

# **RDAc System I/O Table**

*J:\MSWORD\RDac\RDacMAP.DOC*

## RDAC System I/O Table

The RDAC system data is arranged in a globally accessible table layed out as follows:

<b>Address</b>	<b>Length</b>	<b>Function</b>	<b>Aliases</b>
<b>0001-4096</b>	<b>4096</b>	<b>User register area</b>	
0001-1990		Recommended area for user	
1991-2010	19	<b>Old Soft function control area</b>	
2011-4096		Area for user	
4097-4481	384	<b>Old soft function program (6*64)</b>	
4482-6000		Area for SF Variables	
6001-6970		Recommended area for SF Variables	
6971-6986		Last logged time (Files 1 to 16)	
6987		Debug-Count of allocated message buffers	
6988		Debug-Count of allocated data buffers	
6990-6999	10	Ten one-second counters	
7000	1	Web state	
<b>7001-7304</b>	<b>304</b>	<b>I/O sub-system map</b>	
7001 7016	16	256 Digital inputs	10001 10256
7017 7032	16	256 Digital Outputs	00001 00256
7033 7048	16	256 Virtual Digital I/O	00257 10257 00512 10512
7049 7304	256	256 Analogue I/O	30001 30256

**NOTE:** All system table registers are mapped by the MODBUS protocol to the holding register area (40001 to 49999). To convert a system table address to a MODBUS address for SCADA access, add 40000 to the corresponding table address.

## RDAC System I/O Table *(continued)*

### Soft function Control & Diagnostics

<b>Address</b>	<b>Len</b>	<b>Function</b>
<b>7305-7321</b>	<b>16</b>	<b>Soft function control block</b>
7305		Program base address
7306		Variable table start
7307		Variable table end
7308		Reserved
7309		Reserved
7310		Reserved
7311		Reserved
7312		Current module executing (0 to 63)
7313		S/F executor state (1,2,3,4,5)
		1 Soft functions executing
		2 Module Run-time checksum failure
		3 Program CRC failure
		4 Not in Run or single step mode
		5 Single step mode
7314		S/F Task engine state (1,2,3,4)
		1 Task installed
		2 Busy with start up
		3 Task Running
		4 Busy with shutdown
7315		S/F scan time (ms)
7316		Program load CRC fault
7317		Program run-key failure
7318		S/F run flag
7319		Soft function command register
7320		Soft function command information
<b>7321-7384</b>	<b>64</b>	<b>Soft function block 0 error Soft function block 63 error</b>

## RDAC System I/O Table *(continued)*

(Not implemented yet)

<b>Address</b>	<b>Len</b>	<b>Function</b>
<b>7385-7402</b>	<b>18</b>	<b>Task engine diagnostic registers</b>
7385		Task 1 state
7386		Task 2 state
7387		Task 3 state
7388		Task 4 state
7389		Task 5 state
7390		Task 1 Time
7391		Task 2 Time
7392		Task 3 Time
7393		Task 4 Time
7394		Task 5 Time
7395		Reserved
7396		Reserved
7397		Reserved
7398		Reserved
7399		Reserved
7400		Reserved
7401		Reserved
7402		Reserved

