

TagMaster AB

***TagMaster S1566 Heavy Duty
HW Installation Guide***

Manual issue 01

TagMaster AB

Disclaimer

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FCC ID: M39S15XX

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution

Information to user.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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2 REVISIONS

Document revision history.

<i>Revision</i>	<i>Date</i>	<i>Issued by</i>	<i>Comment</i>
01	2003-04-30	Dev. Dept.	First issue

This document follows the TagMaster documentation version numbering standard to identify the document version. This standard uses the form P01A, P01B to P01n for draft versions (not for customer issue) then 01 for a released version (reviewed; can be given to the customer). Subsequent issues use 02, 03, 04 etc and are changed via the formal change control process.

3 ASSOCIATED DOCUMENTATION

51027803 TagMaster AB	TagMaster HW Installation Guide
51021106 TagMaster AB	Confident Programmer's Guide

4 INTRODUCTION

This manual describes the installation requirements and user information for the TagMaster S1566 Heavy Duty Reader (HD-Reader).

4.1 Audience

The intended audience for this document is system integrators, installation engineers, contractors or the like who have the task to install and commission the TagMaster systems. The audience is expected to have adequate experience and education in the field of installation and commissioning of control and identification systems and to be qualified for electrical installations.

4.2 System Block Diagram

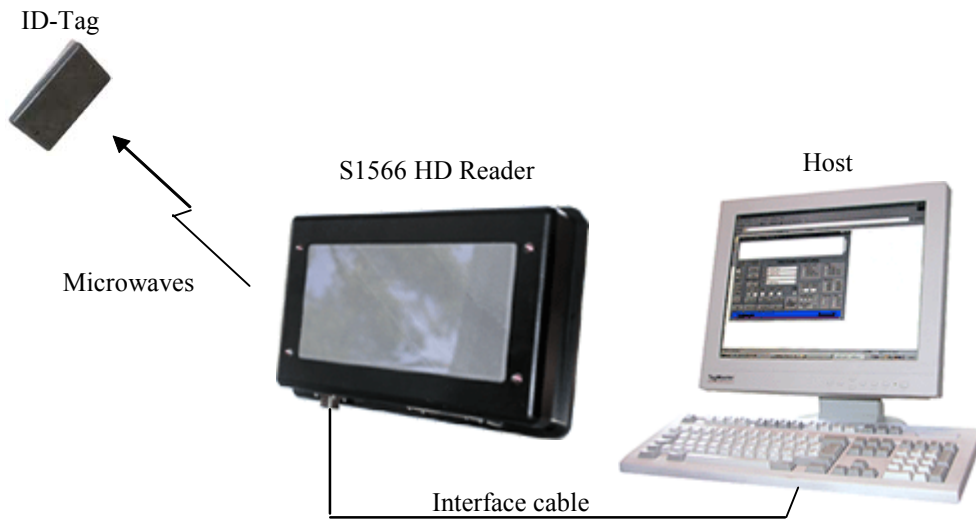


Diagram to show system and interconnections with a host and relation with tag.

4.3 Definitions

Reader	Device (e.g. S1566) used to read and write Tags in the TagMaster system.
ConfiLib	The CONFIDENT Library Software (ConfiLib) is the uniting name of the device drivers that are included in all S1500/S1501/S1566 host C-language software modules.
ConfiTalk	Standard communication protocol. Used by Pyramid and Solid. Included in ConfiLib.
Host	IBM PC or compatible used as master computer in a TagMaster system.
Pyramid	Pyramid is the <i>S1500</i> standard software delivered from factory. S1500 with Pyramid is capable of taking decisions on its own when a Tag has been read or when a movement has been detected. Refer to the S1500 datasheet for further details.
Solid	Solid is the <i>S1501 and S1566</i> standard software delivered from factory. This software receives ConfiTalk commands on the serial port and executes them. This is the same as the ConfiTalk only mode of the S1500.
Tag	ID-carrier (e.g. <i>ScriptTag S1251</i>) in the CONFIDENT system which is read/writable via microwaves, using a Communicator.

