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PL- LFI- OAT- ME- 019

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

21 June 2006

Michele Maris,
Marco Frailis

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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

CRISA

H-P SPU/REBA

AvM - SPU

C.I. No :

N / 16 / 01

ABCL :

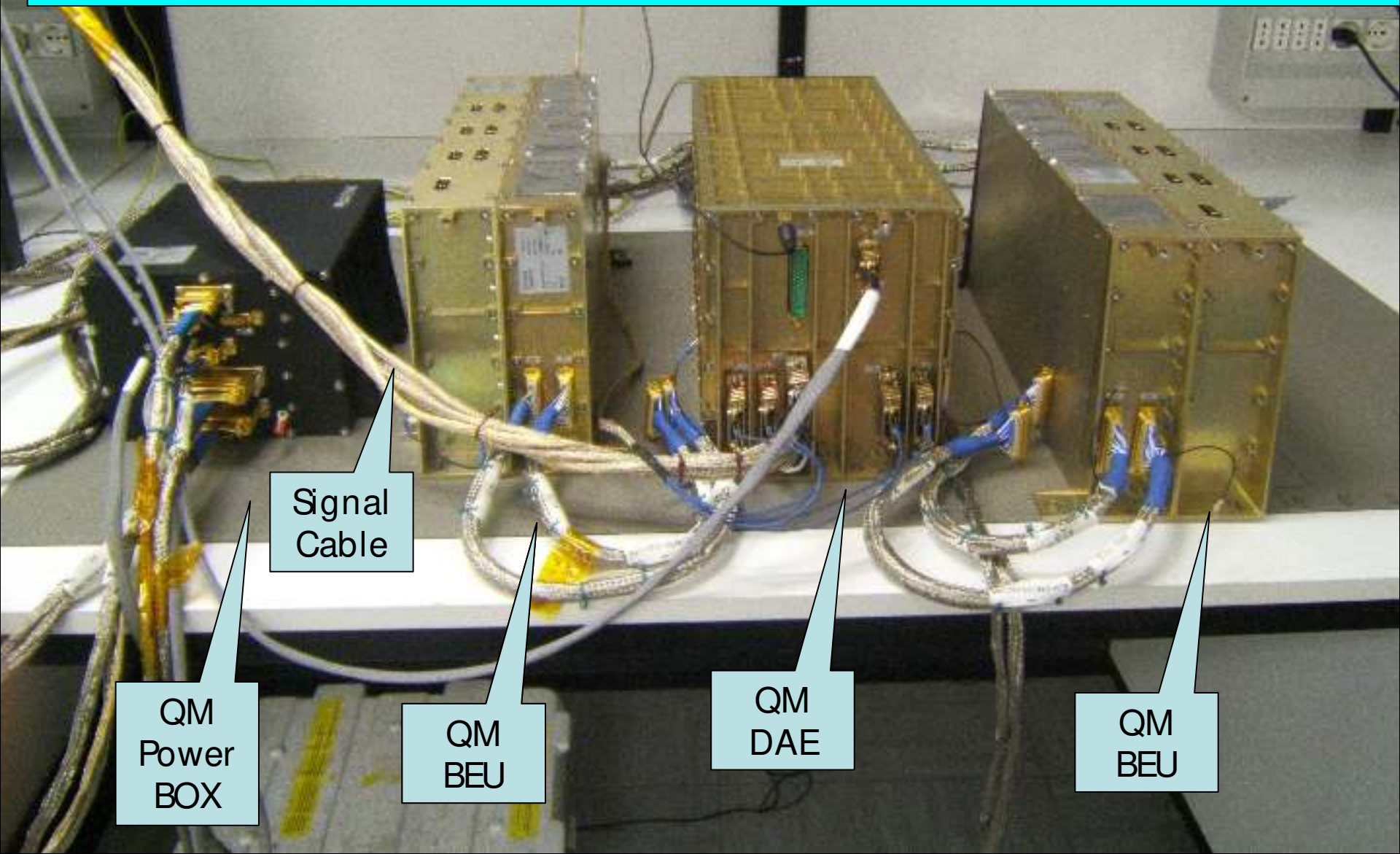
P/N :

S/N :

