Logos Foundation
LogoTronics Lab
director: Prof.Dr.Godfried-Willem Raes
assistents:
- Kristof Lauwers – software
- Bert Vandekerckhove - mechanics
- Leonaar Degraeve - installations

Users Manual for <Invisible Instrument>

Starting up:

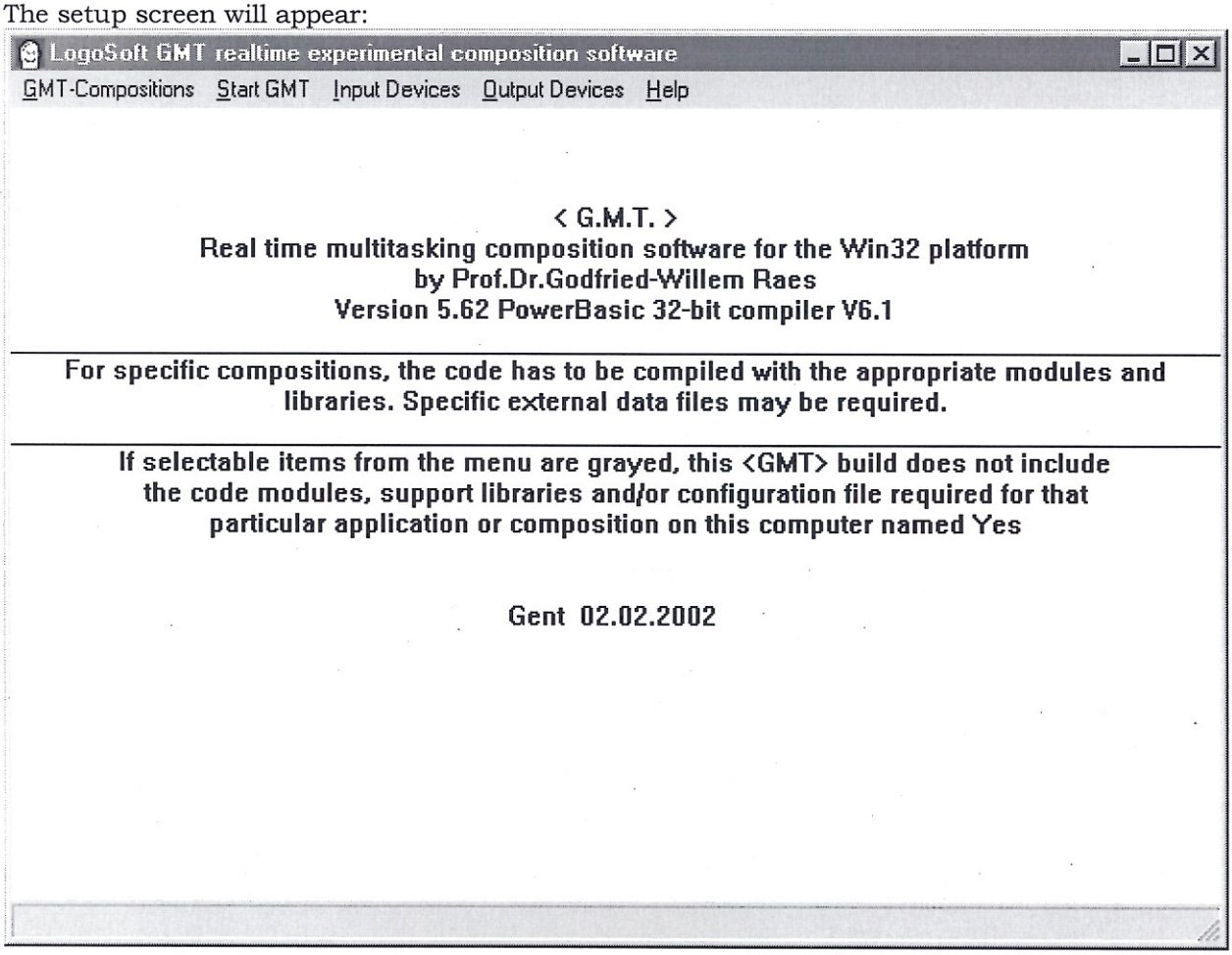
First switch on the PC.
There is no password set by us. The operating system is Windows 2000.

Second, switch on the Invisible Instrument

The LED's in the transducers should now light up. The emitter, equiped with blue LED's, should face the performer. Make sure the NiDAQ switch is set to ON on the Invisible instrument chassis.

Third: start up <MIM> software on the PC

We placed a shortcut on the computers desktop. [mim]
The setup screen will appear:



Output Devices

In the menu of the set-up screen, under the menu-item "Output Devices" select the internal midi output device. (This activates the soundcard).

Input Devices

Then select, under the menu-item "Input Dervices", Data Acquisition Hardware (popup menu), National Instruments (popup), DAQPad USB. If this device does not show up in the menu, you forgot to switch on the DAQ device on the holosound module, or the module was not switched on before starting up the software. In this case you have to exit the software, and start up again.

GMT-Compositions

Then select under 'Godfried-Willem Raes', popup: <Invisible Instrument>
Start GMT
This is the last selection to be made: select GMT Main, unless you made an error in the previous sequence, case in which you should now select Exit GMT.

Now the invisible instrument control cockpit will appear on the screen.

You can now switch on –in the left task column- both the Radar and the ii-VU tasks, which will display gesture information visually. These display windows will only work however, if you also switch on the DAQ-Task.

