DigiCORA MW11A & MARWIN MW12A

TECHNICAL REFERENCE

M010108en-A
January 2001

VAISALA

PUBLISHED BY

Vaisala Oyj
P.O. Box 26
FIN-00421 Helsinki
Finland

Phone (int.): (+358 9) 8949 1
Fax: (+358 9) 8949 2227

Visit our Internet pages at http://www.vaisala.com/

Table of Contents

CHAPTER 1
GENERAL INFORMATION 3
About This Manual 3
Contents of This Manual 3
Version Information 3
Getting Help 4

CHAPTER 2
PRODUCT OVERVIEW 5
Operation of the Radiosonde 5
Operation of the Rawinsonde Set 7
UHF Antenna 8
Omnidirectional UHF Antenna (Type RM) 8
Directional UHF Antenna (Type RB) 9
Portable UHF, GPS and VLF Antenna (Type CG) 9
UHF Radiosonde Receiver 10
Receiver Functions 10
PTU Functions 10
LOCAL Navaid Antenna and Preamplifier 11
VLF-Navaid Processor 11
GPS Antenna 12
GPS Processor 13
Main Processor Unit 14
Main Functions of the Main Processor Unit 15
Operator Console 16
Power Supply 17

CHAPTER 3
TECHNICAL SPECIFICATIONS 19
Measurement Precision 22
Standard MW12A Configurations 23

CHAPTER 4
DIAGRAMS AND BOARD LAYOUTS 25

This page intentionally left blank.

CHAPTER 1

GENERAL INFORMATION

About This Manual

This manual provides a brief overview of the operation of the radiosonde and the MARWIN/DigiCORA Automatic Rawinsonde Set.

Contents of This Manual

This manual consists of the following chapters:

- Chapter 1, General Information, provides revision history and contact information for the product.
- Chapter 2, Product Overview, is a brief overview of the operation of the radiosonde and the MARWIN/DigiCORA Automatic Rawinsonde.
- Chapter 3, Technical Specifications, provides the technical data of the DigiCORA and MARWIN.
- Chapter 4, Diagrams and Board Layouts, lists the diagrams and board layouts.

Version Information

Table 1 Manual Revisions

Manual Code	Description
S229en-1.3, February 1998	
M010108en-A, January 2000 (this manual)	Covers also the MWG210 GPS Processor.

Getting Help

Contact Vaisala technical support:

E-mail	helpdesk@vaisala.com
Telephone	+358 9 8949 2789
Fax	+358 9 8949 2790

CHAPTER 2

PRODUCT OVERVIEW

This chapter is a brief overview of the operation of the radiosonde and the MARWIN/DigiCORA Automatic Rawinsonde. The set receives and processes the data sent by the radiosonde.

Operation of the Radiosonde

Radiosondes of the Vaisala RS80 Series measure atmospheric pressure, temperature and humidity and deliver signals required for wind computation. Each of a number of sensors is selected in succession to deliver data to the measurement circuit. The figure below illustrates the operation of the radiosonde.

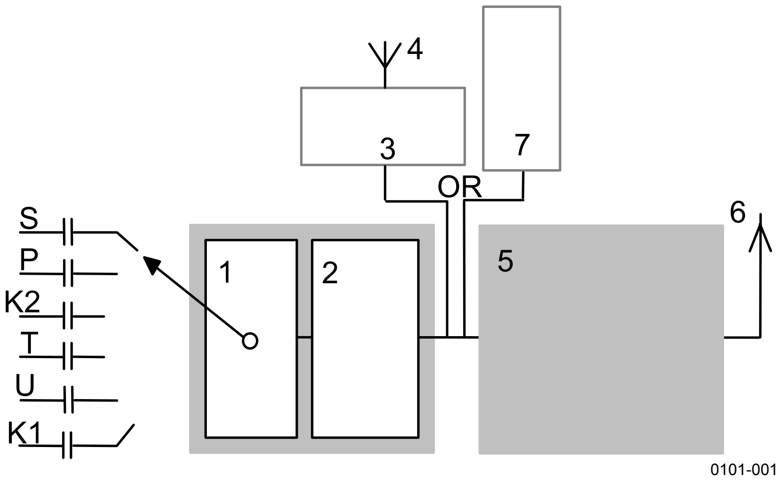


Figure 1 Radiosonde Block Diagram

The following numbers refer to Figure 1:

1 Electronic Switch
2 RC Oscillator

The following numbers refer to Figure 1:

3	VLF Receiver
4	VLF Antenna
5	FM Transmitter 403 MHz
6	Transmitter Antenna
7	GPS111 Module
S	Temperature Sensor of P Sensor
P	Pressure Sensor
K2	Constant Capacitor 2
T	Temperature Sensor
U	Humidity Sensor
K1	Constant Capacitor 1

Capacitive sensors are used whereby a change in the capacitance of the measured parameter acts on the frequency of the oscillator modulating the 403 MHz carrier. The duration of a measurement sequence is typically 1.2 to 1.8 s, see figure 3. The sequence consists of measuring P, T and U sensor values as well as the internal temperature of pressure sensor S. K1 and K2 produce constant frequencies.

Wind observations utilize radionavigation signals. The VLF signals (and Loran-C when used) are received by an antenna tied to the cord between the radiosonde and the balloon. Navigation signals are added to the PTU measurement signal before modulation. The GPS signals are detected by the GPS111 module and the wind finding data are output in digital format. The data are FSK modulated on to the carrier.

