

**ALMA Spring Symposium**  
**“Test and Measurement Systems”**

**THE CLIO SYSTEM**  
**AUDIOMATICA S.r.l. , ITALY**

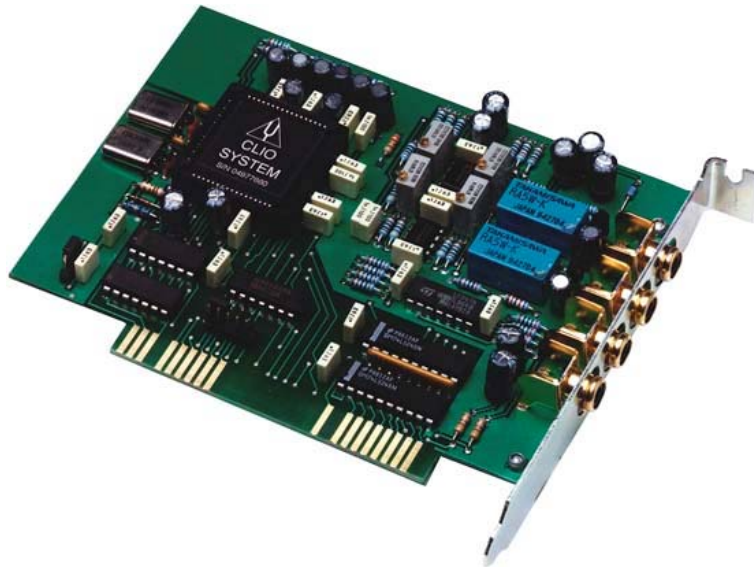
**Presented by**  
**Joe D’Appolito, Ph.D.**

**Marriott Nashville Airport - April 28, 1999**

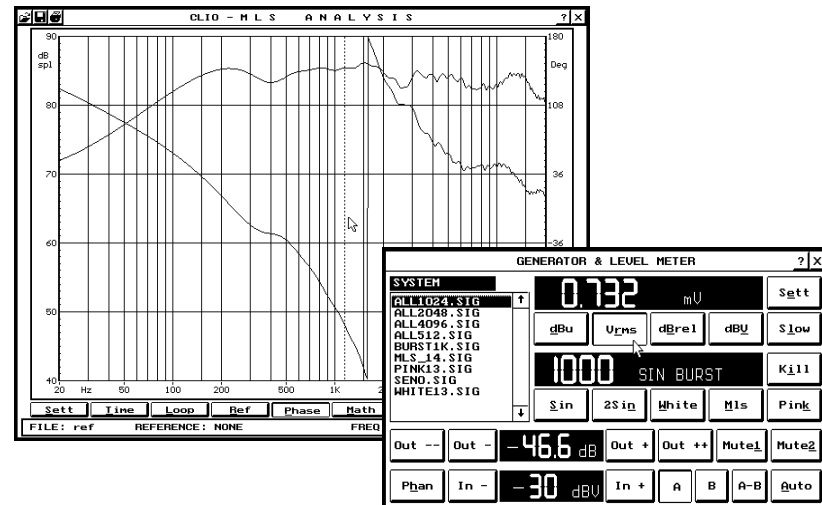




# THE CLIO SYSTEM



THE HR-2000 PC BOARD



REL.4.5 SOFTWARE



## **CLIO FEATURES IN GENERAL**

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- **PC-IBM BASED INSTRUMENT**
- **PROPRIETARY HARDWARE DESIGN**
- **TWO CHANNELS INPUT**
- **TWO CHANNELS OUTPUT**
- **FREQUENCY COVERAGE: <1 Hz - 22 kHz**
- **16-BIT RESOLUTION**



# THE CLIO SYSTEM ACCESSORIES



**CLIOQC AMPLIFIER & SWITCHBOX (MODEL 2 AND MODEL 3)**



**PREAMPLIFIER PRE-01**



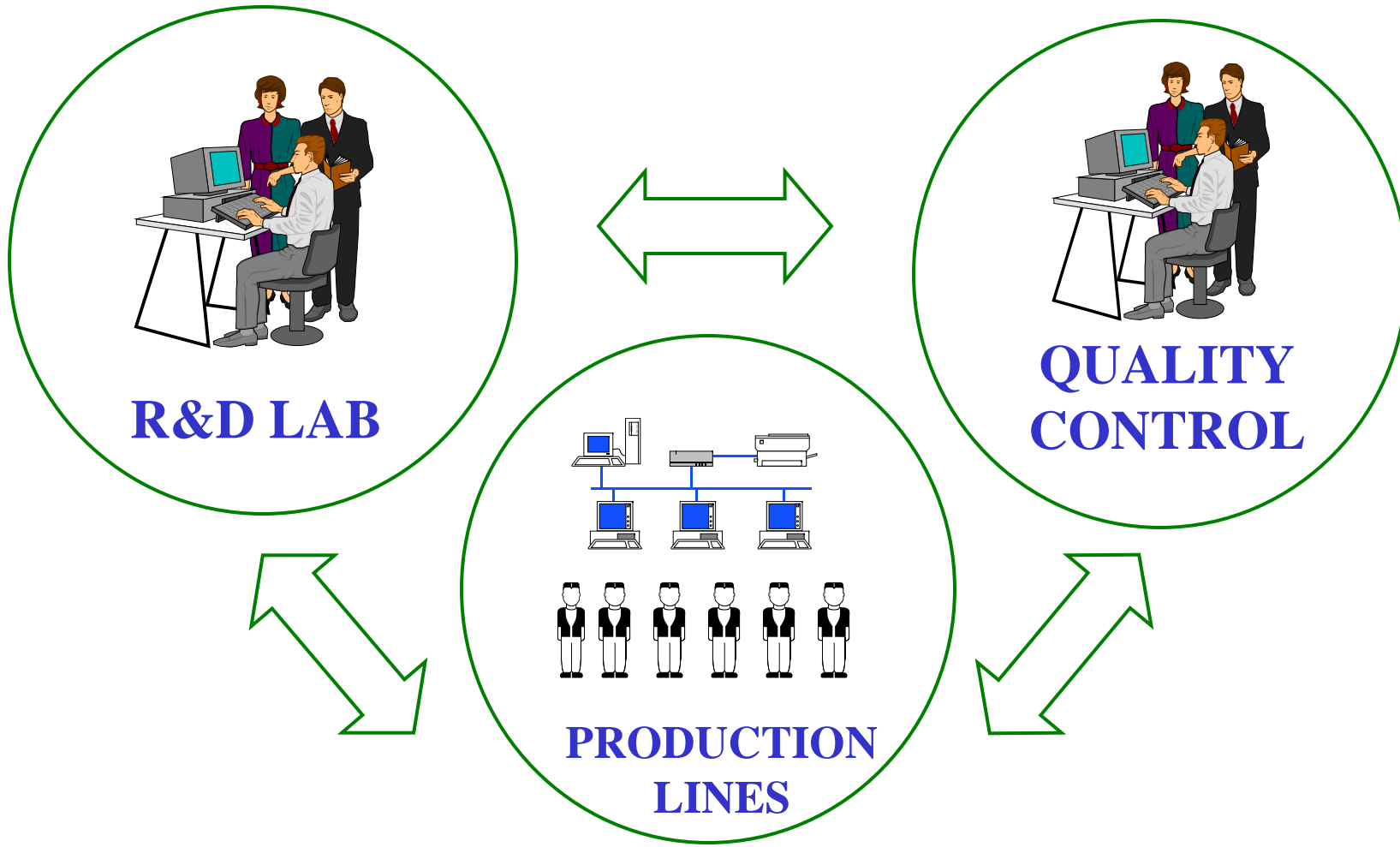
**MICROPHONES MIC-01 & MIC-02**



**CONDENSER MICROPHONE MIC-33**



# CLIO - WHERE?





## **HOW DOES HARDWARE DESIGN REFLECT ON YOUR INSTRUMENT ?**

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- **GENERAL PERFORMANCE AND ACCURACY**
- **EASE OF INTERFACING**
- **OPERATION LIKE ITS ANALOG COUNTERPART**
- **FULLY PROGRAMMABLE GENERATOR**
- **THE ANALYZER AND GENERATOR OPERATE SEPARATELY (GENERATOR IN BACKGROUND)**