02

The QM HW With cabling

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



Signal
Cable

QM
Power
BOX

QM
BEU

QM
DAE

QM
BEU

The QM Power Box

LABEN

PROGRAM:	PLANCK LFI
EQUIPMENT	DAE POWER BOX
P. N.	740800115-01B
S.N.	001
MODEL	QM

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

PROGRAM:	PLANCK LFI
EQUIPMENT	DAE DAE BEU BOX
MANUFACTURER	LABEN
P. N.	740800117-01B
S.N.	001
MODEL	QM

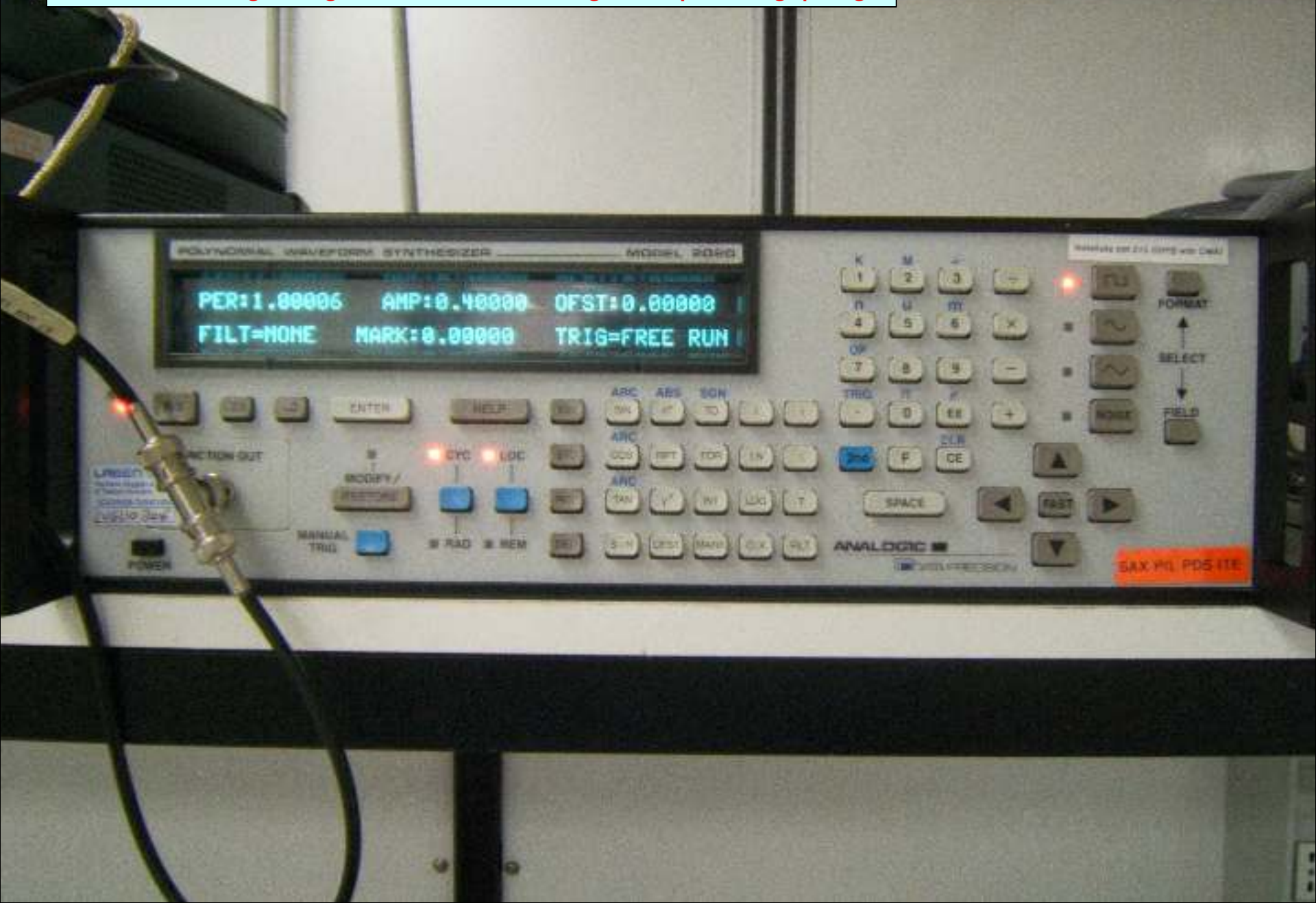
The QM DAE BEM box

PROGRAM:	PLANCK LFI
EQUIPMENT	DAE RIGHT BEM BOX
MANUFACTURER	LABEN
P. N.	740800119-01B
S.N.	001
MODEL	QM

The QM DAE FEM box

PROGRAM:	PLANCK LFI
EQUIPMENT	DAE RIGHT FEM BOX
MANUFACTURER	LABEN
P. N.	740800171-01B
S.N.	001
MODEL	QM

The 2020 signal generator with signal splitting plug



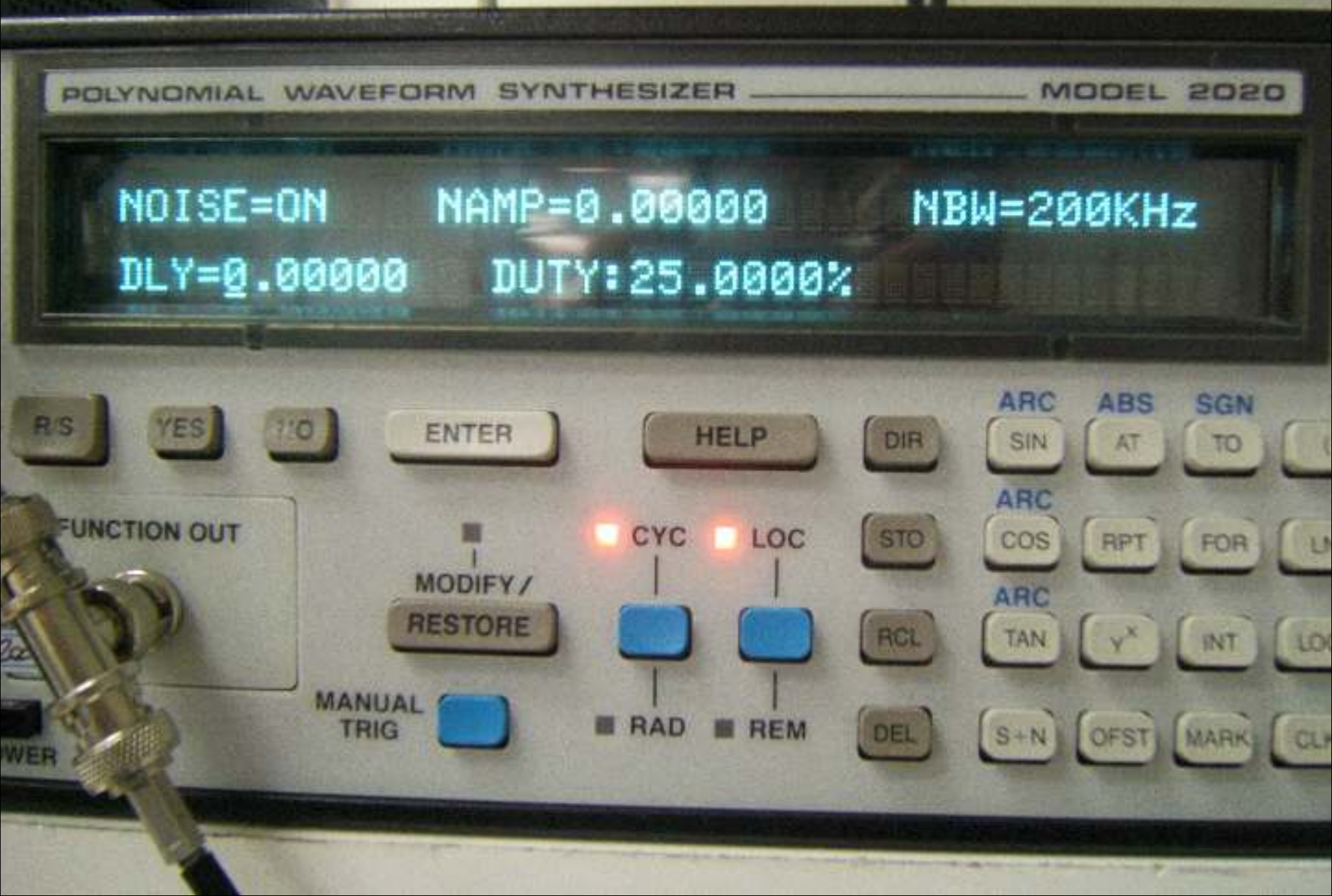
The 2020 signal generator 1ST menu



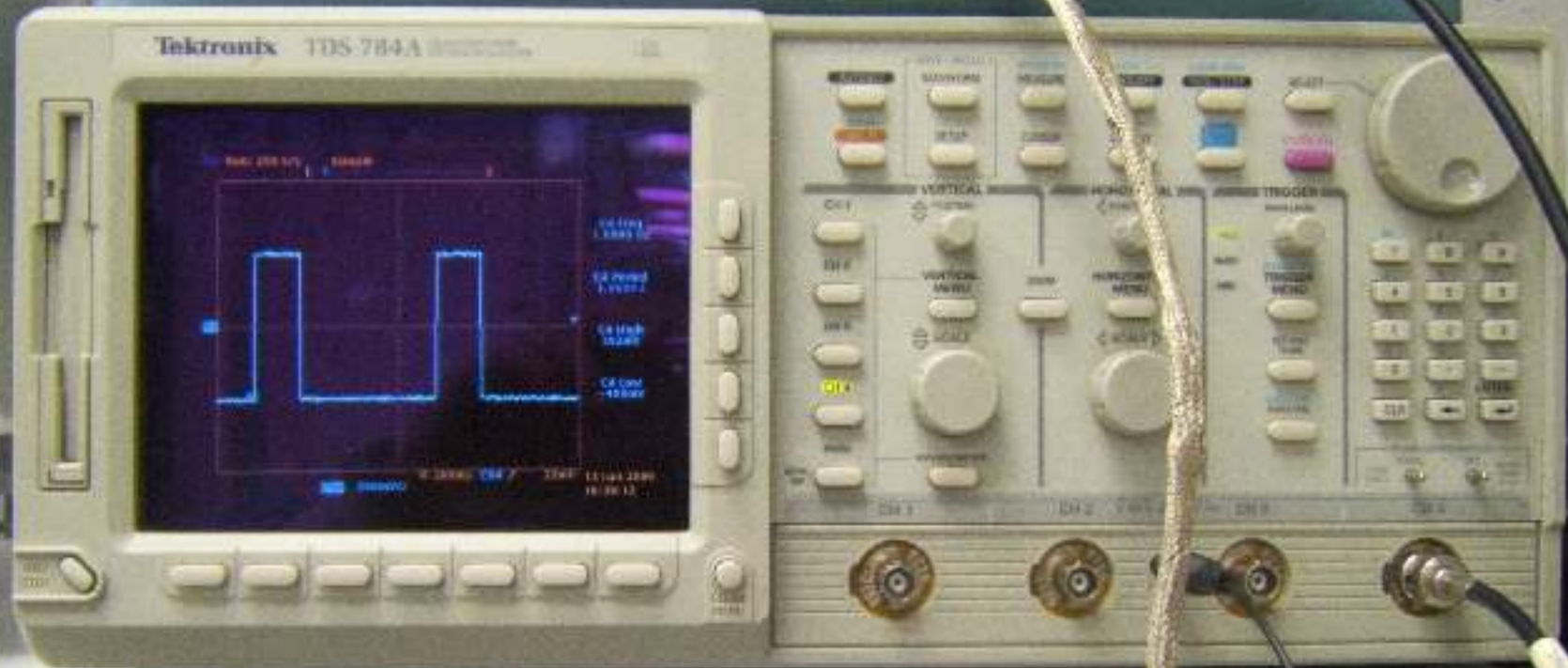
The 2020 signal generator 2nd menu



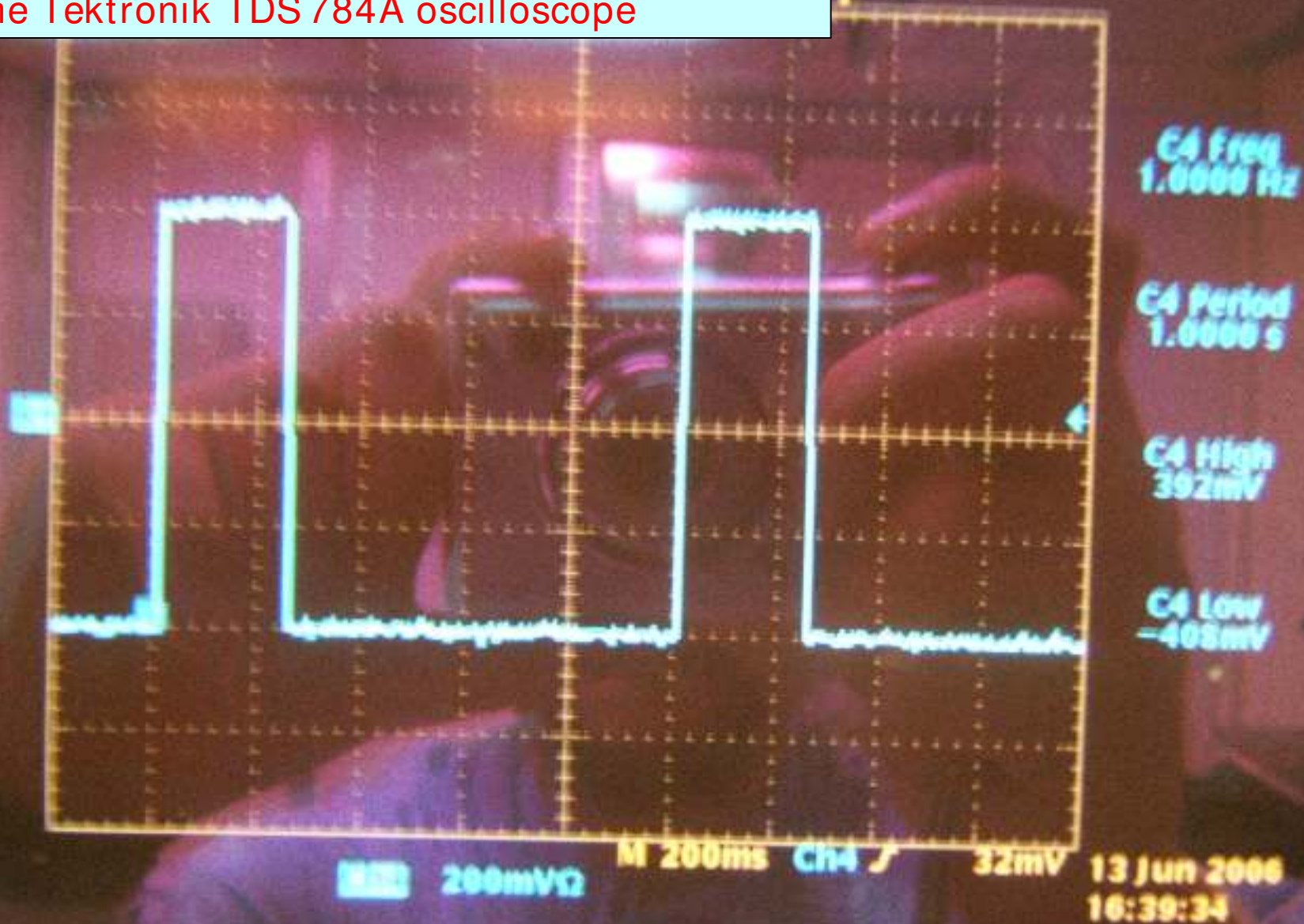
The 2020 signal generator 3rd menu



The Tektronik TDS 784A oscilloscope