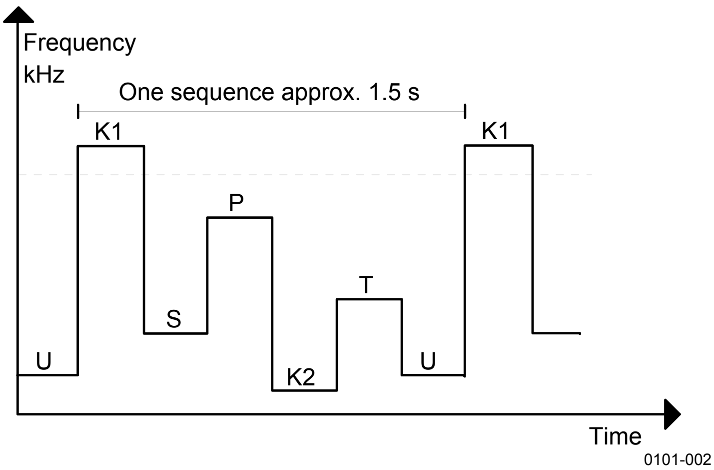


Figure 2 Radiosonde Measurement Sequence

Operation of the Rawinsonde Set

Measurements are based on the use of a free flying balloon-carried radiosonde, transmitting data to the ground station at a frequency of 400*406 MHz. Pressure, temperature and humidity (PTU) are measured by sensors in the radiosonde. The speed and direction of wind is determined by means of navigation networks (Navaid) or GPS navigation satellites. The sonde includes a Navaid receiver module or a GPS111 module for this purpose.

The Navaid signals and GPS wind finding data are relayed to the ground station for processing and wind vector computation. The VLF or Loran-C networks or GPS navigation satellites can be used in wind finding. The VLF based wind finding includes Communications VLF and Alpha navigation networks. The VLF and Loran-C methods cannot be used simultaneously.

The standard system configuration includes a directional antenna receiving signals from distances up to 200 km. Also an omnidirectional and portable antenna can be used. A whip antenna with preamplifier and a GPS antenna are needed for monitoring the Navaid networks and the GPS satellites, respectively.

0101-003

Figure 3 MW11 DigiCORA

0101-004

Figure 4 MW12 MARWIN

The MW11A/MW12A receives and processes radiosonde signals in real time. The signals are converted to upper-air meteorological data consisting of pressure, temperature and relative humidity. Furthermore the MW11A/ MW12A delivers the collected PTU and wind data to other processing devices such as Personal Computers (PC).

The main functions of each module are described in the following paragraphs. Block diagrams of the MW11A and MW12A Rawinsonde Sets are enclosed in this section.

The MW11A/MW12A comprises power supply, ra-diosonde receiver with control processor and signal filters, signal processing units for PTU and wind finding, and Main Processor Unit including program storage. The processor units communicate via asynchronous serial data channels.

UHF Antenna

The UHF antenna is used to receive the radiosonde signals at 400*406 MHz frequency. There are three optional antennas available for the MW11/12, when the URR20 radio is included in the configuration.

Omnidirectional UHF Antenna (Type RM)

The UHF ground plane antenna allows the reception of radiosonde signals from a distance of up to 100 kilometres. It is suitable for most low and medium altitude observation work. High altitude observations require the optional directional antenna.

The antenna is of the quarter wave monopole type. It provides maximum gain towards the horizon. The 403 MHz UHF preamplifier uses a low noise circuit to improve receiver sensitivity.

The preamplifier is installed close to the receiving antenna in a sealed box. It is powered over a coaxial cable connecting it to the receiver.

Directional UHF Antenna (Type RB)

The directional UHF antenna is intended for high altitude soundings. It provides radio-sonde telemetry up to a distance of 200 km, which is sufficient even under high-wind conditions.

The antenna consists of six directional, 60° corner reflector elements and an omnidirectional cross dipole mounted inside a glass fibre radome. The antenna element is connected to the receiver cable through a diode switch. The assembly includes a band-pass filter and UHF preamplifier.

The antenna can be controlled either manually or automatically by means of the receiver processor of the MW11/12.

Portable UHF, GPS and VLF Antenna (Type CG)

The portable UHF, GPS and VLF antenna is especially designed for use in mobile applications where light weight and portability are essential.

The antenna system consists of a mounting tripod, the omnidirectional UHF antenna and optional VLF and GPS local antennas, placed in a transportation bag. All antennas have preamplifiers.

The antenna is used for radiosonde reception from distances of up to 100 km.

UHF Radiosonde Receiver

The Radiosonde Receiver consists of two modules: UHF radio and receiver processor. The purpose of the receiver processor is two-folded. It manages the radio controls such as tuning up/down, AFC and antenna direction. On the other hand it is capable of processing incoming signals from the radiosonde and calculating so called raw PTU values which are in turn passed to Main Processor Unit for final computation.

Receiver Functions

The UHF radiosonde receiver consists of one Euro 1 size board. The (double) super heterodyne FM receiver receives radiosonde signals in the 400 to 406 MHz band.

The operation of the receiver is controlled by the receiver processor (UPP), which executes commands received from the serial channel from the console. The receiver processor uses a microprocessor for automatic tracking of the radiosonde frequency during launch and flight. It also controls the directional antenna making operator presence unnecessary during sounding.