## CLIO FEATURES - HARDWARE

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- **PRECISE OUTPUT SIGNAL CONTROL**
  - FROM +12 dBU TO FULL MUTE IN 0.1 dB STEPS (SINE)
- **HIGH INPUT ACCEPTANCE:**
  - FROM +30 dBV TO -40 dBV FULL SCALE
- **SINGLE-ENDED OR BALANCED ACQUISITION**
- **VARIABLE SAMPLING: 51.2 KHz TO 1.6 KHz**
- **DUAL DMA TRANSFER TO PC (OR I/O)**
- **ON-BOARD MICROPHONE POWERING**



# HOW DOES SOFTWARE DESIGN REFLECT ON YOUR INSTRUMENT ?

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- **IT'S EASY TO LEARN**
- **IT'S EASY TO USE IN EVERYDAY WORK**
- **GIVES YOU THE IMPRESSION OF FACING  
AND OPERATING A REAL INSTRUMENT**
- **GIVES YOU INTEROPERABILITY BETWEEN  
DIFFERENT MEASUREMENTS**





## **CLIO FEATURES - SOFTWARE**

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- **WINDOWS-LIKE USER INTERFACE**
- **CUSTOM CONTROL PANELS**
- **CONTEXT SENSITIVE HELP ON-LINE**
- **POWERFUL EDITING AND EXPORT**
- **ON-THE-FLY HW SETTINGS CONTROL**
- **CONTROLS FOR EXTERNAL HARDWARE**



# CLIO MEASUREMENT TECHNIQUES

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- **MAXIMUM LENGTH SEQUENCES (MLS)**
- **SINUSOIDAL ANALYSIS**
- **FFT ANALYSIS**
- **ONE-THIRD OCTAVE ANALYSIS (RTA)**
- **ACOUSTICAL ANALYSIS (RT60, Leq)**
- **LEVEL, L-C METER AND OSCILLOSCOPE**



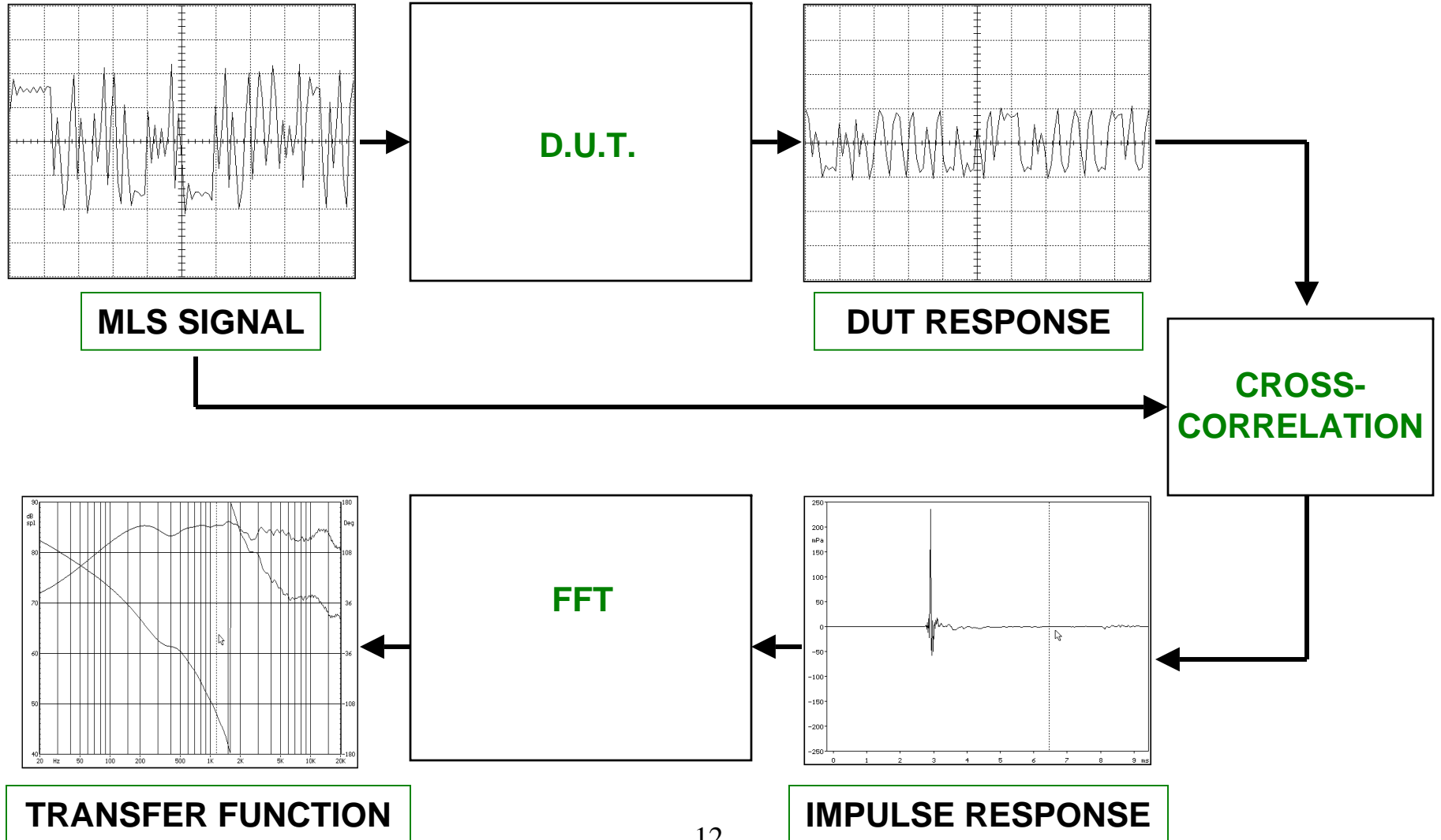
# MAXIMUM LENGTH SEQUENCES (MLS)

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- **FREQUENCY AND PHASE RESPONSE**
- **IMPULSE RESPONSE**
- **ANECHOIC ANALYSIS**
- **ENERGY TIME CURVE (ETC)**
- **WATERFALL PLOTS**



