spica

DOG20

Time & Attendance Terminal

Technical Reference Manual

Doc No: DOG20-MAN-ENG
Version: 1.2
Date: 13/03/06

HARDWARE WARRANTY STATEMENT

SPICA INTERNATIONAL WARRANTS TO REPAIR OR REPLACE ANY MANUFACTURING DEFECTS, FAULTS OR PRODUCT DEFECTS ARISING FROM MATERIAL DEFECT OR WORKMANSHIP WITHIN PERIOD SPECIFIED BY STATUTE, AT ITS OWN COST AND IN THE HEADQUARTERS OF OUR AUTHORISED REPAIR SERVICE. IF THE SERVICE REPAIR PERIOD EXCEEDS 10 DAYS, THE WARRANTY PERIOD WILL BE EXTENDED FOR THE TIME OF REPAIR.

THE WARRANTY DOES NOT INCLUDE:

- FAULTS CAUSED BY NON-COMPLIANT OR IMPROPER INSTALLATION
- FAULTS CAUSED BY UNAUTHORIZED OR NEGLIGENT PRODUCT USAGE
- FAULTS CAUSED BY USAGE THAT DOES NOT CONFORM TO THE INSTRUCTIONS OF USE
- FAULTS CAUSED BY INSUFFICIENT PRODUCT MAINTENANCE
- FAULTS CAUSED BY UNAUTHORIZED MODIFICATIONS
- MECHANICAL FAULTS, CAUSED BY THE USER
- FAULTS CAUSED BY POWER LOSSES OR FLUCTUATIONS AND LIGHTNING
- FAULTS CAUSED BY EXTREMES OF TEMPERATURE OR HUMIDITY
- FAULTS CAUSED BY RUNDOWN BATTERIES
- FAULTS CAUSED BY ACCIDENTS, DISASTERS (FIRE, EARTHQUAKE, WAR...)

THIS WARRANTY DOES NOT APPLY TO COMPONENT PARTS, SUBJECT TO CONSTANT WEAR AND TEAR (PRINTHEADS, TAPES,...). THE WARRANTY WILL BE VOID IN CASES OF UNAUTHORIZED ATTEMPTS TO DISASSEMBLE OR MODIFY THE PRODUCT.

PRODUCT'S LIFE EXPECTANCY IS 5 YEARS.

WARRANTY PERIOD: 12 MONTHS FOLLOWING THE DATE OF THE DELIVERY TO THE ORIGINAL PURCHASER, BUT NO MORE THAN 13 MONTHS FROM THE DATE OF DELIVERY TO THE AUTHORIZED DEALER.

THIS WARRANTY IS EFFECTIVE UPON A RECEIPT OF THE WARRANTY CARD AND INVOICE.

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1 Inroduction

1.1 About the manual

DOG20 Technical Reference Manual is divided in two main sections: **Installation and Setup Instructions** and **User Instructions**.

The first section (Installation and Setup Instructions) is mainly intended for technical personnel. Here they will find information on terminal installation and maintenance. Some parts of this section are useful also for the end user's authorized person, especially the part, describing terminal with fingerprint reader. The second section (User Instructions) is intended for the end user, describing terminal usage, its operating principles and parametrising.

1.2 General

DOG20 terminal is designed for use in Time & Attendance applications. The basic function of the terminal is to receive users' bookings and transmit them to the host for further processing.

DOG20 can operate on-line or off-line, and it switches between these two modes automatically, depending on the host availability.

Using built-in ID card reader and function keys, the users can record various pre-defined events.

Proximity version offers comfortable usage with no physical contact, which is especially convenient in harsh and security critical environments.

Proximity terminal

Direction sensitive swipe reader (magnetic) enables fast and accurate clocking of the two most frequent events (arrival/departure) even without key usage.

Magnetic terminal

For higher security demands a fingerprint reader can be built-in in the terminal as a supplement or alternative to ID cards.

Terminals with Fingerprint Reader

1.3 Product Coding Principles

DOG20 terminal models vary in:

- The type of the built-in ID card reader,
- Options.

Therefore the full product code of a terminal consists of a generic name (**DOG20**) followed by codes that denote: the reader type, connectivity and options. The order of appearance is fixed as shown below:

DOG20 - R - O

DOG20 - generic name
R - reader type
O - options

The tables below show possible variants appearing in these fields.

Reader type	R
Proximity (Indala reader)	P
Proximity (H4000 reader)	H
Proximity (Mifare reader)	F
Proximity (Legic reader)	L
Magnetic	M

Option	O
Ethernet interface 10BaseT	E10
Ethernet interface 100/10BaseT	E100
Fingerprint identification reader	FIB
Fingerprint verification reader	FVB

Example:

a) **DOG20-M-E100** would be a terminal with a magnetic stripe reader and Ethernet interface

b) **DOG20-P-FIB-E100** would be a terminal with Indala proximity reader, with fingerprint identification reader, and Ethernet interface.

1.4 Technical specifications

Display	LCD supertwist, 2 lines by 20 characters, char. dimensions 9.66 x 6 mm, LED backlit
Keypad	Integral polycarbonate membrane, 20 keys
ID Card Reader	Proximity readers Frequency: 125kHz (Indala, H4000) 13.56MHz (Mifare, Legic) Reading range: up to 10 cm, Magnetic reader ISO track 2, Lo-Co or Hi-CO
Fingerprint identification reader (FIB)	Capacitive sensor 13mm x 13mm **1:1 mode:** 4000 templates, Verification / Enrollment time < 1s, EER (FAR=FRR) = 0,1% **1:N mode:** 500 templates, Identification / Enrollment time < 2s, FAR= 0,2% , FRR = 1%
Fingerprint verification reader (FVB)	Capacitive sensor 9.75mm x 9.75mm, 1:1 mode 4000 templates, Verification / Enrollment time < 1s, EER (FAR=FRR) < 0,1%
Memory	4000 user records, 3200 bookings
Clock	Real time clock/calendar, tolerance 10 ppm, stability +10/-120 ppm
Party Line Interface	RS-485 (party line), optically isolated, SDLC, 15.6 - 187.5 Kbaud, max. 32 terminals per segment, max. segment length about 1200 m
Serial Interface	RS-232 (data only) or RS-422, 300 - 57600 baud
Network Interface	Ethernet, 100/10BaseT, TCP/IP
Auxiliary interface	RS-232 (data only) , 300 - 57600 baud
Door Control	Two relay output (max. 150V, 2A), Two opto-coupled inputs (active or passive)
Power supply	230V AC, consumption less than 10VA
Environment	Operating temperature: 0°C to +50°C, Storage temperature: -20°C to +70°C, Humidity: 10% to 90% (non condensing)
Approvals	89/336/EEC, 73/23/EEC , CE marking
Physical	220mm (W), 245mm(H), 85mm(D),weight app. 1500 g

1.5 Declaration of conformity

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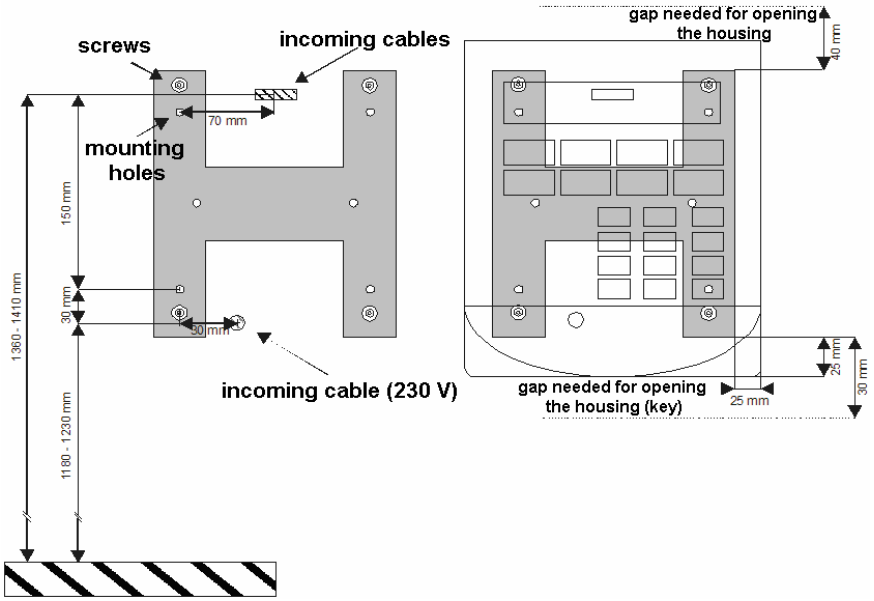
EC Declaration of Conformity

Manufacturer:	**Špica International d.o.o.** **Pot k sejmišču 33** **1231 Ljubljana** **Slovenia**
Details of electrical equipment:	
Model numbers:	**DOG20**
Description:	**Time&Attendance Terminal**
Directives this equipment complies with:	**89/336/EEC – Electromagnetic Compatibility (EMC)** **73/23/EEC – Low voltage equipment (LVD)** **1999/5/EC – R&TTE Directive (R&TTE)**
Harmonised Standards applied in order to verify compliance with directives:	
EMC	**EN 55022:1998+A1:2000+A2(2003) (CLASS A); EN 61000-3-2:2000; EN 61000-3-3:1995+A1:2001; EN 55024:1998+A1:2001+A2:2003; EN 61000-6-2:1999;**
LVD	**IEC 60950-1:2001 (1st Edition) and/or EN 60950-1:2001**
R&TTE	**EN 300 330-2:2001, R&TTE Dir. 1999/5/EC**
Notified body involved:	SIQ, Tržaška cesta 2, SI-10000, Ljubljana
Test Reports issued by:	SIQ, Tržaška cesta 2 SI-1000 Ljubljana Report ref. No: T223-0229/05 of 2005-12-05 T251-0305/05 of 2005-10-11 T251-0365/05 of 2005-10-12
Technical file held by:	Špica International d.o.o., Pot k sejmišču 33, SI-1231, Ljubljana
Year in which CE mark was affixed:	**2005**
Authorised Signatory	Date of issue: **2005-12-28**
Manufacturer: **Spica International d.o.o.** Name: **Tone Stanovnik, General Manager**	Place of issue **Ljubljana**

2 DOG20 Installation and Setup Instructions

2.1 Terminal mounting



1. Lay all necessary cables for DOG20 terminal. The number of cables and connection method depend on the type of the terminal. For details see the connection diagrams. The cables should protrude from the wall as shown on the figure. The length of the loose ends of the cables protruding from the wall should be at least 300 mm.

2. Mount the enclosed H frame onto the wall using 2 screws as shown above.

3. Place the terminal laying on its rear plate and unlock it using the enclosed key (turn the key 90 degrees clockwise).

4. Push the front plate gently forward app. 1 cm, and then lift it.

5. Disconnect all the cables that connect the front plate to the main board.

6. Take the rear plate carrying the main board, place it over four bolts on the H frame, pull the mains cable through the round hole and all the other cables through the square hole in the rear plate. Bolt the plate using four nuts.

7. Connect all incoming cables following instructions (see connection diagrams).

8. Connect the cables from the front plate back to the main board.

9. Place the front plate slightly above the rear plate positioning it approx. 1 cm higher and slide it downwards into place. Lock the terminal by turning the key 90 degrees counter clockwise.

10. Apply mains 230V supply.

Warning

Make sure the electricity is disconnected when mounting the terminal. A qualified technician should perform any installation, which involves 230V mains.