The controls used by the operator are at the front panel of the instrument. Received signals can be monitored by a built-in loudspeaker. The frequency, field strength and antenna control indications are available in the display.

The TELEMETRY commands are introduced in paragraph Operation Control Keys.

PTU Functions

The control processor for radio (UPP) includes PTU Sampler to convert the radiosonde signals into meteorological values representing pressure, temperature and relative humidity. The conversion rate is determined by the radiosonde transmission frame rate.

The PTU Sampler collects frequency samples from built-in PTU filter. The samples from each sensor element are converted into meteorological quantities. In the computation, radiosonde calibration coefficients and ground check values are taken into account.

The PTU processing in the receiver processor provides for first level data analysis. The computed meteorological values are transmitted in digital form through the serial channel to the Main Processor Unit.

LOCAL Navaid Antenna and Preamplifier

The LOCAL Navaid whip antenna is made of aluminum and glass fiber. The same antenna is employed for VLF and Loran-C based wind finding. The whip connects to the preamplifier which couples the antenna to the cable. The preamplifier is provided with a band pass filter to attenuate interfering signals and protection against overvoltages. The same amplifier can be used for VLF and Loran-C wind finding methods.

VLF-Navaid Processor

VLF-Navaid Processor is a subsystem that extracts wind information from the radiosonde signal. All Navaid options are provided on a single MWV201 unit without additional filter boards.

There are two sounding modes: VLF-Navaid (Communications VLF and Alpha) and Loran-C (Loran-C and Chayka).

Digital Signal Processing (DSP) is used in nearly all signal conditioning and signal processing stages which leads to a flexible and upgradable software implementation. Compared to conventional analog implementation advantages are achieved in precision, high performance and long-term stability. Self-diagnostics are performed automatically after power-up.

Loran-C filter is required, when the processor board is used with Loran-C network. The system is capable of listening to two operator selectable Loran-C chains at the same time.

The receiver can operate in low signal-to-noise ratio conditions. A selector controlled by the processor switches the receiver into the radiosonde signal listening mode when it has been synchronized to the Loran-C chains chosen by the operator.

The analog part of the receiver consists of a 95 to 105 kHz band pass filter and three notch filters. Digital notch adjustment by the Loran-C processor eliminates strong interference signals. A narrow band sweep filter is used for spectral measurement to detect interfering signals. Programmable gain control is provided.

Arrival time differences of Loran-C pulses are measured through coherent wave form sampling. The Loran-C processor contains a large buffer memory holding the samples which form an image of the Loran-C pulse pattern. This image is updated by summing new samples to each previous one in coherence with the Loran-C group repetition interval (GRI). The phase coding of pulses is identified before summing operations. When the radiosonde moves with the wind, the images of the pulses travel along the sampling buffer. This movement is extracted by fitting to the contents of the buffer a 100 kHz sinusoidal which is damped by the pulse envelope curve.

The result of each fitting is the time difference of the corresponding pulse with respect to its original position.

Operation with Communications VLF signals is similar in principle. Instead of using the Loran-C filter a Multichannel VLF filter is required to separate different received frequencies which vary between 16 and 29 kHz depending on VLF transmitter. The processor is capable of receiving signals from up to six transmitters simultaneously.

Finally the program computes phase derivatives for each Loran-C or Communications VLF station used. The derivatives are transmitted via the serial line to the main processor in digital form.

GPS Antenna

The GA20 GPS Antenna System is intended for reception of C/A code signals from the NAVSTAR satellites. These signals are Right Hand Circular Polarization (RHCP) centered at 1575.42 MHz. The GA20 is suitable for stations equipped with the GPS wind finding system.

The Radiator Element with the Low Noise Amplifier module is a commercially available GPS antenna unit, which rejects the unwanted Left Hand Circular Polarization (LHCP) and out-of-band signals. The antenna filters, amplifies and transfers the signals to navigation unit for processing.

The active GPS Antenna module consists of an L1 frequency antenna element integrated with an internal interference rejection filter and Low Noise Amplifier (LNA). The element is enclosed within a radome with an attached mounting base. A single N connector carries both the GPS signal to the Navigation unit and the 5 volt power to the LNA.

The radiator element and preamplifier are housed in a water-tight round-shaped plastic radome that is mounted on top of the 1.5-meter pole. The antenna is equipped with a mounting flange at the lower end of the pole.

GPS Processor

GPS Processor is a subsystem that calculates wind information from the GPS data processed and transmitted by the radiosonde. The GPS processor uses the GPS Remote (from sonde) and GPS Local (received at the station) signals for calculating the wind solution.

The Vaisala GPS wind finding system uses a commercial Coarse Acquisition (C/A) code correlating receiver for the positioning and possible navigation of the sounding station. The GPS sonde uses a codeless technique to observe the GPS satellites. The wind finding is based on satellite Doppler frequencies observed by the radiosonde.

Determining the wind velocity (speed and direction) is based on the measurement of the Doppler shift on the GPS satellites' 1575 MHz L1 carrier frequency. The Doppler shift is caused by the relative movement between the sonde and the satellites. The value of the Doppler shift (typically +/- 5kHz) is calculated and sent by the radiosonde to the sounding station along with the measured PTU information.

