Exercises on radio measurements

School on Radio use for ICT - 2003
carlo fonda
http://wireless.ictp.trieste.it/school_2003/

Tasks

- task 1: cable characterization

- task 2: antenna characterization

- task 3: antenna radiation patter

Task 1

- cable characterization (1 h)

  - 9 cables (different lenghts and types)

  - we want to measure freq. response, Z, geometrical characteristics

  - using a S.A. with T.G. or a S.G. and a P.M.

Cable characterization
with a S.G. and a P.M.

- S.G. = Signal Generator
  (HP8660C: synthetized, 1 ÷ 2600 MHz, 10mW)

- P.M. = Power Meter
  (HP435A + 8481A sensor: analog, 0.5 ÷ 18 GHz, 3µW ÷ 100mW)

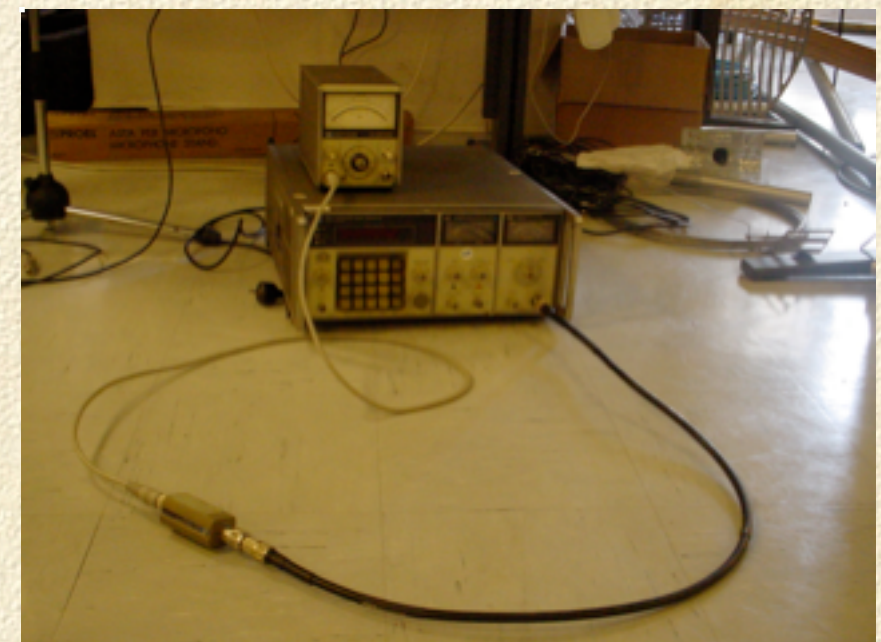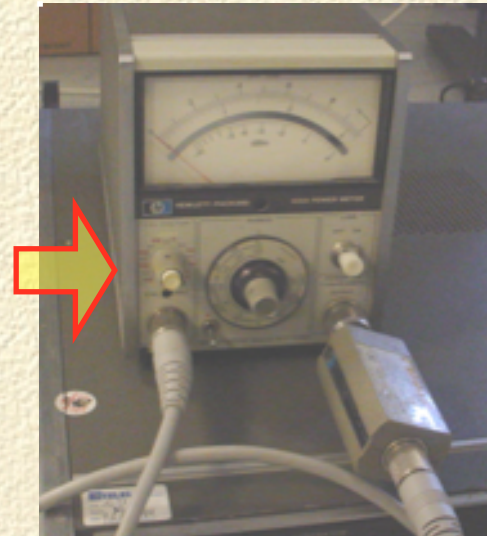- N-female to N-female connector adapter

- various cables to test

Cable characterization with a S.G. and a P.M.

- 1. Self-calibration of P.M.

- 2. Calibration of S.G. with the P.M.

- 3. Measurement of cable loss, connecting the S.G. to the P.M. through the cable under test
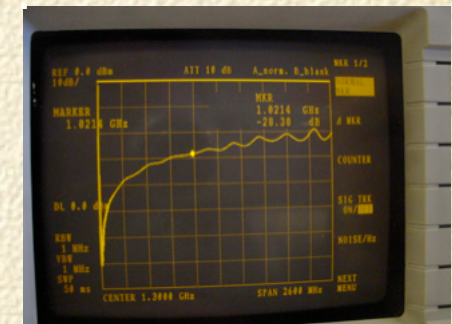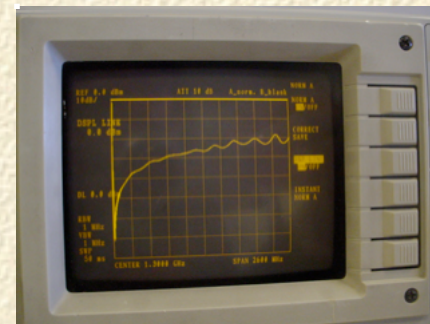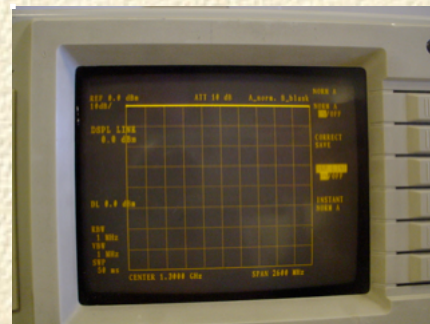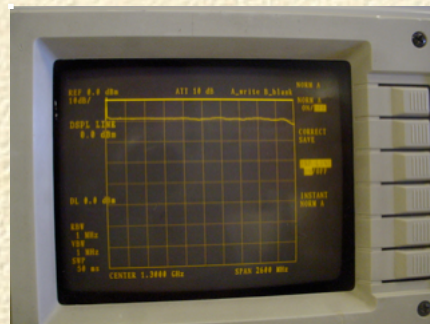
Cable characterization with a S.A. with T.G.

☐ S.A. = Spectrum Analyzer, with Tracking Generator (T.G.)
(ADVANTEST R3361A: digital, synthetized, 9 kHz ÷ 2,6 GHz)

Cable characterization with a S.A. with T.G.

- 1. Full Reset of the S.A.

- 2. Self-calibration of T.G.

3. Measurement of cable loss, connecting the T.G. output to the S.A. input through the cable under test

Task 2

- antennas characterization (1½ h)

  - 4 antennas for 2,4 GHz (different sizes)

  - we want to measure gain and SWR

  - using a S.G. and a P.M.

Antenna characterization with a S.G. and a P.M.

- S.G. = Signal Generator
  (HP8660C: synthetized, 1 ÷ 2600 MHz, 10mW)

- P.M. = Power Meter
  (HP435A + 8481A sensor: analog, 0.5 ÷ 18 GHz, 3μW ÷ 100mW)

- calibrated "probe" antenna

- directional coupler

- various antennas to test

- e.m. anechoic chamber or "free space" environment

Antenna characterization with a S.G. and a P.M.

- a. measurement of SWR

- using the directional coupler, we measure the forward and reflected power, and we compute the ratio

Task 3

- antenna radiation pattern (1½ h)

  - 2 antennas, a YAGI and a parabolic grid

  - we want to plot the radiation patterns (horizontal and vertical) @ 2,4 GHz

  - using a S.A. with T.G.