The Tektronik TDS 784A oscilloscope



The Tektronik TDS 784A oscilloscope Setup

Signal splitter

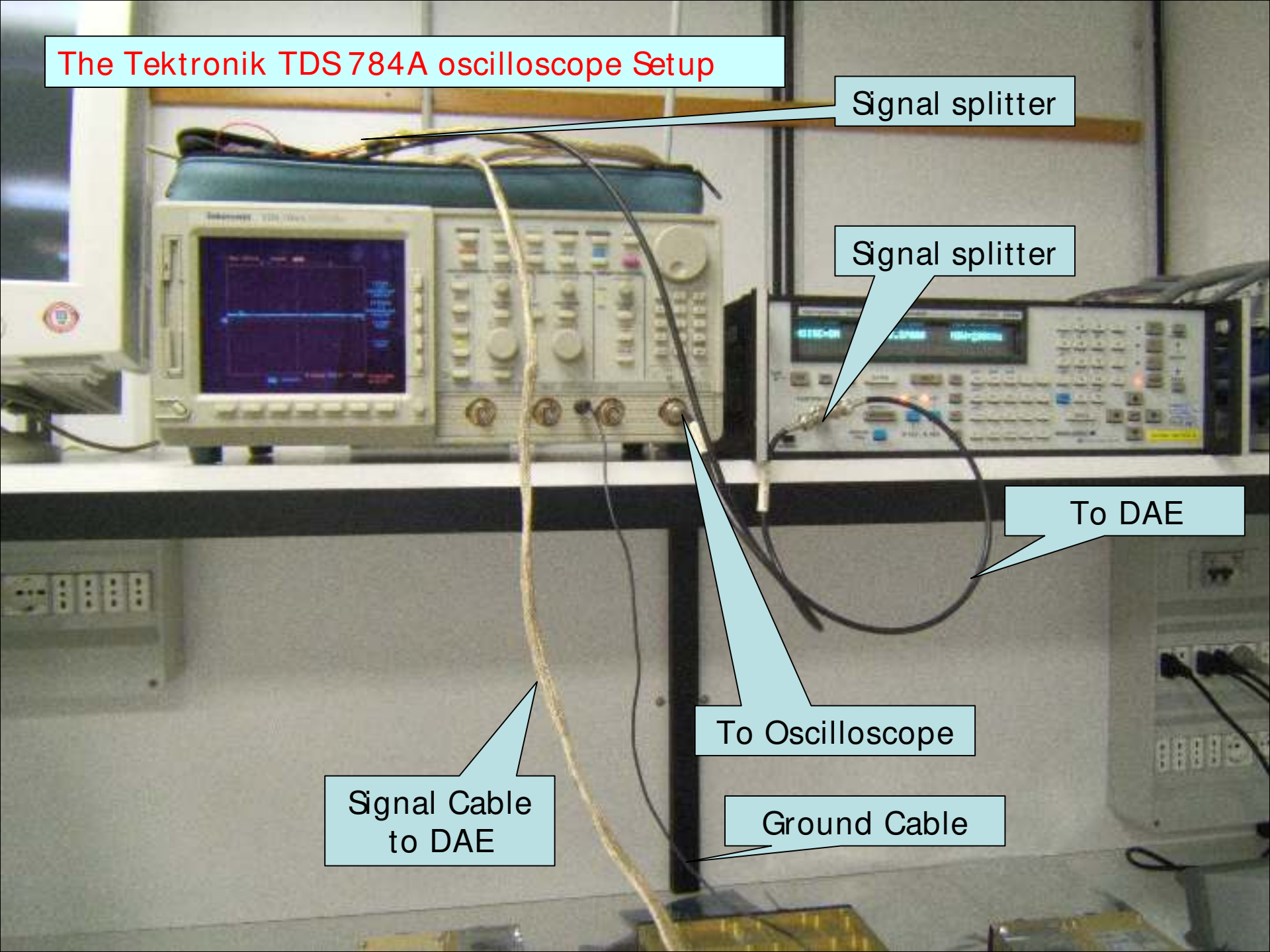
Signal splitter

To DAE

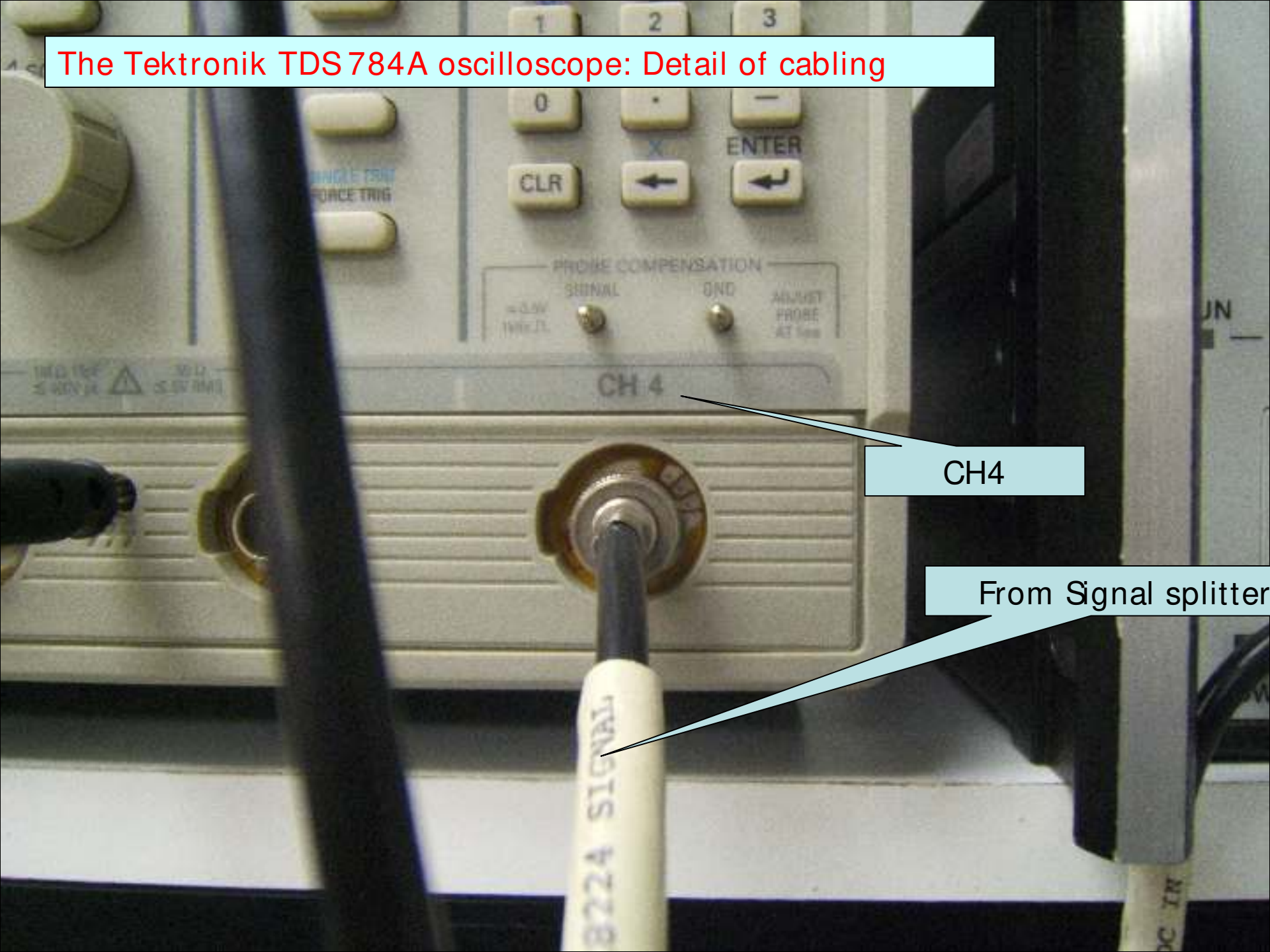
To Oscilloscope

Ground Cable

Signal Cable
to DAE



The Tektronik TDS 784A oscilloscope: Detail of cabling



CH4

From Signal splitter

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: 299.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN



ARC



ABS



SGN



SHL



RPT



ARC



y°



LOG



S-Y



MARK



FILT



K



M



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n



U



ON



OF



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9



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TRIG



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F



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DNR



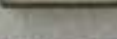
F



CE



SPACE



FORMAT



SELECT



FIELD



LABVIEW 4.0
National Instruments
© 1999 National Instruments
Model 2020
April 2001

