OLYMPUS/ACTS SCINTILLATION EXPERIMENT AT THE LEWIS RESEARCH CENTER

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SATELLITE/LOCATION: OLYMPUS, 19° WEST

RECEIVE TERMINAL LOCATION: CLEVELAND, OHIO

ANTENNA SITE LONGITUDE: 81.8656° WEST

LATITUDE: 41.4125° NORTH

HEIGHT: 790 FEET ABOVE SEA LEVEL

ANTENNA ELEVATION: 11.5°

AZIMUTH: 108.73° CLOCKWISE FROM NORTH

RF: 29.655 589 GHz

1ST IF: 2.145 589 GHz

2ND IF: 0.160 000 GHz

WAVELENGTH: 10.11 MM

DOWNLINK POWER BUDGET

SYSTEM NF(*)	5.8	dB
SATL. EIRP (CLEV.)	16.0	dBW
FREE SPACE PATH LOSS	-214.1	dB
POINT/POLAR/ATM LOSS	-0.9	dB
4-FT ANT. DIRECTIVITY	48.9	dBi
ANT. FEED INPUT (CLEV.)	-120.1	dBm
$1/T_{SYS}$	-29.1	dB/K
G/T	19.8	dB/K
BOLTZMANN'S κ	-198.6	dBm/K-Hz
No ($\kappa * T_{SYS}$)	-169.5	dBm/Hz
C/No	49.4	dBHz
C/N (BW=800 Hz)	20.4	dB
RCVR DYNAMIC RANGE ($2B_L$=30 Hz)	34.6	dB

(*) REFERENCED TO THE INPUT OF THE ANTENNA FEED

OLYMPUS EXPERIMENT AT LEWIS RESEARCH CENTER

COMPUTER:	APPLE MACINTOSH II
ACQUISITION BOARD:	NATIONAL INSTRUMENTS
SOFTWARE:	LABVIEW 2.0

1400-MR MICRODYNE RECEIVER

RF: 160 MHz, IF: 20 MHz 800 Hz WIDE

PM DEMODULATOR WITH AUTOMATIC PHASE CONTROL

AGC DERIVED FROM ENVELOP AND SYNCHRONOUS AM DETECTORS

SYNCHRONOUS DETECTOR INCREASES SENSITIVITY BY 15 dB WHEN IN PHASE LOCK

AGC TIME CONSTANT OF 10 ms USED WITH NARROW IF BPF FOR STABILITY

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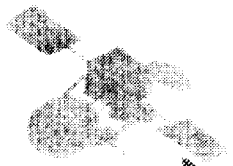


SAMPLING RATE: 10 SAMPLES/SEC

ANTIALIASING POSTDETECTION 8-POLE, 6-ZERO ELLIPTIC LPF

FILTER SET AT F_r=2.8 Hz WITH F_{-3dB}=3.16 Hz AND F_{-80dB}=4.96 Hz

(.5 LSB=1.22 mV/FULL ADC SCALE=10 V)=-78.25 dB

CONSTANT DELAY OF .8 SEC TO 1.4 Hz

APPROX. 24 MBYTES OF HD SPACE ARE AVAILABLE FOR DATA STORAGE
OR 2 WEEKS OF CONTINUOUS DATA ACQUISITION OF .1 SEC SAMPLES

AVERAGE SIX (6) 8K FFT's WITH 50% OVERLAPPING OF 8K TIME RECORDS

FFT RESOLUTION: 10 Hz/8192 OR .00122 Hz

28672 TIME SAMPLES ARE USED FOR ONE (1) AVERAGED FFT PLOT

TOTAL TIME OF ONE FFT 47 MIN. 50 SEC.

VARIABLE FREQUENCY WINDOW LINEAR REGRESSION CALCULATES MAX SCINTILLATION SLOPE

OLYMPUS EXPERIMENT AT LEWIS RESEARCH CENTER

- DURING LAST 14 DAYS OLYMPUS BEACON SIGNAL ACQUISITION COMPUTER RECORDED 15 EVENTS WITH SCINTILLATION SLOPES $\leq$-2.00 BUT ONLY 1 EVENT WHERE SLOPE <-2.67 (-8/3).

