Metor 300

MELS 5126, MCDS 5129 AND MCES 5135

MAINTENANCE MANUAL

9100 529-4VE ED. 1.30

Rapiscan® systems

An OSI Systems Company

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Rapiscan systems
An OSI Systems Company

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O.Rantala	1.30	9100 529-4VE
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MAINTENANCE MANUAL MELS 5126, MCDS 5129 AND MCES 5135		

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  - MTRS 5137 8100 705-40
    - MTXS 5138 8100 706-40
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          - MZDU 5133 8100 697-40
        - Traffic light 8100 702-40
          - MTLU 5134 8100 698-40
    - MRXS 5139 8100 707-40
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Depends on customer

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
03	MCLS -> MCES schanged product structure	2007 11	IJ	ORA
02	MSDU 5125 -> 5125.1	2004 08	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUHDE SCALE

LIITTYY NEXT ASSY: Metor 300

SUUNN. DESIGNED: 2004 08 MB
PIIRT. DRAWN: 2004 08 IJ
TARK. CHECKED: 2004 08 MB
HYV. APPROVED: 2004 08 ORA

Rapiscan® systems

Product structure
Tuoterakenne

TUOTE PRODUCT: Metor 300
OSAL.N:O PART LIST: 8100 718-40
REV.: 03
PIIR.N:O CODE: 9100 495-3QE

SINGLE LEVEL

Last.revision: 07
Revision updated: 2.11.2007
Version: PLANNING
Accept:

8100718 4OE METOR 300 1,000 KPL 07

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100705	4OE	MTRS 5137 M300 TX/RX COIL PANEL SET	1,000	KPL		01
1	20	8100703	4OE	MCES 5135 M300 CROSS PIECE AND ELECTRONICS SET	1,000	KPL		03
1	200	8100016	4OE	ACCESSORIES M300	1,000	KPL		08

Related Drawings

	9000	9100495	3QE	PRODUCT STRUCTURE METOR 300	0,000	KPL		03
	9001	9100719	4QE	ORDER AND SHIPPING STRUCTURE M300	0,000	KPL		1.30
	9002	9100392	3LE	BLOCK DIAGRAM M300	0,000	KPL		03
	9003	9100379	2JE	WIRING DIAGRAM METOR 300	0,000	KPL		04
	9004	9100522	4VE	OPERATIONAL DESCRIPTION METOR 300 v.3	0,000	KPL		1.00
	9005	9100529	4VE	MAINTENANCE MANUAL METOR 300 v.3	0,000	KPL		1.30
	9006	9100416	4VE	ERROR MESSAGES METOR 300	0,000	KPL		0.10
	9007	9100417	4VE	SOFTWARE UPDATE GUIDE METOR 300	0,000	KPL		1.20
	9008	9100722	4XE	TESTING PLAN MCSS/MTRS DETECTION COIL SYSTEM M300	0,000	KPL		1.00
	9009	9100723	4XE	TESTING PLAN ELECTRONICS MELS 5126,MCDS 5129/MDPS 5142, MRCS 5116 M300	0,000	KPL		1.00

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Author	Rev.	Code
J Niemi	1.00	9100 522-4VE
Approved	Date	Document
ORA	24.11.2004	
Product		Archives
METOR 300 v.3		METOR 300
Title		
OPERATIONAL DESCRIPTION		

METAL DETECTOR GATE, METOR 300

1 GENERAL

Metor 300 metal detector is designed to give an alarm when a metal object larger that allowed by calibration is taken through the gate. Due to multiple vertical zones the detector discriminates weapons from several small innocuous objects and indicates the height where the weapon is taken through the gate.

The Metor 300 metal detector gate consists of the following main modules:

- Crosspiece, MCCS 5136
- Receiver coil panel, MRXS 5139
- Transmitter coil panel, MTXS 5138
- Electronics set, MELS 5126
- (Remote) Display set, MDPS 5142 (without keyboard, optional)
- Control and Display set, MCDS 5129 (with keyboard)
- Remote control unit, MRCS 5115 or 5116

In the following is a description how to service the M300 main modules. Separate documents describe more in-depth description of the functions of these modules.

2 TECHNICAL DATA

2.1 Power Supply

Mains voltage, nominal:	100 – 240VAC
Mains voltage, max:	90 – 264VAC
Mains frequency:	47 - 63Hz
Battery voltage (optional):	12VDC (11.5…15V)
Mains fuses:	2 x T2AL250V, slow blow, 5x20mm

CAUTION:
DOUBLE POLE / NEUTRAL FUSING

2.2 Operating Conditions

Ambient temperature:	-10…55°C
Storage temperature:	-20…55°C
Humidity:	0 – 95%, no condensation
Protection class:	IP21, IP41 optional

2.3 Power Consumption

This is the power consumption of the complete metal detector including the Display Unit, two Zone Displays and Traffic Lights.

State	DC +12V	AC (line)
Standby (transmitters off)	10W	13W
Normal (transmitters on, no alarm)	52W	72W
Alarm (50% of Zone Display lights on)	64W	89W

3 CROSSPIECE

The crosspiece consists of:

- Frame, made of extruded aluminum profile
- Support brackets for the MELS
- Lid
- Connector cover

The crosspiece is not symmetrical and must be installed so that the electronics set is closer to the receiver panel. On the MELS support brackets are stickers “RX” and “TX” that indicate the orientation.

4 ELECTRONICS

The MELS is the main electronics unit in M300. It includes several printed circuit boards and the AC/DC power supply.

4.1 Replacing the MELS

- Disconnect the coil cables from coils
- Disconnect Display Unit cable from the Display Unit
- Disconnect the mains cord and battery cable from the MELS
- Loosen, dot not remove, the four finger screws holding the MELS in place
- Support the MELS and pull the finger screws next to power switch inwards
- Withdraw the MELS from the crosspiece

Note that the coil cables are connected on top of the MELS and cannot be disconnected without removing the MELS from the crosspiece.

5 DISPLAY UNIT

The Display Unit has an alphanumeric display for user interface, Red (alarm), yellow (wait) and green (ready) lamps, buzzer for alarm sound and (optional) keyboard.

The Display Unit can be mounted on either side of the crosspiece or on either coil panel. The Display Unit can be secured to crosspiece by two M4 screws.

If the MDPS is replaced the MRCU serial number must be taught to the new MDPS. See INSTALLATION AND OPERATING MANUAL for the correct procedure.

6 COIL PANELS

The Receiver coil panel and Transmitter coil panel are externally identical except that the transmitter side has two photocells and the receiver side has two reflectors on the inside.
Up to two Zone Displays and two Traffic Lights can be mounted to M300 in any combination to either panel.

6.1 Replacing the Zone Display or Traffic Light

To Replace Zone Display or Traffic Light, follow the procedure described in the INSTALLATION AND OPERATING MANUAL.

6.2 Replacing the MTXU board

- Disconnect the coil cable from inside the crosspiece
- Remove the top cover of the coil panel
- Disconnect Zone Display and Traffic Light cable
- Remove the three panhead screws holding the PCB in place (two next to the coil cable connector and one under the top cover)
- Withdraw the unit so that you can see all the five IDC connectors (three 16-pin connectors to the coils and two four-pin to the photocells)
- Note the locations of the connectors on the PCB so that they are not mixed in reassembly
- Disconnect the three 16-pin connectors (leave the four-pin connectors in place)
- Withdraw the PCB from the coil panel
- Disconnect the photocell cables and secure them so that they will not fall inside the coil panel or get swapped
- Installation is reverse to removing

6.3 Replacing the MRXU board

Replacing the MRXU board is carried out in a similar manner as the MTXU board, except that the MRXU board has only one 16-pin connector and no photocell connectors.

6.4 Testing Coils

In the following is listed the nominal coil resistances of the RX- and TX - coils. When measuring the resistances disconnect the cable from the PCB.

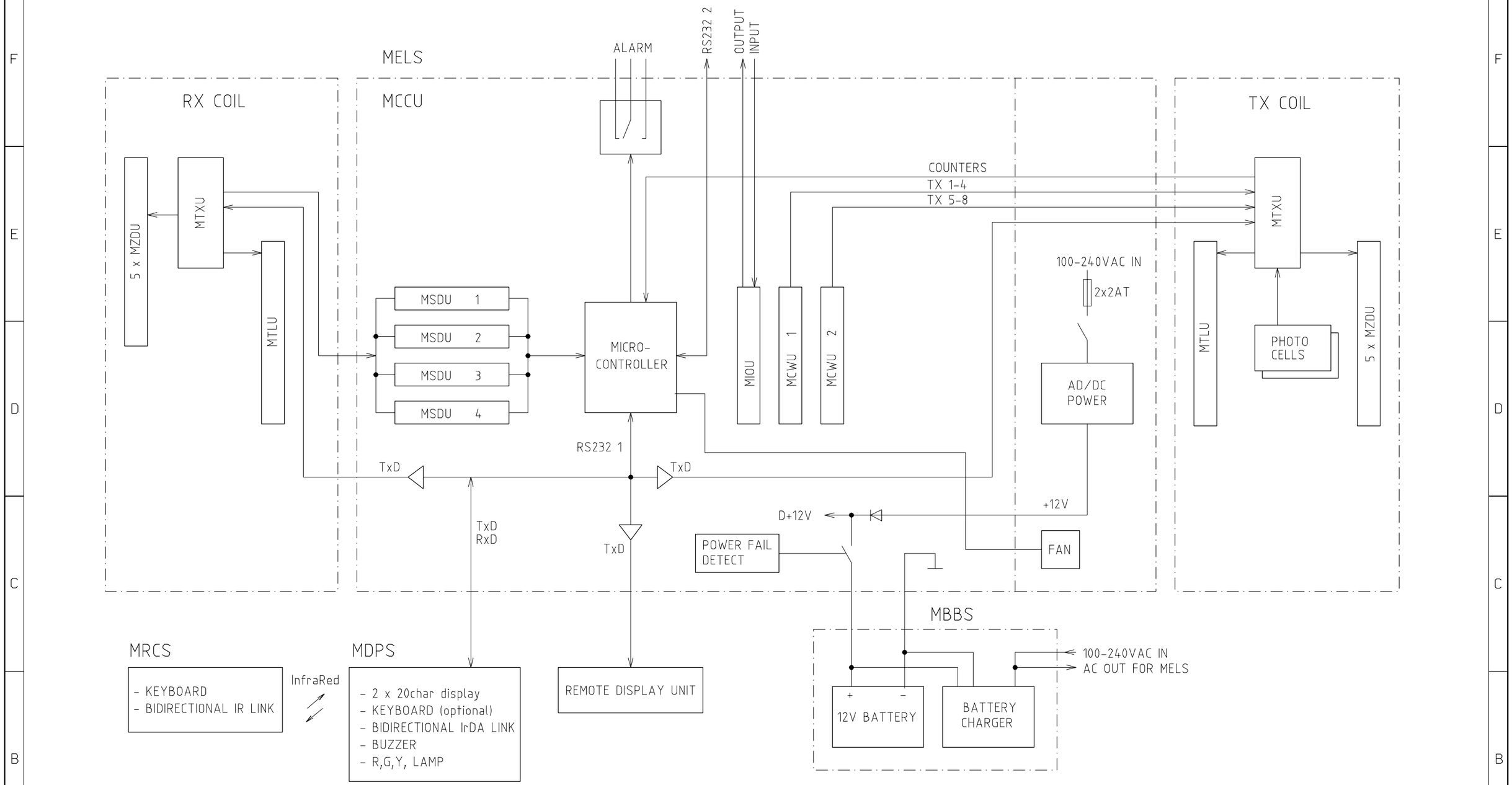
		Chann1	Chann2	Chann3	Chann4	Chann5	Chann6	Chann7	Chann8
TX	X pins	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16
	R (ohm)	3,7±0,4	3,2±0,4	2,8±0,3	2,8±0,3	2,7±0,3	2,7±0,3	2,7±0,3	2,6±0,3
	L (mH)	0,24±0,02	0,28±0,02	0,28±0,02	0,28±0,02	0,28±0,02	0,28±0,02	0,28±0,02	0,28±0,02
RX	X pins	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16
	R (ohm)	8,5±0,9	6,9±0,7	5,8±0,6	5,8±0,6	5,8±0,6	5,7±0,6	5,7±0,6	5,6±0,6
	L (mH)	0,71±0,04	0,70±0,04	0,74±0,04	0,74±0,04	0,74±0,04	0,74±0,04	0,74±0,04	0,74±0,04

Resistance of the transformers inside the TX coil must be less than 1.0ohm. The transformers are connected to X9 and X3 (labeled ”TRANSFORMERS1” and ”TRANSFORMERS2” on the MTXU board). Check the resistance between pins 1-2, 3-4, 5-6 … 15-16. When measuring the resistances disconnect the cable from the MTXU.

7 REMOTE CONTROL UNIT

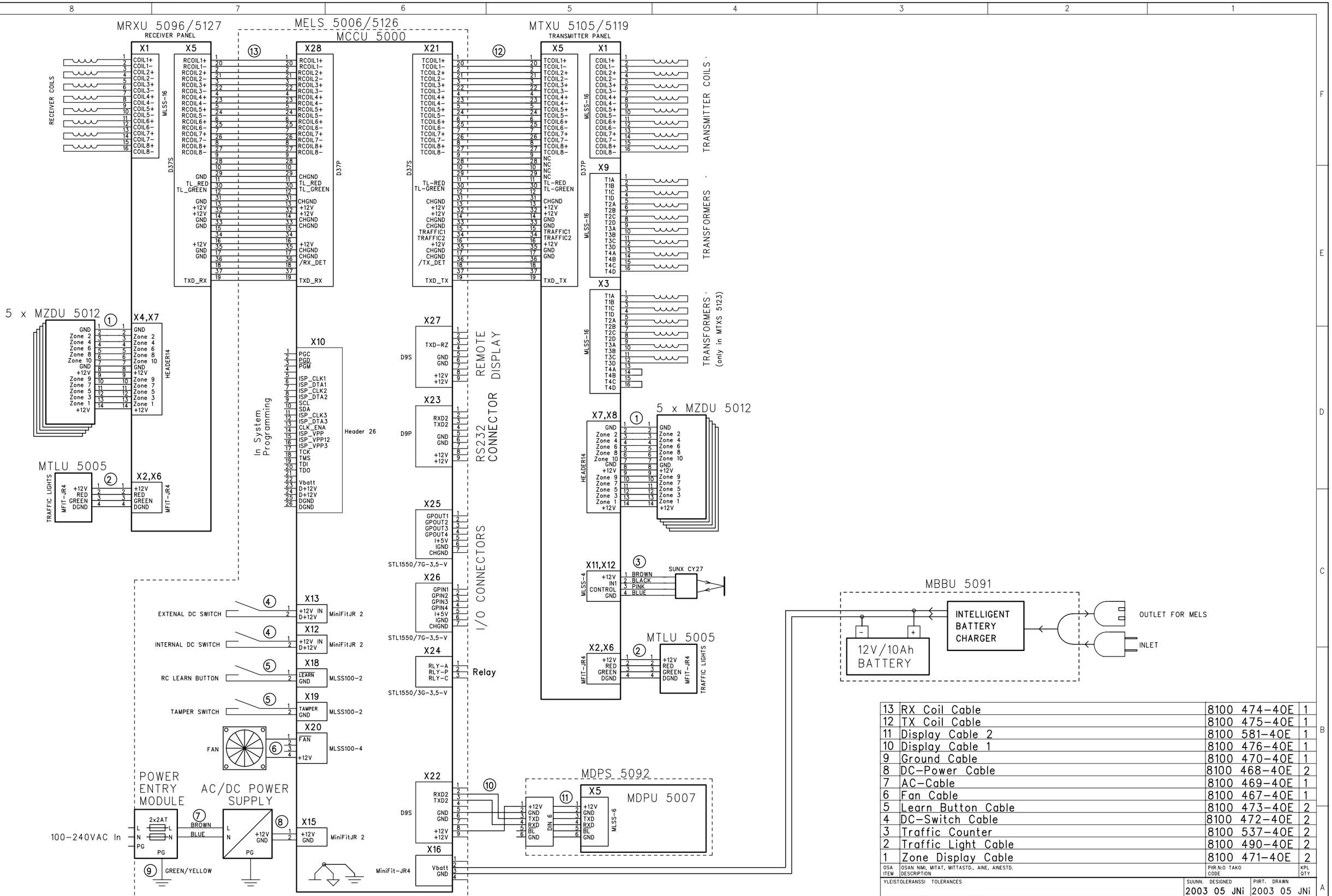
The Remote Control unit MRCS is normally stored inside the crosspiece. The MRCS communicates with the Display Unit via bi-directional infrared link.

If the MRCS is replaced the new MRCS serial number must be taught to the MDPS. See Installation and Operating Manual for the correct procedure.



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
03	Poistettu tyyppinumerot/Deleted type numbers	2004 03	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2003 01 JNI	PIIRT. DRAWN 2003 01 IJ
SUHDE SCALE	LIITTYY NEXT ASSY Metor 300	TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA
		TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 000-40	REV. 03
Rapiscan® systems	Metor 300 Block diagram	PIIR.N:O CODE 9100 392-3LE	



13	RX Coil Cable	8100 474-40E	1
12	TX Coil Cable	8100 475-40E	1
11	Display Cable 2	8100 581-40E	1
10	Display Cable 1	8100 476-40E	1
9	Ground Cable	8100 470-40E	1
8	DC-Power Cable	8100 468-40E	2
7	AC-Cable	8100 469-40E	1
6	Fan Cable	8100 467-40E	1
5	Learn Button Cable	8100 473-40E	2
4	DC-Switch Cable	8100 472-40E	2
3	Traffic Counter	8100 537-40E	2
2	Traffic Light Cable	8100 490-40E	2
1	Zone Display Cable	8100 471-40E	2

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
04	Updated MRXU, MTXU, MELS type	2004 02	JNI	ORA

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SUHDE SCALE

LIITTYY NEXT ASSY: Metor M300

SUUNN. DESIGNED: 2003 05 JNi
PIIRT. DRAWN: 2003 05 JNi
TARK. CHECKED: 2003 09 JNI
HYV. APPROVED: 2003 09 ORA

TUOTE PRODUCT: Metor 300

OSAL.N:O PART LIST: 8100 000-40
REV.: 04

PIIR.N:O CODE: 9100 379-2JE

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Wiring diagram page 1/1

3

MELS ELECTRONICS UNIT

SINGLE LEVEL

Last.revision: 05
Revision updated: 8.2.2008
Version: PLANNING
Accept:

8100649 4OE MELS 5126 M300 ELECTRONICS SET 1,000 KPL 05

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100489	4OE	ELECTRONICS BOX *1	1,000	KPL		04
1	20	8100001	4OE	MCCU 5000 M300 CONTROL AND COMMUNICATION UNIT *2	1,000	KPL		19
1	30	8100648	4OE	MSDU 5125 M300 SIGNAL DETECTION UNIT *3	0,000	KPL	F1	02
1	31	8100732	4OE	MSDU 5125.1 M300 SIGNAL DETECTION UNIT *3	4,000	KPL	F1	03
1	40	8100004	4OE	MIOU 5003 M300 INPUT OUTPUT UNIT *4	1,000	KPL	O1	04
1	50	8100456	4OE	MCWU 5093 M300 CONTINOUS WAVE UNIT *5	2,000	KPL		08
1	60	8100466	4OE	BATTERY CABLE M300 *6	1,000	KPL		02
1	70	8100467	4OE	FAN WITH CABLE M300 *7	1,000	KPL		02
1	80	8100468	4OE	DC-POWER CABLE M300 *8	1,000	KPL		06
1	90	8100469	4OE	AC-CABLE M300 *9	1,000	KPL		04
1	100	8100470	4OE	GROUND CABLE M300 *10	1,000	KPL		01
1	110	8100472	4OE	DC-SWITCH CABLE M300 *11	2,000	KPL		04
1	120	8100473	4OE	LEARN BUTTON CABLE M300 *12	2,000	KPL		03
1	140	8100631	4PE	S/N LABEL BASE 14x76 *14	1,000	KPL		A
1	160	3061174		AC/DC-POWER SUPPLY 85-264VAC/12V,65W PFC ARTESYN NLP65-9612 or UMEC/MESPEK UP0651S-02 or SKYNET ELECTRONIC SNP-Z077 *16	1,000	KPL		

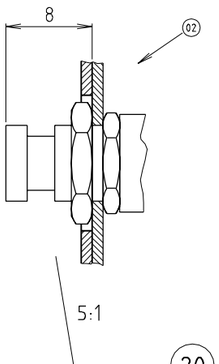
SINGLE LEVEL

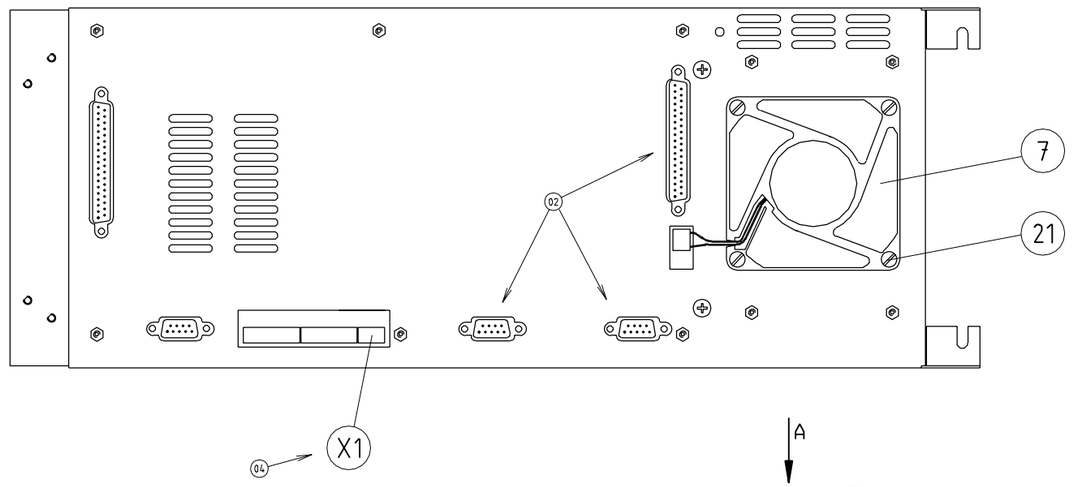
8100649 4OE MELS 5126 M300 ELECTRONICS SET 1,000 KPL 05

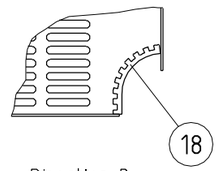
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	170	3061267		FUSE DRAWER 2 POLE SCHURTER 4303.2401 or ZFKE-0028-0002E TIMONTA *17	1,000	KPL		
1	175	3060549		CONNECTOR AK1550/3-3,5-B-GREEN PRINTING N:o 1-3 or MC1.5/3-ST-3.5 1840379 PHOENIX *X1	1,000	KPL		
1	180	1330935		FUSE GLASS TUBE 5x20MM T2AL/H250V IEC/UL GMC-2A COOPER BHUSSMANN *F1	2,000	KPL		
1	190	3061266		MAINS FILTER 2A CD24.1101.151 SCHURTER or FKSP2-55-2I TIMONTA *ZF1	1,000	KPL		
1	200	3061421		GROMMET STRIP SES DX 1 C 1mm 0826 0001 018 *18	0,040	m		
1	250	3054962		PAN HEAD SCREW M3x8-A2-Z-AISI 304 ISO 7045 *19	10,000	KPL		
1	260	3061311		COUNTERSUNK FLAT HEAD SCREW M3x8-A2-Z-AISI 304 *20	2,000	KPL		
1	270	3061422		NYLON SCREW M4x30 CHEESEHEAD EMICO 250 0430 *21	4,000	KPL		
1	280	3061298		WASHER A-3-A2 AISI 304 DIN 6798 *22	11,000	KPL		
1	290	1382662		HEXAGON NUT M3 AISI 304-8-FE/A1J ISO 4032 *23	1,000	KPL		
1	300	3061345		FINGER SCREW M4x12 PS1412M412S *24	2,000	KPL		

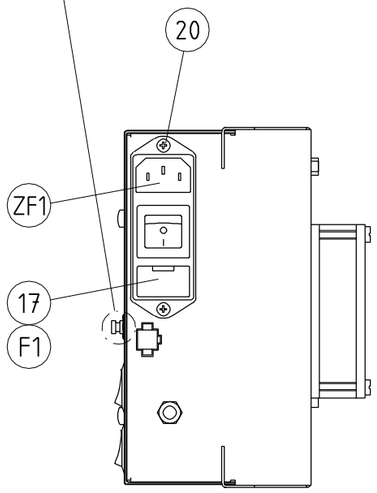
Related Drawings

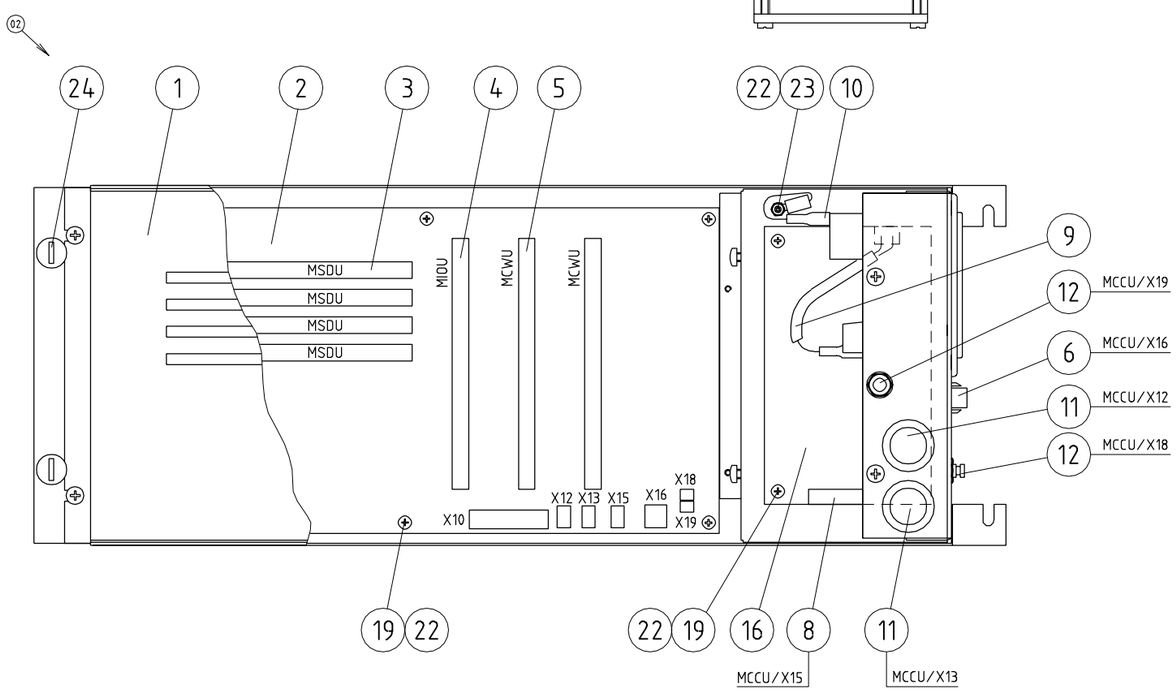
	9001	9100259	2KE	ELECTRONICS SET MELS 5006 M300	0,000	KPL		05
	9002	9100523	4VE	OPERATIONAL DESCRIPTION MELS 5126 M300	0,000	KPL		1.00
	9003	9100404	4XE	TEST SPESIFICATION MELS 5006, 5126	0,000	KPL		1.30
	9004	9100729	4XE	INCOME INSPECTION MELS/MCDS/MRCS M300	0,000	KPL		1.20

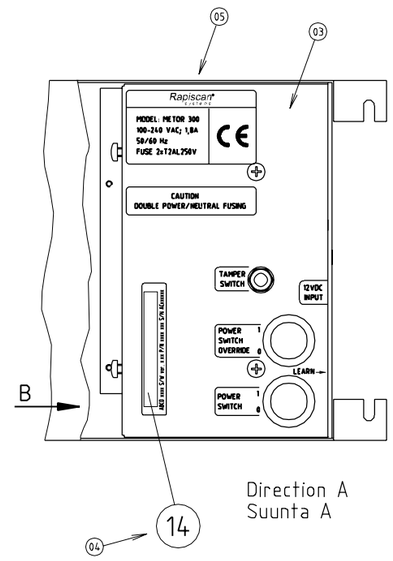












REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
05	Logo muutettu / Logo changed	2005 02	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES			

SUHDE SCALE 1:2	LIITTYY NEXT ASSY Metor 300	SUUNN. DESIGNED 2002 09 JNI	PIIRT. DRAWN 2002 09 IJ
		TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA
		TUOTE PRODUCT Metor 300	
Rapiscan® systems	MELS 5006, 5126 Electronics set	OSAL.N:O PART LIST	REV. 05
		PIIR.N:O CODE 9100 259-2KE	

Rapiscan systems
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Author	Rev.	Code
J Niemi	1.00	9100 523-4VE
Approved	Date	Document
ORA	24.11.2004	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MELS 5126		

ELECTRONICS SET, MELS 5126

1 GENERAL

The MELS consists of the following modules:

- Motherboard (MCCU)
- Four dual channel signal detector units (MSDU)
- Two four channel transmitter units (MCWU)
- Power supply unit
- Power inlet filter including the mains switch and fuses
- Optional input/output –unit (MIOU)
- FAN
- Two DC –power switches
- Learn and Tamper switches

In the following is a description how to replace the MELS components. Separate documents describe more in-depth description of the functions in the units.

2 MOTHERBOARD (MCCU)

This is the heart of the electronics: it contains the main processor, A/D –converter and sockets for the MSDU and MCWU –boards etc. All the external units i.e. coil cables, Display Unit, Remote Display etc. are connected to the MCCU.

2.1 Replacing the motherboard

- Disconnect cables (coil cables, fan, and Display Unit cable) from the backside of the MELS
- Loosen, do not remove, the four M4 panhead (PZ2) screws that hold the MELS cover in place and remove the cover
- Disconnect the internal cables coming from the power supply compartment
- Remove the MSDU and MCWU boards (twist the metal latches at the end of the sockets outwards until the board becomes free)
- Remove the six panhead screws (PZ1, M3x8) holding the MCCU in place.
- Withdraw the MCCU from the MELS
- When installing the new MCCU pay attention to connect the internal cables coming from the power supply compartment to their proper places, especially the Learn and Tamper button cables (X18 and X19).