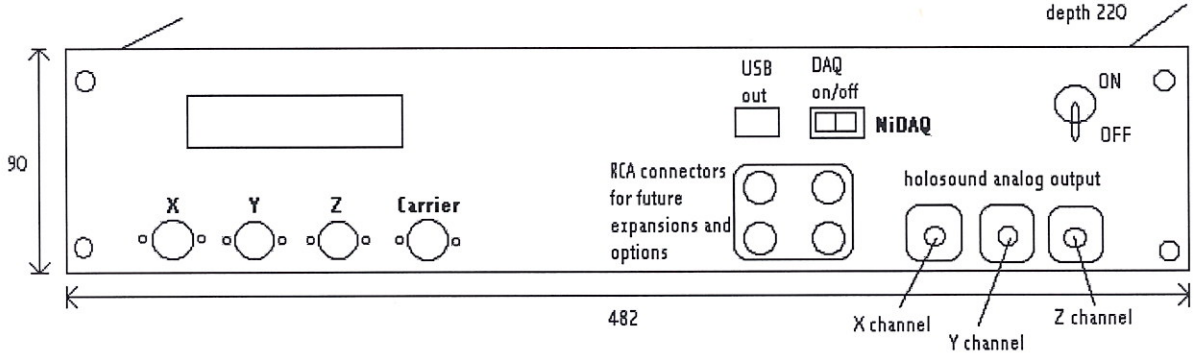
Now you can select any one of the gesture-sound mappings in the second and third column of the cockpit.

To finish playing a certain invisible instrument, use the HALT button. This silences the output and prepares the software for a new selection.

Electrical specification and safety instructions:

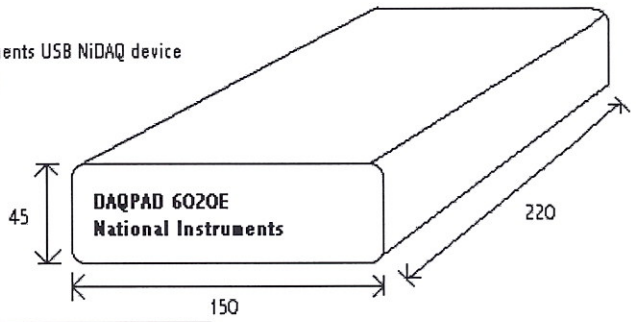
There are 3 separate components in the installation:
1. The personal computer, covered by its manufacturer, Altan – Sluizeken 1, 9000 GENT.
Connect to an electrical outlet 230V ac – 50Hz. Power consumption: maximum 200VA.
The attached keyboard has no electrically touchable parts and internally is operated from a current limited single 5V power supply.
2. The CRT monitor, fabricated by Dell Inc.
Connect to an electrical outlet 230V ac – 50Hz. Further specifications can be found on the backplate of the monitor.
3. The <Holosound> invisible instrument interface (19" rack unit), build and designed in our laboratories.
Connect to an electrical outlet 230V ac – 50Hz. Power consumption: 25VA.
Safety separation transformers are used throughout the equipment such that no dangerous voltages are present in any of the devices (transducers) connected to the device. The transducers are operated from a 15V dc power supply and can be safely touched even whilst switched on. (However, for normal operation, none of the equipment should be touched...). The transducer circuits are encapsulated in well insulating epoxy rosin and cannot be serviced. They should be protected against moisture and severe shocks. If they get exposed to any of these, they may get permanently broken and have to be replaced by new devices.
The power supplies inside the equipment are short circuit protected.
Only qualified technicians should open the device. There are no user servicable parts inside the chassis.