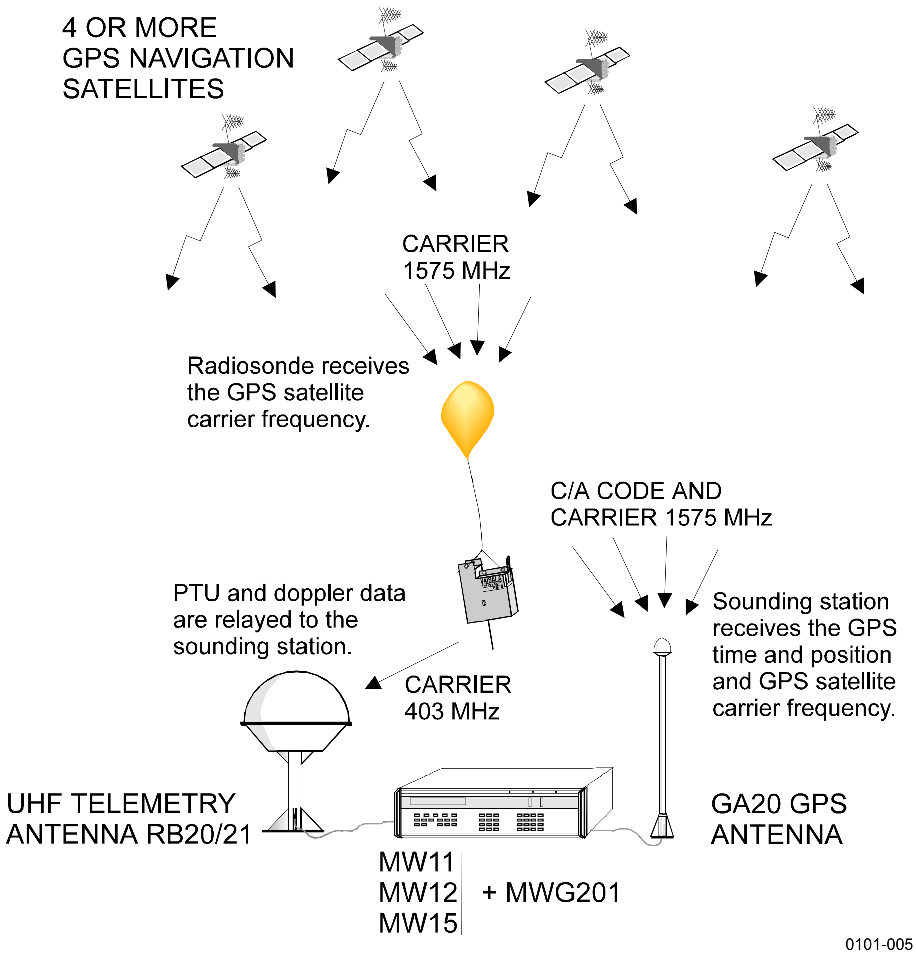


Figure 5 GPS Signal Reception

The value of the remote Doppler shift is compared to the local Doppler shift measured at the sounding station. The sonde and the GPS receiver must be able to receive at least four satellites' L1 simultaneously to attain an accurate wind solution. These correspond to the x, y and z coordinates of the sonde velocity and the receiver clock drift.

Main Processor Unit

The function of the Main Processor Unit (MPU) is to manage real time operation of the modules and to perform higher level data processing such as:

- management of communication between modules,
- higher level data quality control, and
- data formatting for output and transmission.

The MPU uses a 16-bit microprocessor with co-processor and 2 Mbyte RAM. All application programs are executed in the RAM of MPU. Untreated, raw data from the receiver processor is also collected to the MPU for further computation.

EEPROM storage is provided for instrument related steering parameters of the SYSGEN program. The parameters are modified by a program module which writes into the EEPROM data such as the station number, location and altitude, data editing limits, automatic operating sequences, and system specifications. Both instrument related and program related parameters can be entered. This makes it possible to tailor the system for special purposes.

The application programs are permanently stored in program circuits of the MPU. Maximum storage capacity is 3 Megabytes. The board may be re-equipped as needed by inserting new program circuits on the board.

The system time base is obtained from the real time clock circuit of the MPU.

The MPU is connected to other units over serial channels to make fault localization easy and to provide modularity.

Main Functions of the Main Processor Unit

1. Error message handling and diagnostic analysis

   The Main Processor Unit monitors the operation of the processor boards by sending a message to the console upon detecting an error. The MPU reads and analyses error maps from other processor boards. If an error occurs, control is taken over by the error message handler.

2. Console command handling

   The MPU interprets commands given via console to application programs and to other processor boards.

3. Data handling and operational control

   Untreated, raw data is transferred by the MPU from the receiver for processing, editing and smoothing programs. The MPU also detects balloon launch and balloon burst.

4. System configuration

   Many system control parameters can be changed with the SYSGEN program stored on the MPU.

5. I/O control

   The MPU coordinates data input/output to I/O devices such as printer and personal computer.

6. Operator guidance procedures

   The Main Processor Unit provides menu-driven operation and sounds alarms.

