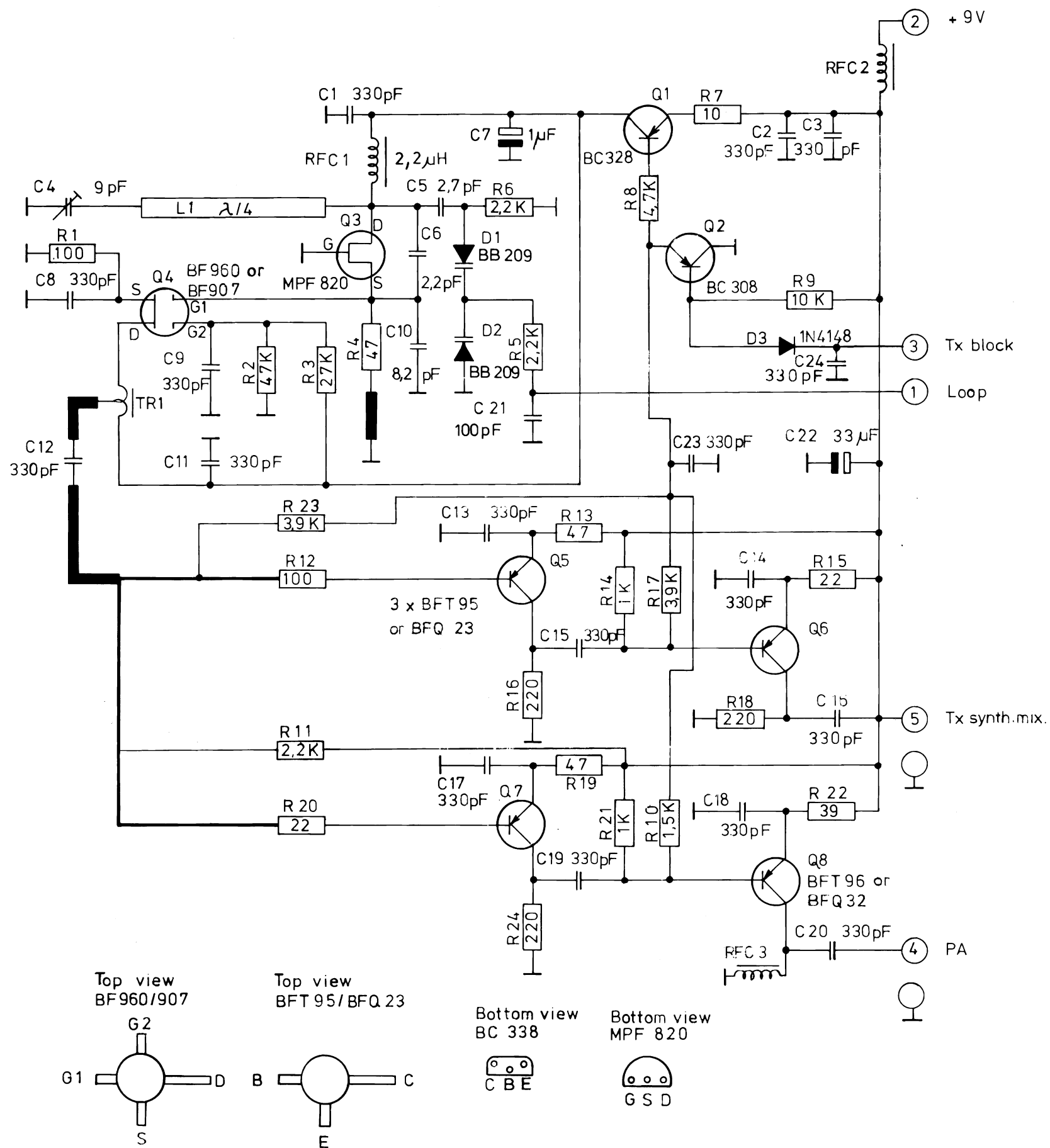
AP type: **3000**

Code no	no	Component		Pos	Rem.
13-279	1	Resistor	470Ω. CR16 1/8W.	R6	
13-281	1	"	680Ω. "	R28	
13-283	7	"	1KΩ. "	R3-14-27-32-33 -34-38	
13-287	2	"	2,2KΩ. "	R22-40	
13-288	1	"	2,7KΩ. "	R36	
13-291	13	"	4,7KΩ. "	R4-8-9-15-19- 20-41-42-44-54 -55-56-57	
"		"	" "		
13-295	4	"	10KΩ. "	R7-21-26-39	
13-299	3	"	22KΩ. "	R25-30-31	
13-302	2	"	47KΩ. "	R37-50	
13-306	7	"	100KΩ. "	R23-24-46-47- 49-51-52	
13-313	2	"	27KΩ. "	R45-48	
16-518/4	1	Printboard	N18D.		
19-081	1	Transistor	BF960	Q2	
19-084	2	"	BC308B.E-line	Q4-6	
19-093	1	"	BC238B.	Q7	
19-104	1	"	BF199	Q5	
19-110	2	"	BFT95	Q1-3	
25-091	1	Coil, Neosid	80052-4E3	L1	
22-044	1	Shielding	74489-3M2		
12-031	1	Testpin	4022 007 45420		

Unit name: **Tx-synthesizer.**

Unit: **Printb.N18D1.**

Diagram: **81188-2E3**



Corrections:
82-5-5 BJ

UHF Tx VCO N 07 C 1

PHILIPS

Tegn.: 82-4-1 BC
Stykl. nr.:

Tegn. nr.:

81189 - 3E3

PARTS LIST

Date: 82-05-05

Page: 2.2

Prod. mod. no: _____

AP type: 3000

[illegible]

Unit name: UHF.Tx.VCO.

Unit: Print.NO7C1.

Diagram : 81189-3E3

PARTS LIST

Date: 82-05-05

Page: 1.2

Prod. mod. no:

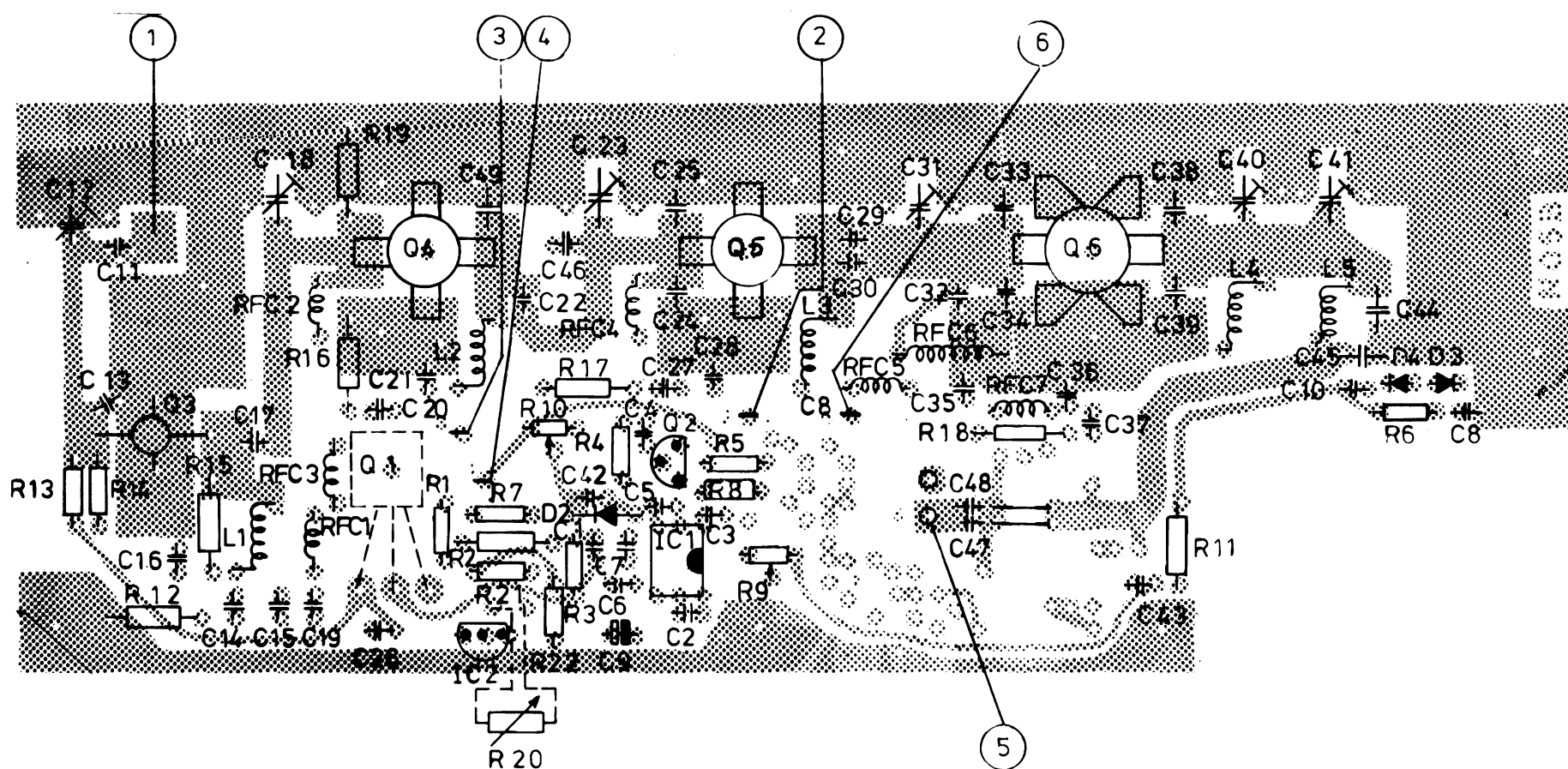
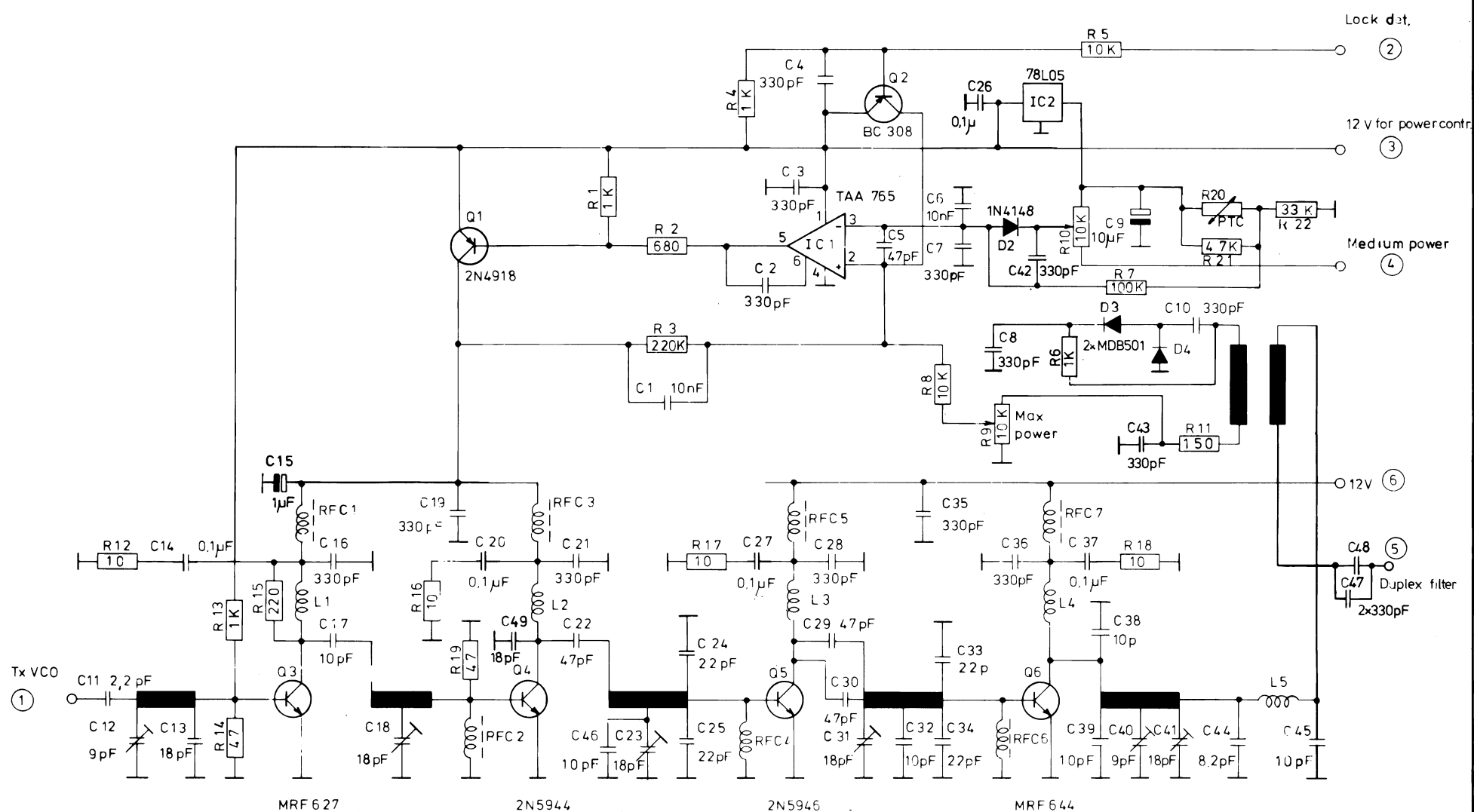
AP type: 3000

Code no.	no.	Component	Pos.	Rem.
04-017	2	Diode BB209	D1-2	
04-062	1	" 1N4148	D3	
04-108	1	Drosselspole 2,2μH.	RFC1	
05-038	1	Elektrolyt 1μF.50V.	C7	
05-041	1	" 33μF.16V.	C22	
11-401	1	Ker.kond. 100pF.N150.	C21	
11-406	17	" 330pF.±10%.	C1-2-3-8-9-11-12-13-14-15-16	
11-406		" "	17-18-19-20-23-24	
11-453	1	" 2,2pF.NPO.400V.	C6	
11-468	1	" 2,7pF.N750.500V.	C5	
11-469	1	" 8,2pF.N750.400V.	C10	
11-795	7	Kontaktbøsning 006-4800-000-99-0		
13-259	1	Modstand CR16 10Ω. 1/8W.	R7	
13-263	2	" 22Ω. "	R15-20	
13-266	1	" 39Ω. "	R22	
13-267	3	" 47Ω. "	R4-13-19	
13-271	2	" 100Ω. "	R1-12	
13-275	3	" 220Ω. "	R16-18-24	
13-283	2	" 1KΩ. "	R14-21	
13-285	1	" 1,5KΩ. "	R10	
13-287	3	" 2,2KΩ. "	R5-6-11	
13-290	2	" 3,9KΩ. "	R17-23	
13-291	1	" 4,7KΩ. "	R8	
13-295	1	" 10KΩ. "	R9	
13-302	1	" 47KΩ. "	R2	
13-313	1	" 27KΩ. "	R3	
16-507/3	1	Printplade NO7C.		
19-076	1	Transistor BFT96/BFQ32	Q8	
19-081	1	" BF960/BF907	Q4	

Unit name: UHF.Tx.VCO.

Unit: Print.NO7C1.

Diagram: 81189-3E3



Endr. nr.:	Rettet:	P.A. and power control N 05 B 1 AP 3000	Tegn.: AMS	Kontr.:
			82-05-13	
		PHILIPS	Tegn. nr.:	Kontr. nr.:
			82147-2E3	

PARTS LIST

Date: 82-05-10

Page: 1.3

Prod. mod.no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
03-031	1	Coaxfatning UG657.Uden tap.		
04-019	2	Diode MBD501	D3-4	
04-062	1	" 1N4148	D2	
04-111	1	Drosselspole 2422 535 00228 2,2μH.	RFC6	
05-038	1	Elektrolyt 1μF.50V.	C15	
05-040	1	" 10μF.16V.	C9	
06-010	2	Ferritrør 3122 104 92900		
06-032	1	Fiberskive 10,2x16x1mm.		
06-044	1	Bølgefjeder 10,5x15,8x 0,3mm.		
09-003	1	IC TAA765A	IC1	
09-249	1	" 78L05A	IC2	
11-247	1	Køleprofil 80024-2M3		
11-376	3	Ker.kond. 10pF.	C17-32-46	
11-378	1	" 10pF.N750.400V.	C45	
11-394	4	" 47pF.	C5-22-29-30	
11-406	16	" 330pF.	C2-3-4-7-8-10- 16-19-21-28-35	
"		" "	-36-42-43-47- 48	
11-434	2	" 18pF.	C13-49	
11-439	1	" 2,2pF.NPO.	C11	
11-457	1	" 9/0116,9.400V. 8,2pF.N150.	C44	
11-527	2	" 10nF.50V.	C1-6	
11-528	5	" 0,1μF.50V.	C14-20-26-27- 37	
11-530	2	" ,chip 10pF.Mica	C38-39	
11-531	4	" , " 22pF. "	C24-25-33-34	
11-795	2	Kontaktbøsning 006-4800-000- 99-0		
13-267	1	Modstand 47Ω. CR16 1/8W.	R14	
13-283	4	" 1KΩ. "	R1-4-6-13	
13-295	2	" 10KΩ. "	R5-8	
13-300	1	" 33KΩ. "	R22	

Unit name: UHF.PA-trin med effektkontrol og antenne-
filter.For NMT.

Unit: Print.NO5B1.

Diagram: 82147-2E3

PARTS LIST

Date: 82-05-10

Page: 2.3

Prod. mod. no:

AP type: 3000

Code no	no	Component		CR16 1/8W.	Pos.	Rem.
13-302	1	Modstand	47K Ω .		R21	
13-306	1	"	100K Ω .	"	R7	
13-309	1	"	220K Ω .	"	R3	
13-350	4	"	10 Ω .	CR25 1/4W.	R12-16-17-18	
13-356	1	"	47 Ω .	"	R19	
13-362	1	"	220 Ω .	"	R15	
13-368	1	"	680 Ω .	"	R2	
13-402	1	"	150 Ω .	"	R11	
13-670	1	" , PTC	P330		R20	
16-505/2	1	Printplade	NO5B.			
19-084	1	Transistor	BC308B.E-line		Q2	
19-123	1	"	MRF627		Q3	
19-162	1	"	2N5944		Q4	
19-163	1	"	2N5946		Q5	
19-176	1	"	2N4918.M/tilb.		Q1	
19-177	1	"	MRF644		Q6	
19-322	2	Trimmer	006.2901.010 10pF.DAU.		C12-40	
19-323	4	"	006.2901.018 18pF.DAU.		C18-23-31-41	
19-274	2	Trimmepotm.	10K Ω .T7X.		R9-10	
24-263	1	Passkrue	81077-4M3			
24-332	2	Møtrik for transist.	77149-4M2			
24-334	1	Kærvmøtrik	81076-4M3			
25-009	6	Drosselspole	75290-4E2		RFC1-2-3-4-5-7	
25-086	4	Luftspole	80053-4E3		L1-2-3-4	
25-087	1	"	80054-4E3		L5	
22-671	1	Antennefilterdåse	80031-4M3			
22-760	1	Kamstykke	81078-4M3			

Unit name: UHF.PA-trin med effektkontrol og antennefilter.For NMT.

Unit: Print.NO5B1.

Diagram: 82147-2E3

PARTS LIST

Date: 82-05-11

Page: 3.3

Prod. mod. no:

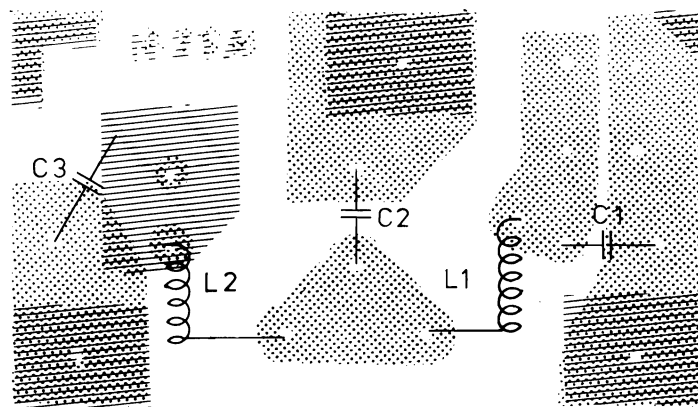
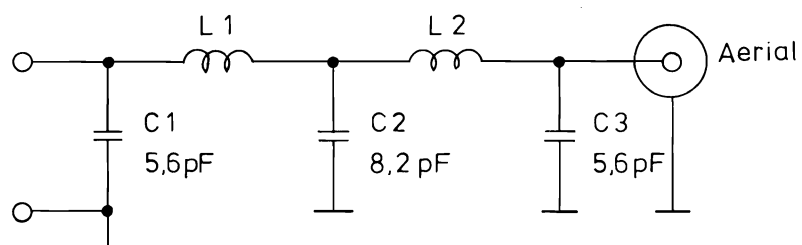
AP type: 3000

[illegible]

Unit name: UHF.PA-trin med effektkontrol og antenne-
filter.For NMT.

Unit: **Print.N05B1.**

Diagram :



Rettet:	Aerial filter AP 3000 UHF Print board N 21A	Tegn.: BC 10 - 6 - 80	Kontr.:	
		Stykl. nr.:		
		PHILIPS	Tegn. nr.: 81191 - 4E3	

PARTS LIST

Date: 82-05-11

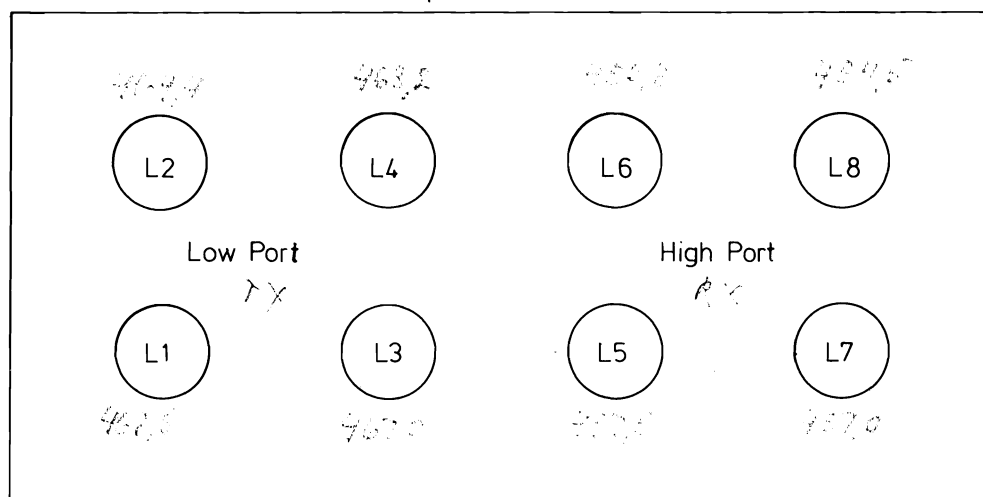
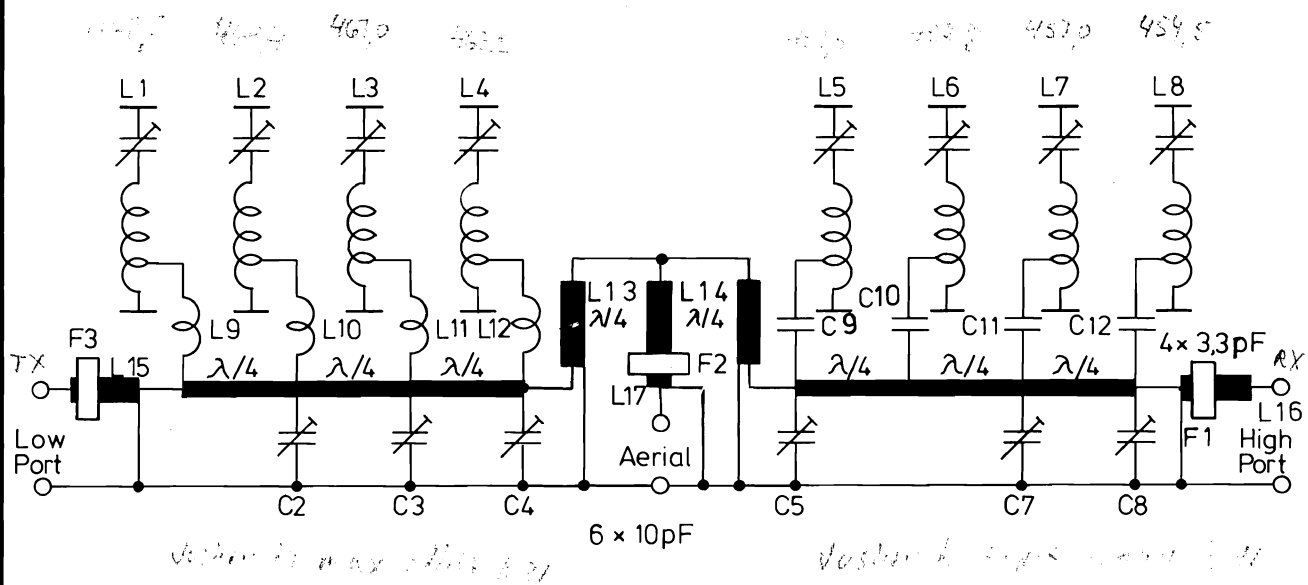
Page: 1.1

