PL-LFI-OAT-ME-019

Planck/LFI: Setup of FM End-To-End test

21 June 2006

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Index

1. Presentation
2. HW setup
3. Tests

1. Presentation

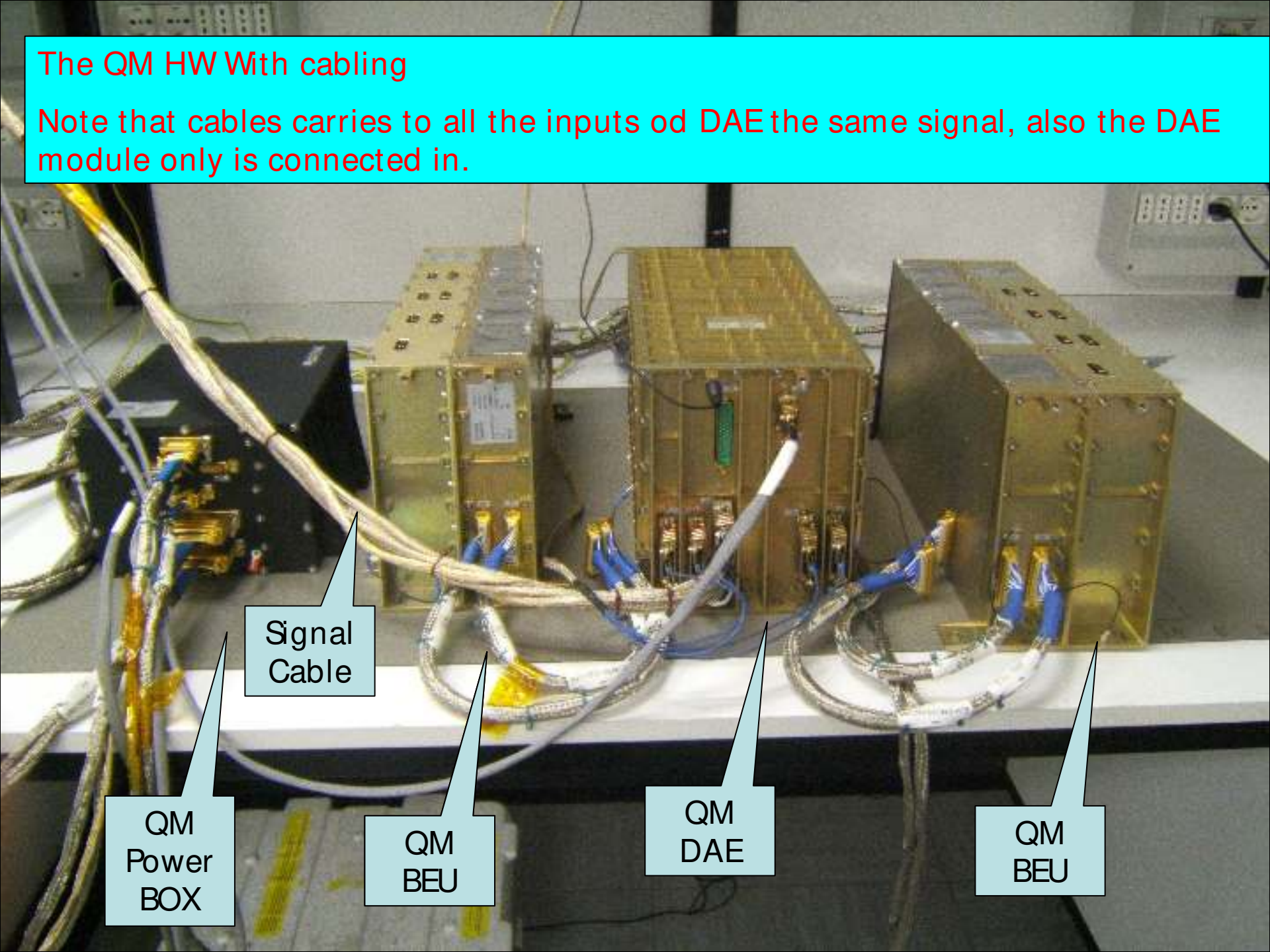
- This memo is the photographic documentation of the setup for the End-To-End tests performed at Alcatel/Alenia – Milano from 13 June 2006 to 15 June 2006.
- See PL-LFI-ME-018 for a quick account.

The FM/ AVM REBA

The FM/ AVM REBA

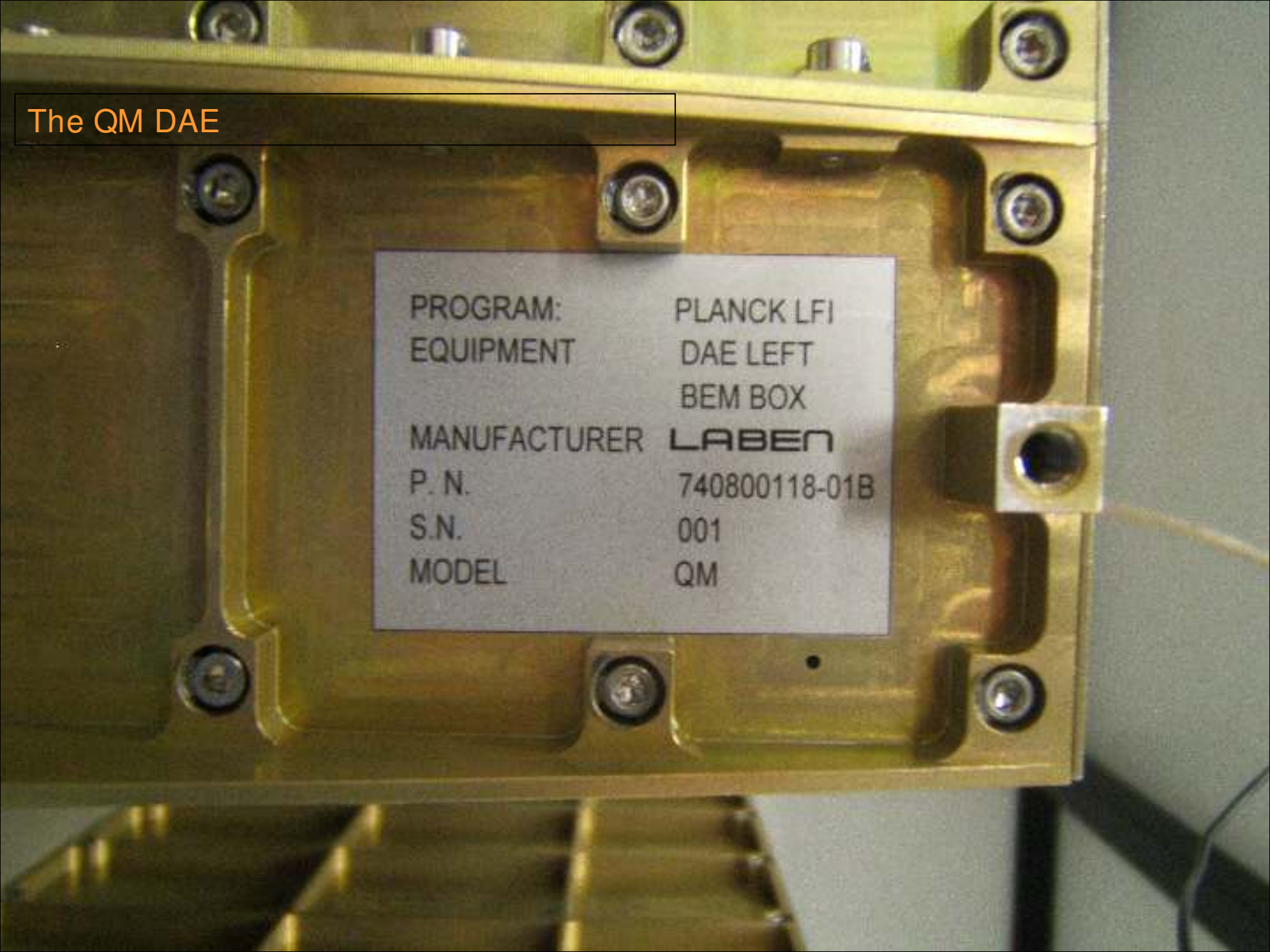
The QM HW With cabling

Note that cables carries to all the inputs od DAE the same signal, also the DAE module only is connected in.



The QM Power Box

The QM DAE


PROGRAM: PLANCK LFI
EQUIPMENT DAE LEFT
BEM BOX
MANUFACTURER LABEN
P. N. 740800118-01B
S.N. 001
MODEL QM

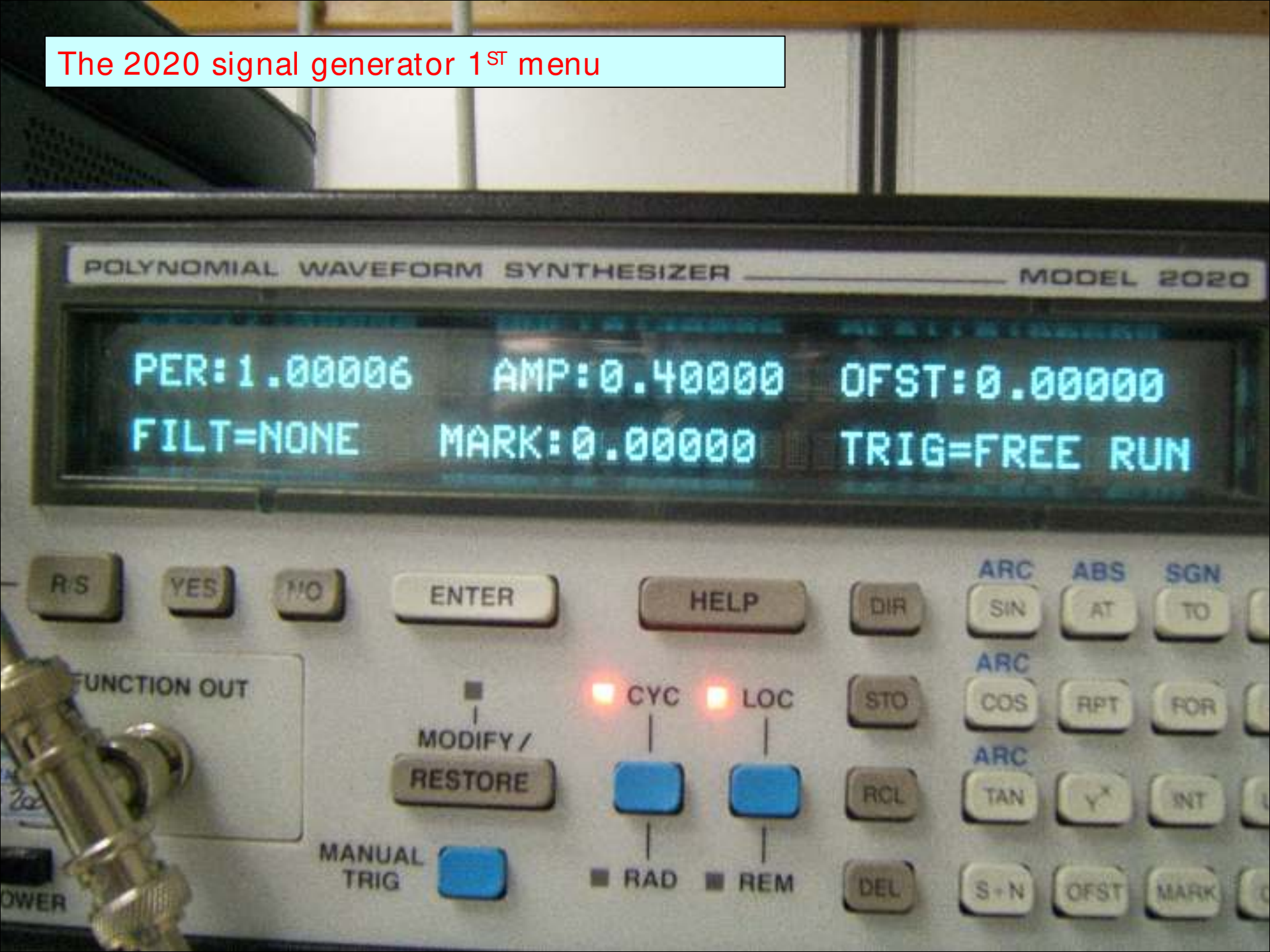
The QM HW With cabling

The QM DAE BEM box

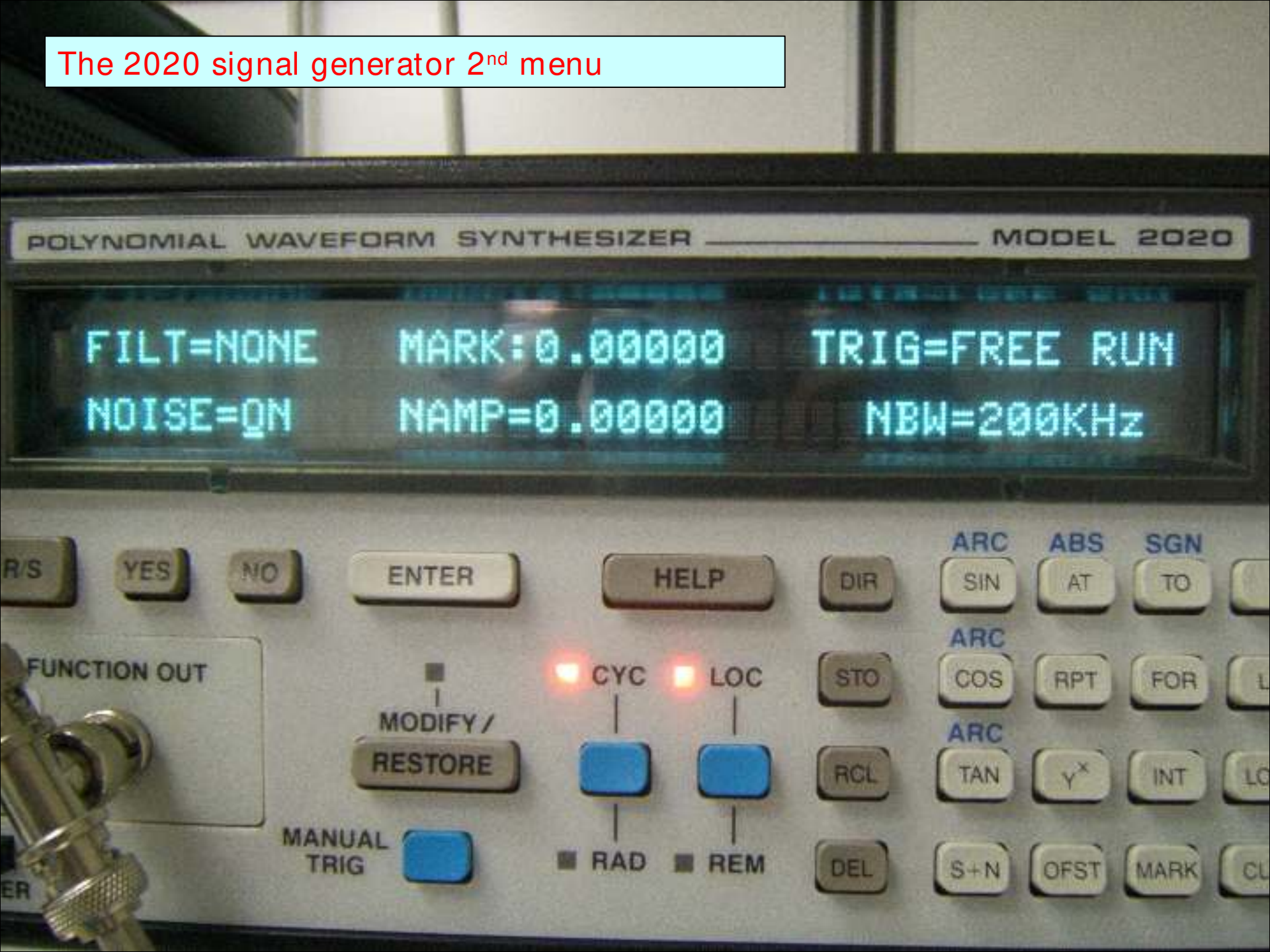
The QM DAE FEM box


The 2020 signal generator with signal splitting plug
PER:1.00006 AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ANALOGIC