# MLS ANALYSIS TECHNIQUE





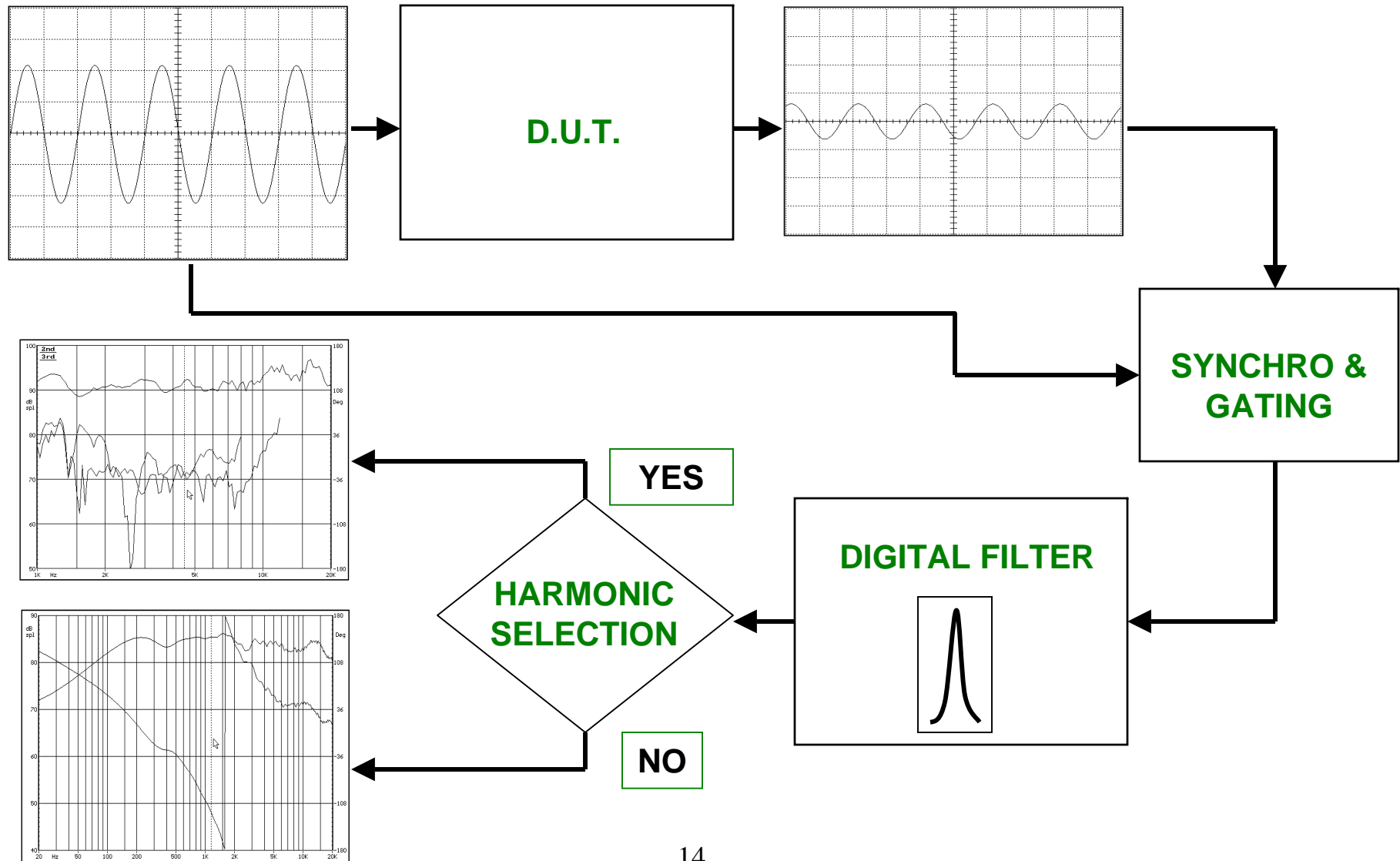
# SINUSOIDAL ANALYSIS

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- **FREQUENCY AND PHASE RESPONSE**
- **OPTIONAL GATED ACQUISITION**
- **HARMONIC ANALYSIS VS. FREQUENCY**
- **DISTORTION VS. LEVEL (THD, SMPTE, CCIF, DIN)**
- **IMPEDANCE & THIELE-SMALL PARAMETERS**
- **POLAR RESPONSE PLOTS**



# SINUSOIDAL ANALYSIS TECHNIQUE





# FFT ANALYSIS

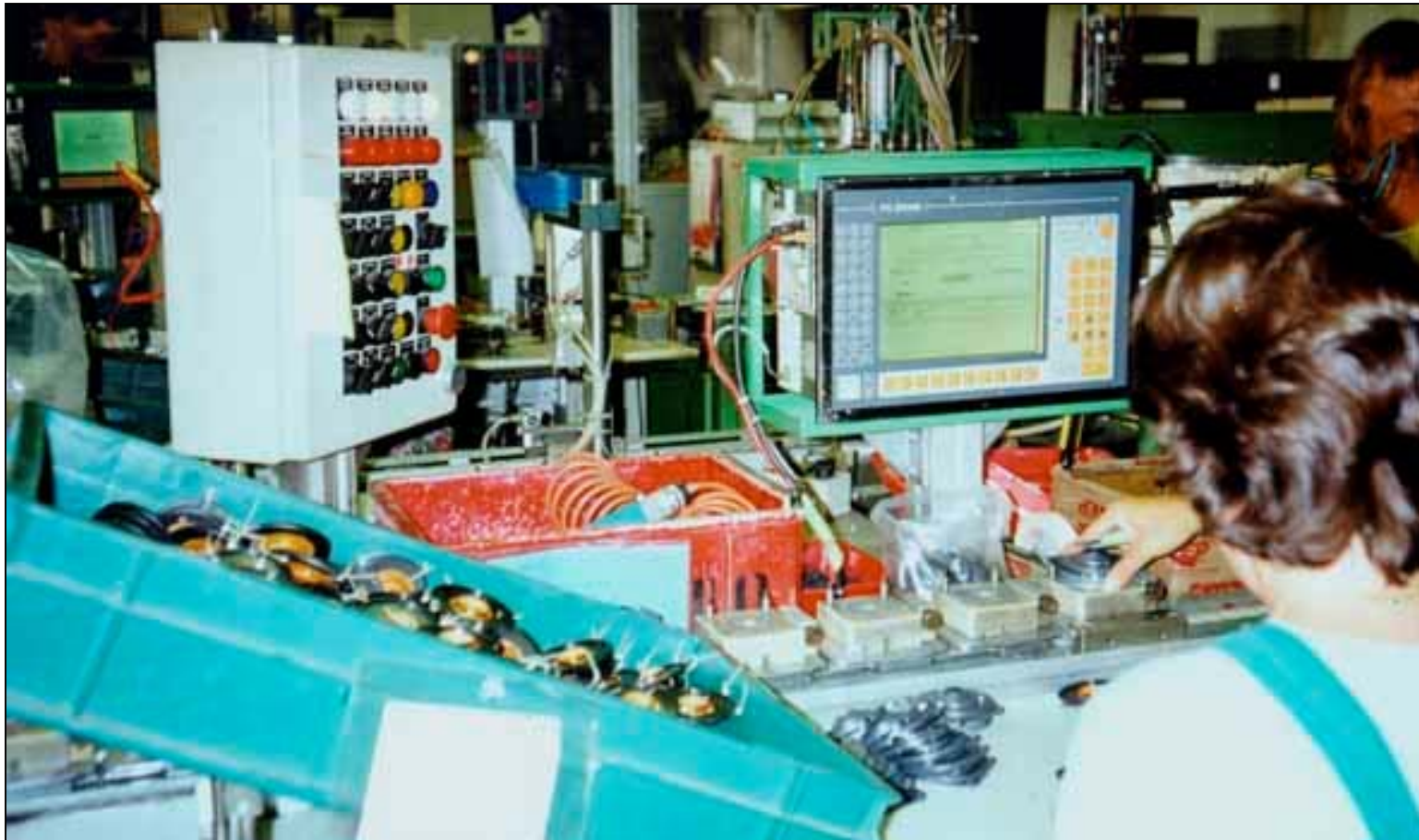
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- **DUAL CHANNEL ANALYSIS AND DISPLAY**
- **TRANSFER FUNCTION**
- **INTERNAL TRIGGER**
- **REAL-TIME THD CALCULATOR**
- **ALLTONE AND MULTITONE GENERATION**





# CLIO AND QUALITY CONTROL







## CLIO AND QUALITY CONTROL

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- **“ON-FIELD” DEVELOPED QC SOLUTION**
- **SIMPLE “GO-NO GO” MASKS**
- **ASCII FILE DRIVEN QC PROCESSOR**
- **SWEEPS, LEVEL, FFT, MLS, IMPEDANCE AND POLARITY TESTS**
- **INTERACTION WITH EXTERNAL HARDWARE TO REALIZE A FULLY AUTOMATIC SYSTEM**

## •LEVEL WITH BARGRAPH

- UP TO 40 POSSIBLE
- DEFINABLE STIMULUS
- USER INTERACTION FOR DUT TUNING
- TYP. EXECUTION TIME: 0.5s

## •FFT

- UP TO 14 POSSIBLE
- DEFINABLE STIMULUS
- RESPONSE, NOISE, THD, IMD & RUB+BUZZ
- TYP. EXECUTION TIME: 1s

## •MLS

- UP TO 10 POSSIBLE
- MAXIMUM LENGTH SEQUENCE PROCESSING
- FREQUENCY RESPONSE & POLARITY CHECK
- DUT SENSITIVITY CHECK
- STANDARD DEVIATION WITHIN THE BATCH
- TYP. EXECUTION TIME: 2s