4.4 References

Communicator S1500&S1501 data sheet	DS1500
Communicator S1503 data sheet	DS1503
Communicator S1566 data sheet	DS1566
ScriptTag S1251 data sheet	DS1251
ScriptTag HD S1450 data sheet	DS1450
ScriptTag HT S1350 data sheet	DS1350
MarkTag S1255 data sheet	DS1255
MarkTag HD S1455 data sheet	DS1455
Card holder WinFix S1951 data sheet	DS1951
Card holder Cardkeep S1953 data sheet	DS1953
Mounting bracket S1952 data sheet	DS1952
RS232/RS485 converter S1942	DS1942
Confident Programmer's Guide	510211
Confident HW Installation Guide	51027802

5 SAFETY NOTICE

5.1 General

This Installation Manual shall be carefully read before any installation works is performed. Special attention shall be paid to this page and the statements in boxes throughout the manual.

The contents of this document are not binding. If any significant difference is found between the product and this document, please contact TagMaster AB for further information

We reserve the right to modify products without amending this document or advising the user.

We recommend using personnel authorised by TagMaster for all installation, service and repair and the use of TagMaster genuine spare parts. TagMaster AB will not otherwise assume responsibility for the materials used, the work performed or any consequences of the same.

Check the contents of the shipment for completeness and possible damage. If the contents are incomplete or damaged, a claim should be filed with the carrier immediately and the TagMaster Sales or Service organisation or the TagMaster representative should be notified in order to facilitate repair or replacement of the equipment.

The equipment described in this manual is designed to be used by properly trained personnel only. Installation, adjustments and maintenance of the exposed equipment shall be carried out by qualified personnel who are aware of the hazards involved and who are qualified for electrical installations.

For correct and safe use of this equipment, it is essential that both operating and service personnel follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The emitted power level from a TagMaster communicator is less than 10mW EIRP. This power level is defined as very low and is far below the European levels that would require any form of analysis when considering health risks. For comparison purposes, the emitted power level from a TagMaster communicator is significantly less than that emitted by a typical mobile telephone. TagMaster uses a radio frequency technology, which has been tested and conforms to the requirements of the European CE mark approval for Short Range Devices.

To conclude, there is no risk to personal safety when working with or in close proximity to the TagMaster communicator.

5.2 Specific warning and caution statements are used throughout this manual.

CAUTION is used to indicate correct operation or maintenance procedures in order to prevent damage to, or destruction of the equipment or other property.

WARNING indicates a potential danger that requires correct procedures or practices in order to prevent injury to personnel.

Whenever it is likely that safe operation is impaired, the equipment must be made inoperative and secure against unintended operation. The appropriate servicing authority must then be informed.

5.3 Installation

Before any other connection is made, the equipment shall be mounted so that the metallic chassis is connected to protective ground.

WARNING Interruption of the chassis connection with protective ground can make the equipment dangerous if it is connected to a defective power supply.

The power supply used to provide the equipment with 24 or 12 VDC must comply with all relevant safety regulations. It must also be made for connection to the local mains voltage and be able to provide the necessary power without producing excessive heat.

- Fuses shall only be renewed by a qualified person who is aware of the risks involved. The use of repaired fuses is prohibited.
- Capacitors inside the equipment can hold their charge even if the equipment has been disconnected from all voltage sources.
- All PCB's removed from the equipment must be adequately protected against damage and all normal precautions regarding the use of tools must be observed.
- The equipment must be disconnected from all voltage sources before any installation or service work is made.

CAUTION Damage may be the result if:

- The equipment is switched on when parts are removed from the PC board.
- A PCB is removed within one minute after switching off the equipment.

6 SYSTEM COMPONENTS

The hardware of a TagMaster system is described briefly below.

6.1 Communicators

The S1566 Reader is a device for reading and writing ID Tags using 2.45 GHz microwaves. It is powered with 12 VDC but can be adopted for 24 VDC. The S1500 has built-in antennas for communication with the Tags and various serial interfaces for communication with a host computer. The Reader also provides a movement detection function which can detect moving objects in the reading zone (also non-Tagged objects). One hundred frequency channels are available. The microprocessor is a 16-bit Hitachi H8/534. Originally designed for mounting under a moving train, it will withstand extremely harsh environments. The S1566 has a 2Wire RS485 and RS232 interface.