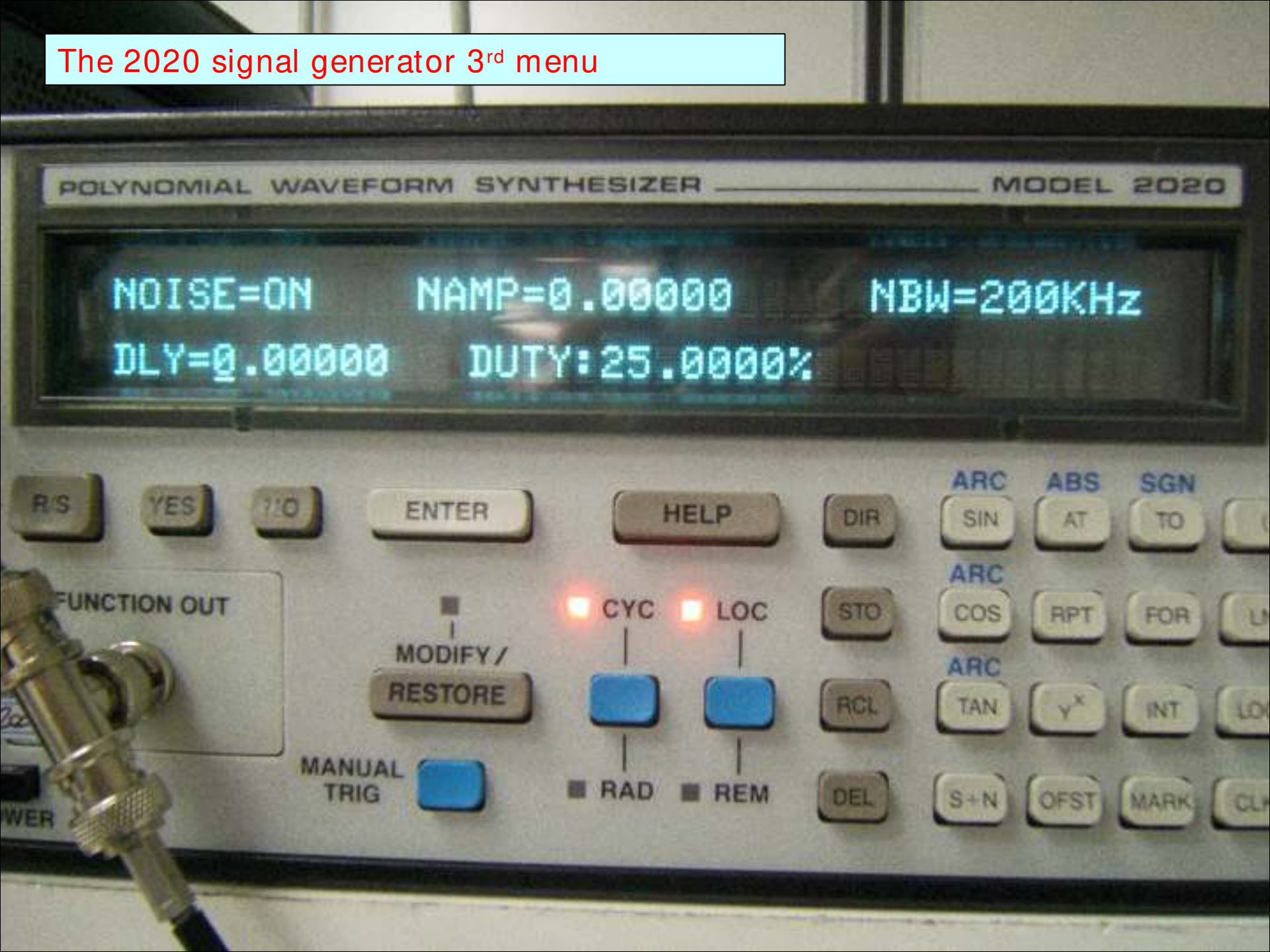
The 2020 signal generator 1ST menu



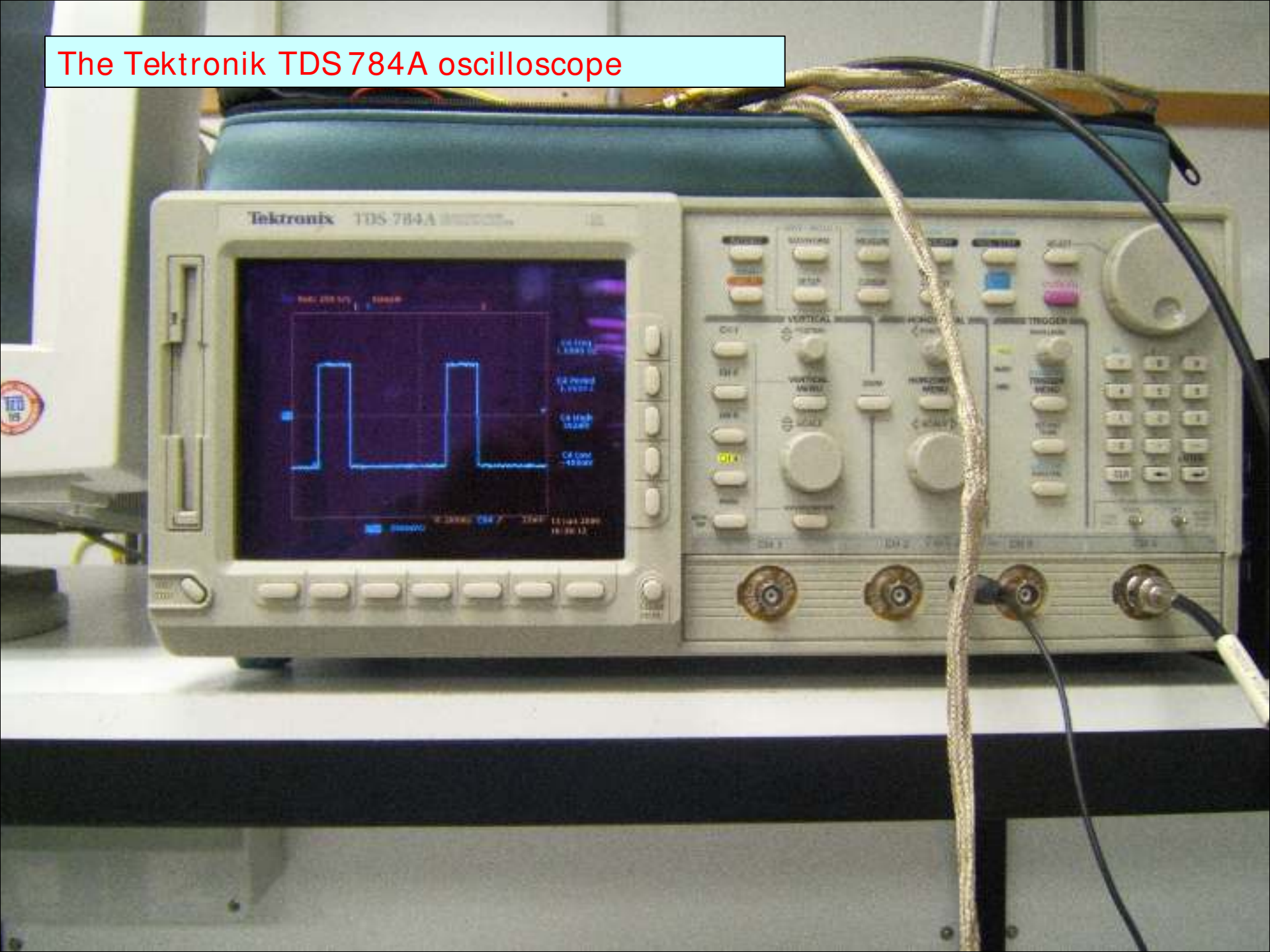
The 2020 signal generator 2nd menu



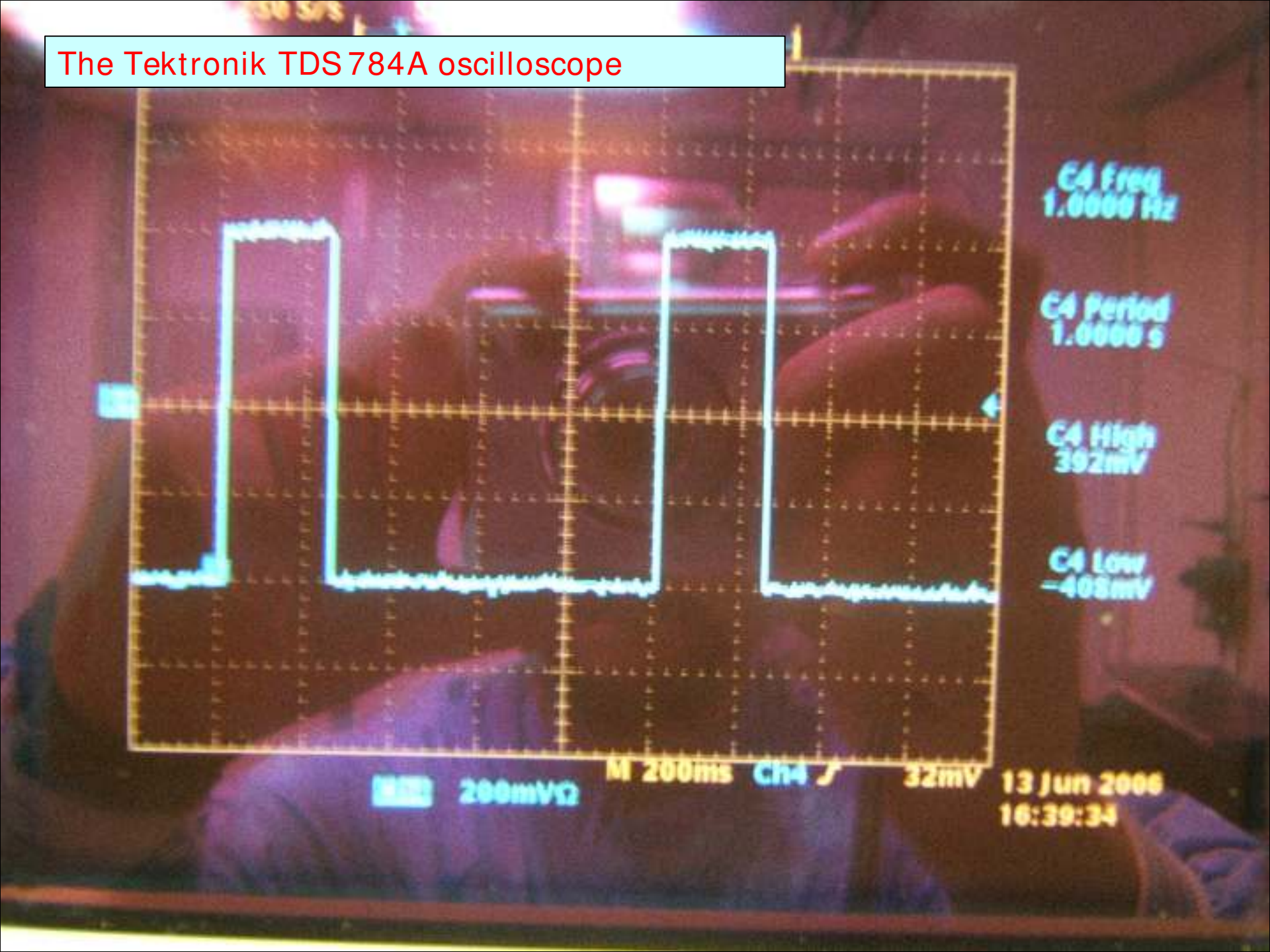
The 2020 signal generator 3rd menu

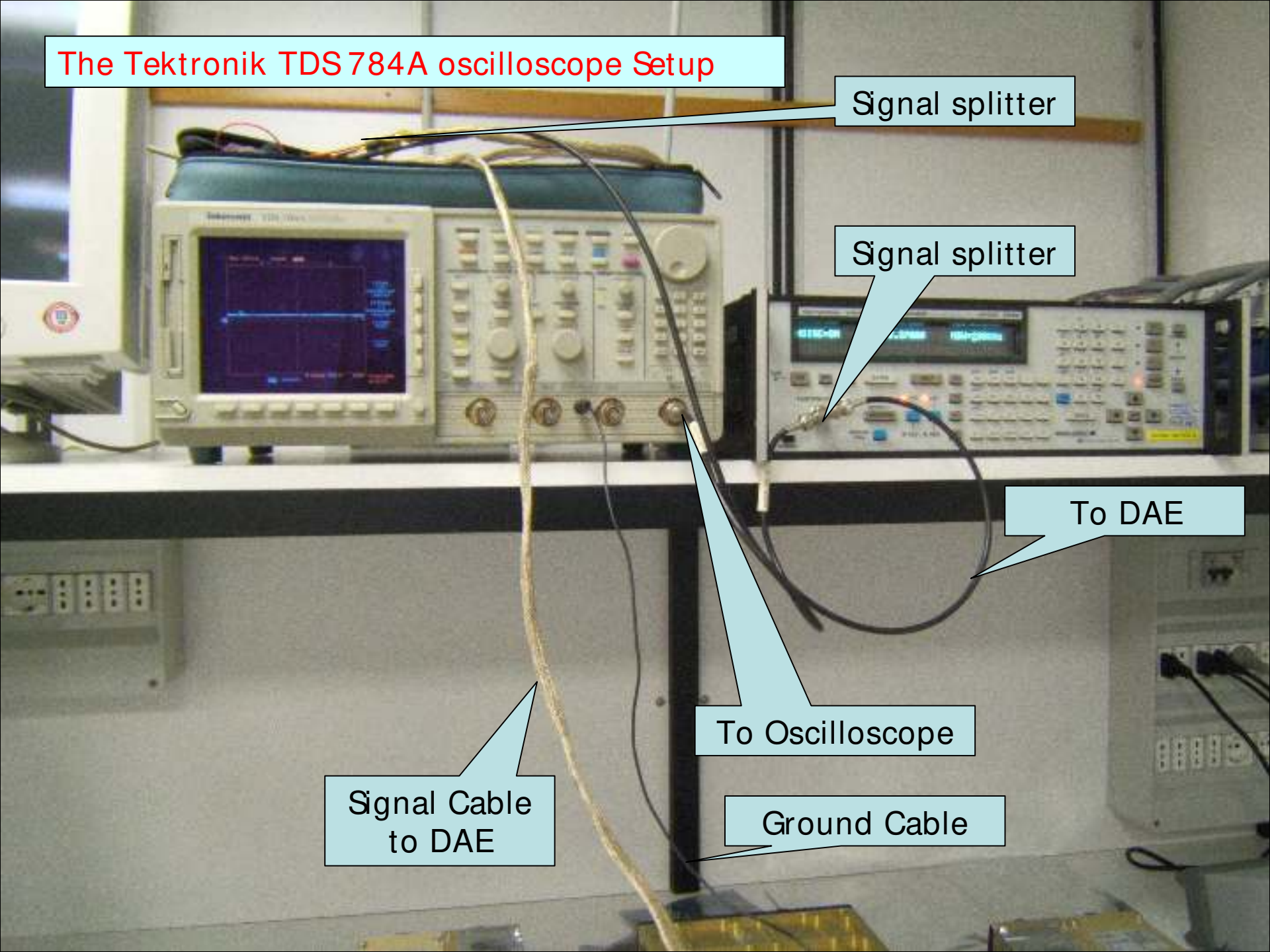


The Tektronik TDS 784A oscilloscope

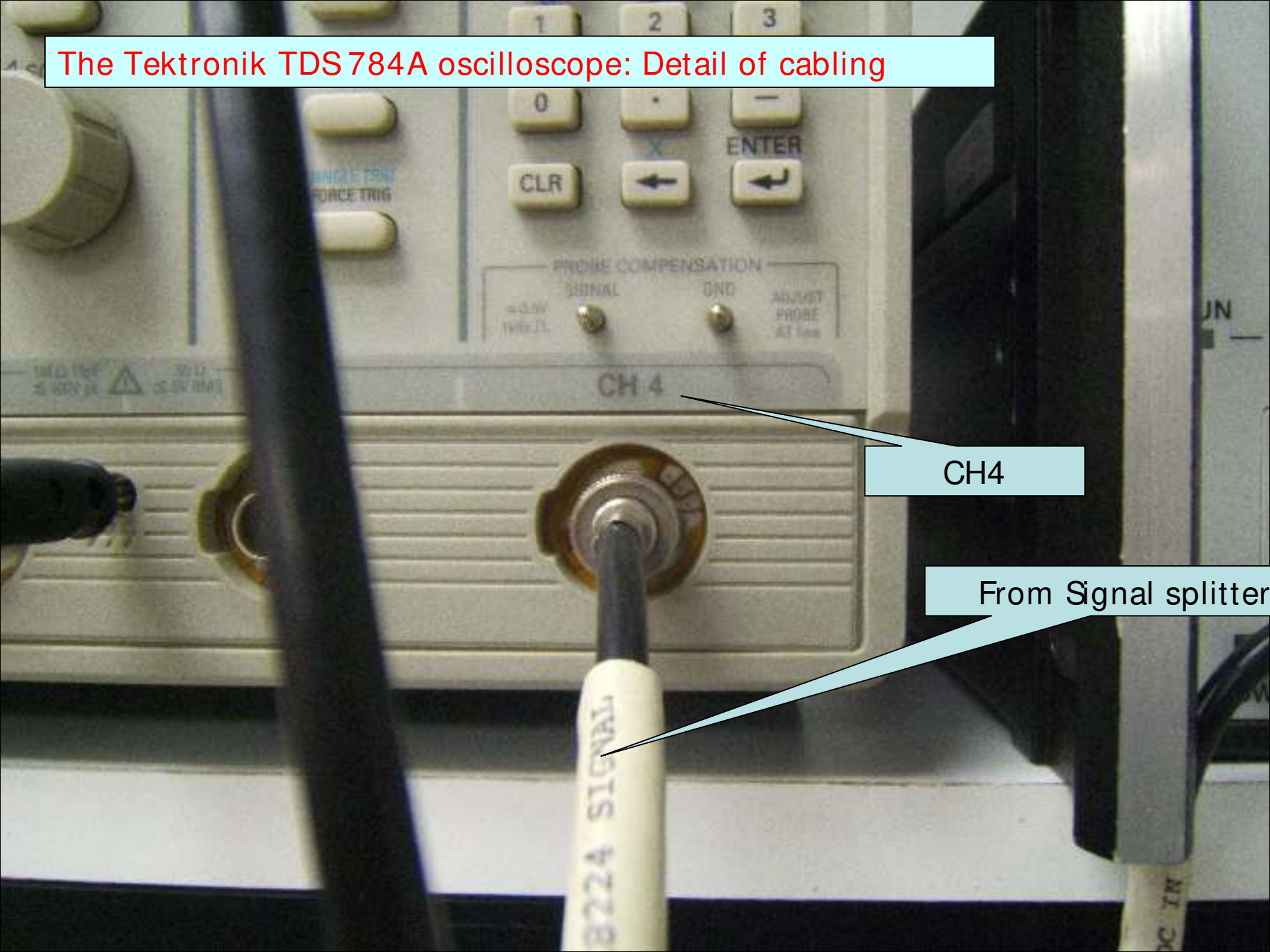


The Tektronik TDS 784A oscilloscope




The Tektronik TDS 784A oscilloscope Setup