## •IMPEDANCE

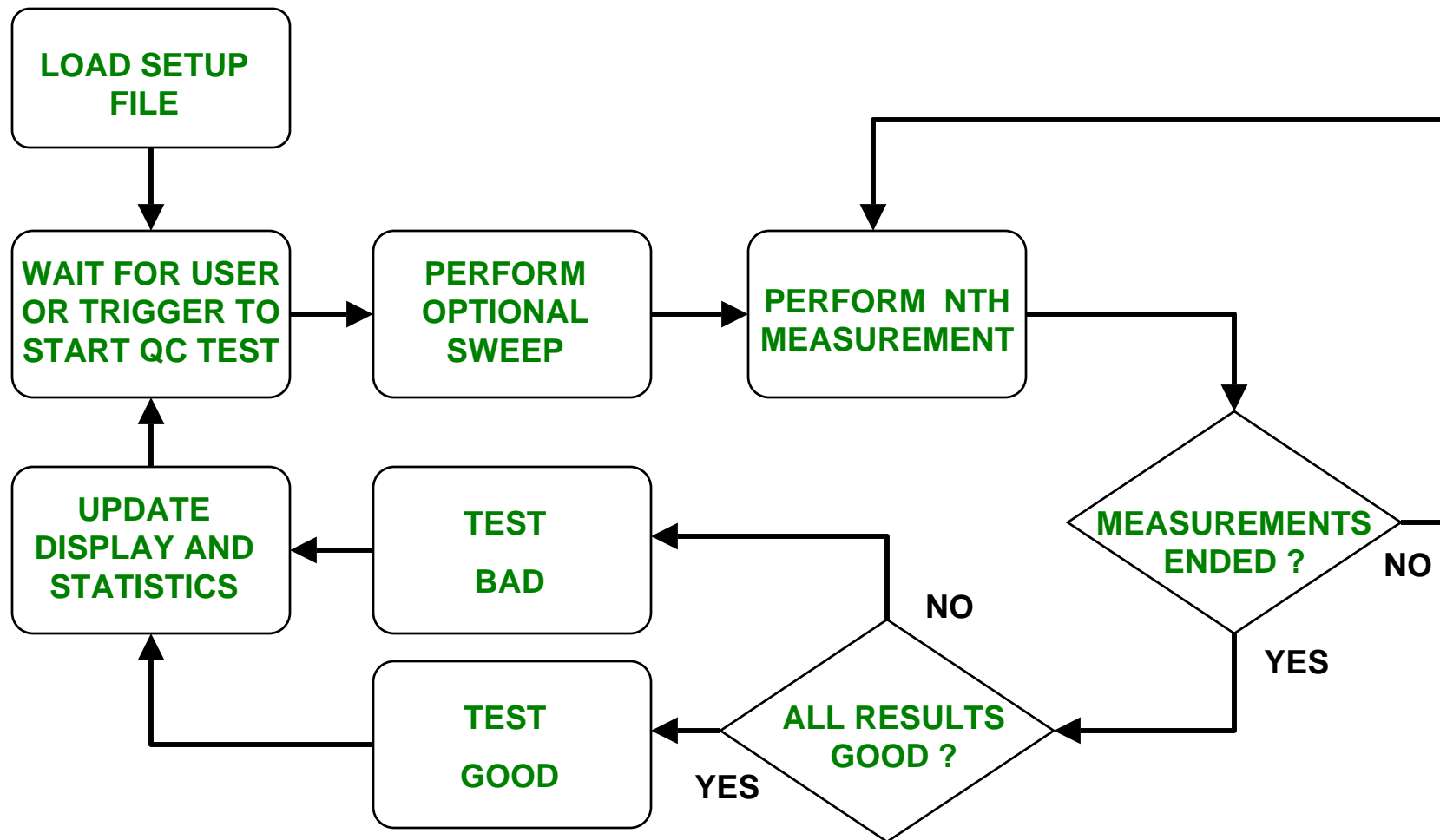
- UP TO 4 POSSIBLE
- SINUSOIDAL STIMULUS
- DEFINABLE TEST FREQUENCIES
- T/S PARAMETERS CHECK
- TYP. EXECUTION TIME: 0.1s/point