## RDAC System I/O Table *(continued)*

### Ethernet configuration

<i>Address</i>	<i>Len</i>	<i>Function</i>
<b>7403-7436</b>	<b>34</b>	<b>Ethernet configuration block</b>
7403		Protocol device address 1
7404		Ethernet MAC (1 & 2) 0080 32768
7405		Ethernet MAC (3 & 4) DAC0 49370
7406		Ethernet MAC (5 & 6) 0001 256
7407		IP Address (3 & 4) .0.99 99
7408		IP Address (1 & 2) 192.168 49320
7409		Sub-net mask (3 & 4) .255.0 65280
7410		Sub-net mask (1 & 2) 255.255 65535
7411		Default gateway (3 & 4) 0
7412		Default gateway (1 & 2) 0
7413		Name server (3 & 4) 0
7414		Name server (1 & 2) 0
7415		Socket receive timeout 30
7416		Socket inactive timeout 55
7417		Multiple homes 0
7418		Packet length 1400
7419		Network Protocol (0=Otok, 1=MB_RTU, 2=MB_TCP)
7420		Reserved
7421		Reserved
7422		Reserved
7423		Protected block 1
7424		Protected block 2
7425		Protected block 3
7426		Protected block 4
7427		Protected block 5
7428		Protected block 6
7429		Protected block 7
7430		Protected block 8
7431		Reserved
7432		Reserved
7433		IP of last server (3 & 4)
7434		IP of last server (1 & 2)
7435		Command register 'WC' (22339d) to write
7436		Ethernet Interface status word

## RDAC System I/O Table *(continued)*

### User timers

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7437-7452</b>	<b>16</b>	<b>100ms Resolution Down counters/timers</b>
7437		Timer 01
7438		Timer 02
7439		Timer 03
7440		Timer 04
7441		Timer 05
7442		Timer 06
7443		Timer 07
7444		Timer 08
7445		Timer 09
7446		Timer 10
7447		Timer 11
7448		Timer 12
7449		Timer 13
7450		Timer 14
7451		Timer 15
7452		Timer 16

The timers 01 to 16 decrement at a rate of 10 counts per second (10hz) or once every one hundred milli-seconds. When a timer reaches zero, it stops.

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7453-7460</b>	<b>8</b>	<b>Ethernet diagnostics</b>
7453		Socket1 status
7454		Socket2 status
7455		Socket3 status
7456		Socket4 status
7457		Socket5 status
7458		Socket6 status
7459		Socket7 status
7460		Gateway re-establish timeout
<b>7461-7524</b>	<b>64</b>	<b>Tag error diagnostic registers</b>
7461		Tag 01 error register
7462 ...		Tag 02 error register, etc
7523 ...		Tag 63 error register
7524		Tag 64 error register
<b>7525-7528</b>	<b>4</b>	<b>Tag status map 01 to 64</b>
7525		Tag 01 to 16 Status (LSB=01,MSB=16)
7526		Tag 17 to 32 Status (LSB=17,MSB=32)
7527		Tag 33 to 48 Status (LSB=33,MSB=48)
7528		Tag 49 to 64 Status (LSB=49,MSB=64)

## RDAC System I/O Table *(continued)*

### Ethernet diagnostics registers

The diagnostic registers contain a value that is built up of the connection state \* 10000 plus the timeout value modulo 10000 (0-9999).

47453 to 47459      Connection 1 to 7  
47460                Timeout before re-initialising gateway parameters

<b>Value</b>	<b>Connection Status</b>
00000-09999	Listening and Waiting for a connection
10000-19999	Connected and waiting for communications
20000-29999	Error state

## RDAC System I/O Table *(continued)*

### Tag diagnostic registers 1 to 64

### Status and error values

The tag diagnostic register will contain a value, representing the current status of the tag. A value between 0 and 32767 denotes success.

<b>Defined</b>	<b>Signed Integer</b>	<b>Word</b>	<b>Status/fault description</b>
<b>?</b>	1->32767	1->32767	Length of returned data
<b>S_AOK</b>	0	0	All went well
<b>S_NOP</b>	-1	65535	Slave module
<b>S_PRT</b>	-2	65534	Invalid port
<b>S_BPR</b>	-3	65533	Invalid protocol
<b>S_TXF</b>	-4	65532	Transmit function
<b>S_TXA</b>	-5	65531	Transmit address
<b>S_TXP</b>	-6	65530	Transmit protocol bad
<b>S_RXT</b>	-7	65529	Receive timeout
<b>S_RXB</b>	-8	65528	Receive too short
<b>S_CRC</b>	-9	65527	Rx. string failed CRC
<b>S_RXF</b>	-10	65526	Receive function bad
<b>S_RXL</b>	-11	65525	Receive length bad
<b>S_RXP</b>	-12	65524	Receive protocol error
<b>S_BUF</b>	-13	65523	Buffer pointer is NULL
<b>S_HSN</b>	-14	65522	HSB slave not setup
<b>S_NIL</b>	-15	65521	Message not processed
<b>?</b>	-15->-32768	65520->32768	Undefined

The tag status map is an array of 64 bits, mapped into four unsigned 16-bit registers.

