MICROSCAN®

SDS
Protocol Box
User's Manual

P/N 83-110014 Rev B

Information and specifications in this manual are subject to change without notice.

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ISO 9001/Certification No. US96/0465

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This warranty is specifically limited to the replacement or repair of any such warrantable defects, without charge, when the complete product is returned to Microscan Systems, Inc., freight prepaid, at the address shown above. Contact the factory at the address above for a Return Material Authorization (RMA) number before returning the product.

Microscan Systems, Inc. shall be the sole judge of the warrantability of alleged product defects. Products that are returned for warranty examination and that are found to be non-warrantable are chargeable and are returned freight collect. A copy of a purchase order with the amount of the charge must be received by Microscan, either by mail or by FAX, before any equipment is returned. Warrantable products are repaired or replaced at no charge and returned freight prepaid.

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The buyer acknowledges that he/she is not relying on the seller's skill or judgment to select or furnish goods suitable for any particular purpose and that there are no warranties that extend beyond the description on the face hereof.

This warranty extends only to the original purchaser, and shall not apply to any products or parts that have been subject to misuse, neglect, accident, or abnormal conditions or operations. Claims for damage in transit are directed to the freight carrier upon receipt.

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Introduction

About the SDS Protocol Box

The SDS protocol box provides an interface that allows you to use Microscan scanners and related devices on an SDS (smart distributed system). SDS host commands are received by the protocol box which passes them to Microscan scanners in a serial format.

The SDS protocol box is in compliance with SDS network architecture for smart devices, Object Model 1.41.5.4.5 protocol per testing performed by UL.

About SDS

SDS (smart distributed system) is a protocol that allows you to connect, address, and operate a distributed communications system for up to 126 SDS devices through an SDS interface card in a host. Each SDS device includes an embedded CAN (controller area network) chip that communicates with the host.

About this Manual

This manual provides information on setting up and installing the SDS protocol box.

The Quick Start section provides step-by-step instructions for quickly setting up and installing the SDS protocol box.

For specifications, see Section - "Specifications" on page 11 include reference tables that explain the SDS protocol and its relation to Microscan scanners.

You should also have manuals for your specific Microscan scanner (or scanners) as well as for your SDS software.

Approvals

This equipment is designed for:

- UL (Underwriters Laboratories, Inc.)
- cUL (UL mark for Canada)
- TüV (Technischer überwachungs-Verein)
- FCC (Federal Communication Commission)
- CE compliance
- SDS compliance

Warning and Caution Summary

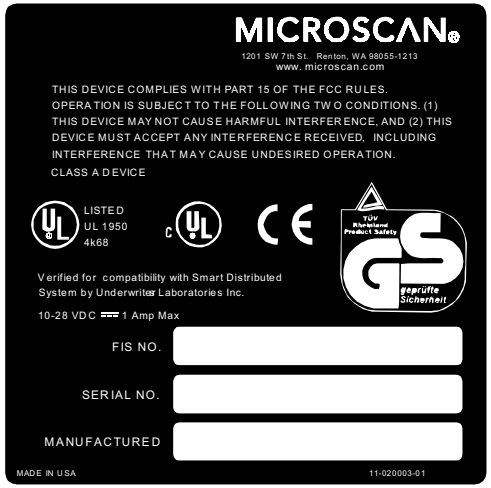
Caution: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment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

Caution: There are no user serviceable parts in the protocol box. Opening the protocol box voids the Microscan Systems warranty.

For connection to a UL Listed direct plug-in power unit marked Class II and rated 10 to 28 VDC at 5 watts.

Labels

The following label is found on the protocol box.



Quick Start

It is assumed that the user has an SDS interface card and an application program such as Think and Do™ installed in their host computer.

1 Install SDS Interface Card

Install an SDS interface card in your host computer.

2 Attach System Cabling

Attach the SDS cable to the BUS connection of your protocol box.

(See figure 1, "Protocol Box Connectors," and pinout tables 1 through 5.)

Caution: Do not attach cabling to any other SDS devices at this time or a software conflict and error message could result.

3 Power-up

a. Attach cable from Microscan scanner to 25-pin SCANNER connector on the protocol box.

b. Attach power cable to scanner POWER connector. If using Microscan power supply, use PN 97-100001-12 (120V) or PN 97-100001-13 (240V).

Note: The S-PWR LED comes ON when power is applied to the scanner.

Note: A flashing ACT LED indicates activity.

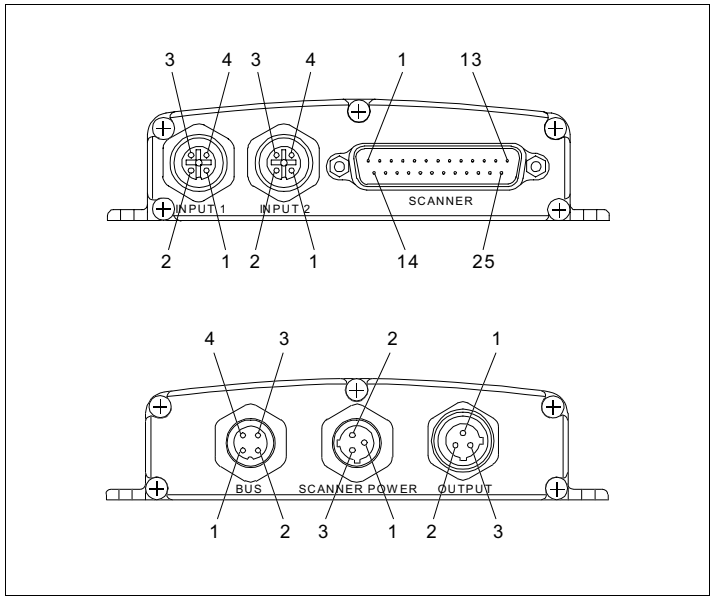


Figure A-1 Protocol Box Connectors

4 Assign Protocol Box Address

Caution: It is important to add only one SDS device at a time.

a. Set configuration of the protocol box as required by the software.

b. Change the address of the protocol box to any number from 1 to 125 in SDS Address attribute.