## •SWEEP

- UP TO 4 POSSIBLE
- FOR CLASSICAL EAR-DRIVEN TESTS
- DETECTION OF MECHANICAL NOISES

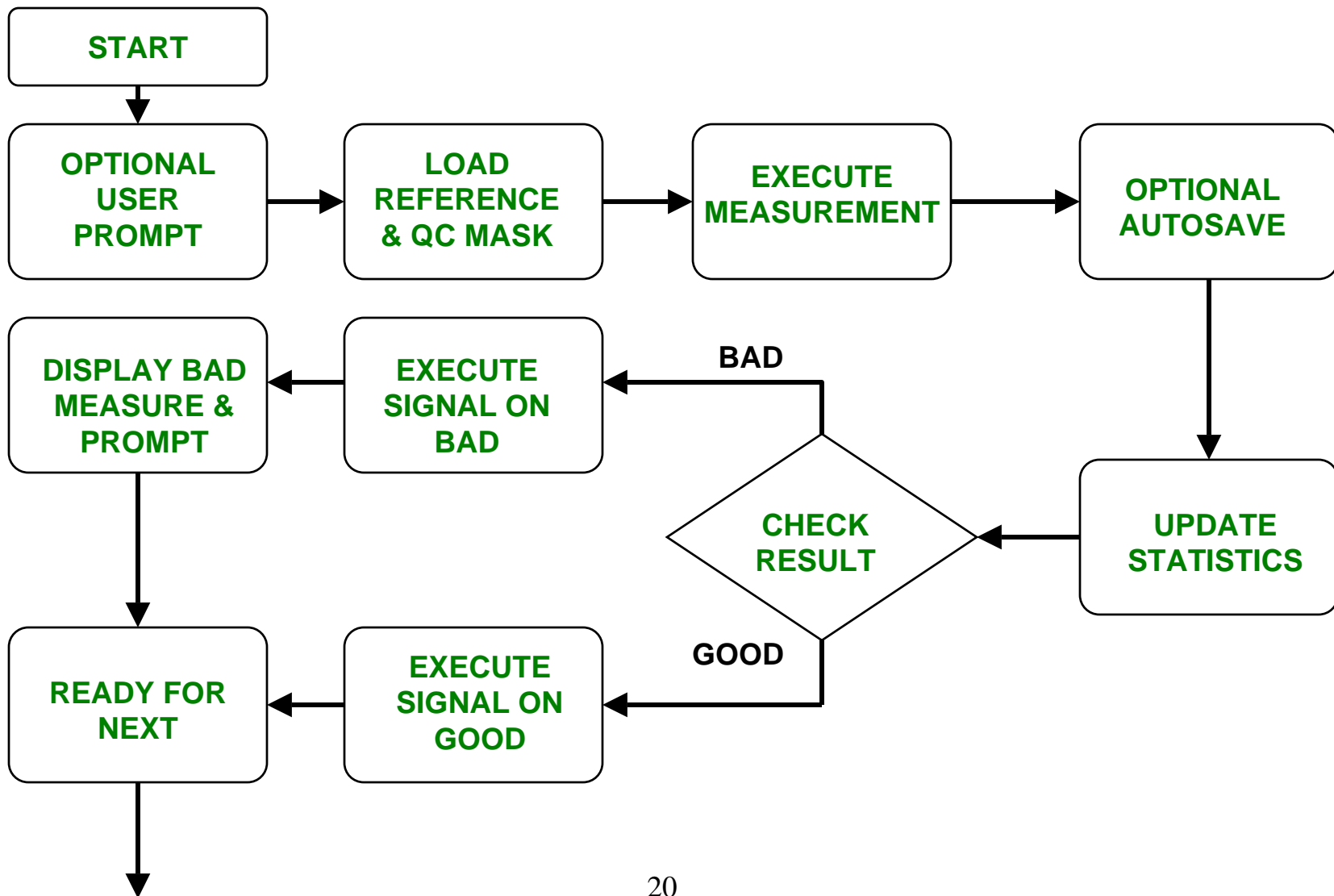


# THE QUALITY CONTROL PROCESSOR



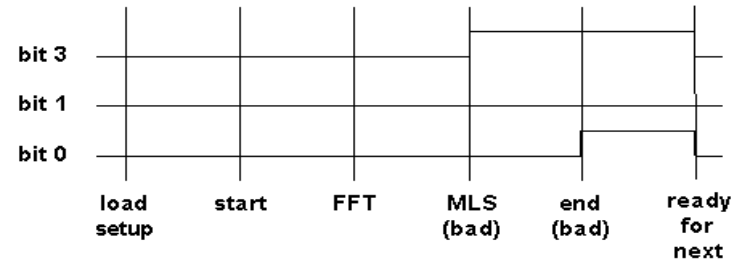
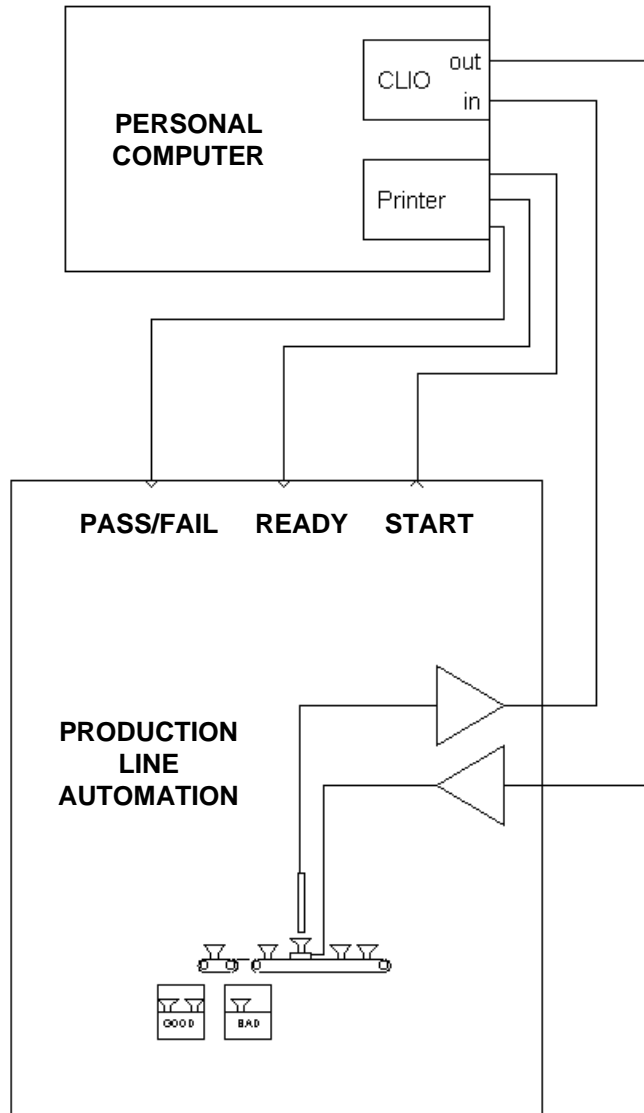


# QC MEASUREMENT DESCRIPTION

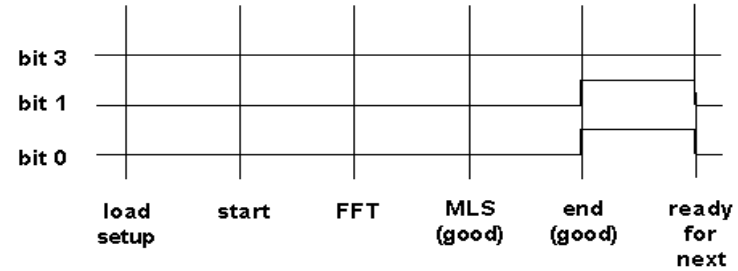




# INTERACTION WITH EXTERNAL HARDWARE



**A**



**B**

[SIGNAL ON BAD]  
 LPTBIT=3  
 STATUS=1  
 DELAY=200  
 [SIGNAL ON GOOD]  
 LPTBIT=3  
 STATUS=0  
 DELAY=200  
 [GLOBAL ON GOOD]  
 LPTBIT=1  
 STATUS=1



# THE QC CONTROL PANEL

AUDIOMATICA CLIO - PRODUCTION LINES QUALITY CONTROL

AUDIOMATICA S.R.L. FIRENZE ITALY  
LOUDSPEAKERS QUALITY CONTROL

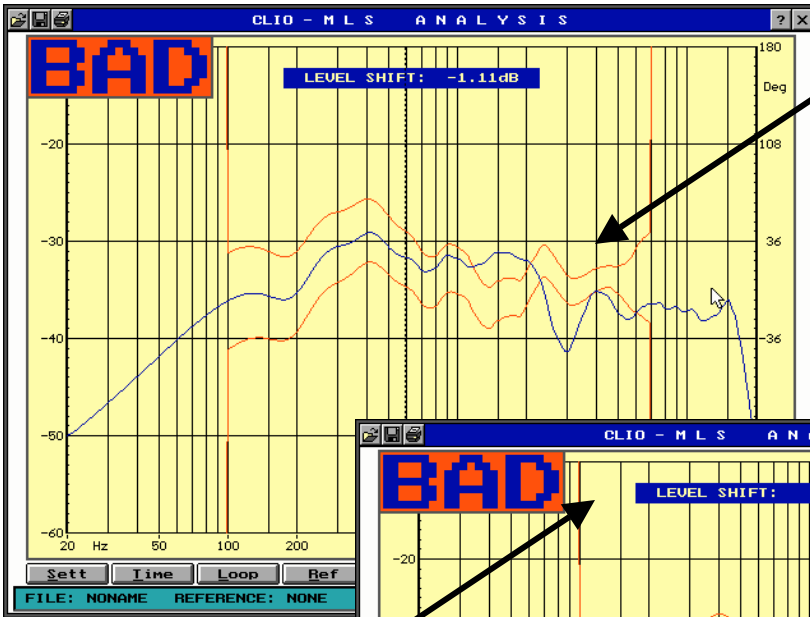
TEST N°:		FFT
2	<b>GOOD</b>	RESPONSE
READY		POLARITY
		IMPEDANCE

Date	: 26/03/97	Out Of Phase	: 0
Setup file	: SAMPLE.STP	Bad FFT	: 0
Total	: 1	Bad Response	: 0
Good	: 1	Bad Impedance	: 0

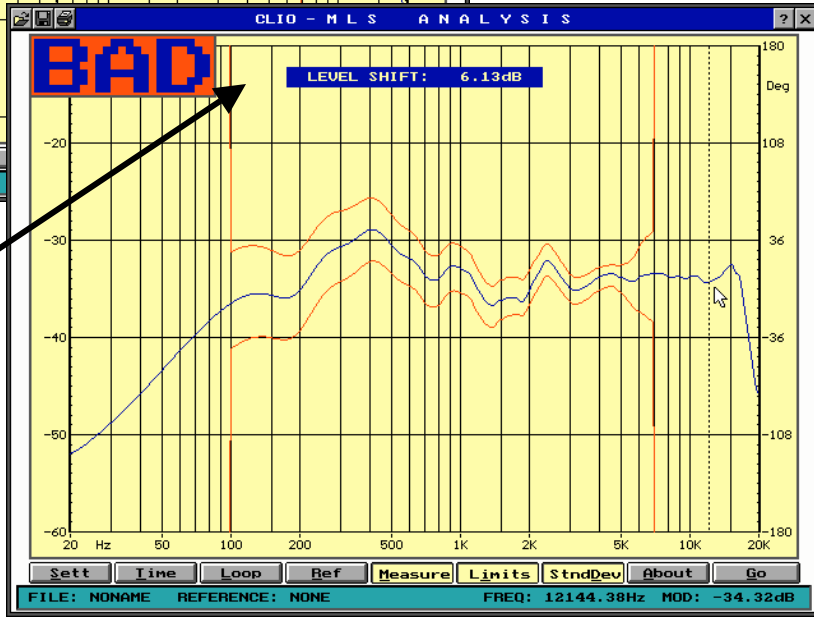
FILE: \_\_\_\_\_



# RESPONSE AND SENSITIVITY WITH MLS



FREQUENCY RESPONSE BAD



FREQUENCY RESPONSE GOOD BUT LOW SENSITIVITY

[MLS]  
 MLSOUT=-6  
 MLSIN=-20  
 MLSREFCURVE=art300.mls  
 MLSREFLIMITS=sample.lim