Signal splitter
Signal splitter
To DAE
To Oscilloscope
Signal Cable to DAE
Ground Cable

The Tektronik TDS 784A oscilloscope: Detail of cabling



3 Tests

- XXX_9103
- XXX_9105
- XXX_9106
- XXX_9108
- XXX_9111
- XXX_9113
- XXX_9114
- XXX_9115

XXX_9103

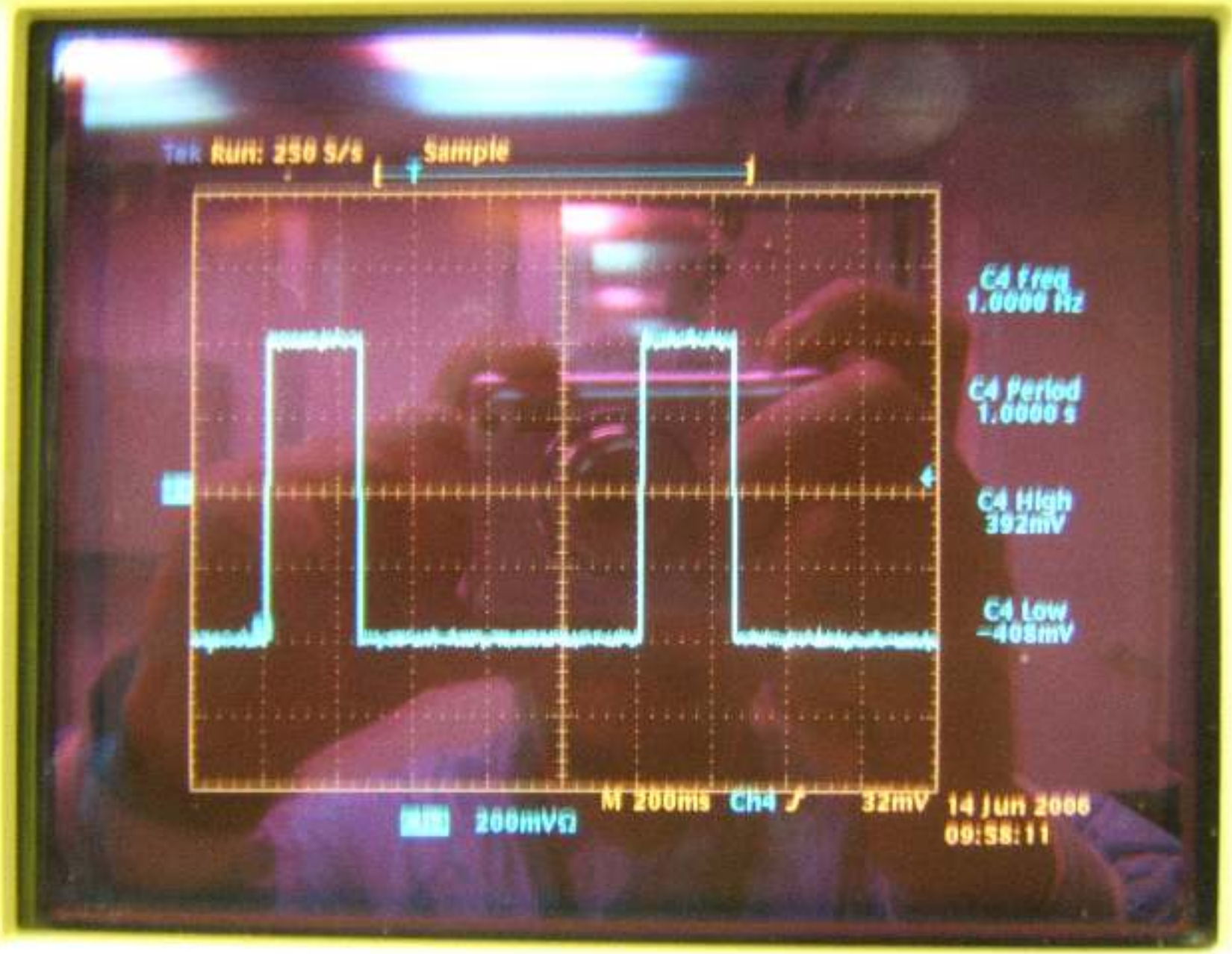
- Square Wave

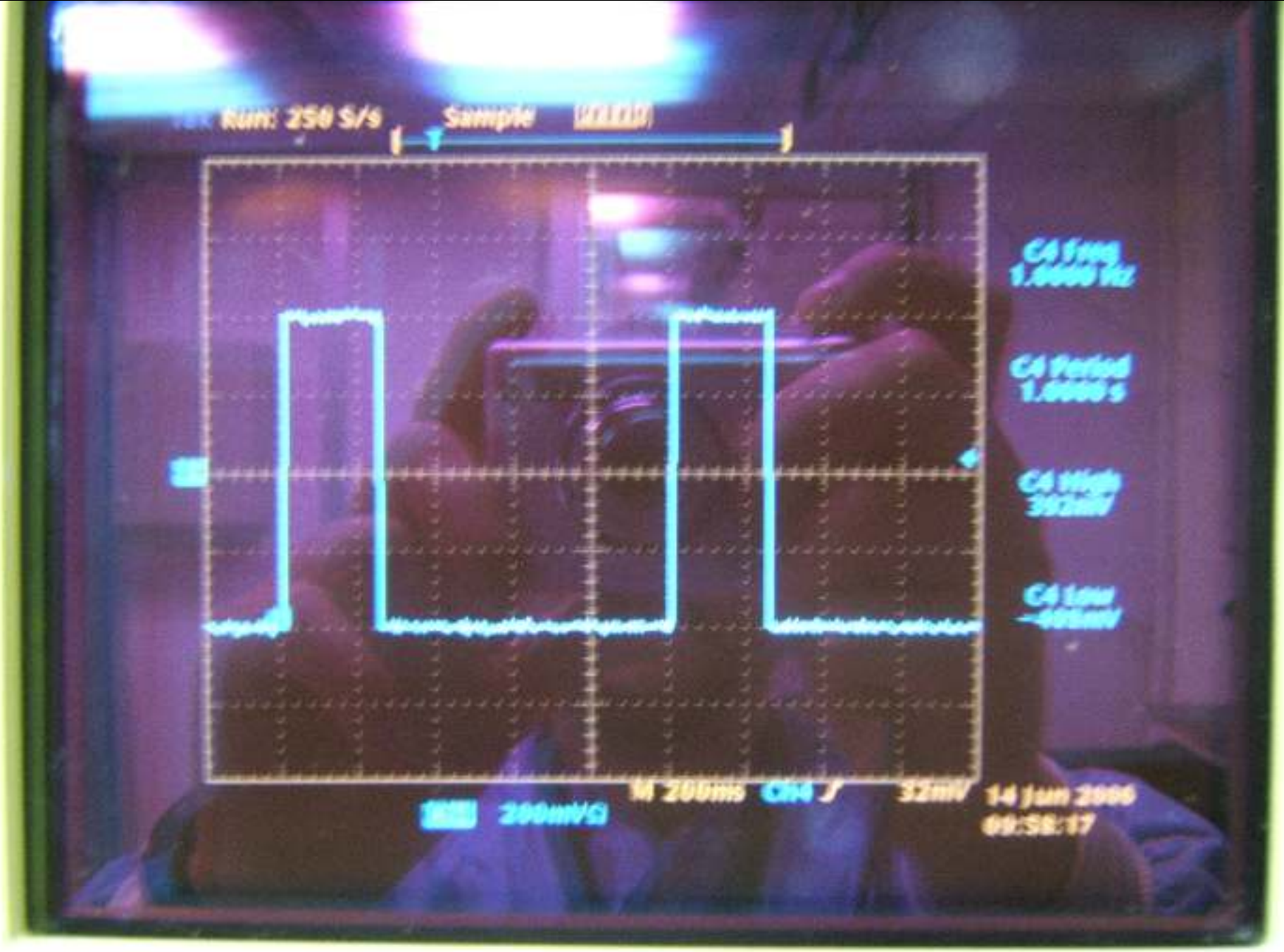

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
POWER
SPACE
FORMAT
SELECT
FIELD
ANALOGIC