Note: All SDS devices are shipped from the factory with a default address of 126. You can assign a 126 address only if there are no other SDS devices on the bus.

5 Define Microscan Scanner Model

If connected to an MS-710/810 scanner, set attribute 61 to 0.

If connected to an MS-7100/7180 scanner, set attribute 61 to 1.

6 Set Trigger Source

You can either attach a triggering device to the SDS bus or directly to the protocol box via input 1 or input 2 (or both).

Note: If connecting to the SDS bus, you will need an SDS triggering device. If connecting directly to inputs of the protocol box, Microscan offers an object detector, PN 99-440001-09 for this purpose.

a. Disconnect power to the protocol box.

b. Attach triggering source to the SDS bus or input 1 or 2 of the protocol box.

c. Reconnect power to the protocol box.

d. Set triggering source, attribute 71, table 6: Bit 0 for SDS, Bit 1 for physical input 1, or Bit 2 for input 2.

e. If you attach an SDS triggering device to the SDS bus, you will need to assign it an SDS address just as you assigned the protocol box an address in step 4.

   If you attach your trigger device directly to the input port of the protocol box, you do not assign it an SDS address.

7 Set Trigger Mode

Set triggering mode to Continuous Read 1, External Level, or External Edge (see attribute 70, table 6).

Caution: Microscan scanners are set to Continuous (0) by factory default. You need to change this setting since Continuous will cause a buffer overflow condition.

8 Set End of Read Cycle

See attribute 73 to set End of Read Cycle. If you select the default Timeout, you will also need to set attribute 74, the length of time the scanner will wait before timing out. (Default timeout is 1 second.)

9 Saving for Power Up

When configuring attributes from your host, the protocol box saves the configuration automatically for power-up.

10 Mount the Protocol Box

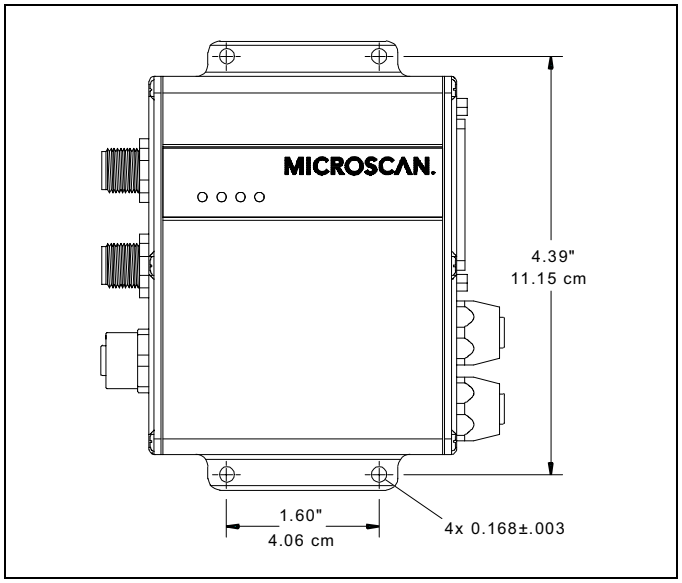


Figure 2 Mounting Diagram

Read Cycle

A successful read cycle initiated by a trigger and ending with a label or labels being read by the host involves several activities that are performed automatically according to your setup.

The following example shows a simplified flow with the scanner's triggering mode set to External Edge and Number of Labels set to 1.

Note: See your scanner user's manual and application software manual for more information.

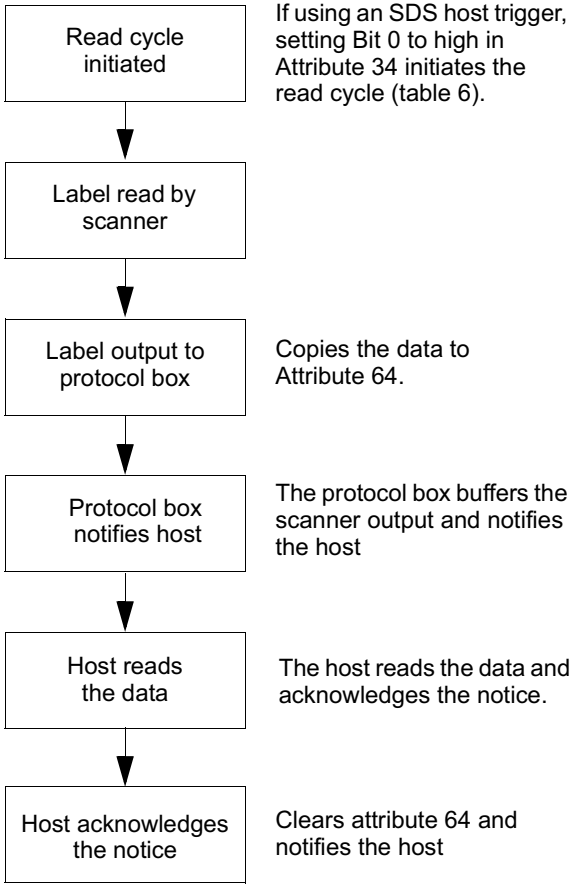


Figure 3 SDS Scanner Data Flow

Specifications

Environmental

Housing: IP65 standard
Operating temperature: 0 to 40°C
Humidity: 5% to 90% (non-condensing)
Noise Immunity: IEC 801-4

Pin Assignments

Table 1 Scanner Connector, 25-pin D-subminiature [1]

Pin No.	Function
1	Signal ground
2	Transmit data RS-232 (out)
3	Receive data RS-232 (in)
4	NC — do not connect
5	NC — do not connect
6	Scanner output 2 (in)
7	Signal ground
8	Scanner output 1 (noread) (in)
9	5 VDC Power (out)
10	Trigger (out)
11	Default (out)
12	NC
13	Chassis ground
14	NC
15	NC
16	NC
17	Power ground
18	Power 10 to 28 VDC (out)
19-25	NC