2.2 Recommended cable types

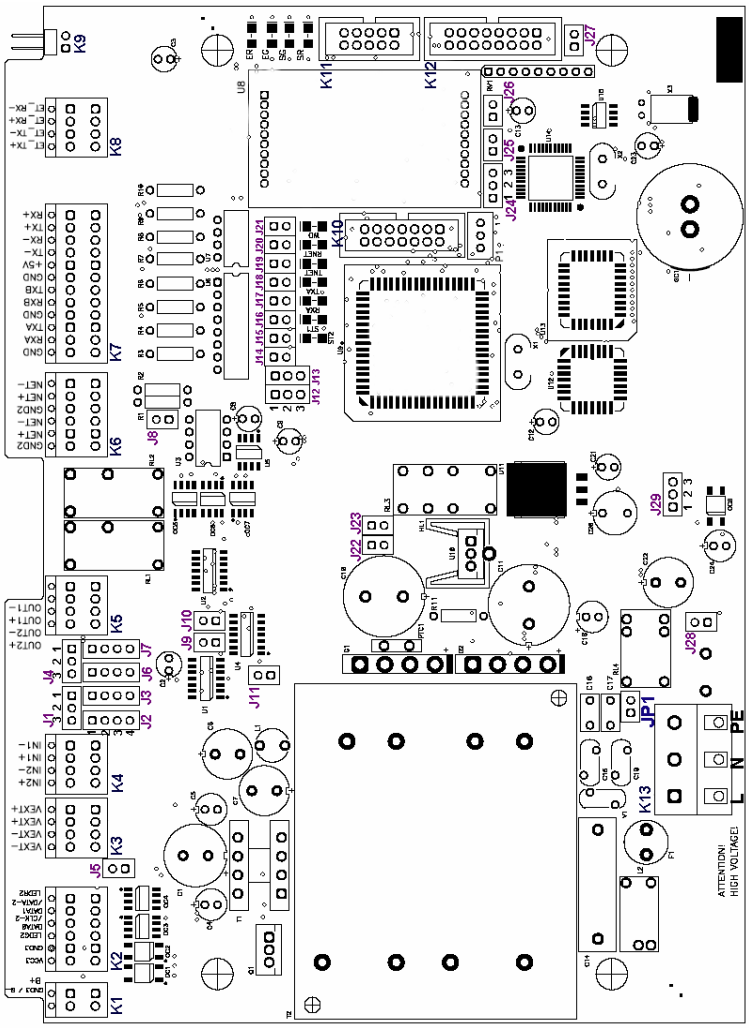
- **Mains cable (230V AC):** PPY 3 x 0.75 $mm^{2.}$
- **Serial cable (RS232 or RS422):** LIYCY 2x2x0.14 mm^2 to 2x2x0.5mm^2, CAT.5 S-UTP, JY(St)Y 4 x 2 x 0.6mm.
- Serial cable connects the host computer (or RS232/RS422 converter) and the terminal.
- **Party line cable:** CAT.5 S-UTP, JY(St)Y 4 x 2 x 0.6mm.
- This cable connects RS485 networked. Normally one twisted pair is in use.
- **Ethernet cable:** CAT.5 UTP.

The RS232 host cable should not be longer than 30m. If the distance between DOG20 and the PC is greater, use RS422 interface.

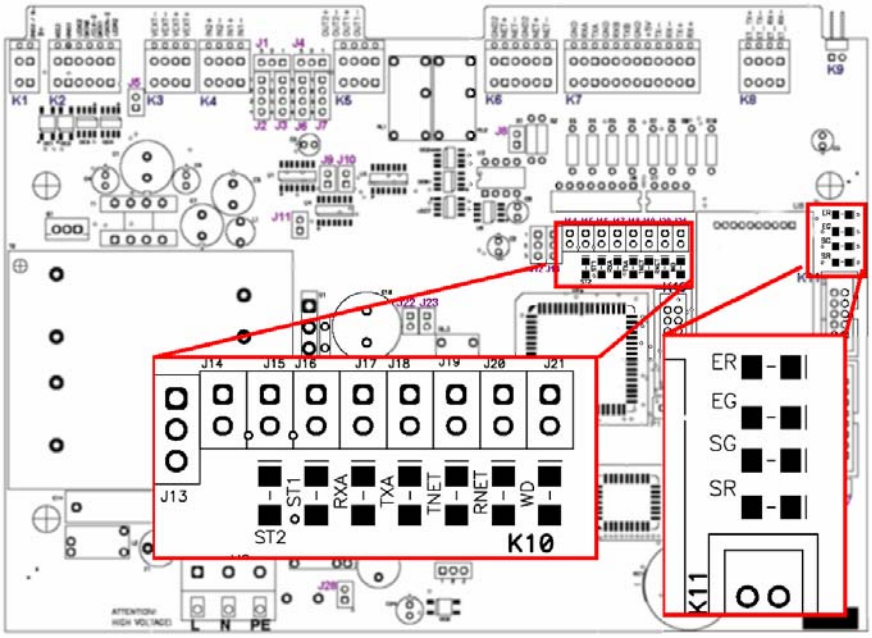
Maximum total length of the party line (the distance between two most distant terminals) is about 1,200 m. Maximum number of DOG20 terminals per one party line is 32.

100 -150 Ω termination resistors should be installed at both ends of the party line.

2.3 DOG20 Main board



A detailed picture of the LED indicator positions on the main board is shown below:



2.4 Connection diagrams

2.4.1 Mains supply

DOG20 terminal requires mains supply (230V AC). For connections use the following table.

DOG20 (Block - Signal name)		Mains supply line
K13 - L	Wire 1 - black	Live
K13 - N	Wire 2 - blue	Neutral
K13 - PE	Wire 3 – yellow/green	Protective Earth

Note! Always install 230V with protective earth cable. If protective earth is not connected, the line filtering does not work properly and damage could be caused to DOG20 terminal and/or any connected device.

For permanently connected equipment, a readily accessible disconnect device should be incorporated in the building installation wiring.

2.4.2 Backup battery supply

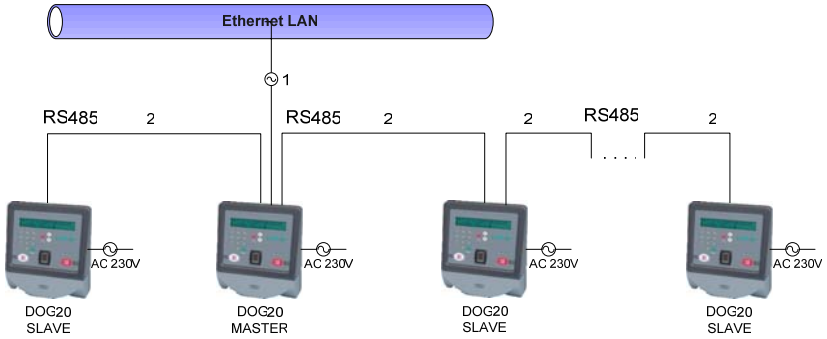
For a continuous operation during main power failures, external backup battery (12V, Rechargeable Sealed Lead Acid Battery) can be connected to the termination block K1 according to the following table.

DOG20 (Block - Signal name)		12V Battery
K1 – B-	Wire 1	Minus pole
K1 – B+	Wire 2	Plus pole

2.4.3 DOG20 segment via Ethernet

For this configuration one terminal should be configured as Master (Connectivity type = Master), and all the others as Slave (Connectivity type = Slave). Master terminal has direct Ethernet connection.

In DOG20 terminal with 10BaseT interface (DOG20-E10) you should connect Ethernet cable into the termination block K8 according to the following table.



DOG20-E10 (Block - Signal name)	1 UTP cable wire (EIA/TIA 568B)	1 UTP cable wire (EIA/TIA 568A)	Network socket RJ45, 10BaseT
K8 –TX+	Orange/white	Green/White	1
K8 – TX-	Orange	Green	2
K8 – RX+	Green/White	Orange/white	3
K8 – RX-	Green	Orange	6

In DOG20 terminal with 100/10BaseT interface (DOG20-E100) there is a standard RJ45 connector as shown in the following table.

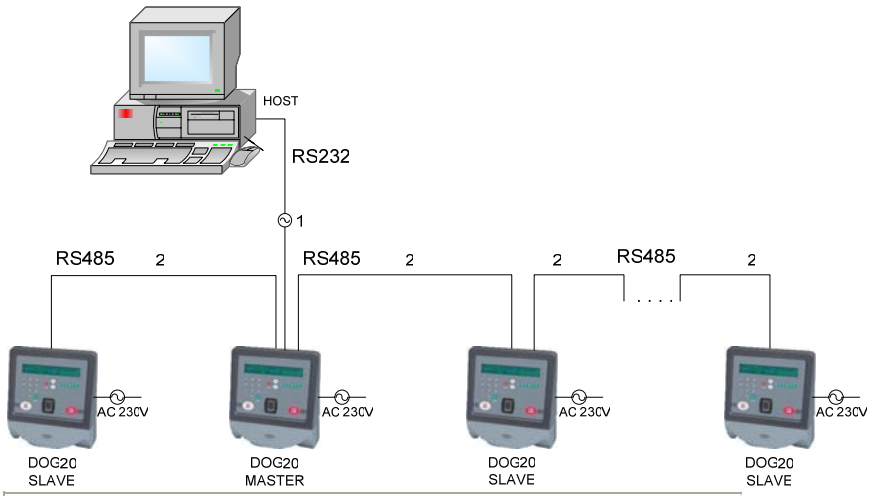
DOG20-E100 RJ45 connector	1 UTP cable wire (EIA/TIA 568B)	1 UTP cable wire (EIA/TIA 568A)	Network socket RJ45, 100/10BaseT
1 (TX+)	Orange/white	Green/White	1
2 (TX-)	Orange	Green	2
3 (RX+)	Green/White	Orange/white	3
6 (RX-)	Green	Orange	6

DOG20 (Block - Signal name)	2	DOG20 (Block - Signal name)
K6 - GND2	Shield	K6 - GND2
K6 - NET+	Wire 1	K6 - NET+
K6 - NET-	Wire 2	K6 - NET-

For connection '2' use wires (wire 1, wire 2) of the same twisted pair. Use cable shield for GND2 connection.

2.4.4 DOG20 segment via RS232

For this configuration one terminal in the segment should be configured as Master (Connectivity type = Master) and all the others as Slave (Connectivity type = Slave). Master terminal has direct RS232 connection to the host PC, therefore it should be placed nearest to the host PC. Namely, RS232 interface could be used for the distances bellow 30m.



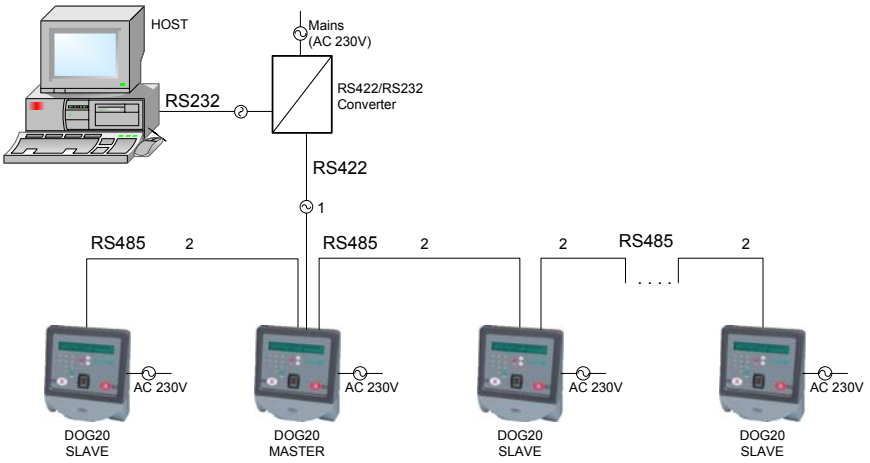
DOG20 (Block - Signal name)	1	PC Com Port, DB9 (Pin - Signal name)
K7 - GND	Wire 1	5 – Signal GND
K7 - RXA	Wire 2	3 – TXD
K7 – TXA	Wire 3	2 – RXD
DOG20 (Block - Signal name)	**2**	**DOG20 (Block - Signal name)**
K6 - GND2	Shield	K6 - GND2
K6 - NET+	Wire 1	K6 - NET+
K6 - NET-	Wire 2	K6 - NET-

For connection ‘1’ connect cable shield on Host PC side to pin 5.

For connection '2' use wires (wire 1, wire 2) of the same twisted pair. Use cable shield for GND2 connection.

2.4.5 DOG20 segment via RS422

For this configuration one terminal should be configured as Master (Connectivity type = Master), and all the others as Slave (Connectivity type = Slave). Master terminal has direct RS422 connection to the host PC, via RS422/RS232 converter.