Sizes for main processing unit: 2 unit standard 19 inch rack



to be connected to line level audio inputs

Sizes for National Instruments USB NiDAQ device mounted inside 19" rack



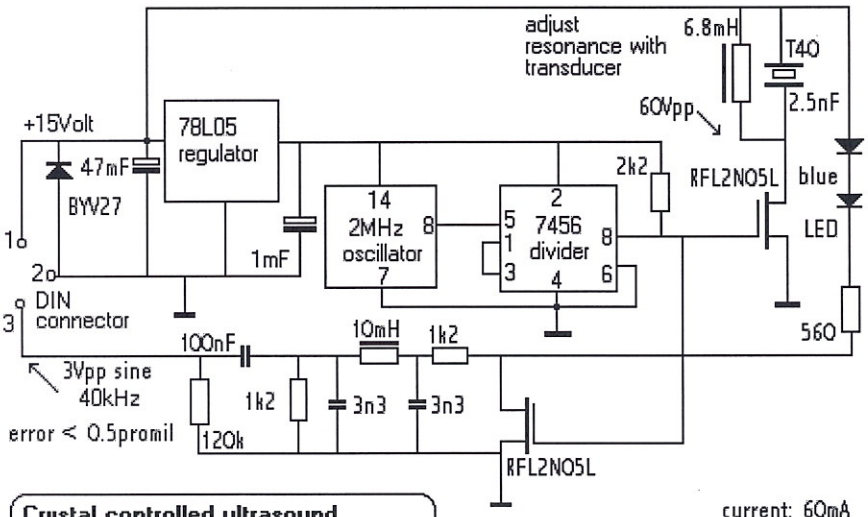
all sizes expressed in mm

Logos Foundation

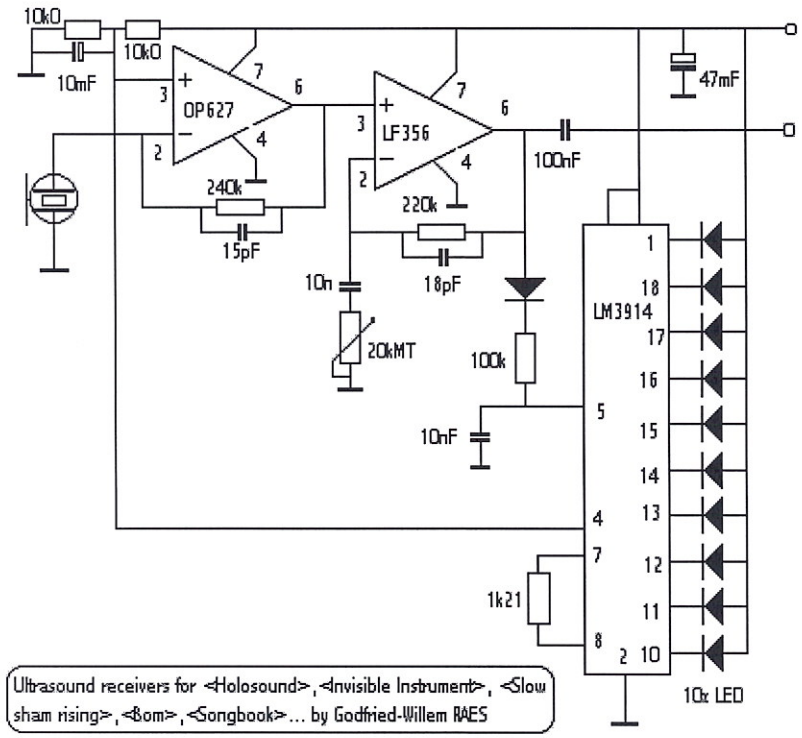
Instrument building workshop & electronic research lab
Project: Invisible Instrument
by Prof.Dr.Godfried-Willem RAES

designed: 20.01.2001
revisions: 01.03.2001
revised: 15.12.2001

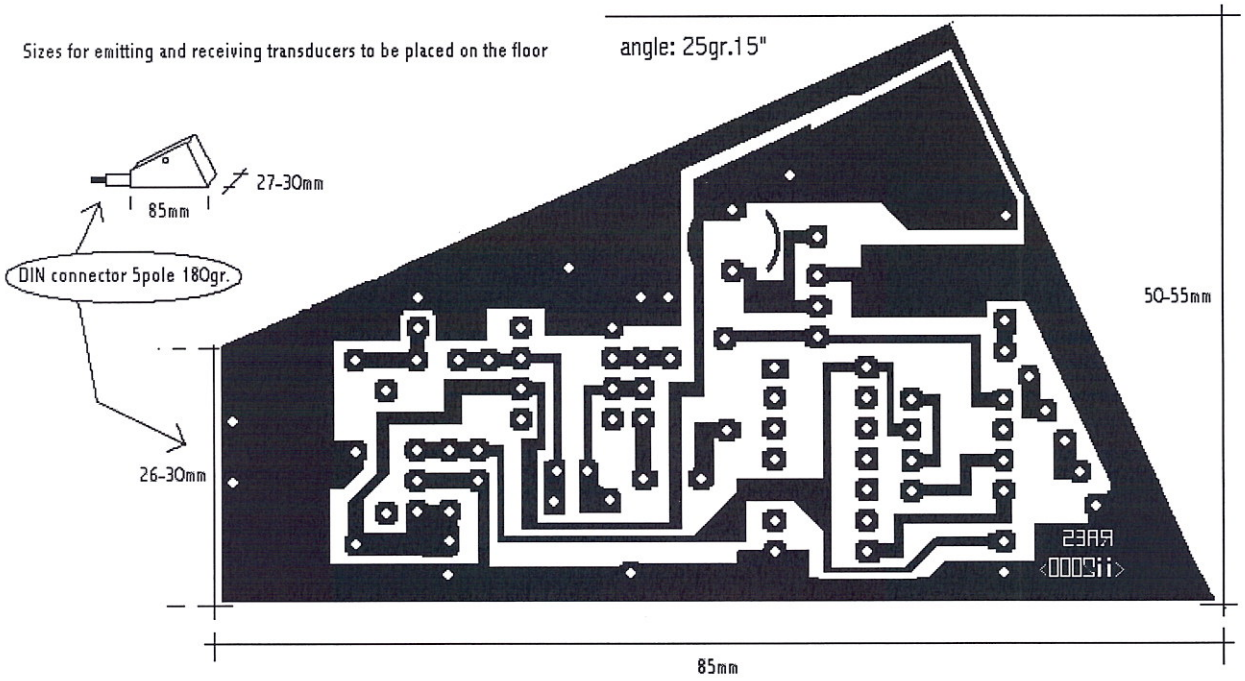
Circuit for ultrasonic emitter:



Circuit for the 3 receivers:

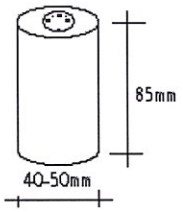


Physical dimensions and PC board layout for the receivers:



Variations in outer dimensions of transducers depend on selection of materials used for the cabinet: brass, aluminium, plexiglass, epoxy resin. However, maximum sizes specified on this sheet will never be exceeded.

Suspended transducer receiver:



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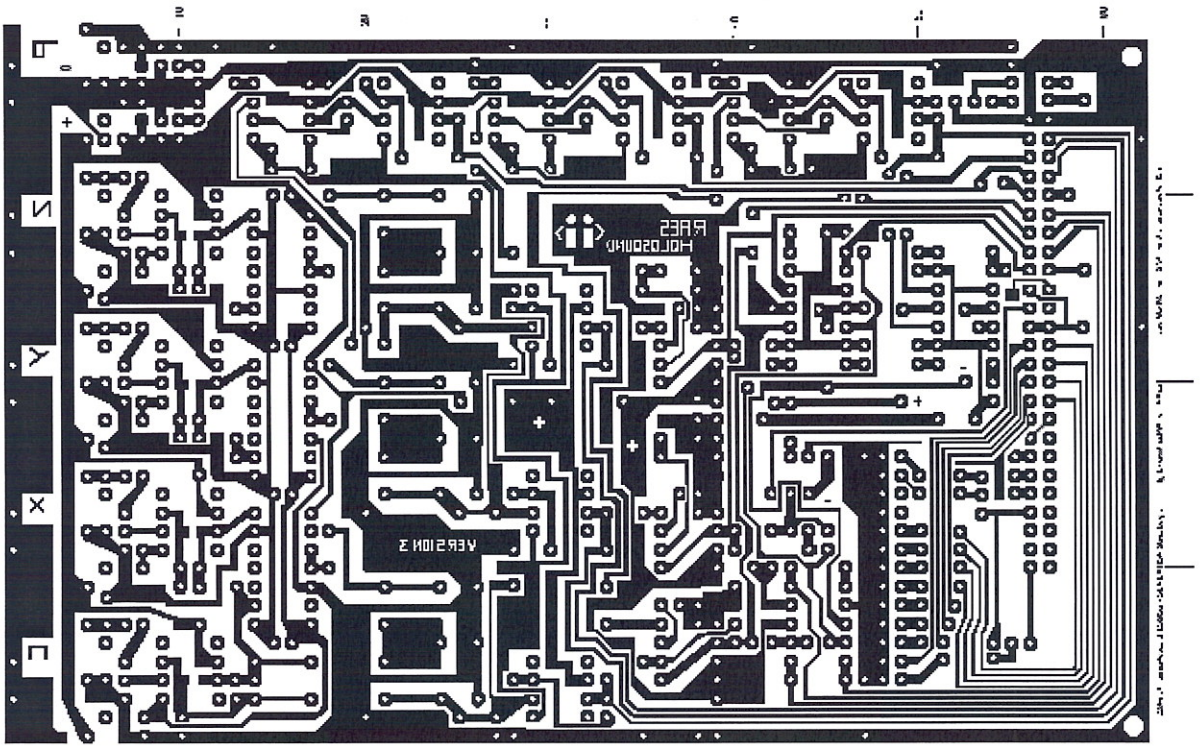
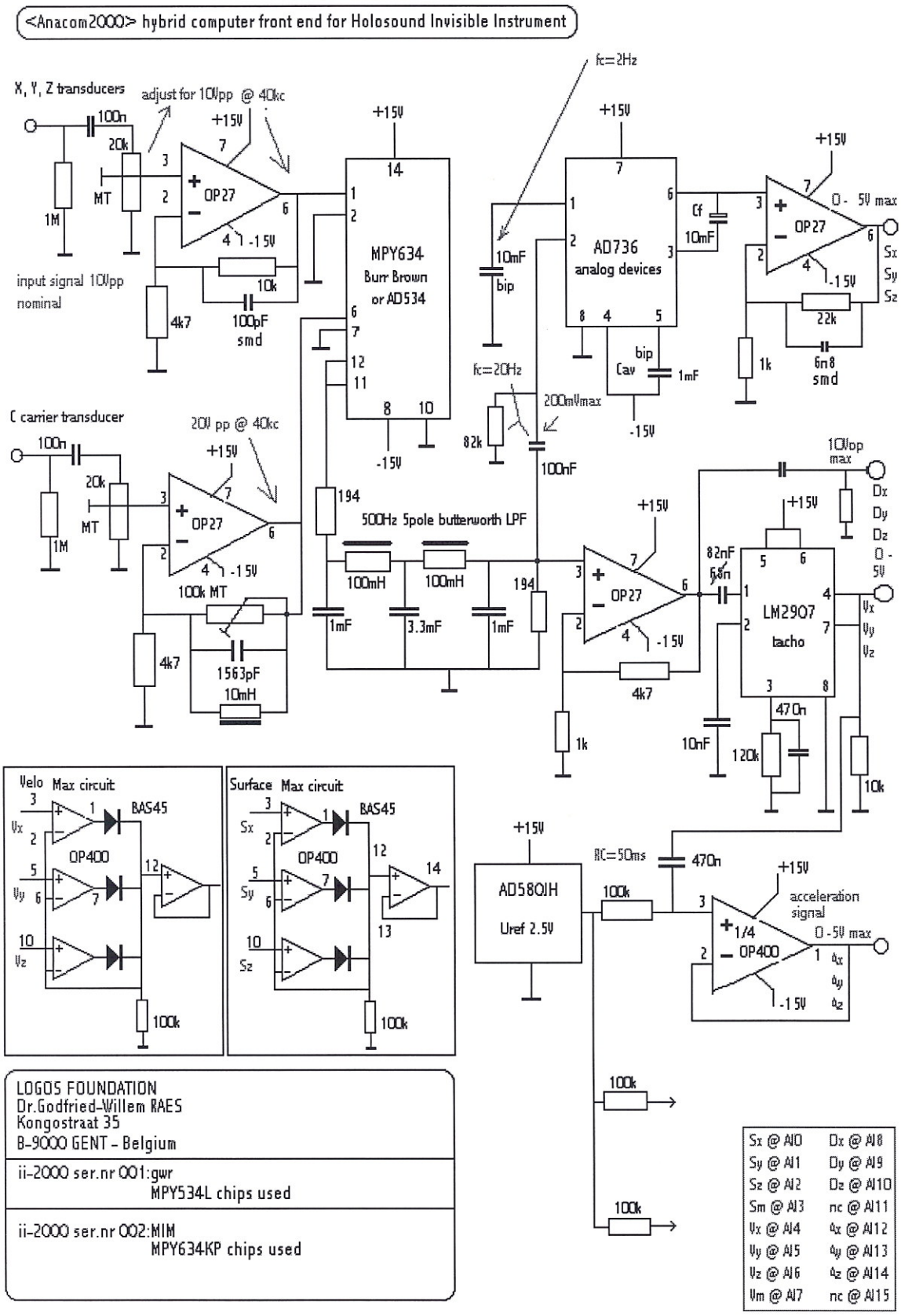
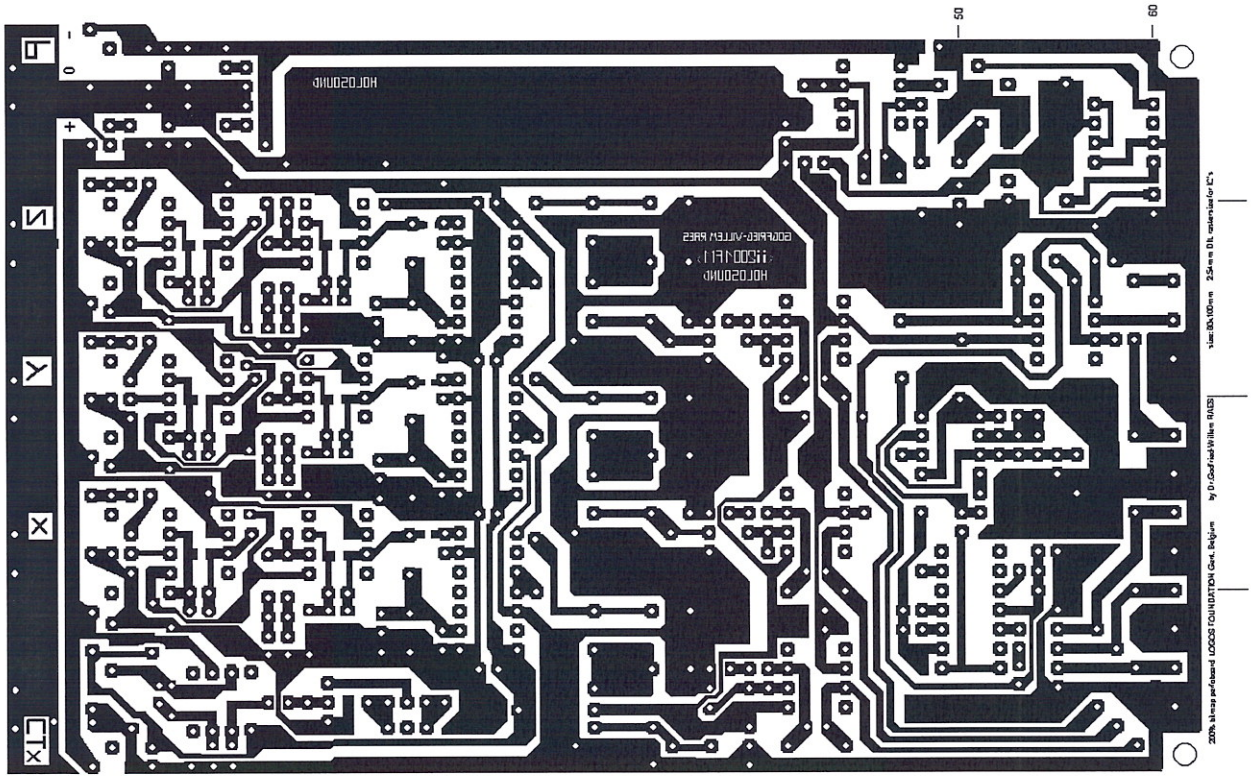
PC board for the Invisible Instrument demodulator board (inside rack):