They start at location 7525 for bits 01 to 16, and end at register 7528 for tags 49 to 64.

This is just a representation of the general health of the tag. A logic '1' indicates all is well with the Tag, and a logic '0' indicates the Tag data could be faulty.

**Note!** This error table is continually growing as new functions are added. The latest version of the RDACIO tool will be the best decoder of newer errors that can't be found in this table. It is always used and updated during the development and testing of new code.

(RDACIO menu path: = RDAC > Comms Tags > Tag Statuses)

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7529-7544</b>	<b>16</b>	<b>System information block</b>
7529		Max-I/O (???)
7530		Virtual digital Output Base
7531		Virtual digital Input Base
7532		Application configuration 0x0010=USERX
7533		Application version
7534		Application ID
7535		Soft Function Version
7536		UDP-Server Version
7537		TCP-Server Version
7538		RDAC-Operating System Version
7539		CMX-Kernel version
7540		CPU Reset counter
7541		System initialisation flag (0x1234)
7542		Reserved
7543		Flash disk size in Kilo-Bytes
7544		Ram size in Kilo-Bytes

The software version numbers are stored in decimal, thus the decimal number 258 would be seen as Version 2.58.

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7545-7564</b>	<b>20</b>	<b>Real Time Clock</b>
7545		Reset input
7546		Input mode
7547		Reset Time window (seconds)
7548		Block period (seconds)
7549		Time elapsed (seconds)
7550		Time Remaining (seconds)
7551		Reserved
7552		Reserved
7553		lms resolution counter
7554		Clock flags
7555		Current minute (0-1439) [Hr*60+Min]
7556		Current Second (0-43199) 12 hours
7557		Day of Year (1-365)
7558		Seconds (0-59)
7559		Minutes (0-59)
7560		Hours (0-23)
7561		Day of week (1-7)
7562		Day of month (1-31)
7563		Month (1-12)
7564		Year (1999-2098)
<b>7565-7584</b>	<b>20</b>	<b>System command protocol</b>
7565		Command reg. (SC-ST-SD-RC) RC = (0x5243 or 21059d)
7566		Command Info 1
7567		Command Info 2
7568		Command Info 3
7569		Command Info 4
7570		Command Info 5
7571		Command Info 6
7572		Command Info 7
7573		Command Info 8
7574		Command Info 9
7575		Command Info 10
7576		Command Info 11
7577		Command Info 12
7578		Command Info 13
7579		Command Info 14
7580		Command Info 15
7581		Command Info 16
7582		Command Info 17
7583		Command Info 18
7584		Command Info 19

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7585-7600</b>	<b>16</b>	<b>Serial port 1 Config (RS232 COM1 DB9M)</b>
7585		Address (1-254)
7586		Protocol
7587		Baud Rate
7588		Data Bits (5-8)
7589		Parity (0-7) (NONENMNS)
7590		Stop Bits (0-1)
7591		Rts On Time in ms
7592		Rts Off Time in ms
7593		Cts On Time in ms
7594		Response Time in ms *slave
7595		Inter Poll Time in ms *master
7596		Modem control
7597		Modem timeout in ms
7598		Reserved
7599		Telemetry force update time
7600		Telemetry Remote address
<b>7601-7617</b>	<b>16</b>	<b>Serial port 2 Config (RS232 COM2 DB9M)</b>
7601		Address (1-254)
7602		Protocol
7603		Baud Rate
7604		Data Bits (5-8)
7605		Parity (0-7) (NONENMNS)
7606		Stop Bits (0-1)
7607		Rts On Time in ms
7608		Rts Off Time in ms
7609		Cts On Time in ms
7610		Response Time in ms *slave
7611		Inter Poll Time in ms *master
7612		Modem Control
7613		Modem timeout in ms
7614		Reserved
7615		Reserved
7616		Reserved