- WHILE RECEIVER WAS PHASE-LOCKED
  - MAXIMUM SLOPE EVER RECORDED 3.31 (FROM 8K FFT's)
  - MINIMUM SLOPE EVER RECORDED 0.16 (FLAT SPECTRUM--PREDOMINANCE OF FRONT-END NOISE)

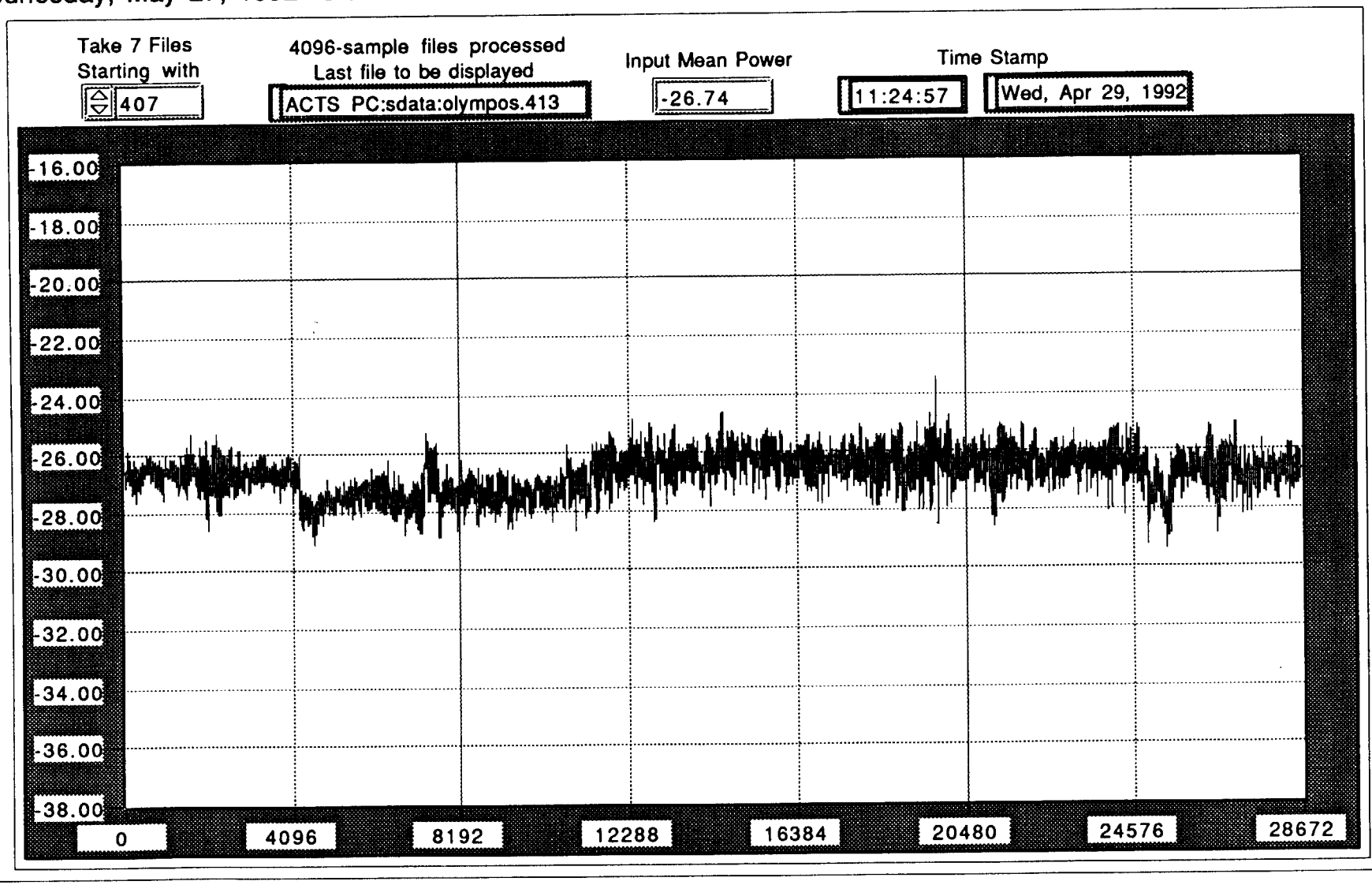
- LOST RECEIVER LOCK/ACQUISITION TWICE OVER BOTH WEEKENDS:

  SATURDAY MAY 2, 1992 17:00 NY TIME

  FRIDAY MAY 8, 1992 23:00 NY TIME

- HAVE FOUND A NEW WAY TO OPEN DEMODULATOR LOOP FOR A FEW SECONDS VIA ACQUISITION I/O BOARD. THIS SEEMS TO HELP RELOCK RECEIVER. (HOWEVER, THIS IS YET TO BE IMPLEMENTED.)

time.domain
Wednesday, May 27, 1992 8:06



BEACON SIGNAL AT INPUT OF 1400-MR (dBm)

0.1 SEC SAMPLES SINCE "TIME STAMP"

TEMPORAL FREQ SPECTRA OF LOG-AMPLITUDE FLUCTUATIONS

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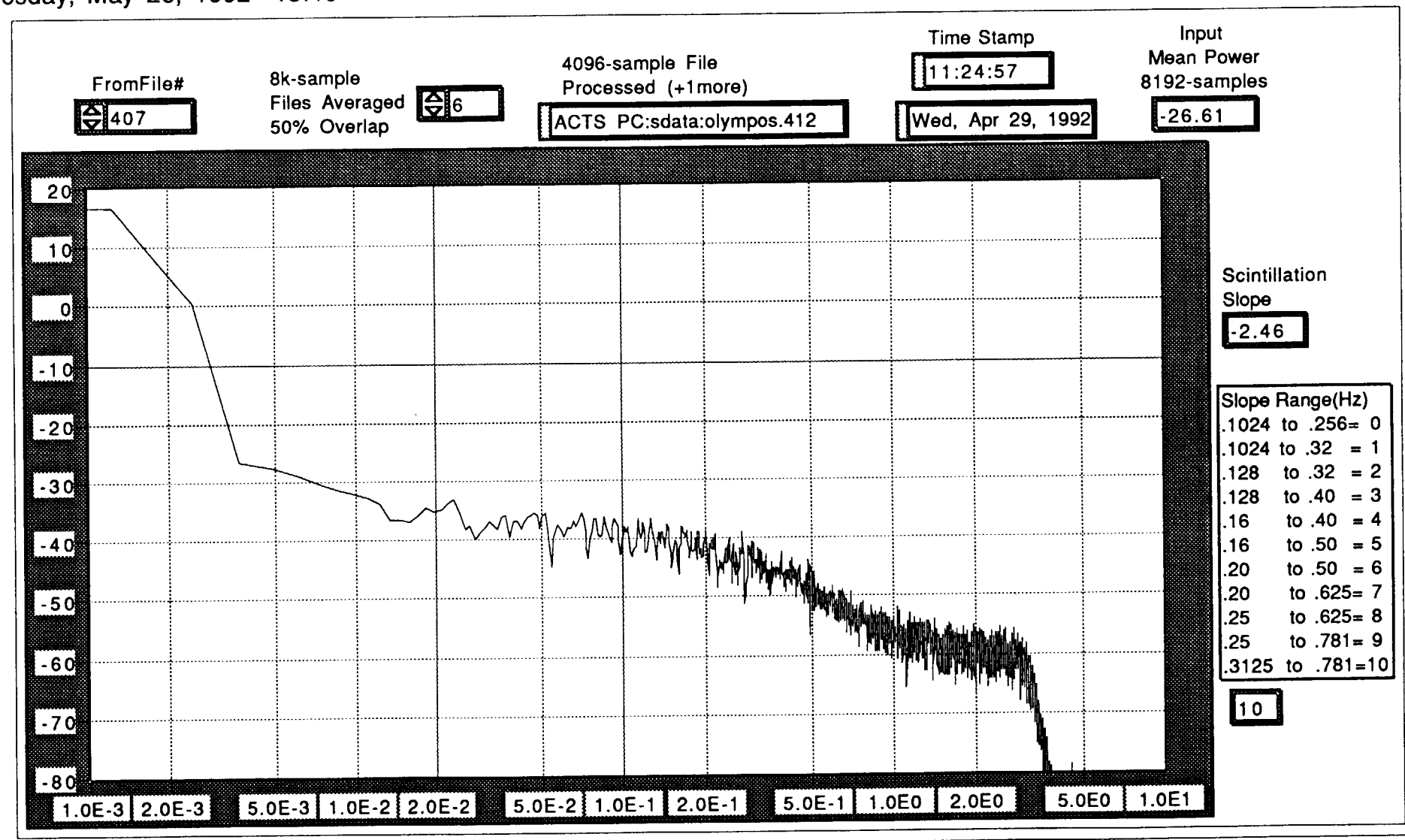
Tuesday, May 26, 1992 15:46