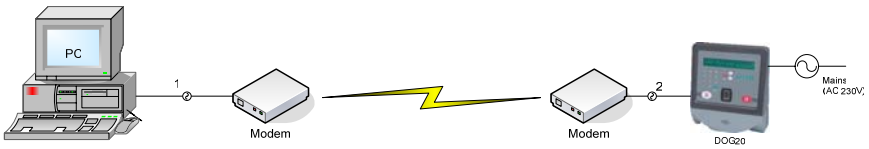
DOG20 (Block - Signal name)	1	RS422/RS232 Converter (Pin - Signal name)
K7-TX-	Wire 1	RX-
K7-RX-	Wire 3	TX-
K7-TX+	Wire 2	RX+
K7-RX-	Wire 4	TX+

Use one twisted pair for wires 1, 2 and the other twisted pair for wires 3, 4.

DOG20 (Block - Signal name)	2	DOG20 (Block - Signal name)
K6 - GND2	Shield	K6 - GND2
K6 - NET+	Wire 1	K6 - NET+
K6 - NET-	Wire 2	K6 - NET-

For connection '2' use wires (wire 1, wire 2) of the same twisted pair. Use cable shield for GND2 connection.

2.4.6 Host connection - DOG20 terminal via dial-up modem



For connection 1 standard modem cable should be used. Connection 2 should be wired according to the following table.

DOG20 Block - Signal name)	2	Modem, DB25F connector (Pin - Signal name)
K7 - GND	Wire 1	7 -Signal GND
K7 - RXA	Wire 2	3 - RXD
K7 - TXA	Wire 3	2 - TXD
	Shield	1 - Frame GND
		4 (RTS) - 5 (CTS) Bridge on connector
		6 (DSR) - 20 (DTR) Bridge on connector

Note: Remote modem should be preset for Auto Answer mode and its DTE speed should be preset according to DOG20 host line baud rate before the operation.

2.4.7 Door control

With its two relay outputs and two digital inputs DOG20 terminal is able to control access on a single access point (door, gate …).

The door lock mechanism can be controlled by either one relay output (single output mode) or two relay outputs (double output mode). In a single output mode the output is activated for each granted door release for a short period of time, as well as during time zones when the door should remain open. In a double output mode the first relay output is activated for each granted door release for a short period of time, while the second relay is active during time zones when the door should remain open.

Which mode should be used depends on lock mechanism type. For example, simple door release requires single relay output mode, while sliding door mechanism typically requires double output mode: one

output for pulse door triggering (single release), one output for continuous door release function. Door control mode is selected within DOG20 setup mode (for details refer to section 2.7).

If door status sensor is used either as a separate unit or as a part of door lock mechanism it should be connected to first input (IN1). Note that N.C. (normally closed) type of sensor has to be used.

If egress button is used it should be connected to second input (IN2). Note that N.O. (normally open) type of egress button has to be used.

The following tables show connection schemes for a single output mode and double mode door control respectively.

Single Output Mode

DOG20 (Block - Signal name)	Door Lock
K5-OUT1+	Door lock, plus pole
K5-OUT1-	Door lock, minus pole
K4-IN1+	Door sensor, plus pole
K4-IN1-	Door sensor, minus pole
K4-IN2+	Egress button, plus pole
K4-IN2-	Egress button, minus pole

Double Output Mode

DOG20 (Block - Signal name)	Door Lock Mechanism
K5-OUT1+	Pulse input, plus pole
K5-OUT1-	Pulse input, minus pole
K5-OUT2+	Continuous door open input, plus pole
K5-OUT2-	Continuous door open input, plus pole
K4-IN1+	Door sensor, plus pole
K4-IN1-	Door sensor, minus pole
K4-IN2+	Egress button, plus pole
K4-IN2-	Egress button, minus pole

Depending on jumper configuration relay outputs can be either active (delivering power) or passive (potential free contact). For more details on jumpers refer to section 2.5. When relay outputs are configured as active

their voltage is 12V DC (unregulated) and maximum total current consumption (sum of both outputs) is 0,75A.

If electrical lock connected to DOG20 relay output has voltage or current demands that exceed above mentioned features, appropriate external power supply should be used and connected to K3 termination block as shown in the following table.

DOG20 (Block - Signal name)	External Power Supply
K3-VEXT-	GND
K3-VEXT+	+VCC

Before connecting external power supply jumpers J22 and J23 must be removed.

2.4.8 External reader

With DOG20 terminals it is possible to connect external reader with DATA/CLOCK or Wiegand interface.

2.4.8.1 External reader with Data/Clock interface

Apply this to the readers with Data/Clock interface like MSR40, HXR08, HXR10, HXR15S, FXR05, LXR15, …

You can connect external reader with Data/Clock interface according to the following table. Depending on reader power supply demands, J29 jumper has to be set accordingly (see section 2.5, describing jumper function).

DOG20 (Block - Signal name)	External reader (Signal name)
K2-VCC3	Vcc
K2-GND3	GND
K2-LEDG2	LED Green
K2-DATA0/CLK-2	CLOCK
K2-DATA1/DATA-2	DATA
K2-LEDR2	Red LED

2.4.8.2 External reader with wiegand interface

This applies to Indala proximity reader PXR10, PXR20..

You can connect external reader with Data/Clock interface according to the following table. Depending on reader power supply demands, J29 jumper has to be set accordingly (see section 2.5 describing jumper function).

DOG20 (Block - Signal name)	External reader (Signal name -wire color)
K2-VCC3	VCC - Red
K2-GND3	GND - Black
K2-LEDG2	GREEN LED - Orange
K2-DATA0/CLK-2	DATA0 -Green
K2-DATA1/DATA-2	DATA1-White
K2-LEDR2	RED LED - Brown

2.5 Jumper settings

DOG20 main board includes two-pin, three-pin and four-pin jumpers. Two-pin jumper can be either ON (installed) or OFF (not installed). Three-pin jumper can be in 1-2 position (jumper on pins 1 and 2), 2-3 position (jumper on pins 2 and 3), or OFF position (no jumper installed). Four-pin jumper can be in 1-2/3-4 position (jumper on pins 1, 2 and 3, 4), 2-3 position (jumper on pins 2 and 3), or OFF position (no jumper installed).

Here are explained jumpers with their functions.

J1 – Normal state selection for relay output OUT2;
1-2 …Normally Closed State
2-3 .. Normally Open State

J2 – Active/passive output selection for relay output OUT2;
1-2/3-4…Active output
2-3 …Passive output
If output is set active you will get voltage on OUT2 when relay is activated. If it is set passive you will get potential free contact on OUT2 when relay is activated.

J3 – Active/passive input selection for digital input IN2;
1-2/3-4…Active input
2-3 …Passive input
Set input active when connecting passive (potential free) sensor, switch or button. Set it passive when connecting active sensor (sensor with voltage output).

J4 – Normal state selection for relay output OUT1;
1-2 …Normally Closed State
2-3 .. Normally Open State

J5 - External reader port interface selection
ON … Wiegand interface
OFF … Data/Clock interface
External reader interface port selection should match to the interface of external reader.

J6 –Active/passive output selection for relay output OUT1;

1-2/3-4…Active output
2-3 …Passive output
If output is set active you will get voltage on OUT1 when relay is activated. If it is set passive you will get potential free contact on OUT1 when relay is activated.

J7 – Active/passive input selection for digital input IN1;
1-2/3-4…Active input
2-3 …Passive input
Set input active when connecting passive (potential free) sensor, switch or button. Set it passive when connecting active sensor (sensor with voltage output).

J8 - RS485 termination resistor (100 Ohm) enable/disable
ON … Termination resistor on
OFF … Termination resistor off
RS485 termination resistors should be enabled on two terminals located on both ends of the party line cable. It should be disabled on all the others.

J9 - Hardware Loader restart
ON … Run Loader and/or remain running it; disable running application program
OFF … Enable running application
On jumper insertion terminal restarts its resident Loader program if it has been already running the application program. As long as the jumper is ON the terminal remains running Loader. One minute after the jumper is removed the terminal will restart application program, if it exists, automatically.

J10 – Application setup
ON … Enter application setup mode
OFF … Normal operation
On jumper insertion terminal enters application setup mode.

J11 - Internal reader port interface selection
ON … Wiegand interface
OFF … Data/Clock interface
Internal reader interface port selection should match to the interface of internal reader.

J12, J13 - Channel selection for secondary RS232 interface
1-2 … service channel on secondary RS232 port

2-3 … auxiliary channel on secondary RS232 port
Set jumper to 2-3 position when fingerprint reader and/or read/write RFID reader is installed in DOG20 terminal. Set it to 1-2 position to download application firmware via service channel.

J14, J15, J16, J19, J20, J21 … Interface selection for host channel
J14 =ON, J21=ON … RS232 interface (K7-TXA, K7-RXA, K7-GND)
J15=ON, J20=ON … RS422 interface (K7-TX-, K7-RX-, K7-TX-, K7-TX+)
J16=ON, J19=ON … Ethernet interface (K8)
Only a single pair of jumpers enabling required interface is allowed to be on.

J17, J18 - Ethernet interface configuration via RS232
ON … Ethernet interface configuration via RS232 enabled
OFF... Normal operation
Set jumpers on only when configuring Ethernet interface of DOG20 via RS232 port (for details see section **Error! Reference source not found.**). Otherwise the jumpers should be OFF.

J22, J23 – Power source selection for Inputs and Outputs
ON … power for inputs/outputs provided by DOG20 internal power supply
OFF … power for inputs/outputs provided by external power supply, connected to K3 termination block

J24 – Ethernet interface watch-dog-timer trigger selection
1-2 … if 10BaseT interface installed (DOG20-E10)
2-3 … if 100/10BaseT interface installed (DOG20-E100)

J25 – Main watch-dog-timer timer enable/disable
ON … main watch-dog-timer enabled
OFF … main watch-dog-timer disabled
Note. Main watch-dog-timer must be enabled for normal operation

J26 – Ethernet interface mode control
ON … put Ethernet interface into programming mode
OFF … normal operation
Upon jumper insertion Ethernet interface enters its internal programming mode required for Ethernet interface configuration via serial interface (for details refer to section **Error! Reference source not found.**). If the jumper is still on when the configuration is finished the Ethernet interface will remain in programming mode. Therefore you should just insert the jumper and remove it immediately. For normal operation the jumper must be off.

J27 – not used

J28 – Start from battery
ON – without mains power (230V AC) the terminal can start from 12V battery
OFF – normal operation
If backup battery is used (connected to K1) the terminal switches to battery power automatically when mains power fails. When the terminal is switched off and you want to restart it from the battery power (no mains supply present) you should just insert and remove the jumper. For normal operation the jumper must be off.

J29- External reader voltage selection
1-2 … 12V DC
2-3 … 5V DC
Note. Check external reader power supply requirements for proper jumper setting.

JP1 – RS485 grounding
ON – GND2 connected to PE (Protective Earth)
OFF – GND2 floating
Jumper connects GND2 to protective earth; via this jumper the party line (RS485) signal ground and consequently all cable shields of party line segment are connected to earth ground. To avoid ground loops this connection should be made at a single point. Therefore, it is recommended that JP1 jumper should be on in DOG20 master terminal only. It should be off in slave terminals.

For a quick reference use the following tables.

Two-pin-jumpers:

	ON	OFF
J5	Wiegand interface for external reader	DATA/CLOCK interface for external reader
J8	RS485 termination resistor on	RS485 termination resistor on
J9	Run Loader	Normal operation
J10	Enter application setup mode	Normal operation
J11	Wiegand interface for internal reader	DATA/CLOCK interface for internal reader
J14,J21	Host channel RS232 interface	Otherwise
J15,J20	Host channel RS422 interface	Otherwise
J16,J19	Host channel Ethernet interface	Otherwise
J17,J18	Ethernet int. programming via RS232	Normal operation
J22,J23	Internal power supply for IN/OUT	External power supply for IN/OUT
J25	Main watch-dog-timer enabled (Normal operation)	Main watch-dog-timer disabled
J26	Ethernet interface programming mode trigger	Normal operation
J28	Start from battery	Normal operation
JP1	RS485 ground connected to PE (Protective Earth)	RS485 ground floating

Three-pin- jumpers:

	1-2	2-3	OFF
J1	Normally closed state for OUT2	Normally open state for OUT2	OUT2 disabled
J2	Normally closed state for OUT1	Normally open state for OUT1	OUT1 disabled
J12,J13	Service channel on secondary RS232 port	Auxiliary channel on secondary RS232 port	Secondary RS232 not used
J24	10BaseT interface installed (DOG20-E10)	100/10BaseT interface installed (DOG20-E100)	No Ethernet interface
J29	12V DC for external reader	5V DC for external reader	No power for external reader

Four-pin- jumpers:

	1-2/3-4	2-3	OFF
J2	OUT2 active	OUT2 passive	OUT2 disabled
J3	IN2 active	IN2 passive	IN2 disabled
J6	OUT1 active	OUT1 passive	OUT1 disabled
J7	IN1 active	IN1 passive	IN1 disabled

2.6 DOG20 system setup

The system setup should be performed at the time of installation. Settings are stored in a non-volatile memory and retained while the terminal is switched off.