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7617-7632</b>	<b>16</b>	<b>Serial port 3 Config (RS232 COM3 RJ-11)</b>
7617		Address (1-254)
7618		Protocol
7619		Baud Rate
7620		Data Bits (7-9)
7621		Parity (0-3) (NONE)
7622		Stop Bits (1)
7623		Rts On Time in ms *not used
7624		Rts Off Time in ms *not used
7625		Cts On Time in ms *not used
7626		Response Time in ms *slave
7627		Inter Poll Time in ms *master
7628		Modem control
7629		Modem timeout in ms
7630		Link inter-character time
7631		Reserved
7632		Reserved
<b>7633-7648</b>	<b>16</b>	<b>Serial port 4 Config (RS485 COM4 ON BASE)</b>
7633		Address (1-254)
7634		Protocol
7635		Baud Rate
7636		Data Bits (7-9)
7637		Parity (0-3) (NONE)
7638		Stop Bits (1)
7639		Rts On Time in ms *485 net turn
7640		Rts Off Time in ms *485 net turn
7641		Cts On Time in ms *not used
7642		Response Time in ms *slave
7643		Inter Poll Time in ms *master
7644		Modem Control
7645		Modem timeout in ms
7646		Reserved
7647		Reserved
7648		Reserved

## RDAC System I/O Table *(continued)*

### Serial protocol details

The protocol selection for a port can be a decimal value between 1 and 127 or in hexadecimal 1 to 7F.

Protocol values of 0 and 128 are invalid selections.

The eighth bit in the register (128 or 80h) determines whether the protocol is handled as a master or a slave.

<b>Definition</b>	<b>Value</b>	<b>Protocol description</b>	<b>Implemented</b>
<b>MODBUS_RTU</b>	1	MODBUS RTU	Yes
<b>MODBUS_ASC</b>	2	MODBUS ASCII	No
<b>PNB_RELAY</b>	3	P&B Relay	Yes
<b>TERMINAL</b>	4		Yes

#### **Modem Control:**

0x0001	1	Welcome message, 0=enabled , 1=Disabled
0x0002	2	Override inter-character timeout
0x0004	4	
0x0008	8	
0x0010	16	
0x0020	32	
0x0040	64	
0x0080	128	

#### **Most significant 8 bits of Modem Control = Modem type**

0x0000	0	None
0x0100	256	U.S. Robotics
0x0200	512	GCOM Cellular modem

**Note:** *The base protocol of the RDAC is a sub-set of MODBUS RTU. All of the Csoft extended command functionalities are only supported in this protocol and not in any other.*

**Example:** *For a MODBUS RTU slave you would set the protocol register to '1' (01h). To make the port a MODBUS RTU master you would set the register to 128+1 or 129 (81h).*

## RDAC System I/O Table *(continued)*

<b>Address</b>	<b>Length</b>	<b>Function</b>
<b>7649-7680</b>	<b>32</b>	<b>Slave configuration</b>
7649	2	Slave 01 configuration
7650		Slave 01 status
7651	2	Slave 02 configuration
7652		Slave 02 status
7653	2	Slave 03 configuration
7654		Slave 03 status
7655	2	Slave 04 configuration
7656		Slave 04 status
7657	2	Slave 05 configuration
7658		Slave 05 status
7659	2	Slave 06 configuration
7660		Slave 06 status
7661	2	Slave 07 configuration
7662		Slave 07 status
7663	2	Slave 08 configuration
7664		Slave 08 status
7665	2	Slave 09 configuration
7666		Slave 09 status
7667	2	Slave 10 configuration
7668		Slave 10 status
7669	2	Slave 11 configuration
7670		Slave 11 status
7671	2	Slave 12 configuration
7672		Slave 12 status
7673	2	Slave 13 configuration
7674		Slave 13 status
7675	2	Slave 14 configuration
7676		Slave 14 status
7677	2	Slave 15 configuration
7678		Slave 15 status
7679	2	Slave 16 configuration
7680		Slave 16 status