6.2 ID Tags

An ID Tag is a device carrying ID information that can be read at a long distance using microwaves. Versions that can be read at a distance of up to 8 meters with the Reader S1503 are available. The actual reading range, depend on the Reader type. Also different shaped versions of the tags are available. Some have the shape of a credit card but is slightly thicker. Each Tag has its own unique 8-digit mark. It is possible to read many Tags concurrently. To maintain the information, to get the long reading range and the high communication speed, a lithium battery cell is used. The life of the cell is depends of the Tag type but is typically 5 - 10 years and independent of how often the Tag is used. Certain types of Tags (e.g. *ScriptTag S1251*) can also be written by the user. The Tags then have a static RAM memory array that can be configured for different memory sizes; 14, 154 or 574 bits (32 bit checksum not included in these figures). Refer to the Tag (e.g. S1251 or S1450) data sheet for details.

7 ENVIRONMENTAL CONSIDERATIONS

7.1 General

Microwaves have, during more than a decade, proven to be the most reliable technology for identification systems. In particular, microwaves are unaffected by the normal electromagnetic background noise found in industries and elsewhere. They also form a base for products that have to withstand other rough environmental conditions as high temperatures, chemicals, shock and vibrations

7.2 Electromagnetic immunity

The TagMaster system has been tested and approved, in operation, according to the IEC standards. This guarantees trouble-free operation in demanding electromagnetic environments.

Electromagnetic interference on the microwave link

Industrial noise is typically present in the KHz and low MHz frequency band. The TagMaster system is only receptive for frequencies closed to 2.45 GHz so typical industrial noise will not affect the microwave communication. Transients from spot-welding equipment or from switching on other welding equipment, soldering machines and fluorescent lamps may produce short pulses around 2.45 GHz. However, since the TagMaster system, if interfered, will retransmit the entire message very fast there is in most cases ample time for a re-transmission. If strong microwave fields, from for instance microwave dryers, can be suspected, TagMaster AB should be consulted.

Electromagnetic interference in cables

By selecting a suitable communications interface, using specified cables and proper shielding and grounding, optimum communication reliability is ensured.

8 ELECTRICAL REQUIREMENTS

The following characteristics apply under following conditions:

8.1 Temperature

8.1.1 Communicators

In most applications, normal convection cooling is enough. In applications where heat is generated close to the Reader, forced cooling or heat shields may be necessary.

The S1566 has the following characteristics: Environmental temperature: -25 to +60° C.

8.1.2 Tags

TagMaster Tags are available for operation in various ambient temperatures ranging from -40°C up to 85°C, refer to the data sheets. The specified reading range is valid for normal ambient temperature conditions. If reading range is critical and the intended operating temperature deviates from normal ambient temperature TagMaster AB should be consulted.

8.2 Supply Voltage

The Reader is supplied with external DC to the connector (pin P=12 V and pin R=0 V (return)).

Item	Symbol	Min	Typical	Max	Unit	Notes
Supply voltage	Vspl	10	12	14	V	1
Ripple/noise	Nspl			50	mV	2
Consumption	Ispl		250	500	mA	

Notes:

- 1 The input DC power must be within these limits.
- 2 The maximum ripple and noise on the supply power to the Communicator.

8.3 Radio Interface

Item	Symbol	Min	Type	Max	Unit	Notes
Frequency range	fc	2435		2465	MHz	1
Frequency deviation	fdev			± 100	kHz	2
Output power EIRP high	Pohh		8	10	dBm	3,4
Output power EIRP low	Polh		-2		dBm	3;4
Lobe width horizontal	Lh	40	45	50	deg	5
Lobe width vertical	Lv	40	45	50	deg	5
Harmonics EIRP				15	nW/4 kHz	6
AM modulation ratio	Aam	15			dB	7

Notes:

- 1 The frequency range is divided into 99 channels, 300 kHz apart. The channels are selectable by software.
- 2 Frequency deviation from the chosen channel.
- 3 The output signal is right hand circular polarized.
- 4 The lobe width is defined as the angle between the directions in front of the antenna where the power field is 3 dB below the front direction single way at far field distance. This is the lobe width of the transmitting antenna.
- 5 This value applies in frequency bands above the Communicator working frequency. The value is set with a margin to the EN 300 440. See also environmental data.
- 6 Carrier on/off ratio.