INTEGRAL IRIS VETO 15

FUNCTION OUT



RESTORE



MANUAL TRIG



C



R



REM



C



R



REM



C



R



REM



C



R



REM



ANALOGIC



TECHNICAL

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

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OFST

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INT

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LN

LOG

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

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MARK

CLK

FILT

POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

DUTY:25.0000%

RS

YES

NO

ENTER

HELP

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MANUAL
TRIG

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DEL

S+N

OFST

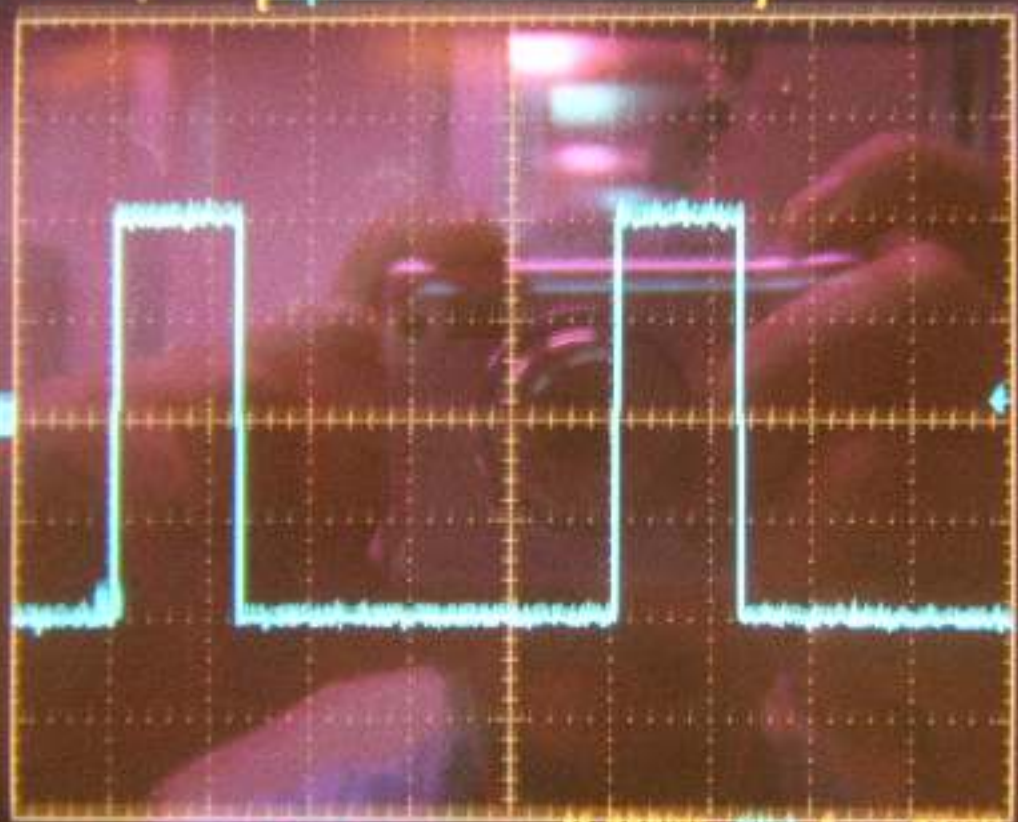
MARK

CLK

POWER

Tek Run: 250 S/s

Sample



C4 freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-408mV

200mV

M 200ms CH4

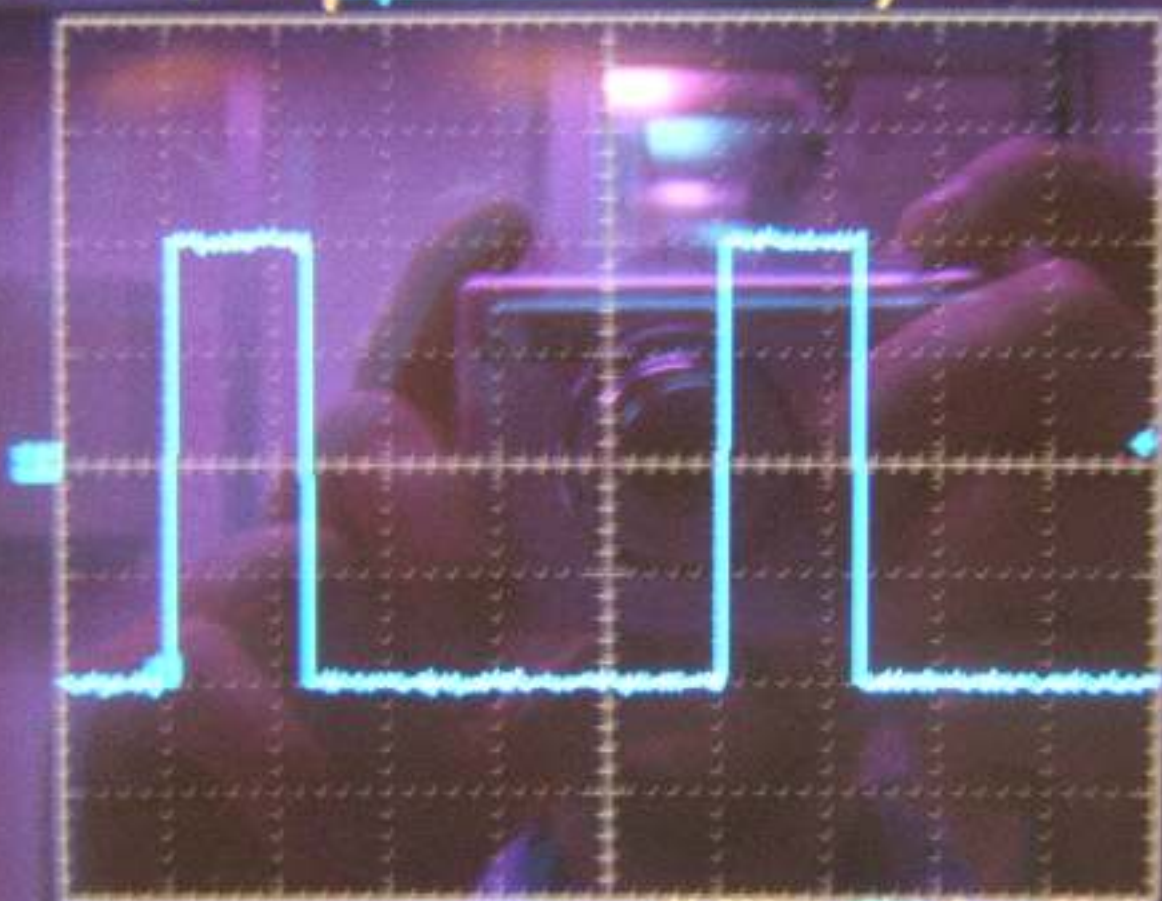
32mV

14 Jun 2006
09:58:11

Run: 250 S/s

Sample

(200000)



C4 Freq
1.000 Hz

C4 Period
1.000 s

C4 High
392mV

C4 Low
-408mV

200mV

M 200ms CH4

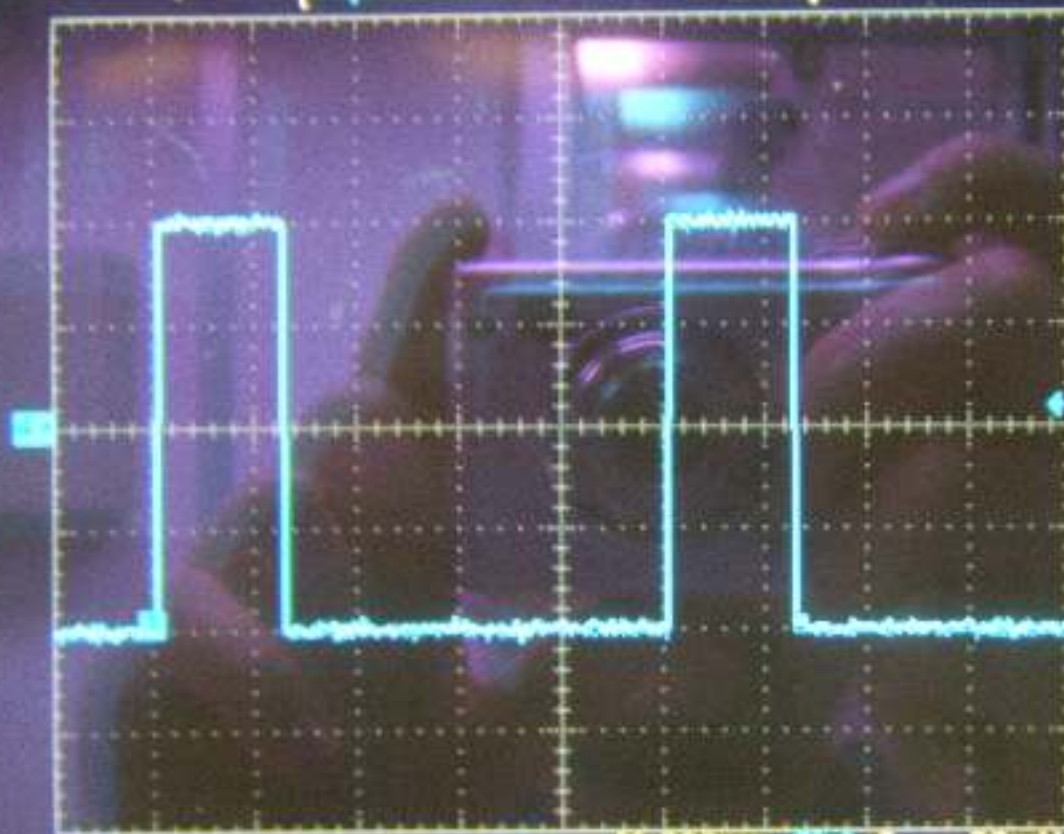
32mV

14 Jun 2006

09:58:17

Tek Run: 250 S/s

Sample



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-408mV



200mV

M 200ms

Ch4

32mV

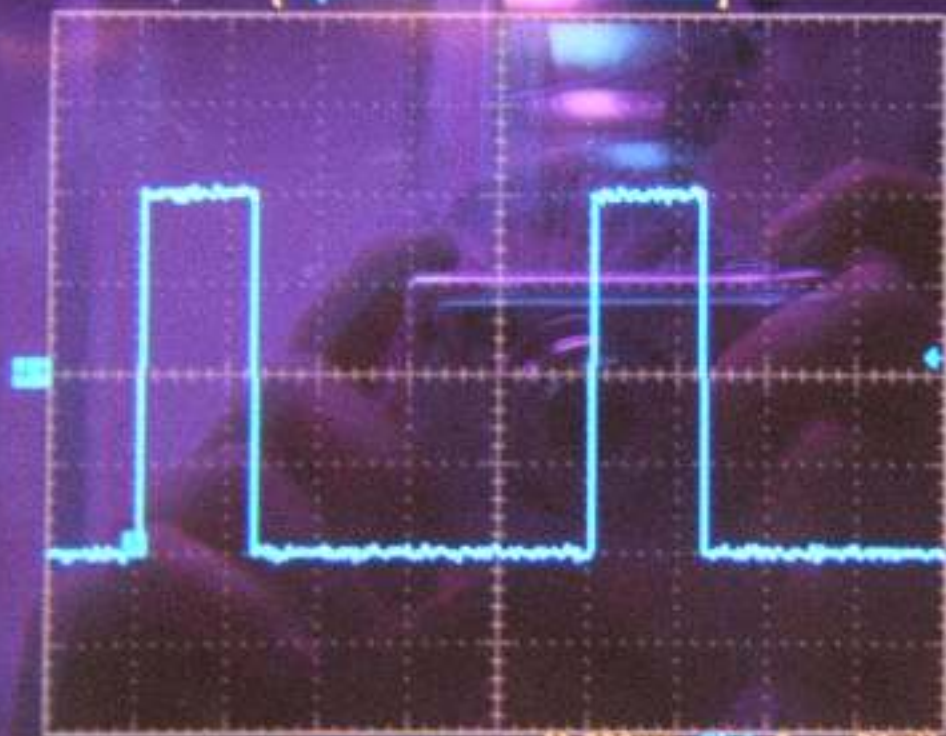
14 Jun 2006

09:58:23

Tab Run: 250 S/s

Sample

100ns



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-405mV

200mV

200ms

Ch4

32mV

14 Jun 2006

09:59:12

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

RUN



YES

NO

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HELP

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SPACE

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FAST

FAST

LEADER
Analog Synthesizer
100 MHz to 100 MHz
100 MHz to 100 MHz
100 MHz to 100 MHz

MANUAL
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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

R/S

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HELP

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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