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$10 \log W_x$ [dB^2/Hz]

FREQUENCY (Hz)

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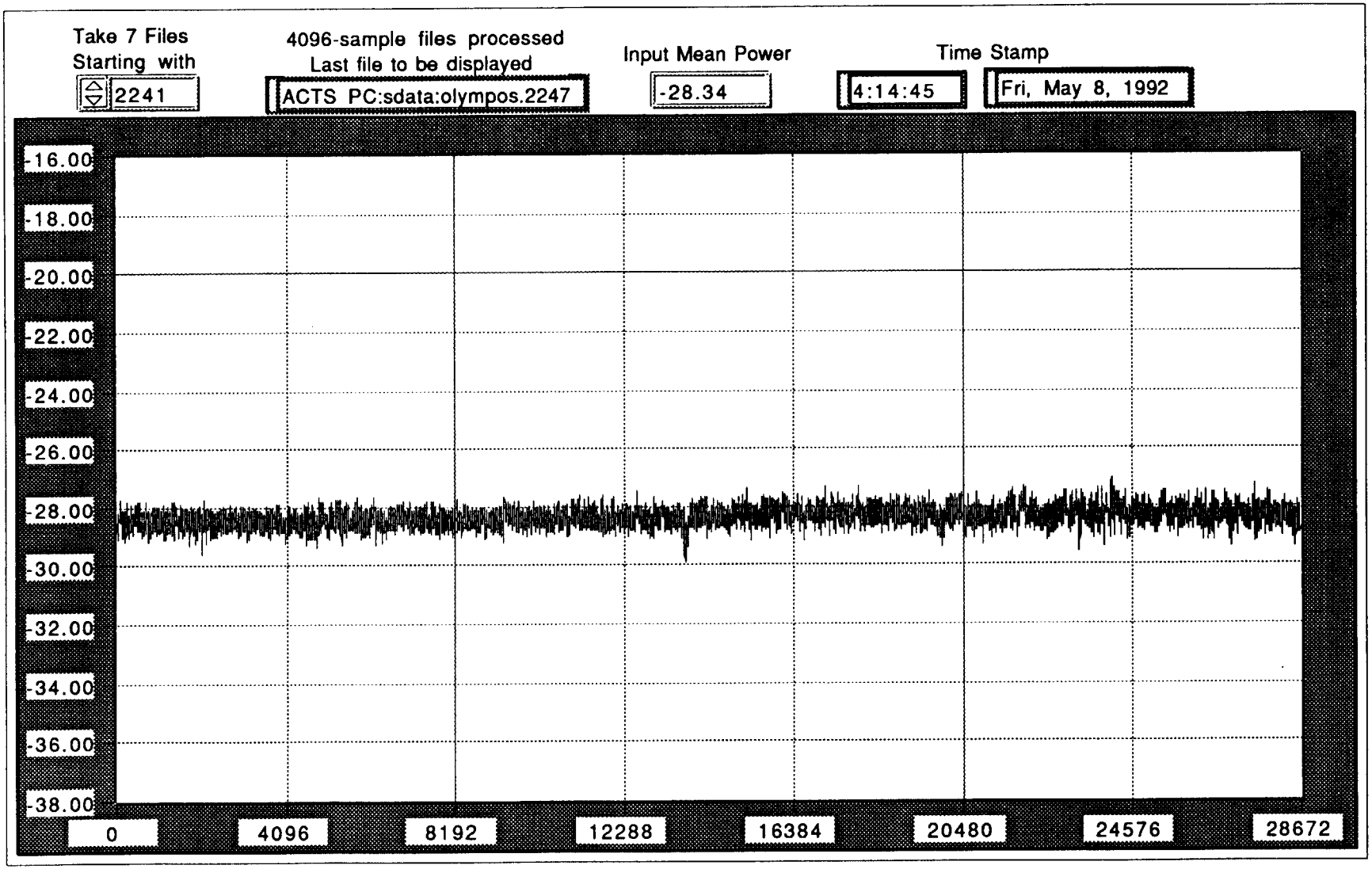