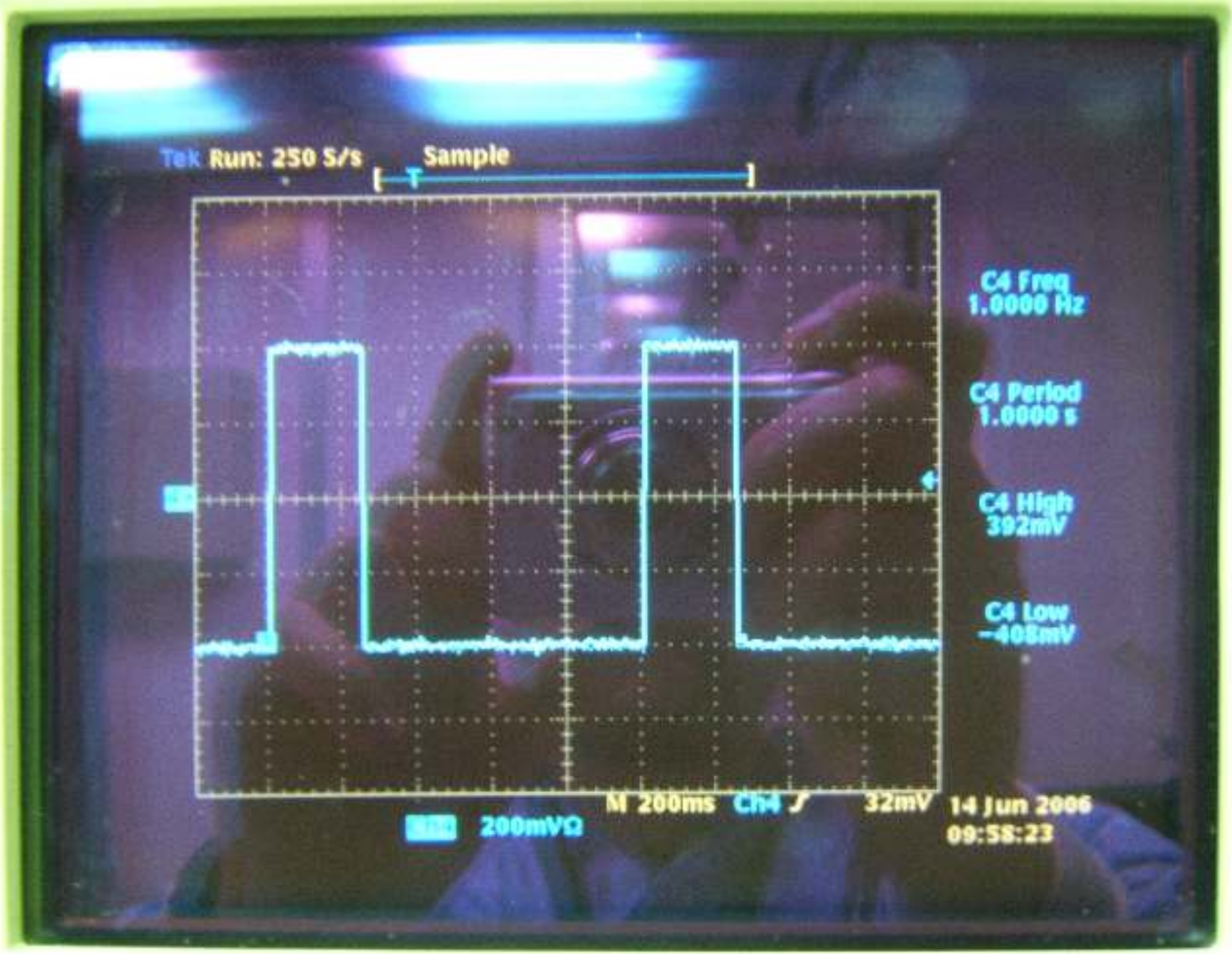

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK

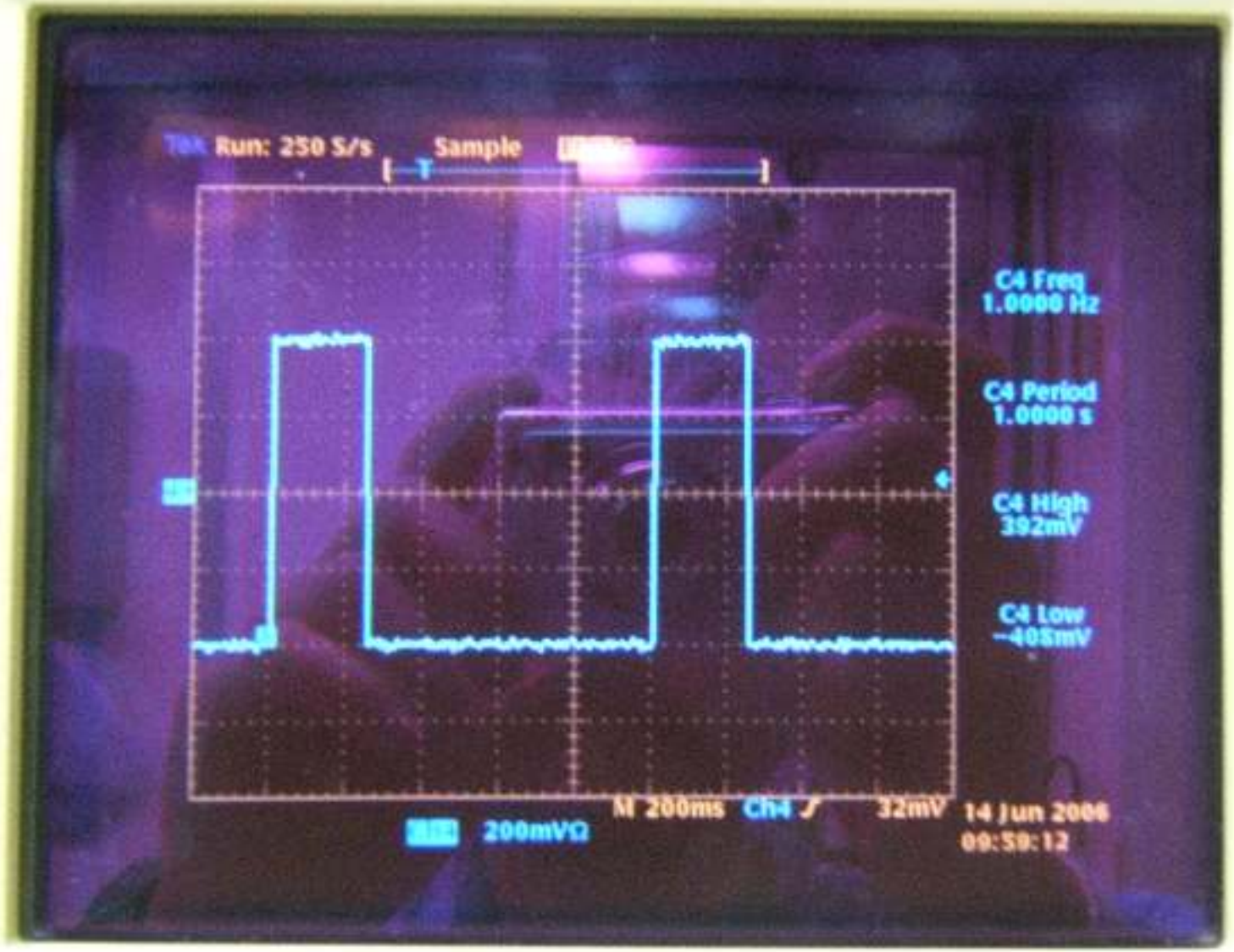

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
ABS
SGN
SIN
AT
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK
FILT
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC SIN
ABS AT
SGN TO
FUNCTION OUT
CYC
LOC
STO
ARC COS
RPT
FOR
LN
RESTORE
RCL
ARC TAN
Y^X
INT
LOG
MANUAL TRIG
REM
DEL
S+N
OFST
MARK
CLK


Tek Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
200mV Ω
14 Jun 2006
09:58:11


Run: 250 S/s
Sample
200mV/Ω
M 200ms Ch4 ƒ
32mV
14 Jun 2006
09:56:17


Tek Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
14 Jun 2006
09:58:23
200mVΩ


Tek Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-405mV
M 200ms Ch4 ∫ 32mV
14 Jun 2006
09:59:12
200mVΩ

XXX_9105

- Constant signal
- Square wave
- Triangular Wave
- Sinusoidal wave

XXX_9105

- Constant Signal
- Square wave 1Hz A=0.4V, duty = 25%
- Triangular wave 1Hz A=0.4V duty = 25%


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
FORMAT
SELECT
FIELD
NOISE
SPACE
FAST
ANALOGIC
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
LN
ARC
TAN
INT
LOG
STO
RCL
DEL
S-N
OFST
MARK
CLK
FUNCTION OUT
CYC
LOC
REM
MANUAL
TRIG
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
LN
ARC
TAN
INT
LOG
STO
RCL
DEL
S+N
OFST
MARK
CLK
FUNCTION OUT
CYC
LOC
RESTORE
MANUAL
TRIG
REM
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RESTORE
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


Tek Run: 250 S/s Sample
C4 Freq
998.7mHz
Low signal
amplitude
C4 Period
1.0012 s
Low signal
amplitude
C4 High
112mV
Unstable
histogram
C4 Low
−176mV
Unstable
histogram
M 200ms Ch4 ƒ 32mV
200mVΩ
14 Jun 2006
10:34:19


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
FORMAT
SELECT
FIELD
NOISE
ENTER
HELP
SPACE
FAST
CYC
LOC
REM
MANUAL TRIG
ANALOGIC
INTEGRAL IBIS VETO TE


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
PHS=0.00000
SYM=50.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RESTOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Tek Run: 250 S/s
C4 Freq
1.0005 Hz
C4 Period
999.6ms
C4 High
384mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
200mVΩ
14 Jun 2006
10:57:47

XXX_9106

- Constant Signal
- Square wave

XXX_9106

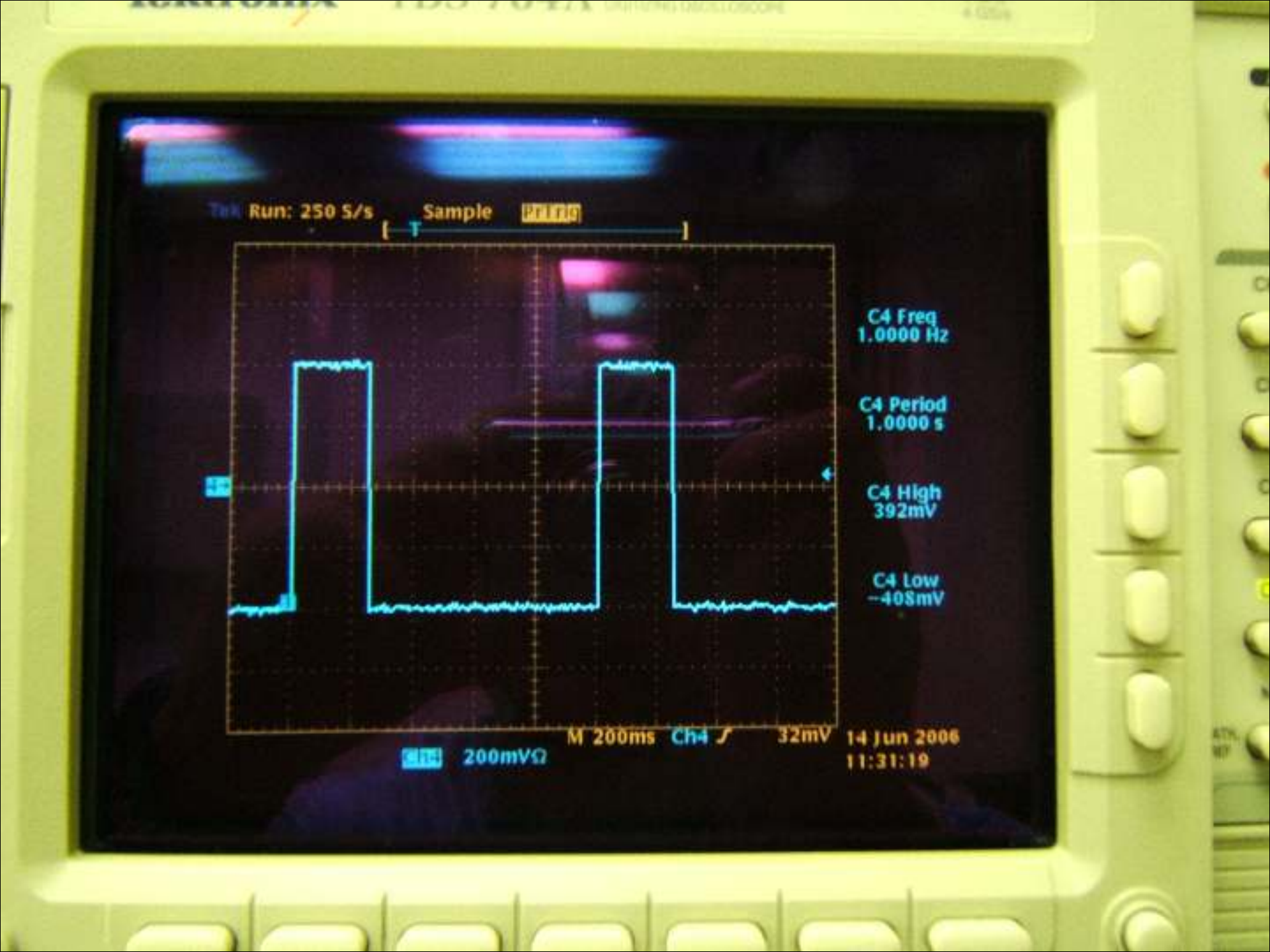
- Constant Signal
- Square wave 1Hz A=0.4V, duty = 25%


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
RESTORE
CYC
LOC
MANUAL TRIG
REM
POWER
SPACE
FAST
NOISE
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 202
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 202
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
UNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Run: 250 S/s
Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
14 Jun 2006
11:31:19
200mVΩ