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

R/S

YES

NO

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POWER

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

200mV

200mV

M 200ms

Ch4 J

32mV

14 Jun 2006

10:34:19

MODEL 2020

FREQ:999.954m AMP:0.40000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

R/S

YES

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

PHS=0.00000

SYM=50.0000%

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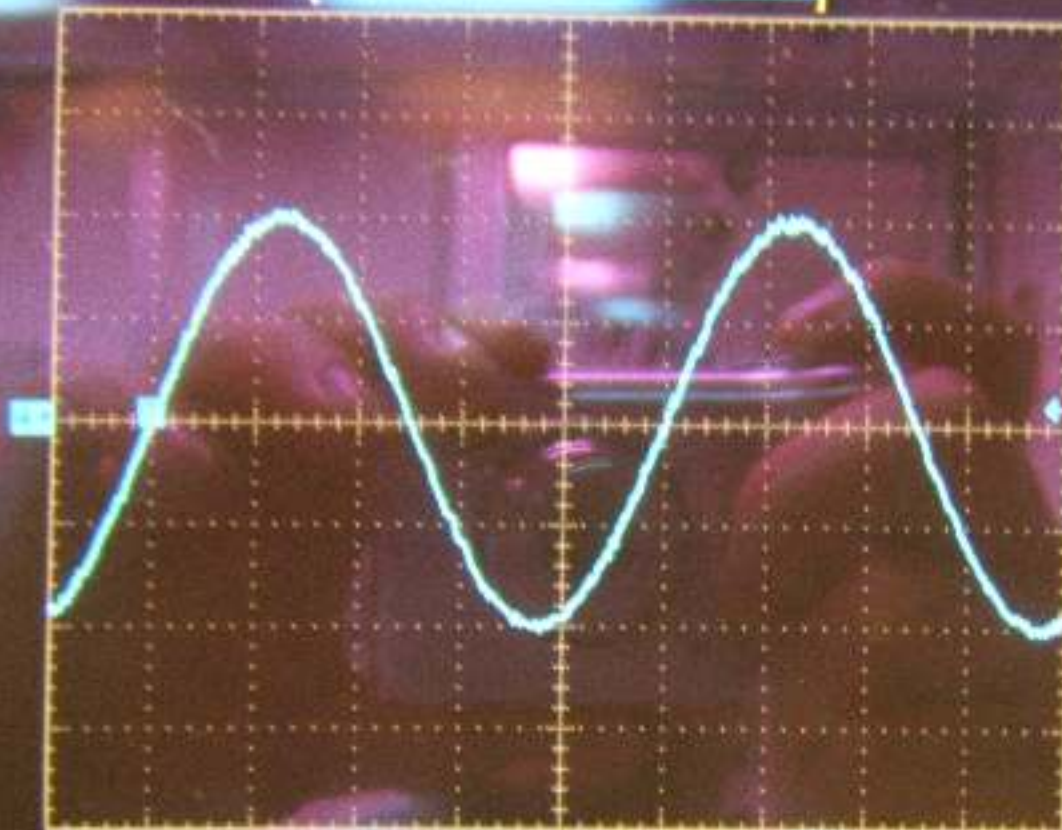
S+N

OFST

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CL

Tek Run: 250 S/s



C4 Freq
1.0000 Hz

C4 Period
999.6ms

C4 High
384mV

C4 Low
-408mV

200mV

M 200ms

Ch4

32mV

14 Jun 2006

10:57:47

XXX_9106

- Constant Signal
- Square wave

XXX_9106

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

I

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

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MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

R/S

YES

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POLYNOMIAL WAVEFORM SYNTHESIZER MODEL 202

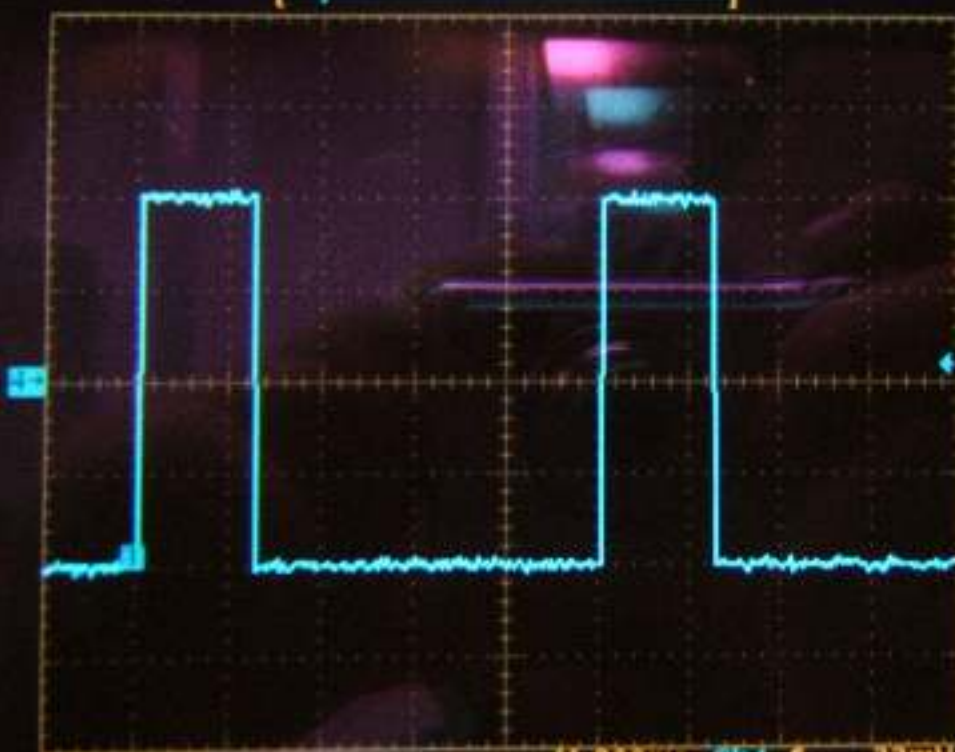
NOISE=ON NAMP=0.00000 NBW=200KHz
DLY=0.00000 DUTY:25.0000%



Run: 250 S/s

Sample

120000



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-408mV

200mV

200ms

M 200ms

Ch4

32mV

14 Jun 2006

11:31:19

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

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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

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK=0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

RS

YES

NO

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HELP

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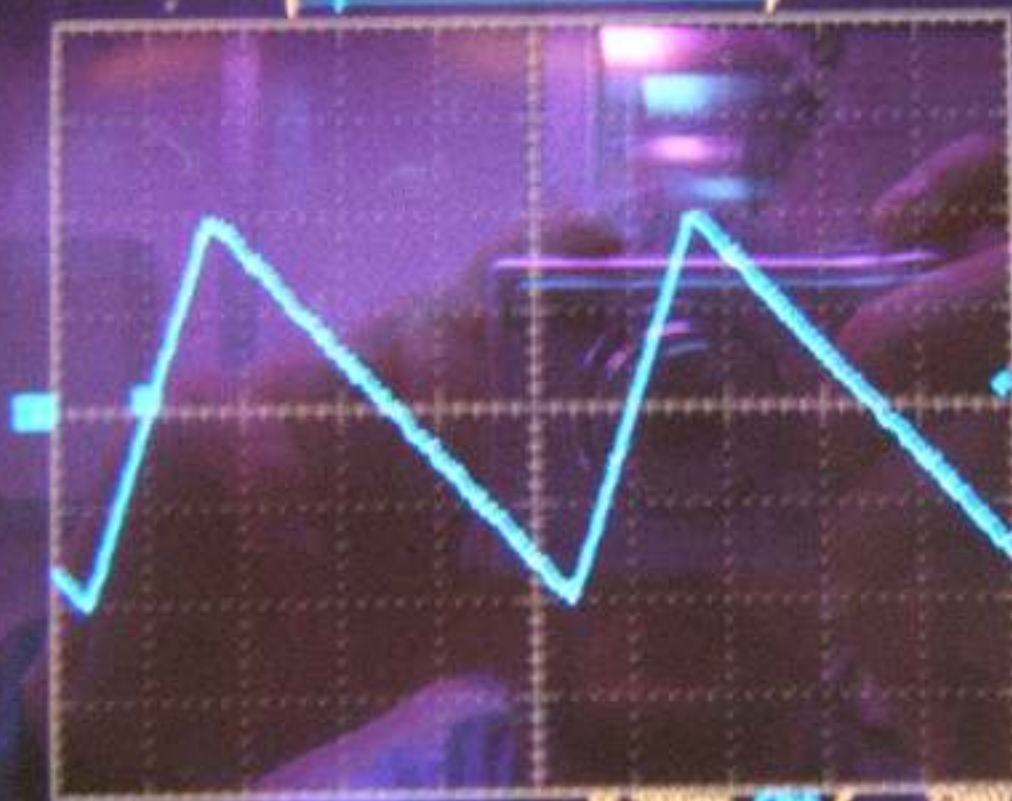
POLYNOMIAL WAVEFORM SYNTHESIZER MODEL 2020

NOISE=ON NAMP=0.00000 NBW=200KHz
DLY=0.00000 SYM=25.0000%



Test Run: 250 S/s

Sample 0000



C4 Freq
999.7mHz
Unstable
Histogram

C4 Period
1.0004 s
Unstable
Histogram

C4 High
112mV
Unstable
Histogram

C4 Low
-200mV
Unstable
Histogram

200mV

200ms

CN4

32mV

14 Jun 2009

12:05:27

XXX_9108

- Square wave

XXX_9108

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

I

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN

FUNCTION OUT

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN

R/S

YES

NO

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HELP

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MANUAL
TRIG

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DEL

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OFST

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CL

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

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HELP

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FUNCTION OUT



CYC



LOC

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POLYNOMIAL WAVEFORM SYNTHESIZER