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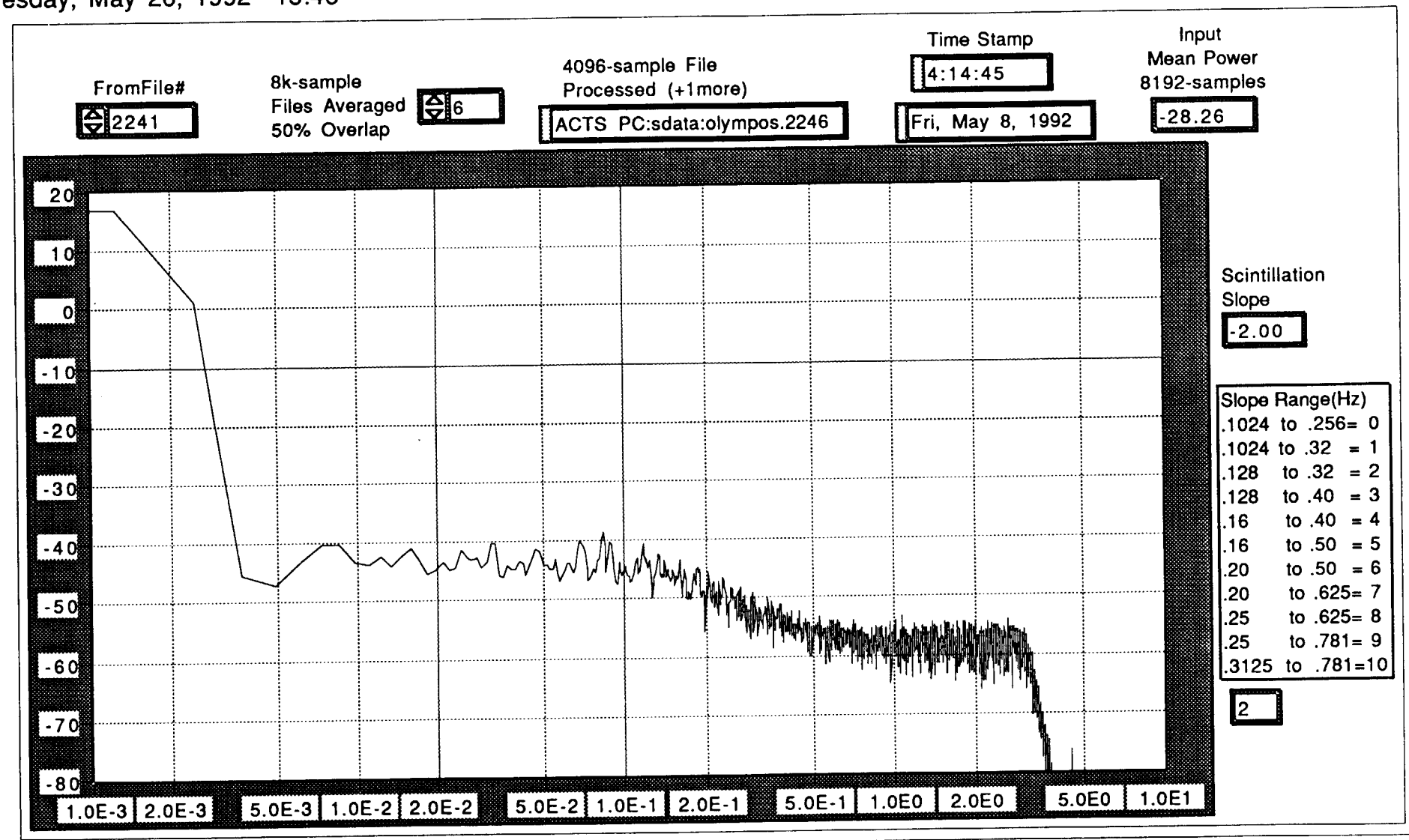