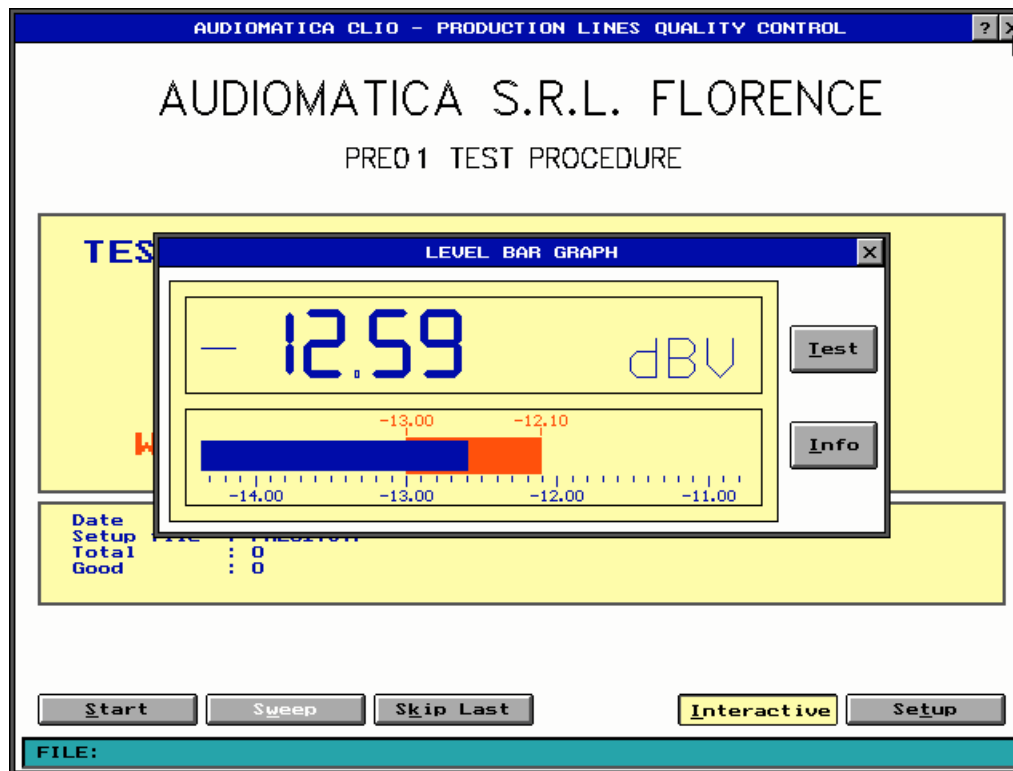
[GLOBAL LEVEL]  
 MLSUPPER=+3  
 MLSLOWER=-3

[DATA]

FREQ(HZ)	UPLIM(dB)	LOWLIM(dB)
100	+5	-5
500	+3	-3
5000	+1	-1
7000	+5	-5



# QC LEVEL TEST WITH LOOP MODE



```
[LEV]  
LEVOUT=-10  
LEVSINUS=1000  
LEVACQUIDELAY=0  
LEVAVERAGE=IMP  
LEVSINUS=2000  
LEVUPPER=-12.1  
LEVLOWER=-13
```

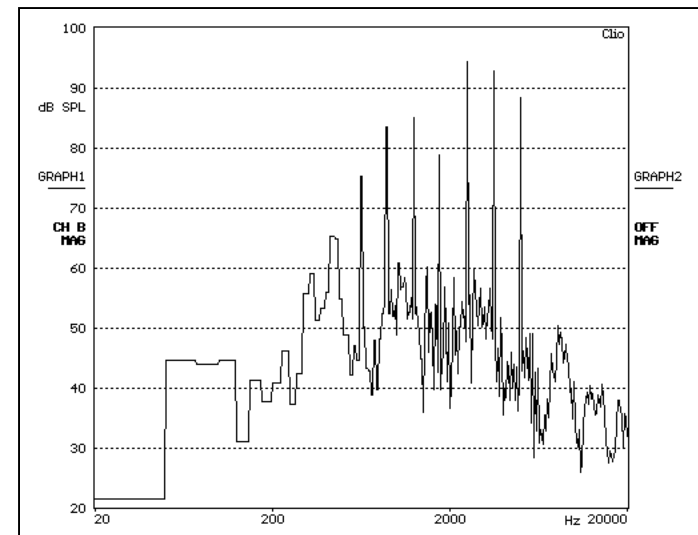
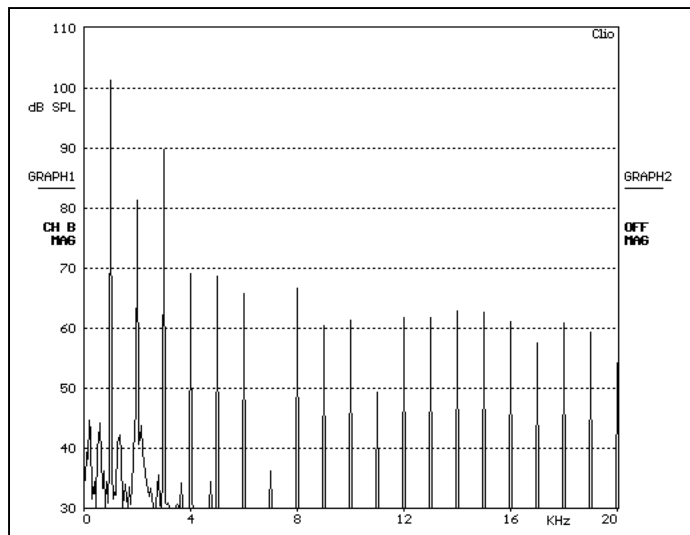
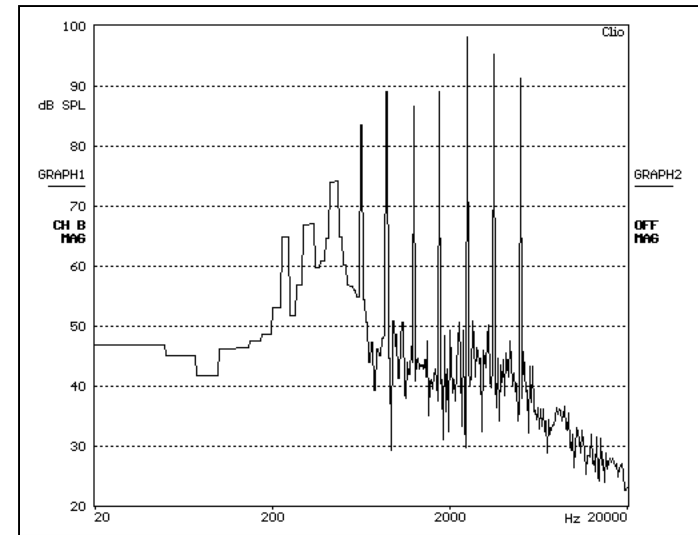
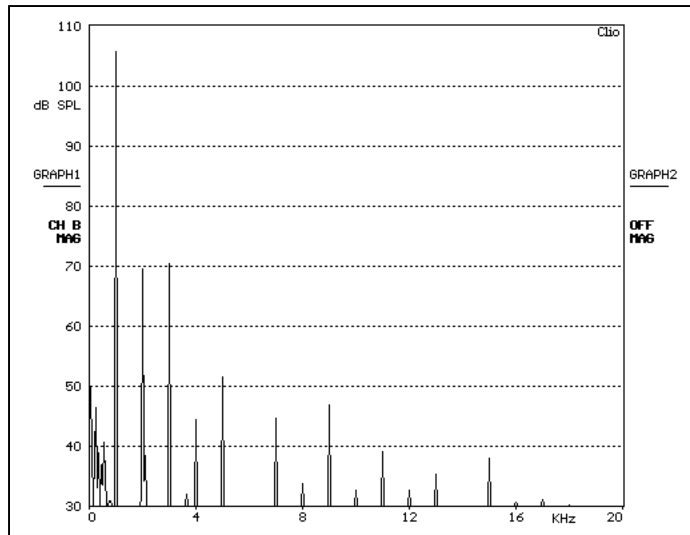
LEVLOOPMODE=1