1. The SDS protocol box does not support output #3 in the MS-7100/7180.

Table 2 SDS Bus Connector, 4 pin micro plug

Pin No.	Function
1	Bus Power (DC+)
2	Bus Power (DC-)
3	Bus Comm. (Bus-)
4	Bus Comm. (Bus+)

Table 3 Output Connector, 3 pin micro socket

Pin No.	Function
1	Common
2	Output 1 (scanner)
3	Output 2

Table 4 Scanner Power Connector, 3 pin micro plug

Pin No.	Function
1	Ground
2	NC
3	Power (10 to 28 VDC) (in)

Table 5 Input 1 & 2, Micro Socket, 4 pin micro socket

Pin No.	Function
1	Sensor Power 10-28 VDC (out)
2	NC
3	Sensor power (DC-)
4	Sensor signal (in)

Electrical

Scanner power requirement: 10 to 28 VDC
Maximum supply current (SDS bus) = 50 mA @ 24V

Certifications

Designed for: FCC, TüV, CE, cUL, UL, SDS compliance
ISO 9001/Cert. No. US96/0465

Status Lights

S-PWR: Comes ON when power is applied to the scanner.

ACT: A flashing ACT LED indicates activity. For example, the CAN chip in all SDS devices continuously re-transmits any outbound messages, looking for an acknowledge from the host controller.

ERR: Indicates an error in the SDS protocol box. It comes ON steady for a few seconds, then clears itself. It is set when either the receive or transmit error counter exceeds some preset value (internal to the CAN chip).

Component Model Tables

Component Model Attributes

Note: Checkmarks in last two columns (starting at Attribute 61) indicate corresponding scanner-specific serial commands. For a complete listing of Microscan commands, see your scanner user's manual.

Table 6 Component Model Attributes

Attribute ID	Description	Functionality	
0	Network Data Descriptor	The network data descriptor is used by the host device to determine the data types of the I/O variables.	
1	Baud Rate	Shows the current baud rate setting. The baud rate may be changed using action 10.	
		0	Autobaud
		1	1 mbaud
		2	500 kbaud
		3	250 kbaud
		4	125 kbaud
2	Object Model	A string of bytes that is used to reference the functionality of the object.	
3	Vendor Id	A value assigned by Honeywell that is unique to a specific vendor. Microscan Systems Inc. is vendor number 467.	
4	Logical Address	A single byte that contains the logical address of the component.	
6	Unsolicited Mode	The Unsolicited Mode, when set True (1) configures the device to initiate Change of Value events when the input variable changes. When set to False (0), only error events are generated unsolicited.	
7	Software Version	A string entered by manufacturer that contains the current software version.	
8	Diagnostic Error Counter	The number of error conditions that exist in the diagnostic register (attribute 9).	
9	Diagnostic Register	Contains a bit for each defined error. First byte contains errors common to all products, the second contains object specific errors.	
		Bit 0	CHKSUM:
		Bit 1	WDOG: designates the output watchdog timer has expired.
		Bit 2	BUSOFF:
		Bit 3	DEVERR:
		Bit 4	NODE:
		Bit 5	reserved
		Bit 6	reserved
		Bit 7	EEPROM
		Bit 8	TIMEOUT: the interface box is unable to write to the scanner.
		Bit 9	OVERRUN: a scanner message has been received before the current data has been read by the host.

Table 6 Component Model Attributes

Attribute ID	Description	Functionality	
9	Diagnostic Register	Bit 10	n/u
		Bit 11	n/u
		Bit 12	n/u
		Bit 13	n/u
		Bit 14	n/u
		Bit 15	n/u
10	Cyclic Timer	The cyclic timer determines the rate at which periodic events are reported. The unsigned integer defines the number of 10 millisecond time ticks between events. When the timer expires, an end of timer event is transmitted. A value of zero disables the timer.	
11	Serial Number	An unique 32-bit number assigned by the manufacturer.	
12	Date Code	The date of manufacture of the product in the format 'mmyy'.	
13	Catalog Listing	The catalog listing for the product (MIC-ASM100).	
14	Partner Name	Microscan Systems, Inc.	
15	Component Description	Microscan SDS Protocol Box	
18	Input Variable	Bit-mapped variable with the following bit definitions:	
		Bit 0	LABEL1: goes on (1) when label 1 contains a new read. When the label data is read from attribute 64 the bit will reset to a value of 0.
		Bit 1	LABEL2: functions the same as label 1, with label data in attribute 65.
		Bit 2	LABEL3: functions the same as label 1, with label data in attribute 66.
		Bit 3	LABEL4: functions the same as label 1, with label data in attribute 67.
		Bit 4	LABEL5: functions the same as label 1, with label data in attribute 68.
		Bit 5	LABEL6: functions the same as label 1, with label data in attribute 69.
		Bit 6	INPUT0: state of physical input 1.
		Bit 7	INPUT1: state of physical input 2.
		Bit 8	OUTPUT1: the state of the Output 1 line from the scanner.
		Bit 9	OUTPUT2: the state of the Output 2 line from the scanner.
		When new label data has been received by the protocol converter a Change of Value Event (event 6) is generated with the corresponding bit set for the label number. When the host has read the appropriate attribute that contains the label data, the bit will be changed to 0, thereby generating another COV event to acknowledge the label data has been sent.	