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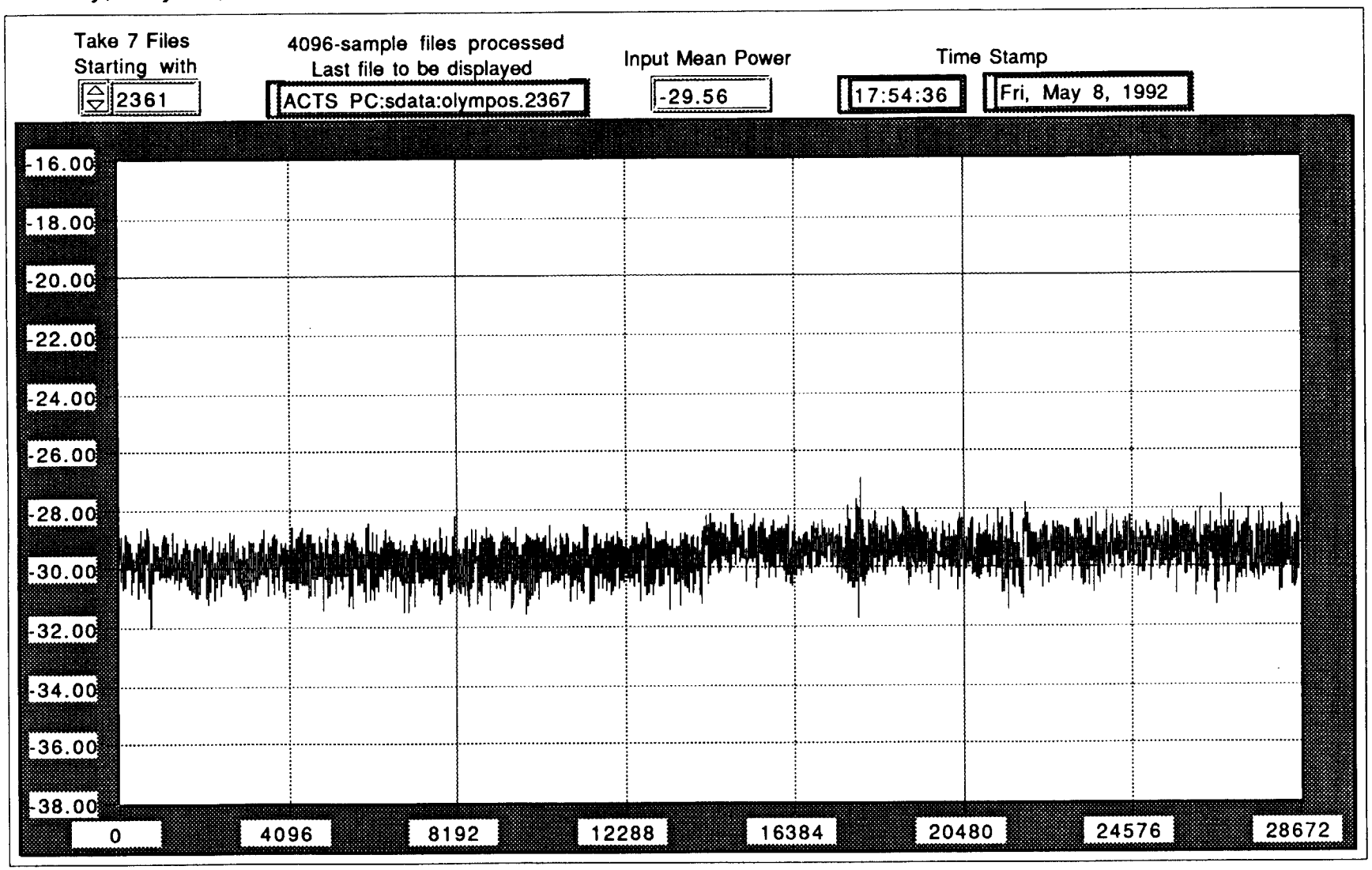