Prod. mod. no: _____

AP type: 3000

[illegible]Unit name: **UHF.Aerial filter.**Unit: **Printb.N21A1.**

Diagram: 81191-4E3



Rettet:
13-3-81 S.B.
30-9-81 BJ/AS

Duplex Filter, AP 3000 UHF 304-001
Print board N 19 B 1

AP-RADIOTELEFON A/s

Tegn.: 20-10-80 Kontr.:
AMC

Stykl. nr.:

Tegn. nr.:

80136-4E3

PARTS LIST

Date: 82-06-23

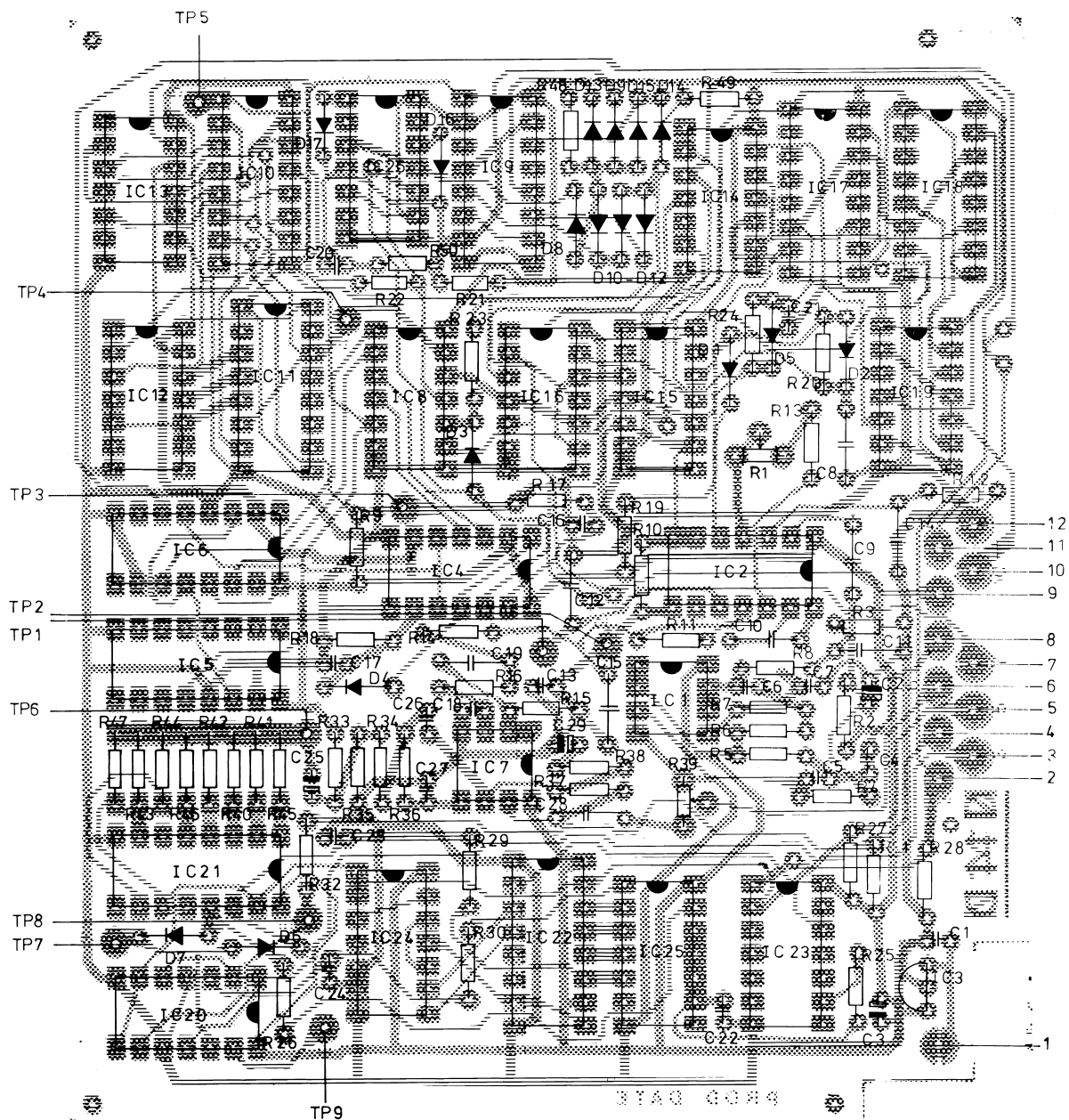
Page: 1.1

Prod. mod. no: _____

AP type: 3000

[illegible]Unit name: **Print for duplexfilter.UHF.NMT.**Unit: **Print.N19B1.**

Diagram: 80136-4E3



Rettet:	Modem Print board N14D	Tegn.: BC 82-4-1		Kontr.:
		Stykl. nr.:		
		Tegn. nr.:		
	PHILIPS	81193 - 3E2		

PARTS LIST

Prod. mod. no:

AP type: 3000

Code no.	no.	Component	Pos.	Rem.
04-062	17	Diode 1N4148	D1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17	
"	"	"	"	
05-038	2	Electrolytic 1 μ F.50V.	C3-25	
05-039	1	" 4,7 μ F.35V.	C2	
05-040	1	" 10 μ F.16V.	C29	
06-239	1	Socket for IC. 14pol.		
09-048	5	IC HEF4013BP	IC8-15-16-20-26	
09-049	4	" HEF4015BP	IC10-11-17-18	
09-063	1	" HEF4002BP	IC25	
09-080	2	" LM358	IC1-7	
09-083	1	" HEF4078BP	IC13	
09-084	1	" HEF4526BP	IC6	
09-212	1	" HEF4518BP	IC22	
09-226	1	" XR2211	IC2	
09-227	1	" HEF4011BP	IC24	
09-229	1	" HEF4024BP	IC23	
09-230	2	" HEF4030BP	IC4-19	
09-232	1	" HEF4068BP	IC12	
09-243	2	" HEF4017BP	IC5-21	
09-249	1	" 78L05A	IC3	
09-252	1	" HEF4520BP	IC9	
09-266	1	" HEF4093BP	IC14	
11-390	1	Capacitor, ceramic 33pF.	C23	
11-396	2	" , " 56pF.	C22-24	
11-413	1	" , " 150pF.	C16	
11-415	1	" , " 4,7nF. 2mod.	C30	
11-488	2	" , MKT 6,8nF.	C15-19	
11-489	1	" , " 22nF.	C10	
11-490	2	" , " 100nF.	C11-12	

Unit name: Modem.

Unit: Printb.N14E1.

Diagram: 81193-2E3

PARTS LIST

82-06-23
Date: 82-06-24

Page: 2.3

Prod. mod.no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
11-493	1	Capacitor, MKT 47nF.	C9	
11-495	1	" , " 10nF.	C8	
11-498	2	" , " 33nF.	C14-28	
11-533	2	" , ceramic 1nF.	C17-20	
11-534	3	" , " 2,2nF.	C13-18-27	
11-535	2	" , " 3,3nF.	C7-26	
11-536	5	" , " 4,7nF.	C1-4-5-6-21	
11-795	12	Connector socket 006-4800-000-99-0		
13-283	2	Resistor 1K Ω . CR16 1/8W.	R38-50	
13-288	2	" 2,7K Ω . "	R8-37	
13-289	1	" 3,3K Ω . "	R30	
13-290	1	" 3,9K Ω . "	R3	
13-291	4	" 4,7K Ω . "	R2-9-19-48	
13-295	4	" 10K Ω . "	R21-35-51-52	
13-296	1	" 12K Ω . "	R33	
13-297	4	" 15K Ω . "	R6-7-34-36	
13-299	1	" 22K Ω . "	R13	
13-300	3	" 33K Ω . "	R5-14-16	
13-302	10	" 47K Ω . "	R4-11-15-22-23-25-26-29-32-49	
"	"	" " "		
13-306	4	" 100K Ω . "	R17-27-28-31	
13-308	1	" 150K Ω . "	R24	
13-312	1	" 1M Ω . "	R20	
13-315	3	" 470K Ω . "	R10-12-28	
13-719	2	" , metal film 11,0K Ω . MR16	R42-43	
13-720	2	" , " 14,0K Ω . "	R41-44	
13-721	2	" , " 22,6K Ω . "	R40-45	
13-722	2	" , " 51,1K Ω . "	R46-47	
16-514/5	1	Printplade N14E.		

Unit name: Modem.

Unit: Print.N14E1.

Diagram: 81193-2E3

PARTS LIST

Date: 82-06-24

Page: 3.3

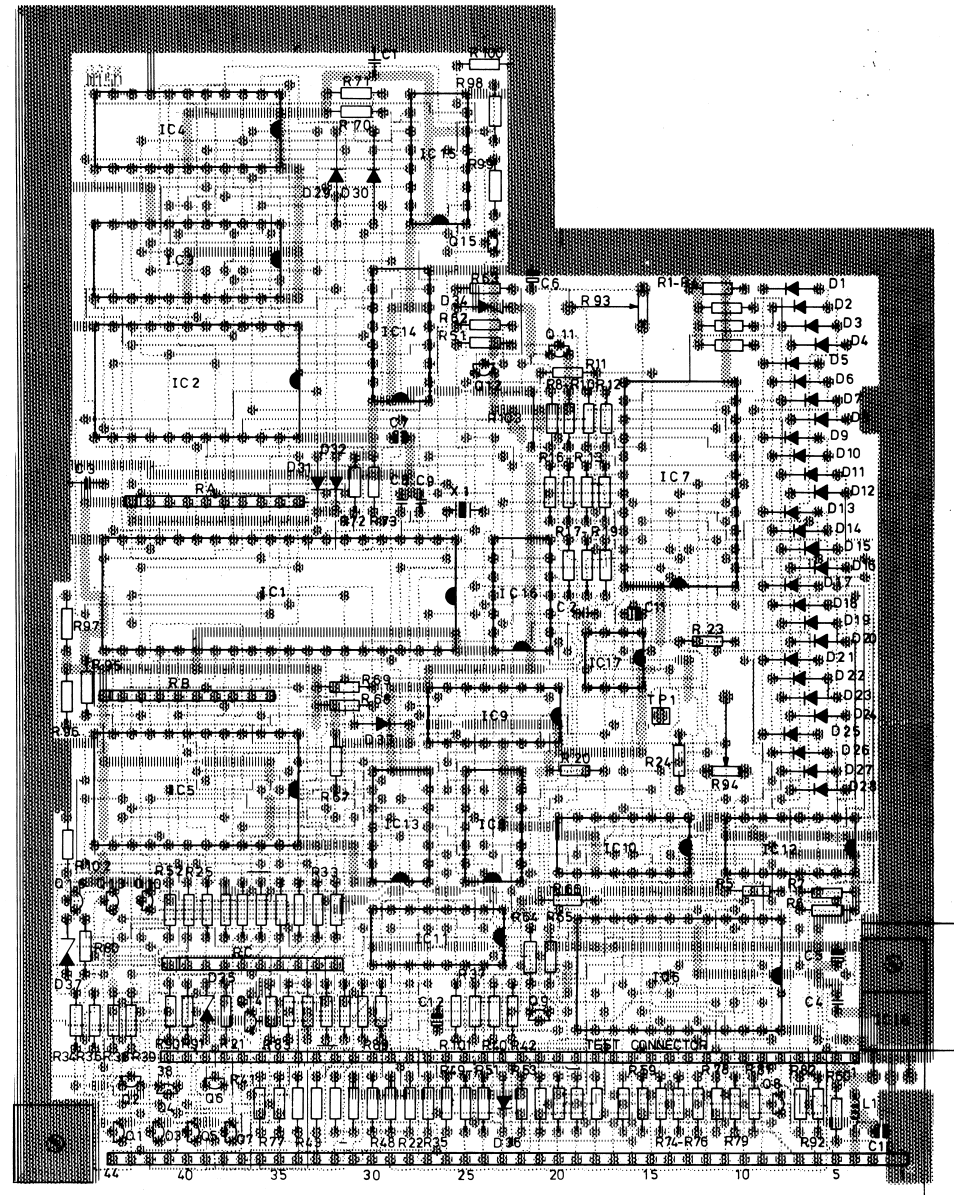
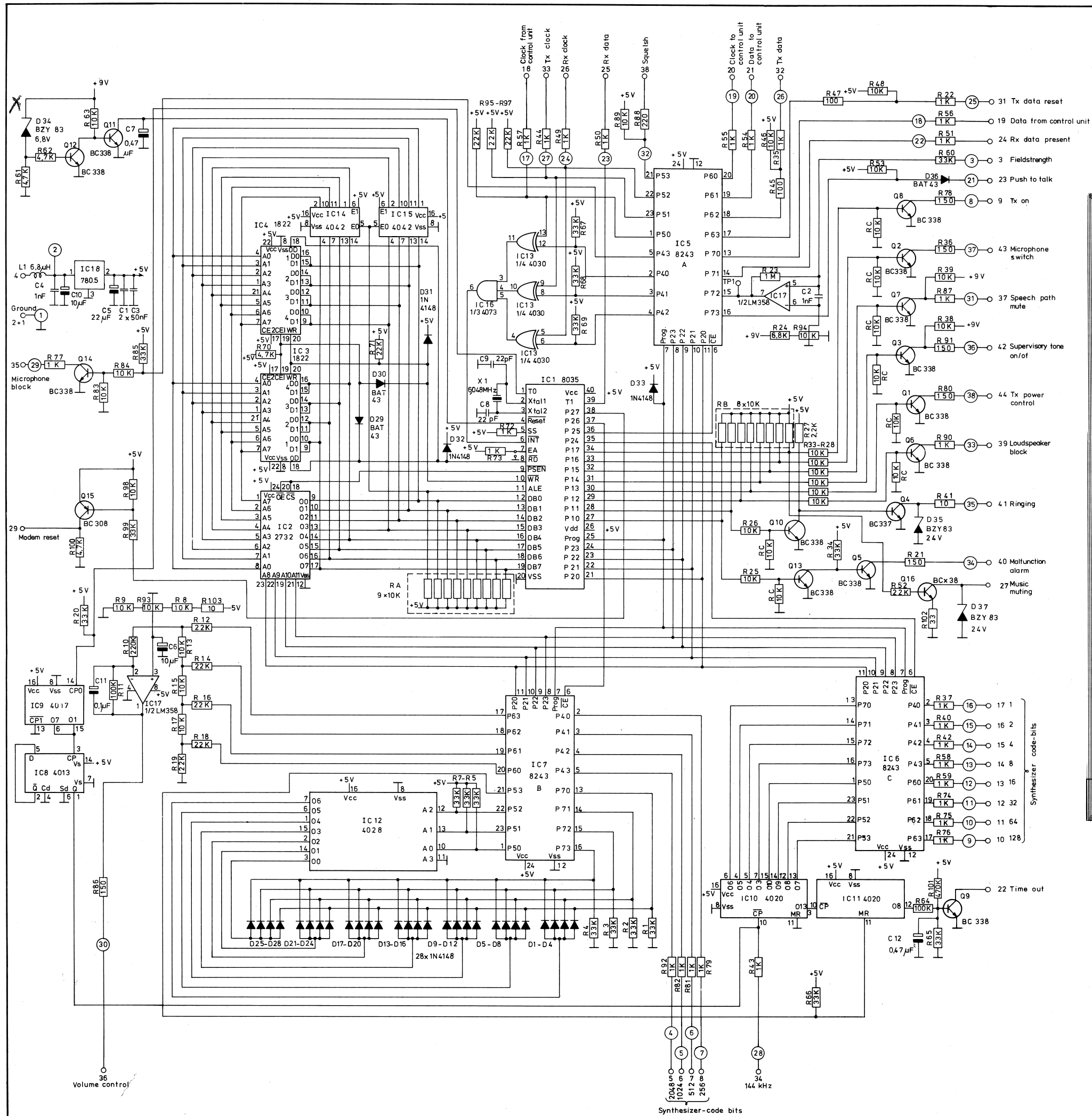
AP type: 3000

Prod. mod. no: _____

[illegible]Unit name: **Modem.**

Unit:Print.N14E1.

Diagram: 81193-2E3



Andr. nr.	Retet.	Andr. nr.	Retet.	CPU radio, AP 3000 NMT N15	Tegn.- BC 17-11-80 17-11-80
83/82	20-1-82 MO		17-2-81 MO		
	11-6-82 MO		1-4-81 MO		
			9-4-81 MO		
			23-4-81 MO		
			7-5-81 MO		
			25-9-81 B		
				AP-RADIOTELEFON 4/s	Tegn. nr.: 80171-1E3

PARTS LIST

Date: 82-06-23

Page: 1.3

Prod. mod. no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
04-011	1	Diode, zener BZX79-D6V8	D34	
04-012	2	" , " BZX79-C24V5	D35-37	
04-047	3	" BAT43	D29-30-36	
04-062	31	" 1N4148	D1-2-3-4-5-6-7-8-9-10-11-	
"		" "	12-13-14-15-16-17-18-19-	
"		" "	20-21-22-23-24-25-26-27-	
"		" "	28-31-32-33	
04-114	1	Drosselspole 6,8 μ H. 74016-4E	L1	
06-023	1	Fiberskive 3,2x6x0,5mm.		
06-223	4	Fladkabel 11pol.		
06-241	1	Fatning for IC 24pol.		
06-243	1	" " 40pol.		
06-244	2	" " 22pol.		
09-048	1	IC HEF4013BP	IC8	
09-080	1	" LM358	IC17	
09-211	1	" CD4028B	IC12	
09-224	1	" LM7805CT	IC18	
09-228	2	" HEF4020BP	IC10-11	
09-230	1	" HEF4030BP	IC13	
09-231	2	" HEF4042BP	IC14-15	
09-233	1	" HEF4073BP	IC16	
09-234	3	" $\frac{1}{2}25-+85$ C. ID8243.	IC5-6-7	
09-235	1	" $\frac{1}{2}25-+85$ C. ID2732.	IC2	Kod. til 09-245
09-237	2	" $\frac{1}{2}25-+85$ C. 5101.	IC3-4	
09-243	1	" HEF4017BP	IC9	
11-385	2	Ker.kond. 22pF.	C8-9	
11-409	2	" 1nF.	C2-4	
11-472	2	Kondensator 47nF. Sibatit	C1-3	
11-500	1	Tantal 0,1 μ F. 35V.	C11	

Unit name: CPU-kort for NMT.

Unit: Print.N15D1.

Diagram: 80171-1E3

PARTS LIST

Date: 82-06-23

Page: 2.3

Prod. mod. no:

AP type: 3000

Code no	no	Component		Pos.	Rem.
11-501	2	Tantal	0,47 μ F.35V.	C7-12	
11-506	2	"	10 μ F.25V.	C6-10	
11-507	1	"	22 μ F.16V.	C5	
11-779	38	Kontaktstrip	5-825433-0.AMP		Part af strip.
11-822	1	Krystal	6.048Mc.AP27	X1	
13-259	2	Modstand	10 Ω . CR16 1/8W.	R41-103	
13-265	1	"	33 Ω . "	R102	
13-271	2	"	100 Ω . "	R45-47	
13-273	6	"	150 Ω . "	R21-36-78-80- 86-91	
13-275	1	"	220 Ω . "	R88	
13-283	28	"	1K Ω . "	R22-35-37-40- 42-43-44-49-	
"		"	" "	50-51-54-55- 56-57-58-59-	
"		"	" "	72-73-74-75- 76-77-79-81-	
"		"	" "	82-87-90-92	
13-287	1	"	2,2K Ω . "	R27	
13-291	4	"	4,7K Ω . "	R61-62-70-100	
13-293	1	"	6,8K Ω . "	R24	
13-295	23	"	10K Ω . "	R8-9-13-15-17 -25-26-28-29-	
"		"	" "	30-31-32-33- 38-39-46-48-	
"		"	" "	53-63-83-84- 89-98	
13-299	10	"	22K Ω . "	R12-14-16-18- 19-52-71-95-	
"		"	" "	96-97	
13-300	17	"	33K Ω . "	R1-2-3-4-5-6- 7-20-34-60-65	
"		"	" "	-66-67-68-69- 85-99	
13-306	2	"	100K Ω . "	R11-64	
13-309	1	"	220K Ω . "	R10	
13-312	1	"	1M Ω . "	R23	
13-315	1	"	470K Ω . "	R101	
13-685	3	" ,netværk	10K Ω .	RA-RB-RC	

Unit name: CPU-kort for NMT.

Unit: Print.N15D1.

Diagram: 80171-1E3

PARTS LIST

Date: 82-06-23

Page: 3.3

Prod. mod. no: _____

AP type: 3000

Code no	no	Component	Pos.	Rem.
16-515/4	1	Printplade N15D.		
19-084	1	Transistor BC308B.E-line	Q15	
19-085	13	" BC338B. "	Q1-2-3-5-6-7-8-9-10-11-12-13-14	
"		" " "		
19-088	1	" BCX38	Q16	
19-096	1	" BC337	Q4	
19-257	2	Trimmepotm. 10K Ω .Ligg.	R93-94	
22-688	1	Kølevinkel 80070-4M3		
22-689	1	Vinkel 80071-4M3		

06-080	2	Flex 4x0,5mm.Rød		
09-257	1	IC 725-+85 C. C8048.	IC1	
12-031	1	Loddespyd 4022 007 45420		
12-052		Lim 1322 506 69701		
19-384	1cm	Tape,dobbelt. 4016.3M.		
19-501	2	Tandskive 3,2mm.		
24-152	1	Skrue M3x6mm.CHJ.		
24-153	1	" M3x8mm.CHJ.		
24-305	2	Møtrik M3x5x2mm.		

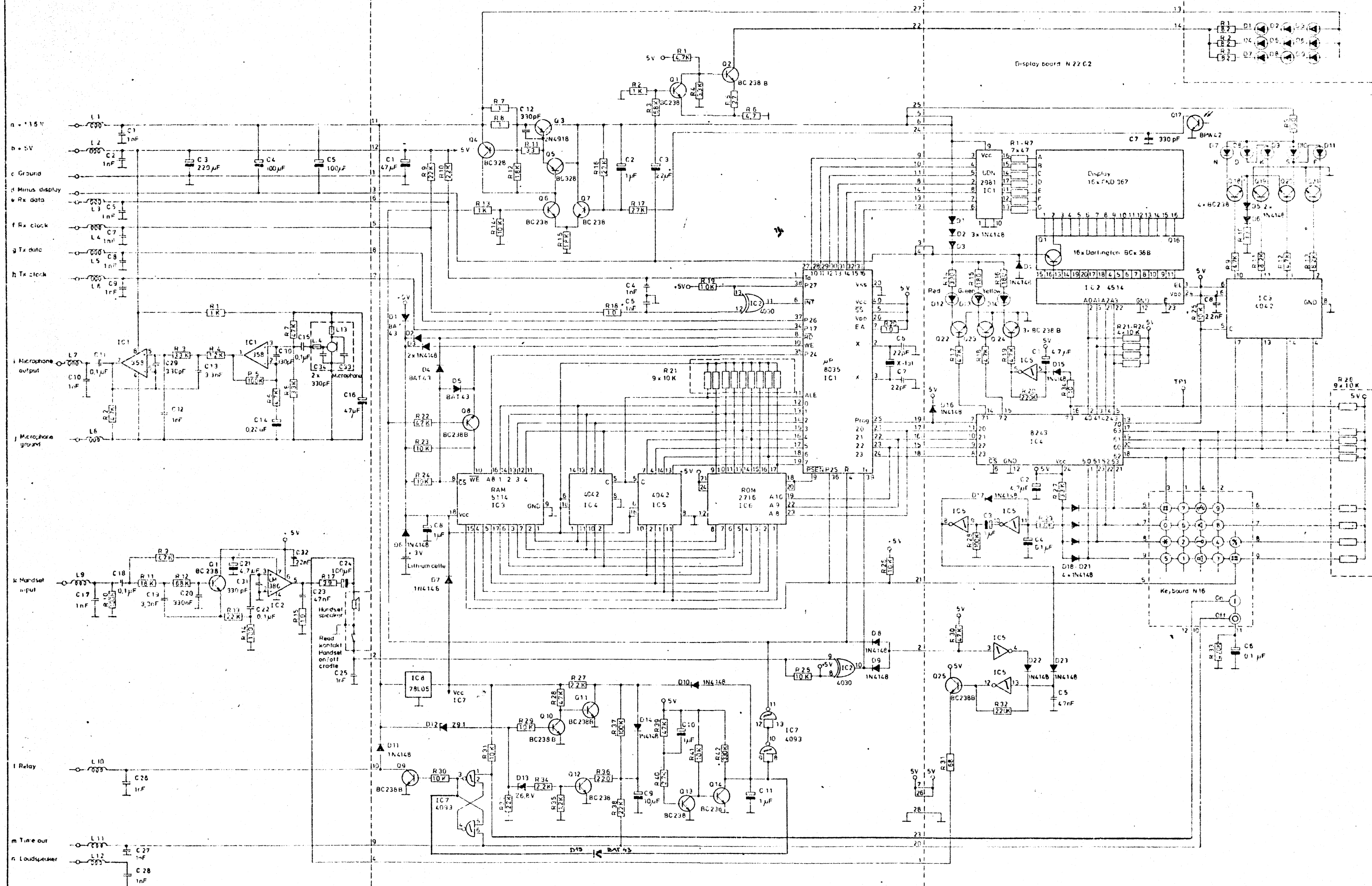
Unit name: CPU-kort for NMT.