Table 6 Component Model Attributes

Attribute ID	Description	Functionality	
34	Output Variable	Bit 0	TRIGGER: when the scanner is in trigger mode (attribute 70) setting this bit high initiates a scan read cycle.
		Bit 1	NEW MASTER: tells the scanner that the next label is to be the new master.
		Bit 2	OUTPUT0: sets the state of the physical output 0 if the output source (attribute 77) enables SDS to write the output.
		Bit 3	OUTPUT1: sets the state of the physical output 1 if the output source (attribute 78) enables SDS to write the output.
		Bit 4	COMMAND: transmits the command in attribute 62 to the scanner.
		Bit 5	n/u
		Bit 6	TEST: sets the scanner in read rate test mode that is set in attribute 120.
		Bit 7	n/u
		Bit 8	Update No Read Counter
		Bit 9	Update Trigger Counter
		Bit 10	Update Match Code/good Read Counter
		Bit 11	Update Mismatch Counter
		Bit 12	Reset No Read Counter
		Bit 13	Reset Trigger Counter
		Bit 14	Reset Match Code/good Read Counter
		Bit 15	Reset Mismatch Counter
50	Watchdog Timer	The output watchdog timer sets the time interval in 10 millisecond increments within which the master must communicate with the module. A message from the master resets the timer. When the timer is 30 milliseconds from expiring it transmits a NOOP event.	
51	Default Output	The value to which the outputs will be set in the event of an output watchdog event (attribute 50).	
55	Manufacturing Codes	Used by manufacturer to configure a product.	
56	Tag Name	User entered string that defines the location, functionality or any other meaningful information.	
60	Input NO/NC	Allows for the logic of the inputs to be inverted. Each bit in the Input NO/NC variable is mapped directly to the corresponding bit in the input variable (attribute 18).	

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
Attributes that relate to the Microscan Scanners					
61	Configuration	A value that tells the protocol conversion box which scanner is connected. This setting is important as it determines which attributes relate to the connected scanner.		set to 0	set to 1
62	User Command	ASCII command to the scanner set by the user.			
63	User Command Response	Response to the user command. Data is cleared after it is read by the SDS host.			
64	Label 1 Data	Contains the most recent ASCII label data. The data remains in the attribute until it is read by the SDS host, or if new data is received from the scanner. If new data is received prior to the host reading the message an OVERRUN error (see attribute 9).			
65	Label 2 Data	If the number of labels (attribute 76) is set to two or more labels then the ASCII data for label 2 is contained in this attribute.			
66	Label 3 Data	If the number of labels (attribute 76) is set to three or more labels then the ASCII data for label 3 is contained in this attribute.			
67	Label 4 Data	If the number of labels (attribute 76) is set to four or more labels then the ASCII data for label 4 is contained in this attribute.			
68	Label 5 Data	If the number of labels (attribute 76) is set to five or more labels then the ASCII data for label 5 is contained in this attribute.			
69	Label 6 Data	If the number of labels (attribute 76) is set to six labels then the ASCII data for label 6 is contained in this attribute.			
70	Triggering Mode	Establishes the type of trigger event that will initiate or end the read cycle.			
		0	Continuous Read: trigger input options are disabled and scanner is always in the read mode. Label information is continuously transmitted to the protocol box, likely resulting in a OVERRUN error.	√	√
		1	Continuous Read 1 Output: label data is immediately transmitted once every time new label data is placed in front of the scanner.	√	√
		2	External Level: the scanner is in a read cycle as long as the trigger is enabled.	√	√
		3	External Edge: the scanner begins a read cycle when the trigger has a rising edge and stays in a read cycle until a good read output, a timeout or a new trigger.	√	√
71	Triggering Source	Sets source to initiate read cycles if trigger mode is external.			
		Bit 0	SDS (attribute 34, bit 0)		
		Bit 1	Physical Input 1		
		Bit 2	Physical Input 2		

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
73	End of Read Cycle	Sets the condition which ends a read cycle.			
		0	Timeout (default)	√	√
		1	New Trigger	√	√
		2	Timeout and New Trigger	√	√
74	Read Cycle Timeout	The amount of time (in 10 millisecond increments) which constitutes an end of read when a timeout mode is enabled in attribute 73.		√	√
75	Good Decode Reads	The number of good reads that constitute a good read. Valid entries are 1 (the default) through 31.		√	√
76	Number of Labels	The number of labels to be scanned on an object.		√	√
77	Output 0 Source	Sets physical source of Output 0. Non-Exclusive bit-mapped variable.			
		Bit 0	SDS (attribute 34, Bit 2)		
		Bit 1	Scanner Output 1		
		Bit 2	Scanner Output 2		
78	Output 1 Source	Sets physical source of Output 1. Non-exclusive bit-mapped variable.			
		Bit 0	SDS (attribute 34, bit 3)		
		Bit 1	Scanner Output 1		
		Bit 2	Scanner Output 2		
79	New Master Trigger Source	Sets trigger source to the scanner. Non-exclusive bit-mapped variable.			
		Bit 0	SDS (attribute 34, Bit 1)		
		Bit 1	Input 1		
		Bit 2	Input 2		
80	Match Code Type	Sets how match code functions (or disables)			
		0	Disabled	√	√
		1	Enabled	√	√
		2	Sequential	√	
		3	Wild Card	√	
81	Match Code Master	ASCII string that constitutes a master label. Can be entered manually or can be updated through a trigger (see attribute 79, New Master Trigger Source).		√	√
82	Sequential Matching Setup	If the Match Code Type (attribute 80) is set to sequential then determines the order in which characters are compared.			
		Bit 0	0= increment = , 1 = decrement	√	
		Bit 1	Sequence on noread, 0 = disable, 1 = enable	√	
		Bit 2	Sequence on mismatch, 0 = disable, 1 = enable	√	
83	Match Start Position	Which character on the label corresponds to the first character in the Match Code Master (attribute 80).		√	