XXX_9106

- Triangular wave

XXX_9106

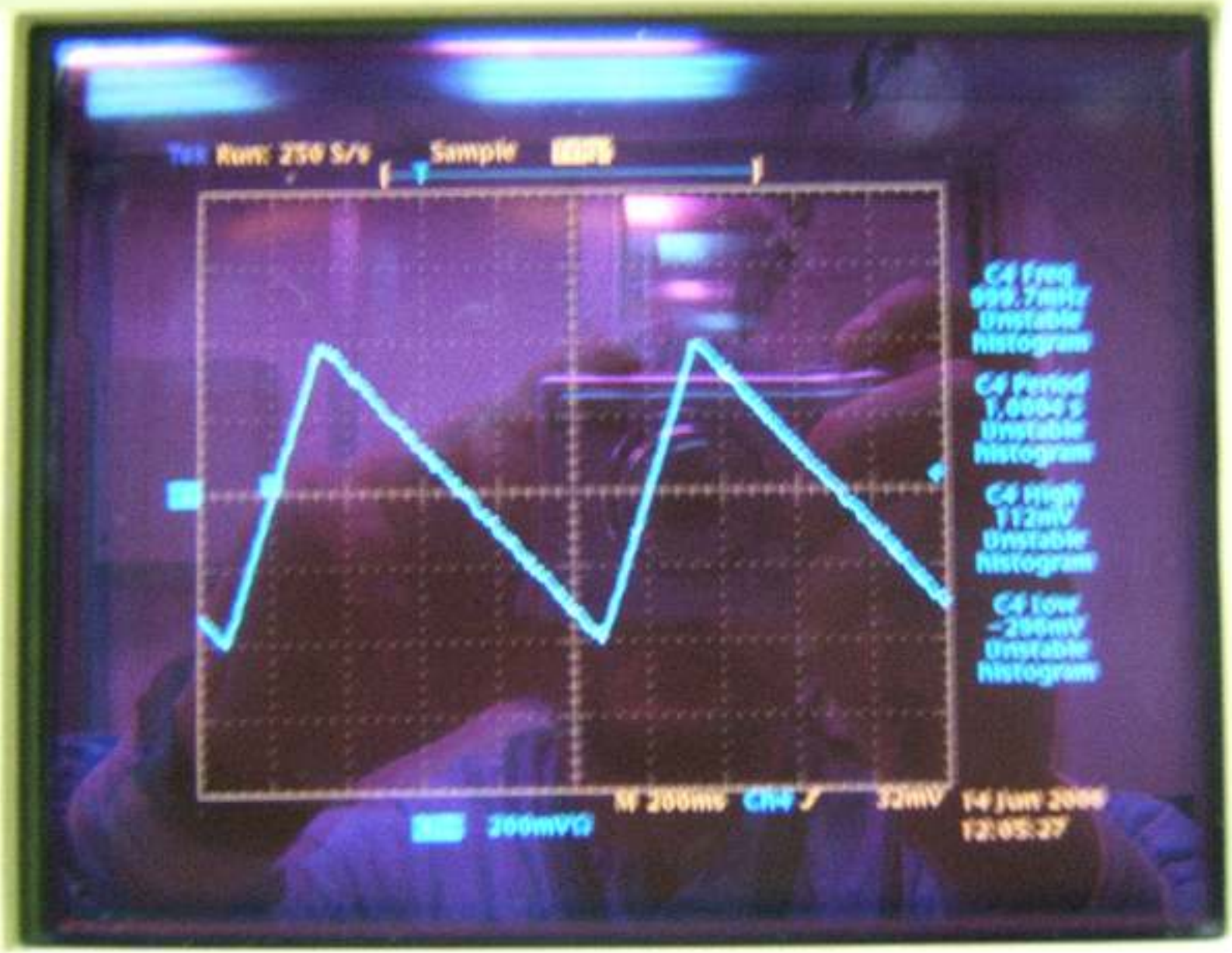
- Constant Signal
- Square wave 1Hz A=0.4V, duty = 25%
- Triangular wave 1Hz A=0.4V duty = 25%


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
SPACE
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
UN
FUNCTION OUT
CYC
LOC
STO
ARC
TAN
INT
LOG
RCL
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
MBW=200KHz
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


Run: 250 S/s
Sample
C4 Freq
Unstable
Histogram
C4 Period
Unstable
Histogram
C4 High
112mV
Unstable
Histogram
C4 Low
-280mV
Unstable
Histogram
200mV/Ω
32mV
14 Jun 2006
12:05:27

XXX_9108

- Square wave

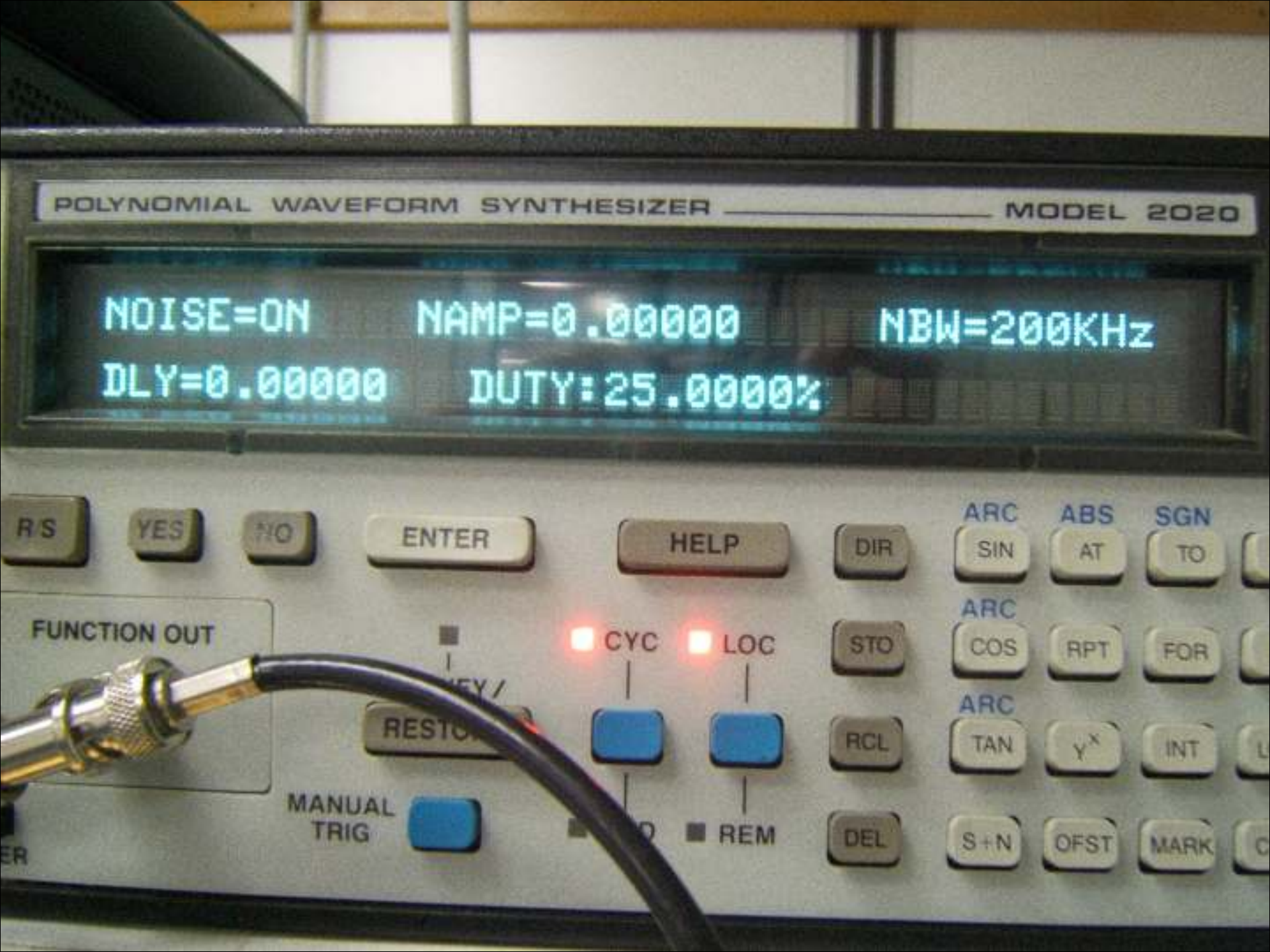
XXX_9108

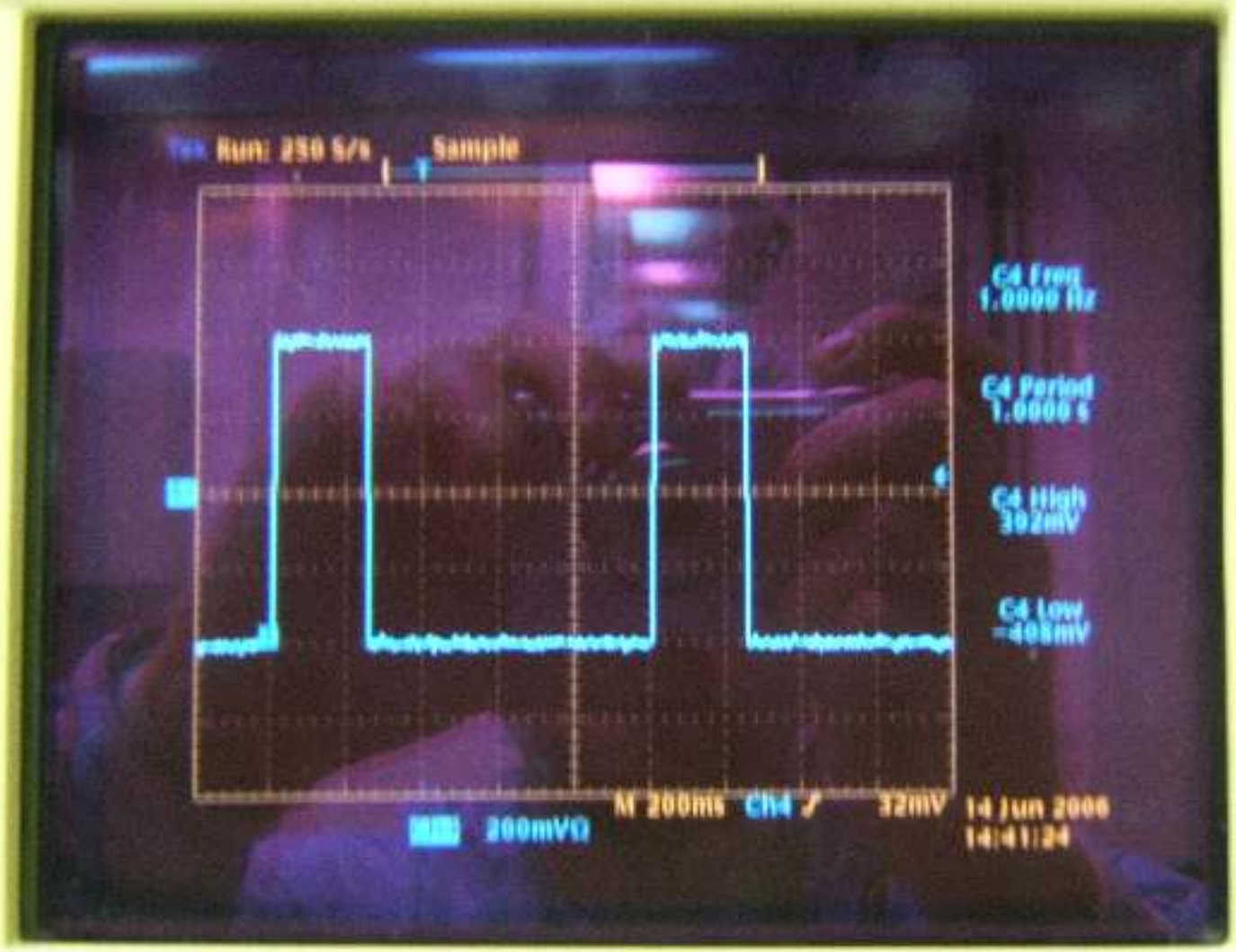
- Constant Signal
- Square wave 1Hz A=0.4V, duty = 25%

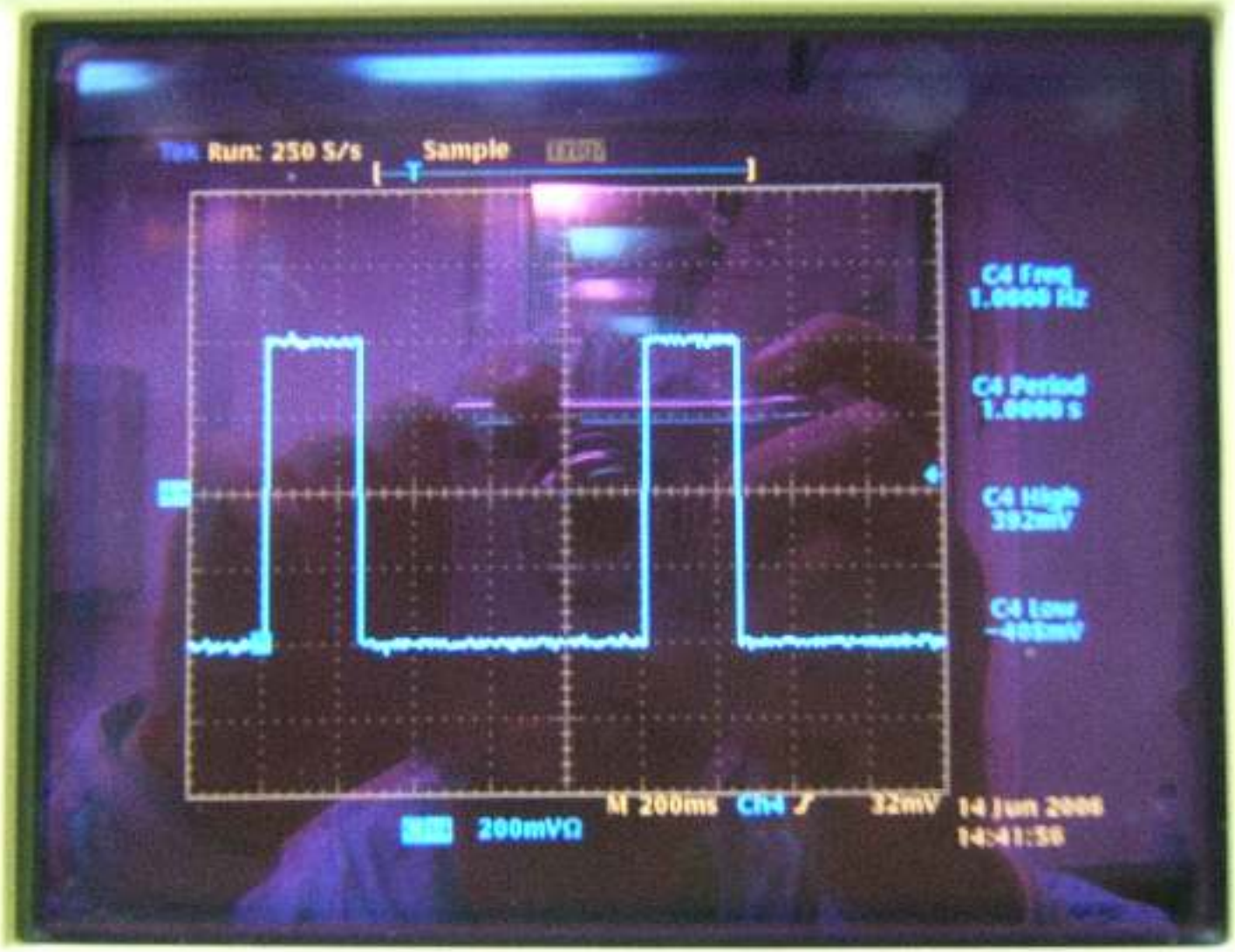

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
POWER
SPACE
FAST
ANALOGIC
INTEGRAL
NOISE