POSSIBILITY OF  
D.U.T. TUNING



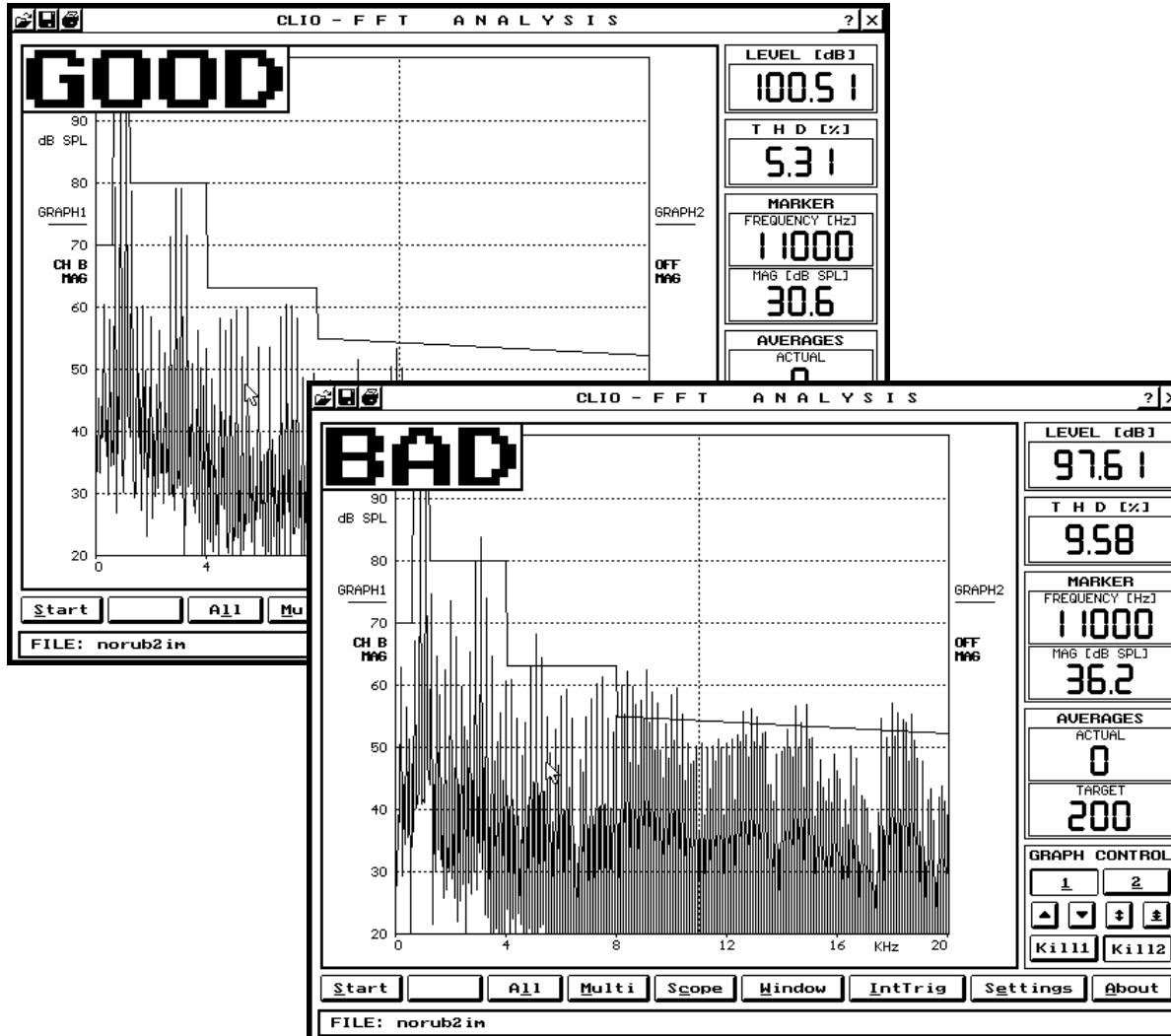


# RUB&BUZZ FFT TEST





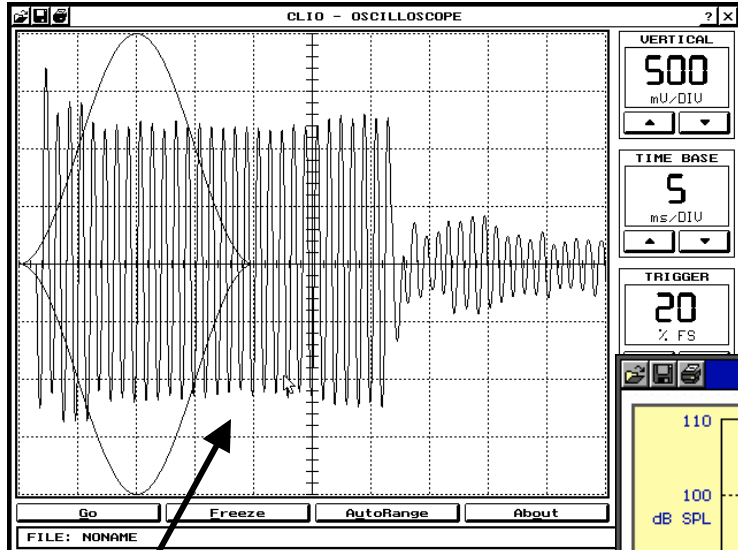
# RUB&BUZZ QC FFT TEST



[FFT]  
FFTACQUIDELAY=100  
FFTOUT=0  
FFTIN=-10  
FFTRFCURVE=norub2im.fft  
FFTRFLIMITS=fftlim.lim  
SINUS1=900  
PERCENT1=50  
SINUS2=1100  
PERCENT2=50



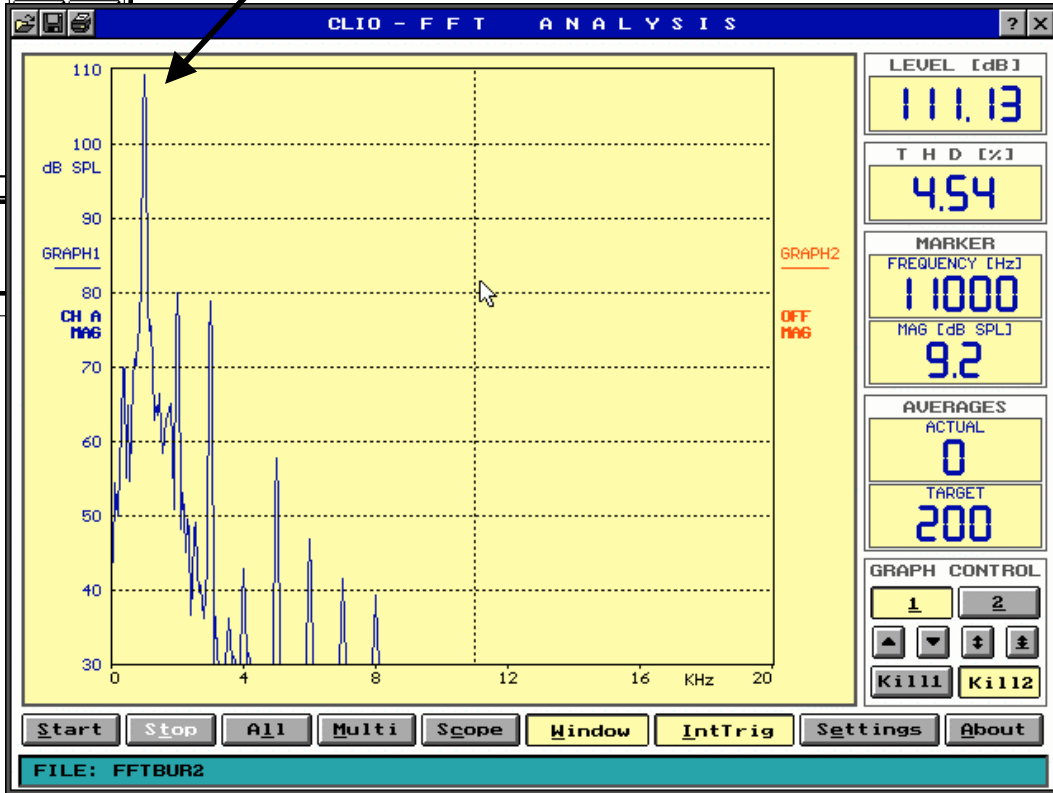
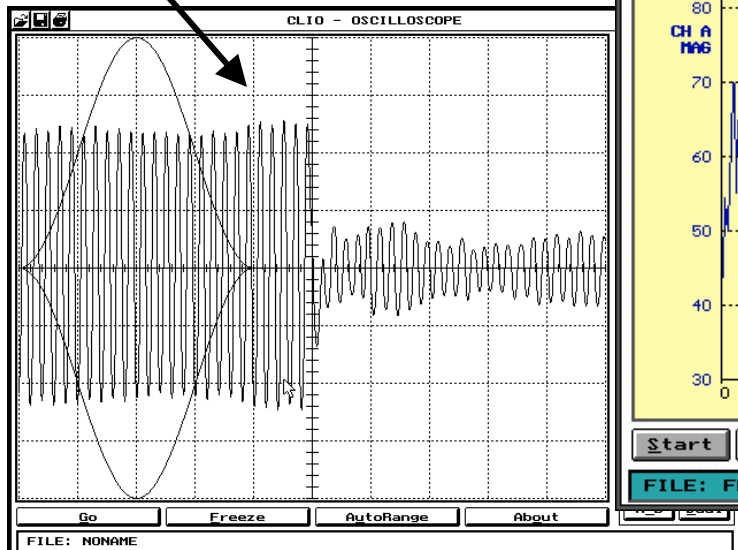
# HI-SPL QC FFT TEST