- When installing MSDU and MCWU boards, verify that the metal latches are locked and the plastic pins next to the latches are properly seated in the holes in the MSDU/MCWU board

3 SIGNAL DETECTOR UNITS (MSDU)

The MELS contains four dual channel signal detectors, totaling eight channels. These boards amplify and filter the signal from the receiver coils. All the four boards are identical; in case of failure, the faulty one is easy to find by swapping boards and monitoring the effect on signal detection.

3.1 Replacing the Signal Detectors

To remove the board, twist the metal latches at the end of the sockets on the MCCU outwards until the MSDU board becomes free. When installing the board, verify that the metal latches are locked and the plastic pins next to the latches are properly seated in the holes in the MSDU board.

4 TRANSMITTER UNITS (MCWU)

The MELS contains two four-channel transmitter units (MCWU). These boards contain the power transmitters that drive the transmitter coils. Both boards are identical; in case of failure, the faulty one is easy to find by swapping boards and monitoring the effect on gate operation.

Replacing the boards is carried out in a similar manner as replacing the Signal Detector Units.

5 POWER SUPPLY AND ASSOCIATED COMPONENTS

The MELS contains a universal input, 65W 12VDC power supply. All components connected to the line voltage are enclosed in a separate compartment. To gain access to this compartment, four screws (PZ2 M4x10) must be removed: two on the top and two at the bottom.

WARNING: Line voltage is present on numerous components inside the power supply compartment. Always remove the power cord from the MELS before servicing the power supply.

If the power supply is to be removed, the external DC-switch (in the corner) and the power inlet module must be removed to gain access to the mounting screws.

CAUTION:
DOUBLE POLE / NEUTRAL FUSING

6 INPUT/OUTPUT UNIT (MIOU)

This is an optional board that adds four galvanically isolated inputs and outputs to the MELS. These lines are connected to the MCCU connectors X25 and X26.

Replacing the boards is carried out in a similar manner as replacing the Signal Detector Units.

7 FAN

The fan is connected by four M4x30 plastic screws.

CAUTION: REPLACE THE FAN SCREWS ONLY WITH EQUIVALENT (PLASTIC) ONES, AS METAL SCREWS MAY SHORT THE POWER SUPPLY OR AT LEAST WILL DECREASE THE SAFETY ISOLATION AIR GAP.

8 DC –POWER SWITCHES

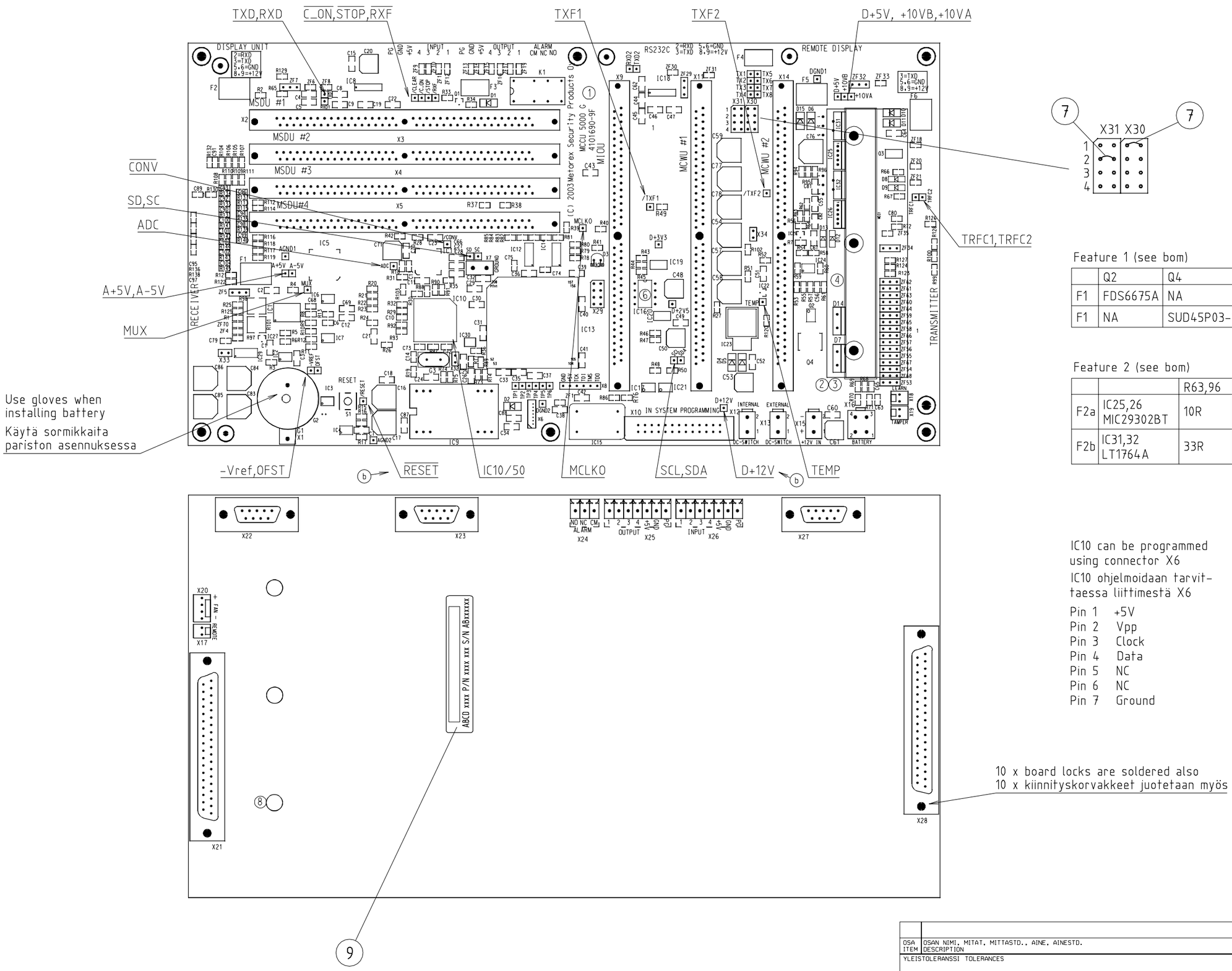
These two switches are named as internal DC- switch and external DC – switch. Only the external switch is visible when the crosspiece lid is closed. Switches are connected in parallel on the MCCU board.

9 LEARN AND TAMPER SWITCHES

If the Tamper switch is to be replaced, remember to install the new one so, that it reaches as far out of the MELS as possible. Otherwise the crosspiece lid will not close the switch, and tamper alarm newer turns off.

4

MCCU CONTROL AND COMMUNICATION UNIT



Feature 1 (see bom)

	Q2	Q4
F1	FDS6675A	NA
F1	NA	SUD45P03-15A

Feature 2 (see bom)

		R63,96
F2a	IC25,26 MIC29302BT	10R
F2b	IC31,32 LT1764A	33R

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
c	Added Feature 1 and 2	2004 01	IJ	ORA
b	Printing on PCB and notes modified	2004 01	IJ	ORA
a	PCB F->G	2003 12	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2002 06 JNI	PIIRT. DRAWN 2002 07 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY MELS 5006	TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA
Rapiscan® systems	MCCU 5000 Control and communication unit	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 001-40	REV. C
		PIIR.N:O CODE 9100 295-2KE	

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.10	9100 408-4VE
Approved	Date	Document
ORA	26.8.2003	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MCCU 5000		

CONTROL AND COMMUNICATIONS UNIT, MCCU 5000

1 GENERAL

The main components located on the MCCU are the main microcontroller, a 16 -bit serial A/D –converter, a 16 -channel analog multiplexer, a real time clock (RTC), 32 Kbytes serial EEPROM, a Field Programmable Gate Array (FPGA) and power regulators. It contains also sockets for the MSDU, MIOU and MCWU –boards. All the external units i.e. coil cables, display unit, remote display etc. are connected to the MCCU.

2 OPERATIONAL DESCRIPTION

2.1 Signal Chain

Metal signals from MSDUs are demultiplexed and then fed to A/D –converter via gain and offset adjustment circuit. The FPGA reads conversion results from the A/D –converter and removes noise by digital filtering. Finally the processor reads data from the FPGA and calculates the amount of metal.

2.2 Power Supplies

The M300 is powered by a universal 12V power supply. The MCCU has two separate linear low drop regulators, one for each MCWU, to regulate the transmitter voltage (9.8V). ±5V for the analog circuitry is created by a DC/DC –converter. +5V for the digital parts is regulated from 12V supply. +2.5V and +3.3V for the FPGA are also regulated from the 12V power supply.

A power fail detection circuit monitors the +12V power supply voltage and switches to battery when the 12V supply drops below 10.75V. Two schottcy diodes prevent current from the battery from flowing to the power supply and vice versa.

The 12V power supply is connected to MRXU, MTXU, Display Unit, Remote Display and RS232 connector via a resetable fuse located next to each connector on the MCCU.

2.3 Real Time Clock

The MCCU is equipped with a Real Time Clock circuit. This circuit is powered from a lithium battery (CR2032) when power is turned off the gate. Lifetime of the battery is over ten years and is limited by its self discharge current.

CAUTION:
RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

2.4 EEPROM

On the MCCU is two 16kByte serial EEPROM that are connected via I2C bus to the microcontroller. These memories are used to store all the adjustable parameters.

2.5 Reset

A reset circuit monitors the +5V power supply and resets the microcontroller, FPGA and MSDUs when the D+5V supply voltage drops below 4.65V.

2.6 Oscillator

A crystal sets the operating frequency for the microcontroller. A separate oscillator is used for the FPGA internal timings and is also connected via the FPGA and buffers to the microcontrollers on the MSDUs.

2.7 Serial Ports

On the MCCU are three DB9 serial port connectors; one is for the Display Unit, one for Remote Display and one is for the MetorNet. The Display Unit and Remote Display share the same serial port in the microcontroller but only transmit data (TxD) is connected to the Remote Display. The serial port signals are buffered by ESD tolerant buffer.

2.8 Fan

The fan is turned on or off by the microcontroller depending on the MELS temperature. The fan is a Low Noise type and its operating voltage is reduced by a diode to minimize audible noise.

2.9 Self Diagnosis

The self diagnostic circuitry has the following features:

- Built in A/D –converter in the microcontroller is used to monitor supply voltages.
- Signals /RX_DET and /TX_DET have pull-up’s and are grounded at the MRXU and MTXU boards, respectively. These signals are used to verify that the RX and TX -cables are connected.
- Signal /RX_FAIL goes LOW if any one of the receiver coils is disconnected or broken. This line is driven by the MSDUs. Shorted coil is not detected.

- Transmitter current monitor circuit on each channel sets /TX_FAIL1 or /TX_FAIL2 signal LOW if no or low current goes to any one of the transmitter coils 1-4 or 5-8, respectively. These lines are driven by the MCWU boards #1 and #2.
- A temperature sensor is used to monitor the MCCU temperature. Sensor output is 500mV+10mV per degrees Celsius.
- The /FPGA_OK signal goes LOW when the FPGA is configured properly. This signal controls the green LED (D3) on the MCCU.
- The /BB_DET signal is LOW when the battery backup is connected

3 TEST POINT SIGNALS

In the following table is listed DC-voltages at relevant testpoints:

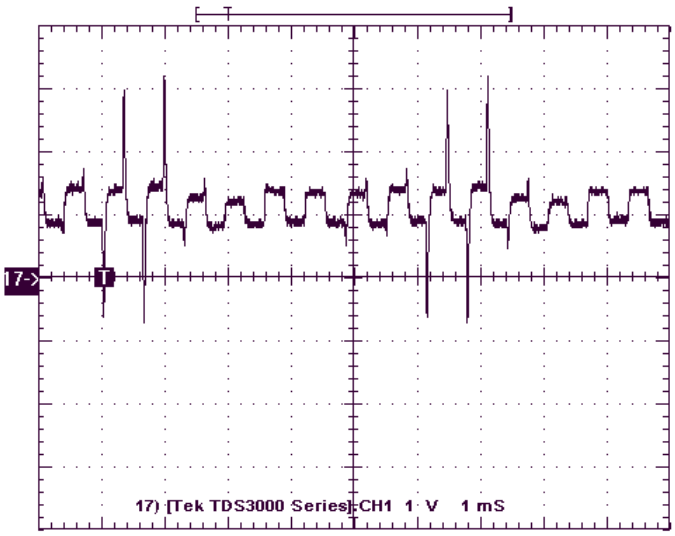
Testpoint	Low limit	Nominal Voltage	High Limit
TEMP		500mV+10mV/°C	
-Vref	-2.53V	-2.5V	-2.47V
D+5V	4.5V	5.0V	5.5V
A+5V	4.5V	5.0V	5.5V
A-5V	-5.5V	-5.0V	-4.5V
+10VA	9.6V	9.8V	10.0V
+10VB	9.6V	9.8V	10.0V
SCL (passive)	4.5V	5.0V	5.5V
SDA (passive)	4.5V	5.0V	5.5V
NET D+12V	11.0V	11.5V	14.0V (on battery)

In the following table is listed testpoints used for diagnostics:

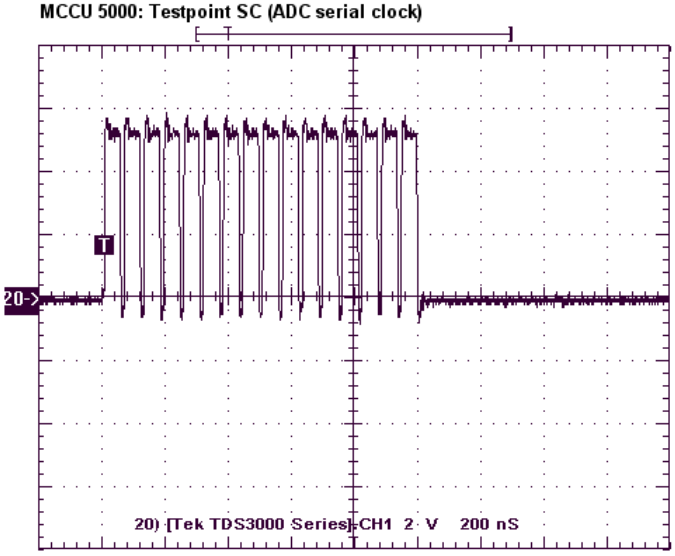
Testpoint	Description
/TXF1	Low when transmitter coil 1,2,3 or 4 has failed (no current)
/TXF2	Low when transmitter coil 1,2,3 or 4 has failed (no current)
/RXF	Low when receiver coil has failed (open circuit)
/RXDET (X28 pin 36)	Low when MRXU board is connected to MELS
/TXDET (X21 pin 36)	Low when MTXU board is connected to MELS
/STOP	Low when MCCU stops MSDU operation
/C_ON	Low when MSDUs are compensating for large static metal object
/CLEAR	Not used
/FCLK	Not used
TRFC1	Traffic counter, high pulse on walkthrough, direction 1
TRFC2	Traffic counter, high pulse on walkthrough, direction 2
/RESET	Low resets the MCCU and MSDU microcontrollers

Next pictures show typical waveforms on some points:

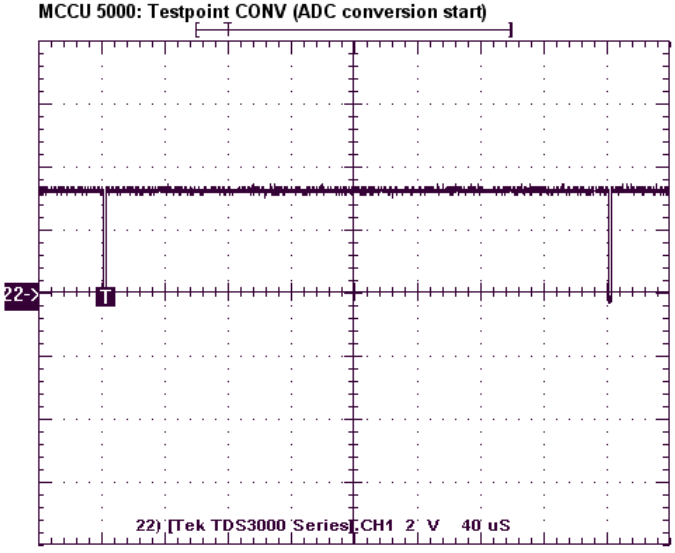
MCCU 5000: Testpoint ADC (A/D-converter input)



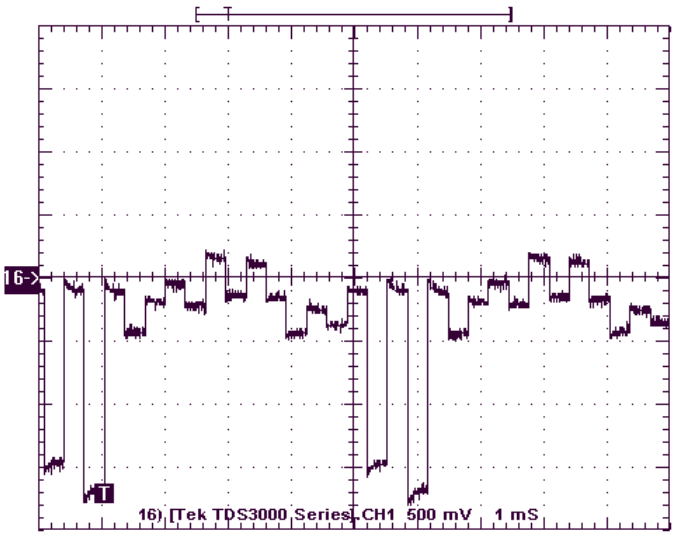
MCCU 5000: Testpoint SC (ADC serial clock)



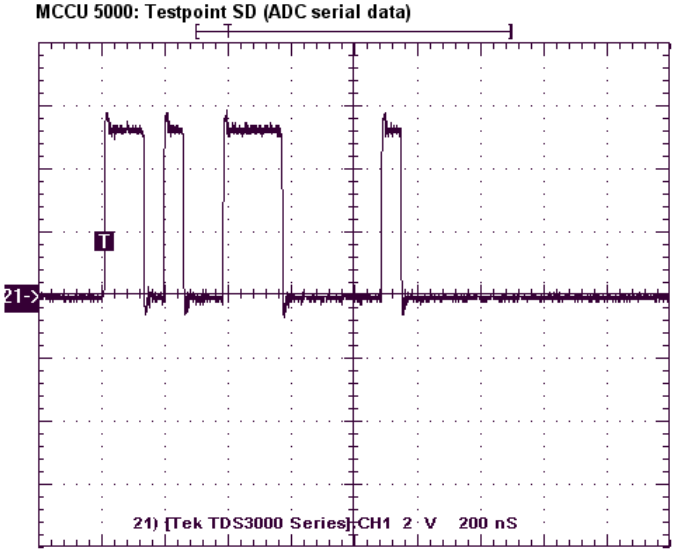
MCCU 5000: Testpoint CONV (ADC conversion start)



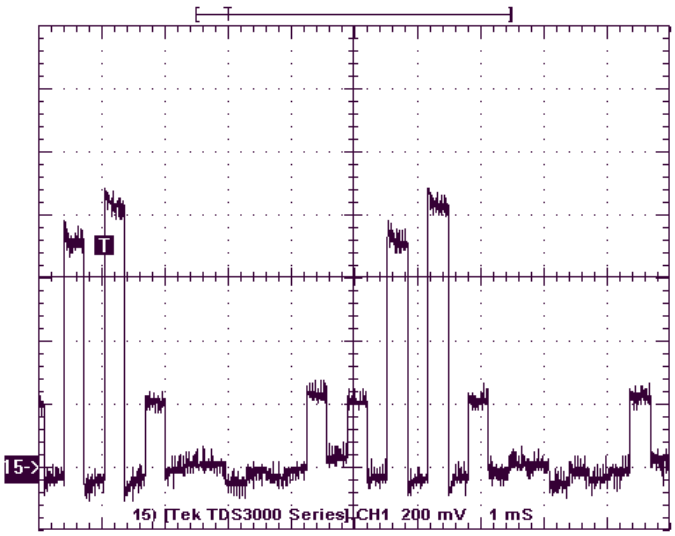
MCCU 5000: IC5 pin 28 (multiplexer output)



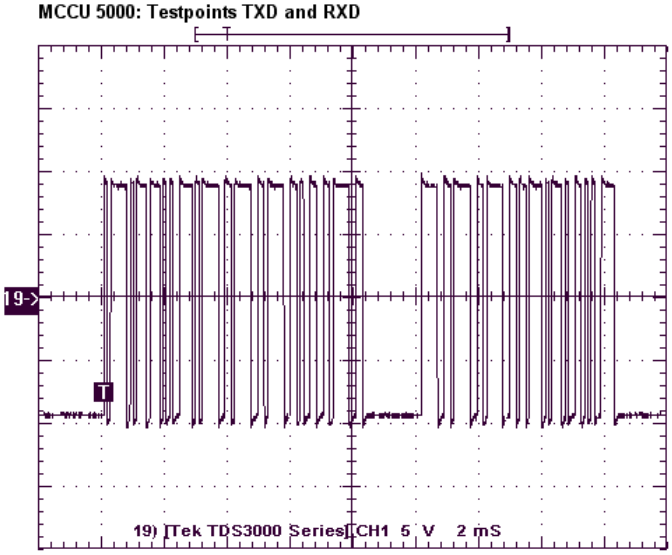
MCCU 5000: Testpoint SD (ADC serial data)



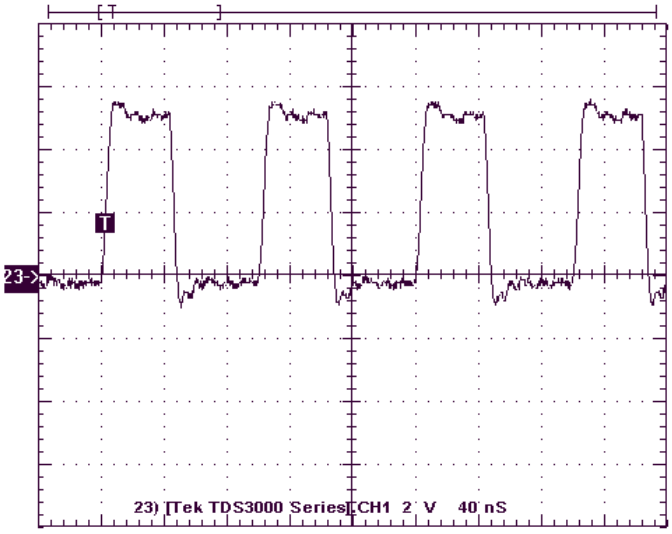
MCCU 5000: Testpoint OFFS (signal offsets for 16 channels)



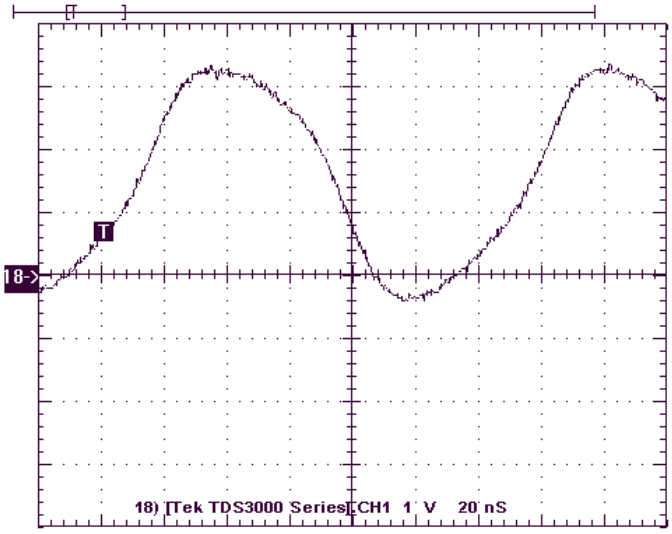
MCCU 5000: Testpoints TXD and RXD



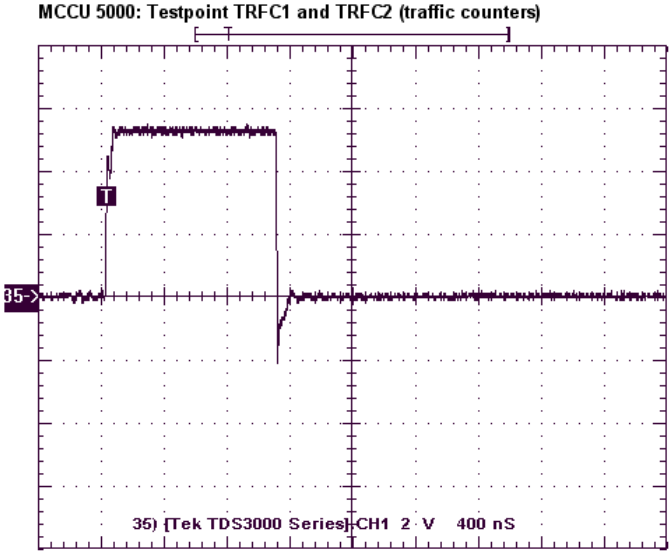
MCCU 5000: IC14 pin 2 (MSDU PIC clock)

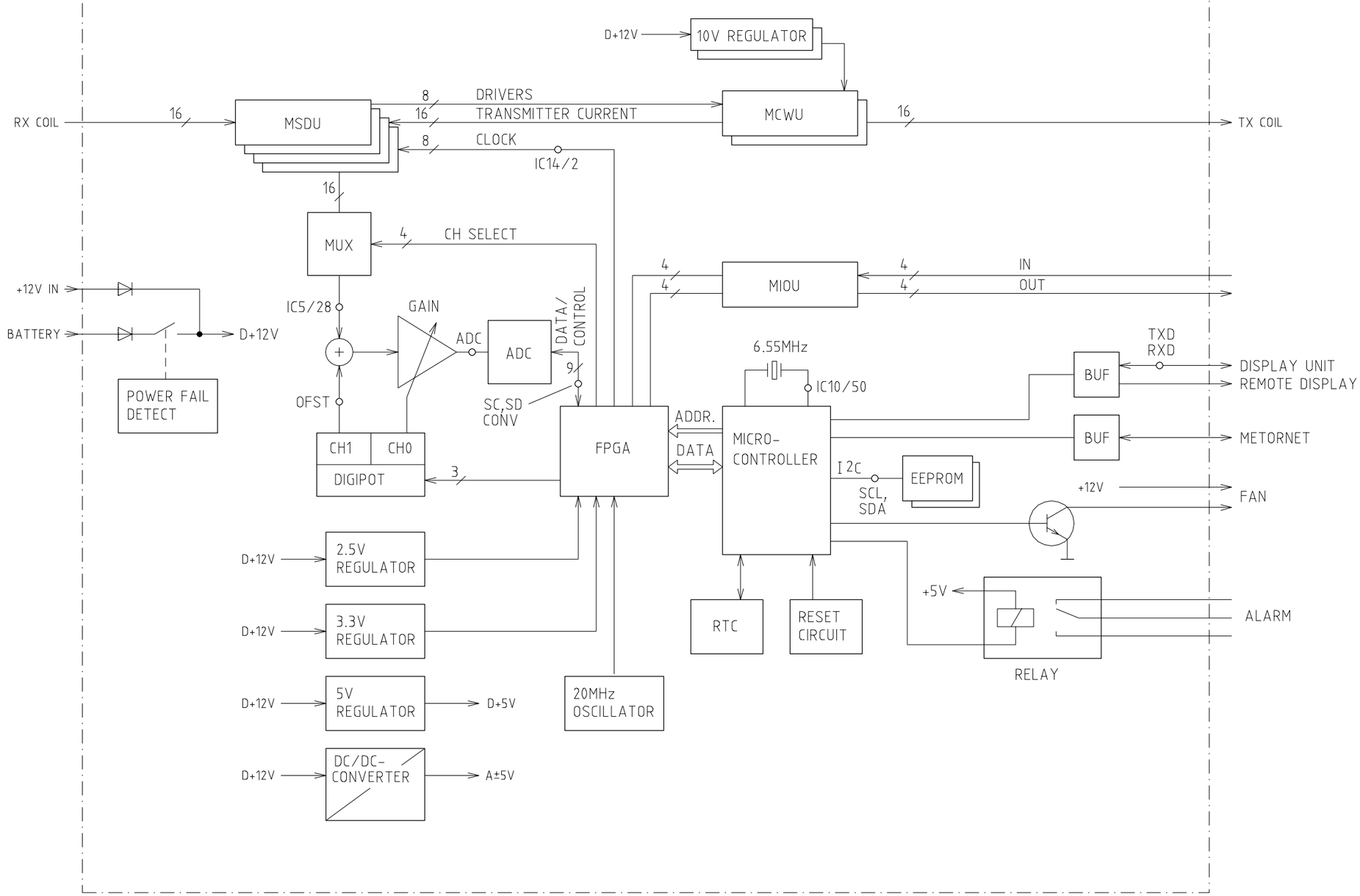


MCCU 5000: IC10 pin 50 (PIC clock output)



MCCU 5000: Testpoint TRFC1 and TRFC2 (traffic counters)





OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUHDE SCALE

LIITTYY NEXT ASSY: Metor 300

SUUNN. DESIGNED: 2003 01 JNI

PIIRT. DRAWN: 2003 01 IJ

TARK. CHECKED: 2003 09 JNI

HYV. APPROVED: 2003 09 ORA

TUOTE PRODUCT: Metor 300

OSAL.N:O PART LIST: 8100 001-40

REV.: 03

PIIR.N:O CODE: 9100 387-3LE

Rapiscan® systems

MCCU 5000
Block diagram

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
04	Poistettu tyyppinumerot/Deleted type numbers	2004 03	IJ	ORA

Author	Rev.	Code
JTY/ORA	1.20	9100 530-4EE
Approved	Date	Document
ORA	17.10.2007	
Product		Archives
Metor 300		Metor 300
Title		
MDPU / MCCU SOFTWARE VERSIONS		

1
Version 2.00 (M300 v.3 MELS 5126)

1. SW modifications (M300 v.3, compared to sw version 1.3 / M300 v.1)

- PG 11 US-AIRPORTS added
- Signal processing in ch1 and ch 2 modified.

2. Usage

- SW can be programmed to current standard MELS 5126 with Labview BOOTLOADER program.
- MELS/MDPS/UI sw version are needed to be same version
- NOTE!
  Not compatible with MELS 5006 / 32Mhz / M300 v.1 or MELS 5126 / M300 v.2.

1.1
MDPU 5128

File: MDPU_2_00.hex
Checksum: 56 5d 7a 00 9d fc 4f 35 42 3f b9 71 b6 40 fe 2a
Date: 11.11.2004

1.2
User Interface

File: UI_2_00.TXT
Checksum: fc 67 b9 85 e3 42 da ed fe da cb a5 2f 17 ea 84
Date: 11.11.2004

1.3
MCCU 5000

File: MCCU_2_00.hex
Checksum: 07 73 71 58 80 9e d2 97 81 8a c5 27 95 f0 32 c9
Date: 11.11.2004

2
Versio 2.10 (M300 v.3 MELS 5126)

1. SW modifications (M300 v.3, compared to sw version 2.00)

- ”Randon alarm” function added.