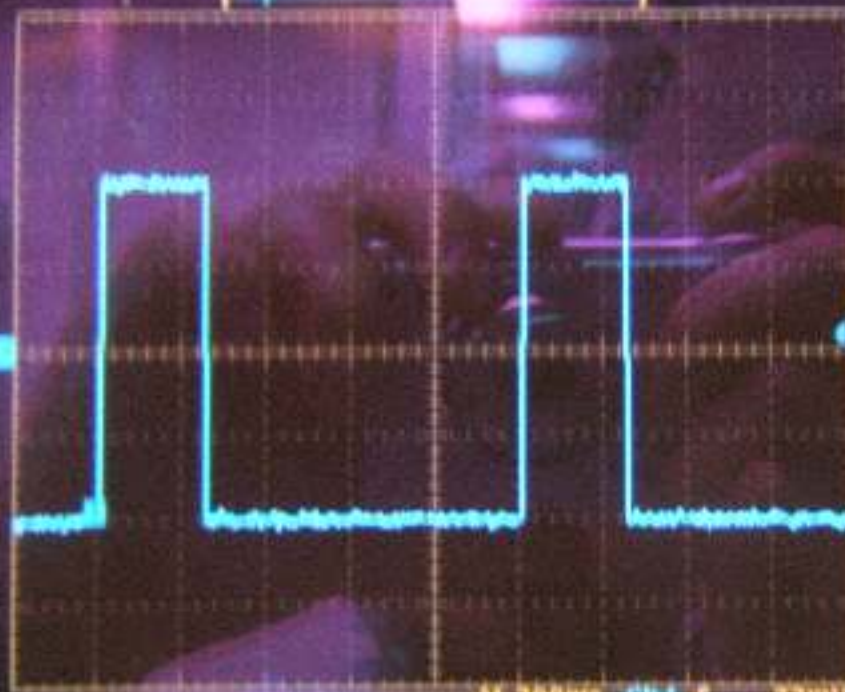
MODEL 2020

NOISE=ON NAMP=0.00000 NBW=200KHz
DLY=0.00000 DUTY:25.0000%



Tektronix TDS 2001

Run: 250 S/s Sample



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
302mV

C4 Low
-403mV

200mV

M 200ms CH4 7 32mV

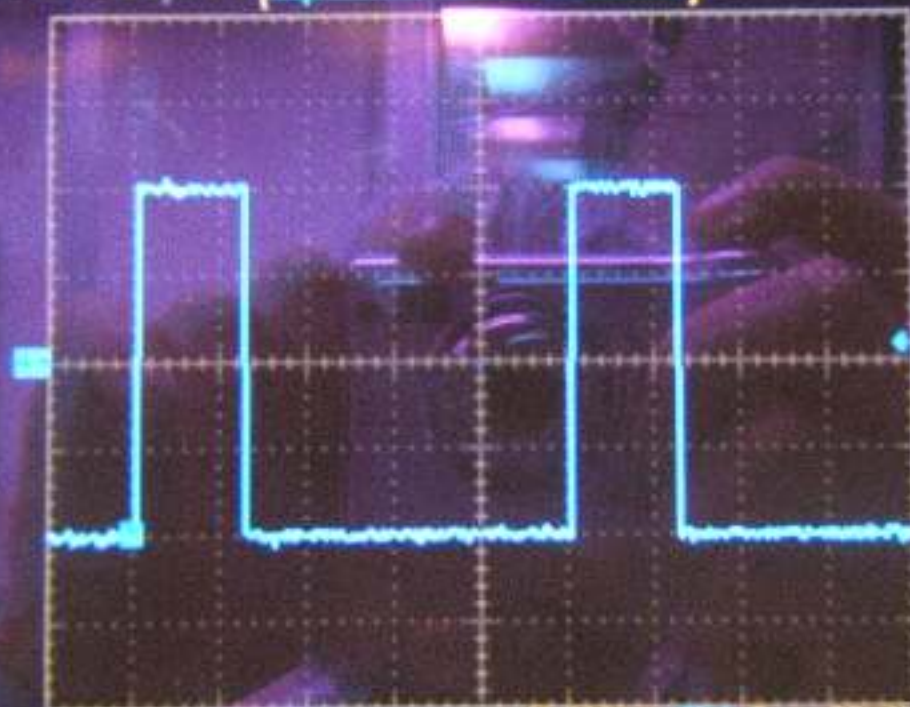
14 Jun 2000
14:41:24

Elektronix

Run: 250 S/s

Sample

10000



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
39.2mV

C4 Low
-40.5mV

200mV

M 200ms

CH4

32mV

14 Jun 2008

14:41:58

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

STOP

YES

NO

ENTER

HELP

ON

ARC
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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.10000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

NO

ENTER

HELP

DIR

ARC

SIN

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TO

FUNCTION OUT

MODIFY /

RECALL

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LOC

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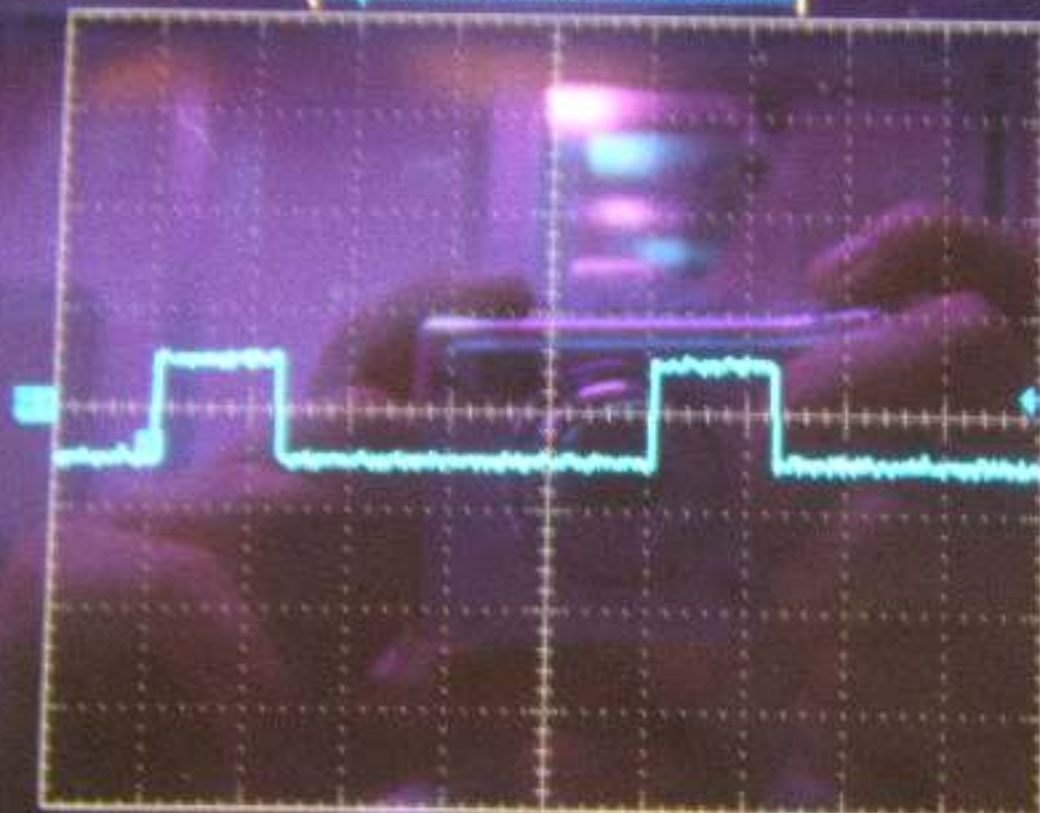
LO

CL

Run: 250 S/s

Sample

000000



C4 Freq
1.0001 Hz
Low signal
amplitude

C4 Period
1.0000 s
Low signal
amplitude

C4 High
88mV

C4 Low
-112mV

200mV

M 200ms

CH4

32mV

14 Jun 2006
15:53:12

XXX_9109

- Constant Signal
- Square wave

XXX_9109

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

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ:999.954m AMP:0.10000 OFST:0.00000
FILT=NONE MARK:0.00000 TRIG=FREE RUN

RUN

STOP

YES

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ANALOGIC

DATA PRECISION

POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.10000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

NO

ENTER

HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

R/S

YES

NO

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HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

DUTY:25.0000%

R/S

YES

NO

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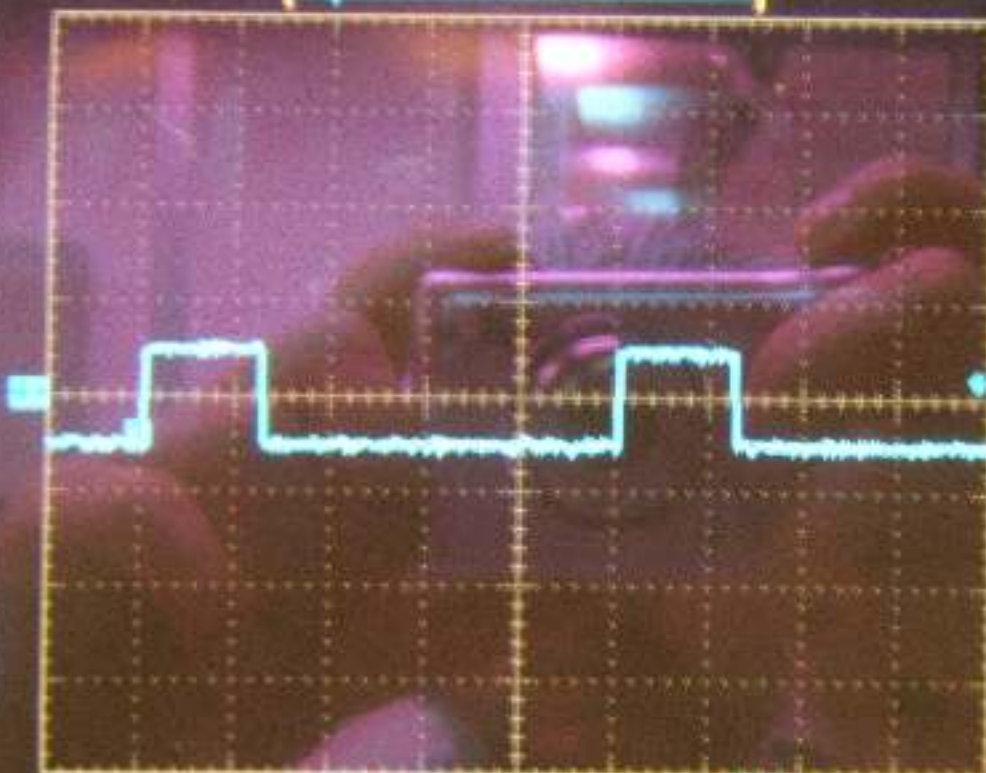
OFST

MARK

Tek Run: 250 S/s

Sample

10000



C4 Freq
1.0000 Hz
Low signal
amplitude

C4 Period
1.0000 s
Low signal
amplitude

C4 High
20mV

C4 Low
-112mV

200mV

M 200ms

CH4

32mV

14 Jun 2006

16:00:52

XXX_9109

- Triangular Wave

MODEL 2520

FILT=NONE MARK:0.00000 TRIG=FREE RUN

10

FUNCTION OUT

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EDGE

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1952年11月

ANALOGIC

Abstract

INTEGRAL 積分 WEB 版

[illegible]