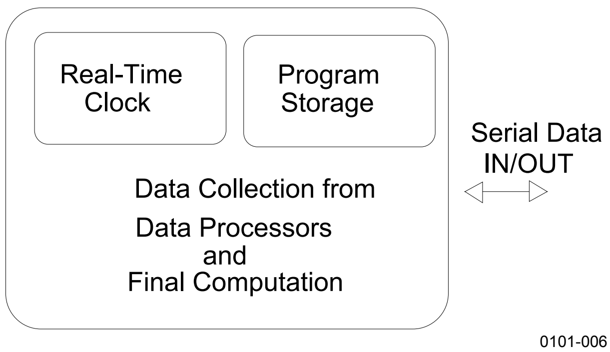


Figure 6 Operating Principle of the Main Processor Unit

Operator Console

The operator console consists of the following functional blocks:

- Console processor including display
- Membrane keyboard
- Paper tape reader
- Loudspeaker

The console processor board is placed behind the operator keyboard. It controls the display, keyboard, tape reader and indicator functions. It is connected via serial channels to the main processor and receiver processor.

The membrane keyboard is used to enter operator commands and data. A two-line display is used for data and menu commands. The paper tape reader is of optical type. The punched tape is fed in manually to the reader to enter the radiosonde-specific calibration coefficients.

Power Supply

The sounding instrument can be connected to 115/230 VAC power outlets. In addition, it can be operated from 18*58 VDC sources. Filters eliminate interference in supply voltage. In the event of mains power break, the internal battery automatically begins to supply power to the instrument. The minimum back-up time from the internal battery is for 2 minutes. The internal battery is recharged automatically.

The power supply consist of the main power supply and DC/DC converters. The main power supply produces the input voltage for the DC/DC converters, which in turn supply the other units.

This page intentionally left blank.

CHAPTER 3

TECHNICAL SPECIFICATIONS

This chapter provides the technical data of the DigiCORA and MARWIN.

NOTE	Where differences exist between specifications for DigiCORA and MARWIN, values for MARWIN are given in brackets [ ].

Table 2 General Specifications

Property	Description / Value
Radiosonde Compatibility	Vaisala RS80 Series Radiosondes (including additional sensors)
Radiosonde ground check	Optional (with ground check set)
Wind measurement methods	Multifrequency VLF-Navaid (Communications VLF, Alpha, Loran-C), GPS. **Note:** Available wind measurement methods depend on the system setup.
System architecture	Multi-processor system with serial interconnections
Operation control	Menu-driven keyboard
Power consumption (maximum)	150 [130] W
Mains connection	115/230 V +15 %, - 25 %, 50/60 Hz +/-5 Hz
DC power connection	18 to 58 V, 130 W
Minimum external DC voltage to prevent internal batteries from discharging	+26 V
Operating temperature (indoor eqpt.)	0 to +50 [+55] °C
Operating temperature (outdoor eqpt.)	-40 to +55 ° C
Storage temperature	-30 to +60 °C
Operating humidity (indoor eqpt., continuously powered)	0 to 100 % RH
Operating humidity (outdoor eqpt.)	0 to 100 % RH, non-condensing

Property	Description / Value
Cabinet measurements	Height 580 [405] mm Width 580 [585] mm Depth 445 [410] mm
Cabinet construction	Polyurethane case with hinged card frame and hinged front door [Aluminum case with removable cover and card frame]
Weight (excl. antennas)	45 [29] kg
Internal uninterrupted power supply, duration	2 minutes
Cooling	Forced, closed-circuit internal ventilation with heat exchanger [Forced filtered ventilation]
Shock absorbing buffers	Optional [provided]

Table 3 Receiver URR

Property	Description / Value
Frequency range	400 to 406 MHz
Antenna input impedance	50 Ω
Modulation type	FM
Intermediate Frequencies (IF)	10.7 MHz and 455 kHz
IF bandwidths (selectable)	300 kHz or 20 kHz (shown as Wide and Narrow in the TELEM display)
Sensitivity, narrow band, 3 kHz deviation	-110 dBm/-114 dBm with RB21
Sensitivity, wide band, 30 kHz deviation	-100 dBm/-104 dBm with RB21
Telemetry range	Up to 200 km with RB21 directional antenna
Frequency search and locking in on received signal	Manual/Automatic
Direction search of received signal	Manual/Automatic
Automatic Frequency Control	Provided
Telemetry display	Digital for frequency, field strength and direction

Table 4 PTU Measurement

Property	Description / Value
Frequency range	PTU 7*10 kHz (3 dB) Additional radiosonde sensors Bell 103 Standard (2025/2225 Hz)
Data conversion to meteorological parameters	Provided, fully automatic
Sampling rate	According to sonde cycle, within 0.5 to 2.5

Table 5 Data Input

Property	Description / Value
Entry of radiosonde calibration data	By optical paper tape reader or through keyboard
Radiosonde ground check	Optional, manual entry of PTU reference data readings

Table 6 Data Output

Property	Description / Value
Pressure measurement range	1060 to 3 hPa
Pressure measurement resolution	0.1 hPa
Temperature measurement range	+60 to -90 °C
Temperature measurement resolution	0.1 °C
Humidity measurement range	0 to 100 % RH
Humidity measurement resolution	1 % RH

Table 7 VLF NAVAID and LORAN-C Wind Finding

Property	Description / Value
VLF-NAVAID Processor MWV201 Frequency Range	10 to 30 kHz in VLF mode 95 to 100kHz in Loran mode
Digital Signal Processor	TMS 320C40, 50 MHz clock
Digital to Analog conversion	16-bit/ 100kHz in VLF mode 12-bit/ 400kHz in Loran mode
Control Processor	16-bit Processor with Flash type Program memory