2. Usage

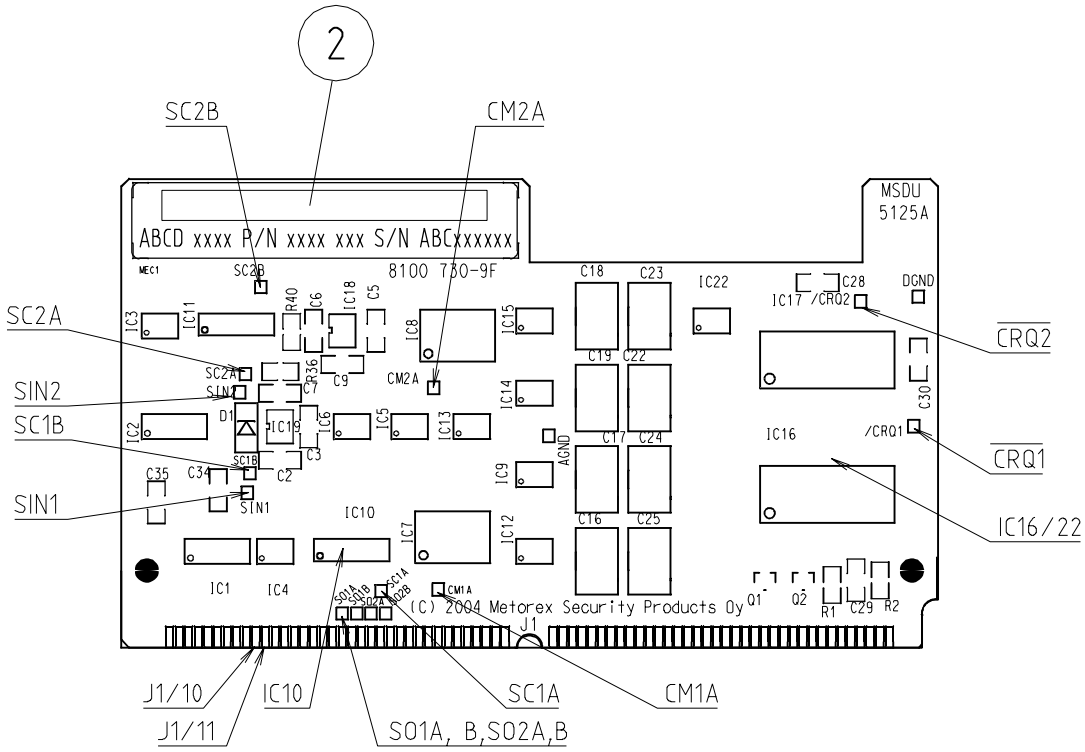
- SW can be programmed to current standard MELS 5126 with Labview BOOTLOADER program.
- MELS/MDPS/UI sw version are needed to be same version
- NOTE!
  Not compatible with MELS 5006 / 32Mhz / M300 v.1 or MELS 5126 / M300 v.2.

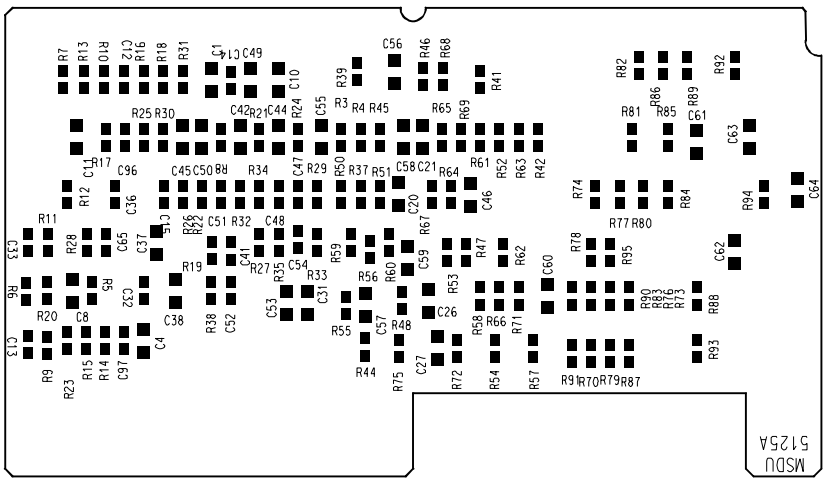
5

MSDU SIGNAL DETECTION UNIT

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.





OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 08 JNI	PIIRT. DRAWN 2004 08 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY MELS 5006, 5126	TARK. CHECKED 2004 08 JNI	HYV. APPROVED 2004 08 ORA
		TUOTE PRODUCT Metor 300	
Rapiscan® systems	MSDU 5001.1, 5125.1 Signal detection unit	OSAL.N:O PART LIST	REV. 01
		PIIR.N:O CODE 9100 500-4KE	

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.00	9100 524-4VE
Approved	Date	Document
ORA	24.11.2004	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MSDU 5125.1		

SIGNAL DETECTOR UNIT, MSDU 5125.1

1 GENERAL

On each of the signal detector units are two identical signal detectors (channels) that both are controlled by a microcontroller. These channels are fully independent of each other. In the following is described operation of one channel.

2 OPERATIONAL DESCRIPTION

An instrumentation amplifier amplifies the incoming signal from the receiver coil. Next feedback signal from transmitter current is added to compensate transmitter current fluctuations. The signal detector circuit filters out noise and signal from other channels. Then the signal is split into real and imaginary parts that both are filtered further by a low pass filters.

The microcontroller generates the timing signal (TX1) for the respective transmitter (located on the MCWU).

Additional logic (on the board detects if the output signal is out of range (> ±2V). This happens when a very large metal object is placed next to gate. This information enables the microcontroller to adjust the DC-level in operating range using a digital potentiometer. During adjustment the /COMP_ON signal is pulled LOW to force other channels to compensate and to inform the MCCU microcontroller.

/RESET signal from the MCCU resets all the MSDUs simultaneously together with the MCCU.

3 SELF DIAGNOSIS

Each channel is equipped with a circuit that detects a coil failure, i.e. if the coil cable is disconnected or the coil circuit is open. This circuit does not detect a shorted coil. In case of failure, signal /RX_FAIL is pulled LOW by an open collector transistor. This line has a pull-up resistor located on the MCCU, so that any signal detector channel can force this line LOW.

4 TEST POINT SIGNALS

In the following table is listed DC-voltages at relevant testpoints:

Testpoint	**Low limit**	**Nominal Voltage**	**High Limit**
A+10V (IC19/5)	9V	9.5V	10V
A-10V (IC18/2)	-10V	-9.5V	-9V

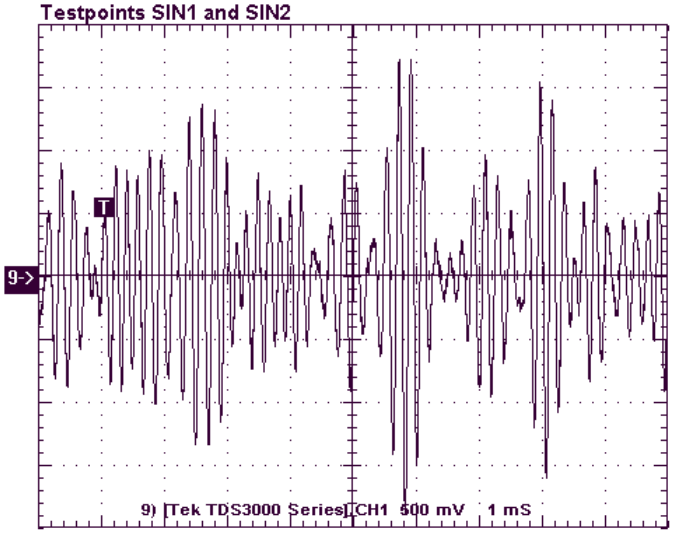
SO1A, SO1B, SO2A, SO2B	-2.0V		2.0V

In the following table is listed testpoints used for diagnostics:

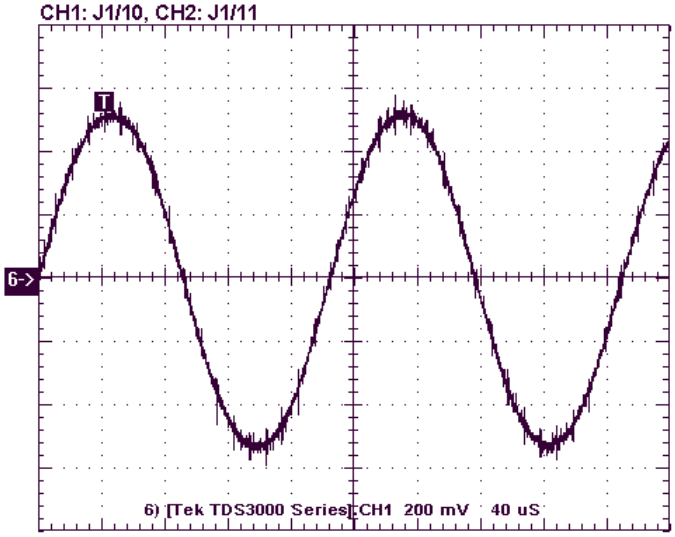
Testpoint	**Description**
/CRQ1	Low = channel # 1 output signal is out of range
/CRQ2	Low = channel # 2 output signal is out of range

Next pictures show typical waveforms on some points on channel 1:

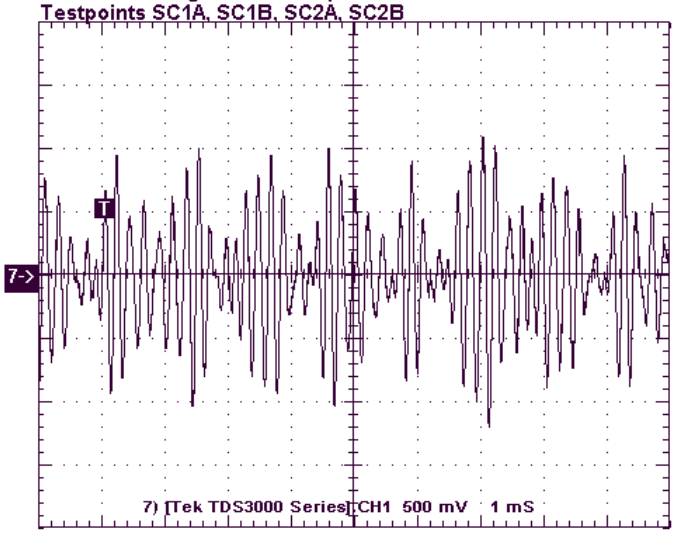
MSDU 5001: Input signal after preamplifier
Testpoints SIN1 and SIN2



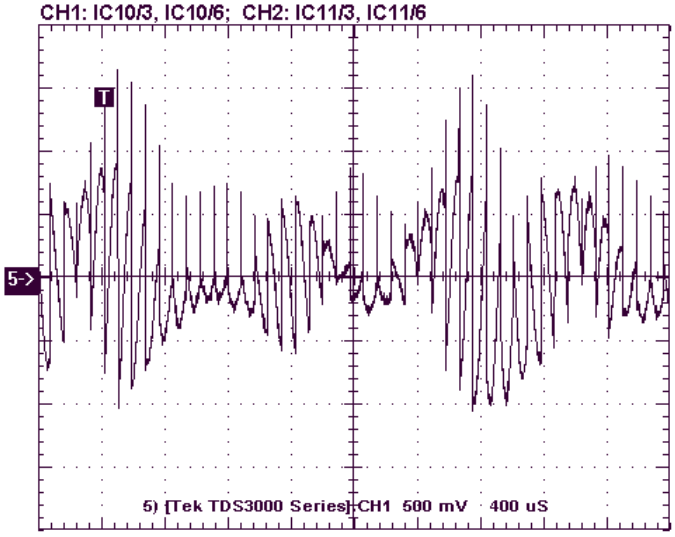
MSDU 5001: Transmitter current
CH1: J1/10, CH2: J1/11



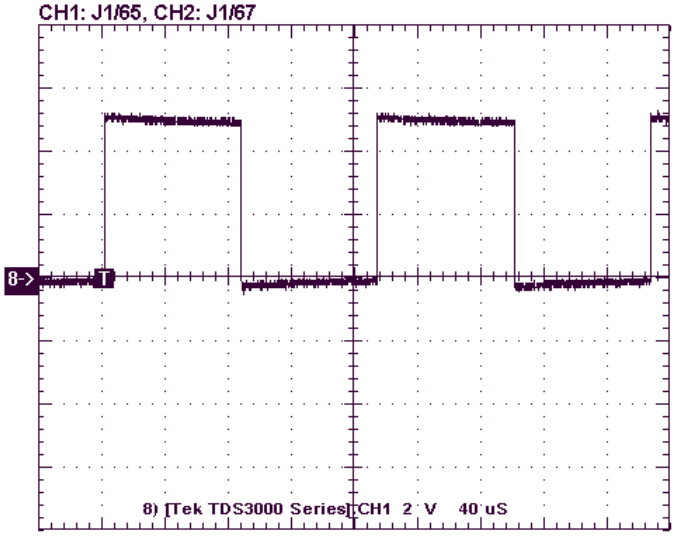
MSDU 5001: Signal after compensation
Testpoints SC1A, SC1B, SC2A, SC2B



MSDU 5001: Rectified signal
CH1: IC10/3, IC10/6; CH2: IC11/3, IC11/6

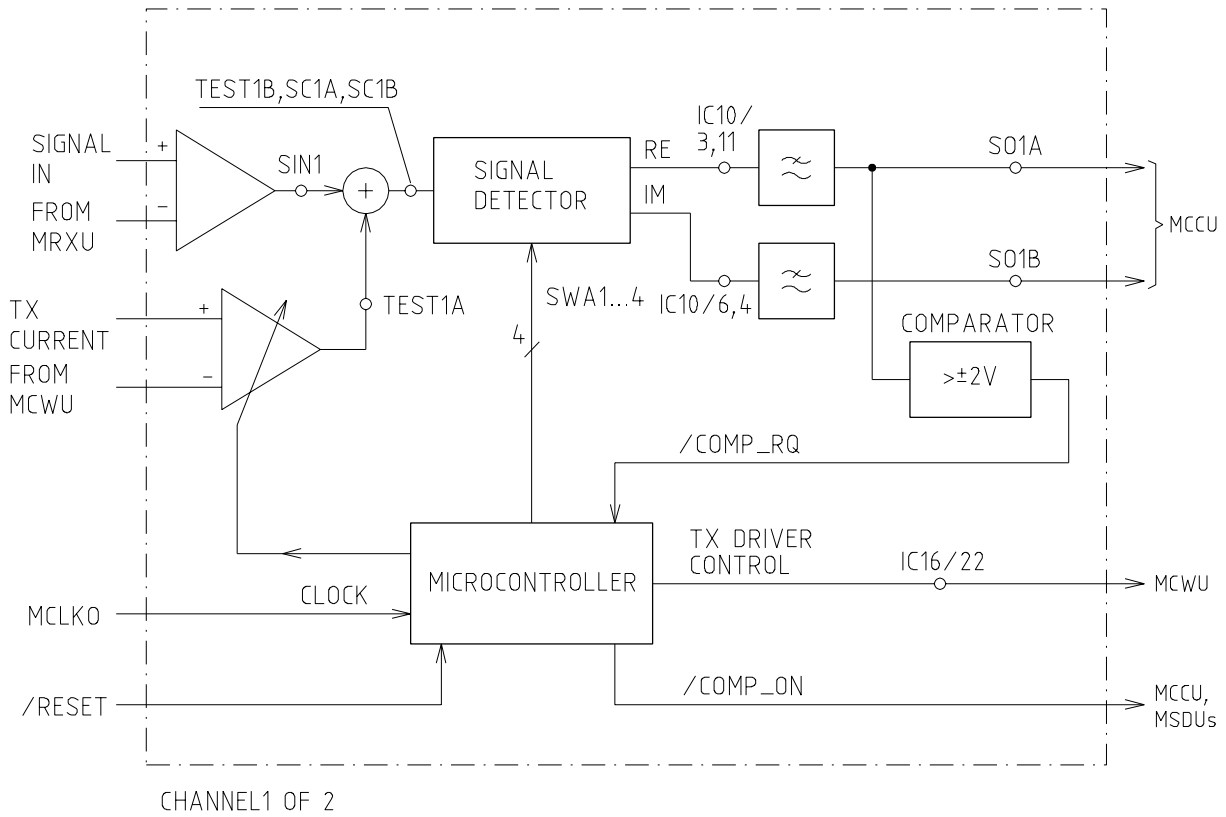


MSDU 5001: Transmitter control
CH1: J1/65, CH2: J1/67



4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



CHANNEL1 OF 2

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 01 JNI	2003 01 IJ

SUHDE SCALE

LIITTYY NEXT ASSY: Metor 300

TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

TUOTE PRODUCT: Metor 300

Rapiscan® systems

MSDU 5001
Block diagram

OSAL.N:O PART LIST: 8100 002-40 REV.: 02

PIIR.N:O CODE: 9100 388-4LE

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
ORA	1.00	5100 441-4EE
Approved	Date	Document
ORA	26.6.2003	
Product		Archives
METOR 300		METOR 300
Title		
MSDU SOFTWARE VERSIONS		

1
3061180, PIC16F73 / IC16, 17

1.1
Ver. 1.02

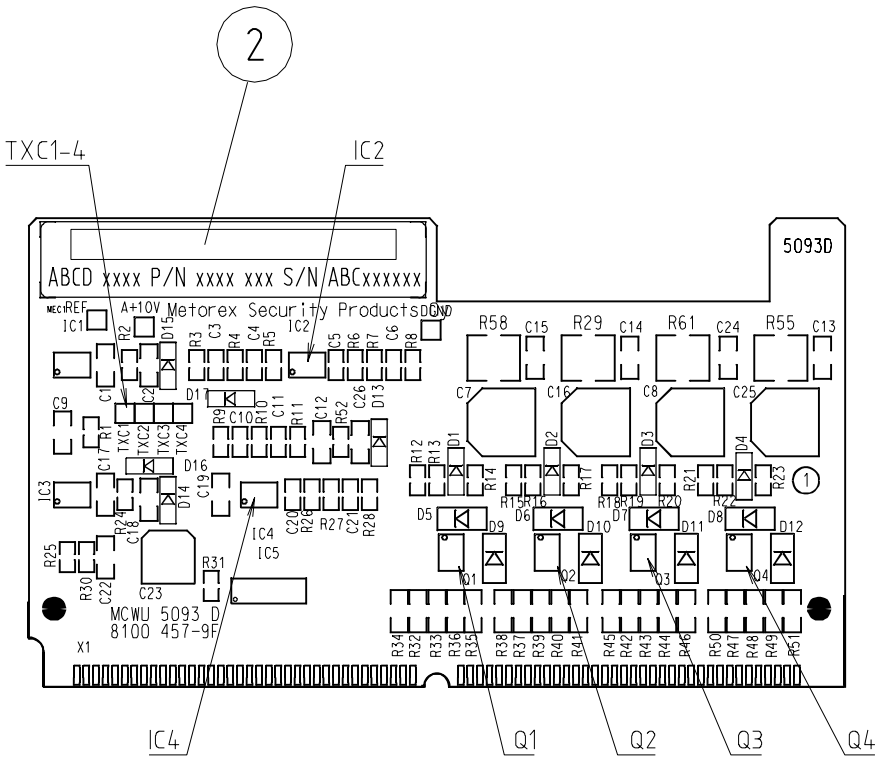
MSDU_1_02.hex
Checksum:
Date:

6

MCWU CONTINUOUS WAVE UNIT

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	2001 09 JNI	PIIRT. DRAWN	2001 09 IJ
TARK. CHECKED	2003 10 JNI	HYV. APPROVED	2003 10 ORA

SUHDE SCALE 1:1

LIITTYY NEXT ASSY: MELS 5006

TUOTE PRODUCT: Metor 300

OSAL.N:O PART LIST: 8100 456-40 REV. 06

PIIR.N:O CODE: 9100 300-4KE

Rapiscan® systems

MCWU 5093
Continous wave unit

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.00	9100 410-4VE
Approved	Date	Document
ORA	13.5.2003	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MCWU 5093		

CONSTANT WAVE TRANSMITTER UNIT, MCWU 5093

1 GENERAL

Each of the Constant Wave transmitter units holds four identical transmitters (channels). In the following is described operation of one channel.

2 OPERATIONAL DESCRIPTION

The transmitter consists of a level translator for the control signal (from the respective MSDU) and a push-pull transistor driver. Power to each channel is fed via a RC –filter to minimize ripple voltage on the +10V power supply. The current flowing to the transmitter coils is measured by three parallel shunt resistors and then fed to the MSDU.

3 SELF DIAGNOSIS

Each channel has a current monitor circuitry that pulls signal /TX_FAIL LOW if the transmitter current drops below predetermined limit. In normal operation voltage on test point TXC1 must be above the DC –level on the transmitter current signal (IC4 pin 1). /TX_FAIL line has a pull-up resistor located on the MCCU, so that any transmitter channel can force this line LOW.

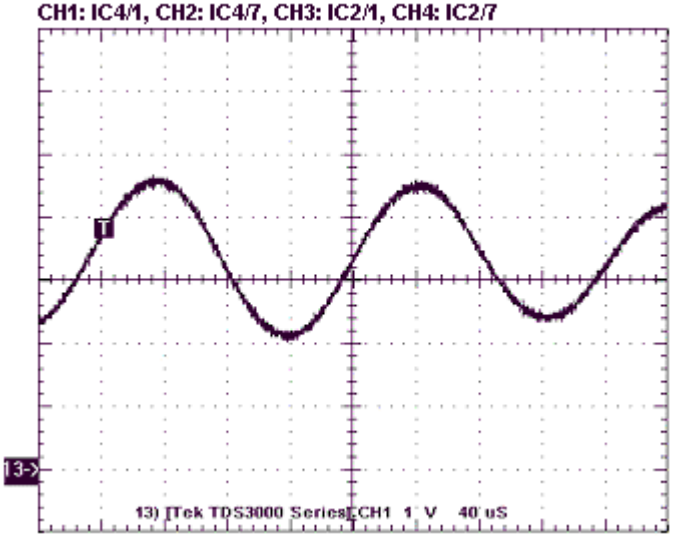
4 TEST POINT SIGNALS

In the following table is listed DC-voltages at relevant testpoints:

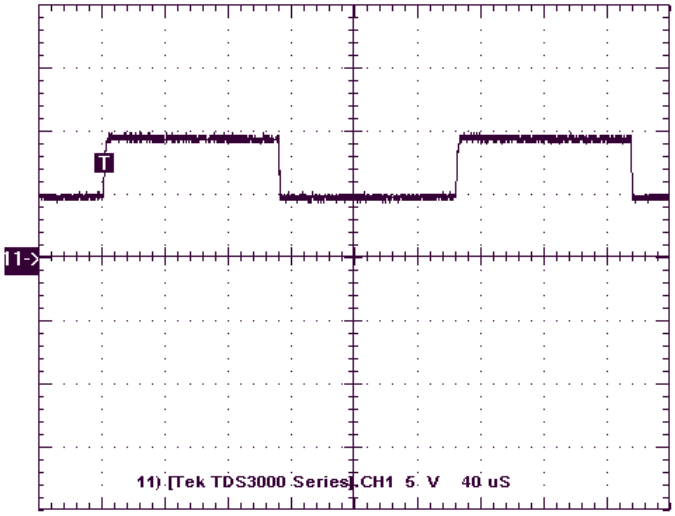
Testpoint	Low limit	Nominal Voltage	High Limit
A+10V	9.0V	9.3V	9.6V

Next pictures show typical waveforms on some points:

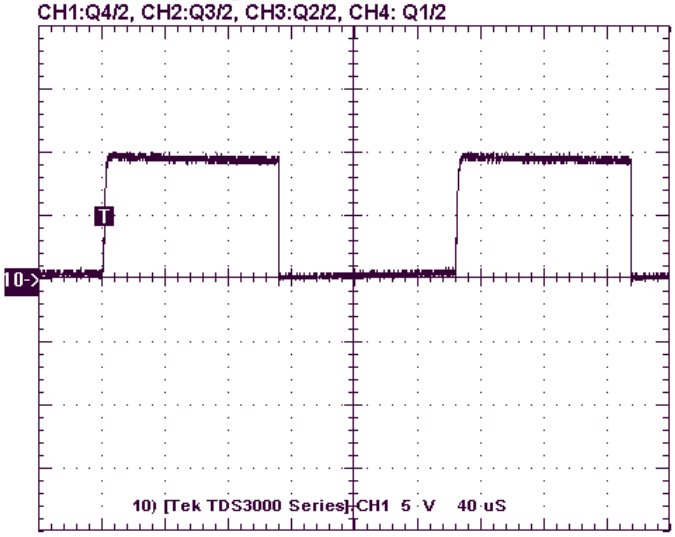
MCWU 5093: Transmitter current (note DC-level)
CH1: IC4/1, CH2: IC4/7, CH3: IC2/1, CH4: IC2/7



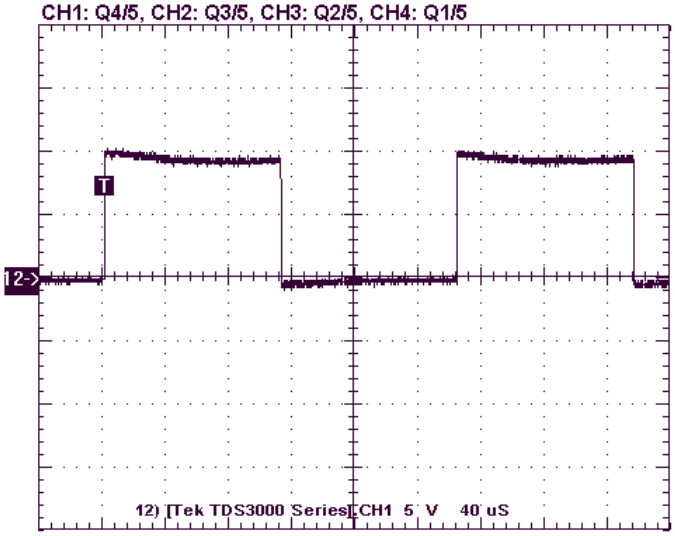
MCWU 5093: PFET gate
CH1: Q4/4, CH2: Q3/4, CH3: Q2/4, CH4: Q1/4



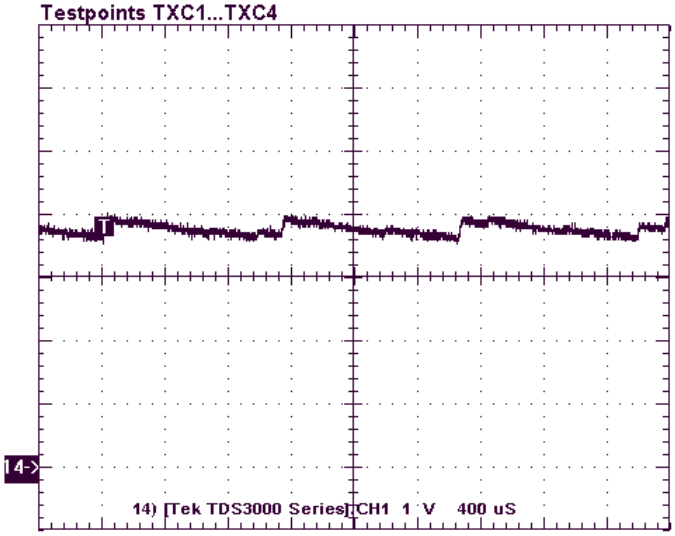
MCWU 5093: NFET gate
CH1:Q4/2, CH2:Q3/2, CH3:Q2/2, CH4: Q1/2



MCWU 5093: Transmitter coil drive
CH1: Q4/5, CH2: Q3/5, CH3: Q2/5, CH4: Q1/5

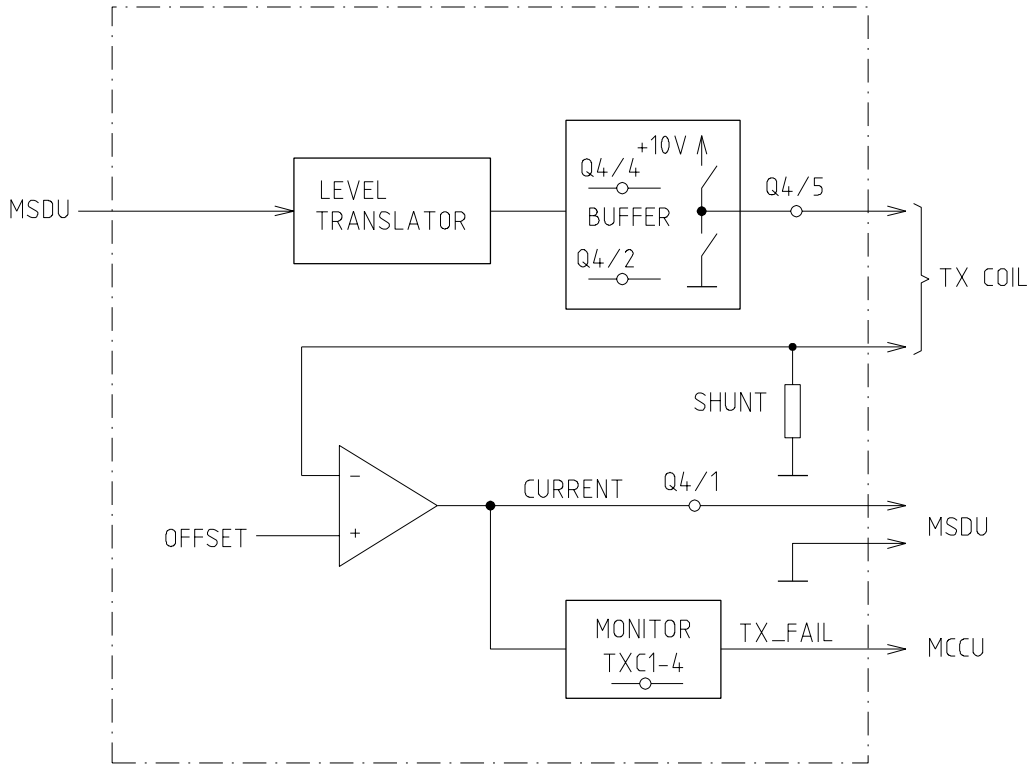


MCWU 5093: Transmitter current monitor
Testpoints TXC1...TXC4



4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



CHANNEL 1 OF 4

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 01 JNI	2003 01 IJ

SUHDE SCALE

LIITTYY NEXT ASSY: Metor 300

TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

TUOTE PRODUCT: Metor 300

Rapiscan® systems

MCWU 5093
Block diagram

OSAL.N:O PART LIST: 8100 456-40 REV.: 02

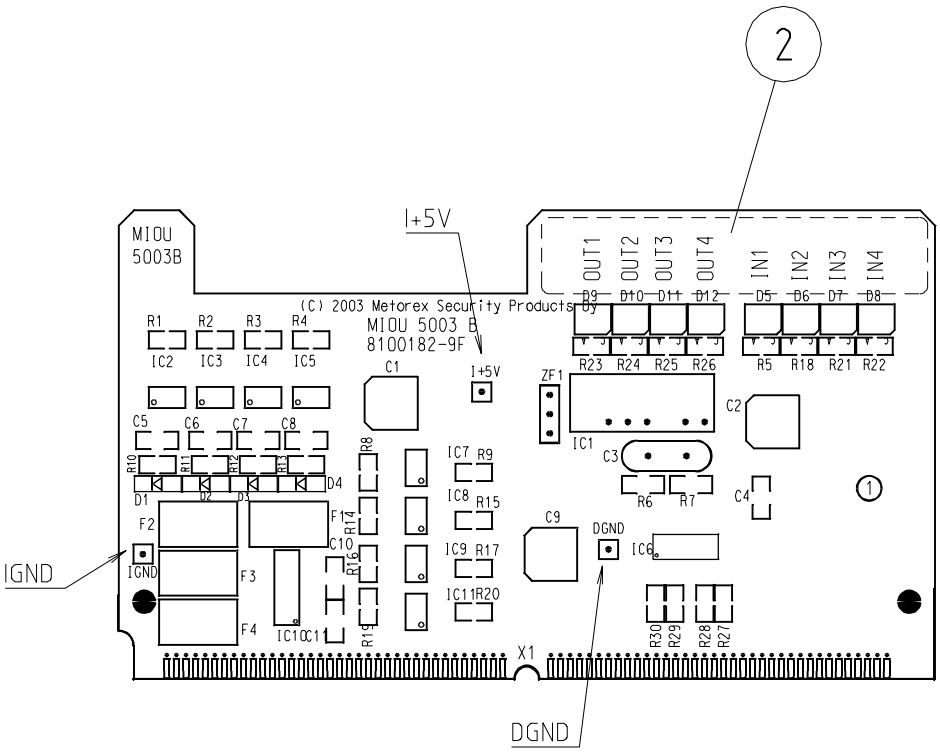
PIIR.N:O CODE: 9100 391-4LE

7

MIOU INPUT OUTPUT UNIT

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 08 JNI	2003 08 IJ
TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

SUHDE SCALE 1:1

LIITTYY NEXT ASSY
MELS 5006

TUOTE PRODUCT
Metor 300

OSAL.N:O PART LIST
8100 004-40

REV.
02

PIIR.N:O CODE
9100 302-4KE

Rapiscan® systems

MIOU 5003
Input output unit

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J.Niemi	1.00	9100 442-4VE
Approved	Date	Document
ORA	15.8.2003	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MIOU 5003		

INPUT/OUTPUT UNIT, MIOU 5003

1 GENERAL

The MIOU 5003 has four isolated digital inputs and four isolated digital outputs. To each input and output is connected a LED to show the status of the line. Inputs, outputs and isolated +5V power are connected via MCCU to screw terminals on the backside of the MELS.