There are two ways to enter the system setup mode.

– When in operating mode press ‘,’ (comma) key at least five times in a row and then press ‘2’ key. On *Password* prompt type in Terminal setup password (as defined in Event Collector manager program) finished with Enter key. When you entered Application Setup mode

select *System Setup* command using arrow keys and press Enter to finally enter System setup.

– Run DOG20 Loader program by inserting jumper J9 for a while. Press ‘,’ (comma) key at least five times in a row and then press ‘3’ key to enter System setup.

To perform SETUP procedure, use both arrow keys, key C and key ENTER.

The functions of these keys in the System Setup mode are as follows:

↑ previous item on the menu

↓ next item on the menu

C exit the menu or operation; exit without changing the parameter (escape)

Enter select option or command from the menu; enter the parameter.

Connectivity Type

Default: Master

There are two connectivity types: Master and Slave.

Connectivity type Master should be assigned to the terminal with direct connection with the host computer via Ethernet, RS232 or RS422 interface. Master terminal will also route communication between host computer and up to 31 slave terminals on the party line (RS485) segment. There should be only one master terminal per each party line segment.

On the contrary, assign Slave connectivity to the terminal without direct host connection, which is connected to RS485 party line interface.

In section 2.4 you can read more about DOG20 terminal segment architecture.

Terminal Address

Default: A

Each terminal in the system has its own address. The allowed range for the addresses is 41h to 7Fh (ASCII 'A' to '∆'). Note that every DOG20 terminal in on terminal segment should have unique address.

Host Channel Baud Rate

Default: 57600.

This parameter sets the communication speed of DOG20 host channel. Available values are in the range from 9600 to 57600 bits per second.

Aux Channel Baud Rate

Default: 57600.

Use this parameter to select the communication speed for auxiliary serial channel. Available values range from 9600 to 57600 bits per second.

Aux Channel Parity

Default: None

This parameter sets the type of parity (None, Odd, Even) for the auxiliary serial channel.

Aux Channel Bits

Default: 8

You can set the bit length of the character on Aux Channel. Available values are 5 to 8 bits per character.

Party Line Baud Rate

Default: 62.5K.

This parameter sets the communication speed on RS485 part-line connection between the master terminal and slave terminals within the segment. Values are: 15K, 31K, 62.5K and 187.5K bauds.

Reader 1 Interface

Default: according to installed reader interface

Here you can adapt DOG20 to the interface type of internal card reader. Available options are Wiegand and Data/Clock. Note that beside this setting you should also set jumper J11 accordingly (see section 2.5).

Reader 2 Interface

Default: according to installed reader interface

Here you can adapt DOG20 to the interface type of external card reader. Available options are Wiegand and Data/Clock. Note that beside this setting you should also set jumper J5 accordingly (see section 2.5):

Communication Mode

Default: Basic

You can select between two communication modes: Basic and Advanced Security. Please, note that this setting should match the corresponding communication mode setting within Event Collector Manager program.

RS485 monitor

This is a diagnostic utility used for testing and servicing purposes. It shows the status and quality of the communication between the terminals on the party line RS485 segment.

Since the diagnostic function is different for DOG20 terminals configured as master or slave we will explain the function separately for each connectivity type.

DOG20 set as master: Upon entering the command, you will get the first screen with the general diagnostic information. First line of such a screen contains the addresses of slave devices found (up to twenty). In the second line you can find the state of each slave device.

Possible slave states are:

d - disconnected state; the slave is not responding;

n - normal state; the slave is responding properly.

If master DOG20 doesn't find any slave terminal, **No Slave** message is displayed.

If there are more than twenty slave devices found in the segment, information is displayed on multiple general information screens. To switch from one general information screen to another, depress any key. Depressing any key when displaying the last general information screen will take you to the first detailed information screen. Such screen contains information on up to four slave devices. The information displayed for each slave contains: slave address, its state (**n**ormal or **d**isconnected), no-response counter in the first line and receive error counter and protocol error in the second line. All three counters contain two hexadecimal digits. The meanings of all three counters are as follows:

- no-response counter counts the cycles when the slave terminal doesn't respond to the master's poll,

- receive error counter counts the occasions on which the master terminal received from the slave an invalid, unknown or inconsistent communication packet,

- protocol counter counts the occasions on which the master receives from the slave a communication packet whose sequence number is not as expected.

Depress any key to switch from one detailed information screen to another. Depressing any key when displaying the last detailed information screen will take you back to the first general information screen.

An ideal situation for the testing of the party line communication is when all the slave terminals are in normal state and their error counters are equal (or very close) to zero.

DOG20 terminal set as slave. On the slave terminal, the diagnostic utility contains only one screen with the information of the following format:

a,m **Re**:xx **Ie:**yy **P:**zz

a - the address of the slave terminal;

m - slave communication state (n-normal state, d-disconnected state);

xx - receive error counter;

yy - protocol error counter;

zz - poll counter.

Each counter contains two hexadecimal digits. The meaning is as follows:

- receive error counter counts the occasions on which the terminal received an invalid, unknown or inconsistent communication packet,
- protocol counter counts the occasions on which the terminal received a communication packet whose sequence number is not as expected,
- poll counter counts the incoming polling packets from the master terminal.

An ideal situation for testing the party line communication is when the slave terminal is in normal state, both error counters equal (or very close) zero and the poll counter is incrementing evenly.

2.7 DOG20 Application Setup

Application setup mode is reserved for authorized use only. Use it to set various parameters and values, enrol and check fingerprint template data and to browse through data in the terminal's memory. Some of these parameters and data may be set and downloaded from the host computer as well. It is recommended to use setup mode setting only for the parameters and data, which are not supported by the host software.

Entering the Setup mode

When in operating mode there are two ways to enter application setup mode.

- Press ',' (comma) key at least five times in a row and then press '2' key. On *Password* prompt type in Terminal setup password (as defined in Event Collector manager program) finished with Enter key.
- Insert jumper J10 for a while.

To exit Setup mode press *C* (*Escape*) when in the main menu. The terminal will also reverse to operating mode automatically if idle (no key pressed) for ten minutes.

The table below shows the functions of the keys in the Setup mode.

Key	Description
↑	previous item on the menu
↓	next item on the menu
0-9	entering numeric data
C	exit the menu or operation; exit without changing the parameter (escape)
Enter	select option or command from the menu; enter the parameter.

This section describes setup commands used by DOG20 firmware versions 8.2.

The set of available setup settings and commands differs for DOG20 type regarding fingerprint reader existence, smartcard (read/write) badge reader existence and Ethernet interface existence. Further to that setup commands and settings are explained separately for the following groups:

- Basic commands and settings (all DOG20 types)
- Fingerprint specific commands and settings (DOG20 terminals with fingerprint unit)
- Template-on-card specific commands and settings (DOG20 terminals with fingerprint and smartcard read/write unit)
- Ethernet specific commands and settings (DOG20 terminals with Ethernet interface)

2.7.1 Basic commands and settings

Commands explained in this section are available with all DOG20 terminal types.

2.7.1.1 LCD light saving

Set the automatic switching off of the backlight for the terminal's display. If the parameter is set to Yes, the backlight is switched off one minute after the last transaction, and switched back again at the time of the next clocking or key depressing. This prolongs the life of the display and saves energy. If this parameter is set to No, the display is permanently lighted.

Default: Yes.

2.7.1.2 Language

Choose language for operating mode messages (note that the Setup mode messages are invariably in English).

Default: English.

2.7.1.3 Beeper Sound

Enable or disable DOB20 beeper making beeps at keystrokes, card readings etc.

Default: Yes

2.7.1.4 Keyboard ID

With this setting you can decide if the user can perform identification also by typing his/her badge ID number on DOG20 keyboard. Typically this option is enabled on DOG20 terminals without badge reader and with integrated fingerprint unit.

Default: No

2.7.1.5 Door control mode

With this setting you can decide how to control locking mechanism (door lock, sliding door, barrier…) .

The door lock mechanism can be controlled by either one relay output (single output mode) or two relay outputs (double output mode). In a single output mode the output is activated for each granted door release for a short period of time, as well as during time zones when the door should remain open. In a double output mode the first relay output is activated for each granted door release for a short period of time, while the second relay is active during time zones when the door should remain open.

Which mode should be used depends on lock mechanism type. For example, simple door release requires single relay output mode, while sliding door mechanism typically requires double output mode: one output for pulse door triggering (single release), one output for continuous door release function.

Default: Single output mode

2.7.1.6 Browse transactions

View stored records of bookings and alarm events. When you select this option the transaction last recorded is shown first.

Transaction data are displayed in the following format.

Booking record:

First line: Transaction's sequential index, Badge number

Second line: Event abbreviation, Booking status granted (G) or denied (D), Time/date stamp.

Alarm record:

First line: Transaction's sequential index, Alarm number (A:1 … A:4)

Second line: Alarm status ON or OFF, Time/date stamp

To browse the transactions use both arrow keys.

If there are no transactions stored in the memory, the message reads **No data**.

2.7.1.7 Browse user list

The terminal can keep the list of user authorisation data downloaded from the host. DOG20 terminal uses this list to perform access control arbitration. Each user record consists of the user's badge number, record scope, PIN code, time zone reference numbers, and expiration date (PIN code, time zone reference and expiration data fields are optionally and may not been present in every user records).

After invoking the command (**Id:** prompt) you should enter the desired badge number to view particular user record, or 0 to browse the user record list. User record data are displayed in the following order:

First line: Record's sequential index, Badge number

Second line A: Scope (see explanation bellow), PIN code existence (No, Yes), Badge expiration date, Time Zone existence mark (*)

Second line B: List of assigned Time Zones indexes

Second line A appears first. If displayed user record has got at least one assigned time zone (asterisk mark), then depressing any key (accept arrow keys or key C) will display assigned time zone indexes in the

second line (second line B). Depressing a key again would restore the second line A view.

For record scope there are the following options: R:1 – record valid for internal reader, R:2 – record valid for external reader, R:3 – record valid for both readers).

To browse user records use arrow keys.

2.7.1.8 System setup

Here you can enter system setup mode. You can find details on system setup in section 2.6.1.

2.7.2 Fingerprint specific commands and settings

Commands explained in this section are available with DOG20 terminals equipped with fingerprint unit.

2.7.2.1 FP store

This command is used for the enrolment of finger templates. For fingerprint verification or identification, the terminal must have stored the fingerprint templates of all the persons involved. This template enrolment stage is very important and has great influence on the percentage of later successful verifications. You should therefore carry out the enrolment with utmost care.

Up to two fingerprint templates can be stored for each individual. Usually, only one template is used. Additional fingerprint template may be captured to store the templates of two different fingers per person.

Template enrolment procedure is based on quantified selection of “good enough” fingerprint templates and is performed by an authorized person (administrator).

The procedure starts with entering the number of the person’s ID badge (by reading a badge or typing the number).

After this the terminal asks for finger placement, makes temporary template and displays the results about template quality (Qlt) and content (Cnt). The scope of both parameters is between 0 (very bad) and 100

(ideal). The administrator should now decide whether to keep that template (press A), to repeat the template enrolment (press B), or quit the enrolment procedure (press C). This decision should be based on some common criteria. It is recommended to keep templates whose quality and content parameters reach at least 40. Otherwise, it is better to repeat the fingerprint enrolment procedure. If you cannot get an acceptable template even after retrying two or three times, you should try using some other finger.