20 VRMS 1KHz BURST  
50 W PEAK

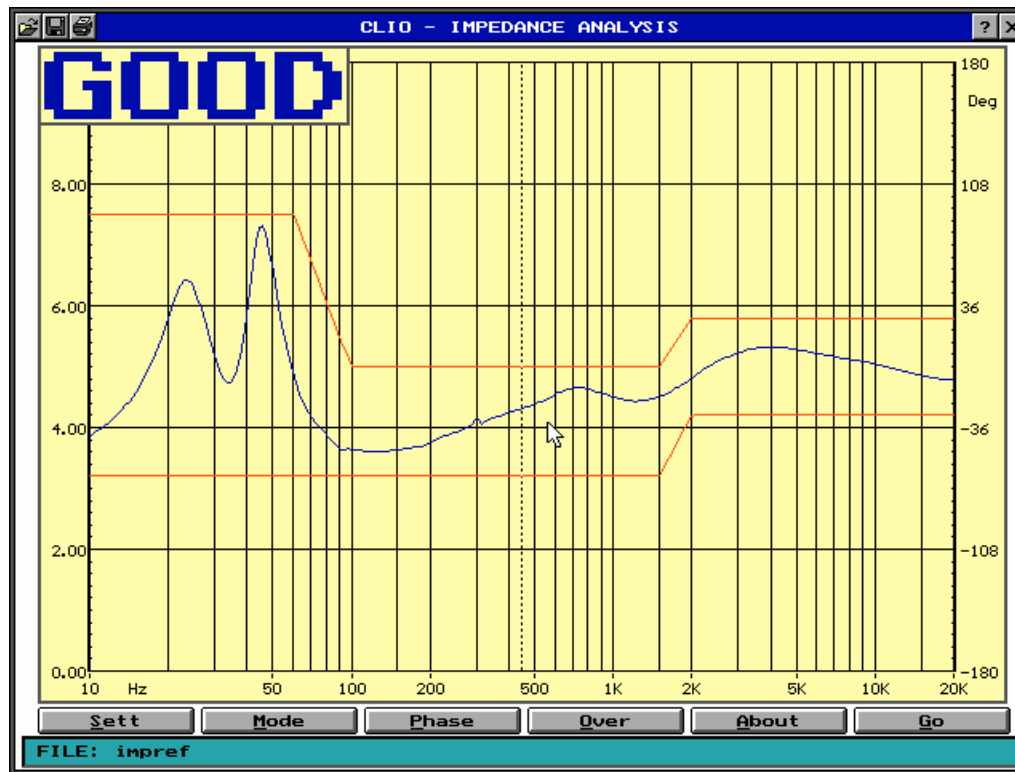
[FFT]  
..  
SINUS=1000  
TON=30  
TOFF=600  
..

TIME ALIGNMENT





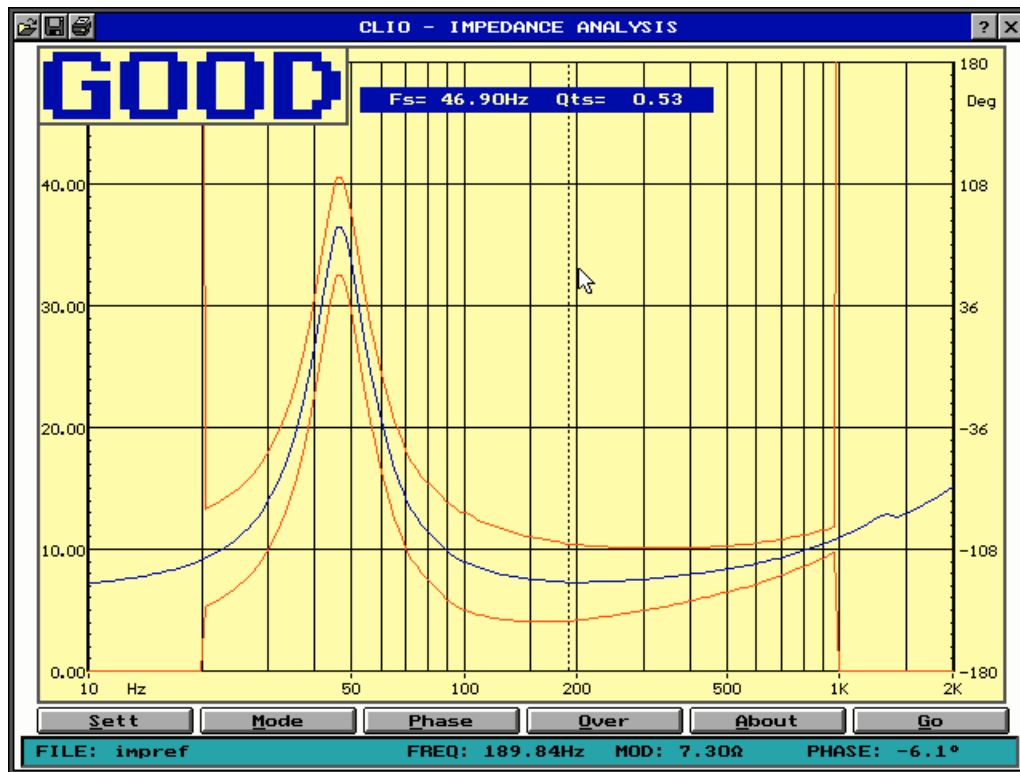
# IMPEDANCE QC TEST



[IMPEDANCE]  
IMPREFCURVE=ref.imp  
IMPREFLIMITS=impabs.lim



# T/S PARAMETERS QC TEST



[PARAMETERS]  
IMPREDC=5.2  
IMPQUPPER=0.3  
IMPQLOWER=0.15  
IMPFSUPPER=70  
IMPFSLOWER=58



# CLIOQC AMPLIFIER & SWITCHBOX

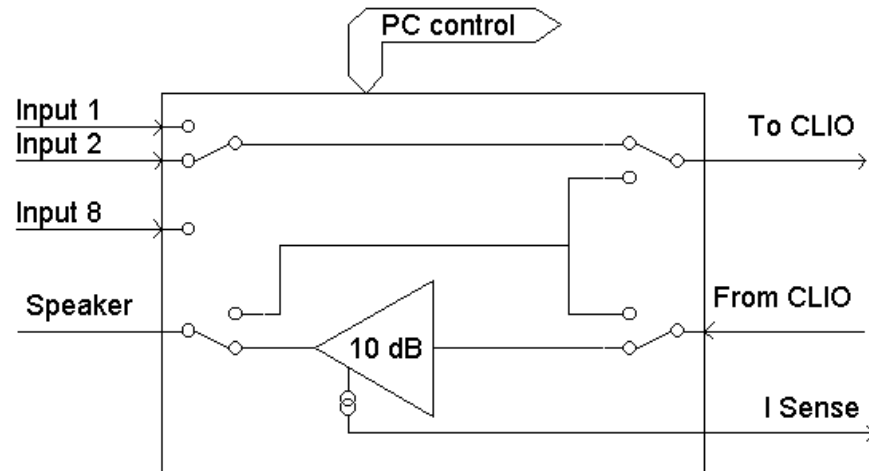


- 10 W POWER AMPLIFIER WITH CURRENT SENSING

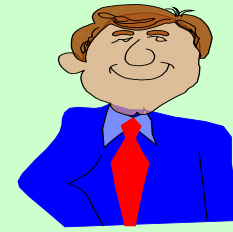
- TWO OR EIGHT LINE / MICROPHONE INPUTS

- INTERNAL SWITCHES FOR IMPEDANCE OR RESPONSE MODES

- ALL FUNCTIONS ARE PC CONTROLLED



**The CLIO system has now reached more than  
2000 satisfied clients.**



**Among them, over 10% bought quality control  
systems to assist several production facilities  
worldwide.**

**A list of selected end users is available.**

**THE END**