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
84	Match Length	The number of characters within the label that should be used to compare against the Match Code Master. Combined with attribute 83, allows for matching any segment of a label.		√	
85	Wild Card Character	A character that constitutes a wild card in the Match Code Master		√	
89	Narrow Margin	Allows a quiet zone less than 10 times the width of the narrow bar.		√	√
90	Code 39 Setup	Bit-mapped register for configuring a Code 39 label.			
		Bit 0	Status	√	√
		Bit 1	Check digit status	√	√
		Bit 2	Check digit output status	√	√
		Bit 3	Large inter-character gap	√	√
		Bit 4	Fixed code length status	√	√
		Bit 5 -7	n/u	√	√
91	Code 39 Code Length	The number of characters in a Code 39 label if Fixed Code Length is enabled (bit 4 of attribute 90).		√	√
92	Codabar Setup	Bit-mapped register for configuring a Codabar label.			
		Bit 0	Status	√	√
		Bit 1	Start and stop match status	√	√
		Bit 2	Start and stop output status	√	√
		Bit 3	Large inter-character gap	√	√
		Bit 4	Fixed code length status	√	√
		Bit 5 - 7	n/u	√	
93	Codabar Code Length	The number of characters in a Codabar label if Fixed Code Length is enabled (bit 4 of attribute 92).		√	√
94	Interleaved 2 of 5 Setup	Bit-mapped register for configuring a I2 of 5 label.			
		Bit 0	Status	√	√
		Bit 1	Check Digit	√	√
		Bit 2	Check digit output	√	√
		Bit 3 - 7	n/u	√	√
95	I 2 of 5 Code Length 1	Code length of I2 of 5 label.		√	√
96	I 2 of 5 Code Length 2	Code length of 2nd I2 of 5 label. Set to 0 if there is not a second label.		√	√

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
97	UPC Setup	Bit-mapped register for configuring a UPC label.			
		Bit 0	Status	√	√
		Bit 1	EAN	√	√
		Bit 2	Supplementals (Disabled/Enabled)	√	√
		Bit 3	Supplementals (Required)	√	√
		Bit 4	Separator	√	√
		Bit 5 - 7	n/u	√	√
98	UPC Separator	Character that denotes the separator in a UPC label format.		√	√
99	Code 128 Setup	Bit-mapped register for configuring a Code128 label.			
		Bit 0	Status	√	√
		Bit 1	Fixed Length Code	√	√
		Bit 2 - 7	n/u	√	√
100	Code 128 Code Length	The number of characters in a Code 128 label if Fixed Code Length is enabled (bit 2 of attribute 99).		√	√
101	UCC/EAN-128 Setup	Bit-mapped register for configuring UCC/EAN-128 setup.			
		Bit 0	UCC/EAN-128 status		√
		Bit 1	symbol identification		√
		Bit 2	format		√
		Bit 3	application record separator status		√
		Bit 4	application record brackets		√
		Bit 5	application record padding		√
		Bit 6 - 7	n/u		√
102	UCC/EAN-128 Separator	any ASCII character except NULL. Default = ,			√
105	No Read Counter	The number of no reads since the last reset or power cycle. The value is updated by a low-to-high transition on bit 8 of the output variable. Bit 12 of the output variable resets the counter.		√	√
106	Trigger Counter	The number of triggers since the last reset or power cycle. The value is updated by a low-to-high transition on bit 9 of the output variable. Bit 13 of the output variable resets the counter.		√	√
107	Match Code/ Good Read Counter	The number of good reads or matches since the last reset or power cycle. The value is updated by a low-to-high transition on bit 10 of the output variable. Bit 14 of the output variable resets the counter.		√	√
108	Mismatch Counter	The number of mismatches since the last reset or power cycle. The value is updated by a low-to-high transition on bit 11 of the output variable. Bit 15 of the output variable resets the counter.		√	√
110	Beeper Status	Configure operation of the beeper. 0 = disabled, 1 = beep on good read, 2 = beep on noread.		√	√
111	Beeper Volume	Set volume level of the beeper, 1 to 5.		√	√

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
112	Scanner Output 1 Driver	Sets what drives the 1st output from the scanner. The state of the output can be read in the input variable (attribute 18, bit 8), and can be mapped to a physical output (see attribute 77).			
		0	Mismatch or No Read	√	√
		1	Match (or Good Read)	√	√
		2	Mismatch	√	√
		3	No Read	√	√
113	Scanner Output 1 Polarity	Sets the state of the scanner output when the condition set in attribute 112 is true.			
		0	Negative	√	√
		1	Positive	√	√
114	Scanner Output 1 Pulse Width	Length of time Relay 1 changes state when the driver condition is satisfied. Valid entries are 1 to 255 representing 10 milliseconds to 2.55 seconds.		√	√
115	Scanner Output 1 Number Before Output	The number of successful decodes before the output state is changed.		√	
116	Scanner Output 2 Driver	Sets what drives the 2nd output from the scanner. The state of the output can be read in the input variable (attribute 18, bit 9), and can be mapped to a physical output (see attribute 78).			
		0	Mismatch or No Read	√	
		1	Match (or Good Read)	√	
		2	Mismatch	√	
		3	No Read	√	
117	Scanner Output 2 Polarity	Sets the state of the scanner output when the condition set in attribute 116 is true.			
		0	Negative	√	
		1	Positive	√	
118	Scanner Output 2 Pulse Width	Length of time Relay 1 changes state when the driver condition is satisfied. Valid entries are 1 to 255 representing 10 milliseconds to 2.55 seconds.		√	
119	Scanner Output 2 Number Before Output	The number of successful decodes before the output state is changed.		√	

Table 6 Component Model Attributes

Attribute ID	Description	Functionality		MS-710/ 810	MS-7100/ 7180
120	Test Mode	Sets which read rate test is to be conducted when the TEST bit in attribute 34 is enabled. Data from the read rate is placed in attribute 64 (label 1 data). The scanner returns to normal operation when the read rate test is disabled.			
		0	Decode rate test for single label	√	√
		1	Percentage rate test for single label	√	
		2	Multilabel decode rate test	√	
		3	Multilabel percentage rate test	√	
122	Laser On/Off	When enabled, the laser is on only during the read cycle. When disabled, the laser operates continuously.		√	√
124	Raster Scan Setup[a]	Bit-mapped register which configures raster setup			
		Bit 0	status		a
		Bit 1	raster on/off		a
		Bit 2 - 7	n/u		a
125	Top Raster Scan Offset	0 to 45. Default = 0			a
126	Bottom Raster Scan Offset	0 to 45. Default = 45			a
127	Sweeps per Second	0 to 135. Default = 14			a

a. MS-7180 model only.