Unit: Print.N15D1.

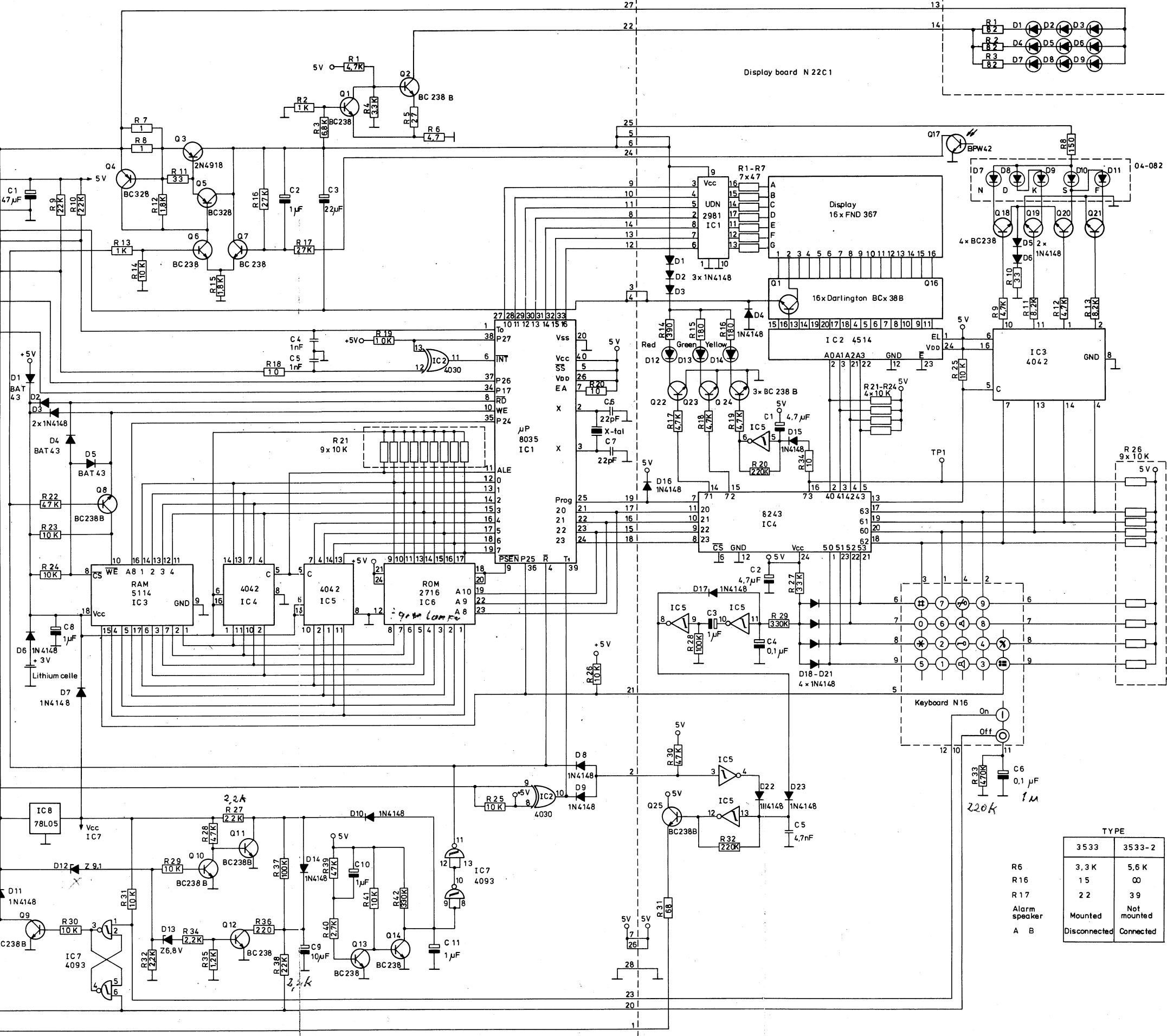
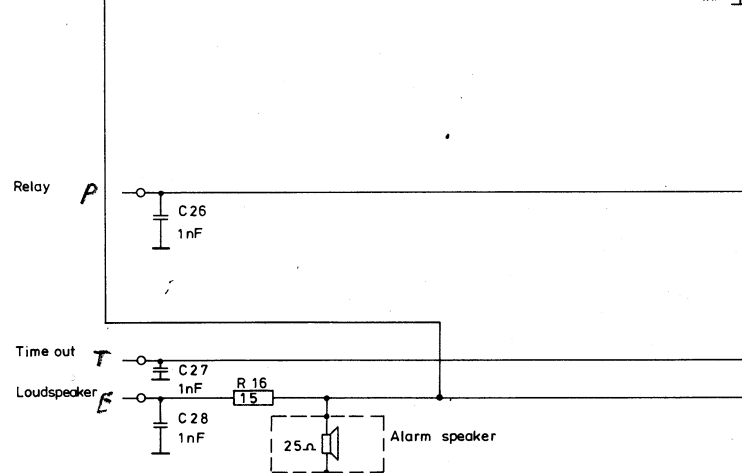
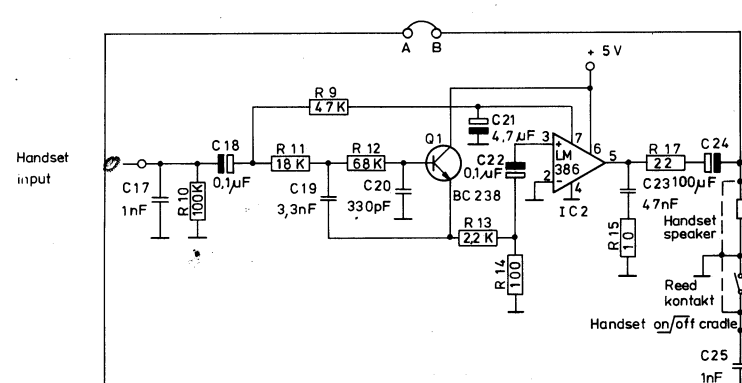
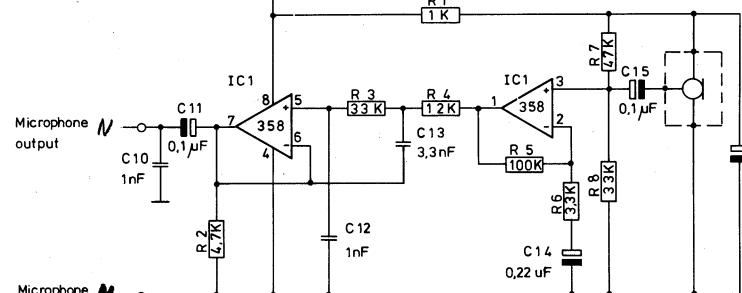
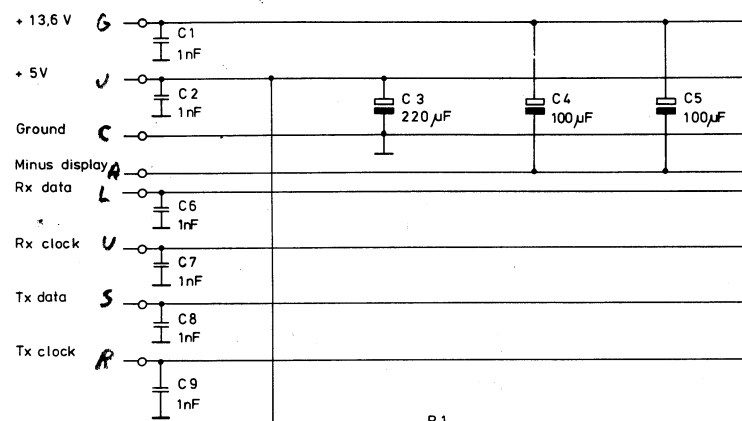
Diagram: 80171-1E3

Edge conn.	Connection to N15	Test conn.
1	Ground	1
2	Ground	
3	Fieldstrength	3
4	+ 9 V	2
5	2048	4
6	1024	5
7	512	6
8	256	7
9	Tx on	8
10	128	9
11	64	10
12	32	11
13	16	12
14	8	13
15	4	14
16	2	15
17	1	16
18	Clock from control unit	17
19	Data from control unit	18
20	Clock to control unit	19
21	Data to control unit	20
22	Time out	
23	Push to talk	21
24	Rx data present	22
25	Rx data	23
26	Rx clock	24
27	Music muting	
28	Tone/data Rx	
29	Modem reset	
30	Tone/data Tx	
31	Tx data reset	25
32	Tx data	26
33	Tx clock	27
34	144 kHz	28
35	Microphone block	29
36	Volume control	30
37	Speech path mute	31
38	Squelch condition	32

Edge conn.	Connection to N15	Test conn.
39	Loudspeaker block	33
40	Malfunction alarm	34
41	Ringling	35
42	Supervisory tone on/of	36
43	Microphone switch	37
44	Tx power control	38

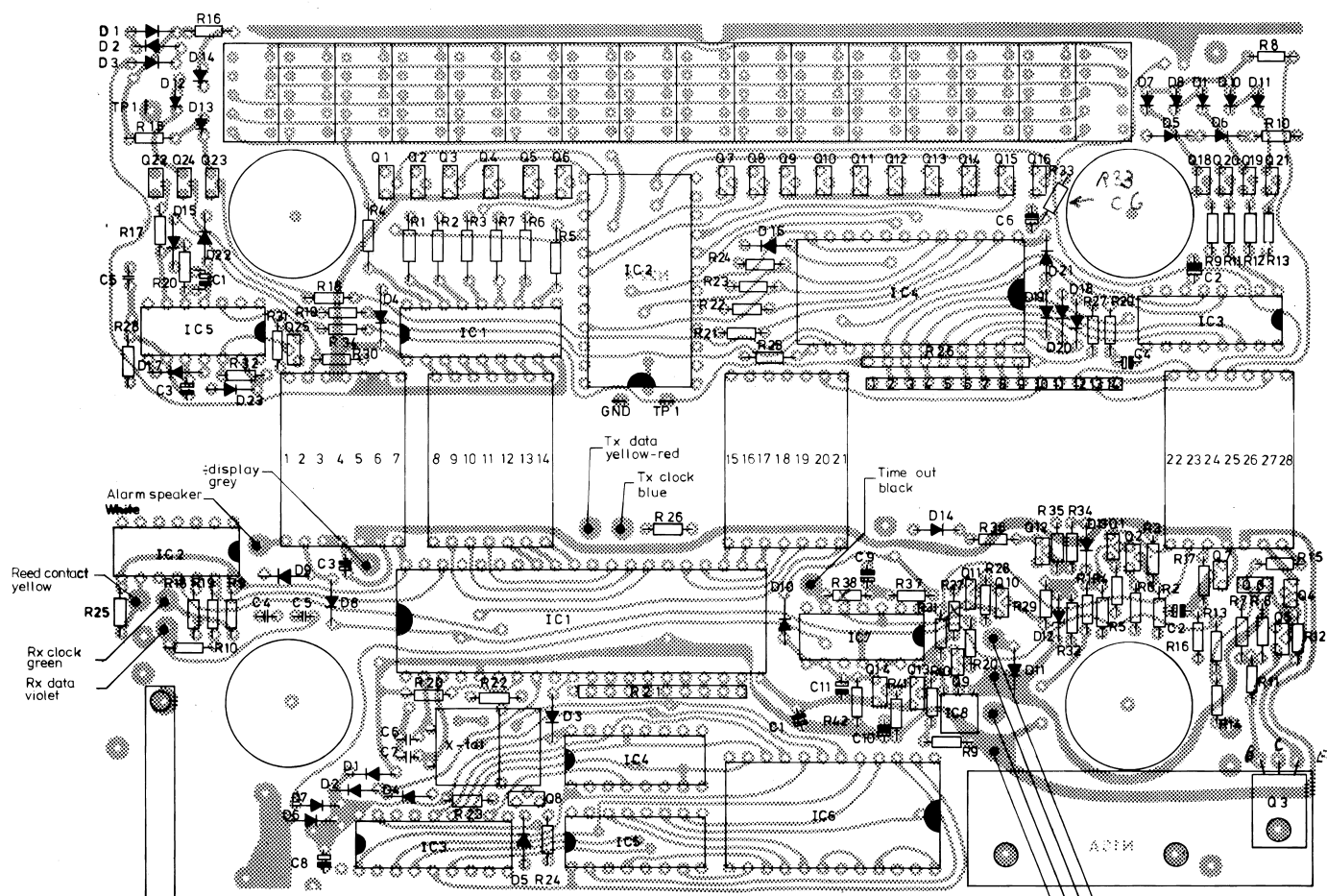


Input indicating po grom og pul lamp.
NMT error OK, has shylas kontrolovany.
af RX data i 25 pol multistikh

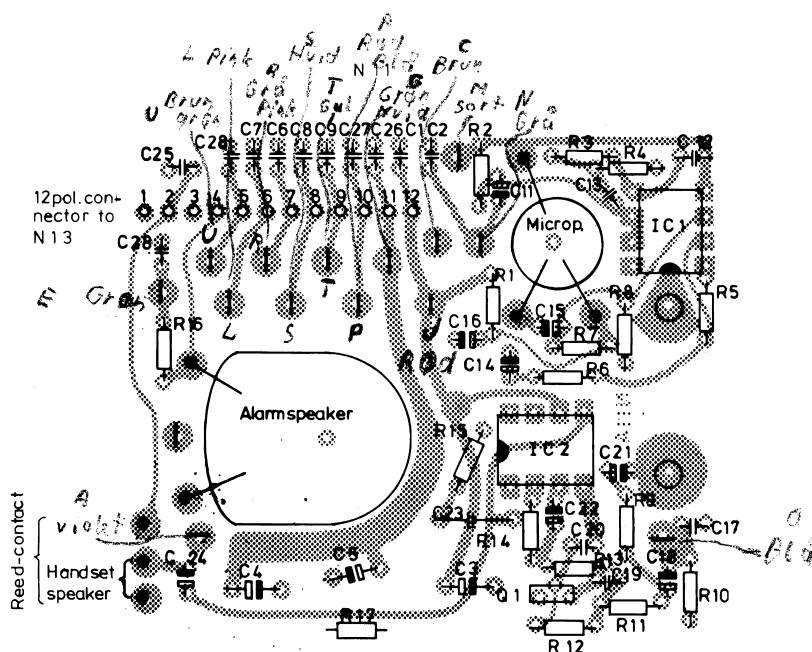


	TYPE	
	3533	3533-2
R6	3,3 K	5,6 K
R16	15	∞
R17	22	39
Alarm speaker	Mounted	Not mounted
A B	Disconnected	Connected

N 22



N 13



Andr. nr.	Rellet:	Control unit	Tegn.: BC	Kontr.:
		NMT AP 3000	26-3-81	
		Print board N 22, N 13, N 11		
		AP-RADIOTELEFON 1/2	Tegn. nr.:	
			81058-2E3	

PARTS LIST

Date: 82-06-24

Page: 1.2

Prod. mod.no:

AP type: 3000

Code no.	no	Component	Pos.	Rem.
06-213	2	Frakolyt 100 μ F.16V.	C4-5	
06-214	1	" 220 μ F.6V.	C3	
09-080	1	IC LM358N	IC1	
09-250	1	" LM386N	IC2	
11-406	1	Ker.kond. 330pF.	C20	
11-409	13	" 1nF.	C1-2-6-7-8-9-10-12-17-25-	
"		" "	26-27-28	
11-414	2	" 3,3nF.	C13-19	
11-493	1	Kondensator,MKT 47nF.	C23	
11-500	4	Tantal 0,1 μ F.35V.	C11-15-18-22	
11-504	1	" 4,7 μ F.10V.	C21	
11-509	1	" 47 μ F.6,3V.	C16	
11-510	1	" 100 μ F.3V.	C24	
11-516	1	" 0,22 μ F.35V.	C14	
13-259	1	Modstand 10 Ω . 1/8W.	R15	
13-261	1	" 15 Ω . "	R16	
13-263	1	" 22 Ω . "	R17	
13-271	1	" 100 Ω . "	R14	
13-283	1	" 1K Ω . "	R1	
13-287	1	" 2,2K Ω . "	R13	
13-289	1	" 3,3K Ω . "	R6	
13-291	1	" 4,7K Ω . "	R2	
13-296	1	" 12K Ω . "	R4	
13-298	1	" 18K Ω . "	R11	
13-300	2	" 33K Ω . "	R3-8	
13-302	2	" 47K Ω . "	R7-9	
13-304	1	" 68K Ω . "	R12	
13-306	2	" 100K Ω . "	R5-10	
16-511/2	1	Printplade N11B.		

Unit name: Mikrofon og telefonforstærker for NMT
betjeningsbox.

Unit: Print.N11B1.

Diagram: 81058-1E3

Fig. 1.

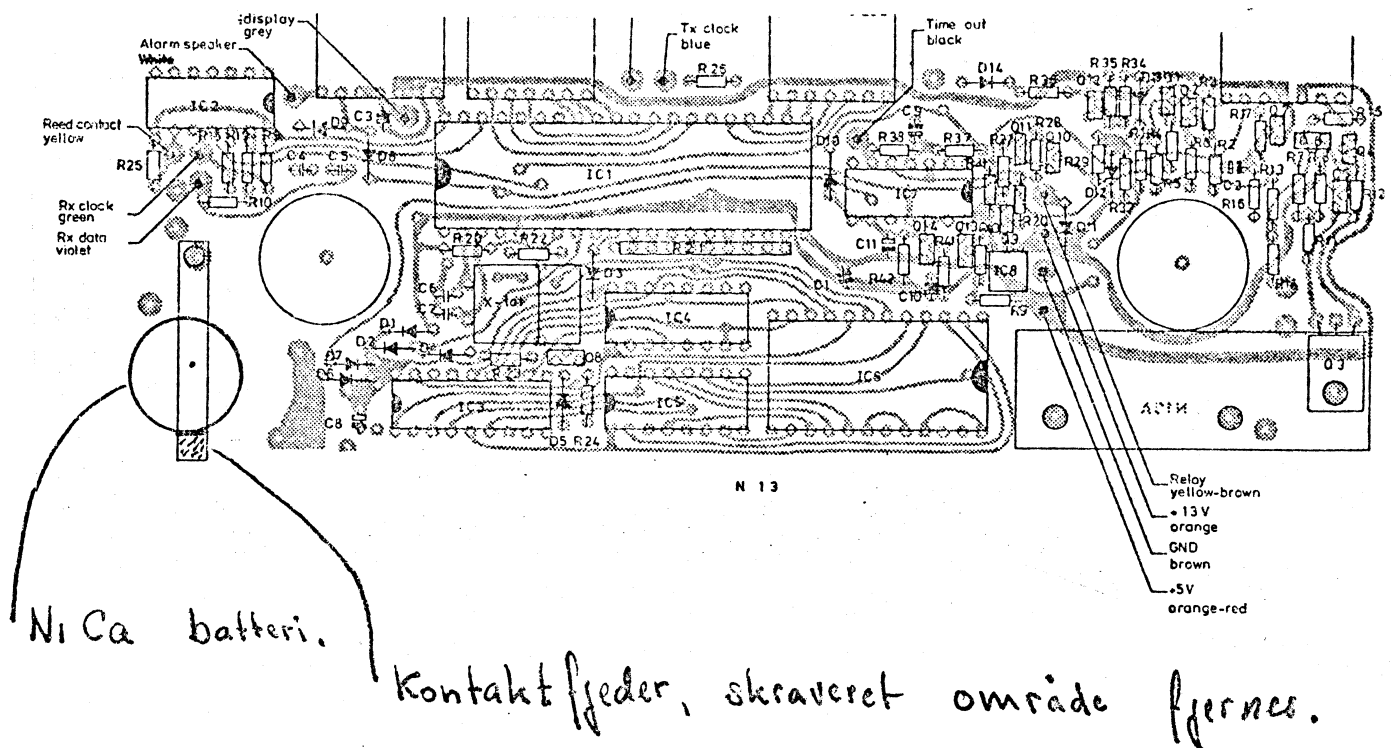
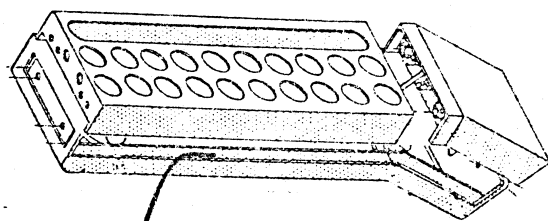


Fig. 2.



folie skærmen skal ud over kanten på underpart af handset.

Vedr.: Mikrotelefonen.

1. Kontaktfjederen der ligger over NiCa-batteriet på print N13 kan kortslutte til chassiet i den skærmede mikrotelefon. Dette kan afhjælpes ved, at fjederen afkortes, som vist på vedlagte skitse, fig. 1.
2. Når mikrotelefonen har været adskilt for service og igen skal samles, skal folieafskærmningen ligge ud over underpartens fals, som vist på skitse, fig. 2.

Monteringen sker lettest ved at sætte et tyndt stykke folie eller lignende op foran folieafskærmningen og ned langs ydersiden af underparten.

PARTS LIST

Date: 82-06-24

Page: **2.2**

Prod. mod. no:

AP type: 3000

[illegible]

Unit name: Mikrofon og telefonforstærker for NMT
betjeningsbox.

Unit: **Print.N11B1.**

Diagram: 81058-1E3

PARTS LIST

Date: 82-06-24

Page: 1.2

Prod. mod.no:

AP type: 3000

Code no	no.	Component	Pos.	Rem.
04-062	15	Diode	D1-2-3-4-5-6-15-16-17-18-19-20-21-22-23	
"		"	"	
04-077	1	" ,lys	Rød	D12
04-078	1	" , "	Gul	D14
04-079	1	" , "	Grøn	D13
04-082	1	Lysdiodeenhed	Tekst:NDKSF.	
04-159	16	Display	FND367	Displ.
09-037	1	IC	MC14584B	IC5 405
09-098	1	"	MC14514BCP	IC2 16.80
09-231	1	"	HEF4042BP	IC3 7.20
09-234	1	"	8243.Udmålt.	IC4 47.40
09-241	1	"	UDN2981	IC1 49.50
11-416	1	Ker.kond.	4,7nF.	C5
11-500	2	Tantal	0,1µF.35V.	C4-6
11-502	1	"	1µF.35V.	C3
11-504	2	"	4,7µF.10V.	C1-2
11-745	1	Kontaktstrip	14pol.742-14	
13-259	1	Modstand	10Ω. CR16 1/8W.	R34
13-265	1	"	33Ω. "	R10
13-269	1	"	68Ω. "	R31
13-273	1	"	150Ω. "	R8
13-274	2	"	180Ω. "	R15-16
13-278	1	"	390Ω. "	R14
13-291	5	"	4,7KΩ. "	R9-12-17-18-19
13-294	2	"	8,2KΩ. "	R11-13
13-295	5	"	10KΩ. "	R21-22-23-24-25
13-300	1	"	33KΩ. "	R27
13-302	1	"	47KΩ. "	R30
13-306	1	"	100KΩ. "	R28

Unit name: Displayprint for NMT betjeningsbox.

Unit: Print.N22C1.