Circuit drawing for the analog computer inside the invisible instrument:


<Anacom2000> hybrid computer front end for Holosound Invisible Instrument
X, Y, Z transducers
adjust for 10Vpp @ 40kc
input signal 10Vpp nominal
MPY634
Burr Brown
or AD534
AD736
analog devices
OP27
OP400
LM2907
tacho
AD580JH
Uref 2.5V
C carrier transducer
20V pp @ 40kc
500Hz 5pole butterworth LPF
fc=2Hz
fc=20Hz
200mVmax
Velo Max circuit
Surface Max circuit
BAS45
RC=50ms
acceleration signal
0 - 5V max
10Vpp max
LOGOS FOUNDATION
Dr.Godfried-Willem RAES
Kongostraat 35
B-9000 GENT - Belgium
ii-2000 ser.nr 001:gwr
MPY534L chips used
ii-2000 ser.nr 002:MIM
MPY634KP chips used
Sx @ AI0
Sy @ AI1
Sz @ AI2
Sm @ AI3
Vx @ AI4
Vy @ AI5
Vz @ AI6
Vm @ AI7
Dx @ AI8
Dy @ AI9
Dz @ AI10
nc @ AI11
ax @ AI12
ay @ AI13
az @ AI14
nc @ AI15

PC board for the analog holosound demodulator board:



FM demodulator circuit with limiter and balanced quadrature detection for Holosound invisible instrument by Prof.dr.Godfried-Willem Raes
file: PCB: PCB_us_2001_FM_demodulator.bmp

