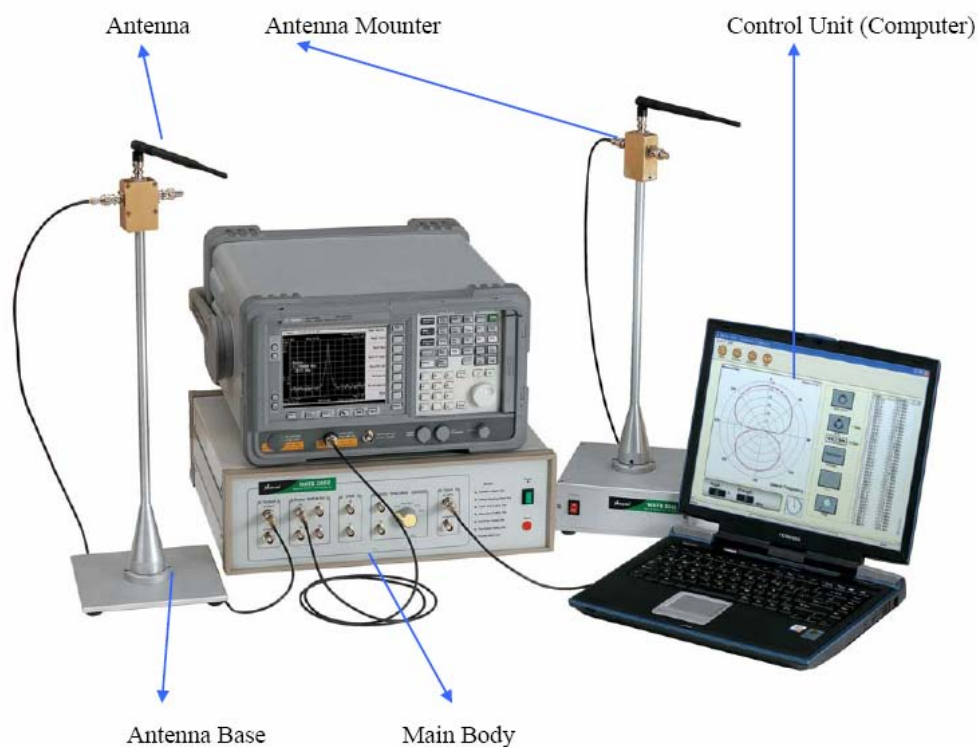


# Wave and Antenna Training System [WATS-2002]

## 1. System configuration



## 2. Characteristics

The majority of existing antenna practice devices identified only radiation pattern of antenna based on fixed radio communication environment. Therefore a new learning system was required to identify and analyze the characteristics of electromagnetic wave in mobile communication environment.

WATS-2002(Wave and Antenna Training System-2002) is an ideal future antenna

training system and multi function system. The standard function of WATS-2002 examines antenna radiation pattern and inspects other mobile communication environments; standing wave measurement, multi-path fading measurement, phase delay fading measurement, time delay fading measurement and Doppler frequency measurement.

Through these experiments, students and engineers should understand the basic characteristics of antenna and mobile communication and will be benefited with followings;

- Insight knowledge on the baseband circuit design in radio communication and mobile communication.
- Ability to forecast a signal change in real communication environment.
- Ability to analyze the performance of the communication system.
- Ability to design a base station transceiver and select the position of the relay station.

### **3. Functions**

- Antenna characteristics experiment
  - Radiation pattern measurement experiment
  - Antenna manufacturing and characteristic measurement experiment
- Mobile communication propagation characteristics experiment
  - Fading experiment (phase delay, power attenuation, multi path)
  - Standing wave experiment
  - Time delay experiment
  - Doppler frequency experiment
- Mobile communication propagation environment simulation
  - Propagation model simulation
- Auto calibration
- User interface with GUI windows

## 4. Specifications

Items	Specifications
<b>RF</b>	
Frequency	914 [MHz], 2.45 [GHz]
Output Power	+4.5 [dBm] Max
Local Oscillation	PLL
Impedance	50 [ohm]
AGC Dynamic Range	40 [dB]
IF	21.7 [MHz]
Supplied Antenna Types	Yagi, Chip, Dipole, Monopole, Loop, Patch, Inverted F, Array Patch
Antenna Body for Manufacturing Experiment	Yagi, Loop, Dipole
<b>Control</b>	
Control Method	Micro-controller
Antenna Angle Control	360 [°], 400 [step]
	0.9 [°]/step
Angle Control Range	0~360°
Position Calibration	Auto Calibration
Motor Rotation	Front, Back, Step

## 5. Experiment Steps

- 1) Antenna characteristic Experiment
  - Radiation pattern measurement
  - Antenna manufacturing and characteristic measurement
- 2) Mobile communication propagation characteristics experiment
  - Fading experiment (phase delay, power attenuation, multi path)
  - Standing wave experiment
  - Time delay experiment
  - Doppler frequency experiment
- 3) Mobile communication propagation environments simulation
  - Propagation model simulation

## **6. Training Contents**

Part 1. Introduction and Installation of Program

Chapter 1. Introduction of WATS-2002

Chapter 2. Program Installation and Instruction

Part 2. Antenna characteristics Experiment

Chapter 3. Dipole Antenna Characteristics Experiment

Chapter 4. Yagi Antenna Characteristics Experiment

Chapter 5. Monopole Antenna Characteristics Experiment

Chapter 6. Loop Antenna Characteristics Experiment

Chapter 7. Ceramic Chip Antenna Characteristics Experiment

Chapter 8. Inverted F Antenna Characteristics Experiment

Chapter 9. Patch and Array Patch Antenna Characteristics Experiment

Part 3. Antenna Design and Manufacturing Experiment

Chapter 10. Dipole and Yagi Antenna Production and Analysis Experiment

Chapter 11. Loop Antenna Production and Analysis Experiment

Part 4. Mobile Communication Propagation Experiment

Chapter 12. Phase Delay Experiment

Chapter 13. Power Attenuation Characteristic Experiment

Chapter 14. Multi-Path Fading Experiment

Chapter 15. Time Delay and Doppler Effect Experiment

Chapter 16. Standing Wave Experiment

Part 5. Mobile Communication Propagation Environments Simulation

Chapter 17. Propagation Modeling and Propagation Loss Experiment

## **7. Components**

- Main body 1 EA
- Carriage Bag 1 EA
- Textbook 1 EA
- Training Antenna 3 EA

- Antenna 14 EA
- Program CD(Video) 1 EA
- Antenna Base 2 EA Power Switch
- Antenna Fixing Bracket 2 EA
- RF Coaxial Cable 3 EA
- 50 ohm Terminator 2 EA
- RS-232C Cable 2 EA
- Adapter 1 EA
- Wrench 1 Set