Diagram: 81058-1E3

PARTS LIST

Date: 82-06-24

Page: **2.2**

Prod. mod. no:

AP type: **3000**

[illegible]

Unit name: **Displayprint for NMT betjeningsbox.**

Unit: **Print.N22C1.**

Diagram: 81058-1E3

PARTS LIST

Date: 82-06-24

Page: 1.3

Prod. mod. no:

AP type: 3000

Code no	no	Component		Pos.	Rem.
04-011	1	Diode, zener	BZX79-C6V8	D13	
04-047	3	"	BAT43	D1-4-5	
04-051	1	" , "	BZX79-B9V1	D12	
04-062	9	"	1N4148	D2-3-6-7-8-9-10-11-14	
06-224	4	Flexstrip	1".7 leder.		
07-061	1	Gevindbøsning	81104-4M3		
09-131	1	Isolerplade	SIL33		
09-230	1	IC	HEF4030BP	IC2	4,05
09-231	2	"	HEF4042BP	IC4-5	7,80
09-236	1	"	725-+85 C. ID2716.	IC6	72,60 Kod. til 09-255
09-238	1	"	5114/1825	IC3	40,80
09-249	1	"	LM78L05 ACZ	IC8	4,80
09-257	1	"	8048H. Udmålt.	IC1	68,40
09-266	1	"	HEF4093BP	IC7	
11-385	2	Ker. kond.	22pF.	C6-7	
11-409	2	"	1nF.	C4-5	
11-502	4	Tantal	1μF. 35V.	C2-8-10-11	
11-506	1	"	10μF. 25V.	C9	
11-507	1	"	22μF. 16V.	C3	
11-509	1	"	47μF. 6,3V.	C1	
11-822	1	Krystal	6.048Mc. AP27.	X1	
13-257	1	Modstand	4,7Ω. CR16 1/8W.	R6	
13-259	2	"	10Ω. "	R18-20	
13-264	1	"	27Ω. "	R5	
13-265	1	"	33Ω. "	R11	
13-275	1	"	220Ω. "	R36	
13-283	2	"	1KΩ. "	R2-13	
13-284	1	"	1,2KΩ. "	R35	
13-286	2	"	1,8KΩ. "	R12-15	

Unit name: Computerprint for NMT betjeningsbox.

Unit: Print.N13A1.

Diagram: 81058-1E3

PARTS LIST

Date: 82-06-24

Page: 2.3

Prod. mod.no:

AP type: 3000

Code no	no	Component		Pos.	Rem.
13-287	2	Modstand	2,2KΩ.	CR16 1/8W. R32-34	
13-288	1	"	2,7KΩ.	" R40	
13-289	1	"	3,3KΩ.	" R4	
13-291	1	"	4,7KΩ.	" R1	
13-293	1	"	6,8KΩ.	" R3	
13-295	10	"	10KΩ.	" R14-19-23-24- 25-26-29-30- 31-41	
"		"	"	"	
13-299	4	"	22KΩ.	" R9-10-27-38	
13-302	3	"	47KΩ.	" R22-28-39	
13-306	1	"	100KΩ.	" R37	
13-310	1	"	330KΩ.	" R42	
13-313	2	"	27KΩ.	" R16-17	
13-346	2	"	1Ω.	CR25 1/4W. R7-8	
13-685	1	" ,netværk	10KΩ.	R21	
16-513/1	1	Printplade	N13A.		
18-975	1	Skilt	81203-4M3 S-1217.		
19-082	2	Transistor	BC328B.E-line	Q4-5	
19-117	11	"	BC238B. "	Q1-2-6-7-8-9- 10-11-12-13-14	
19-176	1	"	M/tilbehør 2N4918.	Q3	
22-723	1	Batterifjeder	80195-4M3		
22-724	1	Batteriholder	80196-4M3		

05-084	1	Lithiumcelle	20x3,2mm.		
14-024	17	Eye-lett nitte	1,5x0,2x3mm. 7340		
14-027	2	Rørnitte	4065		
18-143	1	Skive	M3,0.HFC1245		
19-384	1cm	Tape,dobbelt.	4016.3M.		

Unit name: Computerprint for NMT betjeningsbox.

Unit: Print.N13A1.

Diagram: 81058-1E3

PARTS LIST

Date: 82-06-24

Page: 3.3

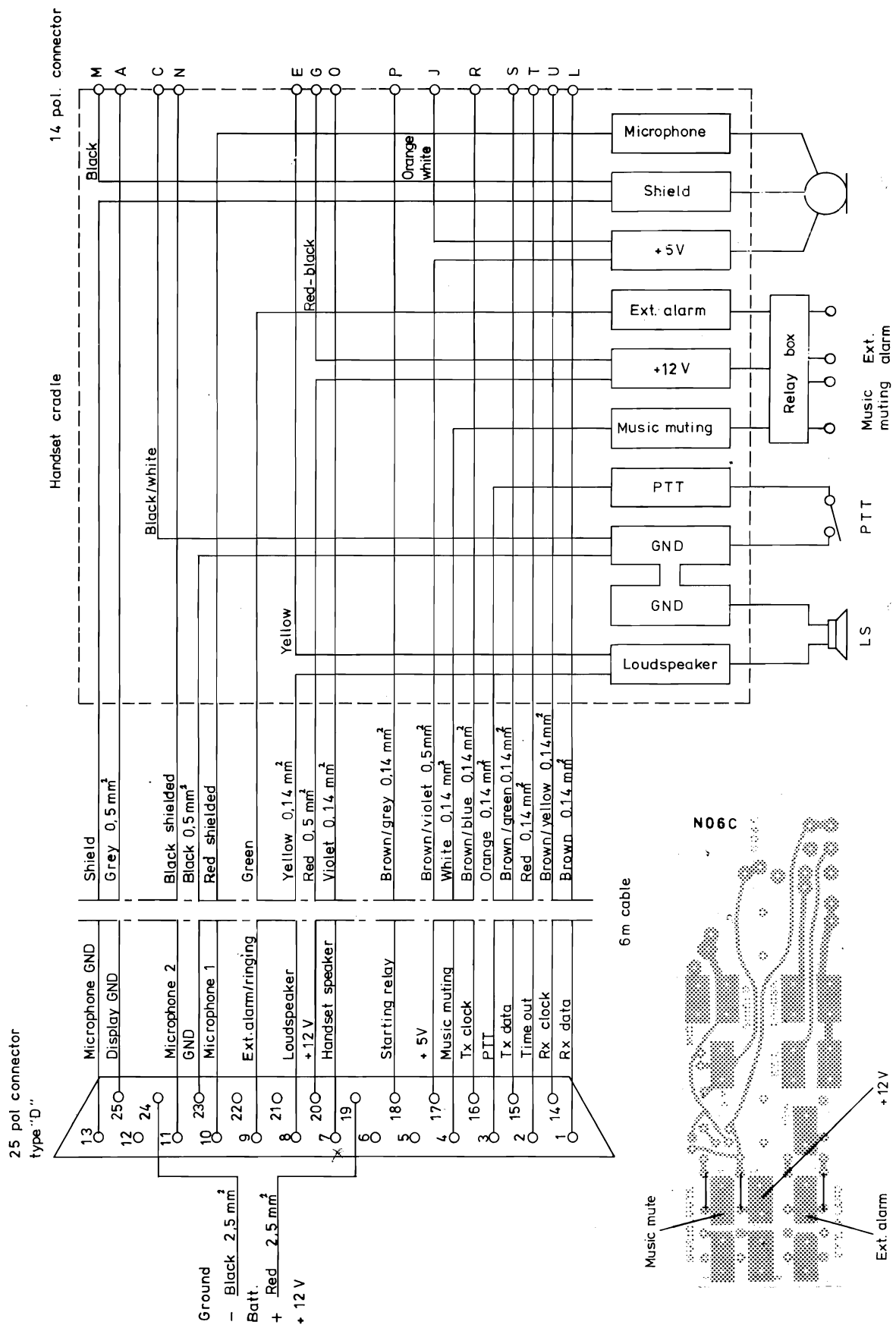
Prod. mod. no:

AP type: 3000

[illegible]Unit name: **Computerprint** for NMT betjeningsbox.

Unit:Print.N13A1.

Diagram : 81058-1E3



Rettet: 5-8-81 JH
13-1-82 LBU
12-5-82 JH/AS

Cable connections for NMT cradle AP 3000
N06

AP-RADIOTELEFON

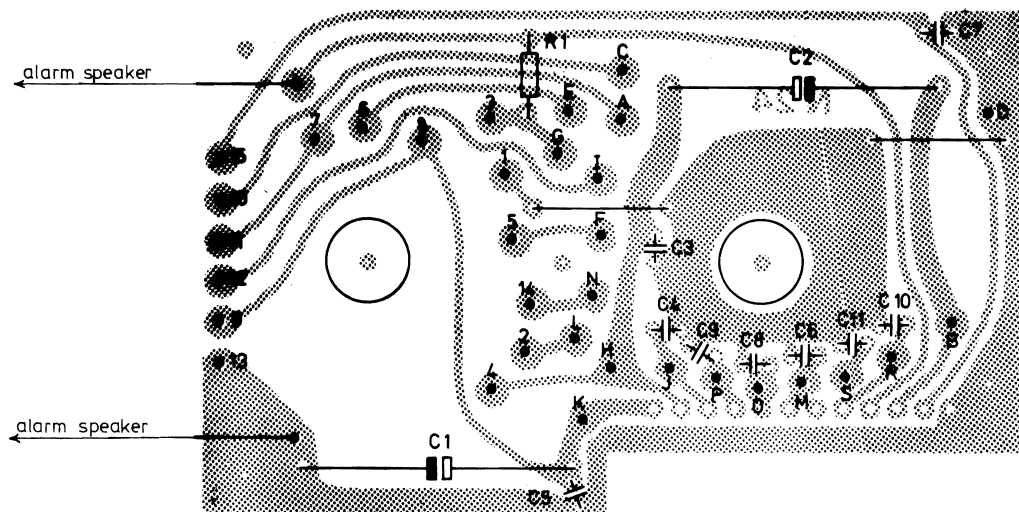
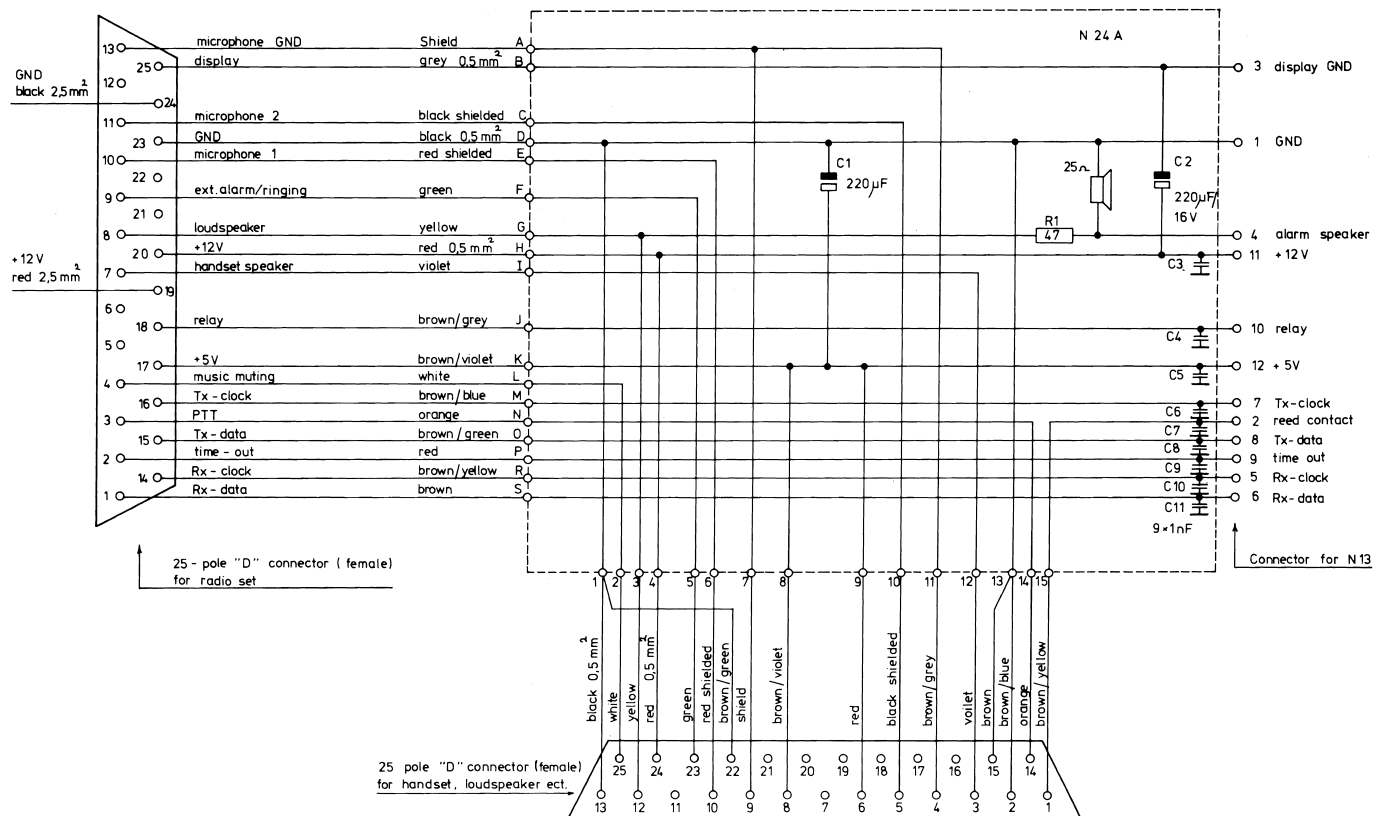
Tegn.: BC Kontr.:

29-4-81

Stykl. nr.:

Tegn. nr.:

81098 - 3E3



Endr. nr.:	Reitet:	Connections in remote control head N 24 A1	Tegn.: AMS	Kontr.:
		ap radiotelefon ars	82-5-6	
			Tegn. nr.:	82038-2E3

PARTS LIST

Date: 82-06-24

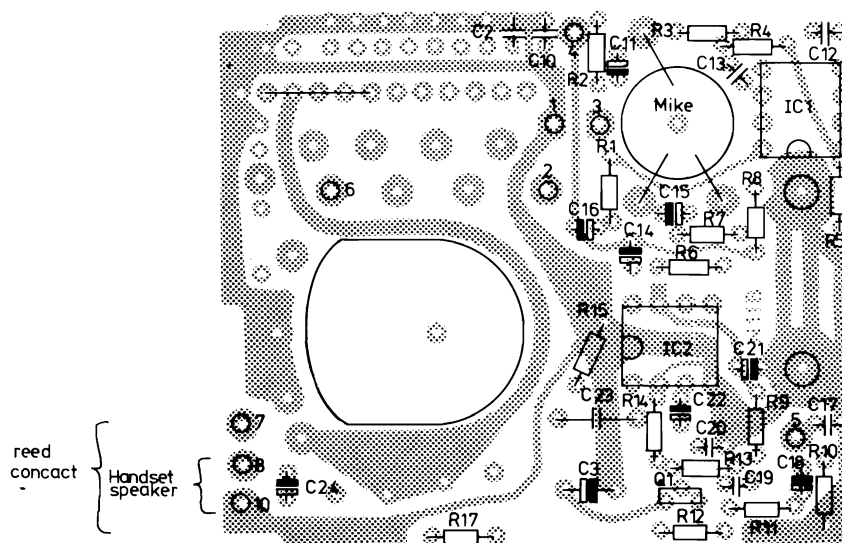
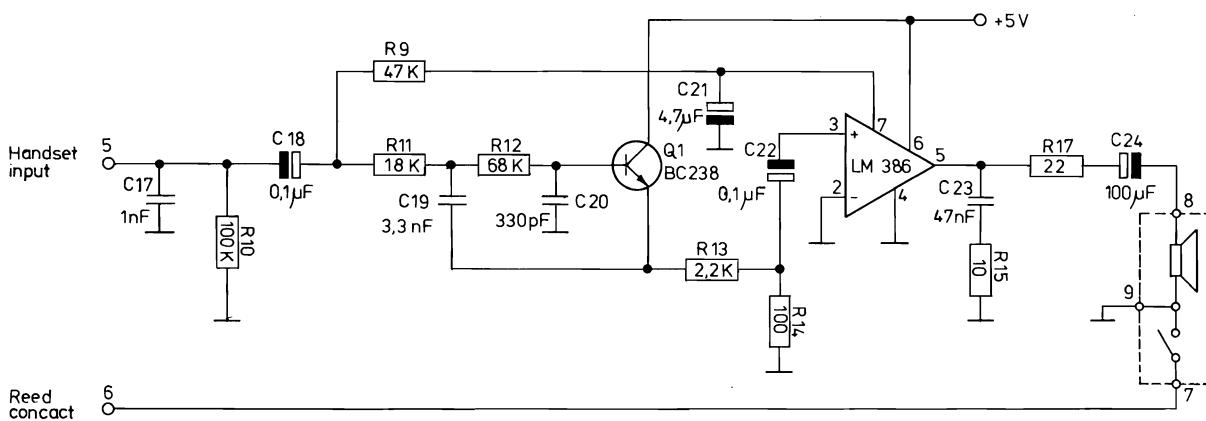
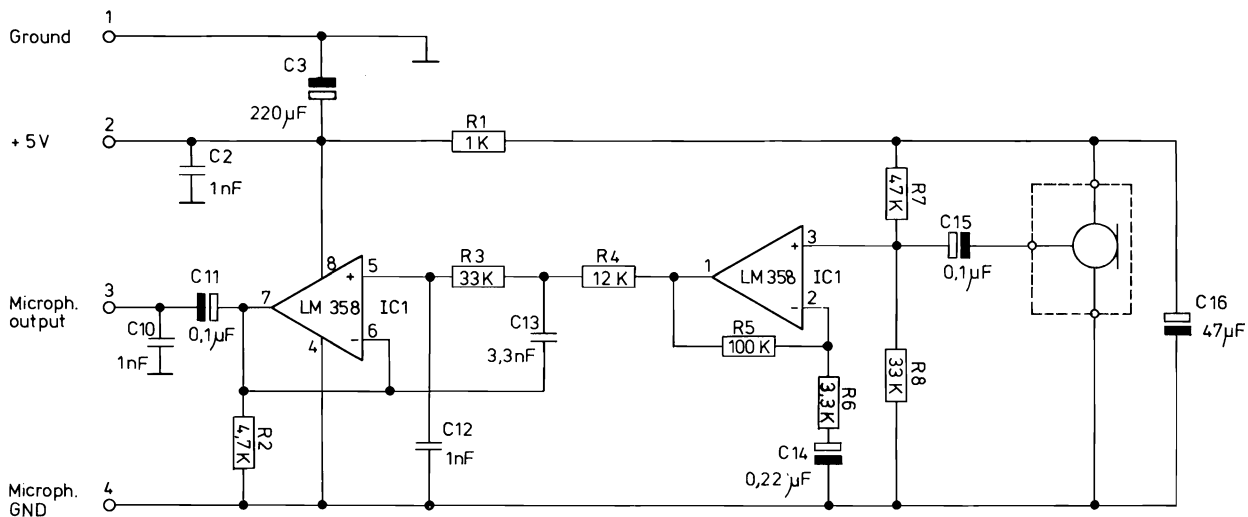
Page: 1.1

Prod. mod. no:

AP type: 3000

[illegible]Unit name: **Samleprint for fjernbetjeningsbox.NMT.**Unit: **Print.N24A1.**

Diagram: 82038-2E3



Ændr. nr.:	Rettet:	Voice amplifier for passive handset NMT N11 B2	Tegn.: AS	Kontr.:
			82-3-3	
		AP-RADIOTELEFON A/s	Tegn. nr.:	82040-3E3

PARTS LIST

Date: 82-06-24

Page: 1.2

Prod. mod. no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
06-214	1	Frakolyt 220μF.6V.	C3	
09-080	1	IC LM358N	IC1	
09-250	1	" LM386N	IC2	
11-406	1	Ker.kond. 330pF.	C20	
11-409	4	" 1nF.	C2-10-12-17	
11-414	2	" 3,3nF.	C13-19	
11-493	1	Kondensator,MKT 47nF.	C23	
11-500	4	Tantal 0,1μF.35V.	C11-15-18-22	
11-504	1	" 4,7μF.10V.	C21	
11-509	1	" 47μF.6,3V.	C16	
11-510	1	" 100μF.3V.	C24	
11-516	1	" 0,22μF.35V.	C14	
13-259	1	Modstand 10Ω. CR16 1/8W.	R15	
13-263	1	" 22Ω. "	R17	
13-271	1	" 100Ω. "	R14	
13-283	1	" 1KΩ. "	R1	
13-287	1	" 2,2KΩ. "	R13	
13-289	1	" 3,3KΩ. "	R6	
13-291	1	" 4,7KΩ. "	R2	
13-296	1	" 12KΩ. "	R4	
13-298	1	" 18KΩ. "	R11	
13-300	2	" 33KΩ. "	R3-8	
13-302	2	" 47KΩ. "	R7-9	
13-304	1	" 68KΩ. "	R12	
13-306	2	" 100KΩ. "	R5-10	
16-511/2	1	Printplade N11B.		
19-117	1	Transistor BC238B.E-line	Q1	

Unit name: Mikrofon og telefonforstærker for fjern-
betjening.NMT.

Unit: Print.N11B2.

Diagram: 82040-3E3

PARTS LIST

Date: 82-06-24

Page: 2.2

Prod. mod. no:

AP type: 3000

[illegible]

Unit name: Mikrofon og telefonforstærker for fjern-
betjening.NMT.

Unit:Print.N11B2.