After the template is accepted the administrator is prompted ("**Finger number**") to enter the number of the finger used. The number is selected according to the following convention: left hand fingers from small finger to thumb are numbered 0, 1, 2, 3, 4, while right hand fingers from thumb to small finger are numbered 5, 6, 7, 8, 9. The enrolment procedure is now finished.

2.7.2.2 FP verify

Use this command to compare the scanned image with the stored template(s). When the terminal displays "**ID:**" enter the badge number (by reading the badge or typing). Keep placing the finger on the fingerprint sensor and observe the verification score on the display. The scope for score is between 0 (no match at all) to 100 (perfect match). Press any key to finish the verification process.

2.7.2.3 FP identify

This command is available with DOG20 terminal containing fingerprint identification reader (FIB) if biometric mode using identification templates is active. Identification templates is used in the following two modes : "Ident(500)+Ver(500)" and "Ver(500)". For more details about biometric mode see section 2.7.2.9

Use this command to perform fingerprint identification procedure. When the terminal displays "Place finger" you can keep placing the finger on the finger sensor and observe the matching score on the display. In case of positive identification procedure the ID number of identified person and matching score ranging from 50 to 100 is displayed. Otherwise **"Not found"** message is displayed. Press any key to finish the identification process.

2.7.2.4 FP delete

Use this command to delete fingerprint template(s) from the database. Specify the template(s) to be deleted by entering the user's badge number (read the user's badge, or enter it using the keyboard). Note that this command deletes all templates of that user. This command is used when an ID badge is removed from use or assigned to another user.

2.7.2.5 Clear FVB

Warning! This command deletes all templates stored in the database.

2.7.2.6 FVB verification level

This command affects global verification level of fingerprint reader. Verification level specifies how closely should a scanned finger image match the stored fingerprint template(s) at the time of fingerprint verification. There are five possible levels, ranging from 1 (the most strict match) to 5 (the least strict match). False rejection rate – FRR is inversely proportional to the selected value. Accordingly, the FAR (False Acceptance Rate) is proportional to the selected value. Typically, a mean value (3) is selected. At this value both rates (FAR, FRR) should be app. 0.1%.

Note that next to the global verification level, every template has assigned also its own template verification level. With enrolment procedure this one is automatically set to 1 (highest match) but it can be later changed if desired. Verifications procedure always takes higher one (less strict one) of both levels unless template level is set to 0 (wild card template). In this case verification procedure respects template level (0).

2.7.2.7 FVB version

This command displays detailed information on integrated fingerprint reader version.

2.7.2.8 Browse templates

This command is used to view data on stored fingerprint templates. When the terminal displays the "**Id:**" prompt, enter the desired badge

number or 0 (for the start of the list). Each template data is displayed as follows:

First line: Badge number, Template Index (1 or 2)
Second Line: Template verification level (S)

To see some additional data you should depress Enter key. Now you get:

First line: Badge number, Template Index (1 or 2), Template Length
Second Line: Finger identifier (F), Template verification level (S), Template quality (Q), Template content (C).

With arrow keys you can scroll back and forth among stored templates.

You can change template verification level (scope from 1 to 5). You can do this simply by pressing the corresponding numeric key. Next to that you can assign also a special “wild-card” verification level 0 to a template. You should note that verification level 0 means positive verification result with this template for any finger!!!

Note. Use verification level 0 only for so called difficult fingers only, when it is not possible to get good enough template or when FRR rate of a single individual is too high for normal use.

Note. Next to template verification level, global verification level is assigned to the reader. Verifications procedure always takes higher one of both levels unless template level is set to 0 (wild card template). In this case verification procedure respects template level (0).

2.7.2.9 Biometric mode

This command is available with DOG20 terminals equipped with fingerprint identification reader (FIB) in order to select desired biometric mode. There are the following three options:

Ver(4000). In this mode only fingerprint verification (1:1 comparison) is possible. The fingerprint unit can handle with up to 4000 verification templates.

Ident(500) + Ver(500). In this mode fingerprint identification (1:N comparison) as well as fingerprint verification is possible. The fingerprint unit can handle with up to 500 identification templates.

Ver(500). In this mode only fingerprint verification (1:1 comparison) is possible. The fingerprint unit can handle with up to 500 identification templates.

Note. Be aware that changing biometric mode from the mode using verification templates (the first one) to the mode using identification templates (the second and the third one) or vice versa causes the deletion of all existing templates in the fingerprint unit. Therefore you are asked (**"Are you sure? "**) to confirm you really want to do that. To confirm the action depress Enter key, otherwise depress any other key.

2.7.3 Template-on-card specific commands and settings

Commands explained in this section are available with DOG20 terminals equipped with fingerprint unit and smartcard read/write unit.

Note. With DOG20-FIB terminals the biometric mode parameter should be set to Ver(4000) for template-on-card feature. For more details about biometric mode see section 2.7.2.9

2.7.3.1 FP store/card

This command is used for enrolment of finger templates where templates are stored on user's smart cards and not in the reader memory or computer database. Note that template enrolment stage is very important and has great influence on the percentage of successful verifications. You should therefore carry out the enrolment with utmost care.

Using this command on DOG20 terminal one fingerprint template can be stored for each individual on his smartcard. With dedicated enrolment station (VSMART Bioscrypt reader) two fingerprint templates can be stored on the card.

Template enrolment procedure is based on quantified selection of "good enough" fingerprint templates and is performed by an authorized person (administrator).

Before template enrolment, Mifare card has to be formatted using *Format card* command.

First, the terminal asks for finger placement (prompt "**Place finger"**), makes temporary template and displays the results about template quality (Q) and content (C). The scope of both parameters is between 0 (very bad) and 100 (ideal). The administrator should now decide whether to keep that template (press Enter), quit the enrolment procedure (press C), or to repeat the template enrolment (press any other key). This decision should be based on some common criteria. It is recommended to keep templates whose quality and content parameters reach at least 40. Otherwise, it is better to repeat the fingerprint enrolment procedure. If you cannot get an acceptable template even after retrying two or three times, you should try using some other finger.

After the template is accepted the administrator is prompted to enter template verification level (prompt "**Sec. Level"**). You can do it simply by pressing corresponding numeric key 1 to 5. Next to that you can assign also a special "wild-card" verification level 0 to a template. You should note that verification level 0 causes positive verification result of this template with any finger!!! So normally verification level 0 should not be used.

Verification level specifies how closely should scanned finger image match the stored fingerprint template(s) at the time of fingerprint verification. There are five possible levels, from 1 (the most strict match) to 5 (the least strict match). False rejection rate – FRR is inversely proportional to the selected value. Accordingly, the FAR (False Acceptance Rate) is proportional to the selected value. Typically, a mean value (3) is selected. At this value both rates (FAR, FRR) should be app. 0.1%.

After entering verification level the terminal prompts to present ID card for writing template on it (Prompt "**Card"**). Bring ID smartcard close to DOG20 reader and hold it there until template data is written on the card. Template writing progress is indicated by dots appearing on LCD display and finished with **"OK"** message.

If there is already a template on the card, you will get message "**Card memory full".**

If the card is new or unformatted, the terminal will display message "**Invalid card format!".** In this case you have to invoke *Format card* command first.

Note. Use verification level 0 only for so called difficult fingers only, when it is not possible to get good enough template or when FRR rate of single individual is too high for normal use.

Note. Next to template verification level, global verification level is assigned to the reader. Verifications procedure always takes higher one of both levels unless template level is set to 0 (wild card template). In this case verification procedure respects template level (0).

2.7.3.2 FP verify/card

Use this command to compare the scanned image with the template(s) stored on ID card. When you are prompted for card ("**Card!"**) bring the ID card close to DOG20 reader and hold it there until template data is read (app. 1s - 2s). Reading progress is indicated with dots appearing on LCD display. Keep placing the finger on the fingerprint sensor and observe the verification score on the display. The scope for score is between 0 (no match at all) to 100 (perfect match). Press any key to finish the verification process.

2.7.3.3 FP delete/card

Use this command to delete a fingerprint template(s) from ID card. When you are prompted for card ("**Card!"**) bring the ID card close to DOG20 reader and hold it there until template data is deleted (app. 1s). Deleting progress is indicated by dots appearing on LCD display and finished with **"OK"** message.

2.7.3.4 Format card

Before fingerprint template is written for the first time to the new factory default Mifare card the card has to be formatted and secured accordingly.

With this command smartcard sectors' security keys and access rights plus some predefined directory blocks are written to the card to enable the card for template storage and prevent unauthorised access to smartcard data.

When you are prompted for card ("**Card**") bring the ID card close to DOG20 reader and hold it there until formatting procedure is finished (this

takes few seconds). Progress is indicated with dots appearing on LCD display and finished with **"OK"** message.

Important! Smartcard security keys depend on site code parameter, which is defined in Event Collector Manager program. You can use smartcards within the system with the same site code parameter only, as it was when cards were formatted. So be careful with site code setting when performing initial card formatting.

2.7.3.5 Unformat card

This command is used when you want to remove all enrolled data (templates) and card format structure (security keys, access rights, directory data) from the card and make it as factory default. When you are prompted for card ("**Card"**) bring the ID card close to DOG20 reader and hold it there until unformatting procedure is finished (this takes few seconds). Progress is indicated with dots appearing on LCD display and finished with **"OK"** message.

2.7.4 Ethernet specific commands and settings

Commands explained in this section are available for DOG20 terminals with Ethernet interface (E100) installed.

2.7.4.1 Ethernet settings

This command is used to configure DOG20 Ethernet interface. With the command you can set the IP address of the DOG20 terminal and TCP port number for data transfer.

First the terminal displays current IP address so you can change it or keep it unchanged. After depressing Enter key the terminal displays current TCP port number so you can change it or keep it unchanged. After depressing Enter key the terminal resets the Ethernet interface with selected values for IP address and TCP port number. All the other Ethernet interface parameters are reset to their default values according to the bellow list.

If you want to quit the command without changing the Ethernet parameters or resetting Ethernet interface depress C key (escape) two

times, the first time to clear the current entry, and the second time to quit the command.

Default Ethernet interface parameters:

DHCP:	0–Disabled
Transport protocol:	1-TCP
Inband commands:	1-Enabled
Data login:	0-Disabled
Connection timeout:	0-Disabled
Routing mode:	0-Server
Serial interface:	0-Full-duplex
RTS/CTS flow control:	0-Disabled or remote
DTR mode	0-Idle or remote
Baud Rate:	match DOG20 host channel baud rate
Parity:	None
Data bits:	1-8bits
Soft entry into ser. pr. mode	0-Disabled
On the Fly commands:	0-Disabled
Notification bitmask:	0
Max. packet length:	255
Max. intercharacter delay:	1
Start on any char:	1-Yes
Use start-character:	0-No
Start-character (ASCII code):	0
Use stop-character:	0-No
Stop-character (ASCII code):	0
Number of post-characters:	0

2.8 Tibbo Device Server Manager (TDSM)

For standard configuration the DOG20 Ethernet interface should be configured as explained in the section 2.7.4.1. When you want that some parameters differ form their default value you should use TDSM utility program.

Note that local Ethernet interface configuration ("Ethernet settings" command) and remote Ethernet interface configuration using TDSM program will override each other. Therefore it is recommended to use single approach for each terminal.

TDSM utility program supports:

- Ethernet interface configuration and settings over the network with auto discovery feature; note that auto discovery works only within a single network segment (does not work over routers).

- Ethernet interface configuration and settings over the network from the address book; you can create entries in this address book when installing terminals with predefined IP addresses. You should use this type of programming when installing DOG20 terminals in remote network segments (behind the router). Here you have the choice to use either inband (programming using TCP connection) or out-of-band (programming using UDP datagrams) access method.

- Ethernet interface configuration and settings via serial port.

Ethernet interface configuration and settings over the network are performed while being in their normal operating mode (no local action is required).

For Ethernet interface configuration and settings over serial port you should enable PC computer to access serial port of DOG20 Ethernet interface by setting jumpers J17 and J18 to ON and put Ethernet module into programming mode by bridging jumper J26 for a while. The serial cable from the PC should be connected to RS232-A port outlets (termination block K7, outlets GND, RXA and TXA).