WARNING: The isolation barrier in MIOU 5003 is intended only to prevent ground loops from disturbing the operation of the metal detector. Line voltage or any circuit connected to line voltage may not be connected to any of the connectors in the electronics.

The external cable shield can be connected to the PGND terminal for improved electromagnetic compatibility (EMC).

NOTE: It is in sole responsibility of the customer/end user to verify compliance of the external connections to local EMC and safety regulations.

2 INPUTS

An input is activated by pulling it low i.e. grounding it to the GND pin on the screw terminal. All inputs have a reverse voltage protection diode.

3 OUTPUTS

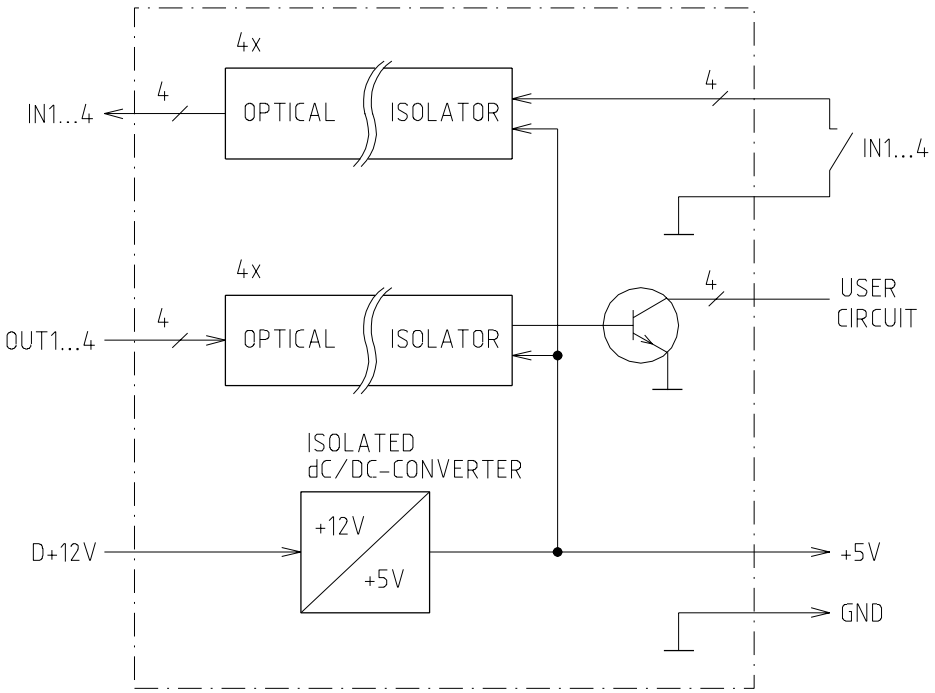
Outputs are active LOW. Power state consists of an open collector transistor capable of sinking 350mA current. When an output is not active, it is floating. Each output is protected by a 500mA resetable fuse.

4 POWER

Isolated +5V power to the I/O screw terminals is generated by a 2W 12/±5V DC/DC –converter. A maximum of 300 mA current can be withdrawn from the +5V supply from the screw terminals.

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 08 JNI	2003 08 IJ
TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

SUHDE SCALE

LIITTYY NEXT ASSY
Metor 300

TUOTE PRODUCT
Metor 300

Rapiscan® systems

MIOU 5003
Block diagram

OSAL.N:O PART LIST	REV.
8100 004-40	01

PIIR.N:O CODE
9100 443-4LE

D C B A

8

MCDS CONTROL AND DISPLAY SET

MDPU DISPLAY UNIT

MDPS DISPLAY SET

SINGLE LEVEL

Last.revision: 04
Revision updated: 13.12.2007
Version: PLANNING
Accept:

8100673 4OE MCDS 5129 M300 CONTROL AND DISPLAY SET 1,000 KPL 04

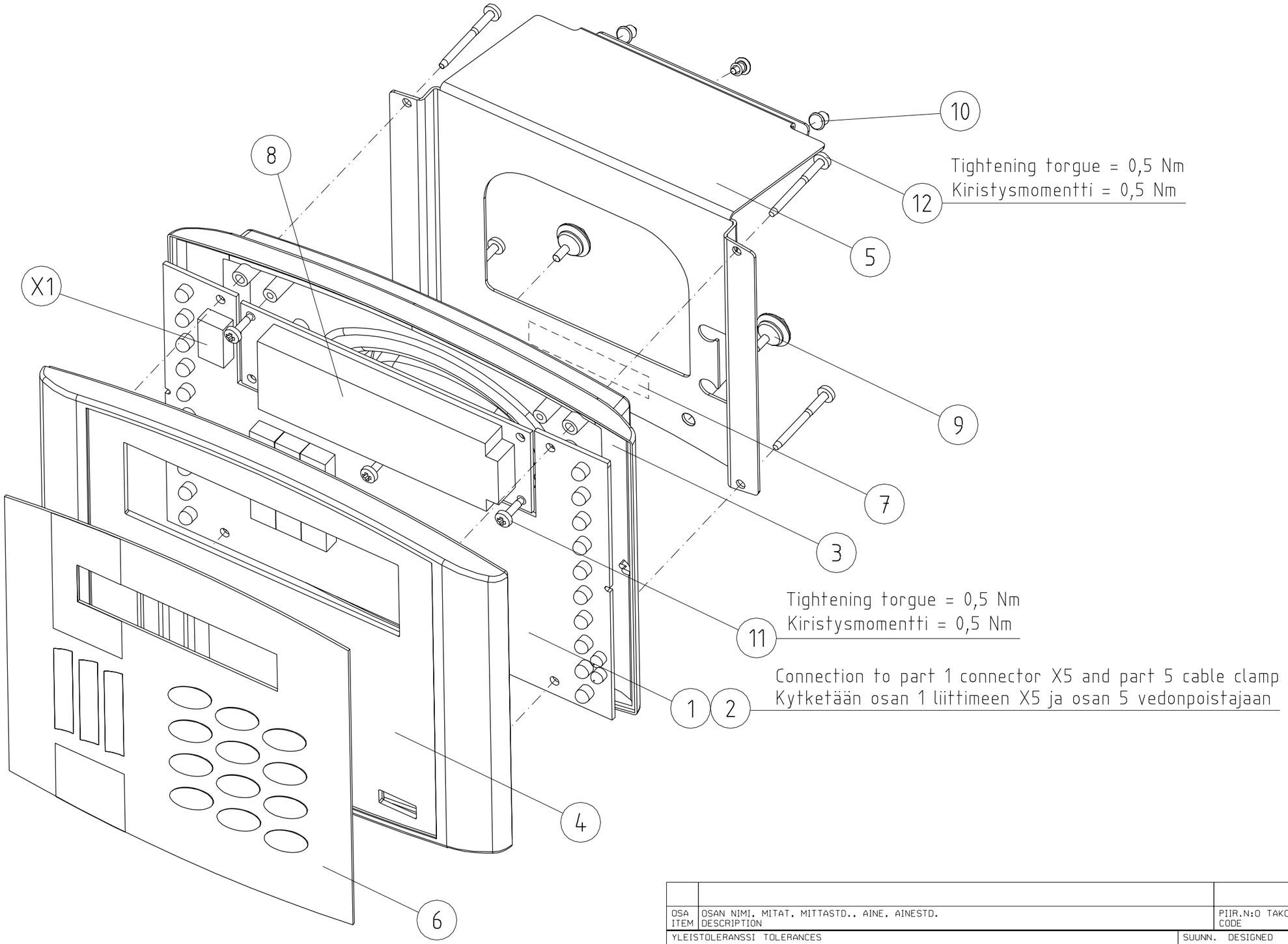
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100669	4OE	MDPU 5128 M300 DISPLAY UNIT *1	1,000	KPL		07
1	20	8100674	4OE	DISPLAY CABLE M300 v.3 *2	1,000	KPL		03
1	30	8100681	3ME	BACK COVER MCDS 5129 M300 *3	1,000	KPL		01
1	40	8100682	3ME	FRONT COVER MCDS 5129 M300 *4	1,000	KPL		01
1	50	8100680	3ME	BACK PLATE MCDS 5129 M300 *5	1,000	KPL		03
1	60	8100675	3XE	MEMBRANE KEYBOARD MCDS 5129 *6	1,000	KPL		06
1	65	8100828	4PE	RAPISCAN SYSTEMS TEXT LABEL L=45 *6	1,000	KPL	O1	02
1	70	8100631	4PE	S/N LABEL BASE 14x76 *7	1,000	KPL		A
1	80	3061542		LCD-DISPLY 2x20 CHAR OPTREX C-51505NFQJ-LW-AD *8	1,000	KPL		
1	90	3061224		RUBBER PAD KORJA-KUMI 2011115 *9	2,000	KPL		
1	100	3061551		CONNECTOR TSW-108-25-L-D-RA MALE SAMTEC or 147A-15-10-016-60 WEITRONIC *X1	1,000	KPL		
1	110	3060250		SNAP RIVET 3MM SR-3035 BK PA-PLASTIC *10	3,000	KPL		
1	150	3061548		THERMOPLASTICS SCREW TP WN 1412 3X10 ZN *11	3,000	KPL		
1	160	3061549		THERMOPLASTICS SCREW TP WN 1412 3X30 ZN *12	4,000	KPL		

Related Drawings

SINGLE LEVEL

8100673 4OE MCDS 5129 M300 CONTROL AND DISPLAY SET 1,000 KPL 04

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	9001	9100483	3KE	CONTROL AND DISPLAY SET MCDS 5129 M300	0,000	KPL		02
	9002	9100502	4XE	INSPECTION OF DELIVERY, COVERS FOR MCDS M300	0,000	KPL		1.10
	9003	9100525	4VE	OPERATIONAL DESCRIPTION MCDS 5129, MDPS 5142 M300	0,000	KPL		1.10
	9004	9100405	4XE	TEST SPESIFICATION MDPS 5092, MCDS 5192	0,000	KPL		1.30



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED 2004 05 MVU

PIIRT. DRAWN 2004 05 IJ

TARK. CHECKED

HYV. APPROVED

SUHDE SCALE 1:1.5

LIITTYY NEXT ASSY Metor 300

TUOTE PRODUCT Metor 300

OSAL.N:O PART LIST 8100 673-40

REV. 02

PIIR.N:O CODE 9100 483-3KE

Rapiscan® systems

MCDS 5129

Control and display set

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.10	9100 525-4VE
Approved	Date	Document
ORA	12.9.2007	
Product		Archives
Metor 300		Metor 300
Title		
OPERATIONAL DESCRIPTION MCDS 5129, 5190, MDPS 5142, 5191		

CONTROL AND DISPLAY UNIT, MCDS 5129, 5190
DISPLAY UNIT, MDPS 5142, 5191

1 GENERAL

The MCDS consists of a microcontroller, a membrane keyboard, an EEPROM memory, a bi-directional infrared (IrDA) port, 2x20 character Liquid Crystal Display (LCD), a buzzer, red, green and yellow lamp.

The MDPS differs from the MCDS only by not having the membrane keyboard. MCDS 5129/5190 differ by hawing different cable.

2 DISASSEMBLY

- Disconncet the Display Cable from the unit
- Remove the four panhead screws (Phillips #1) from the back of the unit
- Lift the front plate carefully and remove the keyboard cable from the PCB (release the connector locking latch using fingernail or a small screwdriver)
- Note the display module connector position as the socket may have free pins on either end depending on the model of the display
- Remove the two panhead screws holding the display module in place
- Lift carefully and withdraw the display module from its connector
- Remove the panhead screw holding the PCB in place
- Remove the PCB

3 OPERATIONAL DESCRIPTION

3.1 Serial Port

The MCDS is connected to MELS via an ESD protected RS232 serial port. Also +12V power is fed to unit from the same connector. The transmission speed is 9600/38400 baud.

3.2 Display Module

The Display Unit is equipped with a 2 rows by 20 characters alphanumeric LCD module. This module is connected to microcontroller by an eight bit parallel bus. The display requires only 5V power supply.

3.3 Keyboard

The Display Unit has a optional membrane keyboard. This keyboard is connected as a four by four matrix: four output lines and four input lines. Each output line is pulsed one at a time and if a key is pressed, respective input line receives the pulse.

3.4 Buzzer

The buzzer is controlled by a full bridge transistor driver. The tone i.e. frequency is fed directly to the driver from the microcontroller. The volume is controlled by adjusting the bridge driver supply voltage.

3.5 Infrared Port

Communication between the MRCS and MCDS is done via an infrared port (IrDA). This port consists of a IrDA controller and treansmitter/receiver circuit. Four extra infrared LEDs boost the transmitted signal to increase the operating distance to several meters. The transmission speed is 9600baud.

3.6 EEPROM Memory

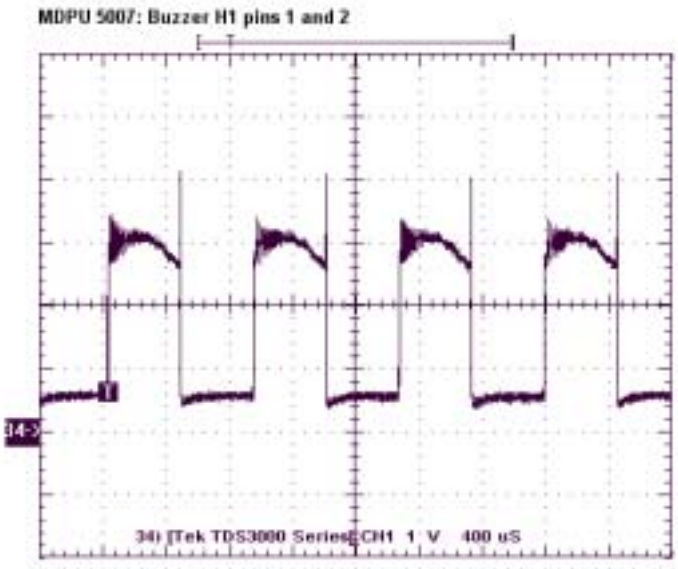
The display unit has 2-4 EEPROM serial memory chips. One contains the operational parameters (gate sensitivity etc.). The other contains English user interface menu texts. The third and fourth are reserved for localized user interface languages.

4 TEST POINT SIGNALS

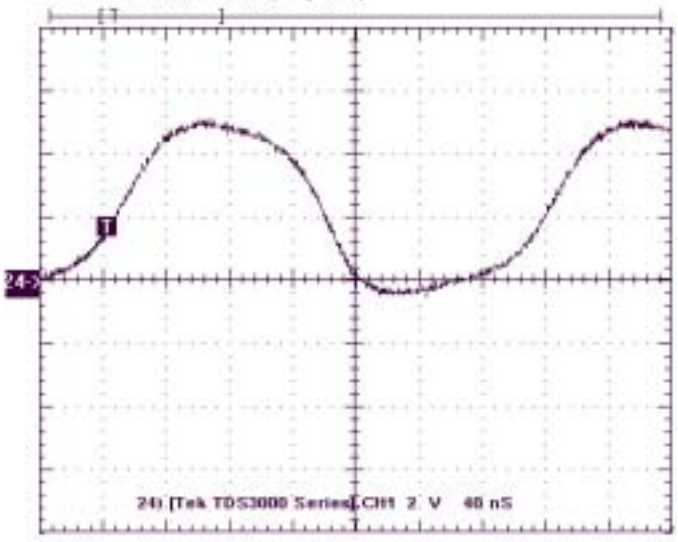
In the following table is listed DC-voltages at relevant testpoints:

Testpoint	**Low limit**	**Nominal Voltage**	**High Limit**
+5V	4.5V	5.0V	5.5V
+12V	10V	11.5	13V

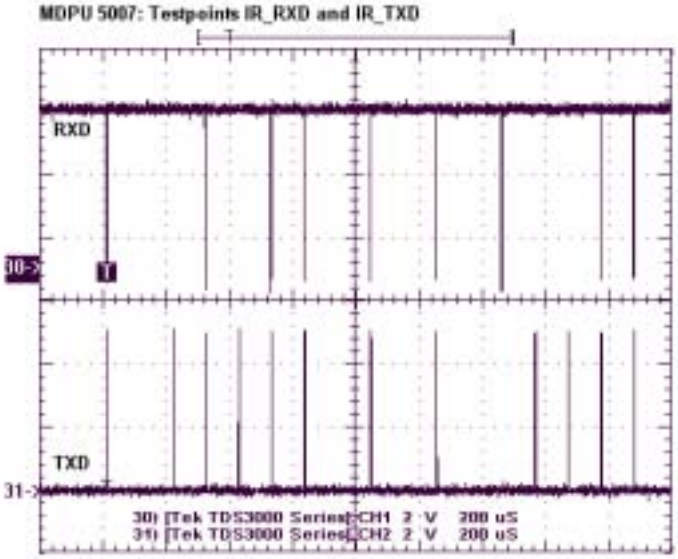
Next pictures show typical waveforms on some points:



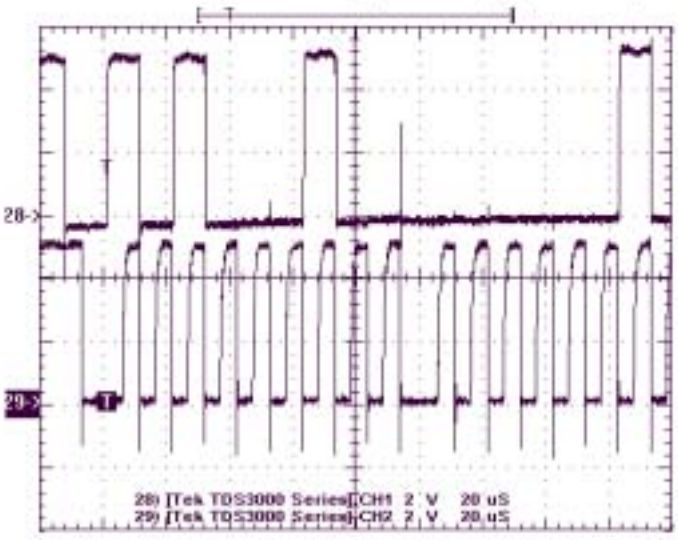
MDPU 5007: 3.6MHz clock (IC3 pin 50)

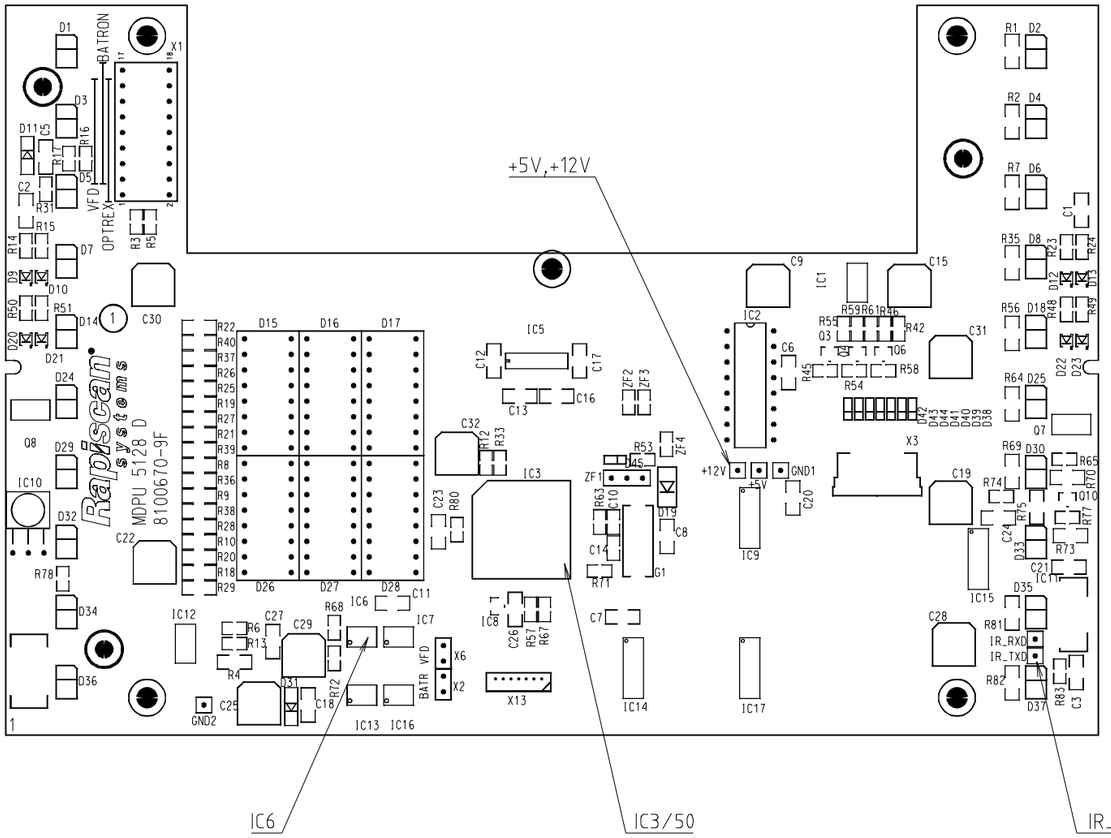


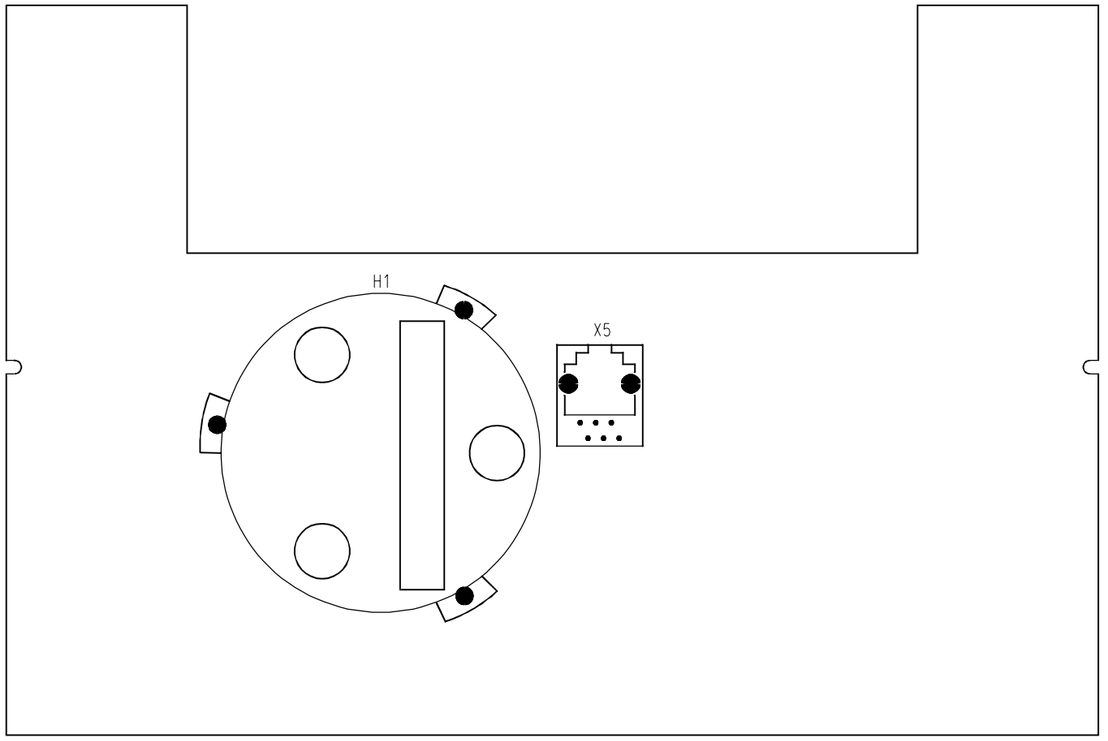
MDPU 5007: Testpoints IR_RXD and IR_TXD



MDPU 5007: I2C clock and data during menu scroll (IC6 pins 6 and 5)







REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
03	PCB C - D	2005 10	IJ	ORA
02	Lisätty/Added R4,6,13, muutettu/changed IC12,X1,			
02	PCB B1->C	2005 04	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	2004 05 JNI
PIIRT. DRAWN	2004 05 IJ
TARK. CHECKED	2003 09 JNI
HYV. APPROVED	2003 09 ORA

SUHDE SCALE 1:1

LIITTYY NEXT ASSY: MCDS 5129

TUOTE PRODUCT: Metor 300

Rapiscan® systems

MDPU 2128
Display unit

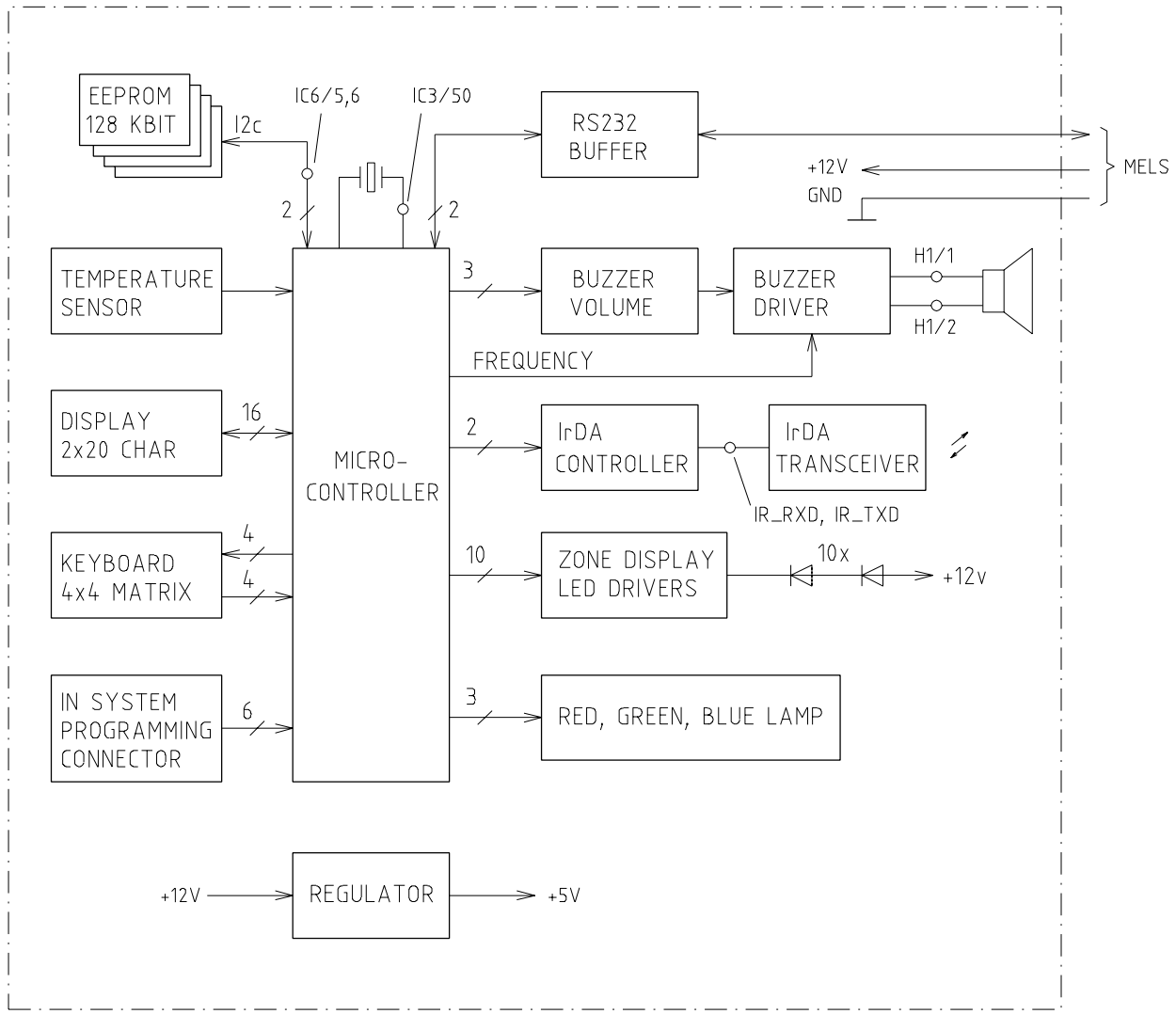
OSAL.N:O PART LIST: 8100 669-40

REV.: 03

PIIR.N:O CODE: 9100 477-3KE

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES	SUUNN. DESIGNED	PIIRT. DRAWN
	2003 01 JNI	2003 01 IJ