Diagram: 82040-3E3

PARTS LIST

Date: 82-06-24

Page: 2.2

Prod. mod. no:

AP type: 3000

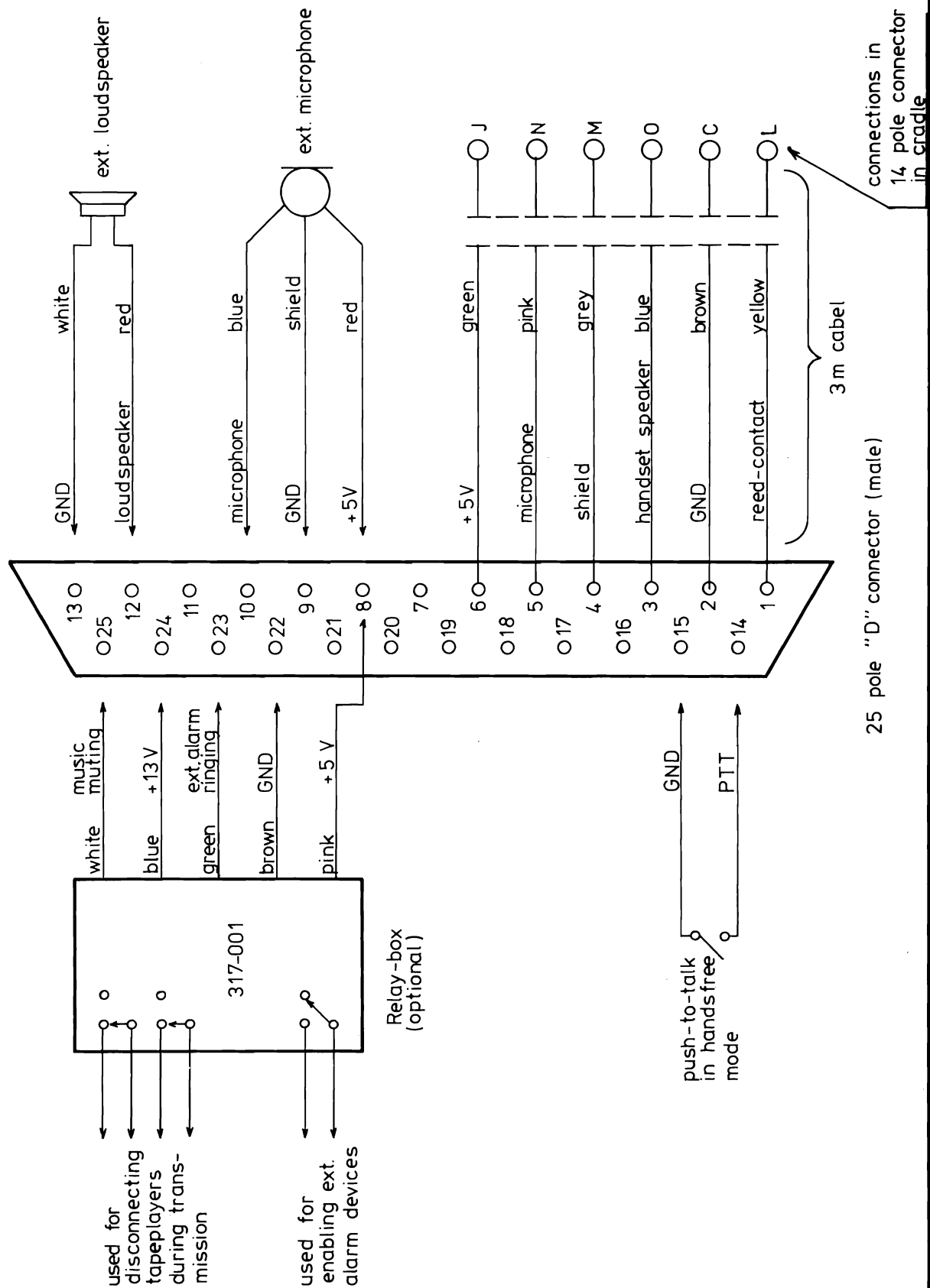
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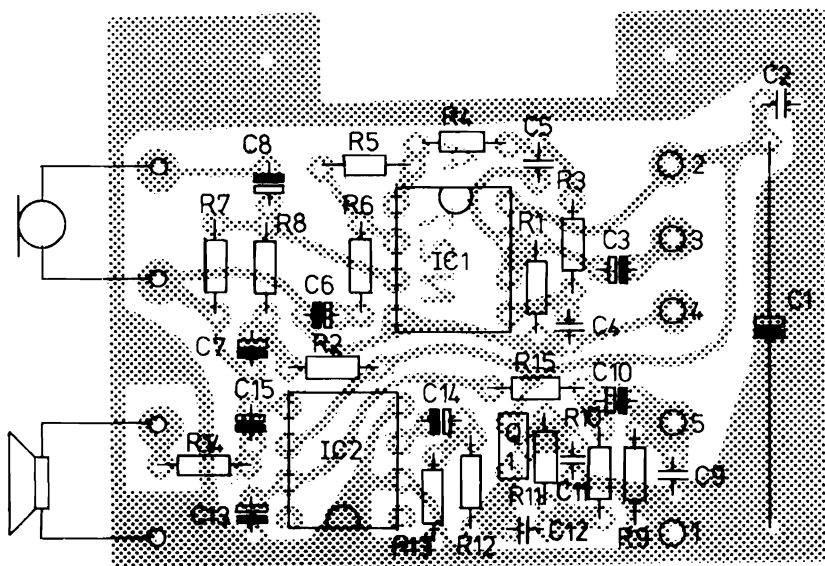
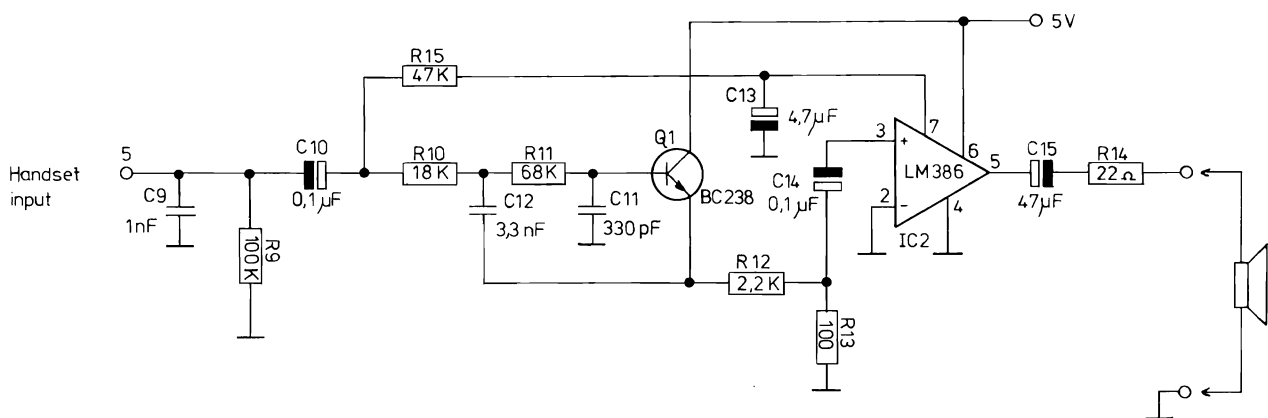
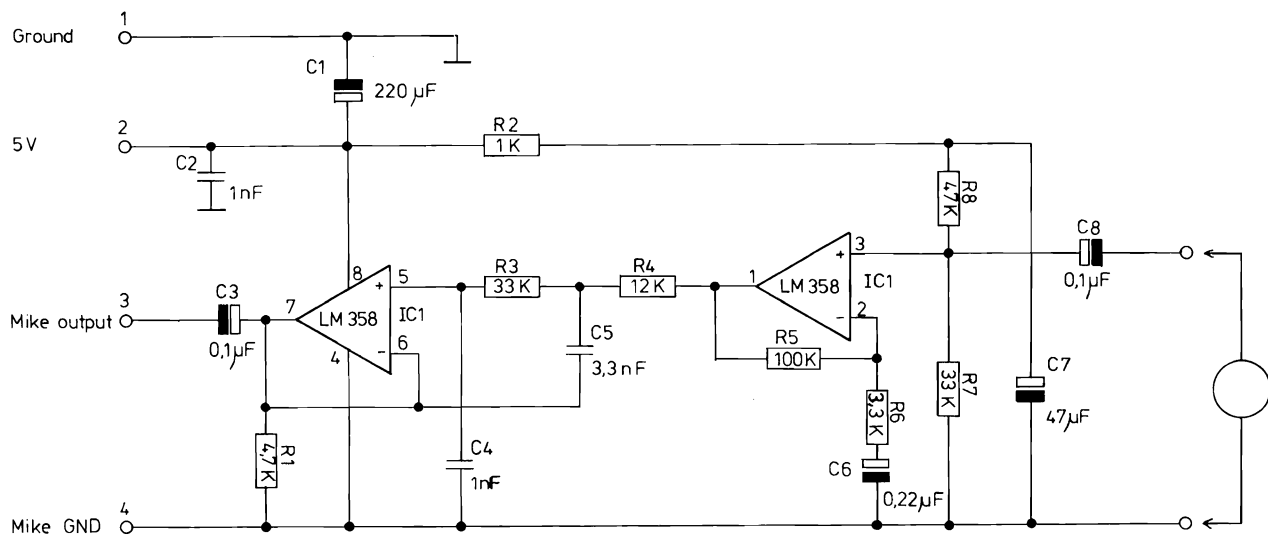
Unit name: Mikrofon og telefonforstærker for fjern-
betjening.NMT.

Unit: **Print.N11B2.**

Diagram: 82040-3E3

Ændr. nr.:	Rettet:	Connections for handset and optional devices	Tegn.: AMS	Kontr.:
			82-06-16	
		AP-RADIOTELEFON A/s	Tegn. nr.:	
			82039 -4E3	





Ændr. nr.:	Rettet:	Voice amplifier for Ackermann handset N27A1	Tegn.: 82-3-30	Kontr.:
			AS	
		AP-RADIOTELEFON A/s	Tegn. nr.:	82036 -3E3

PARTS LIST

Date: 82-06-24

Page: 1.1

Prod. mod. no:

AP type: 3000

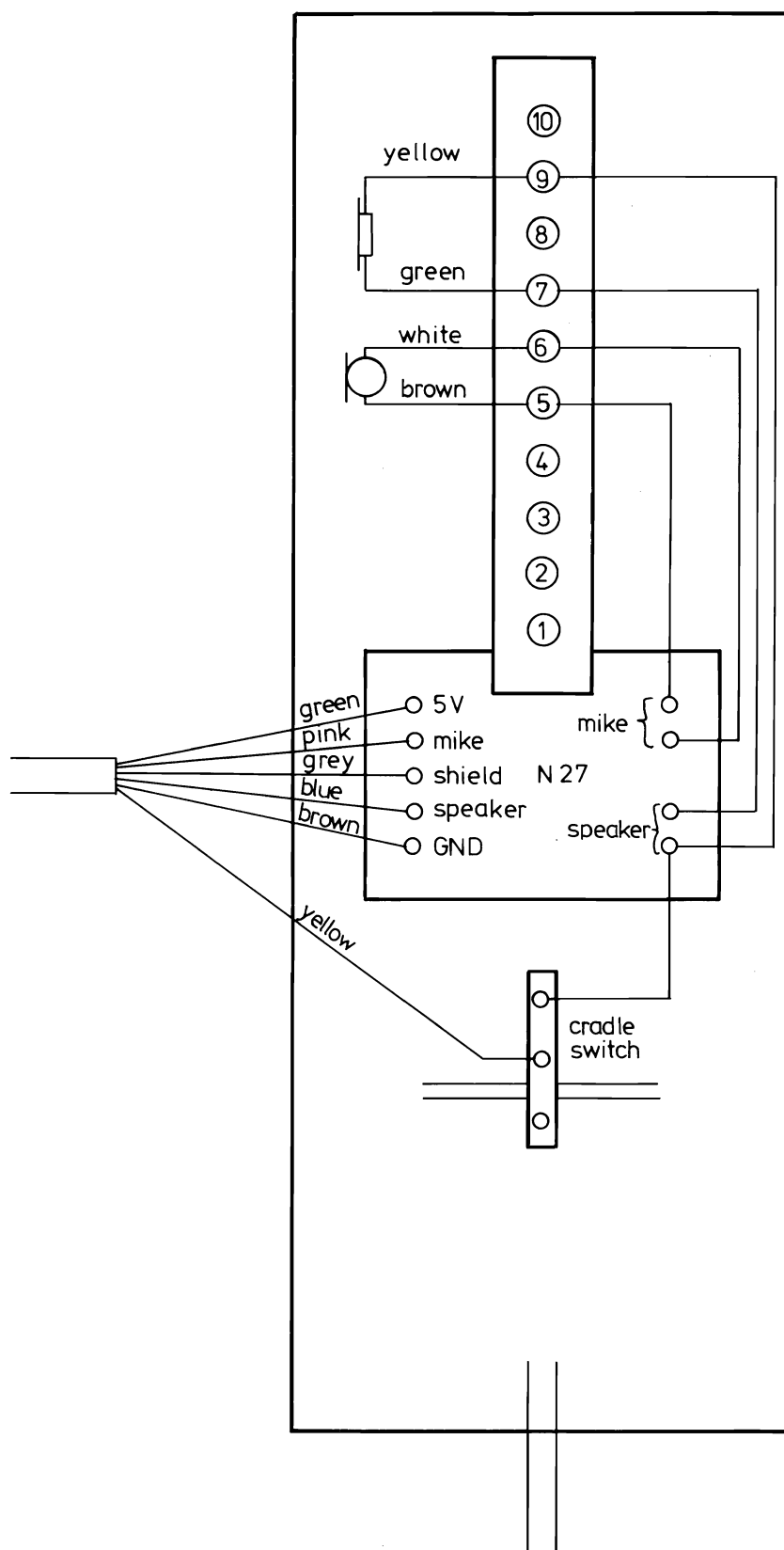
Code no	no	Component		Pos.	Rem.
05-025	1	Elektrolyt	220 μ F.16V.	C1	
09-080	1	IC	LM358N	IC1	
09-250	1	"	LM386N-1	IC2	
11-406	1	Ker.kond.	330pF.	C11	
11-409	3	"	1nF.	C2-4-9	
11-414	2	"	3,3nF.	C5-12	
11-500	4	Tantal	0,1 μ F.35V.	C3-8-10-14	
11-505	1	"	4,7 μ F.25V.	C13	
11-509	2	"	47 μ F.6,3V.	C7-15	
11-513	1	"	0,22 μ F.35V.	C6	
13-263	1	Modstand	22 Ω . CR16 1/8W.	R14	
13-271	1	"	100 Ω . "	R13	
13-283	1	"	1K Ω . "	R2	
13-287	1	"	2,2K Ω . "	R12	
13-289	1	"	3,3K Ω . "	R6	
13-291	1	"	4,7K Ω . "	R1	
13-296	1	"	12K Ω . "	R4	
13-298	1	"	18K Ω . "	R10	
13-300	2	"	33K Ω . "	R3-7	
13-302	2	"	47K Ω . "	R8-15	
13-304	1	"	68K Ω . "	R11	
13-306	2	"	100K Ω . "	R5-9	
16-527/1	1	Printplade	N27A.		
19-117	1	Transistor	BC238B.E-line	Q1	
14-024	9	Eye-lett nitter	1,5x0,2x3mm. 7340		

Unit name: Lyd forstærker for Acki mikrotelefon.

Unit: Print.N27A1.

Diagram: 82036-3E3

Handset cradle, bottom view



Ændr. nr.:	Rettet:	Connections for Ackermann handset for use with NMT	Tegn.: AMS 82-06-16	Kontr.:
		AP-RADIOTELEFON A/s	Tegn. nr.: 82037-4E3	

Relay unit for external alarm and music muting

Functional description

The relay unit contains circuitry for two separate functions which for practical reasons have been built on a common circuit board.

One is the external alarm function which makes it possible to activate a horn, a bell or any other alarm device, indicating a call received. As the traffic horn is normally used, the relay unit activates the horn relay for approximately 0,7 sec. when a call is received. Once the relay has been activated, it is disabled for the next 30 sec. to avoid sounding the horn on each ringing signal.

Maximum load on the internal relay contacts is 2 A, so normally these contacts must in turn be connected to a remote relay via a ON/OFF switch on the dashboard.

If the relay must be activated on each ringing signal, the 30 sec. timer can be disabled by removing resistor R 6. If, on the other hand, the relay must be continuously activated once a call is received, this is done by shortcircuiting capacitor C 2. In this case the relay is reset when telephone is turned OFF.

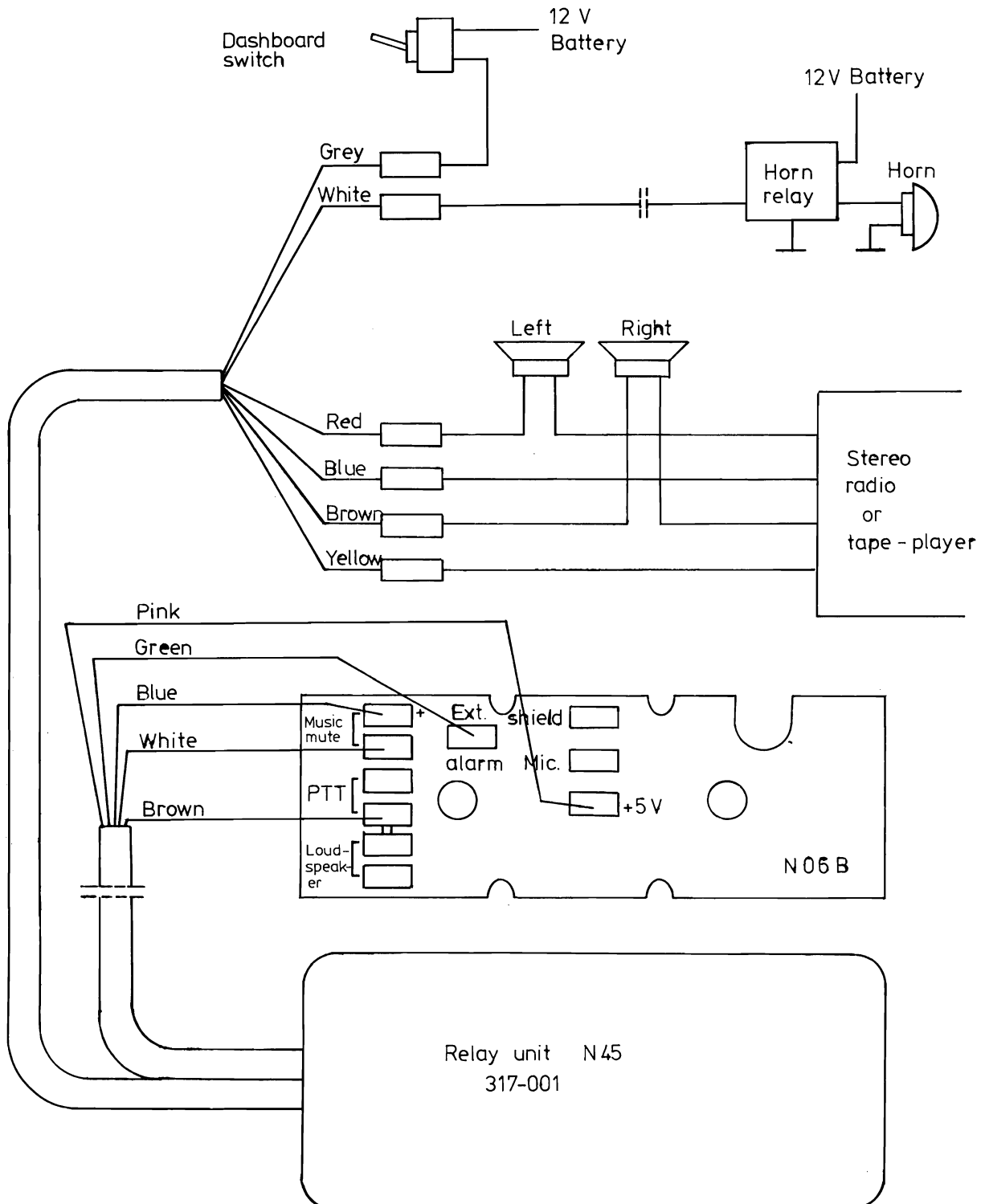
The other function is the music muting, which is used to disconnect stereospeakers of car radio or tapeplayer when transmitter is keyed (conversation mode).

The two functions can be used independent of each other.

Relay box for external alarm and music muting

Wiring instructions

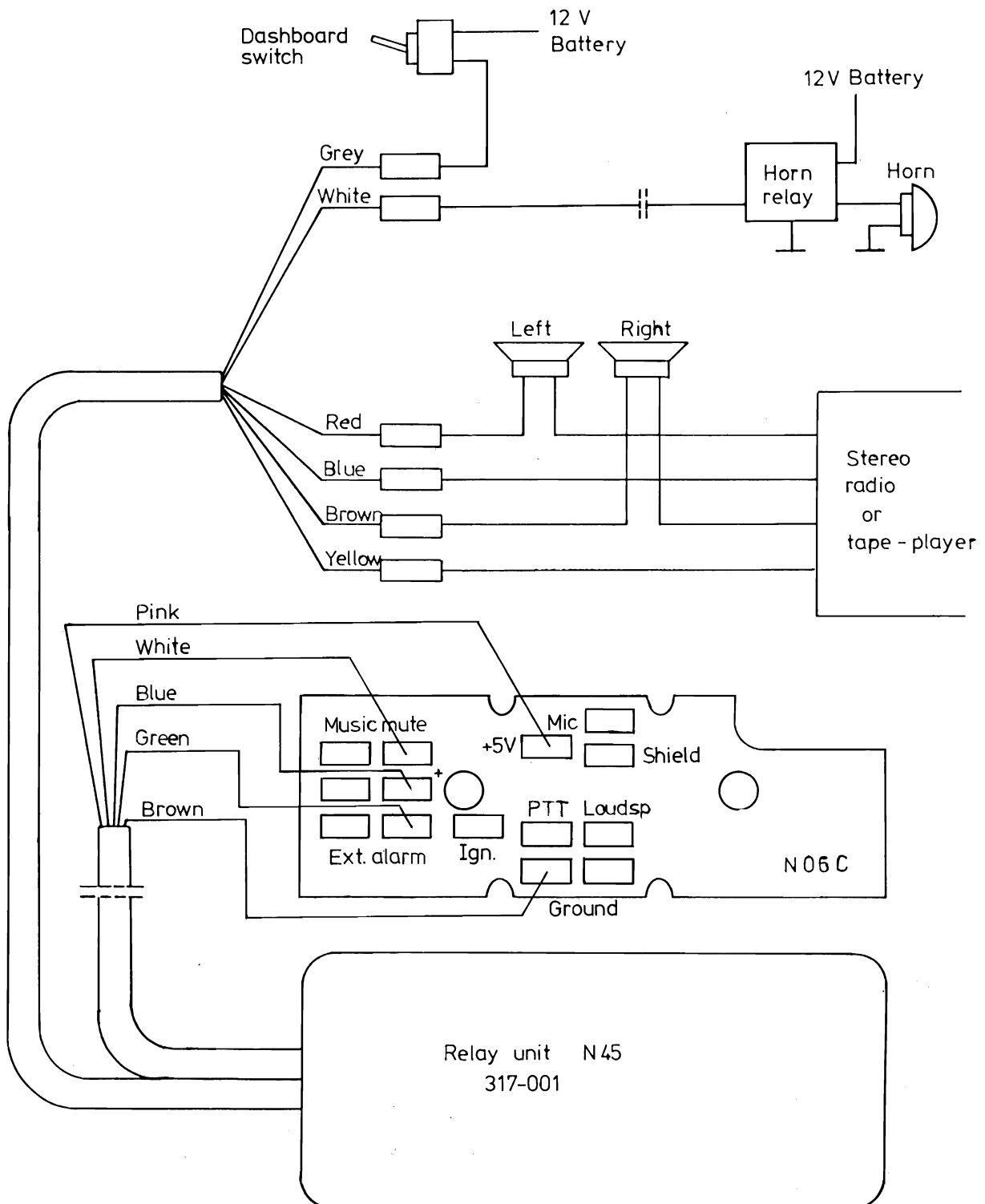
This instruction is valid only for NMT sets with cradle PCB named N 06 B. If PCB is N 06 A, see separate instructions.

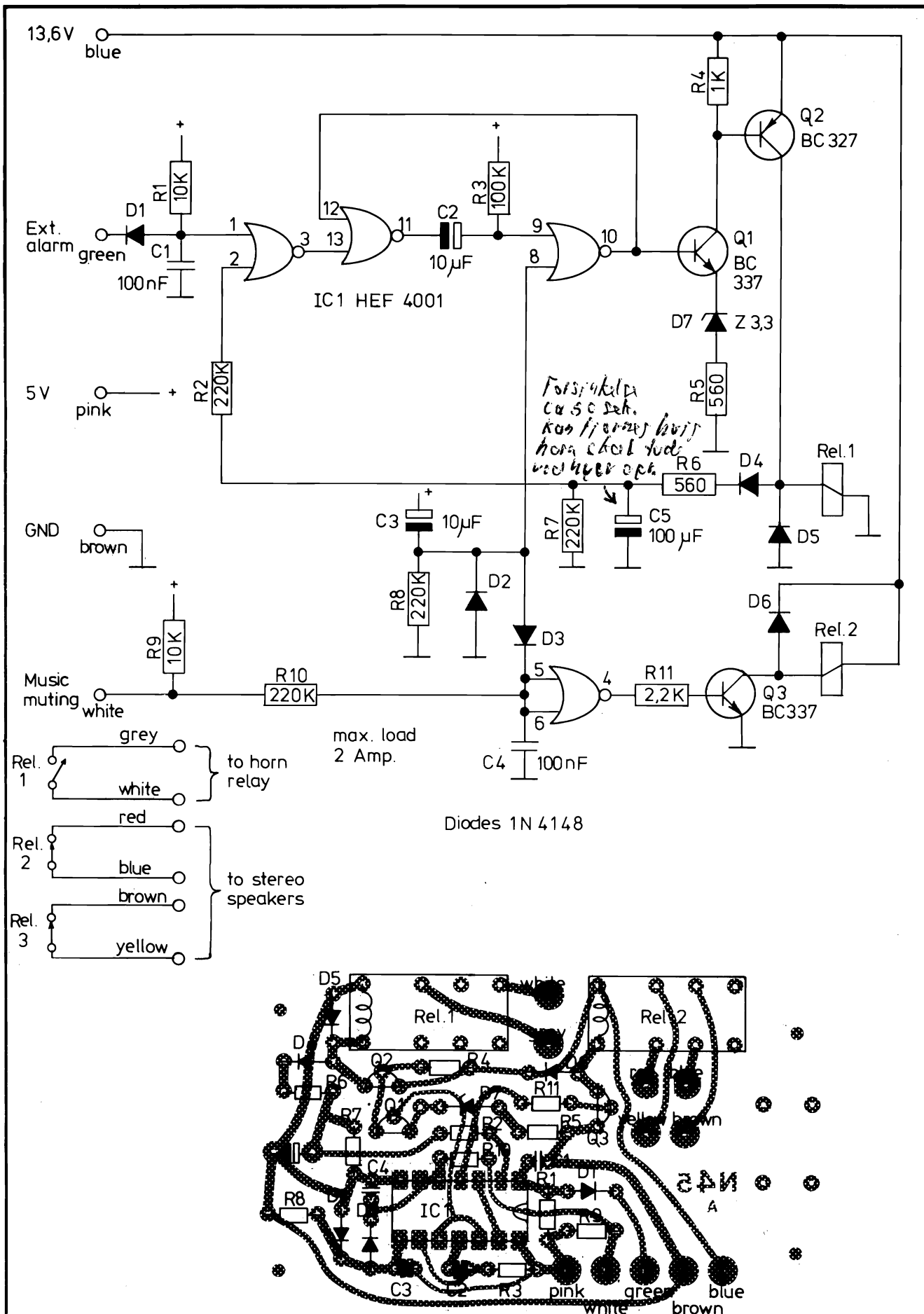


Relay box for external alarm and music muting

Wiring instructions

This instruction is valid only for NMT sets with cradle PCB named N 06 C. If PCB is N 06 A, see separate instructions.