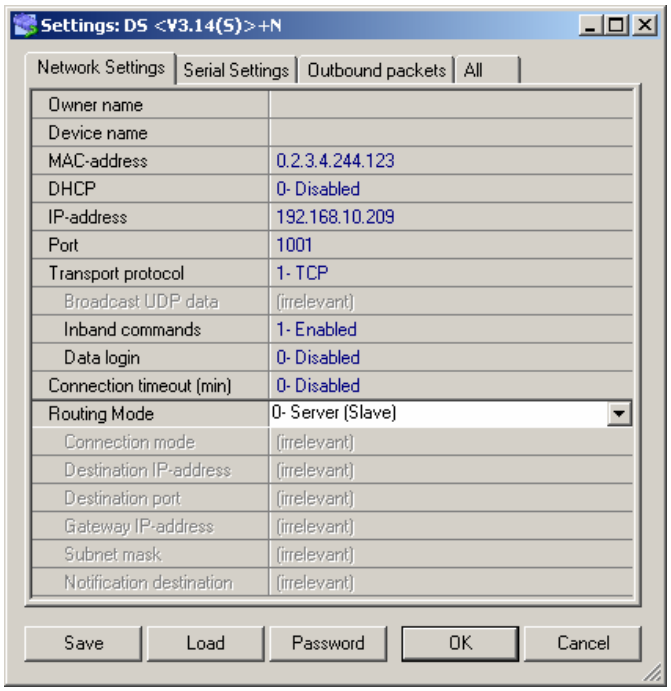
2.8.1.1 IP address setting

Prior performing any other setting, you have to set the IP address of DOG20 terminal. Simply click “Change IP” button and write IP in accordance with your network address.

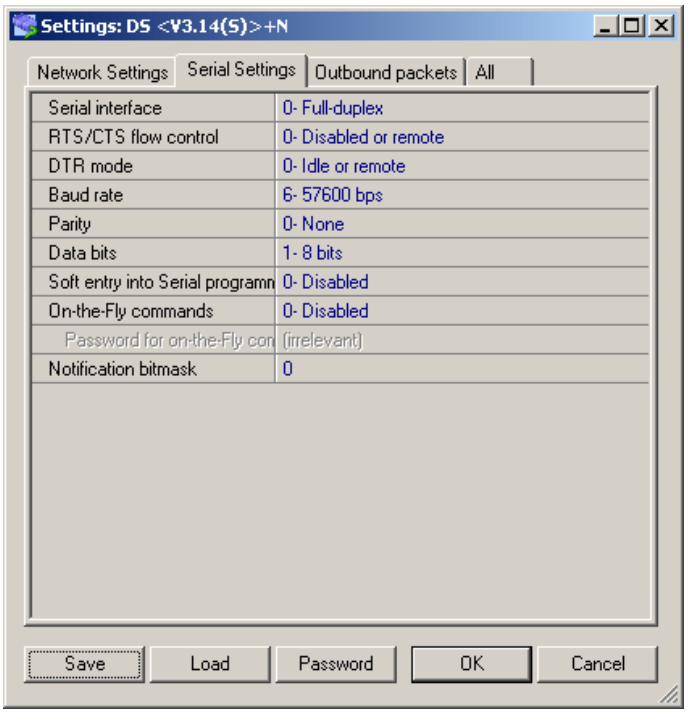
2.8.1.2 Parameter settings

The screenshots bellow show the parameters which could be set with TDSM. On these screenshots standard parameter configuration is shown. Advanced users can customize the configuration according to their specific needs.

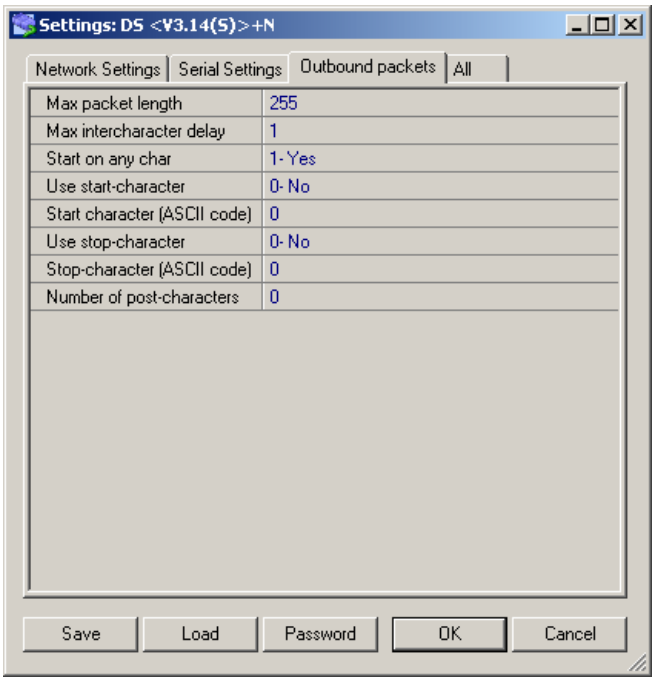
Network settings



Serial settings



Outbound packets



2.9 DOG20 LED indicators

There are eleven LED indicators on DOG20 main board to indicate the status and some activities of the terminal. These are the explanations of their functions:

ST1 indicates Flash EPROM writing (download) is currently on (LED ON). Otherwise LED is OFF.

ST2 indicates application program/loader program status. When application program is running the LED is OFF, when loader program is running it is ON.

RXA indicates incoming traffic on host channel (RS232 or RS422 or Ethernet). It flashes when the terminal is receiving on host channel.

TXA indicates outgoing traffic on host channel (RS232 or RS422 or Ethernet). It flashes when the terminal is transmitting on host channel.

TXNET indicates outgoing traffic on party-line (RS485). It flashes when the terminal is transmitting on party-line.

RXNET indicates incoming traffic on party-line (RS485). It flashes when traffic is indicated on party-line.

WD LED shows the party-line (RS485) status. If DOG20 connectivity is set to slave the indicator shows the party-line status whether the terminal is connected with the master terminal or not. If DOG20 connectivity is set to master, the indicator shows status information of slave terminals.

- DOG20 slave. If terminal is connected (e.g. communication with master terminal is established) the LED flashes slowly within the period of app. 1s (LED-on time and LED-off time app. 0,5s). If the terminal is not connected with the master terminal (e.g. communication with master terminal is not established) the LED flashes fast within the period of app 0,4s (LED-on time and LED-off time app. 0,2s).

- DOG20 master. The LED flashes (LED ON/LED OFF) to indicate status of all possible 64 party-line terminals, e.g. master terminal itself and all possible 63 slave terminals. A cycle starts with LED-off of app. 2s which indicates a cycle start. After that LED flashes appear

sequentially, indicating terminal status starting from terminal with lowest address ('A', 41H) and proceeding to the terminal with highest address ('⌂', 7FH). The whole procedure is repeated periodically. Terminal status of particular terminal is indicated by corresponding LED pulse duration as follows:

- 0,2 s LED pulse – the corresponding slave terminal is not found (it does not exists, it is not connected, it is defective....),
- 0,8 s LED pulse – the corresponding slave terminal is found, iz communicates properly
- 2s LED pulse – the corresponding address belongs to DOG20 master terminal itself.

The pause (LED-off time) between the two consecutive LED pulses is app. 0.2s.

The next four LED indicators show Ethernet line and connection status. In case of DOG20-E10 these LEDs are located on the main board, and in case of DOG20-E100 they are built into RJ45 connector of the E100 module.

ER Ethernet red LED; normally off, blinks to indicate collision error.

EG Ethernet green LED; normally on, blinks when any network packet is received.

SG Status green LED; its function is explained in the table bellow. When in normal mode with established TCP connection, it is on, and only goes off momentarily when Ethernet interface routes a message in either direction (DOG20 to LAN or LAN to DOG20).

SR Status red LED; its function is explained in the table bellow. When in normal mode it is off and blinks on buffer overflow (single blink) or in the case of internal setting error (constantly with 1-second period).

Startup, entering the normal mode	SR and SG LEDs blink three times
Normal mode, setting error, eth. interface halted	SR LED is blinking constantly
Normal mode, LAN or serial buffer overflow	SR LED is continuously ON

Normal mode, DOG20 eth. interface set as server, no connection	SG LED performs double flashes
Normal mode, DOG20 eth. interface set as server, connection established, no routing	SG LED is continuously ON
Normal mode, DOG20 eth. interface set as server, connection established, routing	SG LED is continuously ON, goes OFF for a while when performing routing
Serial programming mode	SG and SR LEDs are blinking (green, red, green, red...)

2.10 DOG20 firmware download procedure

DOG20 keeps its application program (firmware) in internal Flash memory. DOG20 application program can be updated (downloaded) anytime on the field using existing communication infrastructure already established between each DOG20 terminal and host computer (host channel). For these purposes besides the application program there is also a loader program resident in DOG20 Flash memory.

This firmware update feature dramatically simplifies firmware update activities when compared to classic EPROM changes.

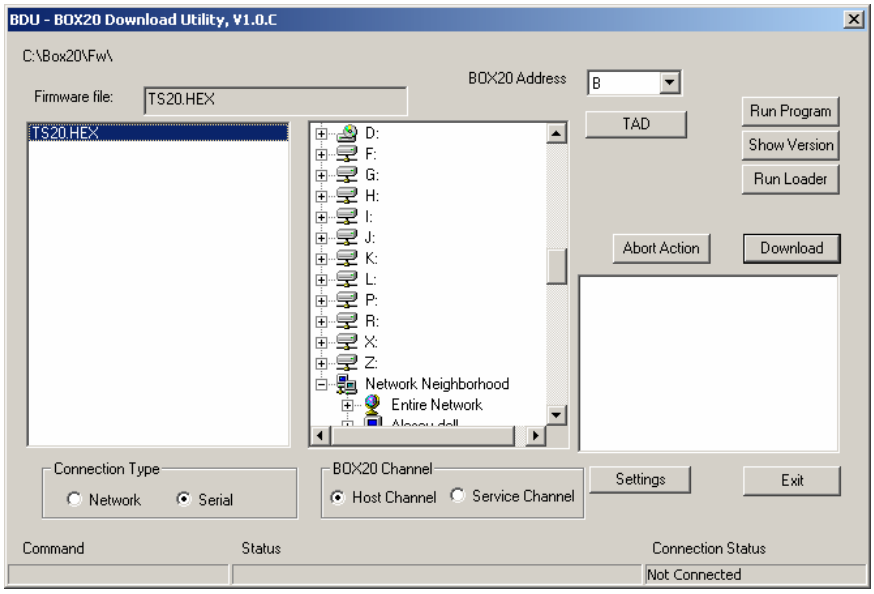
Beside firmware updates via host channel, service personnel also have the opportunity to update DOG20 application program locally via DOG20 service channel.

2.10.1 BDU - BOX20 download utility

DOG20 download procedure is performed by BDU program (BOX20 Download Utility). The program was originally developed for BOX20 access control terminals, but can be used for downloading DOG20terminals as well. You can find BDU program on the CD delivered with DOG20 terminal. Start the program simply by running bdu.exe on your computer.

2.10.2 BDU settings

Before issuing commands the following settings have to be done.



BOX20 address. Here you specify the address of target DOG20 terminal (select from drop-down menu) for single step commands (not for TAD function). The setting is available only if BOX20 Channel is set to *Host Channel*.

Firmware file. Browse the folder containing firmware file to be downloaded to target DOG20. Files with extension .HEX only are shown in left window. Select the right file with single click in left window.

Note. BDU and DOG20 loader support firmware files according to Motorola S-records format.

BOX20 channel. Here you can specify the channel currently used on target DOG20 terminal for firmware download. Available selections: *Host Channel, Service Channel*

Select *Host Channel* if your PC is connected with target DOG20 master using its host channel (RS232-A, RS422 or Ethernet interface), or if your PC is connected with target DOG20 slave (indirectly via master terminal) using its party-line channel (RS485 interface)

Select *Service Channel* if your PC is directly connected to the target DOG20 via its service channel (RS232-B interface).