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RESTORE
RCL
ARC
TAN
Y^X
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RESTO
RCL
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
ARC
TAN
INT
RCL
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
14 Jun 2006
14:41:24
200mV Ω

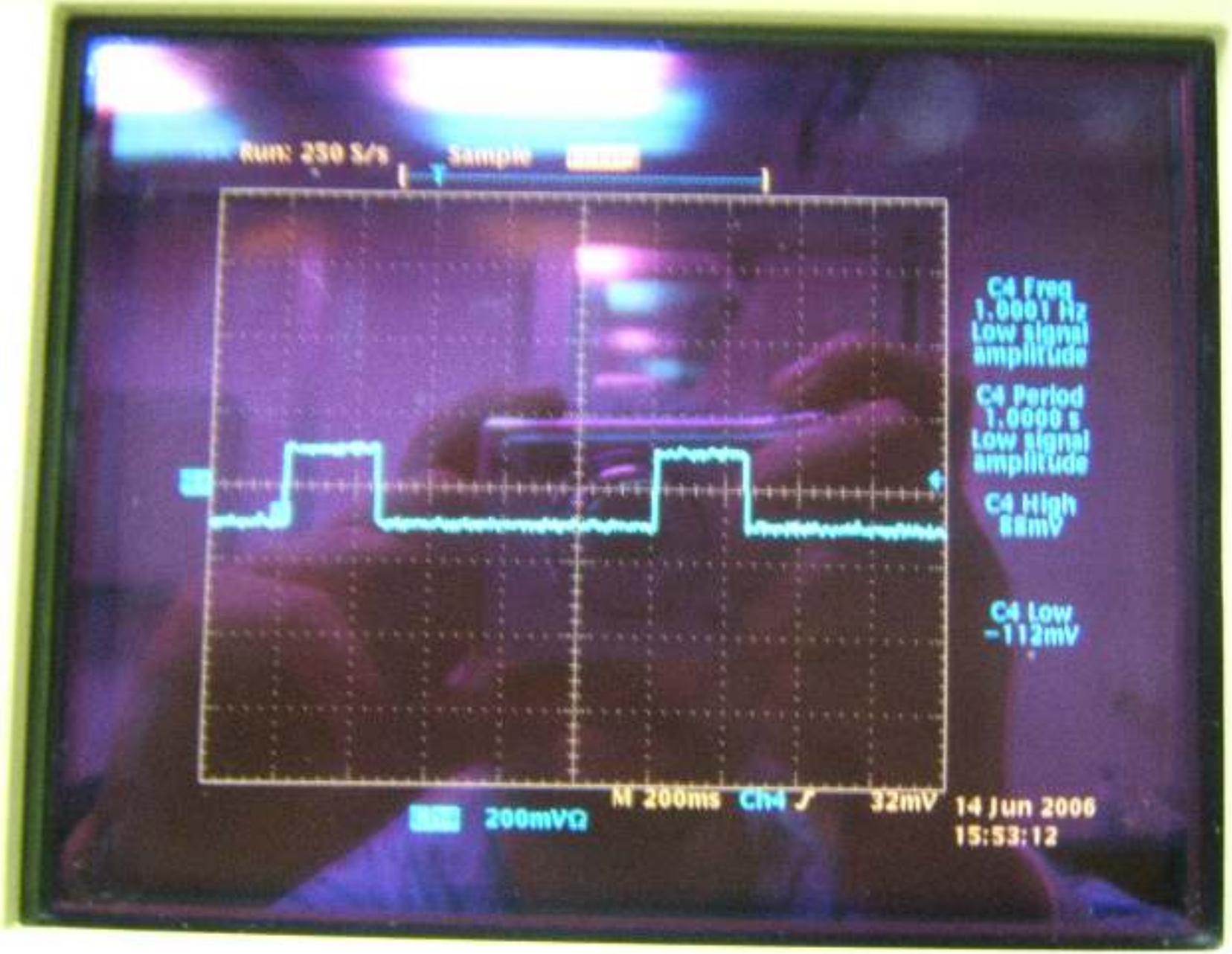

Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
M 200ms CH4 32mV
14 Jun 2006
200mVΩ

XXX_9108

- Constant Signal
- Square wave 1Hz A=0.4V, duty = 25%
- Amp = 0.1 0.05 0.01


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
POWER
SPACE
FAST
FORMAT
SELECT
FIELD
NOISE
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
MODIFY /
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Run: 250 S/s
Sample
C4 Freq
1.0001 Hz
Low signal
amplitude
C4 Period
1.0000 s
Low signal
amplitude
C4 High
88mV
C4 Low
-112mV
200mVΩ
M 200ms Ch4
32mV
14 Jun 2006
15:53:12

XXX_9109

- Constant Signal
- Square wave

XXX_9109

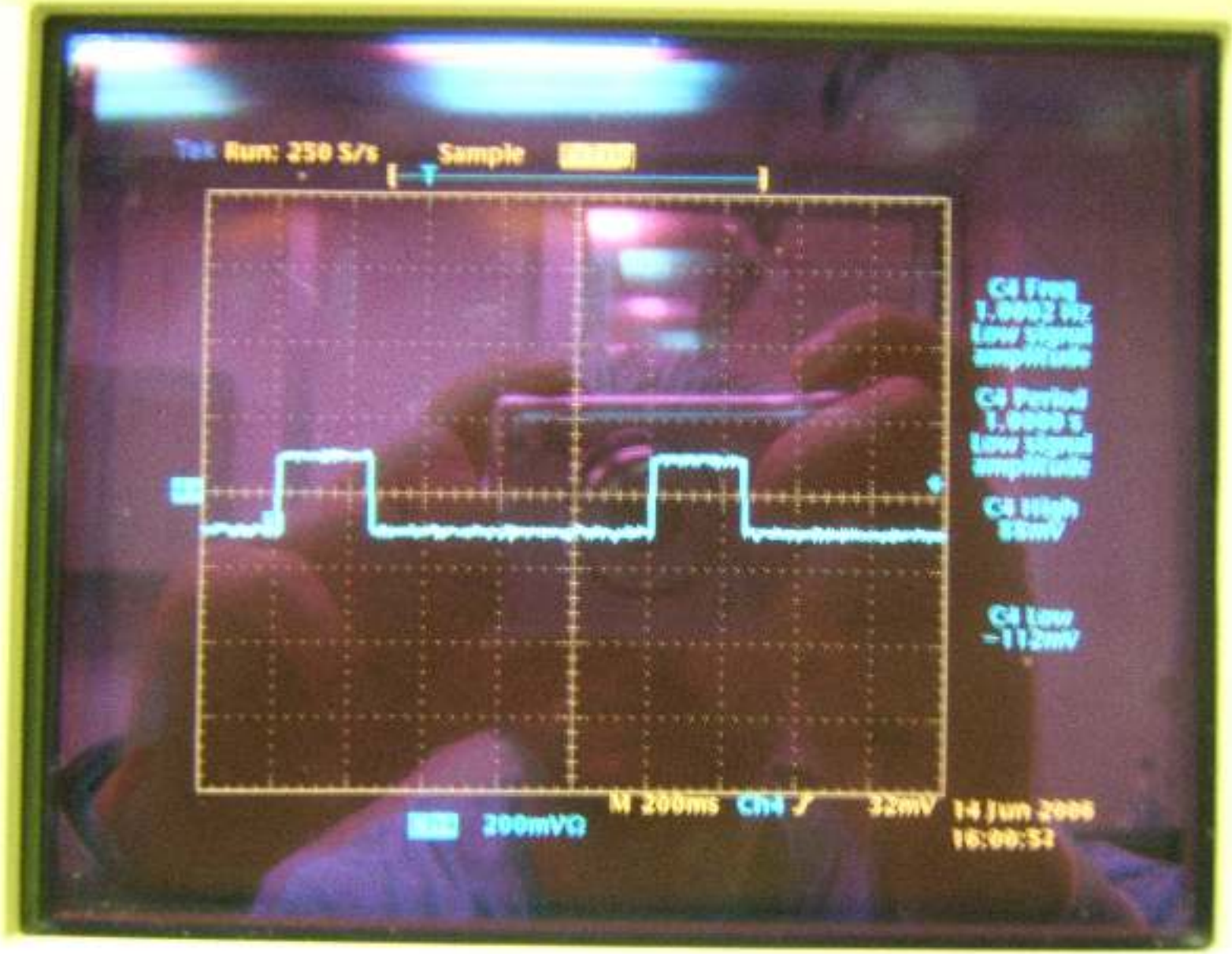
- Constant Signal
- Square wave 1Hz A=0.1V, duty = 25%
- Triangular 1Hz A=0.1V duty=25%
-


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
REM
MANUAL TRIG
POWER
SPACE
FAST
ANALOGIC
DATA PRECISION


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC SIN
ABS AT
SGN TO
FUNCTION OUT
CYC
LOC
STO
ARC COS
RPT
FOR
RCL
ARC TAN
Y^X
INT
MANUAL TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
Y^X
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Tek Run: 250 S/s Sample
Ch4 Freq
1.000 kHz
Low signal amplitude
Ch4 Period
1.0000 s
Low signal amplitude
Ch4 High
80mV
Ch4 Low
-112mV
M 200ms Ch4 ƒ 32mV
14 Jun 2006
16:00:54
200mVΩ

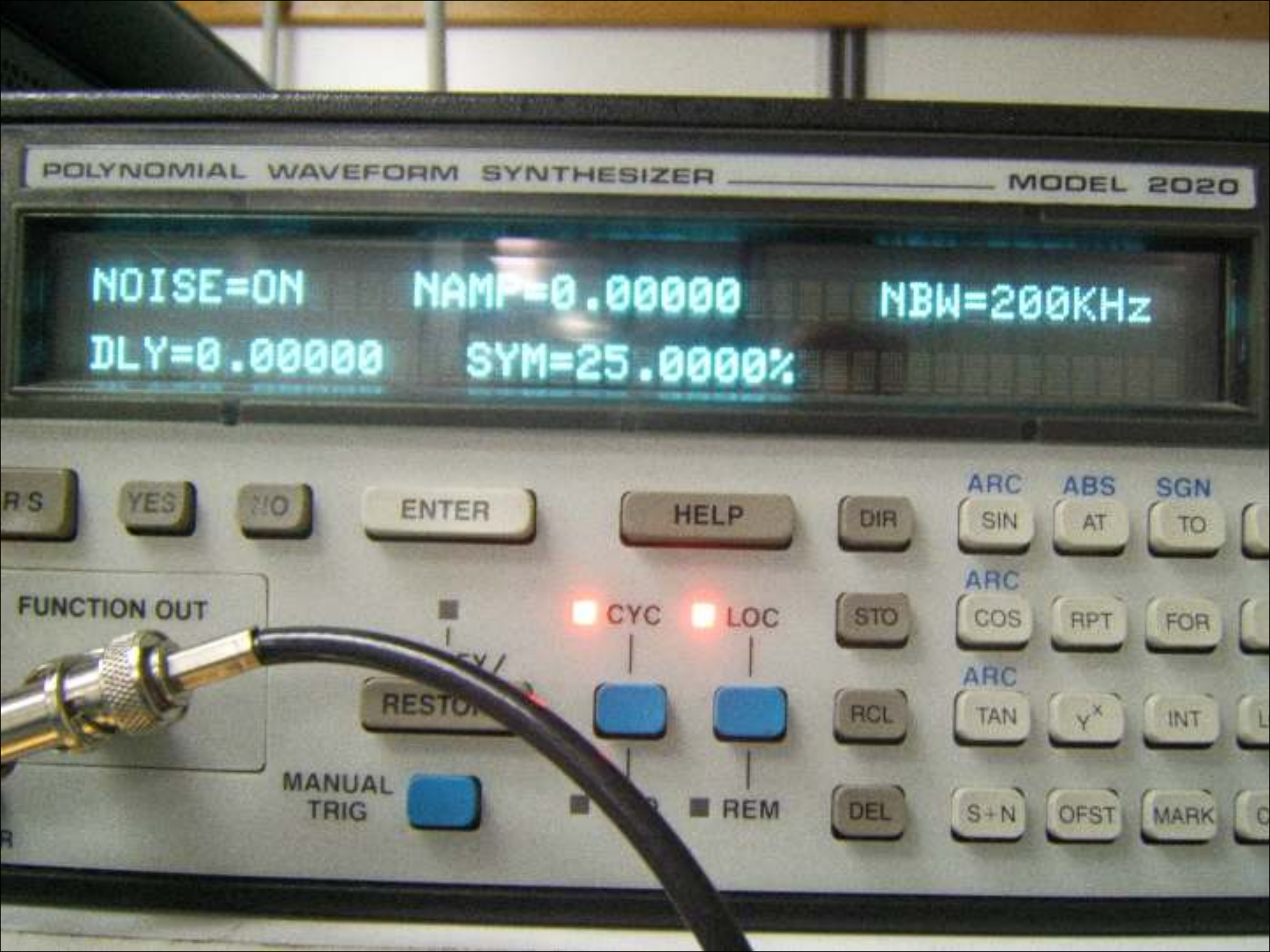
XXX_9109

- Triangular Wave


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFSI:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
SPACE
FORMAT
SELECT
FIELD
NOISE
MANUAL TRIG
POWER
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
LN
ARC
TAN
INT
LOG
FUNCTION OUT
CYC
LOC
STO
RCL
DEL
RESTORE
MANUAL
TRIG
REM
S+N
OFST
MARK
CLK
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK=0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
YES
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
RESTOR
RCL
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Run: 250 S/s
C4 Freq
1.0121 Hz
Low signal
amplitude
C4 Period
988.0ms
Low signal
amplitude
C4 High
16mV
Unstable
histogram
C4 Low
−32mV
Unstable
histogram
M 200ms Ch4
32mV
200mVΩ
14 Jun 2006
16:08:45