Component Model Primitives

Table 7 Component Model Primitives

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Default Attribute Contents
1	Baud Rate	Unsigned	Byte	1	R	N	0…4	0020	0
2	Object Model	Unsigned	Byte	5	R	N		0024	1.41.5.4.5
3	Vendor Id	Unsigned	Word	1	R	N		0040	467
4	Logical Address	Unsigned	Byte	1	R	N	1…126	0020	126
5	not used								
6	Unsolicit Mode	Boolean	Undef	1	W	N	0, 1	8100	1
7	Software Version	Character	Undef	12	R	Y		070B	55.2.2
8	Diagnostic Error Counter	Unsigned	Byte	1	R	N	0…255	0020	
9	Diagnostic Register	Unsigned	Byte	2	W	N		8021	
10	Cyclic Timer	Unsigned	Word	1	W	N	0…65535	8040	0
11	Serial Number	Unsigned	Long	1	R	Y		0060	
12	Date Code	Character	Undef	4	R	Y		0703	"mmyy"
13	Catalog Listing	Character	Undef	32	R	Y		071F	MIC-ASM144
14	Partner Name	Character	Undef	32	R	Y		071F	Microscan Systems, Inc.
15	Component Description	Character	Undef	32	W	N		871F	
16	not used								
17	not used								
18	Input Variable	Boolean	Undef	10	R	N		0109	
19-33	not used								
34	Output Variable	Boolean	Undef	16	W	N		810F	
35-49	not used	10							
50	Watchdog Timer	Unsigned	Word	1	W	N		8040	0
51	Default Output	Boolean	Undef	16	W	N		810F	0x00
52	not used								
53	not used								
54	not used								
55	Manufacturing Codes	Unsigned	Byte	1	R	Y		0020	
56	Tag Name	Character	Undef	32	W	N		871F	
57	not used								
58	not used								
59	not used								
60	Input NO/NC	Boolean	Undef	10	W	N		8109	0
61	Configuration	Unsigned	Byte	1	W	N	0,1	8020	0
62	User Command	Character	Undef	32	W	N	ASCII	871F	
63	User Command Response	Character	Undef	32	R	N	ASCII	071F	

Table 7 Component Model Primitives

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Default Attribute Contents
64	Label 1 Data	Character	Undef	32	R	N	ASCII	071F	
65	Label 2 Data	Character	Undef	32	R	N	ASCII	071F	
66	Label 3 Data	Character	Undef	32	R	N	ASCII	071F	
67	Label 4 Data	Character	Undef	32	R	N	ASCII	071F	
68	Label 5 Data	Character	Undef	32	R	N	ASCII	071F	
69	Label 6 Data	Character	Undef	32	R	N	ASCII	071F	
70	Triggering Mode	Unsigned	Byte	1	W	N	0…3	8020	0
71	Triggering Source	Boolean	Undef	3	W	N	0…7	8102	1
72	not used								
73	End of Read Cycle	Unsigned	Byte	1	W	N	0…2	8020	0
74	Read Cycle Timeout	Unsigned	Word	1	W	N	1…65535	8040	100
75	Good Decode Reads	Unsigned	Byte	1	W	N	1…31	8020	1
76	Number of Labels	Unsigned	Byte	1	W	N	1…6	8020	1
77	Output 0 Source	Boolean	Undef	3	W	N	0…7	8102	1
78	Output 1 Source	Boolean	Undef	3	W	N	0…7	8102	1
79	New Master Trigger Source	Boolean	Undef	3	W	N	0…7	8102	1
80	Match Code Type	Unsigned	Byte	1	W	N	0…3	8020	0
81	Match Code Master	Character	Undef	32	W	N	ASCII	871F	
82	Sequential Matching Setup	Boolean	Undef	8	W	N	0,1	8107	2
83	Match Start Position	Unsigned	Byte	1	W	N	0…31	8020	0
84	Match Length	Unsigned	Byte	1	W	N	1…32	8020	1
85	Wild Card Character	Character	Undef	1	W	N	ASCII	8700	*
86	not used								
87	not used								
88	not used								
89	Narrow Margin	Boolean	Undef	1	W	N	0,1	8100	0
90	Code 39 Setup	Boolean	Undef	8	W	N	0…31	8107	1
91	Code 39 Code Length	Unsigned	Byte	1	W	N	1…31	8020	10
92	Codabar Setup	Boolean	Undef	8	W	N	0…31	8107	0
93	Codabar Code Length	Unsigned	Byte	1	W	N	1…31	8020	10
94	Interleaved 2 of 5 Setup	Boolean	Undef	8	W	N	0…7	8107	0
95	I2 of 5 Code Length 1	Unsigned	Byte	1	W	N	0…30	8020	10
96	I2 of 5 Code Length 2	Unsigned	Byte	1	W	N	0…30	8020	6
97	UPC Setup	Boolean	Undef	8	W	N	0…31	8107	0
98	UPC Separator	Character	Undef	1	W	N	ASCII	8700	,
99	Code 128 Setup	Boolean	Undef	8	W	N	0…3	8107	0
100	Code 128 Code Length	Unsigned	Byte	1	W	N	1…31	8020	10
101	UCC/EAN-128 Setup	Boolean	Undef	8	W	N	0…63	8107	34
102	UCC/EAN-128 Separator	Character	Undef	1	W	N	ASCII	8700	,