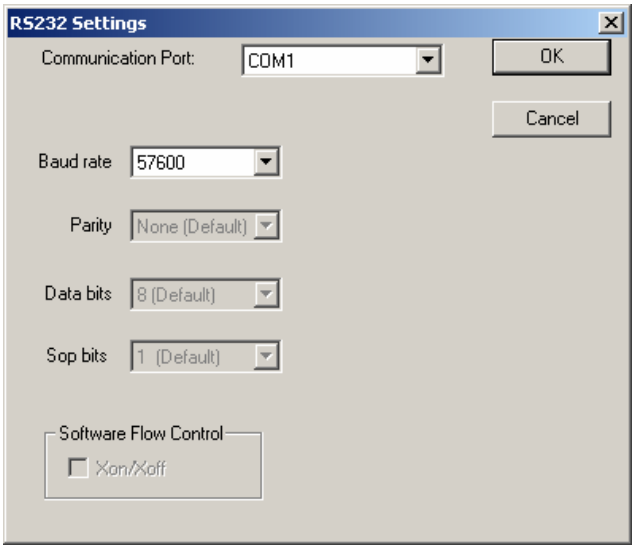
Connection Type. Select the connection type between your PC and target DOG20 firmware download. Available selections: *Serial, Network*

Select *Serial* if your PC communicates with target DOG20 via serial port (RS232 or RS422). Select Network if your PC communicates with target DOG20 via LAN (TCP/IP).

Note. With selection BOX20 Channel = Host Channel both connection types (Serial and Network) are available. But with selection BOX20 Channel = Service Channel only Serial connection type is available.

Connection Settings. Reach this settings by clicking button named »Settings«.

Set of available settings depends on selected *BOX20 Channel* and *Connection Type*, so it is explained separately for each combination.



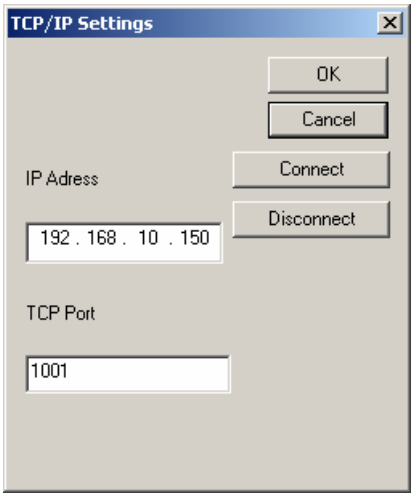
Host Channel, Serial Connection

With this combination the available connection settings are as follows.

Communication Port: specify COM port used (Available options: COM1, COM2, COM3, COM4).

Baud Rate: set it equal as corresponding DOG20 host channel baud rate.

(Available options: 4800, 9600,19200, 38400, 57600.)

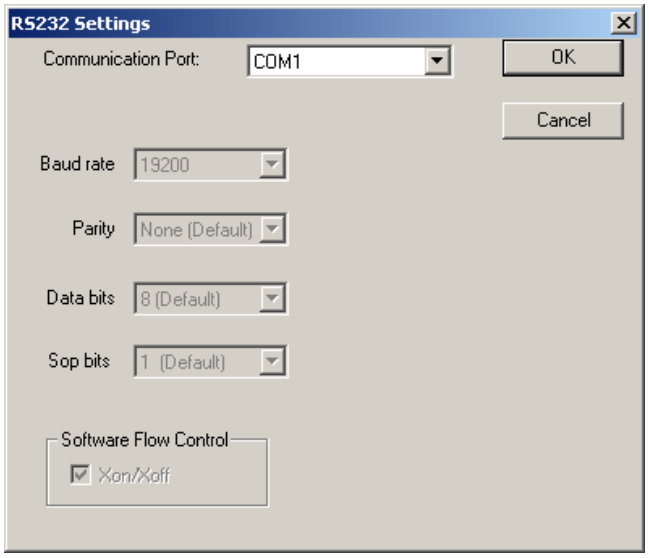


Host Channel, Network Connection

IP Address: Specify IP address of the target DOG20-E10/E100 terminal.

TCP Port: Specify TCP port number for network connection. It must be equal as set in DOG20 Ethernet interface.

Upon parameter settings you can issue TCP connection request by clicking on *Connect* button. You can close TCP connection using *Disconnect* button. TCP connection status is shown in Connection Status field of main BDU window.



Service Channel, Serial Connection

With this combination the available connection settings are the following.

Communication Port: specify COM port used (Available options: COM1, COM2, COM3, COM4).

Note. Baud rate is fixed to 19200 bps as it is fixed for DOG20 serial channel, too.

2.10.3 BDU commands

There are four single step command buttons available in BDU main window: Run Loader, Show Version, Run Program and Download. Next to these single step commands you can use complex TAD (Terminal Auto Discovery) command.

2.10.3.1 Single Step Commands

Upon completion of each single step command DOG20 response is displayed in status field. If BDU does not get any response from target DOG20 within app.10s, »*BOX20 not responding*« message appears in the status field. A command execution could be aborted using *Abort Action* button.

***Run Loader*.** Command is available only if Host Channel (BOX20 Channel selection) is selected. The command causes target DOG20 to exit application program and start its loader program. Successful command completion is signalled by »*Loader Started«* message in the Status field. Note that DOG20 running loader program, would exit loader and restart its application program (if resident) automatically if idle (no commands received) for more than 75 seconds.

***Show version*.** This command is used to obtain information on current firmware versions of DOG20 loader and application program. Information is displayed in BDU Status field in one of two formats explained by the following example:

DOG20 A: V8.2.c L:V1.0.e

DOG20 L: V1.0.e A:V8.2.c

In both cases DOG20 has loader program V1.0.e and Application program V8.2.c. In the first case (application program version written before Loader program version) target DOG20 is currently running application program, while in the second case (loader program version written before application program version) DOG20 is currently running loader program.

***Run Program*.** Issuing this command causes target DOG20, which is currently running loader program, to restart the application program. The application program is checked for integrity before running. Successful command completion is signalled by »*Program Running«* message in the status field. Otherwise »*Program not Running«* message appears which means there is no application program on target DOG20 or application program integrity errors have been found by integrity check.

Download. With this command firmware download procedure is started downloading selected HEX firmware file (Motorola S-records format) into DOG20 flash memory. Download progress is shown by a progress bar. Successful download completion is signalled by »*100%«* message in the status field. If DOG20 can not perform flash download procedure, »*Download Failed«* message is displayed (inconsistent or corrupted firmware file, DOG20 flash memory error…). Execution time of download command depends greatly on firmware file capacity, communication speed and terminal connectivity (master, slave). Typically it takes few minutes.

2.10.3.2 Terminal Auto Discovery Command (TAD)

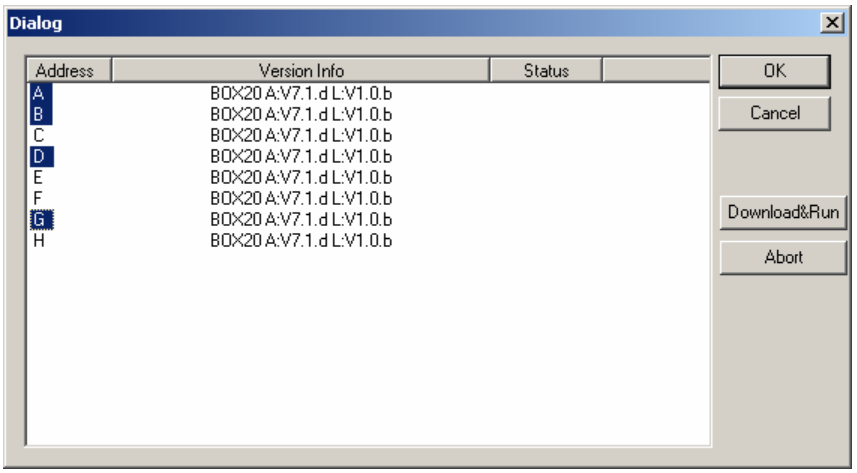
TAD command is a very helpful tool especially in complex systems with many terminals where it is sometimes difficult to know addresses of all terminals and where single step application program download would take quite long time and would need instant operator action for downloading terminals one by one.

TAD command is available only when *Host Channel* is selected using *Serial* or *Network* connection type.

The TAD function has multiple steps:

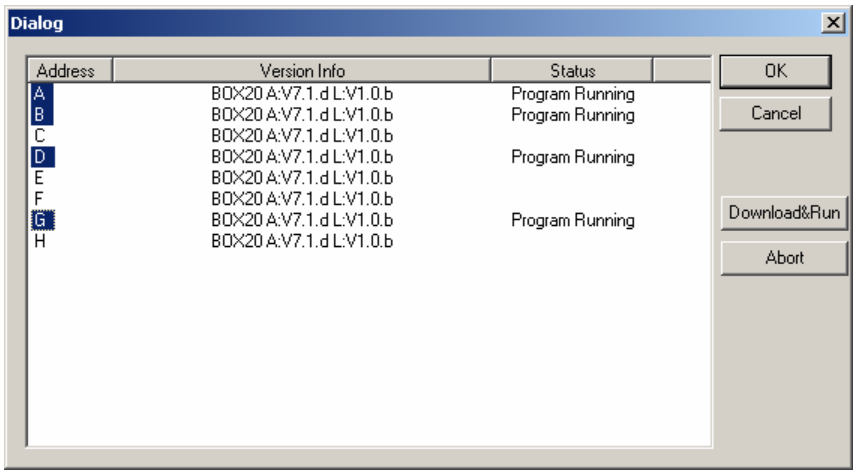
- It finds automatically all DOG20 and BOX20 terminals on selected connection, shows their addresses and version info.
- It makes you able to select the terminals you want to download with firmware file.
- It performs firmware download to selected list of terminals; after download completion for each terminal BDU issues »*Run Program*« command to start application program.
- It shows download completion status for selected terminals.

Here is a detailed description of the TAD command.



TAD command is activated by a click on TAD button. Upon issuing TAD command the program starts with terminal auto discovery function. It polls all possible terminal addresses and displays information on existing terminals in TAD window, line by line. For each existing DOG20 or BOX20 terminal its address and version info is displayed. Version info format is displayed according one of two possible formats explained in the previous section 2.10.3.1 (*Show Version* command). If some lines appear with different version info format (without »DOG20« or »BOX20« on the beginning) they obviously belong to older terminal types in the system (DOG09 or BOX09). These terminals cannot be downloaded with application program firmware file. Auto discovery function takes app. 10 seconds for its completion.

When auto discovery is finished you can select terminals you want to download with application program. In order to do that simply click their addresses in the first column of TAD window while CTRL key is depressed and their addresses become highlighted.



Once target terminals are selected, simply click »*Download&Run«* button in the TAD window. Now the program starts firmware download to selected list of terminals, one by one. After download completion for each terminal BDU automatically issues »*Run Program«* command to that terminal to start application program. If download/run procedure is finished properly for certain DOG20 or BOX20 terminal, BDU writes »Program Running« in Status column. If not, a message »*Failed*« would appear there.

Operator can abort download process any time by clicking »*Abort*« button in TAD window.

2.11 Troubleshooting

This short guide includes common questions and answers regarding DOG20 terminals. It is designed to help you locate the problems and solve them.

1. The terminal is completely "dead" (LCD empty and not lit up, keypress and ID card reading produce no response).

a) Check the supply voltage (230V AC).

b) Check the fuse on DOG20 main board.

2. Terminal does not operate properly (continuous beep, LCD bright but no characters displayed...).

1. Check all jumper positions for a specific DOG20 model (see Chapter 0 for this info).

2. Check variable resistor (trimmer) P1 setting. The trimmer is used for setting LCD contrast and viewing angle; set P1 to achieve the best display visibility.

3. There is no communication with the host, terminal operates locally.

Check the relevant parameters on the host side, which may produce communication problems (RS232 port, communication parameters, application program parameters, cabling...).

DOG20 with master connectivity:

Enter the System Setup mode and adjust settings as follows:

- Host Channel Baud Rate (Chapter 2.6) must match the host port baud rate; in case of DOG20 terminal with Ethernet interface this setting must match Ethernet Interface baud rate (Chapter 2.8.1.2).