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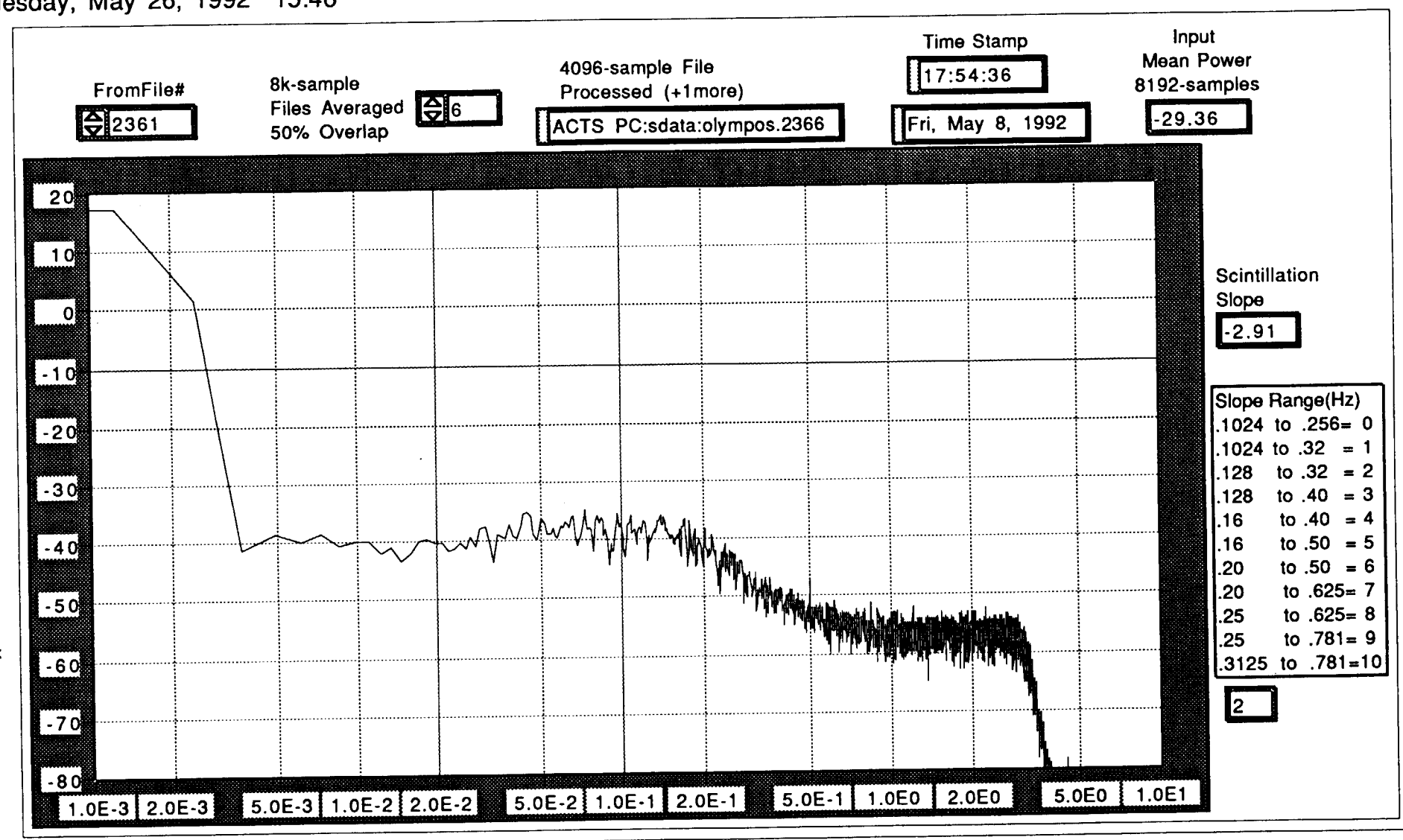

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$10\log W_x[dB^2/Hz]$

FREQUENCY (Hz)