Table 7 Component Model Primitives

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Default Attribute Contents
103	not used								
104	not used								
105	No Read Counter	Unsigned	Word	1	R	N	0…65535	0040	
106	Trigger Counter	Unsigned	Word	1	R	N	0…65535	0040	
107	Match Code/Good Read Ctr	Unsigned	Word	1	R	N	0…65535	0040	
108	Mismatch Counter	Unsigned	Word	1	R	N	0…65535	0040	
109	not used								
110	Beeper Status	Unsigned	Byte	1	W	N	0…2	8020	1
111	Beeper Volume	Unsigned	Byte	1	W	N	1…5	8020	4
112	Relay 1 Driver	Unsigned	Byte	1	W	N	0…3	8020	0
113	Relay 1 Polarity	Boolean	Undef	1	W	N	0, 1	8100	0
114	Relay 1 Pulse Width	Unsigned	Byte	1	W	N	1…255	8020	5 (50 msec)
115	Relay 1 No. before Output	Unsigned	Byte	1	W	N	1…255	8020	0
116	Relay 2 Driver	Unsigned	Byte	1	W	N	0…3	8020	0
117	Relay 2 Polarity	Boolean	Undef	1	W	N	0, 1	8100	0
118	Relay 2 Pulse Width	Unsigned	Byte	1	W	N	1…255	8020	5
119	Relay 2 No. before Output	Unsigned	Byte	1	W	N	1…255	8020	0
120	Test Mode	Unsigned	Byte	1	W	N	0…3	8020	0
121	not used								
122	Laser On/Off	Boolean	Undef	1	W	N	0,1	8100	0
123	not used								
124	Raster Scan Setup	Boolean	Undef	8	W	N	1,2	8107	1
125	Top Raster Scan Offset	Unsigned	Byte	1	W	N	0…45	8020	0
126	Bottom Raster Scan Offset	Unsigned	Byte	1	W	N	0…45	8020	45
127	Sweeps per Second	Unsigned	Byte	1	W	N	0…135	8020	14
128-255	not used								

Component Model Action

Actions originate from the network and act on the protocol box.

Table 8 Component Model Action

Model	Act	Action Name	Pa-ram	Name	Descrip	RW	Req	Type	Size	Len	Min	Max
0	0	No Oper-ation	0	None	No Param	W	Yes					
0	1	Change Address	1	Address	Request	W	Yes	0	1	1	0	125
0	1	Change Address	1	Device ID	Request	W	Yes	0	1	1	0	125
0	1	Change Address	1	Partner ID	Request	W	No	0	1	1	0	31
0	1	Change Address	3	Partner ID	Request	W	No	0	2	1	0	65535
0	1	Change Address	4	Serial Number	Request	W	No	0	3	1	0	42949 67295
0	2	Self Test	0	None	No Param	W	Yes					
0	6	Clear Errors	0	None	No Param	W	Yes					
0	8	Enroll Logical	0	None	No Param	W	Yes					
0	8	Enroll Logical	1	Partner ID	Response	R	Yes	0	2	1	1	65535
0	8	Enroll Logical	2	Serial Number	Response	R	Yes	0	3	1	0	0
0	53	Read Primitive	1	Attribute ID	Request	W	Yes	0	1	1	0	255
0	53	Read Primitive	1	Attribute ID	Response	R	Yes	0	1	1	0	255
0	53	Read Primitive	2	Primitive Tag	Response	R	Yes	0	2	1	0	42949 67295
0	57	Pass-word	1	Password	Request	W	Yes	0	2	1	0	65535
1.41.5.4.5	51	Force States	1	State	Request	W	Yes	0	2	1	0	1023
1.41.5.4.5	52	UnForce States	0	Unforce	No Param	W	Yes					
1.41.5.4.5	60	Reset Factory	0	None	No Param	W	Yes					

Component Model Event

Events are actions that originate from the protocol box and affect the network.

Table 9 Component Model Event

Model	Event	Description	Param	Name	Type	Size	Len
0	0	Diagnostic Event Counter	1	Counter Value	0	1	1
1.41	3	End of timer	1	Attribute ID	0	1	1
1.41	3	End of timer	2	Data	0	0	0
1.41	6	Change of Value	1	Attribute ID	0	1	1
1.41	6	Change of Value	2		0	0	0
1.41.5.4	7	NOOP Event	0		0	0	0

Component Model Network Data

Table 10 Component Model Network Data

Attribute ID	Description	Variable Type	Size	Actual Length	R/W	Password Protected	Actual Range	Primitive Tag	Default Attribute Contents
0	Network Data Descriptor	Unsigned	Byte	6	R	N		0025	
	Attribute	18						12	
	Attribute data descriptor	Boolean	Undef	10	R			0109	
	Attribute	34						22	
	Attribute data descriptor	Boolean	Undef	16	W			810F	

SDS Glossary

(+) A qualifying suffix used with Result parameter service descriptions. As a Result qualifier, it refers to a successful result in Service Convention diagrams.

(–) A qualifying suffix used with Result parameter service descriptions. As a Result qualifier, it refers to an unsuccessful result in Service Convention diagrams.

(=) A qualifying prefix used with indication and confirm primitive descriptions in Service Convention diagrams. It means that the primitive is the same as one previously occurring at another level (e.g., the indication primitive may be the reception of the request primitive, shown as (=) Request received).

ALP. Application Layer Protocol.

APDU. Application Layer Protocol Data Unit.

Application Layer. The SDS protocol is based on a three layer architecture that is a compacted form of the ISO/OSI Reference Model and includes physical, data link, and application layers. The Application Layer provides communications services enabling the interaction of embedded objects to accomplish the desired application functions.

Application Layer Protocol. The rules governing the structure and timing of APDUs that are used to achieve the services provided by the application layer.

Application Layer Protocol Data Unit. The unit of data transfer exchanged between application layers. It is encapsulated within a Data Link Layer Protocol Data Unit (DLPDU) when transmitted from one component to another.

Application Layer Service. A service provided to the Service User of the application layer. The service may be provided by means of a specified function call.

Branch. Communication line that is a final circuit from a trunk to a node.

Bus. The trunk and all of the physical components connected to it.

CAN. Controller Area Network.

CCD. Channel Capable Device.

Channel. Channel is one of the SDS Service Types.

Channel Capable Device. A Channel Capable Device is one that is able to send, receive and properly process Channel messages.

Channel Code. In a Channel APDU this Service Parameters subfield specifies one of several channel types; for example, Multicast and Peer-to-Peer Channels.

Channel Number. In a Channel APDU this Service Parameters subfield holds a channel number that is the Channel Identifier for the message.

CiA. CAN in Automation International Users and Manufacturers group.