## RDAc System I/O Table *(continued)*

MSB	Slave configuration first word		LSB
Slave address (8-bits) (1-254)	Unused (6-bits)	Slave type (2-bits)	00 - None 01 - Serial 10 - HS - Bus 11 - Reserved
MSB	Slave status second word		LSB
Status (1-bit) 0 - Down 1 - Communicating	Reserved (15-bits) Average time slave took to respond in ms?		

Address	Length	Function
<b>7681-7936</b>	<b>256</b>	<b>I/O Channel configuration</b>
7681		Channel 001 configuration
...		...
7936		Channel 256 Configuration
<b>7937-8192</b>	<b>256</b>	<b>Raw I/O Table</b>
7937		Channel 001 Raw data
...		...
8192		Channel 256 Raw data
<b>8193-8320</b>	<b>128</b>	<b>Dual port ram HSB Slave 01</b>
<b>8321-8448</b>	<b>128</b>	<b>Dual port ram HSB Slave 02</b>
<b>8449-8576</b>	<b>128</b>	<b>Dual port ram HSB Slave 03</b>
<b>8577-8704</b>	<b>128</b>	<b>Dual port ram HSB Slave 04</b>
<b>8705-8832</b>	<b>128</b>	<b>Dual port ram HSB Slave 05</b>
<b>8833-8960</b>	<b>128</b>	<b>Dual port ram HSB Slave 06</b>
<b>8961-9088</b>	<b>128</b>	<b>Dual port ram HSB Slave 07</b>
<b>9089-9216</b>	<b>128</b>	<b>Dual port ram HSB Slave 08</b>

Channel configuration 001 - 256 (7681-7936)		
Map address	I/O range	I/O Type
0-255	0000 - None	0000 - None
	0001 - 0 to 20ma	0001 - DI (Digital input)
	0010 - 4 to 20ma	0010 - DQ (Digital output)
	0011 - 0 to 5V	0011 - AI (Analogue input)
	0100 - 0 to 10V	0100 - AQ (Analogue output)
	0101 - 0 to 20V	0101 - DC (Digital counter)
	0110 - Reserved	0110 - Reserved
	0111 - Reserved	0111 - Reserved
	1000 - Reserved	1000 - Reserved
	1001 - Invalid	1001 - Reserved
	1010 - Invalid	1010 - Reserved
	1011 - Invalid	1011 - Reserved
	1100 - Invalid	1100 - Reserved
	1101 - Invalid	1101 - Reserved
	1110 - Invalid	1110 - Reserved
	1111 - Invalid	1111 - Reserved

**RDAC System I/O Table** *(continued)*  
**Notes or table updates:**

<b>6971-6986</b>		<b>Last logged time stamp (2 sec interval)</b>
6971	1	Last logged time (File 1)
6972	1	Last logged time (File 2)
6973	1	Last logged time (File 3)
6974	1	Last logged time (File 4)
6975	1	Last logged time (File 5)
6976	1	Last logged time (File 6)
6977	1	Last logged time (File 7)
6978	1	Last logged time (File 8)
6979	1	Last logged time (File 9)
6980	1	Last logged time (File 10)
6981	1	Last logged time (File 11)
6982	1	Last logged time (File 12)
6983	1	Last logged time (File 13)
6984	1	Last logged time (File 14)
6985	1	Last logged time (File 15)
6986	1	Last logged time (File 16)

Logged Time = ((Hour \* 3600L) + (Min \* 60L) + Sec) / 2L