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954M AMP: 0.10000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN

R/S

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POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK=0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

RS

YES

NO

ENTER

HELP

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POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

RS

YES

NO

ENTER

HELP

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FUNCTION OUT

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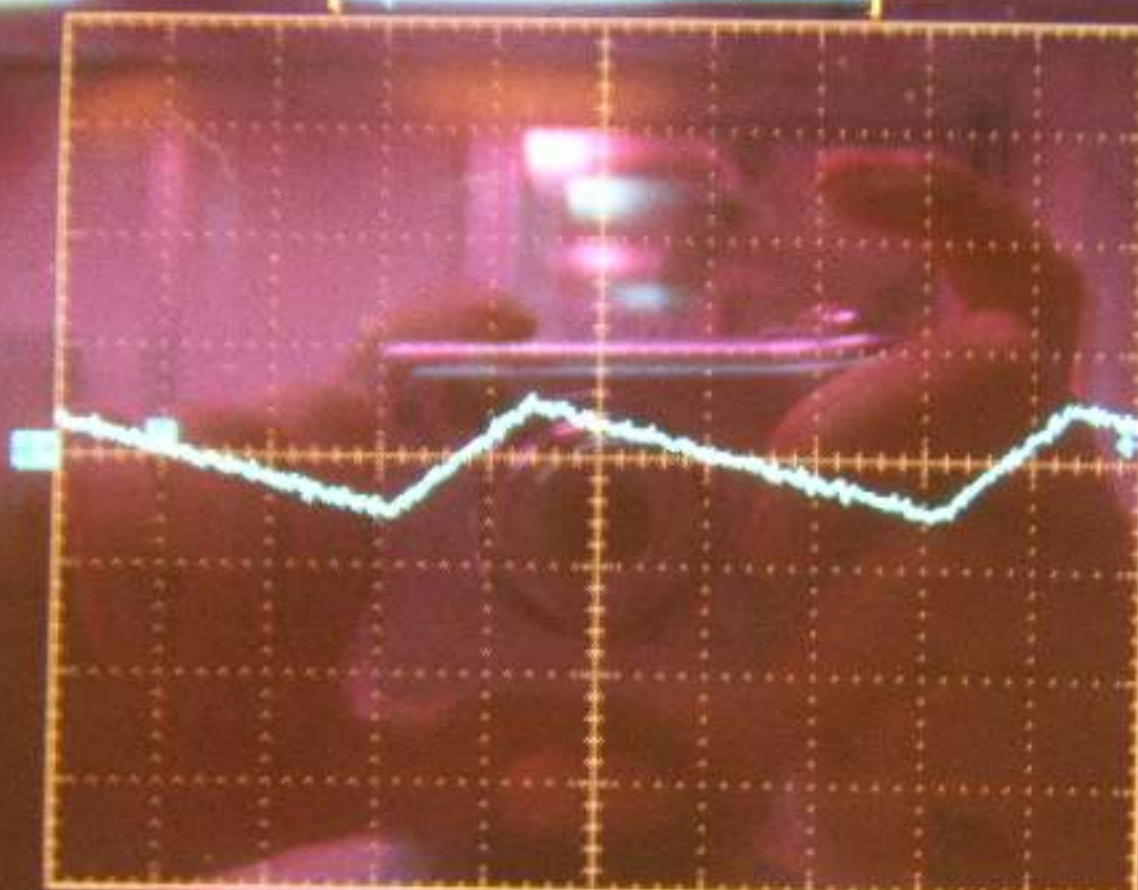
DEL

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

200mV

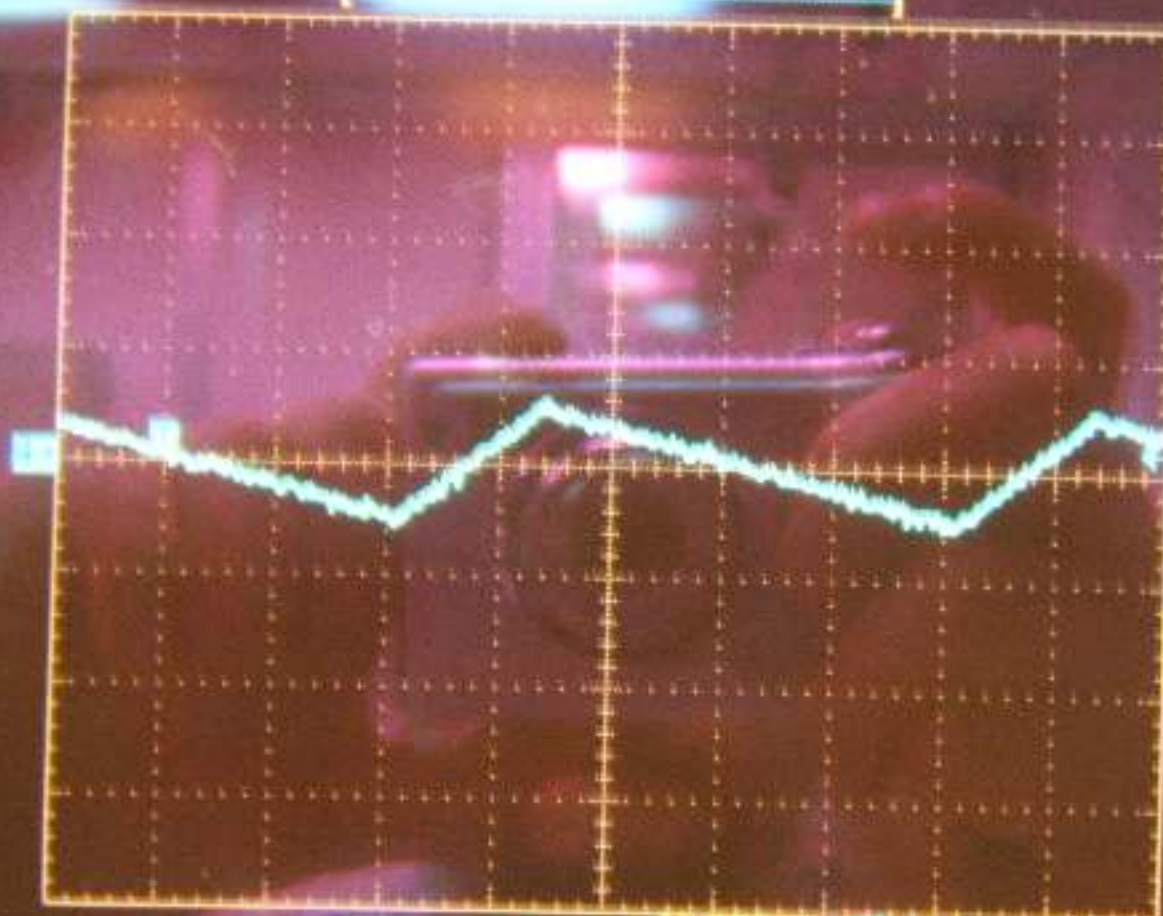
M 200ms

Ch4

32mV

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

200mV

200ms

CH4

J

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

RUN

FUNCTION OUT

POWER

MANUAL TRIG

CYC LOC

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INTEGRAL 1815 VETO TE

FORMAT

SELECT

FIELD

LABEN 300
Electronic Engineering Institute
of Texas Instruments
FOUNDER MEMBERS
1980-1981

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

NO

ENTER

HELP

DIR

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KEY /

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MARK

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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

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CYC



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MANUAL
TRIG



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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 202

NOISE=ON

NAMP=0.00000

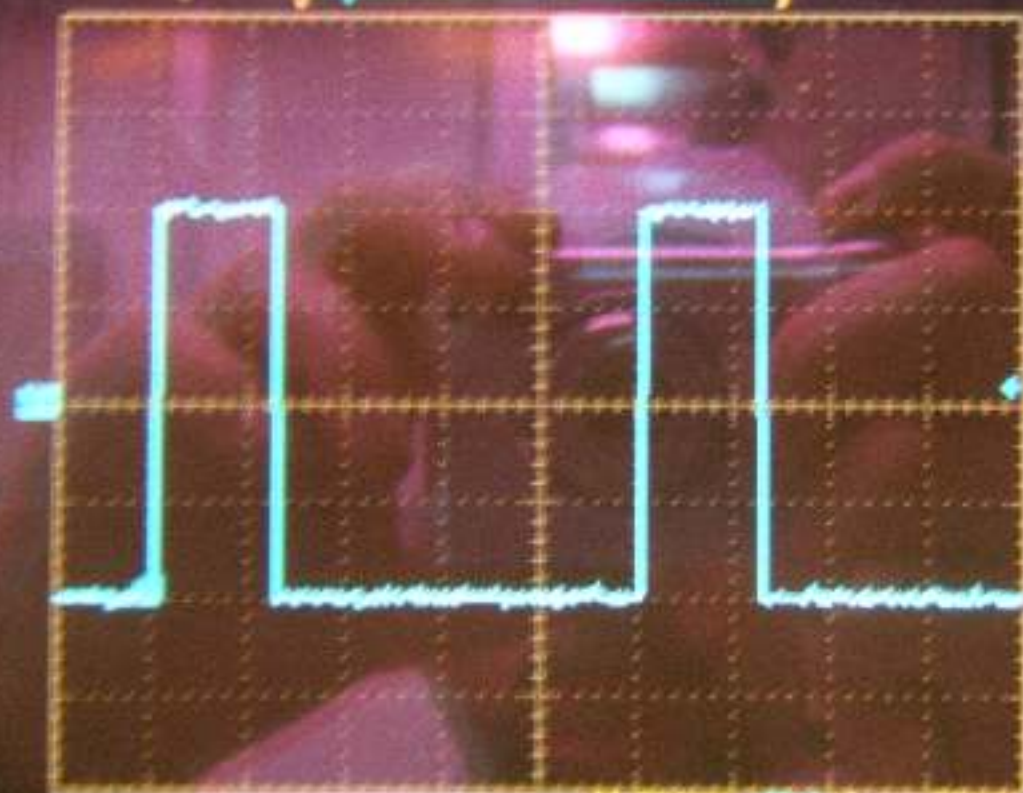
NBW=200KHz

DLY=0.00000

DUTY:25.0000%



Run: 250 S/s Sample



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-402mV

200mV

M 200ms

CH4

32mV

15 Jun 2006

10:30:56

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

R3

YES

NO

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HELP

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INTEGR

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

NO

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HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