- Host Line Parity (Chapter 2.6) must match the host port parity; in case of DOG20 terminal with Ethernet interface this setting must match Ethernet Interface parity (Chapter 2.8.1.2).

Check jumper positions J12 - J21 (see Chapter 0).

In case of DOG20 terminal with Ethernet interface check if Ethernet interface is configured properly (see Chapter **Error! Reference source not found.**).

Check communication cable between DOG20 terminal and host computer, or Ethernet cable in case of DOG20 terminal with Ethernet interface (see Chapter 2.4).

DOG20 with slave connectivity:

In the System Setup mode (see Chapter 2.6) check the slave terminal and master terminal as well as any other slave terminal (if any) in a party-line and make sure that the following settings are correct:

- Every terminal must have a unique address (Terminal address).
- Every terminal must use the same Party line baud (recommended rate is 62.5 K).
- Check communication cable between slave and the master terminal and the termination resistors at both ends of the party line cable (see Chapter 2.4).

4. Terminal does not accept user's ID card. It doesn't react when reading the card.

a) Check setting of jumpers J5 and J11, which should be set depending on the reader in use (see Chapter 0).

b) Check interface settings for internal and external readers (see Chapter 2.6).

c) For magnetic cards check if system code parameter (defined in Event Collector Manager) is set in accordance with system code of badges in use.

5. The terminal rejects certain ID cards by displaying Access Denied message.

a) The access control (AC) or combined event was recorded but the cardholder does not have access permission.

b) Update terminal's user profile list by downloading from the host.

If these guidelines do not provide solution to your problem, please contact your distributor.

3 DOG20 User Instructions

Within this section you can find simple user instructions on how to perform bookings on DOG20 terminals as well as a description of DOG20 operating principles and parametrising.

3.1 Terminology

For better clarity, here is the explanation of some terms used in this chapter.

Identification A. reading ID badge, or

B. typing ID badge number on terminal keyboard

D. fingerprint identification;

Authentication with PIN verification

entering PIN and its verification against database resident PIN

Authentication with fingerprint verification

scanning fingerprint image and its verification against fingerprint template stored in database or smartcard

Default event the event recorded on the terminal by identification only (without use of the function key);

Keyed event the event recorded by depressing a function key followed by identification;

External reader an external card reader connected to DOG20

External Event the event recorded by reading the ID badge on the external reader;

Event generic term for any of the above type (default, keyed or external reader event);

Booking the act of recording an event on the terminal;

Transaction the record (data) of an event clocked on the terminal;

TA attribute a tag that may be assigned to any event to designate it as a T&A event (event important for time recording);

AC attribute a tag that may be assigned to a default, keyed or external reader event to designate it as an “access request” event (the clocking of this type of event triggers the access control arbitration procedure);

TA event an event with TA attribute only;

AC event an event with AC attribute only;

Combined event an event with TA and AC attribute;

Default, keyed or external reader events can have TA and AC attributes assigned (one of them, both or none) by T&S application software. The terminal is in operating mode when it performs (or it is ready to perform) its basic tasks: to record a transaction or perform communication within the system the terminal is automatically set to operating mode when powered on.

3.2 Keyboard functions

This chapter explains the function of keys in the operating mode.

ARRkey, DEPkey, INFOkey, A, B, C, are function keys used for event selection. With each of these keys you can browse among events assigned to that particular key.

Arrow keys are used to browse among all events assigned to the terminal.

Numeric keys. They are used to enter PIN code, setup password and ID code (if Keyboard ID parameter is enabled, see section 2.7.1.4.)

Enter key. Used to finish PIN code entry, setup password, or to finish ID code entry (if Keyboard ID parameter is enabled, see section 2.7.1.4.)

Comma key. Used to invoke InfoScreen command (see Chapter 3.4) or to enter setup mode.

3.3 Display messages

This topic presents and explains terminal resident text messages that can appear on the terminal's display in response to certain activity. The messages defined and downloaded by the host (key text message which is displayed when function key is depressed and 0n-line transaction response message which is displayed when online transaction is processed) are not discussed here.

Accepted! The message associated with an off-line transaction. It signals that the transaction has been accepted and temporarily stored in the terminal's local memory. The user's balance of hours and the date it was last updated in the terminal's memory is displayed along with this message, if available.

Memory Full! The message displayed upon clocking attempt if the terminal memory is full.

Access granted! The message displayed upon recording access control (AC) event. It signals that the event has passed the access control arbitration procedure therefore transaction is accepted and controlled door is opened.

Denied! The message displayed upon recording access control (AC) event. It signals that the event has failed the access control arbitration procedure so the transaction is not accepted and the door lock is not released.

Place finger! or Fingerprint! The message informs the user to place a finger on the fingerprint reader for verification.

Remove finger! The message informs the user to remove a finger from the fingerprint reader.

Retry finger! The message informs the user to place a finger again on the fingerprint reader for verification retry because previous verification has failed.

No template! The message is displayed when terminal or card does not keep fingerprint template for a person who already made identification to perform booking. Therefore DOG20 cannot proceed with fingerprint verification so the transaction is not received.

Verification Error! The message is displayed when fingerprint verification procedure fails after three retries. Event transaction is not received.

3.4 InfoScreen command

In operating mode you can get some information on terminal storage and fingerprint statistics by depressing the key ',' for five consecutive times, followed by depressing the key '1'.

On the display you get:

- number of stored off-line transactions (R),
- number of stored user records (P),
- number of fingerprint templates (T),
- number of granted fingerprint verifications (G),
- number of denied fingerprint verifications (B).

Number of fingerprint templates is shown only if fingerprint unit is installed.

Numbers of granted and denied verifications are shown only if fingerprint unit is installed.

3.5 DOG20 operation principles

This chapter describes the functions of the terminal.

When in operating mode the terminal displays current time, date and the abbreviation of default events' full names (second line).

DOG20 procedure performed at every transaction can be described as having three stages:

- **Booking**
- **Access control**
- **Transaction transfer and/or storage**

3.5.1 Booking

When in operating mode, the terminal's display shows current time and date in the first line and the abbreviation of the default event(s) in the second line. In case of DOG20 terminal with integrated RFID reader or without badge reader there is only one default event, in most cases it is arrival (ARR) or departure (DEP). In case of DOG20 terminal with integrated magstripe reader there are two default events, in most cases they are arrival (ARR) and departure (DEP).

Booking procedure for default and keyed events consists of the following steps:

- Event selection
- Identification
- Authentication with PIN (optional)
- Authentication with fingerprint (optional)

Note that booking procedure for external events does not contain Event selection step, that means it is possible to book ex

Here are explained booking procedures in details:

1. **Event selection.** To record default event you needn't do anything. To record all other events (special absences, special arrivals), select desired event using function keys (ARRkey, DEPkey, INFOkey,A,B,C). Up to 10 events can be assigned to each of these function keys within Event Collector Manager program. By pressing a particular function key you can browse among events assigned to that particular key to select desired event. With arrow keys you can browse among all events assigned to that terminal. On that way you can book up to 60 keyed events on a single terminal. When an event is once selected, its name remains on the screen for 5 seconds and the identification must be done within this interval otherwise the desired event won't be recorded. If you fail to do this (i.e. read the card in the required time) select desired event again.

2. **Identification.** Identification step differs slightly on terminal type.

    - On DOG20 terminal with RFID reader identification is performed by placing the ID badge at the terminal's bottom (the area under the keyboard). The card should be held parallel to the terminal's face. DOG20 terminal signals successful reading by a short beep.

    - On DOG20 with magnetic reader identification is performed by swiping the ID badge through the terminal's reader. Swipe direction is important for default event bookings, but not for keyed events bookings. DOG20 terminal signals successful reading with a short beep. Alternative identification can be performed by typing badge number

- On DOG20 without badge reader identification can be performed by typing badge number into terminal's keyboard. This identification method could be optionally enabled (see section 2.7.1.4) as an alternative identification method on DOG20 with integrated badge reader.

- On terminal with fingerprint identification unit (DOG20-FIB) identification is performed by placing user's finger on the fingerprint reader. The finger should be kept in place until DOG20 terminal reports identification result.

3. **Authentication with PIN verification (optional).** Booking procedure for AC and/or TA events might require PIN code verification. In this case the user is prompted to type his/her PIN number. If user types in the right PIN, the booking is accepted, if not, it is denied.

4. **Authentication with fingerprint verification (optional).** On terminal with integrated fingerprint unit booking procedure for AC and/or TA events might require fingerprint verification. In this case user is prompted to place his/her finger on the finger sensor. DOG20 compares the scanned image with the fingerprint template(s) of that person stored in its database or on persons ID card to verify the identity of the badge owner. Depending on the result the booking is accepted or denied.

Note.

The type of attendance or rather absence is recorded by selecting the appropriate event when clocking out. Therefore, on return, the plain arrival suffices. Exempt from this rule are absences that are recorded for the past i.e. on arrival. Typical examples would be arrival from business absence, authorized late arrival etc.

For each erroneous transaction (wrong function key) repeat the transaction recording procedure.

If you omit some transaction, the current balance of hours will be proportionally lower. The omission should be reported to the T&A administrator to enter missing events manually.

3.5.1.1 Tips for using fingerprint verification/identification

It is very important to advise the users how to place the finger on the fingerprint sensor correctly.

In case of terminal with fingerprint reader, position the finger so the reader's ridge-lock rests comfortably within the first indentation of the finger. Next, lower the finger onto the sensor and apply moderate pressure.

Use the same finger as for enrolment. If more than one fingerprint template has been enrolled, use one of them. The most recommended fingers are index and middle finger. Avoid using thumbs and small finger.

Problems may appear if a person has very dry skin. To overcome this difficulty, you may use hand cream.

3.5.2 Access control

DOG20 terminal can perform also access control feature to control access to restricted areas.

Access control procedure is activated only when somebody records access control (AC) event or combined event (event with attached AC attribute).

The access control procedure includes the verification of the user's ID code, and optionally PIN code, time restrictions (time zones, expiration date) and fingerprint.

If the verification succeeds, the transaction is accepted and the procedure can proceed to the next stage (transaction storage and/or uploading). At the same time, the relay output used for controlling a door lock mechanism is activated for a predetermined period of time.

If the verification procedure fails, (ID is not on the user list, false PIN, booking outside time limits, finger verification fails) the transaction is rejected and access denied.

The user record list is administered and downloaded by T&A application software, Time&Space manager (TSM) and Event Collector Manager(ECM).

You can check the number of user records in the terminal's internal memory by invoking InfoScreen function (see section 3.4).

3.5.3 Transaction transfer and storage

DOG20 terminal tries to send each booking data to the host running Event Collector Service (ECS) immediately. If for some reason this is not possible booking data are temporarily stored in the terminal's memory and will be transferred to the host as soon as possible.

An **online booking** is performed if the host based ECS is currently running. The terminal sends the transaction to the ECS, receives its confirmation and displays the message received as a part of the confirmation. Typically it will be the person's name and balance of hours. For example:

The screen above shows that Cox William recorded arrival and his current balance is 3 hours and 17 minutes credit.

An **offline transaction** occurs when communication with the host cannot be established for some reason at the time of transaction (e.g. ECS is not running, communication is interrupted…). The transaction is temporarily stored in the terminal's memory and the message *Accepted* is shown on the terminal's display.

Above mentioned display messages with on-line and off-line bookings appear when TA events or combined events are booked. In case of AC events (pure access control events) corresponding display messages are "Access granted" or "Denied".

Note that the external reader event transaction does not produce any display message.

The terminal takes care that off-line transaction is proceeded to the host as soon as possible. You can check the number of transactions in the terminal's internal memory by invoking InfoScreen command (see section 3.4).

3.6 DOG20 parametrising with application software

Detailed DOG20 functions depend on the parameters defined in application software and downloaded to the terminal. In Time&Space system DOG20 parameters are mostly set as Point properties in the Event Collector Manager (ECM). All these parameters represent the configuration of a certain DOG20 terminal. They can be sent any time to DOG20 using Reconfiguration command of Event Collector Manager program.

For other details about parametrising you should refer to Time&Space user manual.