Confirm (primitive). A representation of an interaction in which a Service-Provider indicates, at a particular service-access-point, completion of some procedure previously invoked, at that service-access-point, by an interaction represented by a request primitive. The confirm service is an Application Layer primitive. A confirm notifies the Service User of the presence of the response.

Connection Manager. The Network Object responsible for relaying Connection APDUs between the Initiating and Responding Devices.

COS. COS (Change Of State) services are specialized services used by SDS single-point binary objects to report the occurrence of changes in binary I/O. A binary sensor changes states when actuated, whereas a binary actuator changes states upon a command.

COV. COV (Change Of Value) is an event used to report that an input has changed by a predetermined amount.

Device. Logical Device.

Device-Object. Device-Object is an addressable object that is defined by its Logical Address and its EOID.

Dir/Pri. Dir/Pri is a field in all APDUs. In Host-Guest relationships, the Direction/Priority field determines the communication Direction (i.e., if Dir/Pri = 0, the Logical Device Address field holds a destination address; if Dir/Pri = 1, the Logical Device Address field holds a source address). However, in Channel APDUs, it determines the priority (high/low) of the messages.

Embedded Object. An Embedded Object is a network-addressable entity within a logical device. The word object is used as an abstraction for one of several possible types of entities such as I/O Devices. The address of the embedded object is a combination of the Logical Address plus the EOID. Embedded objects have defined attributes, actions, and events that are specific to the embedded object types that make up a Logical Device. An Embedded I/O Object may exist singly or coexist with other Embedded Objects within the Logical Device.

Embedded Object Identifier. The Embedded Object Identifier is a 5-bit APDU field that holds a number used to differentiate among up to 32 embedded objects in a Logical Device. The EOID field is used in all APDUs except Connection.

EOID. Embedded Object Identifier.

FI. Fragmentation Indicator.

Fragment One of the multiple component messages comprising a fragmented long form APDU.

Fragmentation Indicator. Fragmentation Indicator is a single bit field that identifies an APDU as fragmented.

Guest. In a Host-Guest (or Master-Slave) relationship, a specific group of Guest Devices is managed by a Host Device.

Host. In a Host-Guest (or Master-Slave) relationship, a Host Device manages a specific group of Guest Devices.

IDAdd. Initiating Device Address

Indication (primitive). A representation of an interaction in which an ALP Service Provider indicates that a procedure has been invoked by the ALP service-user at the peer service-access-point. The indication service is an Application Layer primitive service. The Indication notifies the Service User of the presence of a request from another device or controller.

Initiating Device. In a Peer-to-Peer relationship, the Initiating Device initiates a message exchange by sending a request message to the Responding Device.

ISO/OSI Reference Model. This is the seven-layer reference model for communication protocols defined by ISO-7498, Information Processing Systems, Open Systems Interconnection, Basic Reference Model.

Logical Address. The Smart Distributed System device address as it appears on the bus and at the device interface. Logical addresses must be within the range {0 ... 125}.

Logical Device. A Logical Device is a separately addressable entity within a physical component. A logical device contains at least one and no more than 32 embedded objects. A Logical Device is connected to the communications channel via its Logical Address.

Media. Twisted pair, optical fiber, or other means of transmitting communication signals between two or more nodes.

Network. All the media, connectors, associated communication elements, and a given set of communicating devices interconnected for the purpose of communication.

Object. Embedded Object.

Object Model. An Object Model provides a method for describing the network-visible aspects of a device. The device behavior or structure is defined by a set of attributes, a set of actions, and a set of events that comprise the model.

P–P. Peer-to-Peer

Peer. One of two addressable objects within a Peer-to-Peer relationship.

Peer-to-Peer. A communication channel between two Channel Capable Devices **Physical Component.** A Physical Component is an abstraction representing a single physical package that is optionally modular, comprises hardware and software, and is connected to the network. The Physical Component contains one or more Logical Devices.

Primitive. An abstract, implementation-independent representation of an interaction between a service user and a service provider. Primitive services exist at the Application Layer level. These commands describe the four services: Request, Response, Indication, and Confirm.

R/R. Request/Response.

RDAdd. Responding Device Address.

Request (primitive). A representation of an interaction in which an ALP Service User invokes some procedure. The request service is an Application Layer primitive service. As a result of the request, the Application Layer typically formats and transmits a request packet.

Request/Response. A subfield of the Service Specifiers field. The entry options are Request, Successful Response, Error Response, and Wait Response. The R/R subfield is used in all Smart Distributed System long form messages.

Responding Device. In a Peer-to-Peer relationship, the Responding Device normally responds to the Initiating Device with a response message and by performing the requested service.

Responding Device Address. In an Open/Close Peer-to-Peer APDU, this Service Parameters subfield identifies the address of the Responding Device.

Responding Device EOID. In an Open/Close Peer-to-Peer APDU, this Service Parameters subfield identifies the EOID for a Responding Device.

Response (message). A long-form message in which the Request Response (R/R) field is set to Response.

Response (primitive). A representation of an interaction in which an ALP Service-User indicates that it has completed some procedure previously invoked by an indication primitive. The response service is an Application Layer primitive service. This service is invoked by the Application Layer Service Provider when a response has been prepared.

RTR. Remote Transmission Request (re. CAN specification).

SDS. Smart Distributed System.

Service Parameters. The Service Parameters field determines how an APDU will be processed. Its definition varies according to Service Type.

Service Provider A Service Provider is an abstraction used to facilitate descriptions of Application Layer services. A Service Provider responds to requests from the Application Layer.

Service Specifiers. An APDU field that holds the subfields R/R and FI.

SubType. In a Peer-to-Peer APDU, this Service Parameters subfield specifies the service type requested of the Responding Device by the Initiating Device.

Service User. A Service User is an abstraction used to facilitate descriptions of Application Layer services. A Service User requests or receives services from the Application Layer.

SubParameters. In a Channel APDU, this Service Parameters subfield identifies the parameters for the Responding Device (e.g. for a Write service, the SubParameters is the Variable ID).

Topology. The physical arrangement and spacing of the trunk, branches, and physical components.