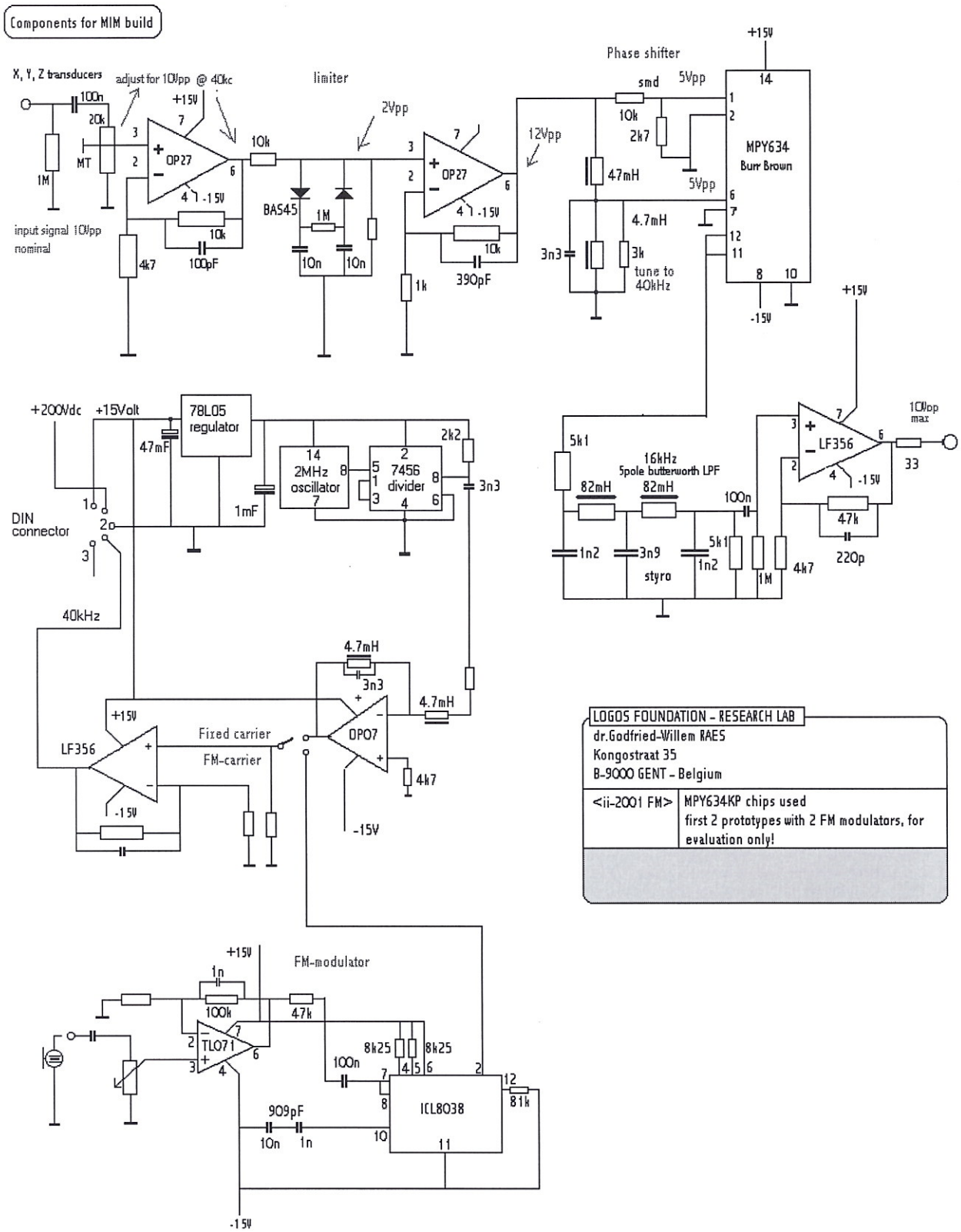
upper right: X-tal oscillator for 40kHz

two on board VCO-FM circuits: 7555 as well as 8038 function generator

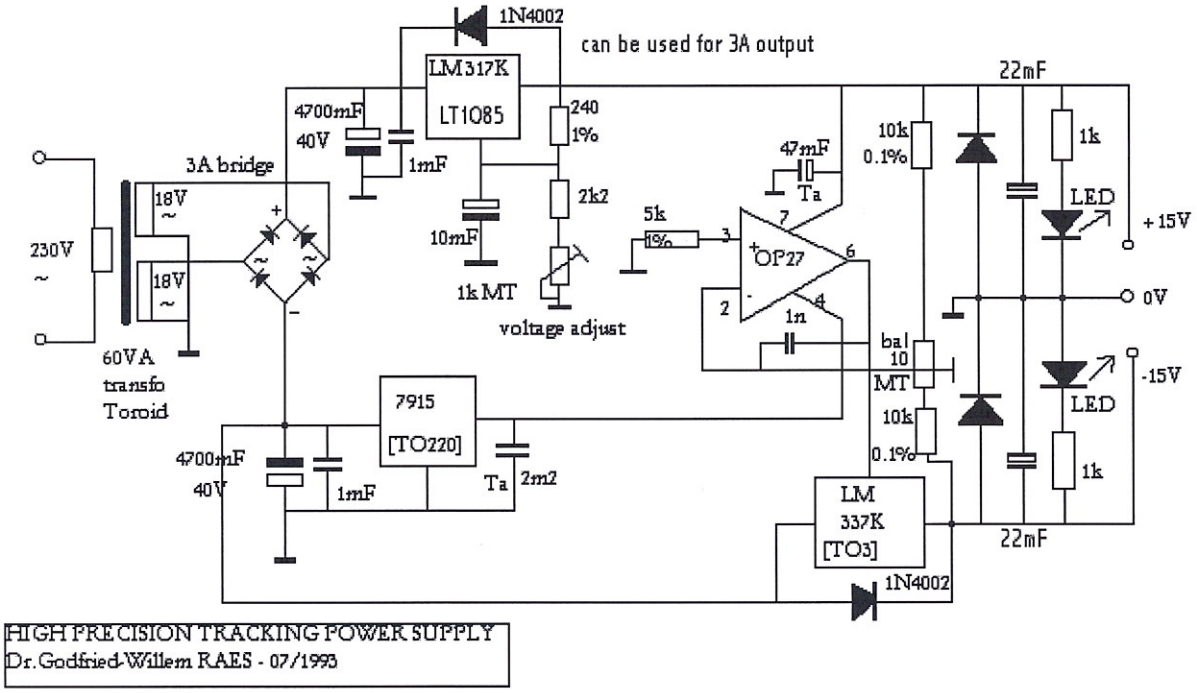
19.02.2001: 2 pc boards besteld bij Digiprint [Prototypes]