9 MECHANICAL INSTALLATION

This chapter describes the procedure of installing the TagMaster units mechanically. It is assumed that the location of Readers and Tags are specified, and the communication distances and movement speeds are considered during the project planning phase. Likewise it is assumed that the project planning is well documented.

9.1 General

Microwaves penetrate wood, dirt, paint, plastic, and most other non metallic materials. The TagMaster system employs circular polarisation and can therefore also often be used when metal surfaces are in the vicinity of the antenna and Tag, especially if the Tag is moving. In such cases however, adjustment of the Tag/Reader position and distance may be necessary to find the best position. Always combine this with tests to verify that the installation will work.

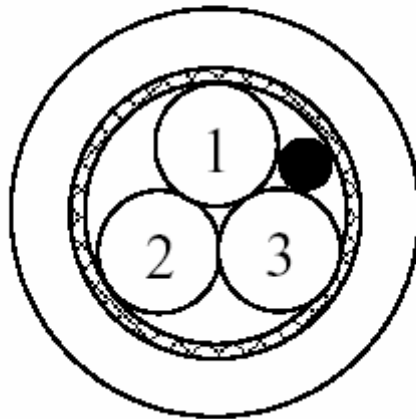
9.2 Readers

9.2.1 Mounting

- Position the Reader with the cable entries pointing downwards and so that the device is easily accessible for service.
- Mount the Reader in an adjustable holder and direct it so that its lobe beam covers the position of the Tag(s).
- If Tags are to be mounted in car wind screens it is recommended to mount the Reader approximately 2 meters up and tilted down for best performance. Refer to the typical installation illustrations in section 5.5.

9.2.2 Connecting Cable recommendation

BRAND-REX LTD RSE-T9-3PR/0.6



Core: Conductor: 0.6mm² 19/0.2mm tinned copper
Insulation: Conforms to RSE/STD/024 – Part 6 Type IV
Diameter: 1.40mm ± 0.05mm

Pair: 2) of the above Cores twinned together

Cable Assembly: 3) of the above Pairs (Items 1-3) cabled together
Binder: Wrapped with polyester tape
Drain wire: 0.6mm² 19/0.2mm tinned copper
Screen: 0.127mm tinned copper braid, 84% minimum coverage
Sheath: Black irradiation cross-linked ZX elastomer
1.15mm nominal radial thickness
Diameter: 8.05mm ± 0.5mm

Colour Code: Pair Cores Blue, Brown and number printed 1 to 3

Maximal Cable Length: 20 m

CAUTION The cable is recommended to fulfil these requirements. The reader might not work properly if these recommendations are neglected.

9.3 ID-Tags

The front side of a Tag is blank while the backside carries a type label. The front side of the ID-Tags must be oriented towards the front side of the Reader. To get the maximum communication range the front surface of the Tag should be in parallel with the front side of the Reader. If the Tag is miss-aligned relative to the front side of the Reader, the communication range is reduced. Refer to the actual product datasheets for details.

Due to TagMaster's circular polarisation the rotational orientation of the Tag relative the Reader is uncritical. The Tags can be mounted on any flat surface. If it is to be expected that the mounting surface material, when warmed up, can expand in a different way than the Tag, the Tag must be mounted in such a way that the material expansion does not damage the Tag.

When screwing the Tags directly on to a surface, the screw must **not** be secured by pulling it until it does not move anymore. Instead a threaded hole should be used and the screw should be pulled until the Tag is just fixed. Then the screw should be secured using a washer and nut from behind.

For the credit card shaped Tags S1251 and S1255, TagMaster AB offers holders for use in vehicle windows or for personal carrying. (WinFix S1951 and Cardkeep S1953). For permanent mounting of the Tag in a vehicle window the CardTape S1954 is recommended.