Run: 250 S/s
C4 Freq
961.5mHz
Low signal
amplitude
C4 Period
1.0400 s
Low signal
amplitude
C4 High
40mV
Unstable
histogram
C4 Low
-72mV
Unstable
histogram
200mVΩ
M 200ms Ch4 32mV
14 Jun 2006
16:08:49

XXX_9111

- Square Wave

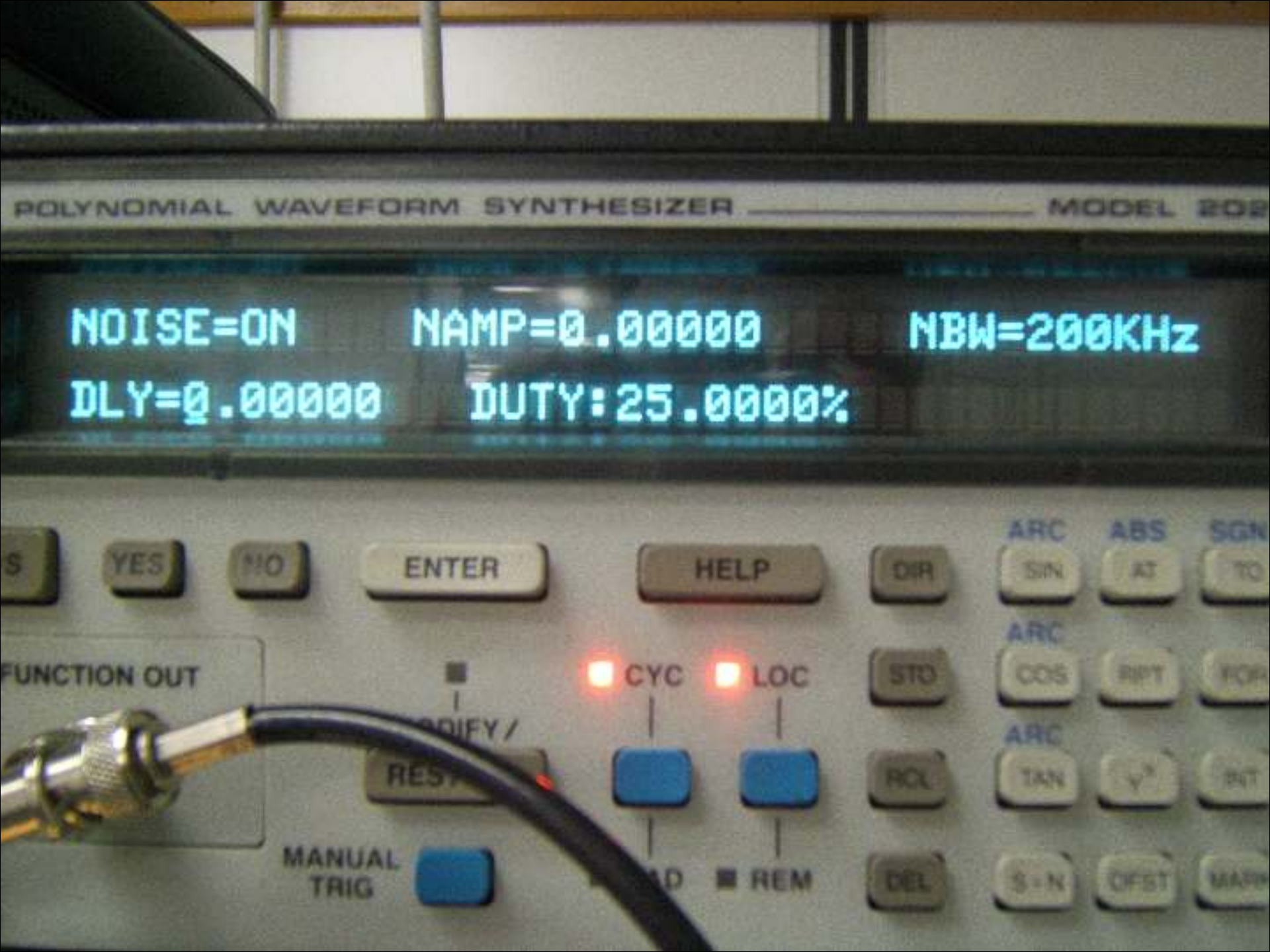
XXX_9111

- Square wave Freq=1Hz Amp=0.4V 25% Duty
- Triangular wave Freq=1Hz Amp=0.4V 25% Duty
-


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
FUNCTION OUT
MANUAL TRIG
POWER
SPACE
FAST
FORMAT
SELECT
FIELD
NOISE
ANALOGIC
INTEGRAL IBIS VETO TE


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RESTO
RCL
ARC
TAN
Y^X
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
Y^
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 202
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
STO
FUNCTION OUT
CYC
LOC
ARC
TAN
RCL
INT
MANUAL
TRIG
REM
DEL
S-N
OFST


Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms CH4 ƒ 32mV
200mV/Ω
15 Jun 2006
10:30:59

XXX_9111

- Triangular Wave


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
ENTER
HELP
SPACE
FAST
FUNCTION OUT
MANUAL TRIG
CYC
LOC
REM
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
ARC
TAN
INT
FUNCTION OUT
CYC
LOC
STO
RCL
DEL
MANUAL
TRIG
REM
S+N
OFST
MARK
POWER

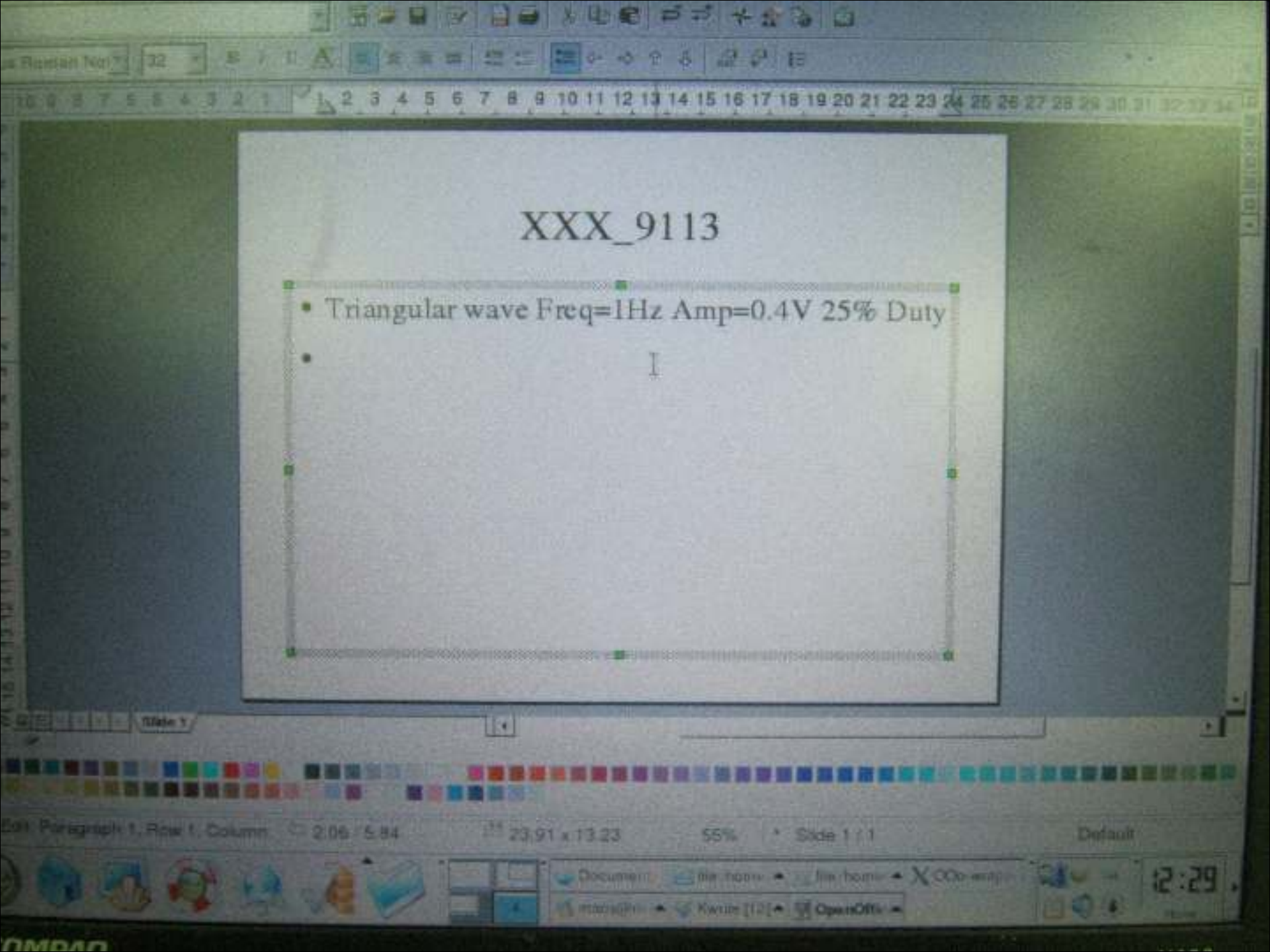

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
STO
FUNCTION OUT
CYC
LOC
ARC
TAN
INT
RCL
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


: 250 S/s
C4 Freq
1.0000 Hz
Unstable
histogram
C4 Period
1.0000 s
Unstable
histogram
C4 High
200mV
Unstable
histogram
C4 Low
−232mV
Unstable
histogram
M 200ms Ch4 ƒ 32mV
200mVΩ
15 Jun 2006
11:14:10

XXX_9113

- Triangular Waves of different frequencies


XXX_9113
Triangular wave Freq=1Hz Amp=0.4V 25% Duty


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
RESTORE
MANUAL TRIG
REM
POWER
SPACE
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC SIN
ABS AT
SGN TO
STO
ARC COS
RPT
FOR
LN
RCL
ARC TAN
Y^X
INT
LOG
DEL
S+N
OFST
MARK
CLK
FUNCTION OUT
CYC
LOC
REM
MANUAL TRIG

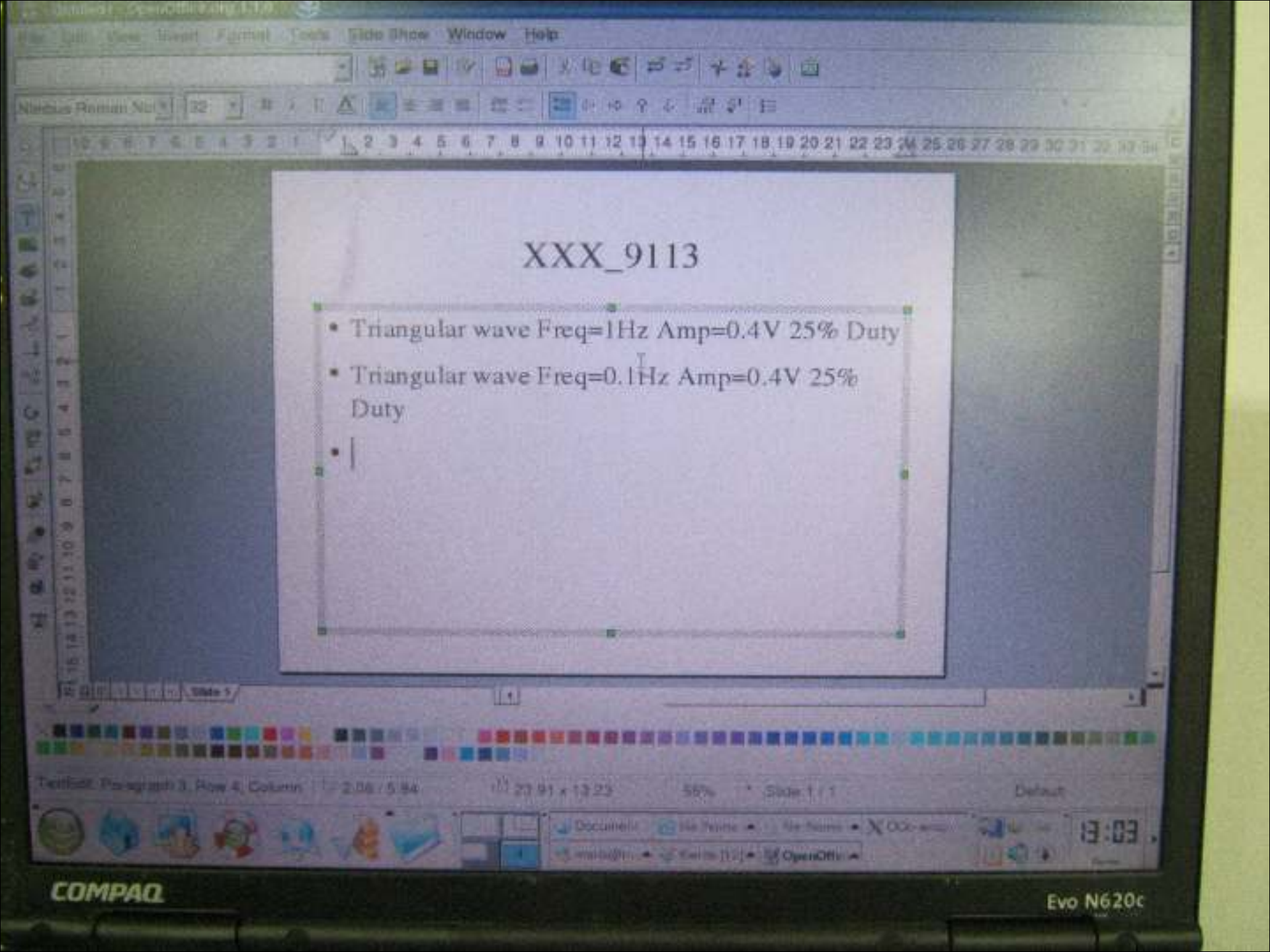

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
LN
STO
ARC
TAN
INT
LOG
RCL
DEL
S+N
OFST
MARK
CLK
FUNCTION OUT
CYC
LOC
RESTORE
MANUAL
TRIG
REM
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
LN
RCL
TAN
Y^X
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


Tek Run: 250 S/s Sample
C4 Freq
1.0081 Hz
Unstable
histogram
C4 Period
992.0ms
Unstable
histogram
C4 High
296mV
Unstable
histogram
C4 Low
−232mV
Unstable
histogram
M 200ms Ch4 32mV
200mVΩ
15 Jun 2006
12:22:38

XXX_9113

- Triangular wave Freq = 0.1 Hz


XXX_9113
Triangular wave Freq=1Hz Amp=0.4V 25% Duty
Triangular wave Freq=0.1Hz Amp=0.4V 25% Duty
COMPAQ
Evo N620c