SUHDE SCALE	LIITTYY NEXT ASSY	TARK. CHECKED	HYV. APPROVED
	Metor 300	2003 09 JNI	2003 09 ORA

	TUOTE PRODUCT	
	Metor 300	
	OSAL.N:O PART LIST	REV.
	8100 008-40	02
	PIIR.N:O CODE	
	9100 390-4LE	

Rapiscan® systems

MDPU 5007
Block diagram

D C B A

SINGLE LEVEL

Last.revision: 02
Revision updated: 7.3.2005
Version: PLANNING
Accept:

8100717 4OE MDPS 5142 M300 DISPLAY SET 1,000 KPL 02

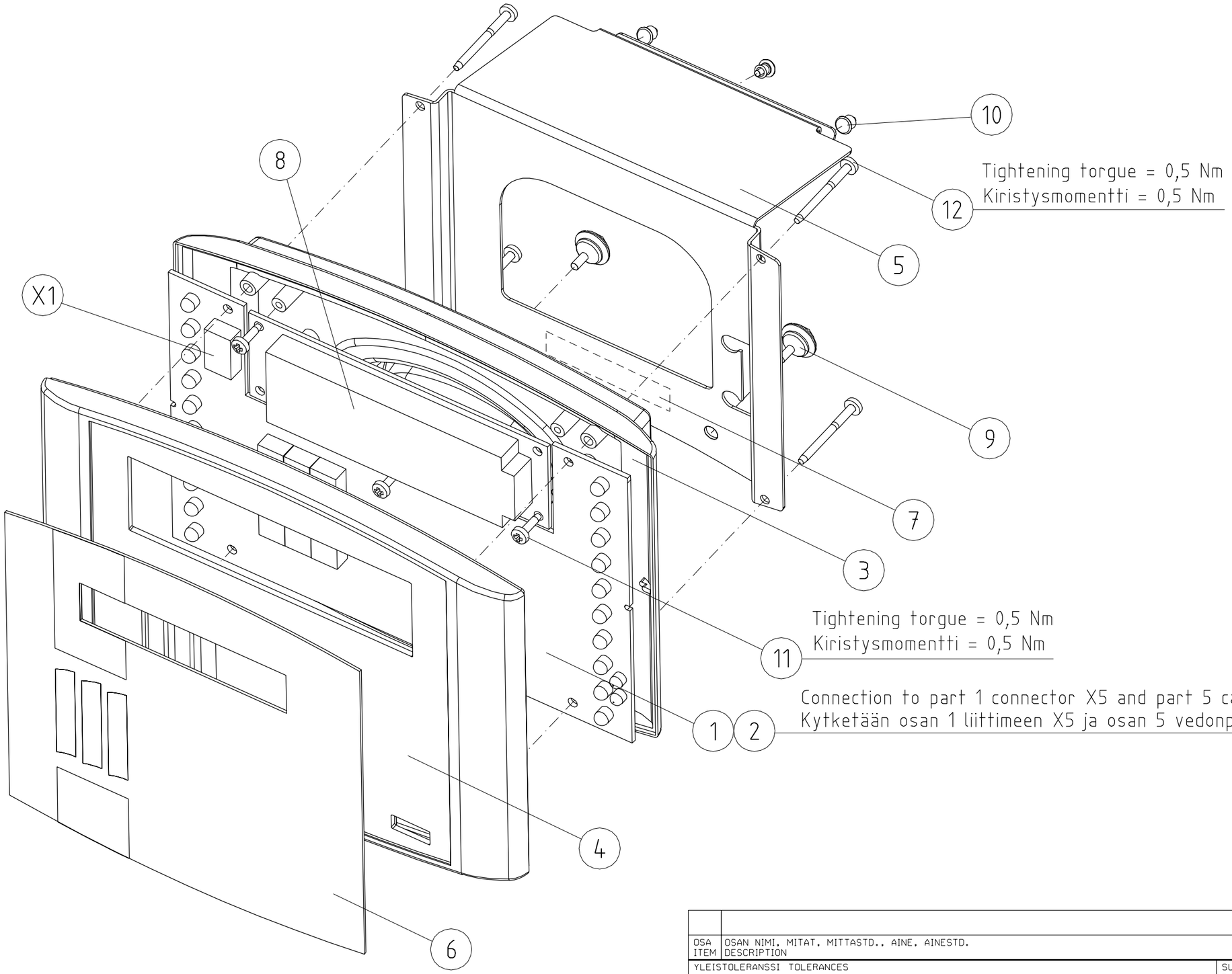
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100669	4O	MDPU 5128 M300 DISPLAY UNIT *1	1,000	KPL		04
1	20	8100674	4OE	DISPLAY CABLE M300 v.3 *2	1,000	KPL		02
1	30	8100681	3ME	BACK COVER MCDS 5129 M300 *3	1,000	KPL		01
1	40	8100682	3ME	FRONT COVER MCDS 5129 M300 *4	1,000	KPL		01
1	50	8100680	3ME	BACK PLATE MCDS 5129 M300 *5	1,000	KPL		03
1	60	8100765	3XE	DISPLAY DIAPHGRAM MDPS 5142 *6	1,000	KPL		03
1	65	8100828	4PE	RAPISCAN SYSTEMS TEXT LABEL L=45 *6	1,000	KPL	O1	02
1	70	8100631	4PE	S/N LABEL BASE 14x76 *7	1,000	KPL		A
1	80	3061542		LCD-DISPLY 2x20 CHAR OPTREX C-51505NFQJ-LW-AD *8	1,000	KPL		
1	90	3061224		RUBBER PAD KORJA-KUMI 2011115 *9	2,000	KPL		
1	100	3061551		CONNECTOR TSW-108-25-L-D-RA MALE SAMTEC or 147A-15-10-016-60 WEITRONIC *X1	1,000	KPL		
1	110	3060250		SNAP RIVET 3MM SR-3035 BK PA-PLASTIC *10	3,000	KPL		
1	150	3061548		THERMOPLASTICS SCREW TP WN 1412 3X10 ZN *11	3,000	KPL		
1	160	3061549		THERMOPLASTICS SCREW TP WN 1412 3X30 ZN *12	4,000	KPL		

Related Drawings

SINGLE LEVEL

8100717 4OE MDPS 5142 M300 DISPLAY SET 1,000 KPL 02

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
	9001	9100528	3KE	DISPLAY SET MDPS 5142 M300	0,000	KPL		01
	9002	9100502	4X	INSPECTION OF DELIVERY, COVERS FOR MCDS M300	0,000	KPL		1.00
	9003	9100525	4VE	OPERATIONAL DESCRIPTION MCDS 5129, MDPS 5142 M300	0,000	KPL		1.00



REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED: 2004 05 MVU
PIIRT. DRAWN: 2004 05 IJ
TARK. CHECKED:
HYV. APPROVED:

SUHDE SCALE: 1:1.5

LIITTYY NEXT ASSY: Metor 300

TUOTE PRODUCT: Metor 300

OSAL.N:O PART LIST: 8100 717-40
REV.: 01

PIIR.N:O CODE: 9100 528-3KE

Rapiscan® systems

MDPS 5142
Display set

9

MRCS REMOTE CONTROL SET

MRCU REMOTE CONTROL UNIT

SINGLE LEVEL

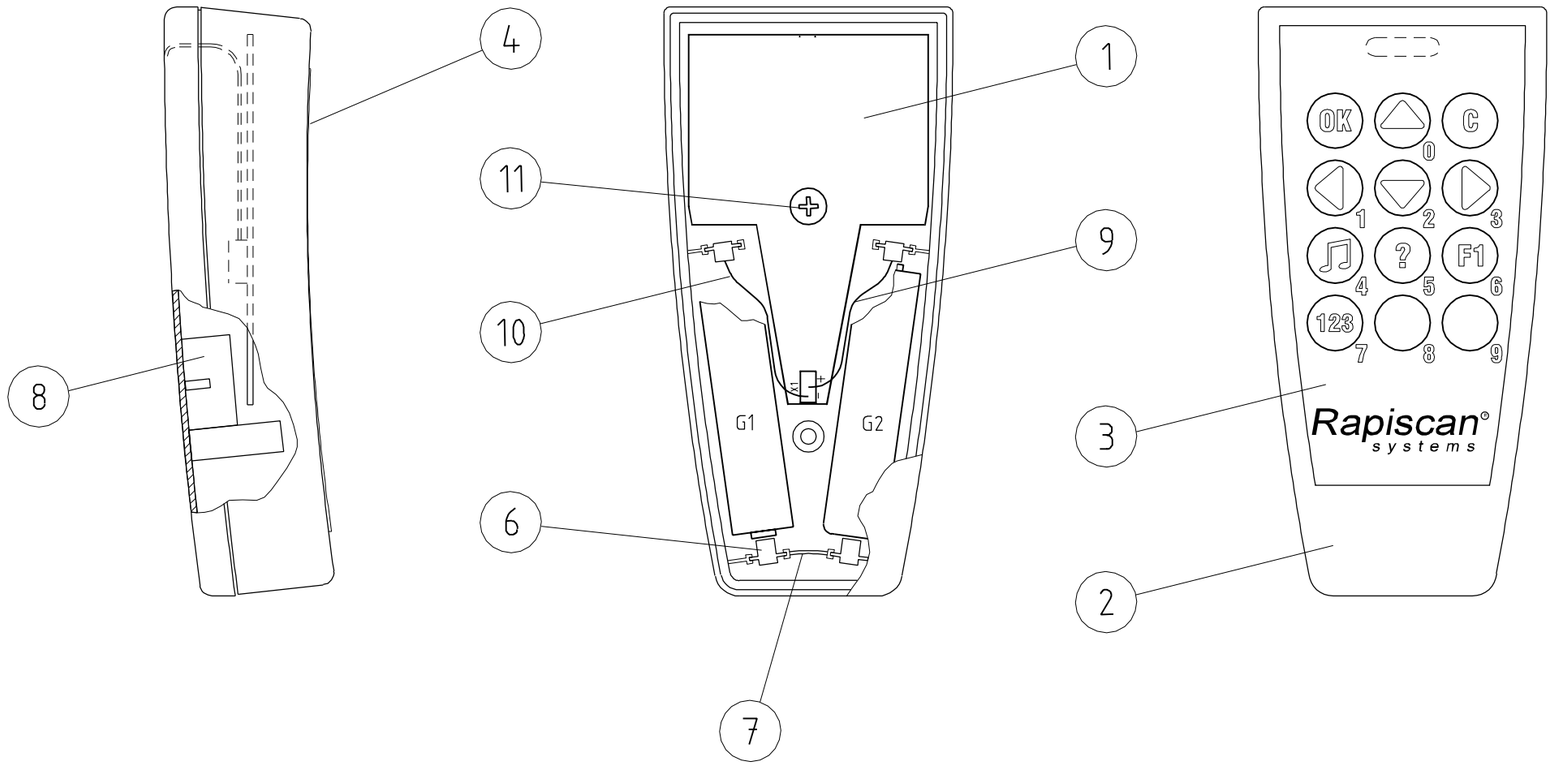
Last.revision: 09
Revision updated: 8.3.2005
Version: PLANNING
Accept:

8100009 4O MRCS 5115 M300 REMOTE CONTROL SET 1,000 KPL 09

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100611	4OE	MRCU 5008 M300 REMOTE CONTROL UNIT	1,000	KPL		03
				*1				
1	20	8100477	4ME	MRCS BOX HOLE M300	1,000	KPL		01
				*2				
1	30	8100494	3XE	MEMBRANE KEYBOARD MRCS 5115 M300	1,000	KPL		05
				*3				
1	35	8100826	4PE	RAPISCAN SYSTEMS TEXT LABEL L=30	1,000	KPL	O1	01
1	40	8100631	4PE	S/N LABEL BASE 14x76	1,000	KPL		A
				*4				
1	60	3061325		BATTERY CLIPS FOR OKW SMART CASE	1,000	KPL		
				*6				
1	70	3061326		BATTERY CLIP CONTACT FOR OKW SMART CASE	1,000	KPL		
				*7				
1	80	3061330		ALKALINE CELL 1,5V AAA 1100mAH D10,5xH44	2,000	KPL		
				*G1,2				
1	90	3025939		SEALING TAPE FLEXOPAD W 8X15	0,025	M		
				*8				
1	100	1496330		WIRE KJ 1X0,15mm2 THINNED RED	0,055	M		
				*9				
1	110	1496322		WIRE KJ 1X0,15mm2 THINNED BK	0,055	M		
				*10				
1	150	3061329		TAPPING SCREW KK ST2,9x6.5-C-PZ-AISI 304 DIN 7981	4,000	KPL		
				*11				

Related Drawings

	9001	9100305	3KE	REMOTE CONTROL SET MRCS 5115 M300	0,000	KPL		04
	9002	9100426	4XE	TEST SPESIFICATION MRCS 5115, 5116 M300	0,000	KPL		1.00
	9003	9100412	4VE	OPERATIONAL DESCRIPTION MRCS 5115, 5116 M300	0,000	KPL		1.10



04	Logo muutettu / Logo changed	2005 02	IJ	ORA
REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2002 02 JNI	PIIRT. DRAWN 2002 02 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY Metor 300	TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA
Rapiscan® systems	MRCS 5115 Remote control set	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 009-40	REV. 04
		PIIR.N:O CODE 9100 305-3KE	

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.10	9100 412-4VE
Approved	Date	Document
ORA	19.11.2004	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MRCS 5115, 5116		

REMOTE CONTROL UNIT, MRCS 5115, 5116

1 GENERAL

The MRCS consist of a microcontroller, membrane keyboard, EEPROM memory, bi-directional infrared (IrDA) port, two 1.5V AA alkaline batteries, a battery voltage monitor and a charge pump.

The MRCS 5115 and 5116 are otherwise identical except that the MRCS 5115 case is smaller and holds two AAA instead of AA size batteries.

2 OPERATIONAL DESCRIPTION

When not in use the remote control unit is in sleep mode and consumes only approximately 30µA current from the batteries. When a key is pressed the microcontroller wakes up, powers the rest of the electronics, and sends the encrypted keymap frame to the Display Unit. After that the MRCU waits for one minute for a command from the Display Unit (parameter copy etc.) and then falls back to sleep. During the sleep mode, the infrared controller and battery voltage monitor is powered down to conserve power.

An EEPROM memory is used to store the information received from the infrared port.

A charge pump regulator supplies the circuitry with regulated +5V power.

Two extra infrared LEDs boost the transmitted signal to increase the operating distance to several meters.

3 SELF DIAGNOSIS

The MRCS is equipped with a two level battery voltage monitor. This circuit signals the microcontroller when the battery voltage is below 2.5V. This will issue “REMOTE CONTROL BATTERY LOW” warning on MCDS. The MRCS is still functional.

When battery voltage drops below approximately 2V, the charge pump regulator cannot anymore supply the 5V operating voltage. The battery voltage monitor signals this to the microcontroller. This issues “REPLACE REMOTE CONTROL BATTERY“ error on MCDS. The MRCS is not functional anymore; it only sends empty keymap and error code to the MCDS and goes immediately to sleep.

NOTE: Using NiCd or NiMH rechargeable batteries will cause premature "Battery low" –warning, as these have typical cell voltage of 1.2V instead of 1.5V.

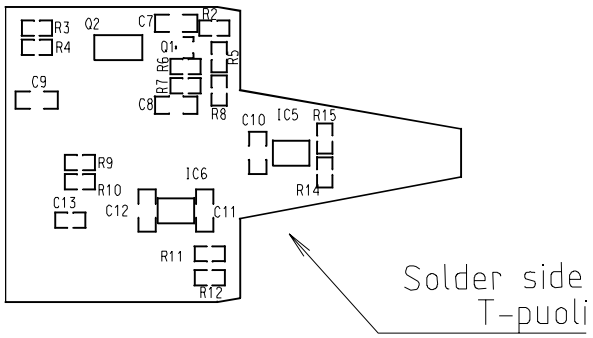
4 TEST POINT SIGNALS

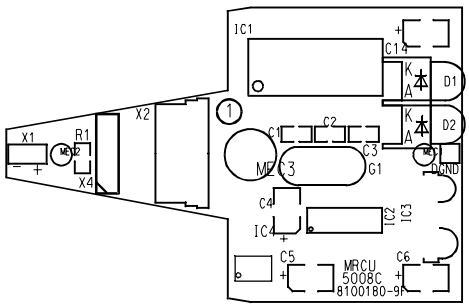
In the following table is listed DC-voltages at relevant testpoints:

Testpoint	Low limit	Nominal Voltage	High Limit
B+5V (IC5/1) (awake)	4.5V	5.0V	5.5V
B+5V (IC5/1) (sleep)		0V	
BATT+	2.0V	3.0V	4.0V
D+5V (IC6/3)	4.5V	5.0V	5.5V

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.





OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 05 JNI	2003 05 IJ
TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

SUHDE SCALE 1:1

LIITTYY NEXT ASSY
MRCS 5115

TUOTE PRODUCT
Metor 300

OSAL.N:O PART LIST
8100 611-40

REV.
01

PIIR.N:O CODE
9100 424-4KE

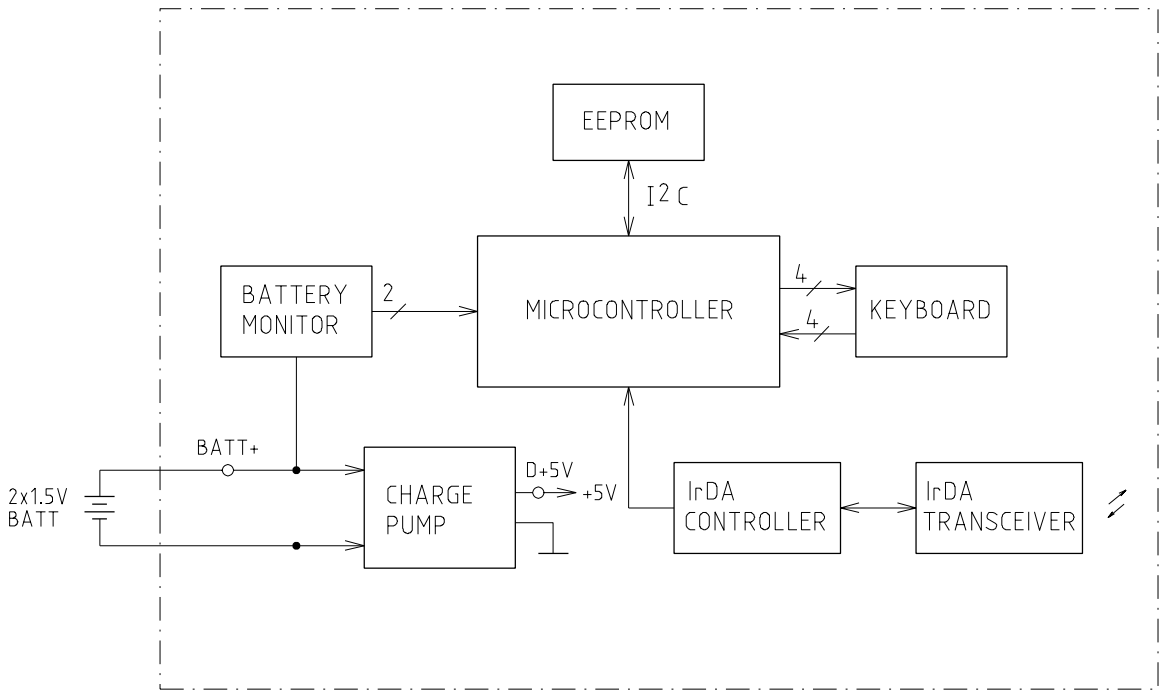
Rapiscan® systems

MRCU 5008
Remote cotrol unit

D C B A

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 01 JNI	2003 01 IJ
TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

SUHDE SCALE

LIITTYY NEXT ASSY
Metor 300

TUOTE PRODUCT
Metor 300

OSAL.N:O PART LIST

REV.
02

Rapiscan® systems

MRCU 5008, 5108
Block diagram

PIIR.N:O CODE
9100 389-4LE

D C B A

Author	Rev.	Code
ORA	1.00	9100 438-4EE
Approved	Date	Document
ORA	26.6.2003	
Product		Archives
METOR 300		METOR 300
Title		
MRCU SOFTWARE VERSIONS		

1
3061348, PIC16F876 / IC1

1.1
Ver. 1.2

MRCU_1_2.hex
Checksum:
Date: 10.6.2003

SINGLE LEVEL

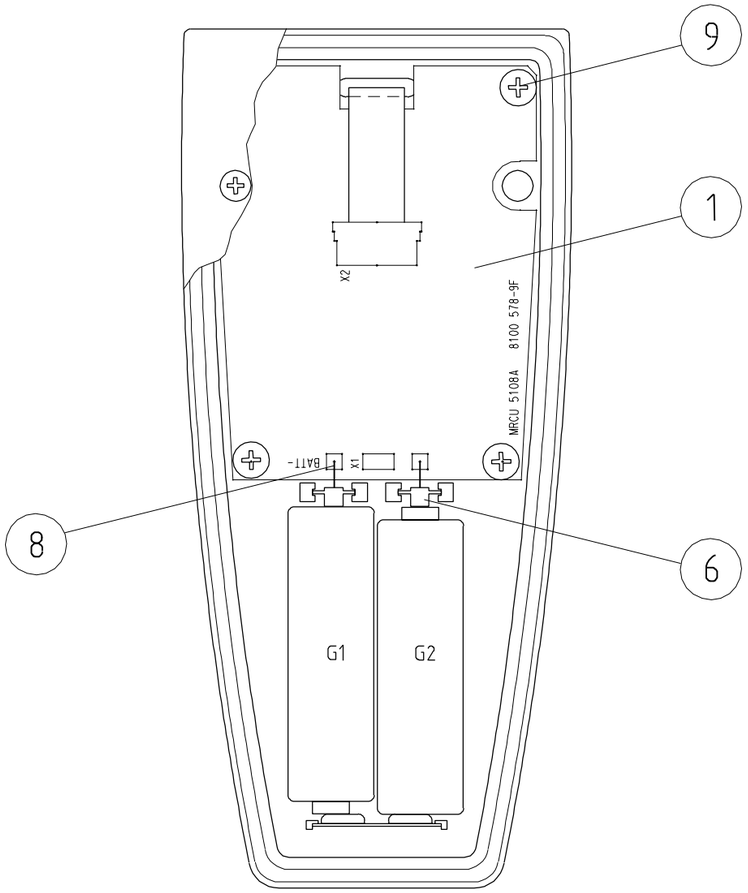
Last.revision: 06
Revision updated: 8.3.2005
Version: PLANNING
Accept:

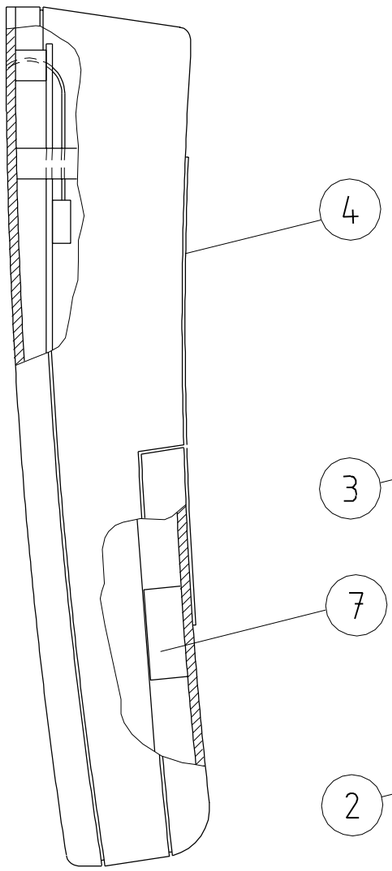
8100577 4O MRCS 5116 M300 REMOTE CONTROL SET 1,000 KPL 06

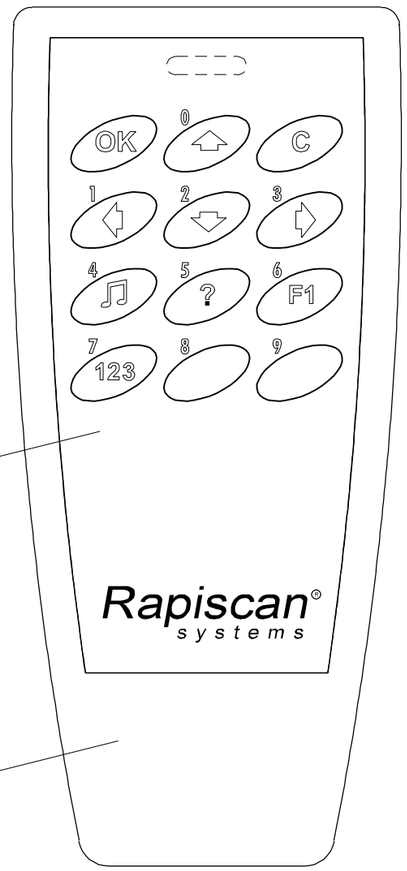
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100612	4OE	MRCU 5108 M300 REMOTE CONTROL UNIT	1,000	KPL		03
				*1				
1	20	8100579	4M	MRCS 5116 BOX HOLE M300	1,000	KPL		01
				*2				
1	30	8100580	3XE	MEMBRANE KEYBOARD MRCS 5116 M300	1,000	KPL		05
				*3				
1	35	8100827	4PE	RAPISCAN SYSTEMS TEXT LABEL L=38	1,000	KPL	O1	01
1	40	8100631	4PE	S/N LABEL BASE 14x76	1,000	KPL		A
				*4				
1	60	3061430		BATTERY CLIPS FOR OKW SMART CASE A91 90 002	1,000	KPL		
				*6				
1	70	3059881		ALKALINE CELL 1,5V AA 2300mAH TYPE 4OO6 D14,5xH50	2,000	KPL		
				*G1,2				
1	80	3025939		SEALING TAPE FLEXOPAD W 8X15	0,020	M		
				*7				
1	90	1496322		WIRE KJ 1X0,15mm2 THINNED BK	0,020	M		
				*8				
1	150	3061329		TAPPING SCREW KK ST2,9x6.5-C-PZ-AISI 304 DIN 7981	4,000	KPL		
				*9				

Related Drawings

	9001	9100366	3KE	REMOTE CONTROL SET MRCS 5116 M300	0,000	KPL		04
	9002	9100426	4XE	TEST SPESIFICATION MRCS 5115, 5116 M300	0,000	KPL		1.00
	9003	9100412	4VE	OPERATIONAL DESCRIPTION MRCS 5115, 5116 M300	0,000	KPL		1.10







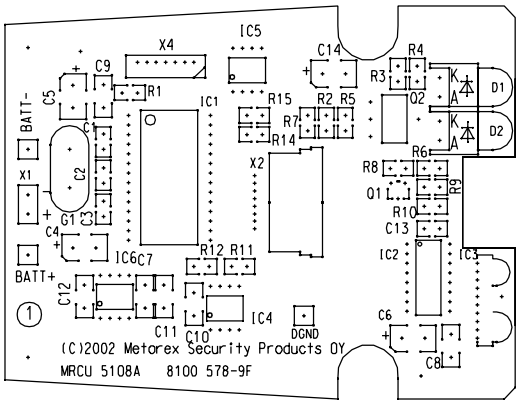
REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.
04	Logo muutettu / Logo changed	2005 02	IJ	ORA

OSA ITEM	OSAN NIMI, MITAT. MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES			

SUUNN. DESIGNED 2002 10 JNI	PIIRT. DRAWN 2002 10 IJ	
TARK. CHECKED 2003 09 JNI	HYV. APPROVED 2003 09 ORA	
SUHDE SCALE	LIITTYY NEXT ASSY Metor 300	TUOTE PRODUCT Metor 300
Rapiscan® systems	MRCS 5116 Remote control set	OSAL.N:O PART LIST 8100 577-40 / REV. 04
		PIIR.N:O CODE 9100 366-3KE

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIIRT. DRAWN
		2003 05 JNI	2003 05 IJ
SUHDE SCALE	LIITTYY NEXT ASSY	TARK. CHECKED	HYV. APPROVED
1:1	MRCS 5116	2003 09 JNI	2003 09 ORA
		TUOTE PRODUCT	
		Metor 300	
Rapiscan® systems	MRCU 5108	OSAL.N:O PART LIST	REV.
	Remote cotrol unit	8100 612-40	01
		PIIR.N:O CODE	
		9100 425-4KE	

D C B A

10

MCES CROSS PIECE AND ELECTRONICS SET

SINGLE LEVEL

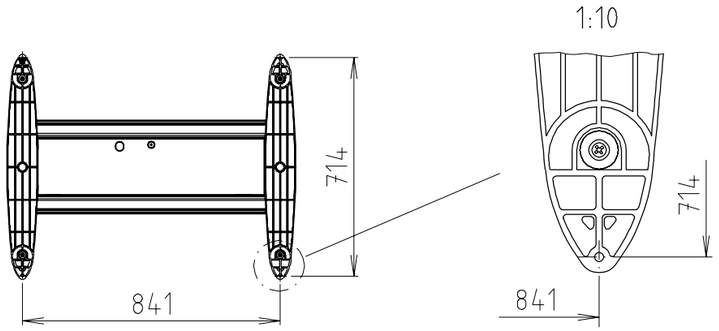
Last.revision: 03
Revision updated: 2.11.2007
Version: PLANNING
Accept:

8100703 4OE MCES 5135 M300 CROSS PIECE AND ELECTRONICS SET 1,000 KPL 03

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100704	4OE	MCSS 5136 M300 CROSS PIECE SET	1,000	KPL	F1	08
1	20	8100866	4OE	MCSS 5136.1 M300 28"/710MM CROSS PIECE SET	1,000	KPL	F1	05
1	30	8100830	4OE	MCSS 5136.2 M300 32"/813MM CROSS PIECE	1,000	KPL	F1	04
1	40	8100649	4OE	MELS 5126 M300 ELECTRONICS SET	1,000	KPL		05
1	50	8100717	4OE	MDPS 5142 M300 DISPLAY SET	1,000	KPL	O1	02
1	60	8100673	4OE	MCDS 5129 M300 CONTROL AND DISPLAY SET	1,000	KPL		04
1	70	8100009	4OE	MRCS 5115 M300 REMOTE CONTROL SET	1,000	KPL	O1	09
1	80	8100577	4OE	MRCS 5116 M300 REMOTE CONTROL SET	1,000	KPL		06
1	90	8100474	4OE	RX COIL CABLE 0,3M M300	1,000	KPL		06
1	100	8100475	4OE	TX COIL CABLE 0,5M M300	1,000	KPL		A
1	110	3056520		MAINS CABLE 115V 2,0M USA	1,000	KPL	F2	
1	120	2459857		MAINS CABLE 230V 2,5M EUROP. SHUKO 27904	1,000	KPL	F2	
1	130	3058291		POWER CORD 115V USA 15FT/4.6M L.GREY 3x18 AVG	1,000	KPL	F2	
1	140	3058290		MAINS CABLE 230V 5,0M	1,000	KPL	F2	
1	150	3061066		POWER CORD UK GREY STRAIGHT 2M 355565 VOLEX BS1363/A 10A/250V FUSE 13A or FARNEL 285-626 / 355565 VOLEX or RS 425-418	0,000	KPL	F2	
1	160	9100518	4VE	INSTALLATION AND OPERATING MANUAL M300 (English)	1,000	KPL	F3	1.12
1	161	9100614	4VE	METOR 300 SW v2.50 OPERATING INSTRUCTIONS	1,000	KPL	F3	1.00
1	162	9100518	4VD	INSTALLATION AND OPERATING MANUAL M300 (German)	1,000	KPL	F3	1.12
1	170	8100660	2PE	QUICK INSTRUCTION LABEL M300 350x140	1,000	KPL		1.40

Related Drawings

	9000	9100504	4QE	DOCUMENT LIST MCSS / MTRS M300	0,000	KPL		



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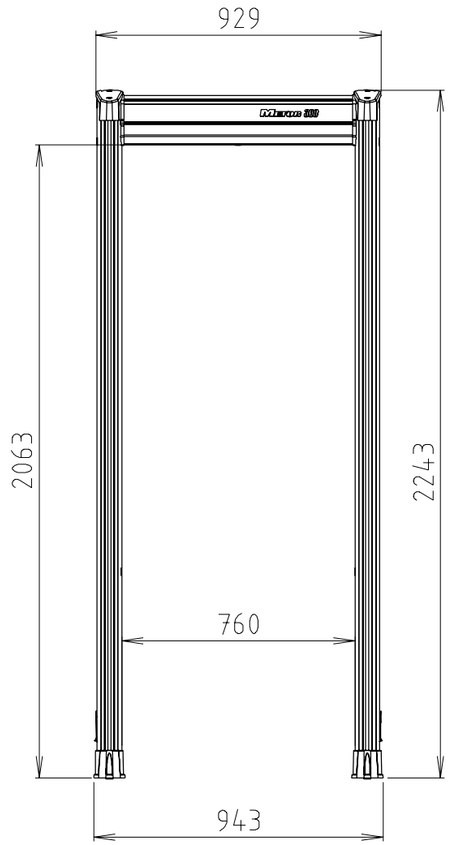
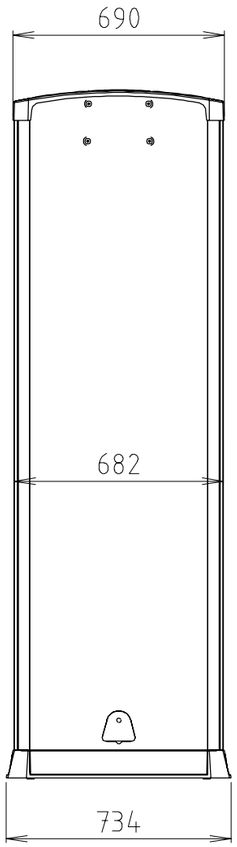
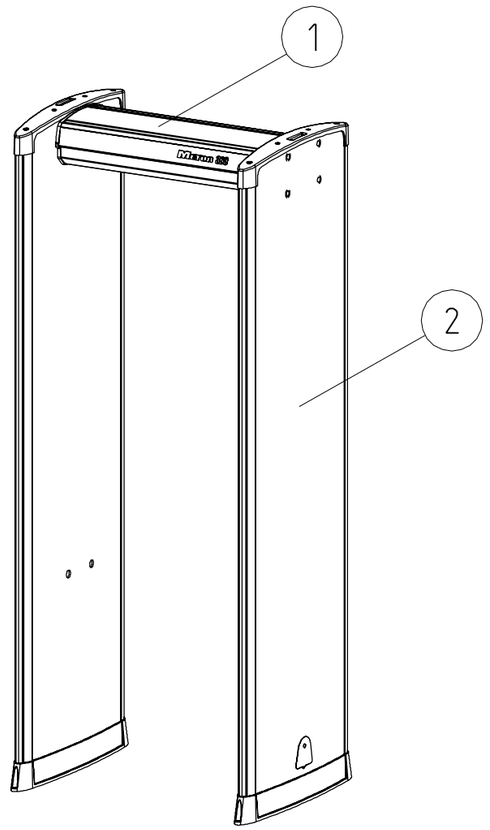






REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED: 2004 11 JLA
PIIRT. DRAWN: 2004 11 IJ
TARK. CHECKED:
HYV. APPROVED:

SUHDE SCALE: (1:10) 1:20

LIITTYY NEXT ASSY: MTXS, MRXS

TUOTE PRODUCT: Metor 300

OSAL.N:O PART LIST:

REV.: 01

Rapiscan® systems

MCLS 5135
Detection coil set v.3

PIIR.N:O CODE: 9100 517-3KE

11

MCSS CROSS PIECE SET

SINGLE LEVEL

Last.revision: 08
Revision updated: 11.9.2007
Version: PLANNING
Accept:

8100704 4OE MCSS 5136 M300 CROSS PIECE SET 1,000 KPL 08

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100696	1ME	CROSS PIECE PROFILE 760 M300 v.3 *1	0,000	kpl	F2	07
1	11	8101145	4OE	CROSS PIECE PROFILE 760mm 3-PART M300 v.3 *1	1,000	KPL	F2	01
1	20	8100749	3ME	CROSS PIECE DOOR 760 M300 v.3 *2	1,000	KPL		02
1	30	8100391	2MOE	RIDGE PLATE 1 M300 *3	1,000	KPL		04
1	40	8100392	3ME	RIDGE PLATE 2 M300 *4	1,000	KPL		05
1	50	8100393	2MOE	RIDGE PLATE 3 M300 *5	1,000	KPL		04
1	60	8100695	3ME	CROSS PIECE FLANGE M300 *6	2,000	KPL		003
1	70	8100875	4ME	CONNECTOR COVER 760 M300 v.3 *7	1,000	KPL		01
1	80	8100427	4ME	SLIPPER PAD M300 *8	2,000	KPL		02
1	90	8100746	4ME	SCREW ADAPTER MTXS v.3 M300 *9	8,000	KPL		01
1	100	8100748	2PE	METOR 300 TEXT DIAPHRAM 760 v.3 *10	2,000	KPL		04
1	105	8100825	3PE	METOR 300 TEXT LABEL *10	2,000	KPL	O1	02
1	110	8100559	3PE	CONNECTOR COVER LABEL M300 *11	1,000	KPL		01
1	120	8100233	4PE	TX INDICATOR LABEL (0811189) M150 *12	1,000	KPL		A
1	130	8100262	4PE	RX INDICATOR LABEL (0311188) M150 *13	1,000	KPL		A
1	140	3061429		HOLDER FOR OKW SMART CASE L BLACK A91 67 309 *14	1,000	KPL		

SINGLE LEVEL

8100704 4OE MCSS 5136 M300 CROSS PIECE SET 1,000 KPL 08

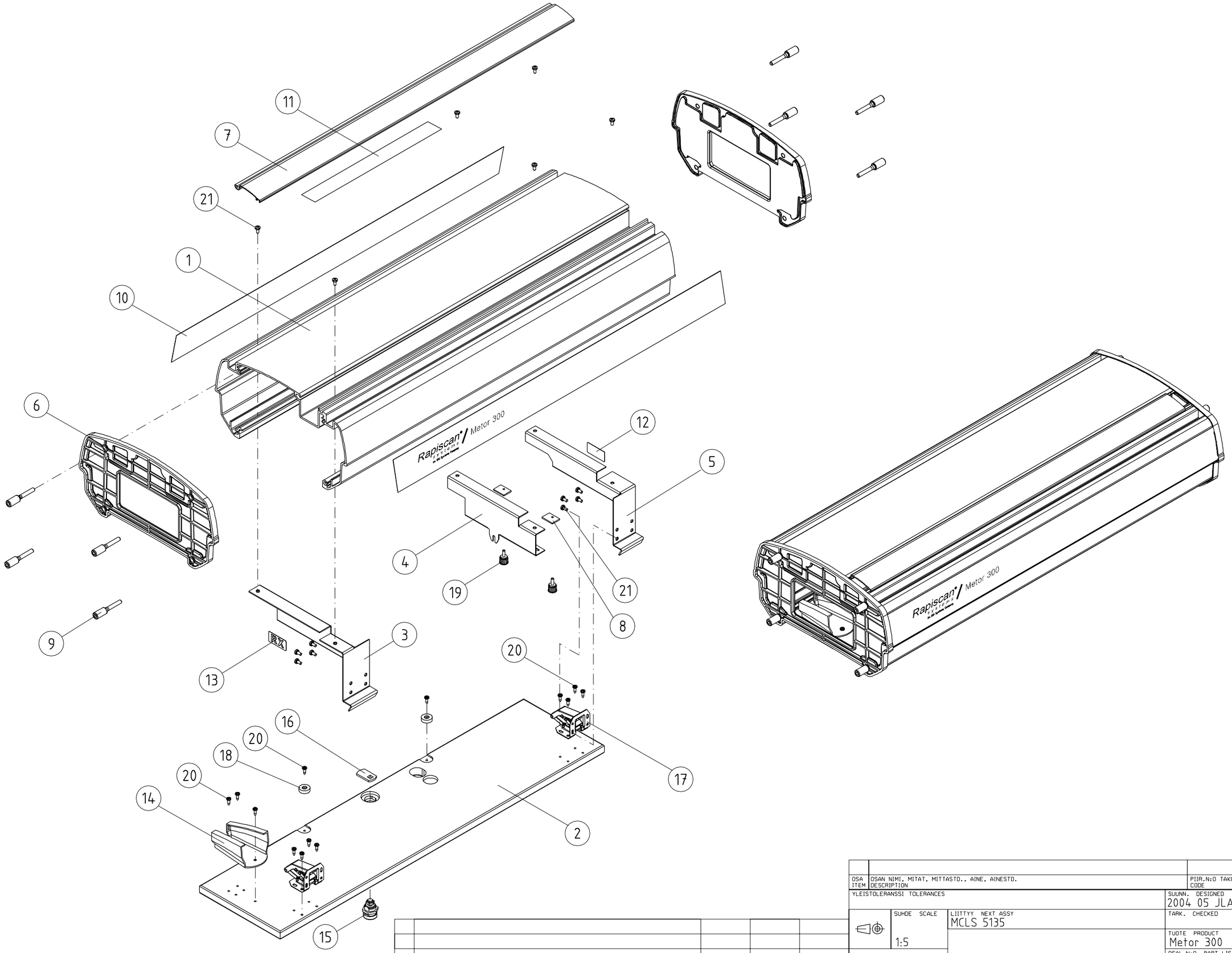
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	150	3061640		LOCK ABLOY CL109C 2xKEY 839306841	1,000	KPL	F1	
				*15				
1	151	3048147		LOCK AVA 0263 2xKEY S55777357DH	0,000	KPL	F1	
				*15				
1	160	3061641		OFFSET CAM 35x27x5 ABLOY 455333	1,000	KPL	F1	
				*16				
1	161	3060238		CAM L=33MM AVA 434869	0,000	KPL	F1	
				*16				
1	170	3061445		CABINET HINGE FERRARI 2000 Fe/Zn	2,000	KPL		
				*17				
1	180	3061223		RUBBER PAD 18x5,5 SES 15-089 02540012010	2,000	KPL		
				*18				
1	190	3061345		FINGER SCREW M4x12 PS1412M412S	2,000	KPL		
				*19				
1	200	3061374		WOODSCREW PAN HEAD 3,5x12 Fe/Zn PZ	13,000	KPL		
				*20				
1	210	3061593		PAN HEAD SCREW M4X8 ZN POZ DIN 7985	14,000	KPL		
				*21				
1	260	3061642		KEY 839306841 ABLOY CL109C	1,000	KPL	F1	
1	261	3060246		KEY S557773575DH AVA 0263	0,000	KPL	F1	
1	300	8100533	4OE	CROSS PIECE PACKING M300 880x400x280	1,000	KPL		07

Related Installation components

8001		8100745	4OE	INSTALLATION KIT MCLS M300 55mm	1,000	KPL		01

Related Drawings

9001		9100505	2KE	CROSS PIECE SET MCSS 5136 M300	0,000	KPL		02



02	Logo muutettu / Logo changed	2005 02	IJ	ORA
REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 05 JLA	PIIRT. DRAWN 2004 11 IJ
SUHDE SCALE 1:5	LIITTYY NEXT ASSY MCLS 5135	TARK. CHECKED	HYV. APPROVED
Rapiscan® systems	MCCS 5136 Cross piece set	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 704-40	REV. 02
		PIIR.N:O CODE 9100 505-2KE	

12

MTXS TRANSMITTER PANEL SET

SINGLE LEVEL

Last.revision: 06
Revision updated: 6.11.2007
Version: PLANNING
Accept:

8100706 4OE MTXS 5138 M300 TRANSMITTER PANEL SET 1,000 KPL 06

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100689	4OE	MTXU 5131 M300 TRANSMITTER UNIT	1,000	KPL		04
				*1				
1	20	8100701	4OE	ZONE DISPLAY SET v.3 M300	1,000	KPL	O1	04
				*2				
1	30	8100755	4OE	TRAFFIC COUNTER SET 1700mm M300v.3, EMD	2,000	KPL	O2	01
				*3				
1	40	8100702	4OE	TRAFFIC LIGHT SET v.3 M300	1,000	KPL		03
				*4				
1	50	8100736	2KE	COIL FRAME MTXS, MRXS M300 v.3	1,000	KPL		03
				*5				
1	60	8100737	4OE	TX COIL M300 v.3	1,000	KPL		01
				*6				
1	70	8100739	4OE	POWER CORD DOOR MTXS, MRXS M300 v.3	1,000	KPL		01
				*7				
1	75	4100343	4OE	POWER CABLE 3M	1,000	KPL		C
1	80	8100740	3ME	HAT M300 v.3	1,000	KPL		005
				*8				
1	90	8100741	3ME	BOOT M300 v.3	1,000	KPL		003
				*9				
1	100	8100742	3ME	LIGHT TUBE FOR ZONE DISPLAY M300 v.3 T40510-2/252 SMOKE GRE	2,000	KPL		004
				*10				
1	110	8100743	3ME	MOUNTING PROFILE ZONE DISPLAY M300 T40510-1/GR v.3	2,000	KPL		003
				*11				
1	115	8101080	3ME	COIL BED WEDGE M300	2,000	KPL		001
				*22				
1	120	8100631	4PE	S/N LABEL BASE 14x76	2,000	KPL		A
				*12				
1	130	8100756	4ME	ANTI-SKID WASHER 25x6x8	2,000	KPL		02
				*18				
1	140	2130177		CABLE TIE ANCHOR TM2S8	1,000	KPL		
				*19				

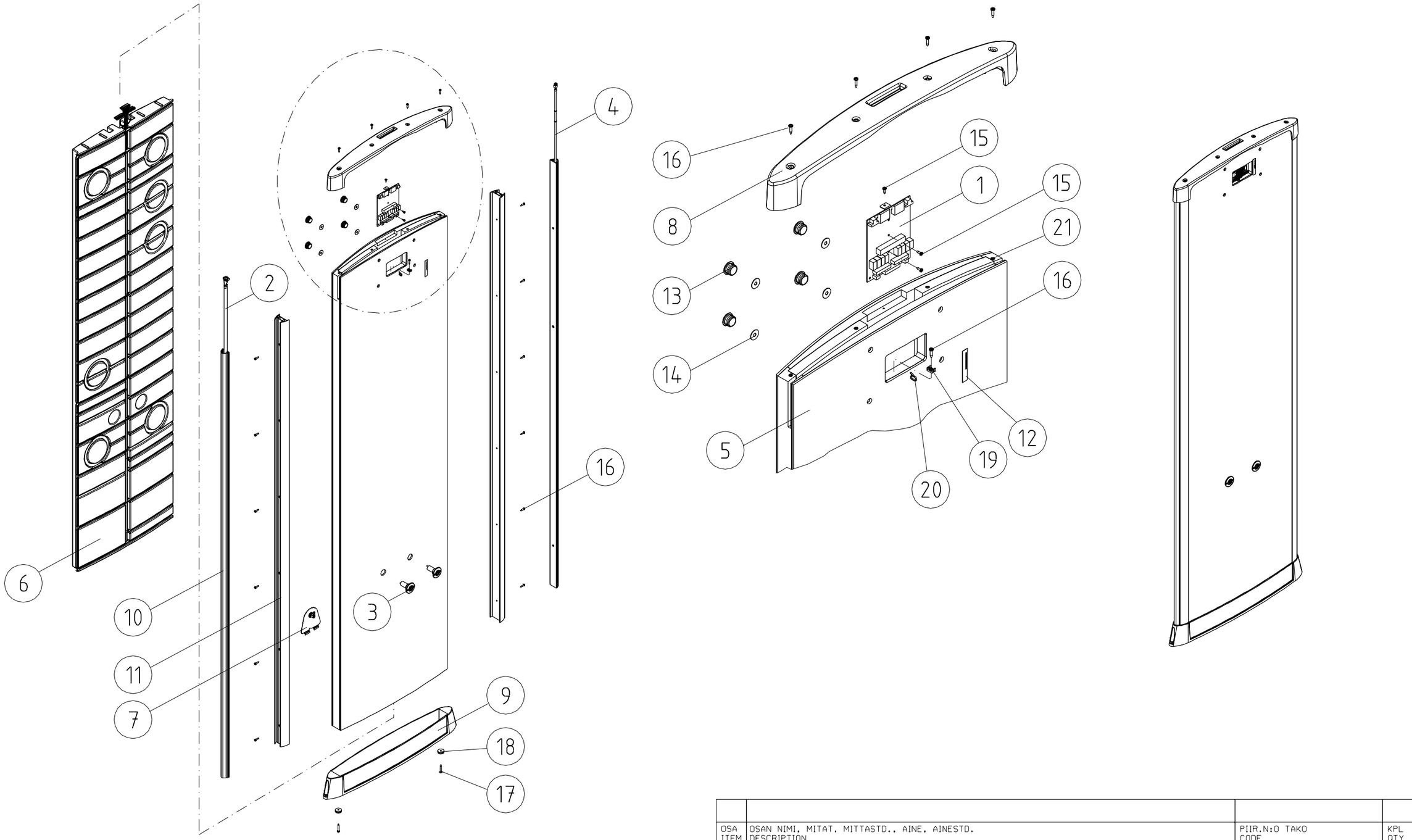
SINGLE LEVEL

8100706 4OE MTXS 5138 M300 TRANSMITTER PANEL SET 1,000 KPL 06

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	150	2130144		CABLE TIE SSM2 4,6X170MM ID TAG *20	1,000	KPL		
1	160	3061389		BUSHING BLACK RK-22 ETOLA *13	4,000	KPL		
1	180	3061597		UNIVERSAL SCREW CH 3,5x15 Zn *15	3,000	KPL		
1	190	3061601		UNIVERSAL SCREW CH 4x20 ZN PZ *16	17,000	KPL		
1	200	3061598		UNIVERSAL SCREW CH 5x35 A2 *17	2,000	KPL		
1	210	3061602		CONE PLUG 8 MM / FOR WOOD *21	4,000	KPL		
1	220	3061764		DUCT TAPE 50MM *23 (60cm)	0,060	RLL		

Related Drawings

9001	9100519	3KE		TRANSMITTER PANEL SET MTXS M300	0,000	KPL		02



02	Lisätty osa/Added part 21	2005 03	IJ	ORA
REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

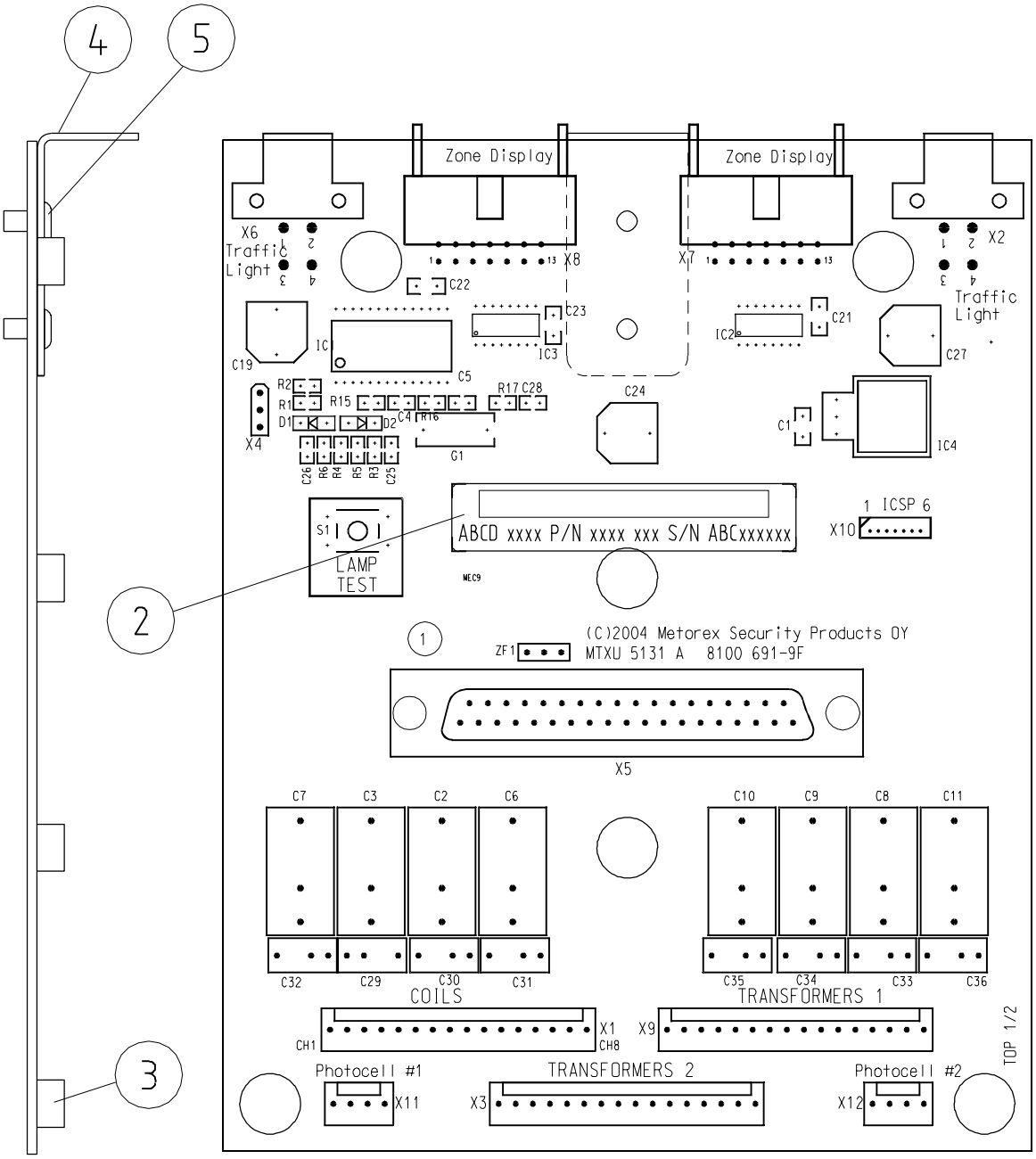
OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 09 JLA	PIIRT. DRAWN 2004 12 IJ
SUHDE SCALE 1:15	LIITTYY NEXT ASSY MTRS 5137	TARK. CHECKED	HYV. APPROVED
Rapiscan® systems	MTXS Transmitter panel set v.3	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 706-40	REV. 02
		PIIR.N:O CODE 9100 519-3KE	

13

MTXU TRANSMITTER UNIT

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIIRT. DRAWN
		2004 05 JNI	2004 05 IJ
SUHDE SCALE	LIITTYY NEXT ASSY	TARK. CHECKED	HYV. APPROVED
1:1	MTXS		
		TUOTE PRODUCT	
		Metor 300	
Rapiscan® systems	MTXU 5131 Transmitter unit	OSAL.N:O PART LIST 8100 689-40	REV. 02
		PIIR.N:O CODE 9100 486-4KE	

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.00	9100 526-4VE
Approved	Date	Document
ORA	24.11.2004	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MTXU 5131		

TRANSMITTER SIDE COIL ADAPTER UNIT, MTXU 5131

1. GENERAL

The MTXU consists of a microcontroller, Zone Display lamp buffers, Traffic Light lamp buffers, coil adapter components, connectors for photocells (traffic counters) and a lamp test button.

2. OPERATIONAL DESCRIPTION

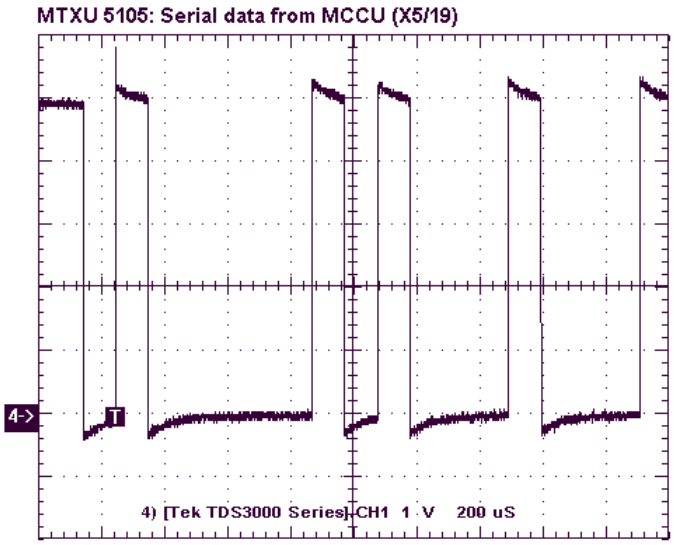
The microcontroller lights up the zone display lamps according the commands from the serial port (from MCCU). The microcontroller controls the traffic lights according the photocell status and the commands from the serial port (from MCCU). The MTXU controls the RED and GREEN signals that tell the MRXU (and MCCU) which lamp is on. The microcontroller monitors the photocell outputs and when it detects a walkthrough it pulses either the COUNT_FW or COUT_BK signal depending on the walking direction.

Coil adapter capacitors (C2,3,6…11) force the bandwidth of all eight channels to same.

A lamp test button starts a lamp test sequence.