10 ELECTRICAL CONNECTIONS

This section describes the method of connecting the S1566 Heavy Duty Reader

WARNING The user uses a 19-pole jackable size 14 military type connector (FCI / Souriau part no: FCI-851 02R 14-19 P50) (Male). The instructions must be followed in order to maintain safety for the installation crew.

Connector

The readers means of connection to the host system is via a 19-pole jackable size 14 military type connector (FCI / Souriau part no: FCI-851 02R 14-19 S50) (Female) selected to make a connection unexposed to dust, wet and insensitive to vibrations.

Pin configuration on S1501/03 (Female)

shell size	L Max		A	B Max	C Max	D Max	E	F Max	J
	solder	crimp							

Power Supply Connector

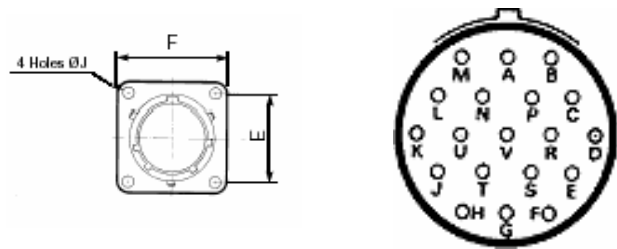
PIN P DC power. (12 V)

PIN R DC power. (0 V)

DC Ground (via a “Y” capacitor and a resistor to casing)*

- Se Earthing requirements

14	32.70	32.00	22.25	11.70	1.32	23.40	23.00	28.89	3.13
	1.287	1.260	.876	.461	.052	.921	.906	1.137	.123



RS232 communication port CAUTION is used only for test purpose

Connector

PIN A Tx/232A.

PIN B Rx/232A.

PIN C GND/232A (internally connected to DC Power (0 V)).

The S1566 Reader host **CAUTION is used for normal operation with TRU**

RS485 communication port

Connector

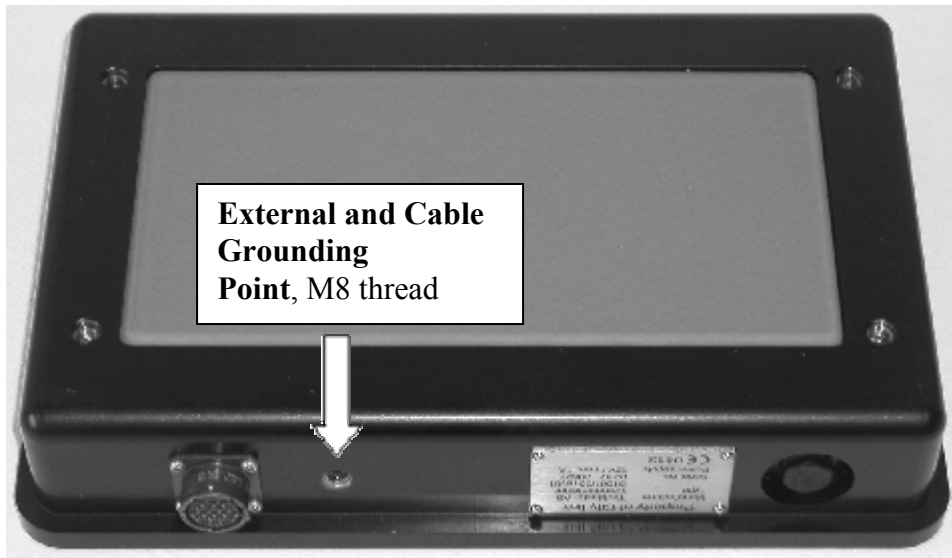
host PIN H Tx+/Rx-485: Transmit (and receive when 2-wire is used), low wire.

PIN J Tx-/Rx+485: Transmit (and receive when 2-wire is used), high wire.

PIN K Gnd485: Shield ground for transmit wires. Note: Signal ground, Interface grounds are separated from chassis.

11 EARTHING REQUIREMENTS

This picture describes where to connect cable screen and ground.