Table 8 GPS Wind Finding

Property	Description / Value
GPS Processor	MWG210
Local GPS receiver	12-channel Navigation Unit
Remote Signal format	BELL 202 or Vaisala FSK
Control Processor	16-bit Processor with Flash type Program memory

Table 9 Main Processor Unit MPU

Property	Description / Value
Processor types	Intel 80C186 and 80C187 (or compatible 16-bit processor)
Clock frequency	16 MHz
Memory capacity	Dynamic RAM 2 Mbytes EEPROM 128 kbytes EPROM 128 kbytes
Program storage capacity	EPROM/FLASH 3 Mbytes (max.)
Calendar clock	Date and time, 10-year battery back-up

Table 10 Built-in Operator Console MWS

Property	Description / Value
Alphanumeric display	2 lines, 40 chrs/line
Sonde calibration tape entry	8 channel, optical paper tape reader
System control	Power On, Power Off, and Reset
System status indicators	Standby, Power on, Error and OK
Keyboard	Membrane switch matrix panels with audible indication of data entry, including display and antenna/cursor control.
Audio monitoring (loudspeaker)	PTU signals. Membrane switch volume control

Table 11 Output Options

Property	Description / Value
Interface types	RS-232C (5 channels) RS-422 (1 channel)
Data codes	ASCII and CCITT-2

Measurement Precision

Following data are based on the twin-ascent method: two Vaisala Series RS80 radiosondes are suspended from one balloon and tracked by two independent receiving systems. Standard deviation of differences is obtained after a number of ascents.

Table 12 Measurement Precision

Property	Description / Value
Pressure measurement precision (1060 to 3 hPa)	0.5 hPa
Temperature measurement precision	0.2 °C
Humidity measurement precision	3 % RH
Total precision at 100 HPa (constant pressure level)	10 gpm
Total precision at 50 HPa (constant pressure level)	15 gpm
Total precision at 20 HPa (constant pressure level)	20 gpm
Wind vector measurement precision	1 m/s typical (VLF-Navaid) 0.7 m/s typical (Loran-C)

Standard MW12A Configurations

MARWIN MW12A is manufactured in three standard configurations for different wind finding situations: MW12AGV, MW12AG and MW12AV.

MW12AGV contains both GPS and Loran-C/Alpha/ComVLF wind finding capabilities. Its product structure includes the following:

Software version label

MW12 BASE

- frame (MWF12F), console (MWK14A)
- UPP20A + URR20, MPM20, MPU13
- mains cables and fuses for 115 and 230 VAC
- serial cable, printer cable
- software: SYSGEN, LIST, STATUS, PCSERV, ADDOUT, MFSERV

STANDARD ITEMS

- MWV201 + software
- MWG210 + software
- SOND, TEMP, PILOT, RESEARCH, SIMUL, FORMOUT, METPAR, SIGPAR, COMPAR, GPS wind, VLF wind
- User's Guide

OPTIONS

- country-specific TEMP, SOND or PILOT
- NATOSTANAGS
- LOADMSG and SAVEMSG
- EACMM
- REFI
- Dornier DCP
- Service Manual

MW12AG is the standard product for GPS wind finding. Its configuration is similar except that it has no MWV201 VLF-Navaid Processor Unit.

MW12AV is for VLF-Navaid use (Loran-C plus Alpha & ComVLF if available). The configuration differs from that of the MW12AGV in that it has no MWG201A GPS Processor Unit.

Software that was previously sold as optional is now standard. This applies to software such as RESEARCH, SIMUL, SIGPAR, COMPAR and FORMOUT. The product structures also contain both 230 and 115 VAC fuses and power cables as standard.