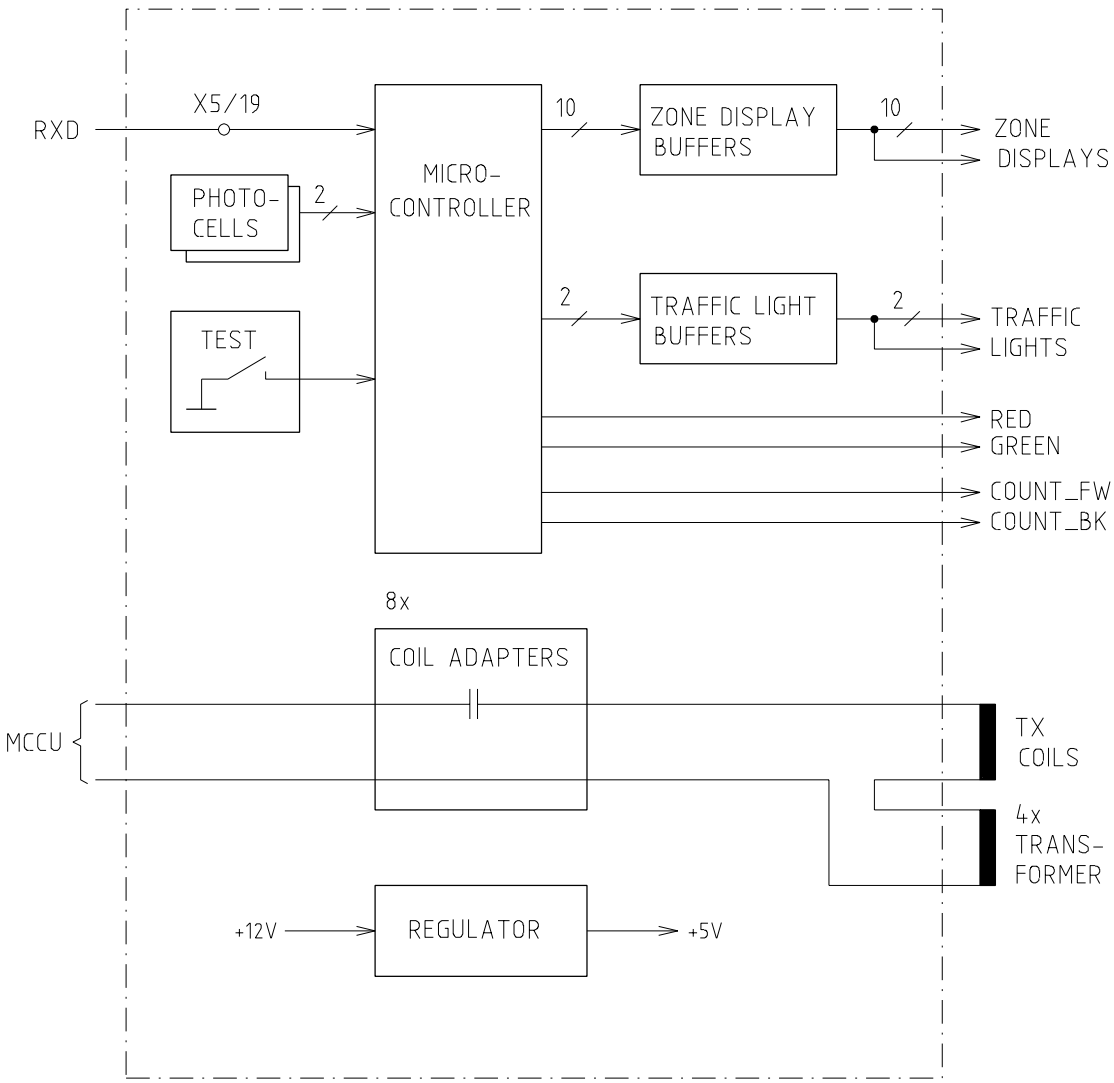
3. TEST POINT SIGNALS

Next pictures show typical waveforms on some points:



4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 01 JNI	2003 01 IJ

SUHDE SCALE

LIITTYY NEXT ASSY: Metor 300

TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

TUOTE PRODUCT: Metor 300

Rapiscan® systems

MTXU 5105
Block diagram

OSAL.N:O PART LIST: 8100 561-40

REV.: 02

PIIR.N:O CODE: 9100 385-4LE

D C B A

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
ORA	1.00	9100 440-4EE
Approved	Date	Document
ORA	26.6.2003	
Product		Archives
METOR 300		METOR 300
Title		
MTXU SOFTWARE VERSIONS		

1
3061180, PIC16F73 / IC1

1.1
Ver. 1.10

MCAU1_10.hex
Checksum:
Date: 5.5.2003

14
ZONE DISPLAY SET

SINGLE LEVEL

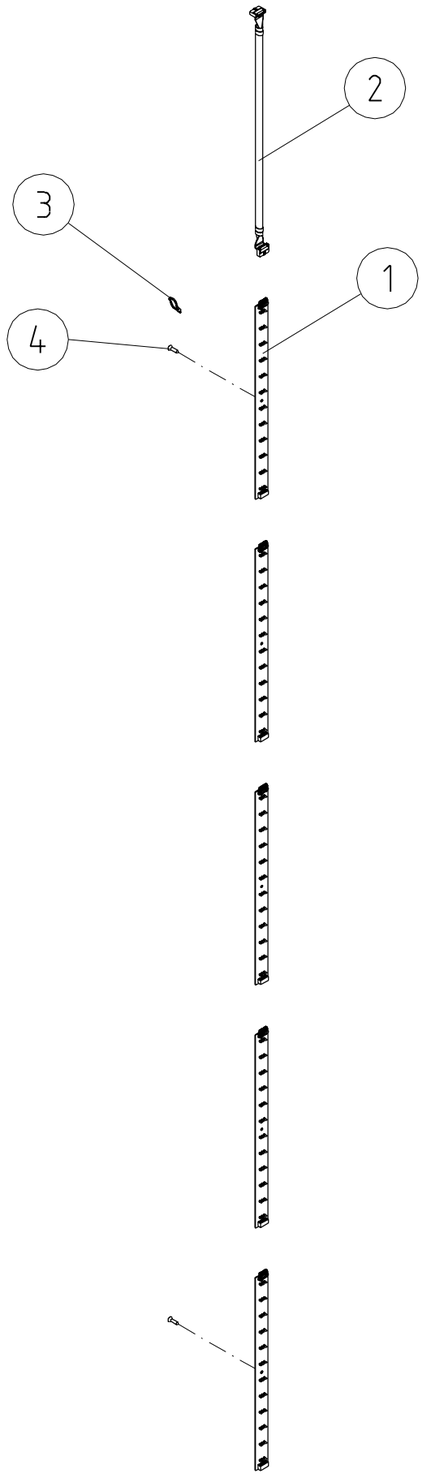
Last.revision: 04
Revision updated: 3.3.2005
Version: PLANNING
Accept:

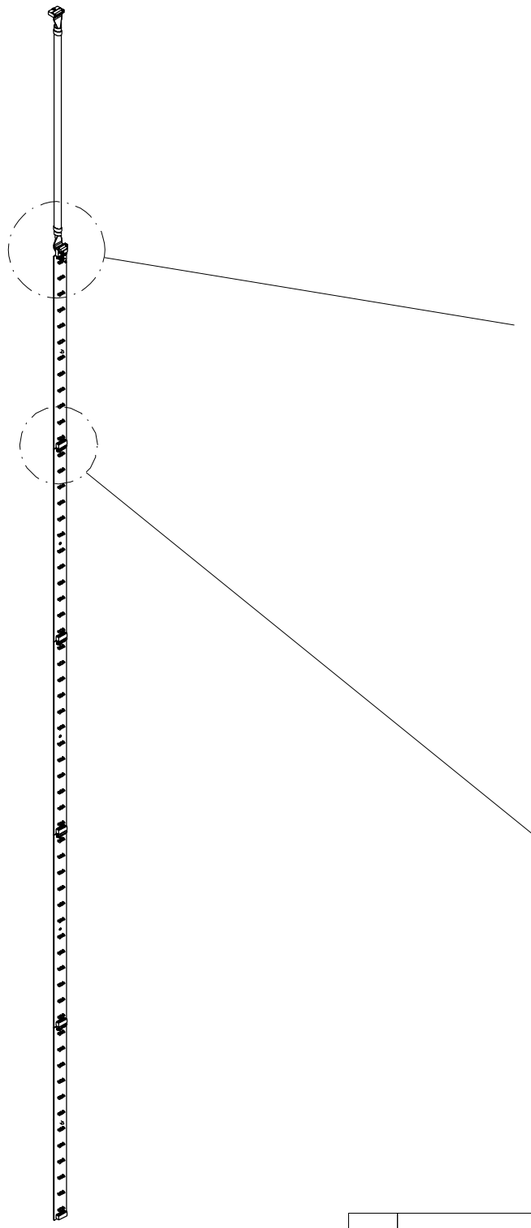
8100701 4O ZONE DISPLAY SET v.3 M300 1,000 KPL 04

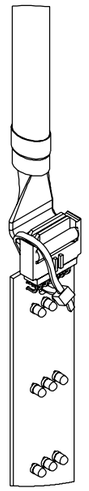
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100697	4O	MZDU 5133 M300 ZONE DISPLAY UNIT *1	5,000	KPL		03
1	20	8100744	4OE	ZONE DISPLAY CABLE M300 v.3 *2	1,000	KPL		01
1	30	3061599		CABLE TIE PANDUIT PLT1M-M20 *3	1,000	KPL		
1	40	3061600		THIN PLATE SCREW CH 4,2x16 ZN PZ *4	2,000	KPL		

Related Drawings

9001	9100510	3AE	ZONE DISPLAY INSTALLATION M300	0,000	KPL		01







1:2

1:2

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED 2004 10 JLA

PIIRT. DRAWN 2004 11 IJ

SUHDE SCALE (1:2)

1:10

LIITTYY NEXT ASSY MTXS, MRXS

TARK. CHECKED

HYV. APPROVED

TUOTE PRODUCT Metor 300

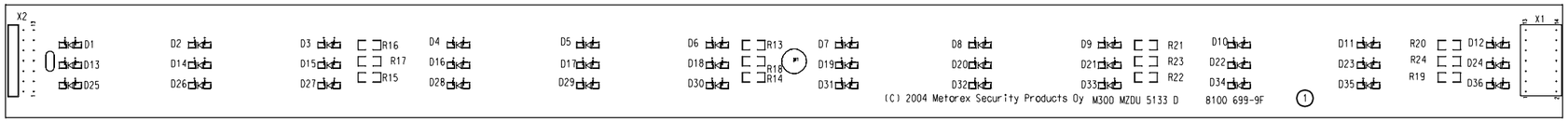
OSAL.N:O PART LIST 8100 701-40

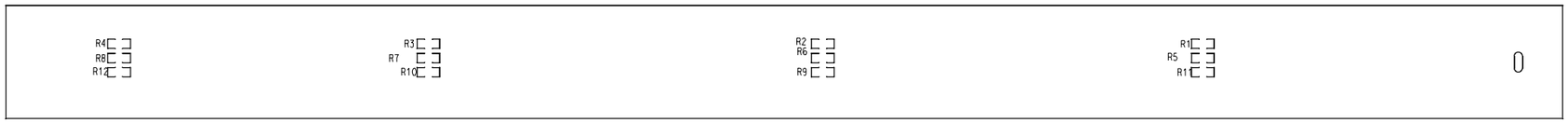
REV. 01

PIIR.N:O CODE 9100 510-3AE

Rapiscan® systems

Zone display installation v.3





REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 06 JNI	PIIRT. DRAWN 2004 06 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY MTXS, MRXS	TARK. CHECKED	HYV. APPROVED
Rapiscan® systems	MZDU 5133 Zone display unit	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 697-40	REV. 02
		PIIR.N:O CODE 9100 488-2KE	

15

TRAFFIC LIGHT SET

SINGLE LEVEL

Last.revision: 03
Revision updated: 3.3.2005
Version: PLANNING
Accept:

8100702 4O TRAFFIC LIGHT SET v.3 M300 1,000 KPL 03

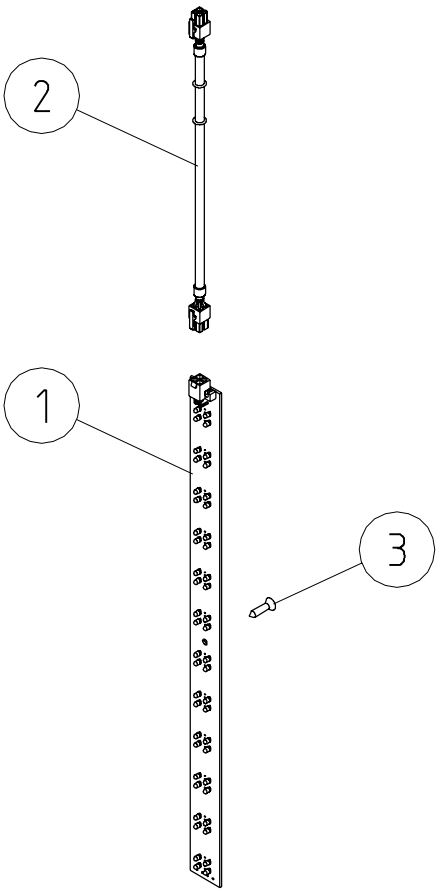
L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100698	4O	MTLU 5134 M300 TRAFFIC LIGHT UNIT *1	1,000	KPL		03
1	20	8100754	4OE	TRAFFIC LIGHT CABLE M300 v.3 *2	1,000	KPL		01
1	30	3061600		THIN PLATE SCREW CH 4,2x16 ZN PZ *3	1,000	KPL		

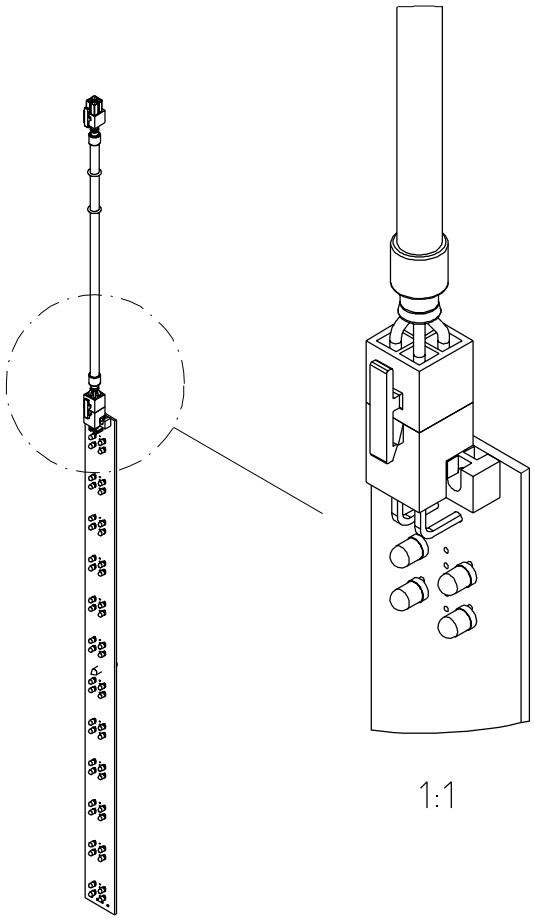
Related Drawings

9001		9100511	4AE	TRAFFIC LIGHT INSTALLATION M300	0,000	KPL		01

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.





1:1

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2004 09 JLA	2004 11 IJ
TARK. CHECKED	HYV. APPROVED

SUHDE SCALE (1:1) 1:5

LIITTYY NEXT ASSY: MTXS, MRXS

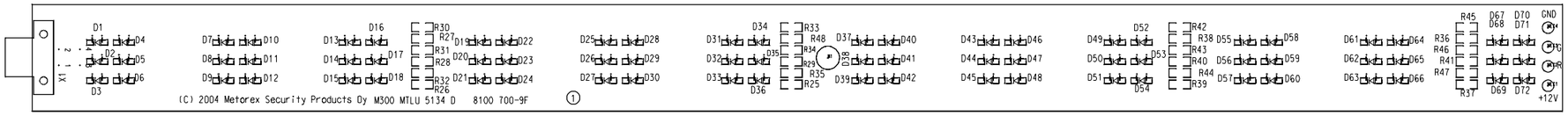
TUOTE PRODUCT: Metor 300

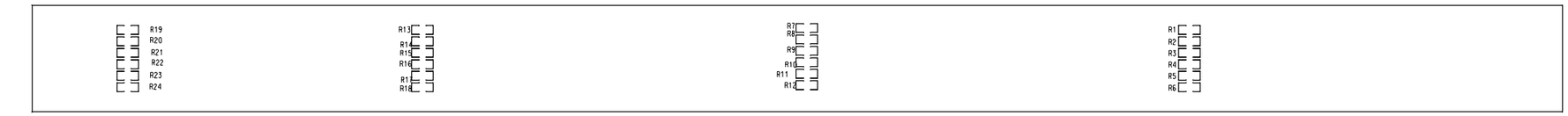
OSAL.N:O PART LIST: 8100 702-40 REV. 01

PIIR.N:O CODE: 9100 511-4AE

Rapiscan® systems

Traffic light installation v.3





REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD.	PIIR.N:O TAKO CODE	KPL QTY
YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED 2004 06 JNI	PIIRT. DRAWN 2004 06 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY MTXS, MRXS	TARK. CHECKED	HYV. APPROVED
Rapiscan® systems	MTLU 5134 Traffic light unit	TUOTE PRODUCT Metor 300	
		OSAL.N:O PART LIST 8100 698-40	REV. 02
		PIIR.N:O CODE 9100 489-2KE	

16

TRAFFIC COUNTER SET

SINGLE LEVEL

Last.revision: 01
Revision updated: 1.11.2004
Version: PLANNING
Accept:

8100755 4O TRAFFIC COUNTER SET 1700mm v.3 M300 1,000 KPL 01

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100556	4M	PHOTO SENSOR MOUNTING BUSHING MTXS M300 *1	1,000	KPL		02
1	20	3060251		PHOTO SENSOR SUNX CY-27 RETROREFLEX NPN LIGHT/DARK-ON or 655.4219.002 BERNSTEIN *2	1,000	KPL		
1	30	3061301		CONNECTOR 4NAP 0,3-0.4mm2 RED CE100F22-4 MAS-CON *X1	1,000	KPL		
1	40	3061388		CONNECTOR COVER EC100F-4 SNAP-ON COVER EC100F-4 MAS-CON *3	1,000	KPL		
1	50	2723294		SCREW UK ST2,9X9,5-C-Z FE/ZNA1 ISO 7050 *4	2,000	KPL		

Related Installation components

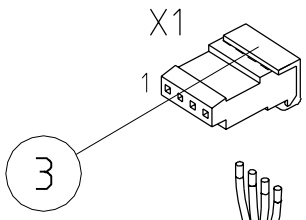
8001		4100347	4ME	REFLECTOR DIA 45MM	1,000	KPL		A

Related Drawings

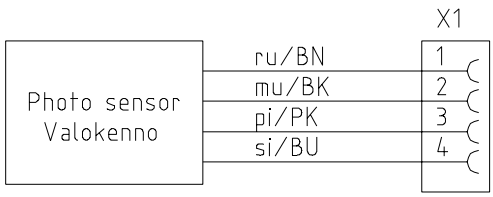
9001		9100520	4KE	TRAFFIC COUNTER SET 1700mm v.3 M300	0,000	KPL		01
9002		9100503	4AE	INSTALLATION OF TRAFFIC COUNTER REFLECTOR M300	0,000	KPL		1.00

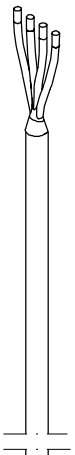
4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.

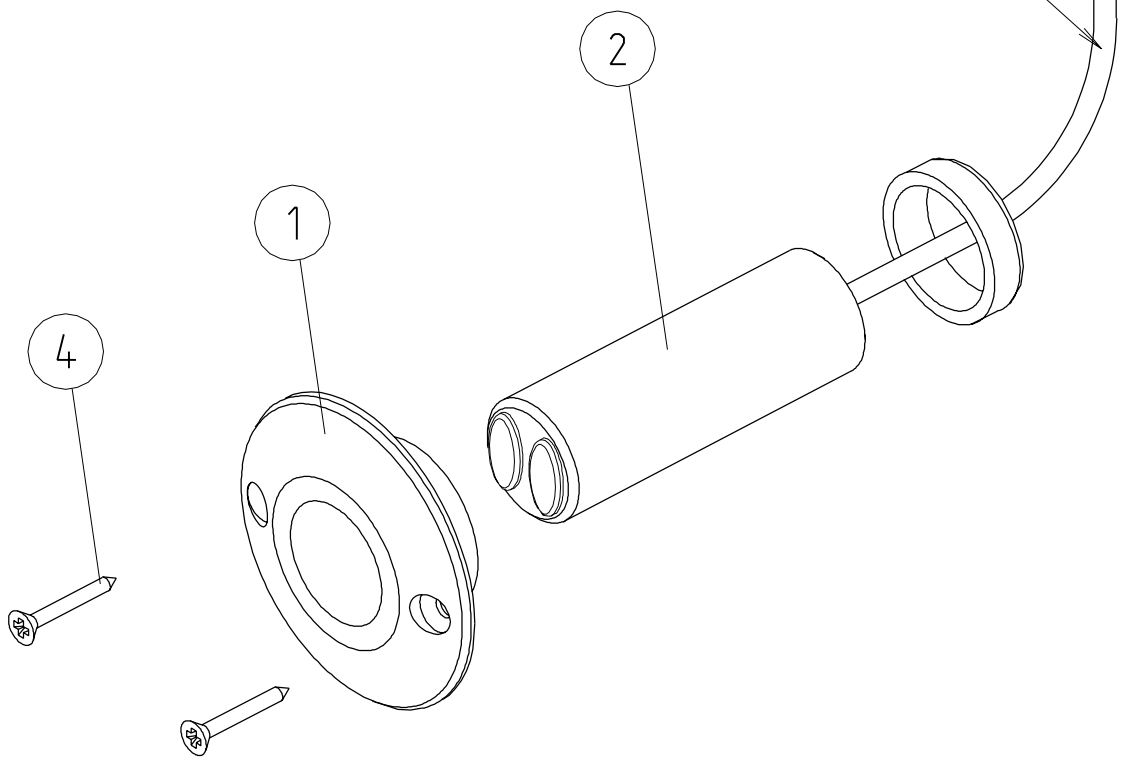


Note! X1 connection after assembly
Huom! X1 kytkentä asennuksen jälkeen





Cable length 1700mm
Johdon mitta 1700mm



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES		SUUNN. DESIGNED	PIIRT. DRAWN
		2004 11 JLA	2004 11 IJ
SUHDE SCALE 1:1	LIITTYY NEXT ASSY MTXS 5100	TARK. CHECKED	HYV. APPROVED
		TUOTE PRODUCT Metor 300	
Rapiscan® systems	Traffic counter set 1700mm v.3	OSAL.N:O PART LIST 8100 755-40	REV. 01
		PIIR.N:O CODE 9100 520-4KE	

D C B A

17

MRXS RECEIVER PANEL SET

SINGLE LEVEL

Last.revision: 07
Revision updated: 6.11.2007
Version: PLANNING
Accept:

8100707 4OE MRXS 5139 M300 RECEIVER PANEL SET 1,000 KPL 07

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100690	4OE	MRXU 5132 M300 RECEIVER UNIT	1,000	KPL		04
				*1				
1	20	8100701	4OE	ZONE DISPLAY SET v.3 M300	1,000	KPL	O1	04
				*2				
1	25	4100347	4ME	REFLECTOR DIA 70mm MTXS	0,000	KPL		B
				*3 (Ref. 8100 755-4OE)				
1	30	8100702	4OE	TRAFFIC LIGHT SET v.3 M300	1,000	KPL	O2	03
				*4				
1	40	8100736	2KE	COIL FRAME MTXS, MRXS M300 v.3	1,000	KPL		03
				*5				
1	50	8100738	4OE	RX COIL M300 v.3	1,000	KPL		01
				*6				
1	60	8100739	4OE	POWER CORD DOOR MTXS, MRXS M300 v.3	1,000	KPL		01
				*7				
1	65	4100343	4OE	POWER CABLE 3M	1,000	KPL		C
1	70	8100740	3ME	HAT M300 v.3	1,000	KPL		005
				*8				
1	80	8100741	3ME	BOOT M300 v.3	1,000	KPL		003
				*9				
1	90	8100742	3ME	LIGHT TUBE FOR ZONE DISPLAY M300 v.3 T40510-2/252 SMOKE GRE	2,000	KPL		004
				*10				
1	100	8100743	3ME	MOUNTING PROFILE ZONE DISPLAY M300 T40510-1/GR v.3	2,000	KPL		003
				*11				
1	105	8101080	3ME	COIL BED WEDGE M300	2,000	KPL		001
				*22				
1	110	8100631	4PE	S/N LABEL BASE 14x76	1,000	KPL		A
				*12				
1	130	8100756	4ME	ANTI-SKID WASHER 25x6x8	2,000	KPL		02
				*18				
1	140	2130177		CABLE TIE ANCHOR TM2S8	1,000	KPL		
				*19				

SINGLE LEVEL

8100707 4OE MRXS 5139 M300 RECEIVER PANEL SET 1,000 KPL 07

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	150	2130144		CABLE TIE SSM2 4,6X170MM ID TAG *20	1,000	KPL		
1	160	3061389		BUSHING BLACK RK-22 ETOLA *13	4,000	KPL		
1	170	3061414		WASHER M8/8.4/20/2 ST Zn SFS373 BOSSARD *14	4,000	KPL		
1	180	3061597		UNIVERSAL SCREW CH 3,5x15 Zn *15	3,000	KPL		
1	190	3061601		UNIVERSAL SCREW CH 4x20 ZN PZ *16	17,000	KPL		
1	200	3061598		UNIVERSAL SCREW CH 5x35 A2 *17	2,000	KPL		
1	210	3061602		CONE PLUG 8 MM / FOR WOOD *21	4,000	KPL		
1	220	3061764		DUCT TAPE 50MM *23 (60cm)	0,060	RLL		

Related Drawings

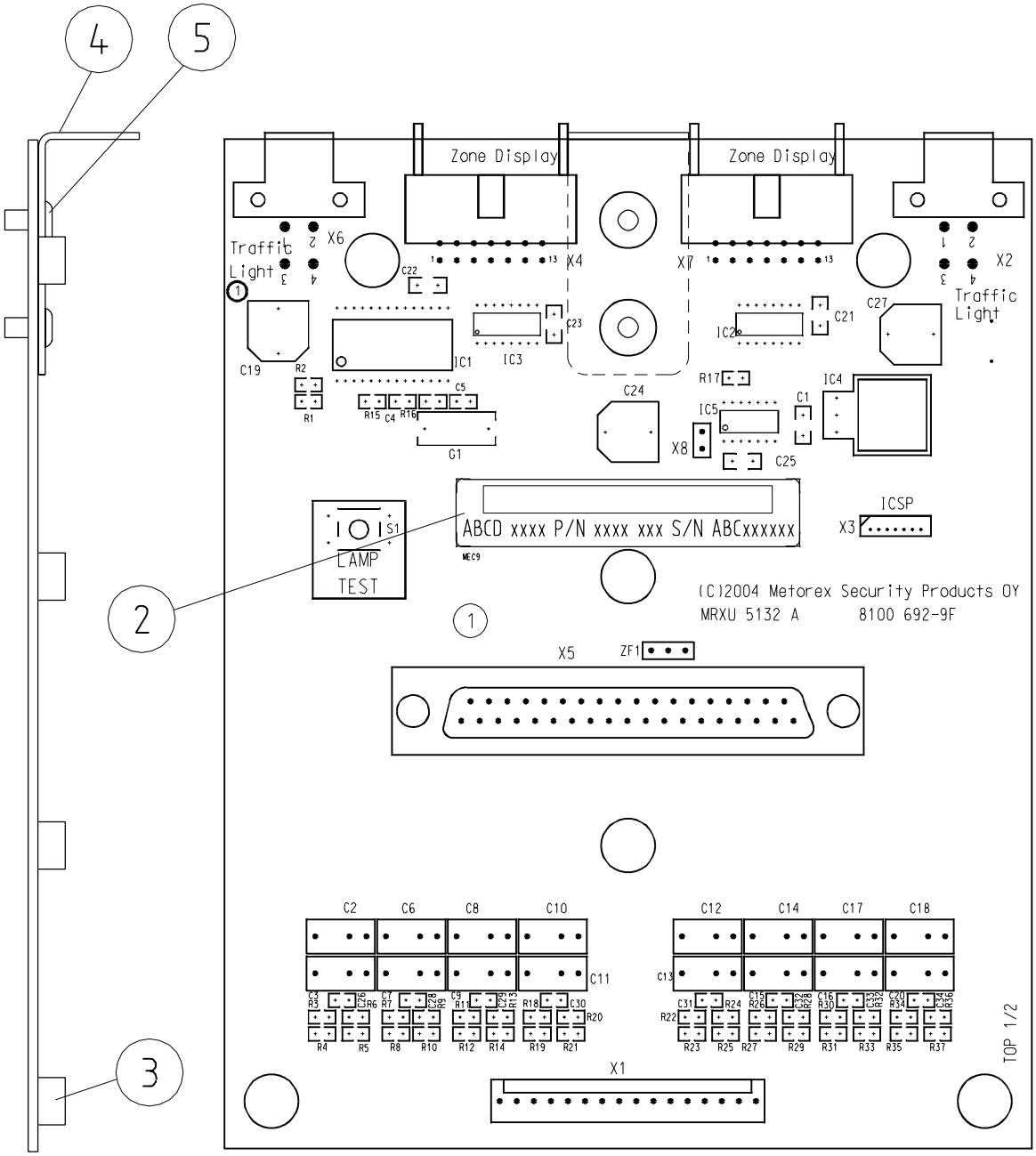
9001 9100515 3KE RECEIVER PANEL SET MRXS M300 0,000 KPL 03

18

MRXU RECEIVER UNIT

4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES	SUUNN. DESIGNED	PIIRT. DRAWN
	2004 05 JNI	2004 05 IJ

SUHDE SCALE	LIITTYY NEXT ASSY	TARK. CHECKED	HYV. APPROVED
1:1	MRXS		

	TUOTE PRODUCT	
Rapiscan® systems	Metor 300	
MRXU 5132 Transmitter unit	OSAL.N:O PART LIST 8100 690-40	REV. 02
	PIIR.N:O CODE 9100 487-4KE	

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.00	9100 527-4VE
Approved	Date	Document
ORA	24.11.2004	
Product		Archives
METOR 300		METOR 300
Title		
OPERATIONAL DESCRIPTION MRXU 5132		

RECEIVER SIDE COIL ADAPTER UNIT, MRXU 5132

1 GENERAL

The MRXU consists of a microcontroller, Zone Display lamp buffers, Traffic light lamp buffers, coil adapter components and a lamp test button.

2 OPERATIONAL DESCRIPTION

The microcontroller lights up the zone lamps according the commands from the serial port (from MCCU). The Traffic Light is controlled by the microcontroller according the RED and GREEN signals from the MTXU.

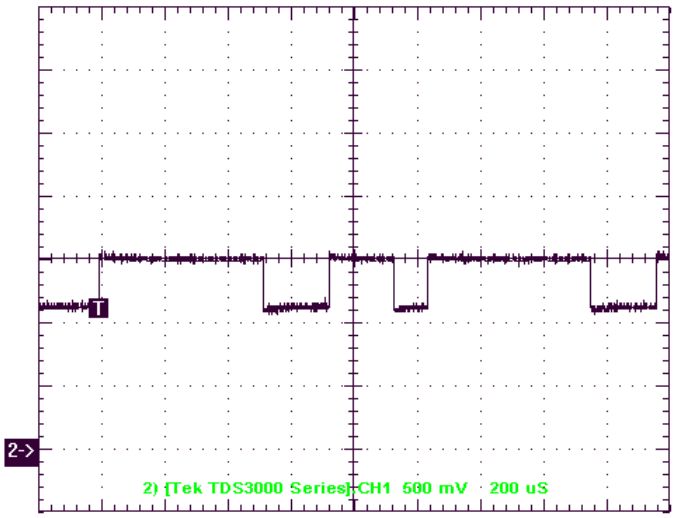
Coil adapter RC –filters force the bandwidth of all eight channels to same.

A lamp test button starts a lamp test sequence.