Ændr. nr.:	Rettet:	Relay unit for external alarm and music muting	Tegn.: AS	Kontr.:
			82-06-10	
		AP-RADIOTELEFON A/s	Tegn. nr.:	
			82 171 - 4E3	

PARTS LIST

Date: 82-06-04

Page: 1.1

Prod. mod. no:

AP type. 3000

[illegible]Unit name: **Print for hornrelæ.317-001.**Unit: **Print.N45A1.**

Diagram: 82171-4E3

Monteringsvejledning

for

relæbox for extern alarm og musikdæmpning i ældre NMT-anlæg

Denne monteringsvejledning er gældende for ældre NMT-anlæg, kendetegnet ved at kablet mellem NMT-app. og mikrotelefon er matsort og stift, samt at printet i ophæng for mikrotelefon er N 06 A.

Kablet i disse anlæg har ikke ledninger til begge relæboxens funktioner, hvorfor man kun kan benytte én af dem.

Normalt er terminalen mrk. "ext. alarm" på print N 06 A ikke forbundet med denne funktion, men derimod med musik dæmpe - funktionen (music muting). Ønskes derfor denne funktion, tilsluttes relæboxen som vist på fig. 1.

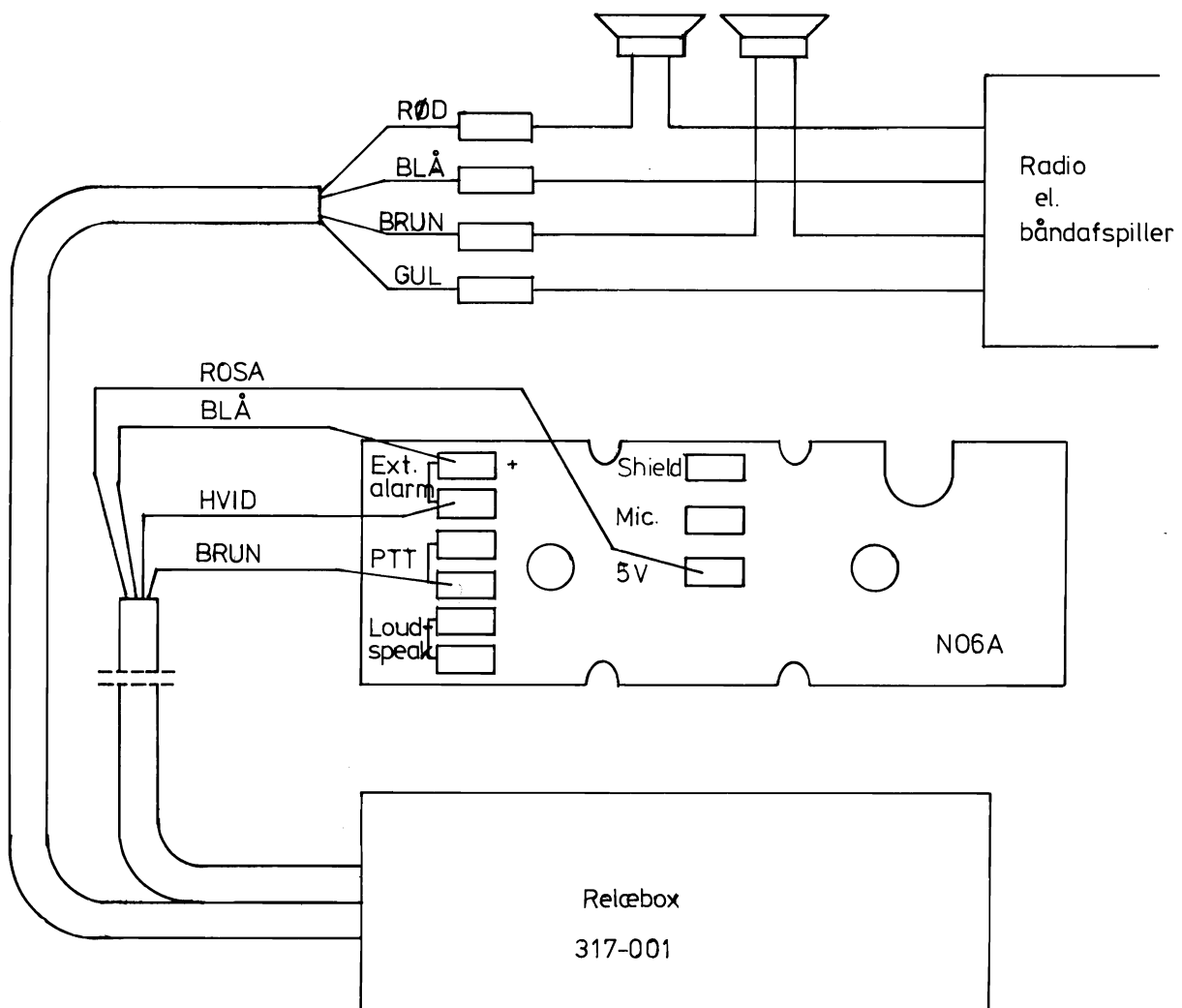


Fig. 1 musikdæmpning på ældre NMT-anlæg

Ønskes derimod ext. alarm - funktionen må en ledning i det 25-polede stik til selve NMT - apparatet flyttes.

Det drejer sig om den hvide ledning på ben nr. 4 som skal flyttes til ben nr. 9.

Herefter tilsluttes relæboxen som vist på fig. 2.

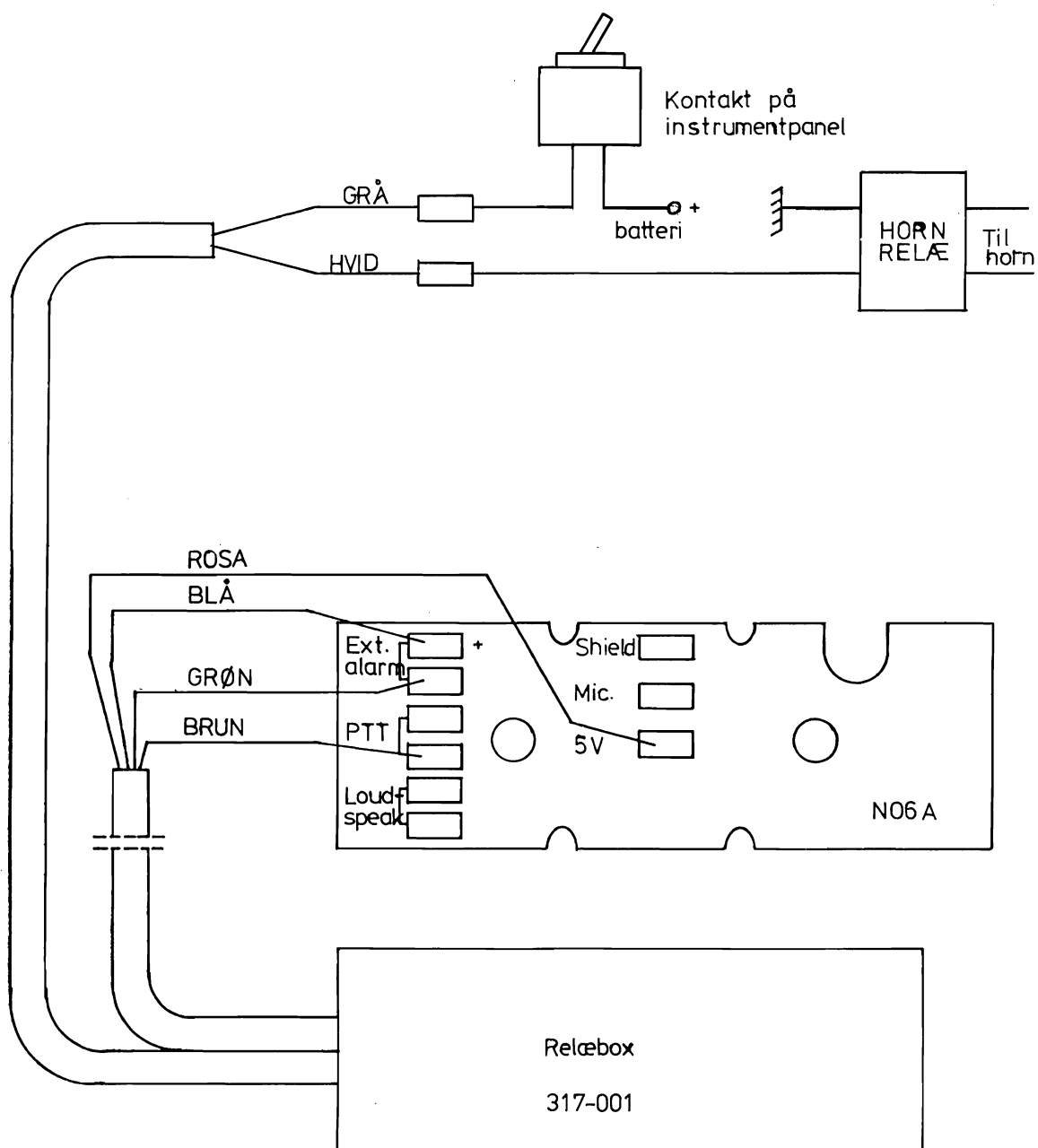
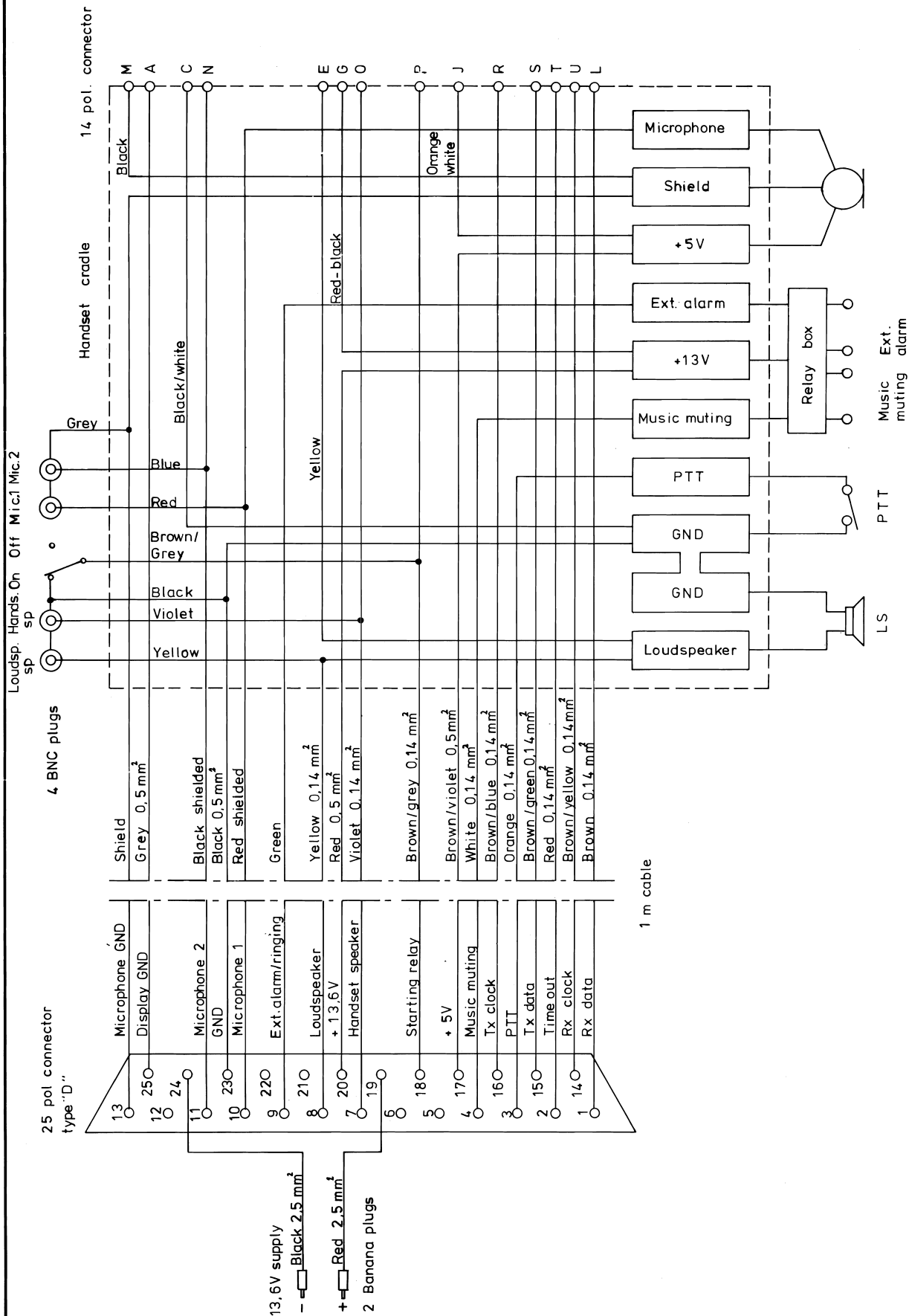


Fig. 2 Hornrelæ på ældre NMT-anlæg



Rettet: 13-1-82 LBU

Cable connections for NMT service cradle AP 3000

AP-RADIOTELEFON

Tegn.: BC

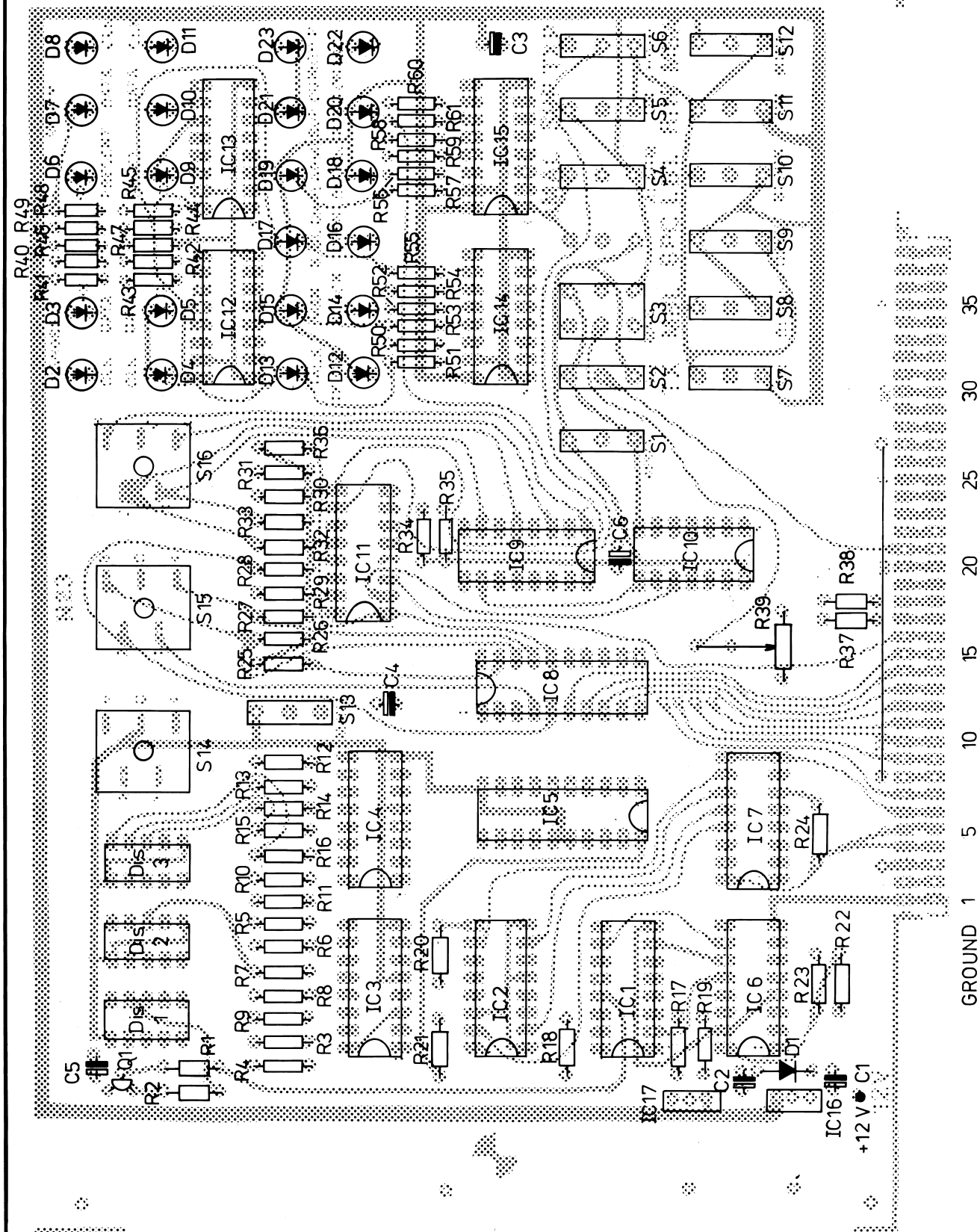
15-11-81

Kontr.:

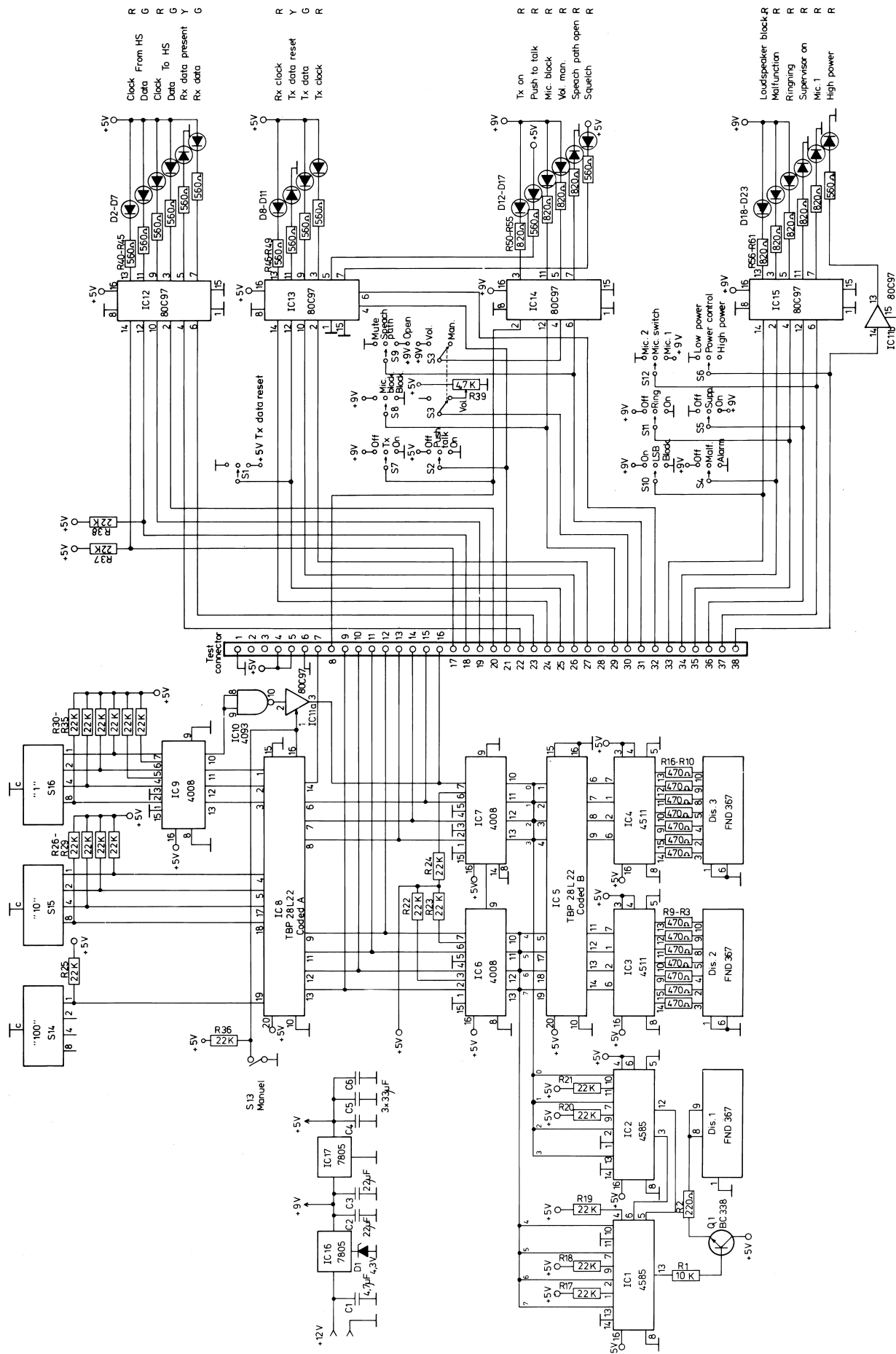
Stykl. nr.: 315-004

Tegn. nr.:

81204 - 3E3



Rettet:	NMT TESTBOX N 23	Tegn.: 6-8-81 AMS	Kontr.:	
		Stykl. nr.:		
		Tegn. nr.:		
		AP-RADIOTELEFON A/s	81117-4E3	



Andr. nr.:	Reitet:	Testbox NMT Print N 23A1	Tegn.: ANS 18-6-81	Kontroll:
		AP-RADIOTELEFON 4/s	Tegn. nr.: 81117-2E3	

PARTS LIST

Date: 82-06-25

Page: 1.2

Prod. mod. no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
04-045	1	Diode, zener BZX83-C4V3	D1	
04-083	16	" ,lys Rød. 5053	D2-4-8-11-12-13-14-15-16-	
"		" , "	17-18-19-20-21-22-23	
04-084	2	" , " Gul. 5353	D6-9	
04-085	4	" , " Grøn. 5253	D3-5-7-10	
04-159	3	Display FND367	Displ. 1-2-3	
06-242	2	Fatning for IC 20pol.		
09-068	2	IC MC14511BCP	IC3-4	
09-072	1	" CD4093BE	IC10	
09-082	5	" MM80C97N	IC11-12-13-14-15	
09-087	3	" CD4008AE	IC6-7-9	
09-131	1	Isoleringsplade SIL33		
09-135	1	Isoleringsskive 105359. Assmann		
09-214	2	IC HEF4585BP	IC1-2	
09-224	2	" LM7805CT	IC16-17	
09-262	1	" TBP28L22. Kod: A	IC8	Råemne: 09-277
09-263	1	" TBP28L22. " : B	IC5	"
11-505	1	Tantal 4,7µF. 25V.	C1	
11-507	2	" 22µF. 16V.	C2-3	
11-508	3	" 33µF. 10V.	C4-5-6	
13-275	1	Modstand 220Ω. CRI6 1/8W.	R2	
13-279	14	" 470Ω. "	R3-4-5-6-7-8-9-10-11-12-13-14-15-16	
"		" " "		
13-280	13	" 560Ω. "	R40-41-42-43-44-45-46-47-48-49-51-55-61	
"		" " "		
13-282	9	" 820Ω. "	R50-52-53-54-56-57-58-59-60	
"		" " "		
13-295	1	" 10KΩ. "	R1	
13-299	22	" 22KΩ. "	R17-18-19-20-21-22-23-24-	

Unit name: Print for textbox. NMT. 319-050.

Unit: Print. N23A1.