CAUTION Cable screen and ground should be connected to this point.

12 START-UP

12.1 General

After having completed the physical installation as described in previous sections, a systematic check of the installation and system performance should be carried out.

This work can be divided into two parts: **inspection** and **performance verification**.

When something does not work as expected the tips in paragraph TROUBLE SHOOTING may be valuable.

12.2 Inspection

- Ensure that there are no metal objects between the Reader and the Tag in the position(s) where communication is to take place.
- Ensure that the Tags and Readers are aligned according to the project documentation. Maximum communication distances and communication paths are achieved when Tag and Readers are in parallel. Communication at maximum specified distance and misalignment should be avoided.

12.3 Verifying communication

12.3.1 *Serial host communication*

Connect a PC to the prepared host connection and verify that the PC can communicate with the Reader. If the actual Reader is a standard S1566 equipped with Solid software this can be made by using the TagMaster test software ConfiTalk Commander which can be used for any Reader where the resident software was developed using ConfiLib and where ConfiTalk is enabled, for example the S1501 with Solid software. A final verification should be made using the actual host project software.

12.3.2 *Reader - Tag communication*

Put a Tag in front of the Reader preferably having the Tag on the object where it normally will be mounted. Perform repeated Tag readings when simultaneously moving the Tag along the expected movement path and checking that the Tag can be read in all expected positions.

For the S1566 the terminals interface "Confitalk commander" is used to confirm the communication. Observe the read results on the screen. It must be possible to read the Tag in all expected positions along the expected movement path. For detailed information concerning how to use Confitalk commander please refer to the manual Confident Programmer's Guide.

Special care should be taken if metal is present close to the communication lobe between Tag and Reader. In such cases adjustment of the Tag/Reader position and distance may be necessary

to find the best location of the both. Always combine this with repetitive Tag read tests to verify that the installation works well.

If the Reader is installed with a low grazing angle to a reflecting surface such as a road or floor, the multipath effect can increase the reading distance. Since the multipath effect may as well reduce the lobe width, a repetitive Tag read test is recommended to check the communication in such installations. If Tags are passing at a close distance from the Reader it might be necessary to reduce the reading range to avoid unwanted readings of remote Tags. The range is reduced by setting of the power and sensitivity parameters.

13 TROUBLE SHOOTING

This section describes problems commonly encountered during system start up

13.1 An S1566 Reader malfunction

If the reader stops to communicate with the Host or indicates malfunction in any way, the reader shall be replaced with a new reader. The non functional reader is to be sent back to TagMaster.

WARNING The TagMaster reader must NOT, under any circumstances, be opened to be checked for errors. There are no replaceable parts inside. TagMaster takes no responsibility for the consequences if the reader is opened by unauthorised personal.

13.2 Unsuitable interface converters

Connecting RS232/RS85 converters to the Reader port A or B requires intelligent converters i.e. converters that can switch between receive and transmit dependent of the information flow direction.

13.3 Interference

If more than one Reader is used in closed vicinity of each other, they must be set to different RF channels. Neglecting to do this will reduce communication range.

13.4 Using wrong address

When many Readers are controlled by one host in a polled network, different Reader addresses must be used. Neglecting this will cause serious communication problems in the network.

13.5 Forgetting the free-wheel diode across inductive loads

Inductive loads connected to the Communicator digital and relay outputs must be provided with a free-wheel-diode to prevent malfunction or damage of the Communicator.

13.6 Using different data speed in the Tag(s) and in the Reader(s).

A Reader operating at high data speed can not communicate with Tags set to low data speed and vice versa.

13.7 Using an unsuitable power supply

If an unsuitable power supply is used for powering the Readers, its functions may be unreliable. In worst case the Reader does not work at all. The power supply used for a TagMaster Reader must deliver a DC power according to following specifications:

Power supply type	Voltage limits	min DC-current
24VDC	20 - 28 Volt	200 mA
12VDC DEFAULT for S1566	10 - 14 Volt	550 mA

The voltage from the power supply must stay within the specified limits all the time. This also includes a possible ripple-voltage from the power supply.