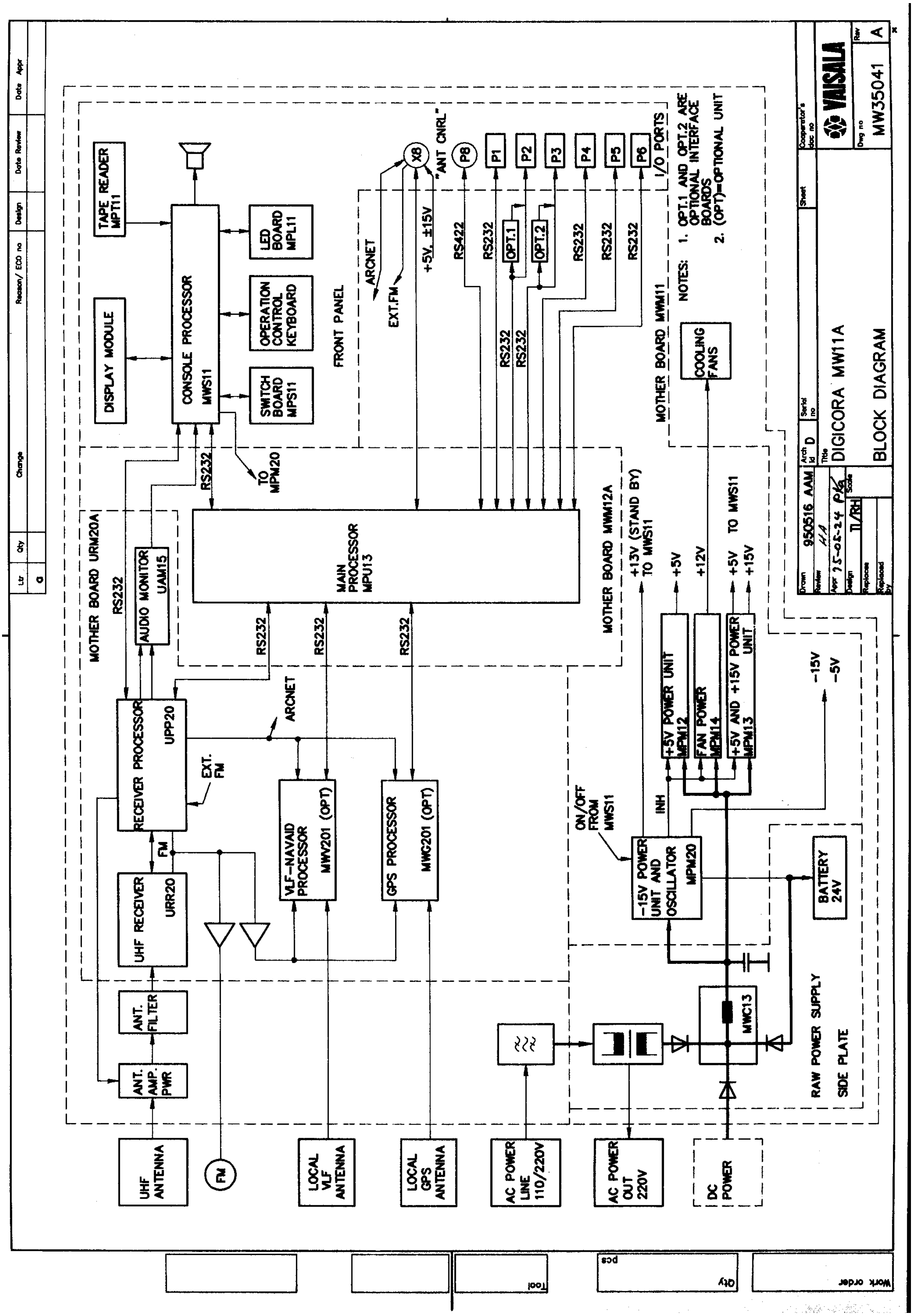
CHAPTER 4

DIAGRAMS AND BOARD LAYOUTS

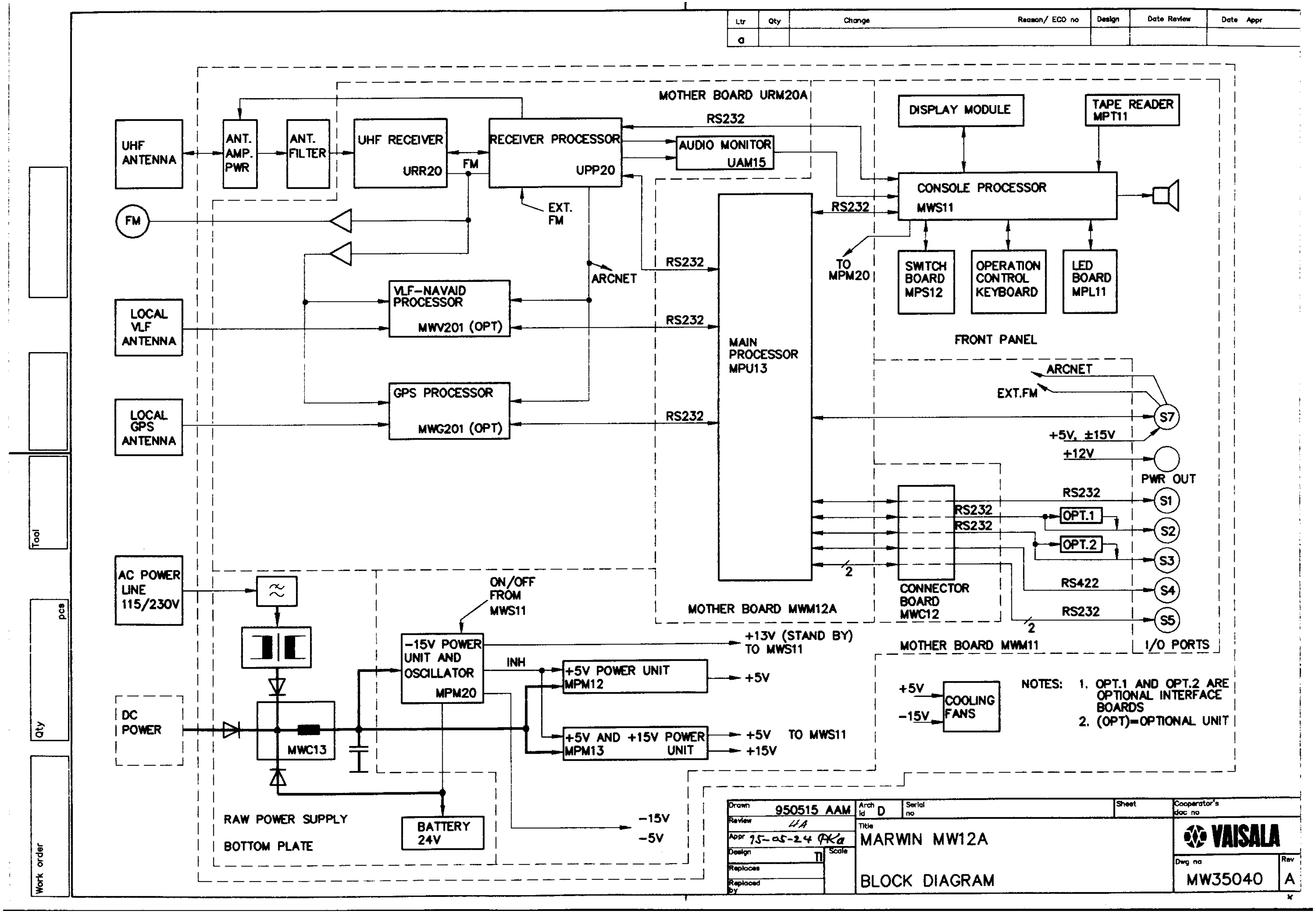
This chapter lists the diagrams and board layouts.