Diagram: 81117-2E3

PARTS LIST

Date: 82-06-25

Page: 2.2

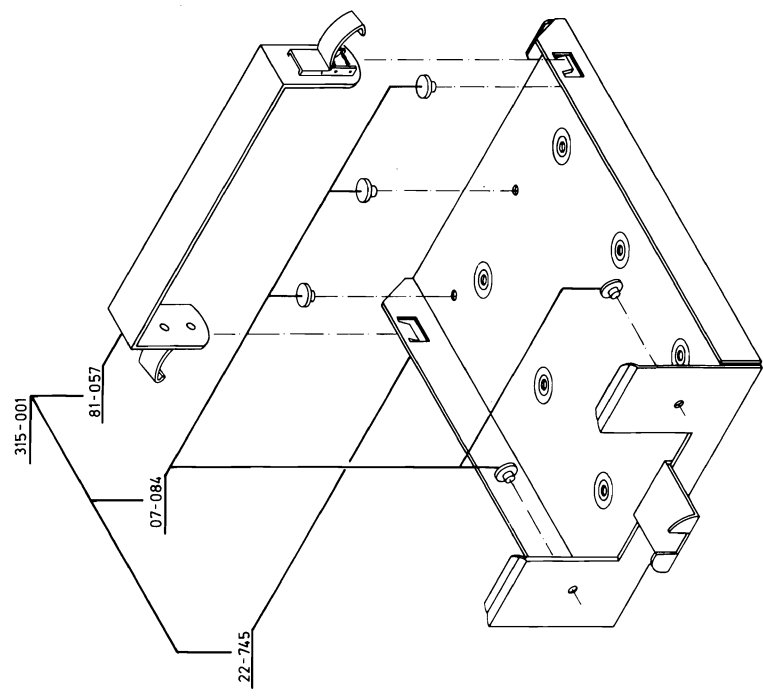
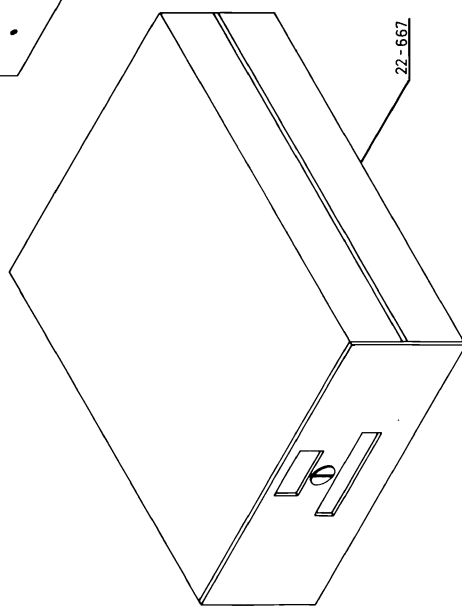
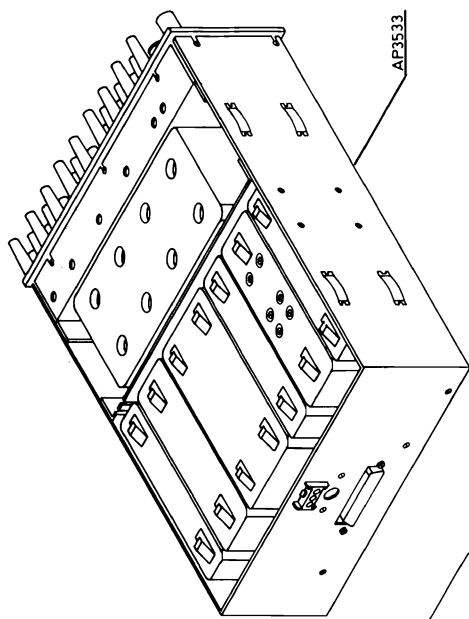
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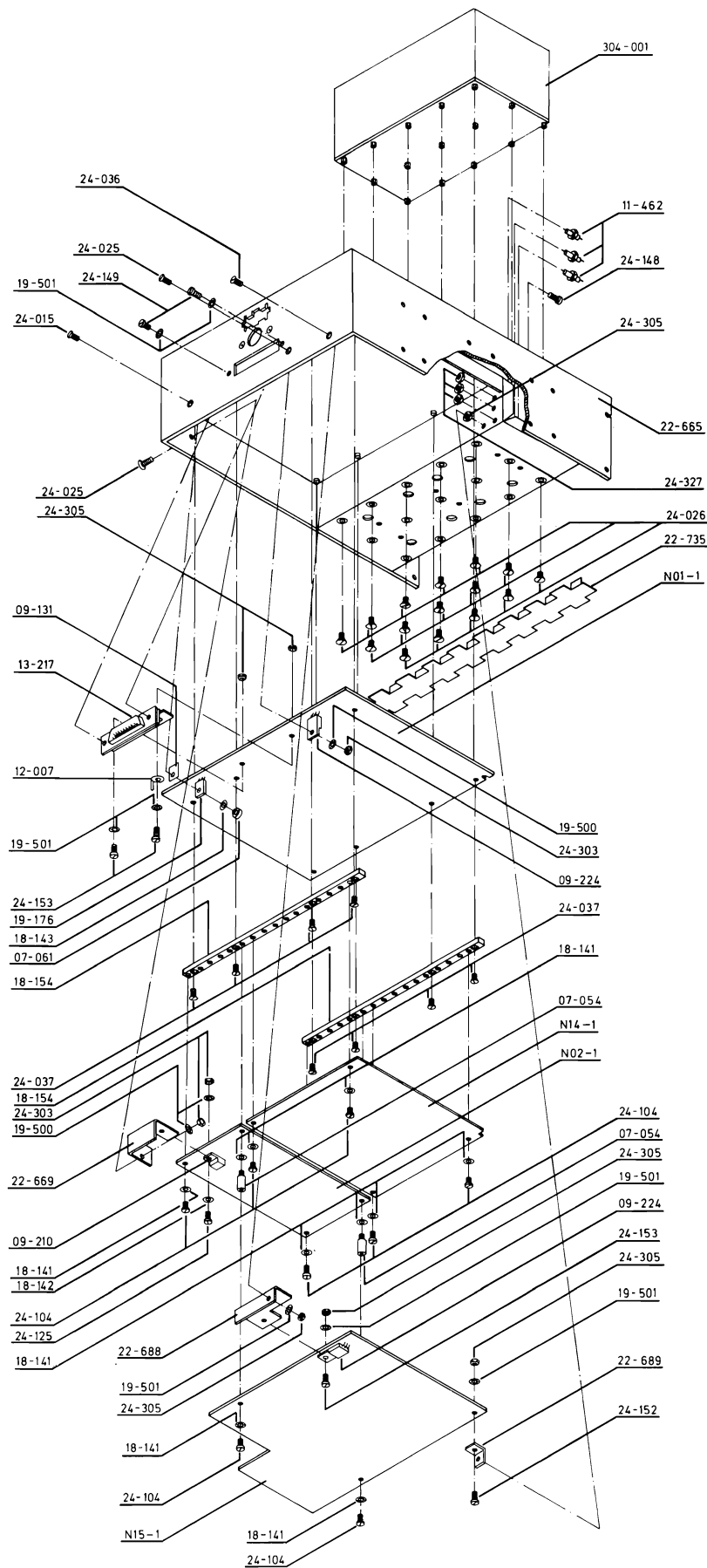
AP type: **3000**

[illegible]Unit name: **Print for textbox.NMT.319-050.**

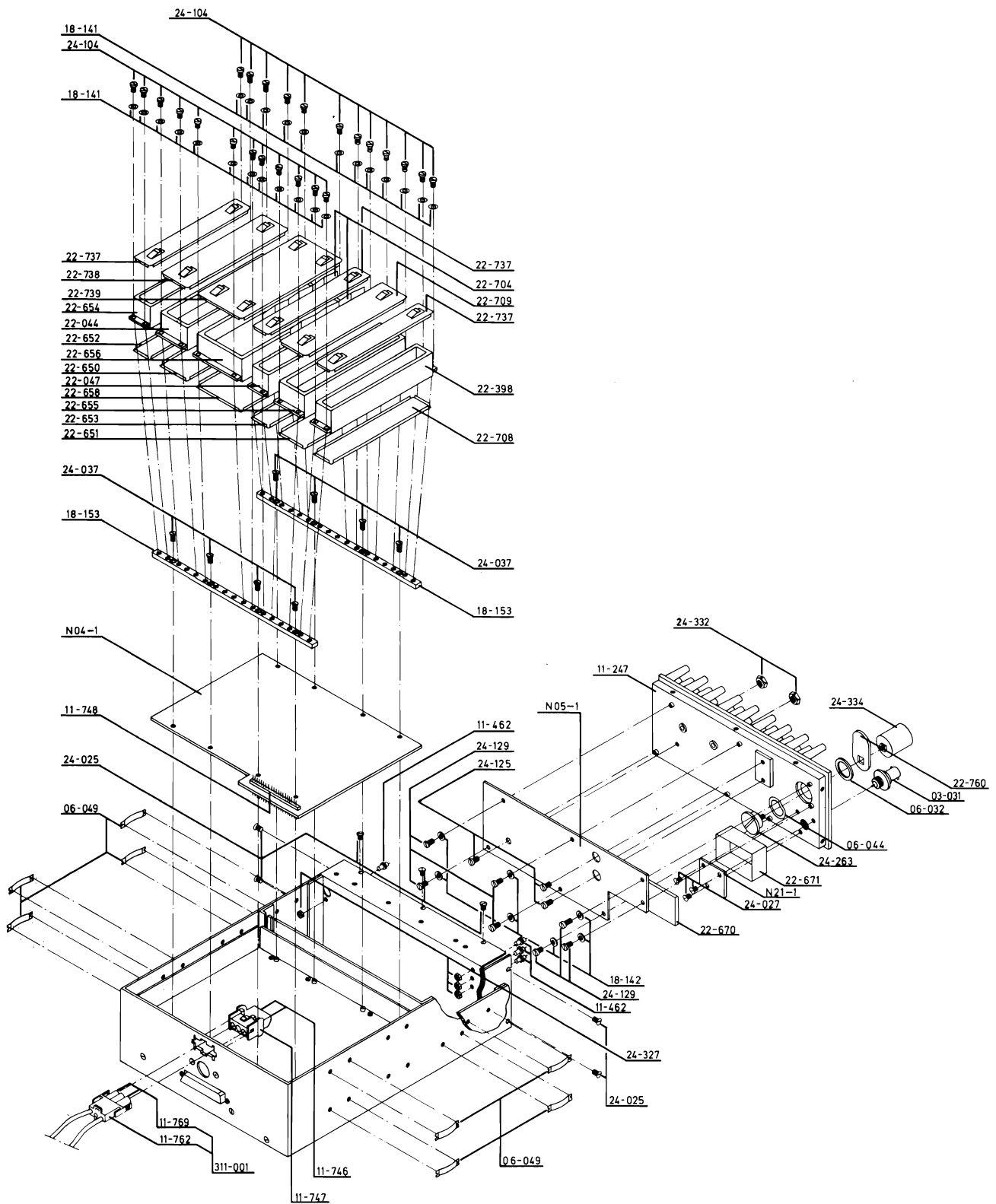
Unit:Print.N23A1.

Diagram: 81117-2E3

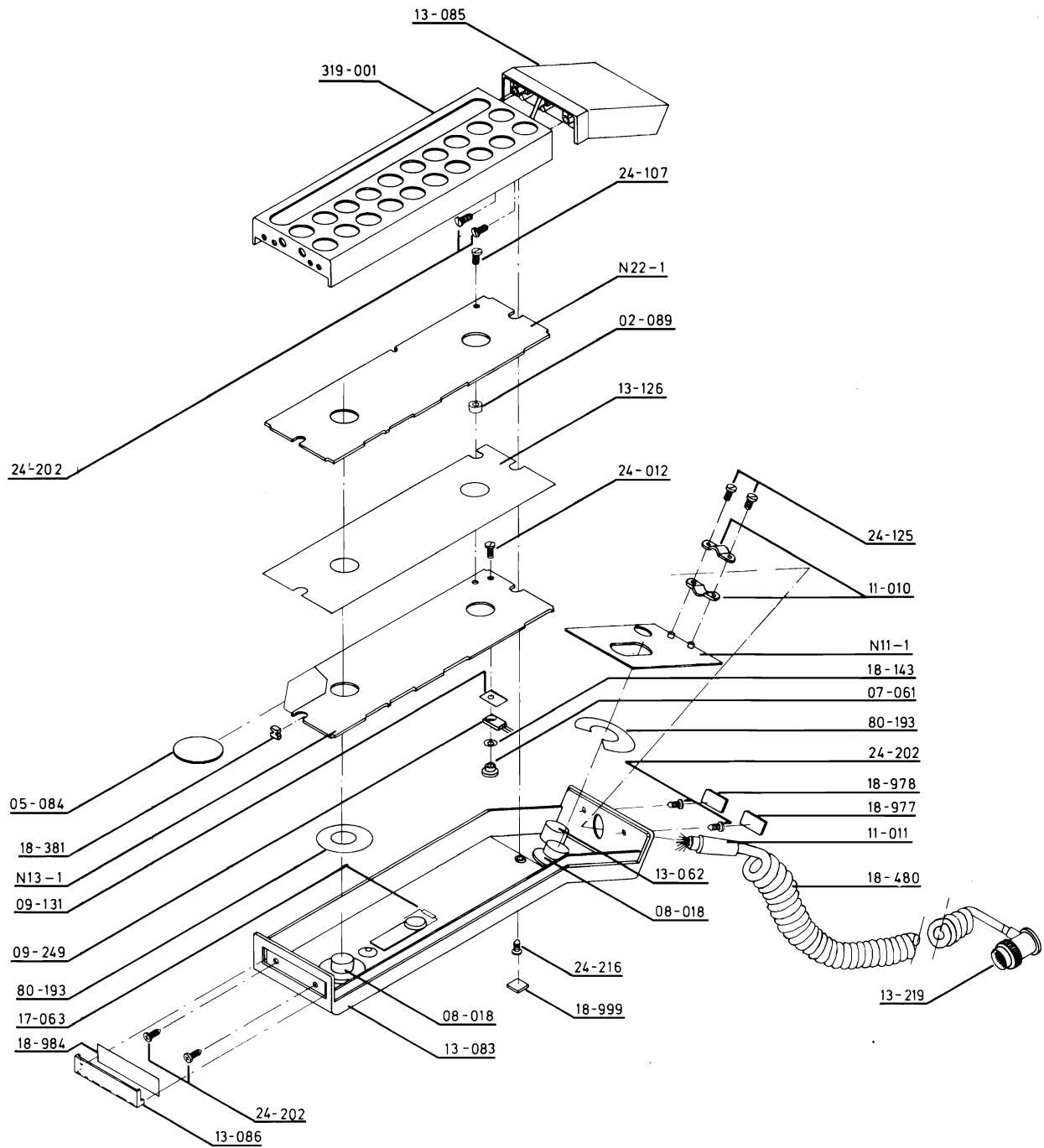




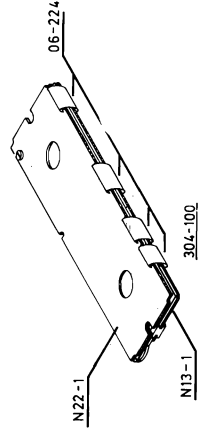
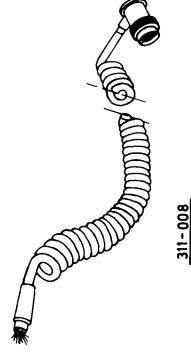
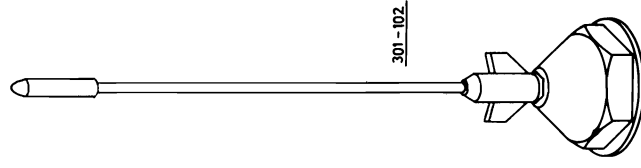
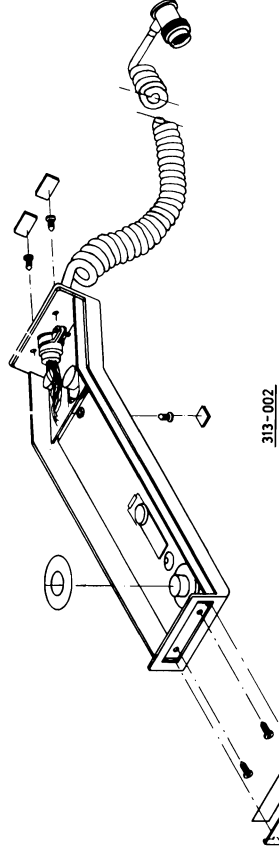
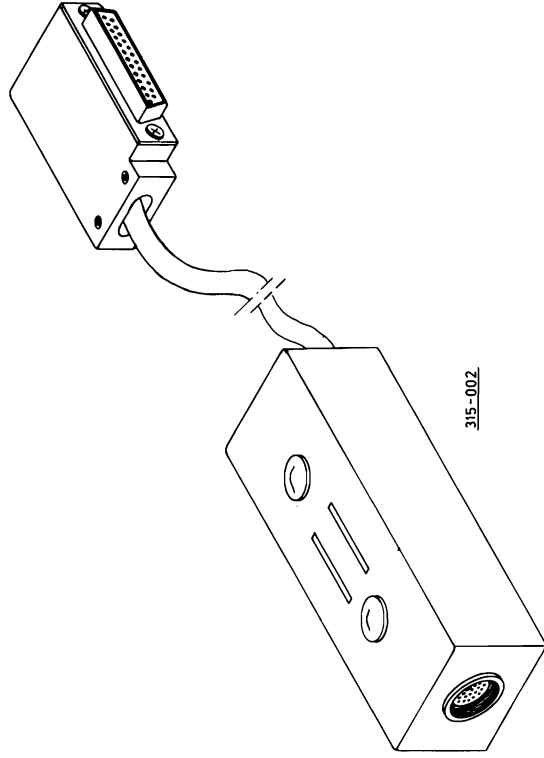
Exploded view of ap 3533
82091 - 4M3



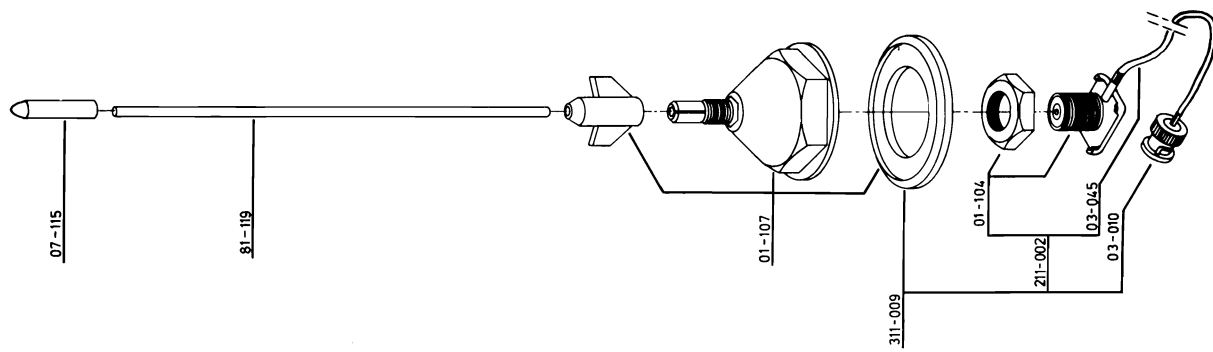
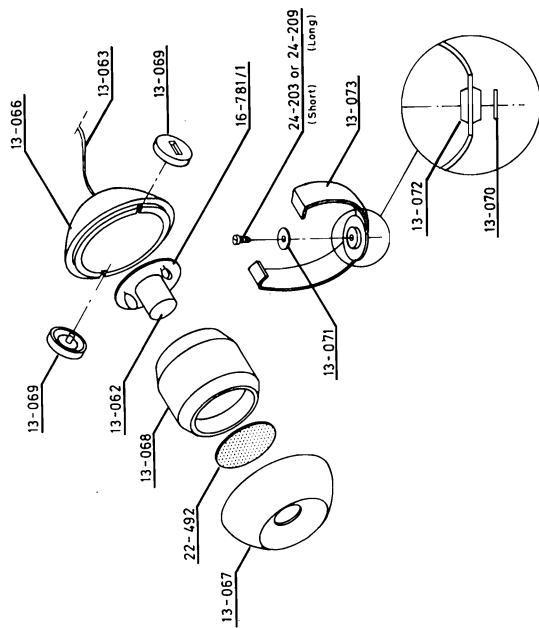
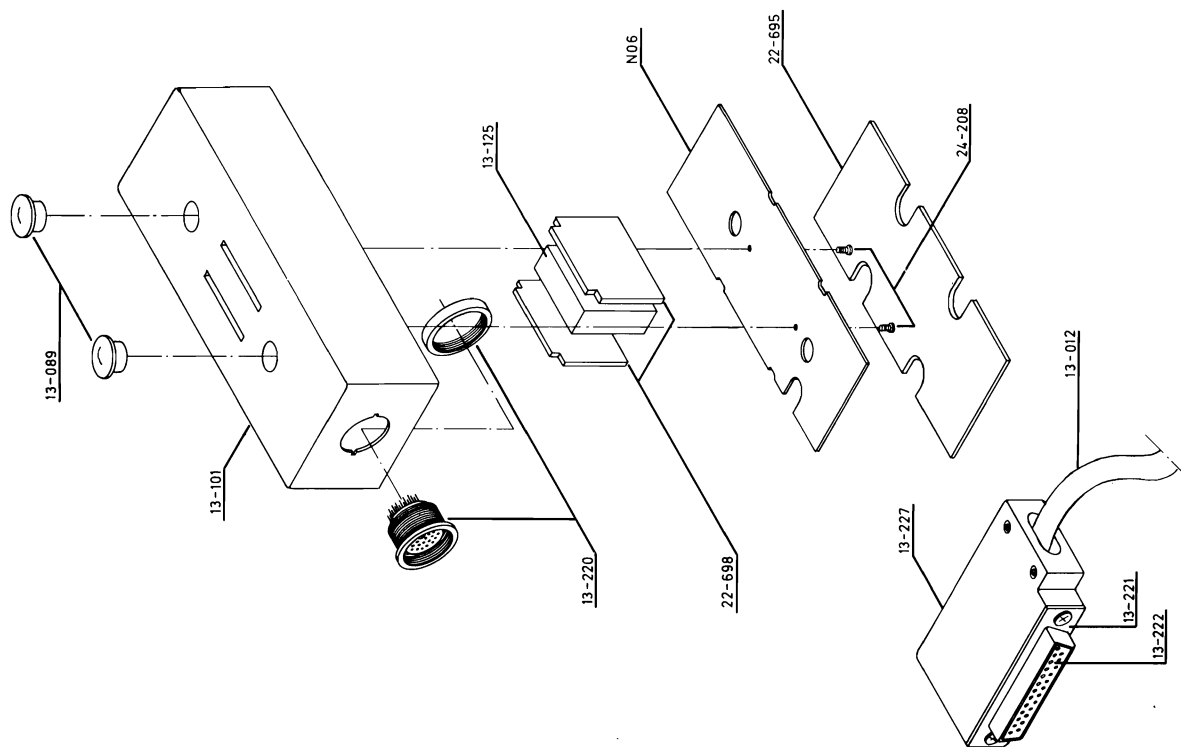
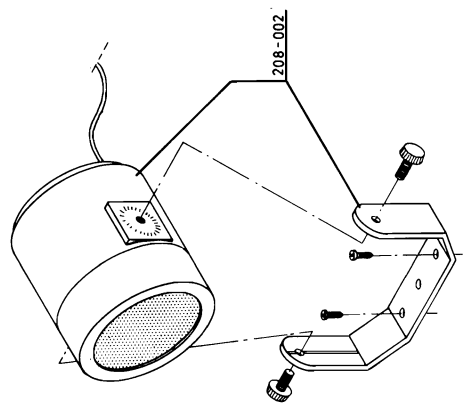
Exploded view of ap 3533
82092 - 4M3