R/S

YES

NO

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HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

R/S

YES

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POWER

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

200mV

M 200ms

Ch4

32mV

15 Jun 2006

11:14:10

XXX_9113

- Triangular Waves of different frequencies

XXX_9113

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

I

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 999.954m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

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POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

R/S

YES

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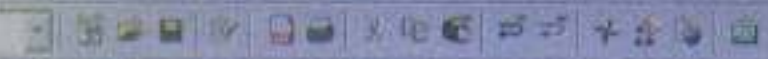


REM



XXX_9113

- Triangular wave Freq = 0.1 Hz



1 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 29 30 31 32 33 34

1 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 29 30 31 32 33 34

XXX_9113

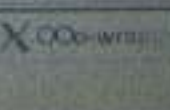
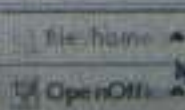
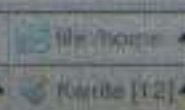
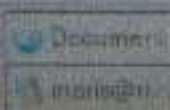
- Triangular wave Freq=1Hz Amp=0.4V 25% Duty
- Triangular wave Freq=0.1Hz Amp=0.4V 25% Duty
- |

1 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 29 30 31 32 33 34



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: 29.9835m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RUN

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HELP

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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

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POWER

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FILT=NONE

MARK:0.00000

TRIG=FREE RUN

NOISE=ON

NAMP=0.00000

NBW=200KHz

RS

YES

NO

ENTER

HELP

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ARC

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FUNCTION OUT



KEY /

RESTORE



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OFST

MARK

POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

RS

YES

NO

ENTER

HELP

DIR

ARC
SIN

ABS
AT

SGN
TO

FUNCTION OUT



MODIFY /
RESET

☒ CYC
[Blue Button]

☒ LOC
[Blue Button]

STO

ARC
COS

RPT

FOR

MANUAL
TRIG
[Blue Button]

AD

☒ REM

RCL

ARC
TAN

Y^x

INT

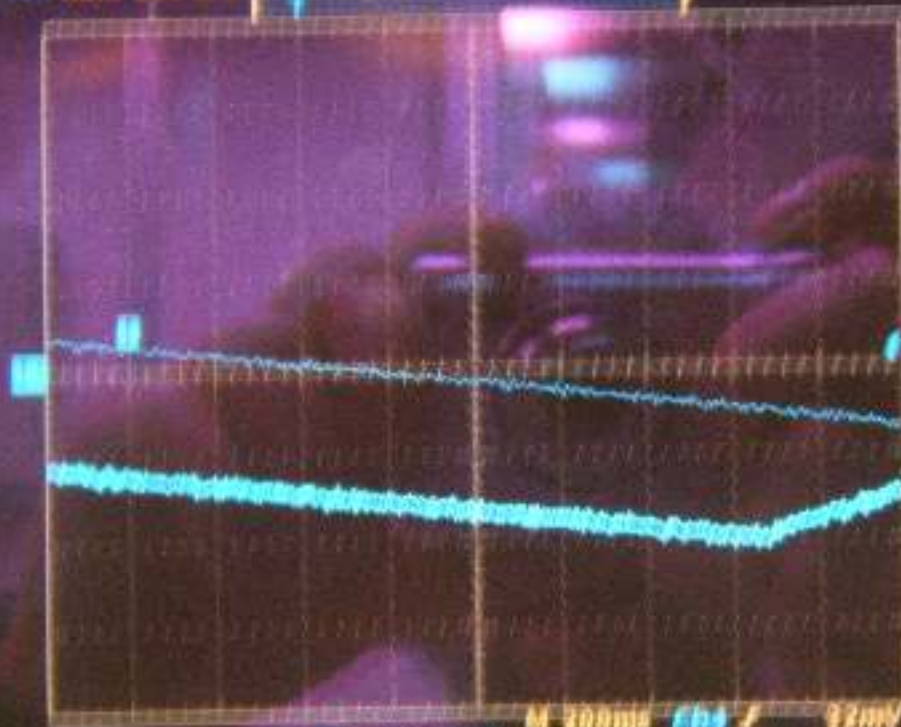
DEL

S+N

OFST

MARK

Run: 250 9/8 Sample



E4 Freq
76.245112
No Valid
Found

E4 Period
1.5ms
No Valid
Found

E4 High
Level
Histogram

E4 Low
Level
Histogram

200mV

M 200ms

CH1 /

32mV

15 Jun 2006

12:59:22

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%

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HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

NOISE=ON

NAMP=0.00000

NBW=200KHz

DLY=0.00000

SYM=25.0000%

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HELP

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POLYNOMIAL WAVEFORM SYNTHESIZER

MODEL 2020

FREQ: 99.9835m AMP: 0.40000 OFST: 0.00000
FILT=NONE MARK: 0.00000 TRIG=FREE RUN

RS

YES

NO

ENTER

HELP

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ARC

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FUNCTION OUT



KEY /

RESTORE



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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

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FUNCTION OUT



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LOG

MANUAL
TRIG



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OFST

MARK

CLK

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

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FUNCTION OUT



KEY /

RESTORE

MANUAL
TRIG



CYC



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REM

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OFST

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MARK

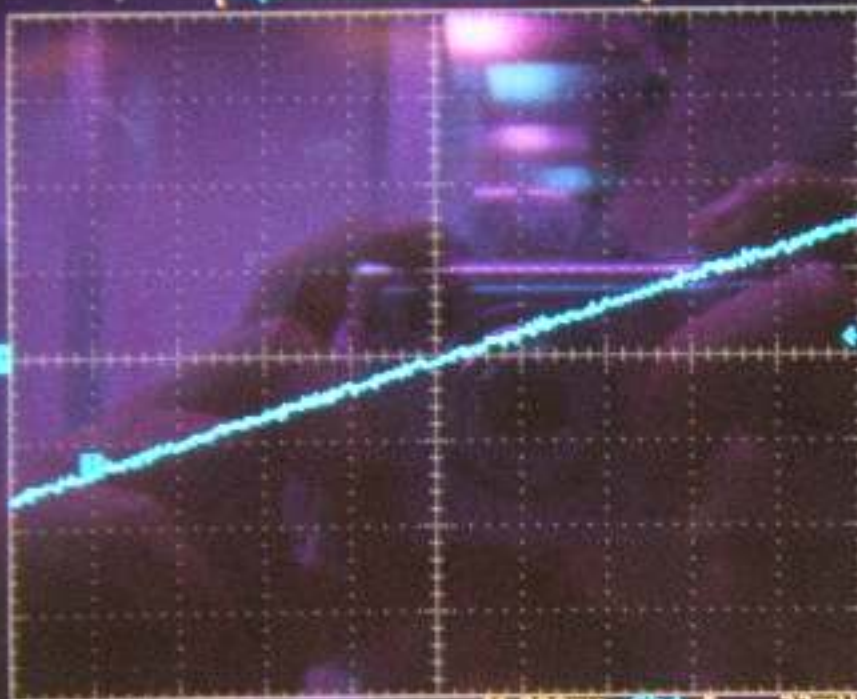
LN

LOG

CLK

Tab Run: 250 S/s

Sample



CLEAR
MENU

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

R/S

YES

NO

ENTER

HELP

DIR

ARC

SIN

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FUNCTION OUT

☒ CYC

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INT

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MANUAL
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☐ 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

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MARK

POWER

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

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FUNCTION OUT

MODIFY /

RESET

MANUAL
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CYC



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DEL

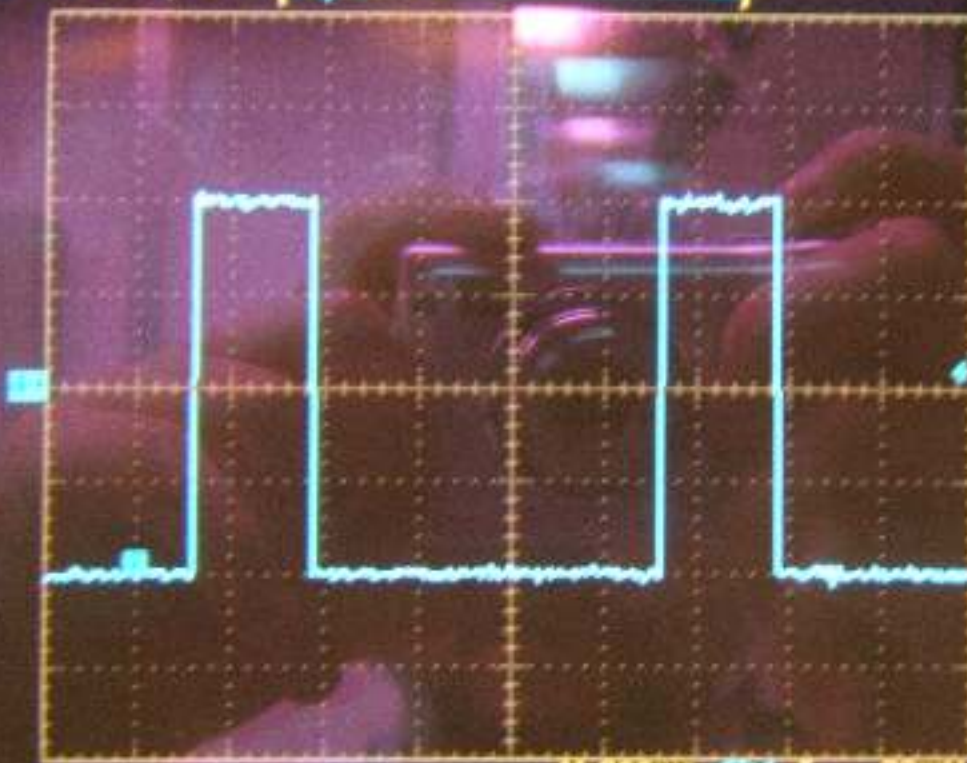
SIN

CHPT

WAVE

Tek Run: 250 S/s

Sample



C4 Freq
1.0000 Hz

C4 Period
1.0000 s

C4 High
392mV

C4 Low
-405mV



200mV

M 200ms

CH4

32mV

15 Jun 2006

14:43:00