27.02.2001: minor corrections on board

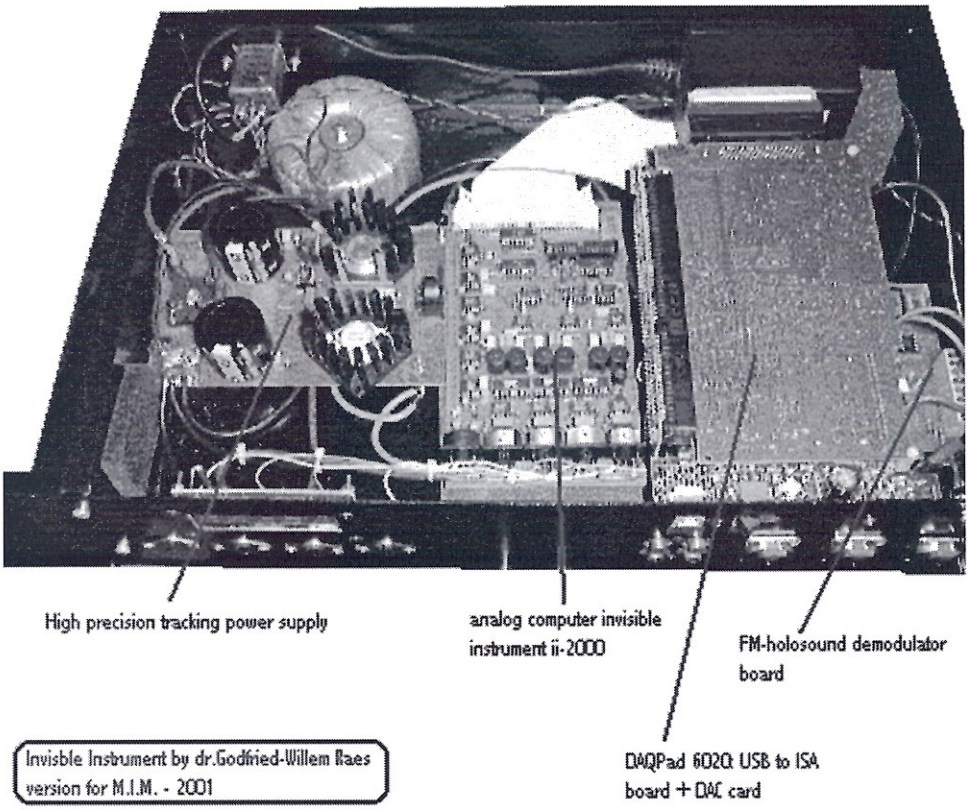
Circuit diagram for the above PC board:

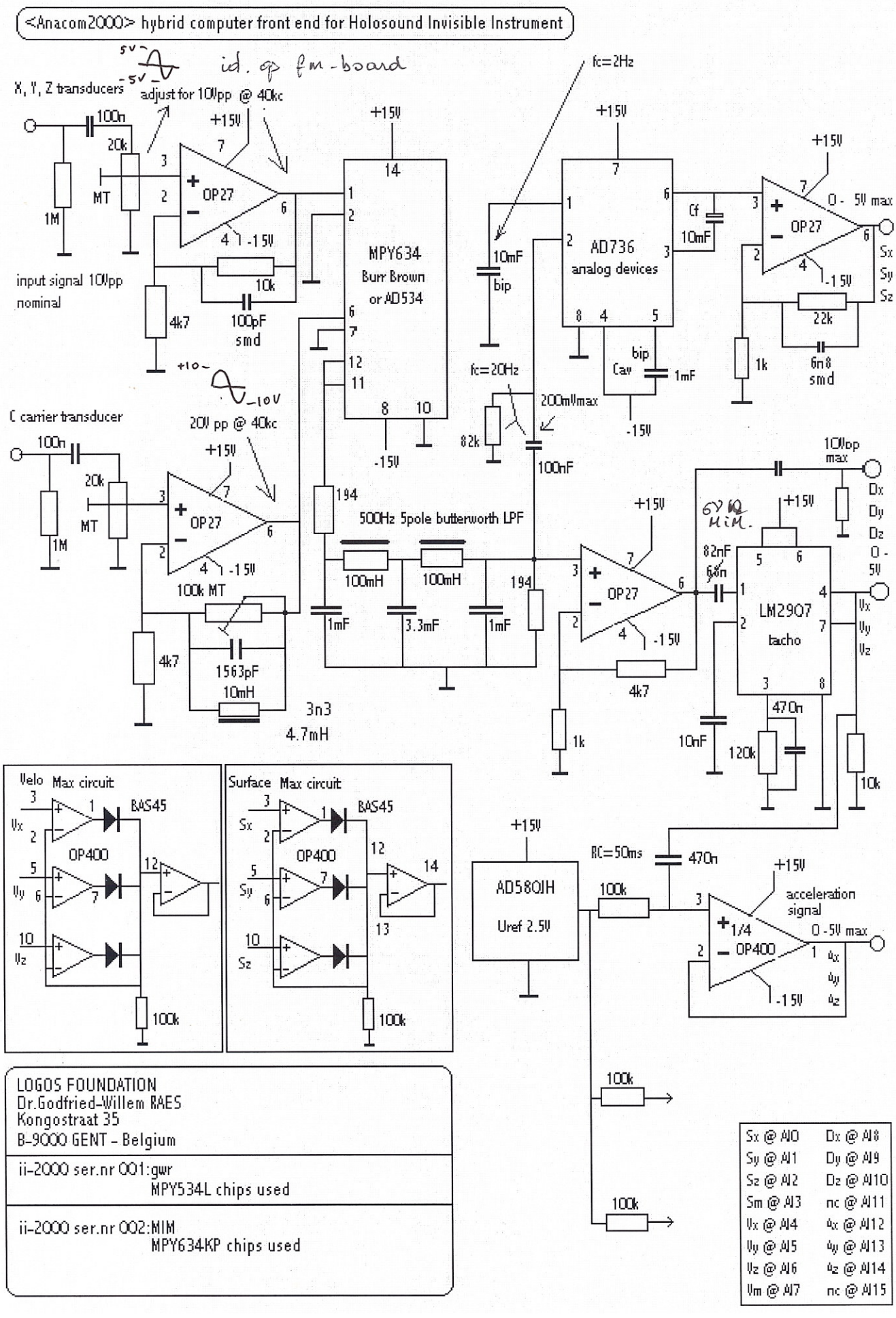

Components for MIM build
X, Y, Z transducers
adjust for 10Vpp @ 40kc
limiter
Phase shifter
input signal 10Vpp nominal
OP27
BAS45
MPY634
Burr Brown
tune to 40kHz
+200Vdc
+15Volt
78L05 regulator
2MHz oscillator
7456 divider
DIN connector
40kHz
16kHz 5pole butterworth LPF
styro
LF356
OP07
Fixed carrier
FM-carrier
FM-modulator
TL071
ICL8038
LOGOS FOUNDATION - RESEARCH LAB
dr.Godfried-Willem RAES
Kongostraat 35
B-9000 GENT - Belgium
<ii-2001 FM>
MPY634KP chips used
first 2 prototypes with 2 FM modulators, for evaluation only!

Power supply for invisible instrument – circuit diagram:



Internal view into the chassis assembly for the invisible instrument:

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Dx @ AI8
Dy @ AI9
Dz @ AI10
nc @ AI11
ax @ AI12
ay @ AI13
az @ AI14
nc @ AI15

Design & lab notes Anacom2000
<Anakomiel>
****
schematic file version 3.1: anacom200.bmp
PCboard file version 3.1: anacom2000-schema.bmp

<ii-2000> Van deze print werden twee exemplaren gebouwd.

serial nr.1 : voor logos, gebruikt in BOM sedert dec.2000
serial nr.2 : voor MIM, voor levering maart 2001.
postponed: levering december 2001.

07.11.2000:

Korrekties aan te brengen in het printontwerp (version3.0):
Weerstand 4k7 van pin 2 naar massa op ingangsopamps was vergeten!
100pF in feedback kring monteren met SMD komponenten.
Draadbrug leggen tussen centrale pin DIN connektors (pin2) en massa!
Belastingweerstand aan pin 4/7 van de LM2907 10k vergeten!

Gaatjes voor draadbrug tussen Vmax opamp OP400, pin 6 en LM2708 pin 7 vergeten.

08.11.2000:
RC konstanten voor acceleratie kanalen:
stel RC = 50ms
dan:
C = 2.2mF - R=22k
C = 470nF - R=100k *** mounted.
C = 100nF - R=470k

24.11.2000: parallelport configuration changed.
Now general counter 0 feeds the strobe on pin 1
general counter 1 feeds pin 14
This way we can adress 255 bytes (usefull for automated instrument control and
general replacement of printerports under NT)

Metingen:
12.11.2000 - lab.
met alu-driehoek transducers (zenders & ontvangers)"
C-signaal: afgeregeld op 20Vpp op pin 6 OP27 (moet mooie sinus zijn)
X,Y,Z signaal: afgeregeld op 10Vpp op pin 6 OP27 (draaggolf)

Uitgang Multiplier: 5Vpp (met modulatie)
Uitgang LPF: 1.6Vpp max. (tot 3Vpp)
Uitgang AD736 (pin6): piek 500mV, nominaal 250mV
==> feedbackweerstand OP27's amplitude kanalen: 22k ==> Uout: nominaal 5.75V
(hier mag nog een C' overgeplaatst worden..)
Ser.Nr.1: MKM cap 6n8 placed
Ser.Nr.2: SMD 6n8 used.

OP27 LPF signaal: feedback weerstanden: 4k7

Test BOM:
24.11.2000 - Tetraeder
Gevoeligheid en bestuurbaarheid heel wat beter dan vroegere versie (Anacomp)
De software gebruikt slechts de laagste 8 kanalen. De overige 8 worden berekend
in de DAQ-Task in de module gmt_ii.inc.

Used in concert Leuven (Wagenhuys).
Computer used: Lily
Used in concert Aveiro (Portugal).
Computer used: Lily.

<ii-2000> Version 3.1 - PC board
****
Should get shuttle print for holosound implementations. (MIM)
filename: anacom2000.bmp (PC board)
anacom2000-schema.bmp (circuit drawing)

Note: the phase relation between the sinewaves at both multiplier inputs must be mechanically
adjusted
with the position of the receivers. When looking with an oscilloscope to the output of the mul
tipliers, a
symmetric 80kHz sinewave must be displayed when phase relation is correct. An alternative is m
easuring DC
offset at no movement on the outputs of the buffer amps after the low pass filter. DC offset s

hould be
close to zero.

<ii-2000> narrow band receivers
****
these use LM3914 LED bar graph indicators for positioning adjustment.
The transducers are 40kHz piezoelectric type.

<ii-2001> wide band receivers
****
PC boards designed & produced: 4 copies angled version, 2 suspended version.
The boards use MCE2500 electret transducers for ultrasonics.
08.02.2001: 3 copies built and tested.
serial number: 001 27 degree board
serial number: 002 27 degree board, identical components
serial number: 003 suspended board, 33k ohm resistors used on Vcc/2 divider.

These receivers should also be usefull as general purpose ultrasound receivers. They should a
lso be the
premium choice for all FM-ultrasonic applications. (<Slow sham Rising>).
Applications:
* Bat receivers (requires tunable oscillator for demodulation)

<ii-2001-FM> demodulator board
****
experimental board 02.2001
Here the received signals x,y,z are first amplitude limited. After normalisation, the signals
are fed to
a phase shifting network tuned to the carrier frequency and then multiplied for demodulation.
Bandwidth should be adjusted with the value of the parallel resistor placed over the tuned LC
circuit
connected to the Y input of the multipliers.
schematic file: SCH_US_2001_FM_demodulator.BMP
PC-board file : PCB_US_2001_FM_demodulator.bmp

<ii-2001-BAT> demodulator board
****
Here a tunable VCO is used to set the reception frequency to that of the bat species to be dec
oded.