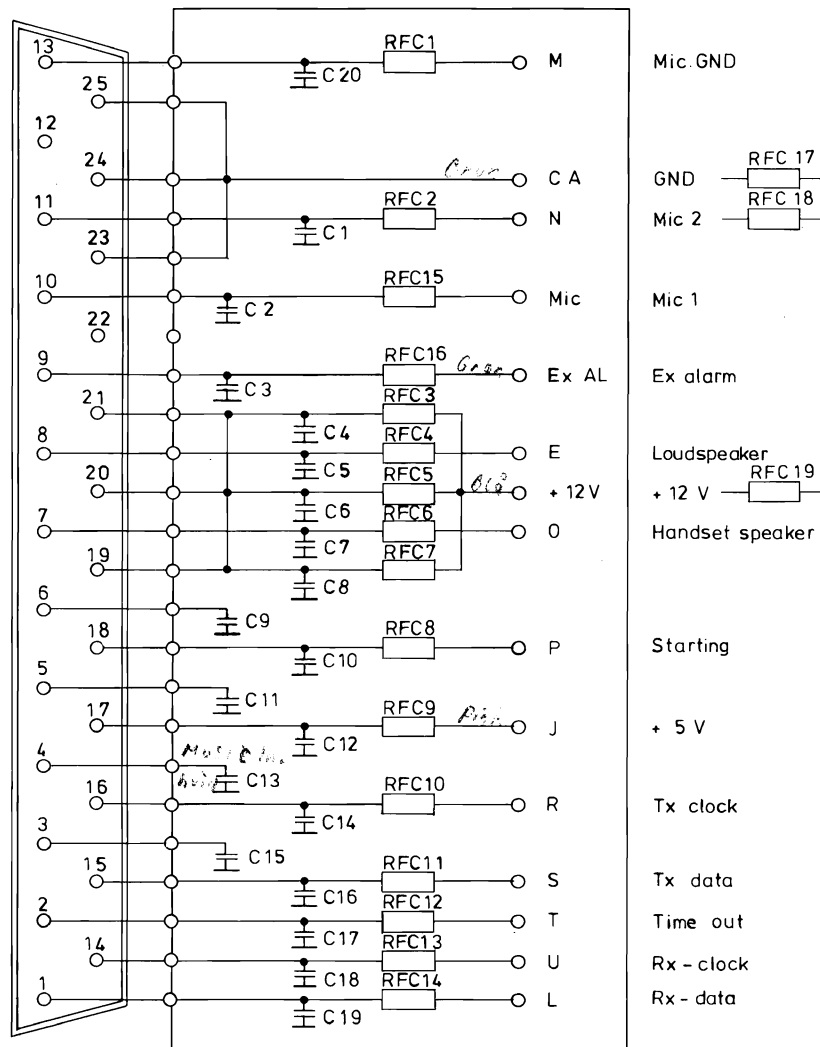
Exploded view of ap 3533
82093 - 4M3



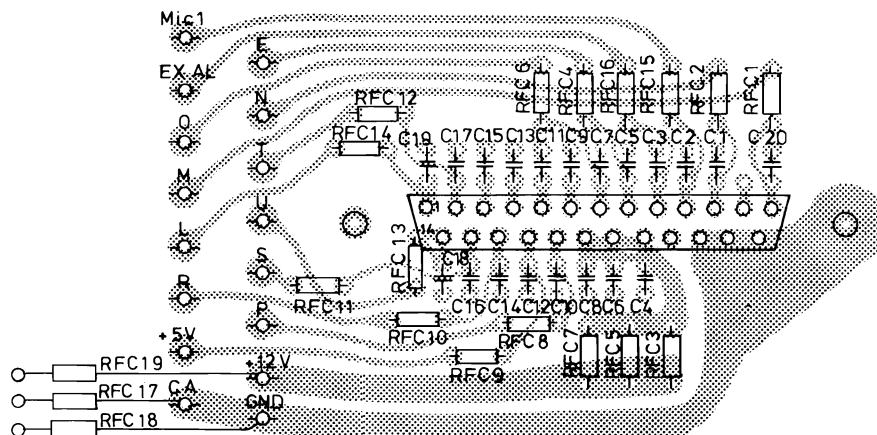
Exploded view of ap 3533
82094 - 4M3



Exploded view of ap 3533
82095 - 4M3

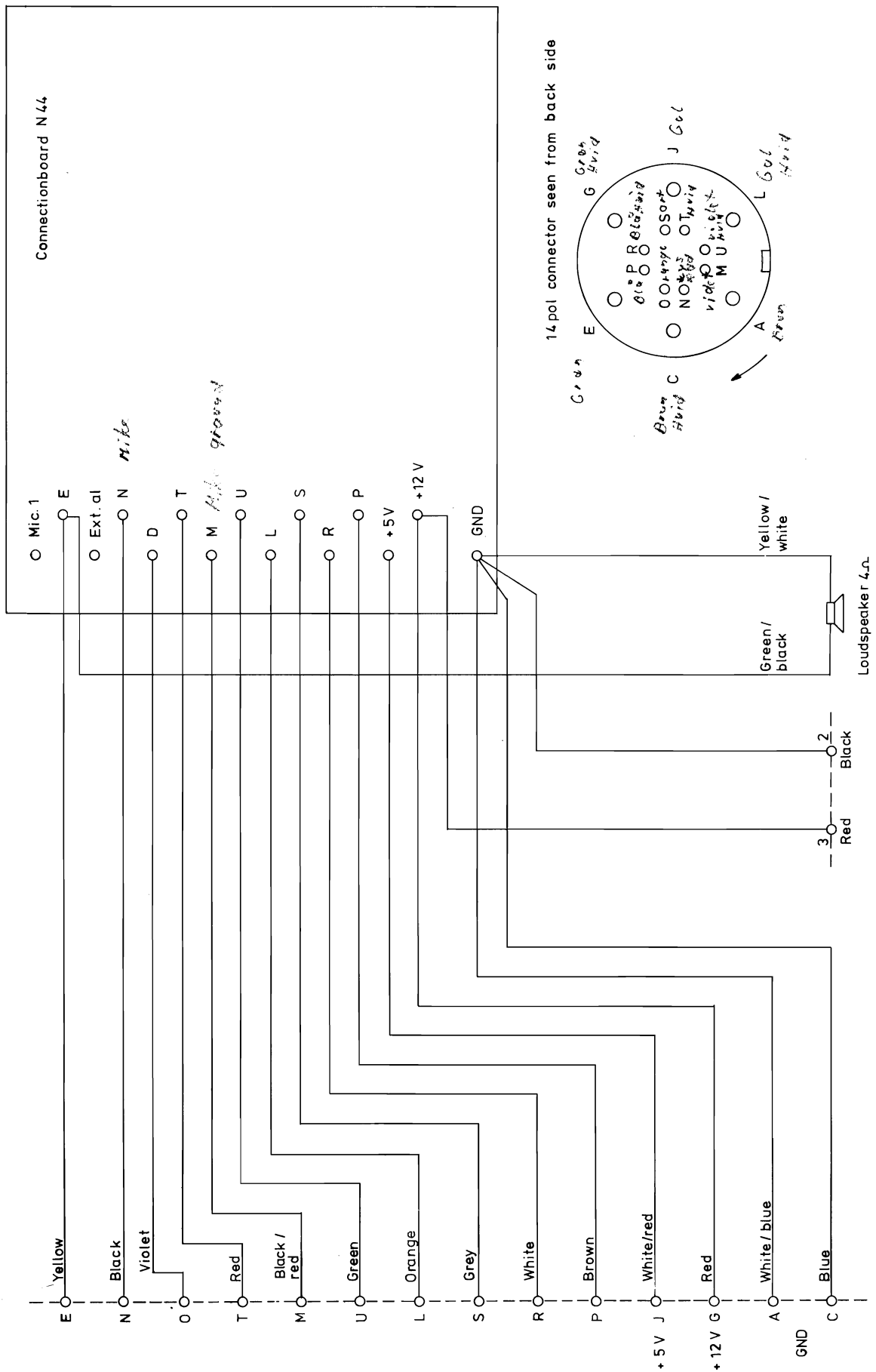


All capacitor C1 - C20 0,33nF
All coils RFC2 - RFC9 and RFC15 = Ferite beard
RFC1, RFC10, - RFC14 and RFC 16 = 10µH
RFC 17, RFC18 and RFC 19 = 6,8 µH



Ändr. nr.:	Rettet: 18 - 6 - 82 PH	Diagram for connection board for portophone 315-017 N44 A	Tegn.: BC 2-3-82	Kontr.: PH
		AP-RADIOTELEFON A/s	Tegn. nr.: 82043 - 3E3	

[illegible]



Ændr. nr.: Rettet: 82-06-07 BJ

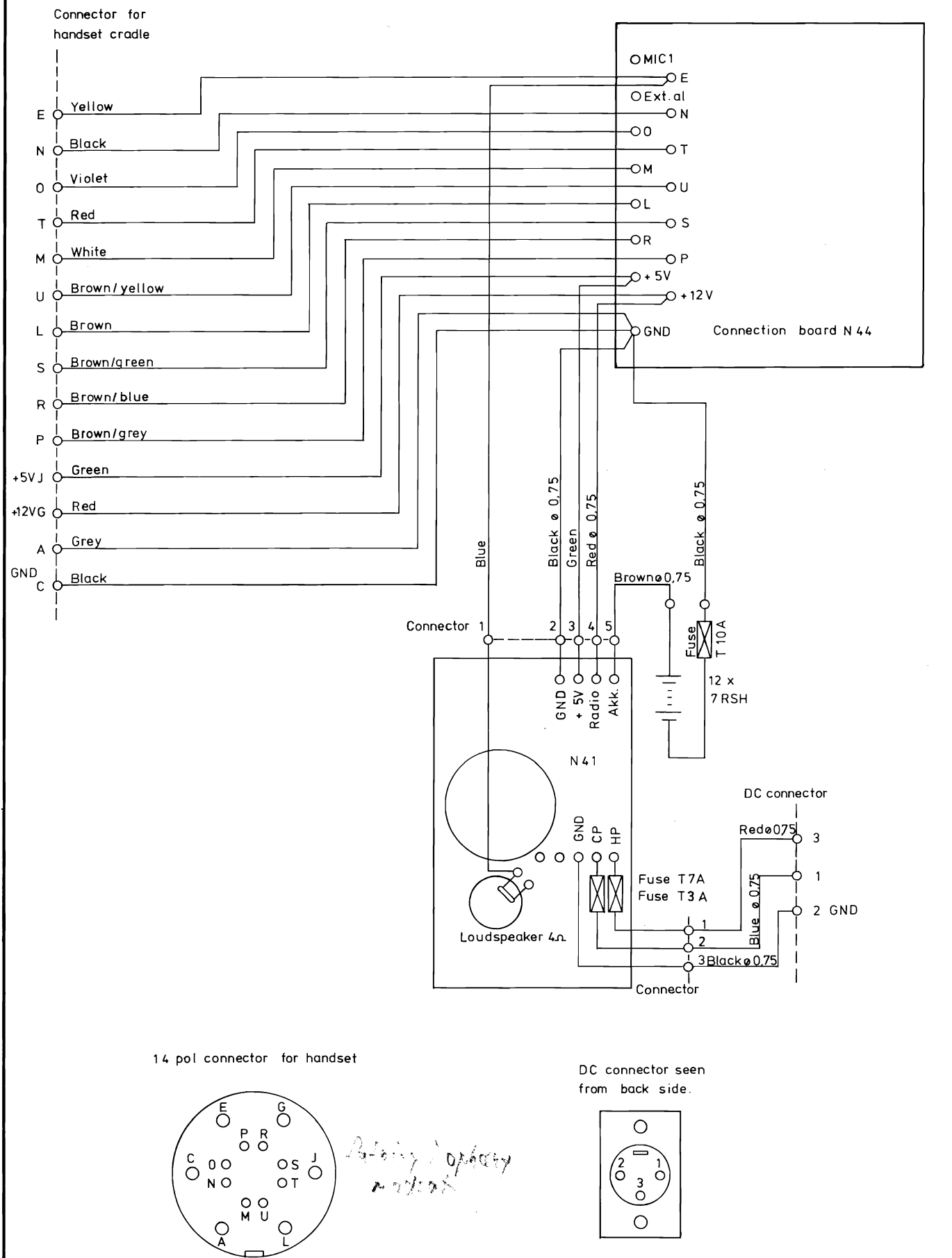
Wiring of portaphone
standard 315-017

Tegn.: BC
16-2-82

Kontr.: PH

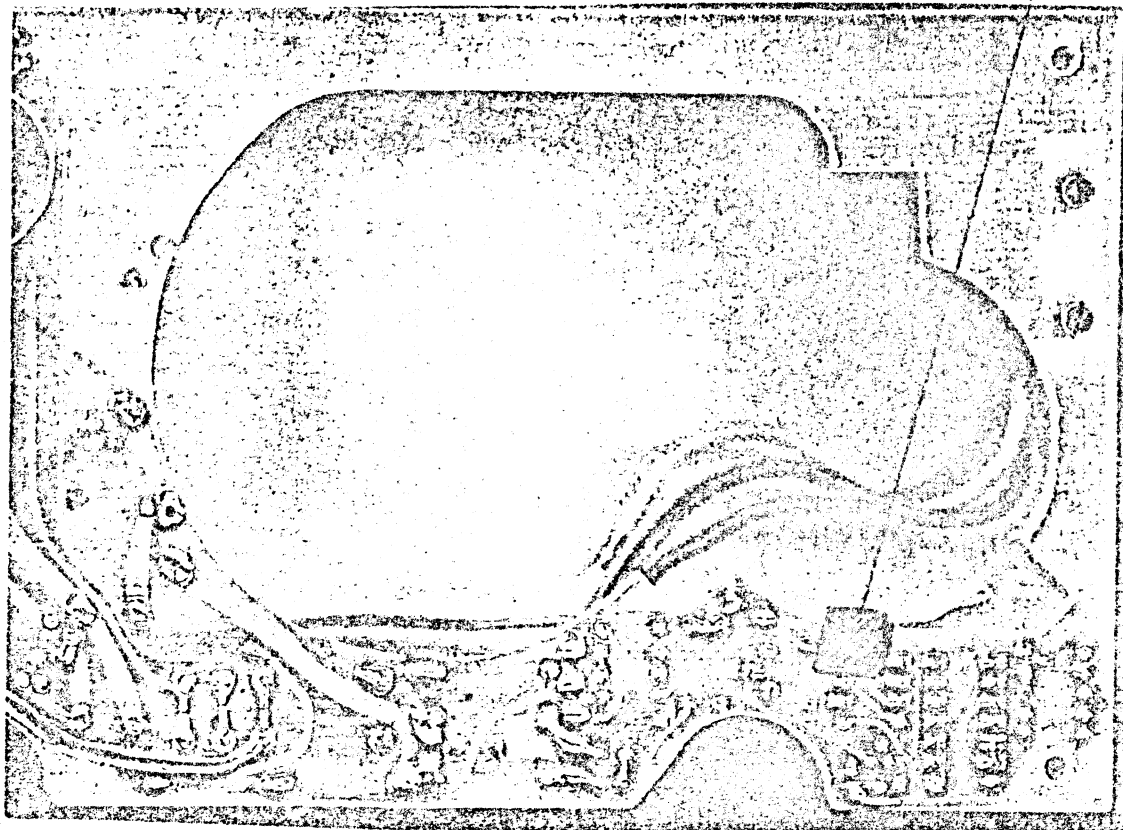
AP-RADIOTELEFON A/s

Tegn. nr.: 82044-3E3



Ændr. nr.:	Rettet: 82-06-07 BJ	Wiring of portophone 315-019	Tegn.: BC	Kontr.: PH
			17-5-82	17-5-82
		AP-RADIOTELEFON A/s	Tegn. nr.: 82152-3E3	

ISOLERINGSTAPE



FOR AT FORHINDRE AT EN BANE PÅ PRINT N41A KORT -
SLUTTES TIL KANTEN AF HØJTTALEREN I BERETASKEEN MON-
TERES ET STYKKE ISOLERINGSTAPE SOM VIST PÅ TEGNINGEN.

Vedr.: Portaphone 315-019.

På print N41 kan printbanen ved IC1 komme i berøring med
højttalerens chassis. Dette kan afhjælpes ved at montere
et stykke isoleringtape over printbanen som vist på ved-
lagte tegning, Produktionsforskrift nr. 3039.

Vedrører:

PORTAPHONE 315-019

PRINT N41A1

DATO: 83-01-19

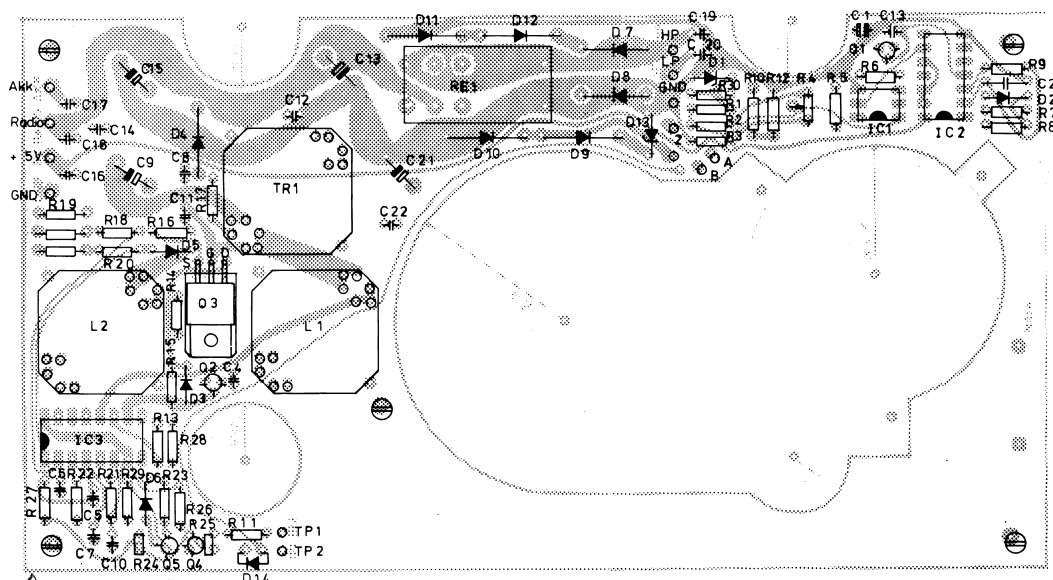
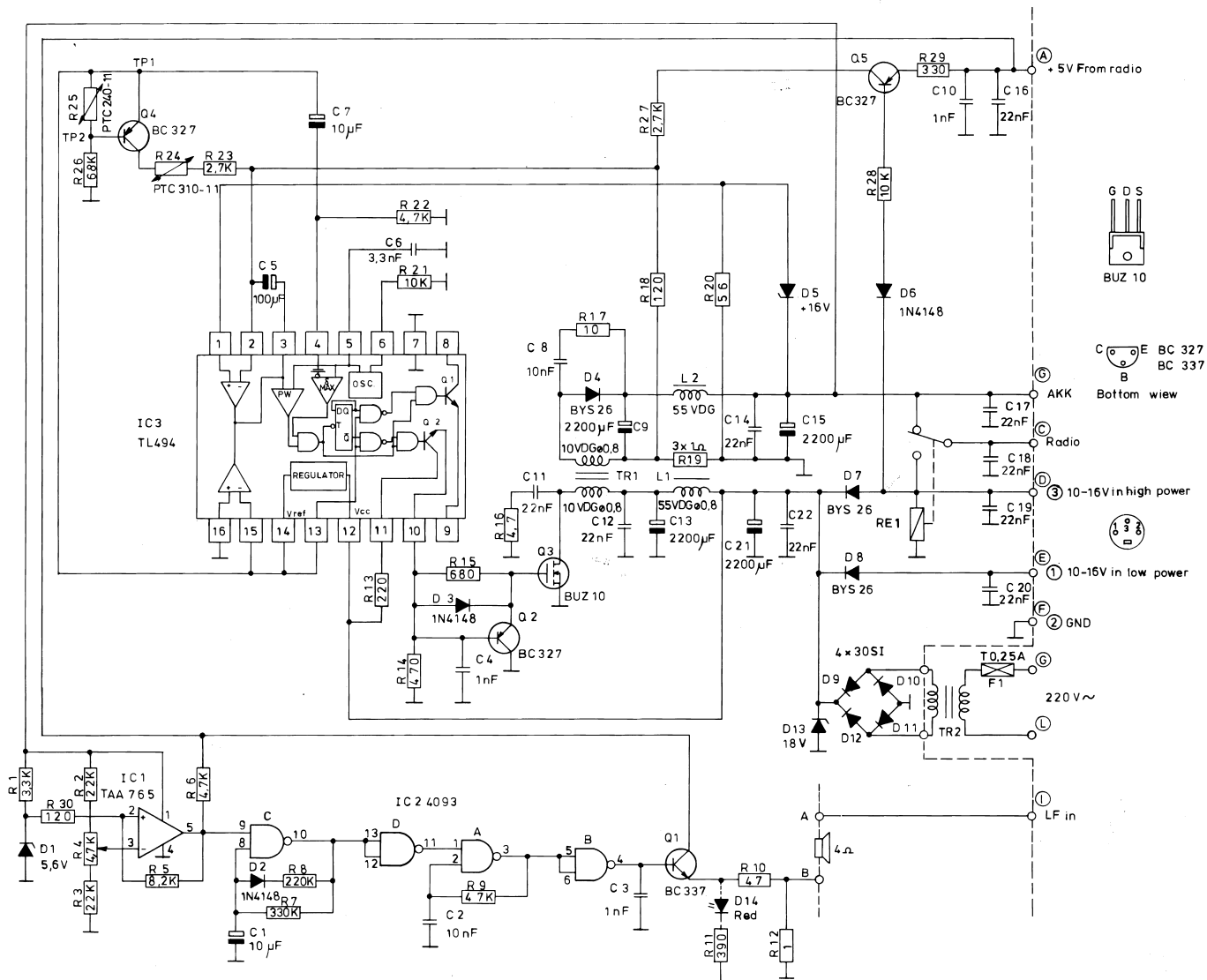
Produktionsstart nr.:

Produktionsændr. nr.:

Udgivet af sign:

NR

PF 3039



Synlet forbrug for akku i bil
radio forbrug 0,5A low power
slukket 0,2A

Ladestrøm 0,6 A også når

forbrug 0,6A når iVH er tændt
eller 0,6A

NMT er forbrug
(high power indgang)

Ladestrøm low power indgang
0,5A radio slukket
0,5A radio tændt

Andr. nr.:	Retlet:	Switch regulator for portaphone N41	Tegn.: BC	Kont.: PH
		ap radiotelefon as	Tegn. nr.:	82105 - 2E3

Beholdning af lader m. Co. 4A4
K4446
N444

i alt 30mA når radio er slukket

PARTS LIST

82-06-17
Date: ~~82-05-29~~

Page: 1.3

Prod. mod. no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
04-013	3	Diode	BYS26	D4-7-8
04-021	1	" , zener	BZX79 C16	D5
04-022	1	" , "	BZX79 C18	D13
04-030	1	" , "	BZX79 C5V6	D1
04-040	4	"	30S1	D9-10-11-12
04-062	3	"	1N4148	D2-3-6
05-006	4	Elektrolyt	2200 μ F. 16V.	C9-13-15-21
05-022	1	"	100 μ F. 10V.	C5
05-040	2	"	10 μ F. 16V.	C1-7
06-011	5	Ferritrør	6x3,6x20mm.	
09-003	1	IC	TAA765A	IC1
09-266	1	"	HEF4093BP	IC2
09-272	1	"	TL494CN	IC3
11-035	3	Kabelbinder	TY23M	
11-409	3	Ker.kond.	1nF.	C3-4-10
11-414	1	"	3,3nF.	C6
11-495	1	Kondensator, MKT.	10nF.	C2
11-527	1	Ker.kond.	10nF. 50V.	C8
11-529	9	"	22nF. 50V.	C11-12-14-16-17-18-19-20-22
13-243	1	Multistikhus	1625-3P. 3pol. Han. Molex	
13-244	1	"	1625-5P. 5pol. " " "	
13-245	8	Kontakt for 13-243 13-244	1560-TL. "	
13-257	1	Modstand	4,7 Ω . CR16 1/8W.	R16
13-259	1	"	10 Ω . "	R17
13-268	1	"	56 Ω . "	R20
13-272	2	"	120 Ω . "	R18-30
13-277	1	"	330 Ω . "	R29
13-278	1	"	390 Ω . "	R11
13-279	1	"	470 Ω . "	R14
13-281	1	"	680 Ω . "	R15
13-288	2	"	2,7K Ω . "	R23-27

Unit name: Print for strømforsyning i bæretaske.

Unit: Print. N41A1.

Diagram: 82105-2E3

PARTS LIST

82-06-17
Date: ~~82-03-29~~

Page: 2.3

Prod. mod. no:

AP type: 3000

Code no	no	Component	Pos.	Rem.
13-289	1	Modstand 3,3K Ω . CR16 1/8W.	R1	
13-291	2	" 4,7K Ω . "	R6-22	
13-294	1	" 8,2K Ω . "	R5	
13-295	2	" 10K Ω . "	R21-28	
13-299	2	" 22K Ω . "	R2-3	
13-302	1	" 47K Ω . "	R9	
13-304	1	" 68K Ω . "	R26	
13-309	1	" 220K Ω . "	R8	
13-310	1	" 330K Ω . "	R7	
13-346	4	" 1 Ω . CR25 1/4W.	R12-19-19-19	
13-356	1	" 47 Ω . "	R10	
13-362	1	" 220 Ω . "	R13	
13-682	1	" , PTC 240-11	R25	
13-717	1	" , " 310-11	R24	
16-541/1	1	Printplade N41A.		
17-047	1	Relæ V23056-A0102-A101	RE1	
18-029	1	Sikring 3Amp. Træg.		
18-031	1	" 8Amp. "		
18-286	2	Sikringsholder Nr. 29		
19-095	3	Transistor BC327	Q2-4-5	
19-096	1	" BC337	Q1	
19-139	1	" BUZ10	Q3	
19-275	1	Trimmeptm. 4,7K Ω . T7YA	R4	
25-099	1	Transformator 82063-4E3	TR1	
25-100	2	Filterspole 82064-4E3	L1-2	
22-861	1	Vinkel for sikring. 82136-4M3		

Unit name: Print for strømforsyning i bæretaske.

Unit: Print. N41A1.

Diagram: 82105-2E3

AP type: 3000

[illegible]

Diagram: 82105-2E3