3 TEST POINT SIGNALS

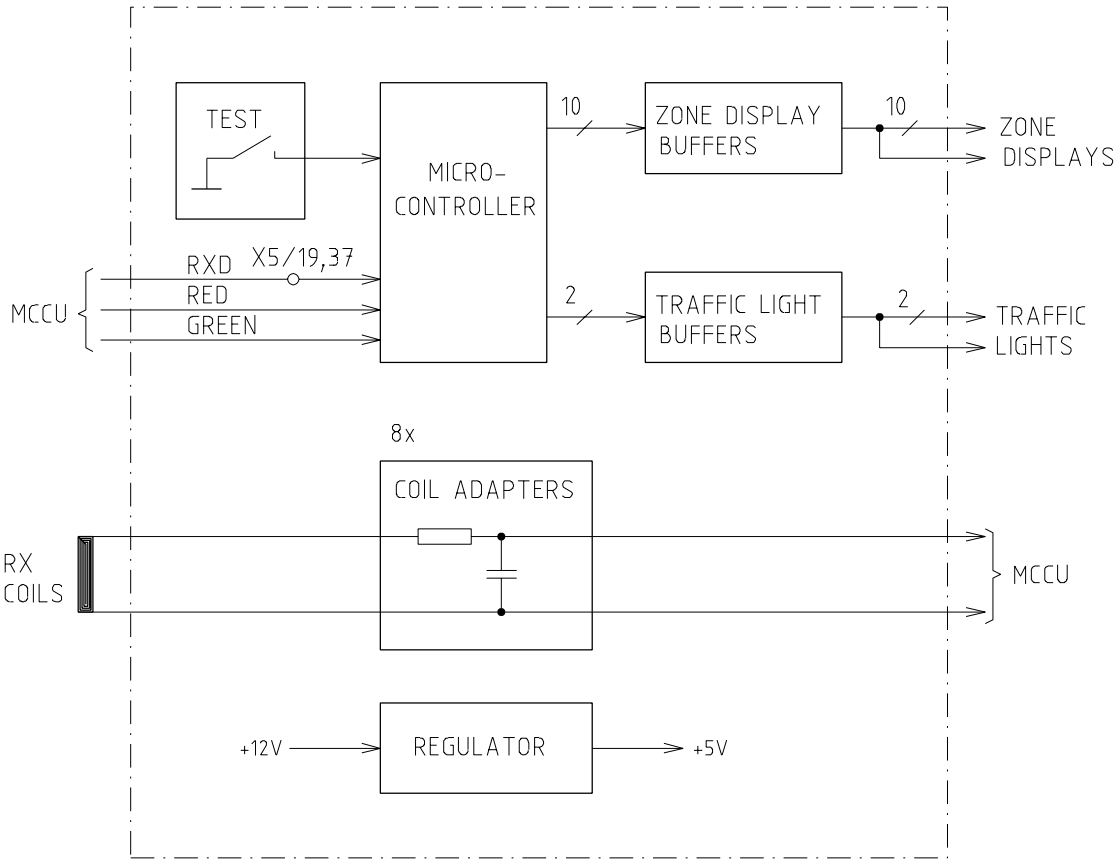
Next pictures show typical waveforms on some points:

MRXU 5096: Serial data from MCCU (X5/19 and X5/37)



4	3	2	1

REV.	MUUTOKSET REVISIONS	PVM DATE	PIIRT. DRAWN	HYV. APPR.



OSA ITEM	OSAN NIMI, MITAT, MITTASTD., AINE, AINESTD. DESCRIPTION	PIIR.N:O TAKO CODE	KPL QTY

YLEISTOLERANSSI TOLERANCES

SUUNN. DESIGNED	PIIRT. DRAWN
2003 01 JNI	2003 01 IJ
TARK. CHECKED	HYV. APPROVED
2003 09 JNI	2003 09 ORA

SUHDE SCALE

LIITTYY NEXT ASSY
Metor 300

TUOTE PRODUCT
Metor 300

Rapiscan® systems

MRXU 5096
Block diagram

OSAL.N:O PART LIST	REV.
8100 480-40	02

PIIR.N:O CODE
9100 386-4LE

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
ORA	1.00	9100 439-4EE
Approved	Date	Document
ORA	26.6.2003	
Product		Archives
METOR 300		METOR 300
Title		
MRXU SOFTWARE VERSIONS		

1
3061180, PIC16F73 / IC1

1.1
Ver. 1.10

MCAU1_10.hex
Checksum:
Date: 5.5.2003

19
ACCESSORIES

Rapiscan Systems Oy PART LIST 12.02.08 15:33 (1)

SINGLE LEVEL

Last.revision: 08
Revision updated: 12.2.2008
Version:
Accept:

8100016 4OE ACCESSORIES M300 1,000 KPL 08

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100421	4OE	MBBS 5091 M300 BATTERY BACK-UP SET	1,000	KPL		C
1	20	8100565	4OE	MSLS 5107 M300 SIMULATION LOAD SET	1,000	KPL		04
1	30	8100550	4OE	MSCS 5103 M300 SIMULATION COIL SET	1,000	KPL		03
1	40	8100609	4OE	PROGRAMMING ADAPTER M300 v.1	1,000	KPL		04
1	41	8100758	4OE	PROGRAMMING ADAPTER MCDS 5129/MDPS 5142 M300 v.3	1,000	KPL		01
1	50	8100613	4OE	MAINTENANCE KIT MELS 5006 M300	1,000	KPL		01
1	51	8100761	4OE	MAINTENANCE KIT MELS 5126 M300	1,000	KPL		01
1	60	8100614	4OE	ON-SITE KIT MELS 5006 M300	1,000	KPL		02
1	61	8100762	4OE	ON-SITE KIT MELS 5126 M300	1,000	KPL		02
1	65	8100676	4OE	MNES 5130 NETWORK 3 PRO SET METOR	1,000	KPL		03
1	70	8100948	4OE	METOR 300 CARRYING CASE SET	1,000	kpl		01
1	90	8100627	4OE	RX MAINTENANCE COIL CABLE 2M M300	1,000	KPL		01
1	100	8100628	4OE	TX MAINTENANCE COIL CABLE 2M M300	1,000	KPL		01
1	110	8101132	4OE	MRDS 5199 M300 REMOTE DISPLAY SET	1,000	KPL		01
1	120	8101124	4OE	METOR TEST OBJECT SET	1,000	KPL		01

Related Drawings

	9001	9100529	4VE	MAINTENANCE MANUAL METOR 300 v.3	0,000	KPL		1.20
	9002	9100283	4QE	DOCUMENT LIST ACCESSORIES M300	0,000	KPL		

SINGLE LEVEL

Last.revision: 01
Revision updated: 2.12.2004
Version: PLANNING
Accept:

8100761 4OE MAINTENANCE KIT MELS 5126 KIT M300 1,000 KPL 01

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100762	4OE	ON-SITE KIT MELS 5126 M300	1,000	KPL		01
1	20	8100649	4O	MELS 5126 M300 ELECTRONICS SET	1,000	KPL		03
1	30	8100673	4O	MCDS 5129 M300 CONTROL AND DISPLAY SET	1,000	KPL		02
1	40	8100690	4O	MRXU 5132 M300 RECEIVER UNIT	1,000	KPL		03
1	50	8100698	4O	MTLU 5134 M300 TRAFFIC LIGHT UNIT	1,000	KPL		03
1	60	8100697	4O	MZDU 5133 M300 ZONE DISPLAY UNIT	1,000	KPL		03
1	70	8100689	4O	MTXU 5131 M300 TRANSMITTER UNIT	1,000	KPL		03

SINGLE LEVEL

Last.revision: 02
Revision updated: 11.1.2006
Version: PLANNING
Accept:

8100762 4OE ON-SITE KIT MELS 5126 M300 1,000 KPL 02

L.	Line	Item	Dty	Description	Qty	U/M	Feat.	Rev
1	10	8100475	4OE	TX COIL CABLE 0,5M M300	1,000	KPL		A
1	20	8100474	4OE	RX COIL CABLE 0,3M M300	1,000	KPL		06
1	30	3056520		MAINS CABLE 115V 2,0M USA	1,000	KPL		
1	40	2459857		MAINS CABLE 230V 2,5M EUROP. SHUKO 27904	1,000	KPL		
1	50	8100754	4OE	TRAFFIC LIGHT CABLE M300 v.3	1,000	KPL		01
1	60	8100744	4OE	ZONE DISPLAY CABLE L=490-520 M300	1,000	KPL		02
1	80	8100674	4OE	DISPLAY CABLE M300 v.3	1,000	KPL		02
1	90	4100347	4ME	REFLECTOR DIA 45MM	2,000	KPL		A
1	100	1330935		FUSE GLASS TUBE 5x20MM T2AL/H250V IEC/UL GMC-2A COOPER BHUSSMANN	10,000	KPL		
1	110	3061446		HEXACON SOCKET KEY T-HANDLE 4x100MM 224-100 TURNUS	1,000	KPL		
1	120	3061642		KEY 839306841 ABLOY CL109C	2,000	KPL		
1	125	3060246		KEY S557773575DH AVA 0263	2,000	KPL		
1	130	3061345		FINGER SCREW M4x12 PS1412M412S	2,000	KPL		
1	140	3061585		FURNITURE SCREW M6x55 Fe/BLACK	8,000	KPL		

20
FAULT TRACING AND DESCRIPTION OF ERROR MESSAGES

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	0.10	9100 416-4VE
Approved	Date	Document
ORA	28.4.2003	
Product		Archives
METOR 300		METOR 300
Title		
FAULT TRACING AND ERROR MESSAGES		

1 FAULT TRACING

Here is listed some possible failures.

Symptom	Possible cause	Corrective action
No power to RX or TX panel	Resetable fuse F1 or F6 tripped or failed	Cycle power; check MTXU/MRXU for short circuit; replace fuse;
Traffic counter does not work, traffic lights are always red	Coil panels are not aligned vertically Photocell mounted incorrectly	Adjust distance between coil panels at bottom Rotate photocell 180 degrees
No power to MELS; fuses in the power entry module are OK	Fuse located in the power supply PCB has failed	Replace fuse with equivalent rating
Zone Display is dead	Zone Display Cable is installed wrong way	Reinstall cable

2 ERROR MESSAGES

In the following are explained errors that are shown on the Display Unit.

Error Message	Possible cause	Corrective action
SYSTEM MESSAGE: ERROR CODE XXX	Depends on error number; see next table	Cycle power on the unit, if reappears contact service
SYSTEM MESSAGE: MDPU Vcc TOO LOW	Display unit extension cable is too long, Power supply failure	Try shorter extension cable Replace MDPS
SYSTEM MESSAGE: MDPU TEMP TOO LOW	Ambient temperature is too low	Wait for the Display unit to warm up
SYSTEM MESSAGE: MDPU TEMP TOO HIGH	Ambient temperature is too high, direct sunlight to display unit	Move display unit to shadow
SYSTEM MESSAGE: MDPU EEPROM INIT.	Memory was corrupted	Cycle power on the unit; verify that all parameters are correct!
SYSTEM MESSAGE: ACCESS CODES INIT.	The Learn –button was pressed for more than five seconds	Re-set all access codes
BATTERIES OF REMOTE CONTROL ARE EMPTY!	Empty batteries on remote control	Replace batteries
LOW REMOTE CONTROL BATTERY LEVEL!	Almost empty batteries on remote control	Replace batteries soon

SYSTEM MESSAGE: MCCU Vcc TOO LOW	Power supply failure MCCU failure	Replace power supply Replace MCCU
SYSTEM MESSAGE: MCCU TEMP TOO LOW	Ambient temperature is too low	Wait for the electronics to warm up.
SYSTEM MESSAGE: MCCU TEMP TOO HIGH	Ambient temperature is too high. Electrical failure	Move gate to cooler place Replace MCCU.
SYSTEM MESSAGE: MCCU EEPROM INIT	Memory was corrupted.	Cycle power on the unit; verify that all parameters are correct!
SYSTEM MESSAGE: RX-CABLE FAILURE!	RX –cable is loose or disconnected.	Connect cable to RX –panel, replace cable
SYSTEM MESSAGE: TX-CABLE FAILURE!	TX –cable is loose or disconnected.	Connect cable to TX –panel, replace cable
SYSTEM MESSAGE: RECEIVER FAILURE!	No signal from RX –panel MSDU failure	Connect cable to RX –panel Replace MSDU
SYSTEM MESSAGE: TX 0-3 FAILURE!	No current to transmitter coil 0,1,2 or 3. MCWU #1 failure	Connect cable to TX –panel Replace MCWU #1
SYSTEM MESSAGE: TX 4-7 FAILURE!	No current to transmitter coil 4,5,6 or 7 MCWU #2 failure	Connect cable to TX –panel Replace MCWU #2
SYSTEM FPGA NOT RESPONDING!	Electronics failure	Cycle power, Replace IC16, Replace MCCU
OPERATION FAILED: NO REPLY FROM MCCU	Display unit cannot communicate with electronics, MCCU failure MDPS failure	Verify that display unit cable is connected properly; Replace MCCU Replace MDPS
MAX COUNT OF REMOTES IS VALIDATED!	No more remote control units can be taught to gate	Remove all remotes and try again. NOTE: This disables ALL previously taught remotes
CUSTOM PARAMS ARE NOT SET!	No custom parameters are saved	Save parameters before loading them
NO METAL DATA FROM MCCU	The MDPU does not get metal signal from the MELS MCCU failure MDPS failure	Check MDPU cable, cycle power, Replace MCCU Replace MDPS
MCCU PARAMS CORRUPTED!!	MCCU parameters are corrupted. MCCU failure	Cycle power on the unit; verify that all parameters are correct! Replace MCCU
NO REPLY FROM MDPU!	Display unit cannot communicate with electronics, MCCU failure MDPS failure	Verify that display unit cable is connected properly; Replace MCCU Replace MDPS

3 ERROR NUMBERS

In the following are explained error numbers that are shown on the Display Unit as "SYSTEM MESSAGE: ERROR CODE XXX"

Code	Error	Possible cause
128	No reply from MSDU 1 channel 1	MSDU 1 not properly seated on connector
129	No reply from MSDU 1 channel 2	MSDU 1 not properly seated on connector
130	No reply from MSDU 2 channel 1	MSDU 2 not properly seated on connector
131	No reply from MSDU 2 channel 2	MSDU 2 not properly seated on connector
132	No reply from MSDU 3 channel 1	MSDU 3 not properly seated on connector
133	No reply from MSDU 3 channel 2	MSDU 3 not properly seated on connector
134	No reply from MSDU 4 channel 1	MSDU 4 not properly seated on connector
135	No reply from MSDU 4 channel 2	MSDU 4 not properly seated on connector
136	Not in use	
137	Not in use	
138	Not in use	
139	Not in use	
140	I2C bus collision	A component connected to I2C has failed
141	No ACK from I2C bus	A component connected to I2C has failed
142	I2C timeout error	A component connected to I2C has failed
143	Invalid command from I2C	A component connected to I2C has failed
144	Data packet checksum	RS232 communication error in MCCU
145	Invalid USART command	RS232 communication error in MCCU
146	Unexpected error during saving the packet!	MRCU failed to save data to EEPROM
147	Unexpected error during loading the packet!	MRCU failed to load data from EEPROM
148	There is not enough memory in the EEPROM!	MRCU error trying to save multiple pages
149	EEPROM is totally full!	MRCU error
150	Error during page write!	MRCU error
151	Error during page read!	MRCU error
152	Tried to save data with illegal ID (0xFF)!	MRCU error
153	Error in writing FAT entry!	MRCU error
154	Error in writing Info-page!	MRCU error
155	Error during packet write!	MRCU error
156	Error during packet read!	MRCU error
157	Wanted ID-type of data was not found from the EEPROM!	MRCU error
158	Data with wanted index was not found from the EEPROM!	MRCU error
159	Can not load the packet, because EEPROM is empty!	MRCU error
160	FAT-page loading failed!	MRCU error
161	Raw Read/Write-operation is pointed to invalid EEPROM!	MRCU error
162	Raw Read/Write-operation is pointed to illegal page!	MRCU error
163	Info-page loading failed!	MRCU error
164	Page checksum error!	MRCU error

165	LCD-timeout, no response!	MDPU alphanumeric display failure
166	Invalid parameter value	Zone number
167	Invalid parameter value	Program number
168	Invalid parameter value	Sensitivity setting
169	Invalid parameter value	Frequency number
170	Invalid parameter value	HP –filter setting
171	Invalid parameter value	LP -filter setting
172	Invalid parameter value	Alarm delay setting
173	Invalid parameter value	Count direction setting
174	Invalid parameter value	Decrement mode setting
175	Invalid parameter value	Volume setting
176	Invalid parameter value	Volume min. setting
177	Invalid parameter value	Tone number
178	Invalid parameter ID	No such parameter number

21
TEST AND SETTING FUNCTIONS

Rapiscan systems
An OSI Systems Company

Author	Rev.	Code
J Niemi	1.20	9100 417-4VE
Approved	Date	Document
ORA	26.6.2007	
Product		Archives
Metor 300 MCCU, MDPS, MCDS		METOR 300
Title		
SOFTWARE UPDATE GUIDE		

CONTROL AND COMMUNICATIONS UNIT, MCCU
DISPLAY UNIT, MDPS, MCDS

1 GENERAL

All the microcontrollers (processors) in the Metor 300 electronics are In Circuit Programmable, i.e. they can be reprogrammed with new software at will, even when they are soldered on the PCBs. The software is located in a FLASH memory *inside* the microcontrollers. Thus software update by replacing memory chips is not possible, but requires use of special hardware and/or software. Two of the PCBs, i.e. MCCU (inside the electronics set, MELS) and MDPU (inside the Display Unit, MDPS), are equipped with a microcontroller that can program itself and thus no external hardware except a PC with RS232 serial port and a serial cable is required to re-program those units.

In addition to the software, the Display Unit User Interface (menu texts and structure) can also be field programmed. This is often required when new software version adds new features.

In the next chapters is explained the software and user interface upgrade procedure for the MDPU and the MCCU. Other units must be returned to the factory if re-programming is required.

2 UPDATING THE SOFTWARE

2.1 Installing the PC Software

A manufacturer supplied software called “M300 Boot Loader” is used to load the new software to the MELS or MDPS. Before using the software, it must be installed to PC. This is done by running program INSTALL`.EXE` on the delivery disk in folder `\BootLoader`. This installs the actual software and also LabView run time libraries to hard disk drive. Default installation directory is `c:\Program Files\M300\BootLoader.`

2.2 Connecting the Cables

The M300 Boot Loader software loads a program file (*.HEX format) from disk to memory and sends the file to the selected unit via RS232 serial port. Before loading the software a special cable called *M300 Programming Cable* must be connected between the PC, Display Unit and MELS (crosspiece) as follows:

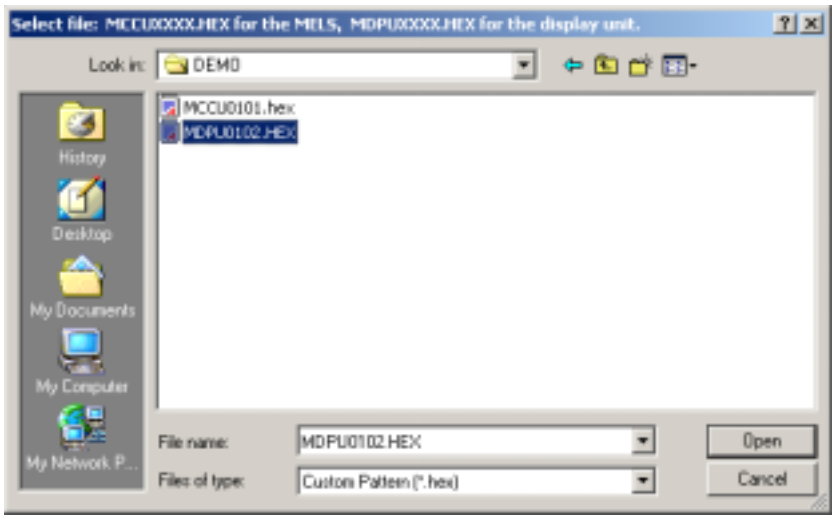
1. Turn power off the M300 and the PC
2. remove the Display Cable from the display unit end

3. connect the Display Cable D –connector to the MELS if not already connected
4. connect the Display Cable to the Programming Cable box (1)
5. connect the RJ11 –connector (2) to the Display Unit (only needed if the Display Unit is to be programmed)
6. connect the Programming Cable D –connector (3) to PC serial port COM1 or COM2
7. use the switch in the Programming Cable box to select the unit to be programmed

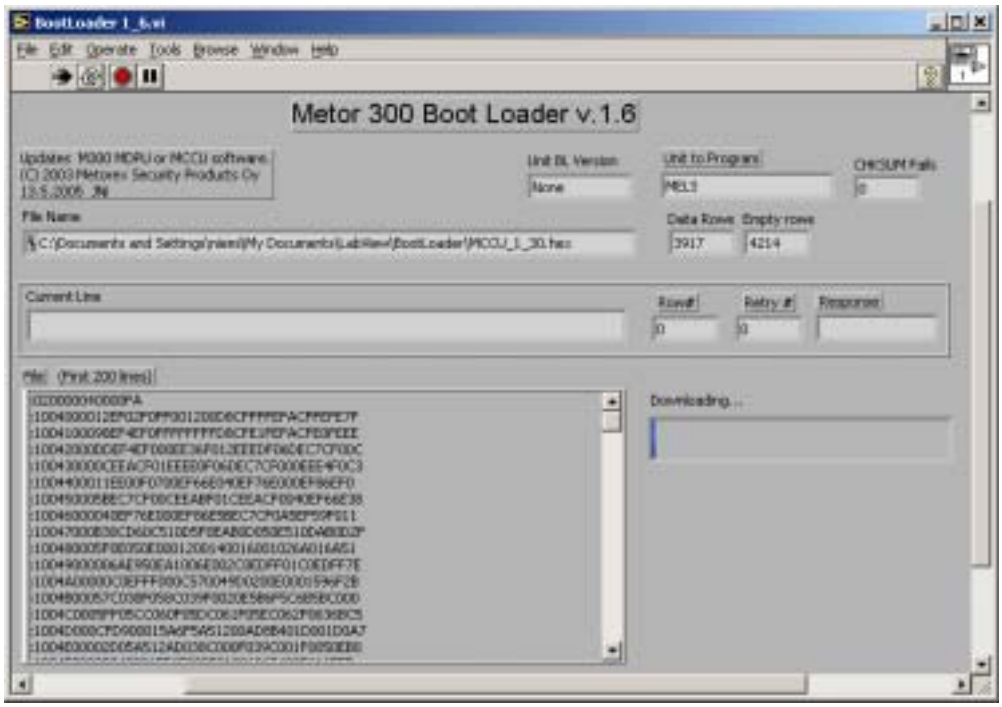
2.3 Programming

Turn on the PC and execute the *M300 Boot Loader* software. Program asks first the program file to be used. The file name is either `MCCUVVVV.HEX` for the MELS or `MDPUVVVV.HEX` for the MDPS, where `VVVV` is the software version. For example, file `MCCU_1_30.HEX` contains software version 1.30 for the MELS. When the software is started, it first asks the user to select the file to be loaded. Here is selected software version 1.02 for the MDPU.

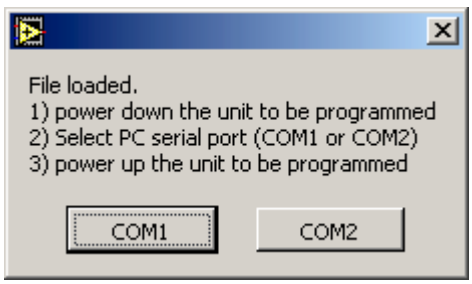
NOTE: The software determines the unit to be programmed by the name of the file, ie. file named as MDPUVVVV.HEX can not be accidentially downloaded to MELS and vice versa.



Here is the main window when the file is loaded to memory:



When the file is loaded, you must select the PC serial port (COM1 or COM2) that the unit is connected to; the following window pops up automatically:



After that turn power on the Metor 300. The download process starts automatically in a few seconds and its status is shown in the blue progress bar. Following information is shown on the display:

File Rows	number of rows in the program file
Serial Port	the serial port that was selected
Unit BL Version	the bootloader software version in the MCCU or MDPU
Unit to Program	this reverts to Display Unit if the file name starts with MDPU and to MELS if the file name starts with MELS
CHKSUM Fails	total number of re-transmissions due to communication errors; normally zero
File Name	the name and path of the selected program file
Current Line	the program line that is being currently transmitted
Row	the current row number that is being transmitted via serial port
Retry	number of retries; normally zero
Response	shows the response from the unit to be programmed; either boot load request (BLxx) or acknowledge (ACxx)

After the download is completed you can either program next unit or quit the Boot Loader program.

2.4 Possible Errors

Symptom	**Possible Cause**
Error message “Invalid address; must be multiple of 8”	• The program file is corrupted or of wrong format
Error Message “File name must begin with MCCU or MDPU”	• Software accepts only files named as MCCUxxxx.HEX or MDPUxxxx.HEX
Error Message “No ACK from unit”	• Verify cable connections
The download process does not start	• Verify cable connections • Turn power on the gate • Verify thet the switch in the Programming Cable is in correct position • Verify that the cable is connected to the PC COM port You selected • Verify that you loaded the correct file (MCCUxxxx.HEX for the MELS, MDPUxxxx.HEX for the MDPS)

3 UPDATING THE USER INTERFACE

3.1 Installing the PC Software

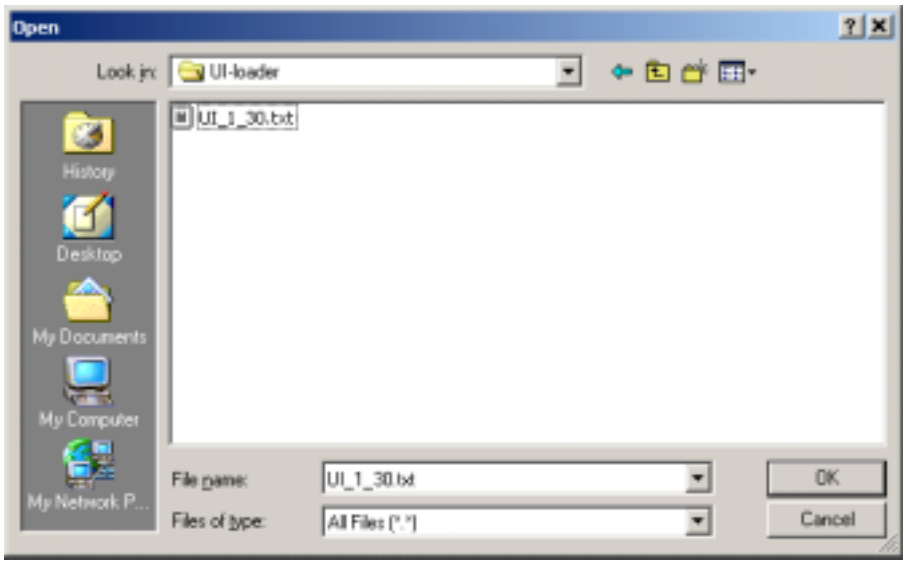
A manufacturer supplied software called “UI-loader” is used to load the new user interface to the MDPS. Before using the software, it must be installed to PC. This is done by running program INSTALL.EXE on the delivery disk in folder \UI-Loader. This installs the actual software and also LabView run time libraries to hard disk drive. Default installation directory is c:\Program Files\M300\UI-loader.

3.2 Connecting the Cables

The M300 Boot Loader software loads a user interface file (*.txt format) from disk to memory and sends the file to the display unit via RS232 serial port.
Before loading the software a special cable called *M300 Programming Cable* must be connected between the PC, Display Unit and MELS (crosspiece) as decribed in chapter 2.2

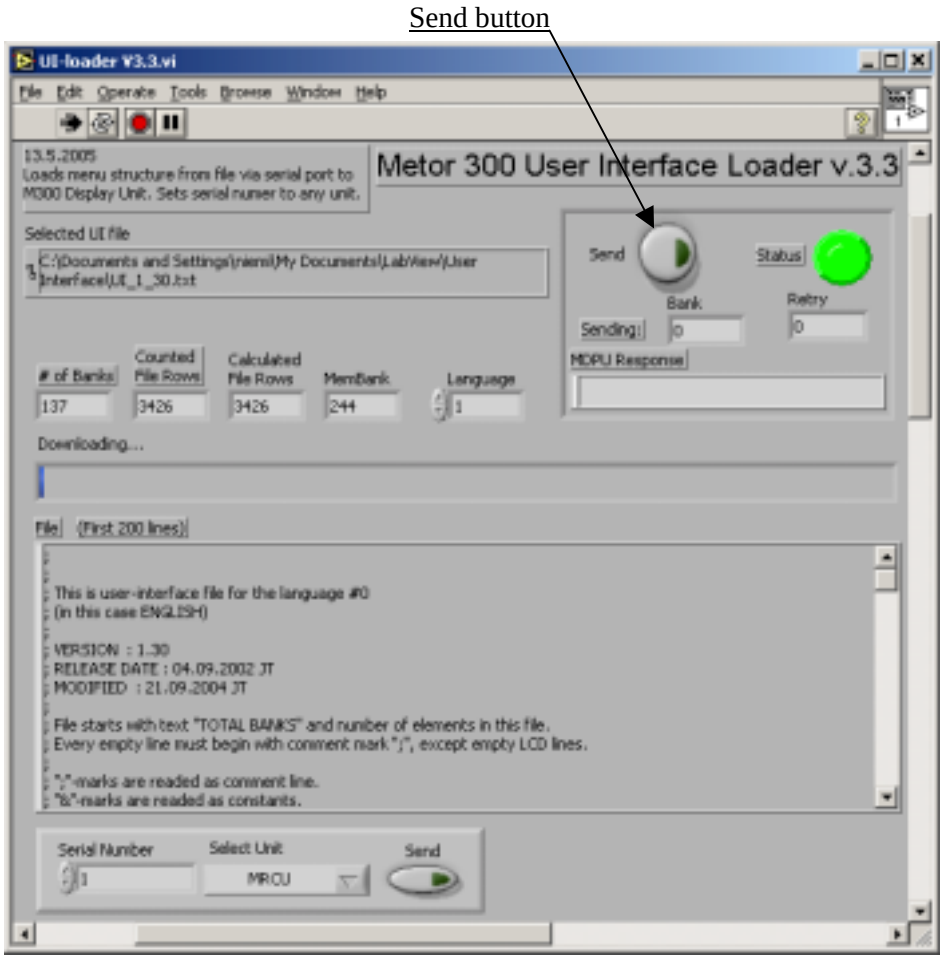
3.3 Programming

Turn on the PC and execute the *UI-Loader* software. Program asks first the file to be used. The file name is UI_VVVV.txt, where VVVV is the version. Example: UI_1_30.txt contains version 1.30.
When the UI-loader program starts, it asks to select the file to be used:



Select the file and press OK. Next the program asks the serial port to use:

Select the serial port the programming cable is connected to. Next turn power on the MELS (and MDPU). When the MDPU issues an error message “No reply from MCCU”, press the “Send” button in the upper right corner of the UI-loader software.
Note that if no user inteface is loaded in the MDPU, it issues an error message. Ignore this error and program the unit as usual.



The display unit and the blue bar show the download progress.
When ready, disconnect the programming cable and turn power on the unit to verify that the programming succeeded.

3.4 Possible Errors

Symptom	Possible Cause
Error Message “Error in File length”	• File is corrupt.
Error Message “No ACK from Display Unit”	• Verify cable connections • Turn power on the gate • Verify thet the switch in the Programming Cable is in correct position • Verify that the cable is connected to the PC COM port You selected

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TECHNICAL INFORMATION