Table 13 List of Diagrams and Board Layouts

Description	Picture Code
DigiCORA MW11A Block Diagram	MW35041
MARWIN MW12A Block Diagram	MW35040



DIGICORA MW11A
BLOCK DIAGRAM
VAISALA
MW35041
950516 AAM
TAPE READER MPT11
DISPLAY MODULE
CONSOLE PROCESSOR MWS11
LED BOARD MPL11
OPERATION CONTROL KEYBOARD
SWITCH BOARD MPS11
FRONT PANEL
TO MPM20
ARCNET
EXT.FM
+5V, ±15V
"ANT CNRL"
X8
P8
P1
P2
P3
P4
P5
P6
I/O PORTS
RS422
RS232
OPT.1
OPT.2
NOTES: 1. OPT.1 AND OPT.2 ARE OPTIONAL INTERFACE BOARDS
2. (OPT)=OPTIONAL UNIT
MOTHER BOARD MWM11
COOLING FANS
MOTHER BOARD URM20A
AUDIO MONITOR UAM15
MAIN PROCESSOR MPU13
MOTHER BOARD MWM12A
+13V (STAND BY) TO MWS11
+5V
+12V
+5V TO MWS11
+15V
RECEIVER PROCESSOR UPP20
VLF-NAVAID PROCESSOR MWV201 (OPT)
GPS PROCESSOR MWG201 (OPT)
+5V POWER UNIT MPM12
FAN POWER MPM14
+5V AND +15V POWER UNIT MPM13
-15V
-5V
ON/OFF FROM MWS11
INH
-15V POWER UNIT AND OSCILLATOR MPM20
BATTERY 24V
UHF RECEIVER URR20
FM
ANT. FILTER
ANT. AMP. PWR
MWC13
RAW POWER SUPPLY
SIDE PLATE
UHF ANTENNA
LOCAL VLF ANTENNA
LOCAL GPS ANTENNA
AC POWER LINE 110/220V
AC POWER OUT 220V
DC POWER


UHF ANTENNA
FM
LOCAL VLF ANTENNA
LOCAL GPS ANTENNA
AC POWER LINE 115/230V
DC POWER
ANT. AMP. PWR
ANT. FILTER
UHF RECEIVER URR20
FM
RECEIVER PROCESSOR UPP20
EXT. FM
ARCNET
MOTHER BOARD URM20A
RS232
AUDIO MONITOR UAM15
VLF-NAVAID PROCESSOR MWV201 (OPT)
GPS PROCESSOR MWG201 (OPT)
RS232
RS232
RS232
RS232
MAIN PROCESSOR MPU13
MOTHER BOARD MWM12A
TO MPM20
DISPLAY MODULE
TAPE READER MPT11
CONSOLE PROCESSOR MWS11
SWITCH BOARD MPS12
OPERATION CONTROL KEYBOARD
LED BOARD MPL11
FRONT PANEL
ARCNET
EXT.FM
+5V, ±15V
+12V
PWR OUT
S7
RS232
RS232
RS232
OPT.1
OPT.2
RS422
RS232
S1
S2
S3
S4
S5
2
2
CONNECTOR BOARD MWC12
MOTHER BOARD MWM11
I/O PORTS
ON/OFF FROM MWS11
-15V POWER UNIT AND OSCILLATOR MPM20
+13V (STAND BY) TO MWS11
INH
+5V POWER UNIT MPM12
+5V
+5V AND +15V POWER UNIT MPM13
+5V
+15V
TO MWS11
MWC13
-15V
-5V
RAW POWER SUPPLY
BOTTOM PLATE
BATTERY 24V
+5V
-15V
COOLING FANS
NOTES: 1. OPT.1 AND OPT.2 ARE OPTIONAL INTERFACE BOARDS
2. (OPT)=OPTIONAL UNIT
Ltr Qty Change Reason/ ECO no Design Date Review Date Appr
a
Drawn 950515 AAM
Review ЦА
Appr 15-05-24 PKa
Design
Replaces
Replaced by
Arch Id D
Serial no
Sheet
Scale
Title MARWIN MW12A
BLOCK DIAGRAM
Cooperator's doc no
VAISALA
Dwg no MW35040
Rev A
Work order
Qty
pcs
Tool