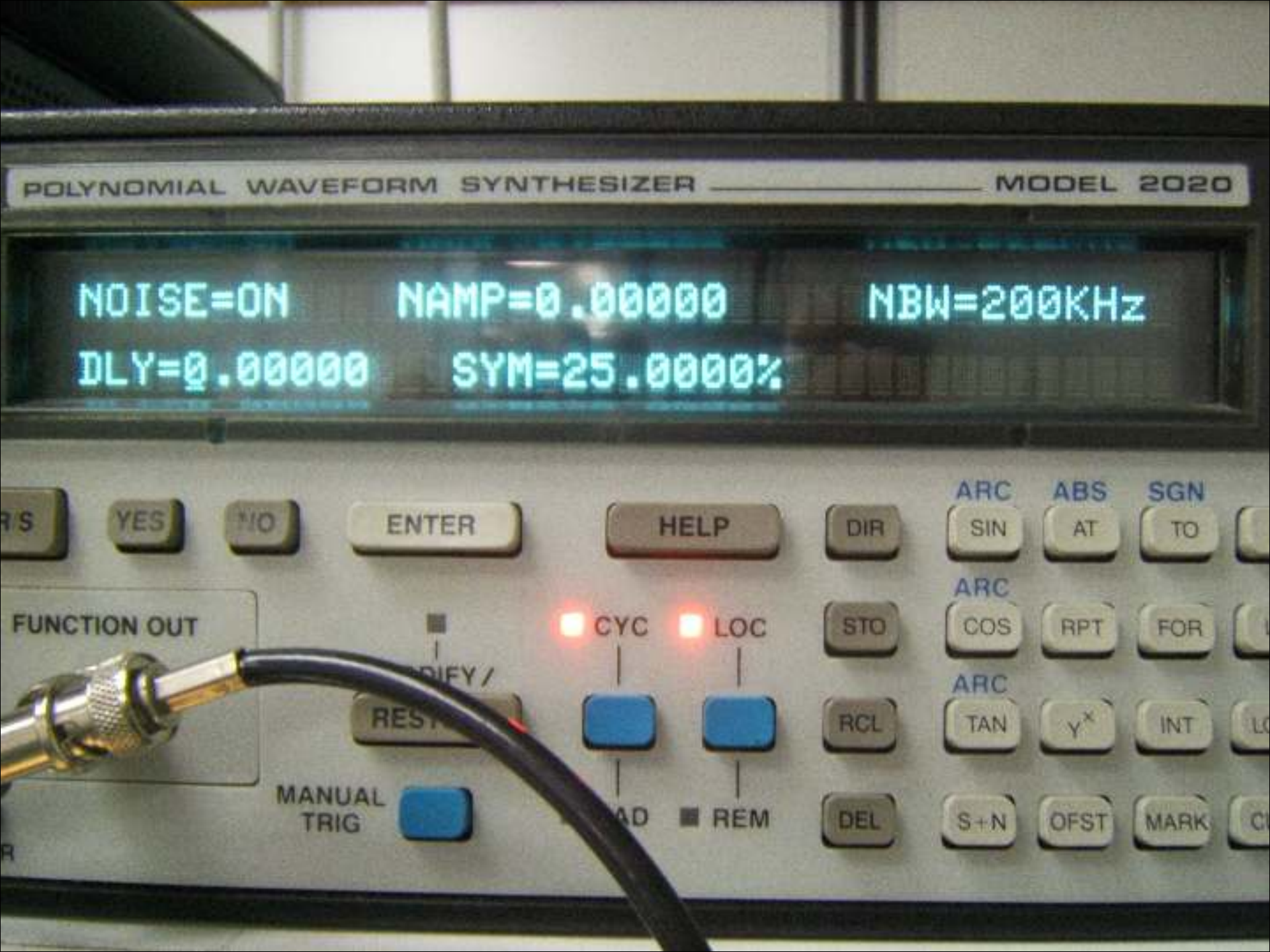
XXX_9113

- Triangular wave Freq=1Hz Amp=0.4V 25% Duty
- Triangular wave Freq=0.1Hz Amp=0.4V 25% Duty
-


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:99.9835m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
RESTORE
MANUAL TRIG
REM
POWER
SPACE
FAST
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:99.9835m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC SIN
ABS AT
SGN TO
FUNCTION OUT
CYC
LOC
STO
ARC COS
RPT
FOR
LN
RESTOR
RCL
ARC TAN
Y^X
INT
LOG
MANUAL TRIG
REM
DEL
S+N
OFST
MARK
CLK
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RESTO
RCL
ARC
TAN
Y^X
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
YES
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


Run: 250 S/s
Sample
M 200ms

XXX_9114

- Triangular Wave

XXX_9114

- Triangular wave Freq=0.1Hz Amp=0.4V 25% Duty
- Triangular wave Freq=0.05Hz Amp=0.4V 25% Duty after OBT=7800
-

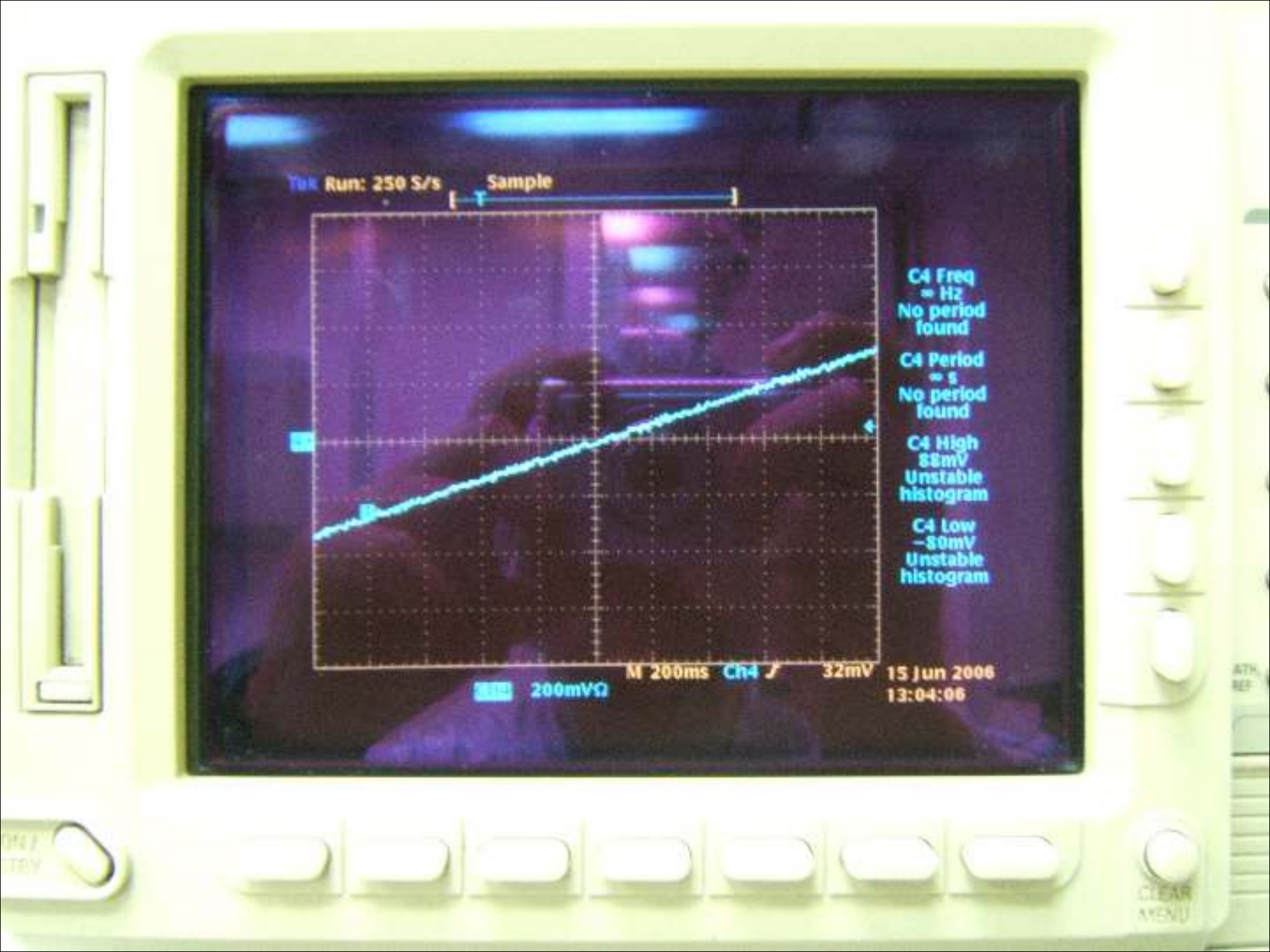

POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
SPACE
FAST
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
SPACE
FAST
ANALOGIC
NOISE


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:99.9835m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
RCL
TAN
INT
MANUAL
TRIG
REM
DEL
S-N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
COS
RPT
FOR
RCL
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
SYM=25.0000%
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
LN
RESTO
RCL
ARC
TAN
INT
LOG
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK
CLK


Tek Run: 250 S/s Sample
C4 Freq
∞ Hz
No period
found
C4 Period
∞ s
No period
found
C4 High
88mV
Unstable
histogram
C4 Low
−80mV
Unstable
histogram
M 200ms Ch4 ƒ 32mV
200mVΩ
15 Jun 2006
13:04:06

XXX_9115

- Square Waves and Triangular Waves

XXX_9115

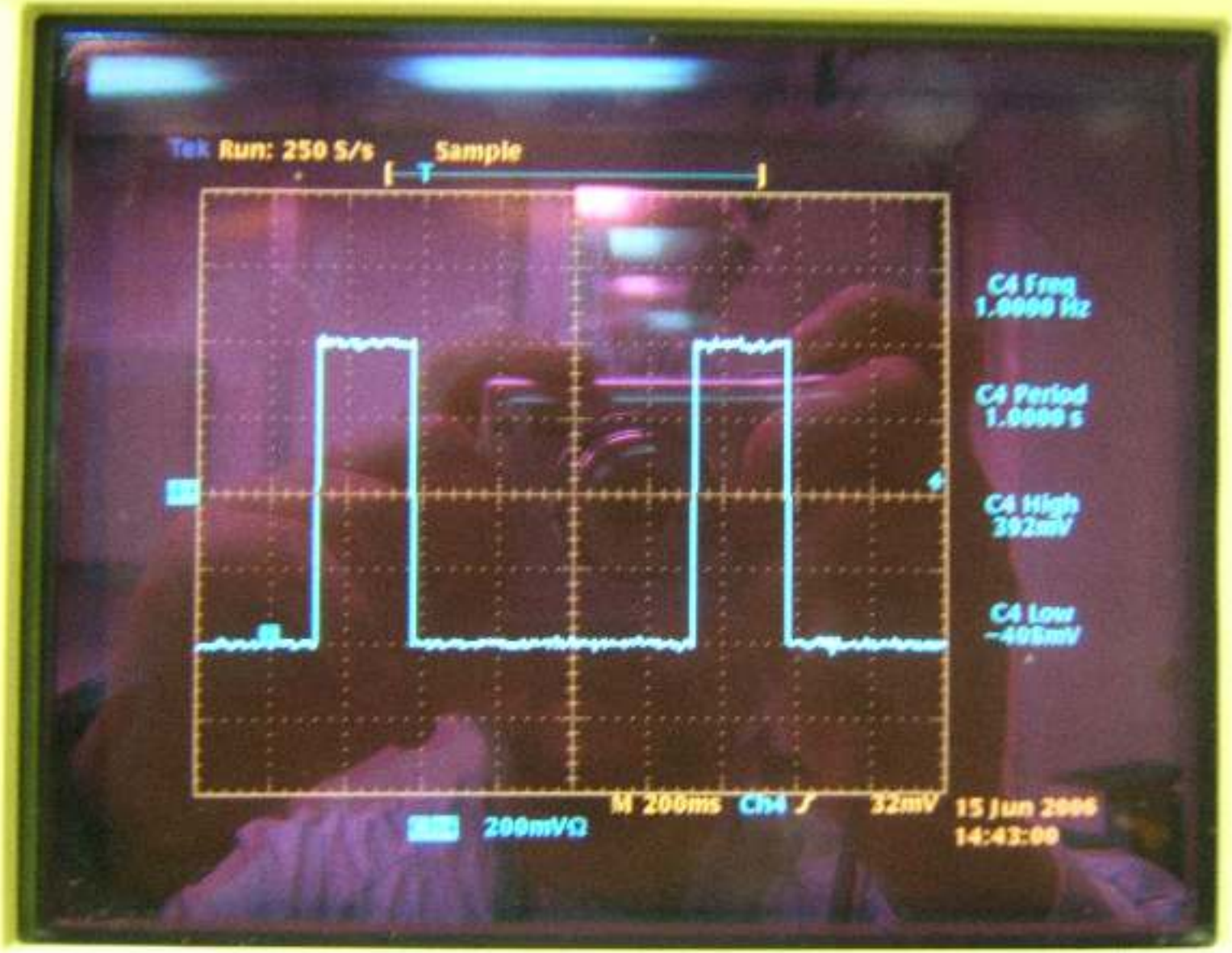
- Square wave Freq=1Hz Amp=0.4V 25% Duty
- Triangular wave Freq=0.05Hz Amp=0.4V 25% Duty
-


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
RUN
ENTER
HELP
FUNCTION OUT
CYC
LOC
MANUAL TRIG
REM
POWER
SPACE
ANALOGIC


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
ARC
COS
RPT
FOR
LN
FUNCTION OUT
CYC
LOC
STO
RESTOR
RCL
ARC
TAN
Y^X
INT
LOG
MANUAL
TRIG
REM
DEL
S÷N
OFST
MARK
CLK
POWER


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
FILT=NONE
MARK:0.00000
TRIG=FREE RUN
NOISE=ON
NAMP=0.00000
NBW=200KHz
R/S
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
AT
SGN
TO
FUNCTION OUT
CYC
LOC
STO
ARC
COS
RPT
FOR
RCL
ARC
TAN
INT
MANUAL
TRIG
REM
DEL
S+N
OFST
MARK


POLYNOMIAL WAVEFORM SYNTHESIZER
MODEL 2020
NOISE=ON
NAMP=0.00000
NBW=200KHz
DLY=0.00000
DUTY:25.0000%
RS
YES
NO
ENTER
HELP
DIR
ARC
SIN
ABS
SGN
TO
FUNCTION OUT
CYC
LOC
STO
RCL
DEL
MANUAL
TRIG
REM
INT


Tek Run: 250 S/s Sample
C4 Freq
1.0000 Hz
C4 Period
1.0000 s
C4 High
392mV
C4 Low
-408mV
M 200ms Ch4 ƒ 32mV
15 Jun 2006
14:43:00
200mVΩ