SOYAL

Communication Protocol

Item No.	AR-721E	Version 1.X
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1 Communication Protocol

All SOYAL® devices use the same protocol, only the commands given vary depending on different devices

1.1 Preparing Connect:

Prior to connection to AR-721H, the node number of the device has to be known. The node number could be checked from the keypad as shown on the table below:

Steps	AR-721H	AR-727H
Step 1:(Enter into EDIT MODE)	＊ 1 2 3 4 5 6 ＃	＊ 1 2 3 4 5 6 ＃
Step 2:(Setting Node ID)	0 0 ＊ 0 0 1 ＃	3 → 1 → 1 ＃
Step 3:(Exit)	＊ ＃	＊ ＊ ＊ ＃

1.2 Data Format :

Baud Rate			9600，N，8，1			
Data Format			Binary HEX Data			
Data Packet						
Head	Length	Destination ID	Command Code	Data …	XOR	SUM
8bits	8bits	8bits	8bits		8bits	8bits

1.3 Data packed :

	Size（Byte）	Description	XOR 0xFF	SUM 0x00
Head	1	0x7E	No	No
Length	1	Data Length Indicator which denotes the length from Destination to the end including XOR and SUM	No	No
Destination ID	1	Destination Node ID 00: Reserved for the bus master FF: Broadcast to each reader	Yes	Yes
Command Code	1	Instruction Command	Yes	Yes
Data	00 ～ D0	Length of Data Block which varies depending on instructions	Yes	Yes
XOR	1	To XOR each byte from Destination ID to Data with 0xFF		Yes
SUM	1	TO sum each byte from Destination to XOR with 0x00. If the summary is greater than 0xFF, it should keep the low byte.		

Example：Polling Status from Node. 1						
Head	Length	Destination	Command	Data …	XOR	SUM
0x7E	0x04	0x01	0x18		0xE6	0xFF

XOR = 0xFF ^ 0x01 ^ 0x18 = 0xE6 SUM = 0x01 + 0x18 + 0xE6 = 0xFF

Node ID needs to set from the keypad。Please refer to the command list for- 00*

1.4 Echo Code :

Command	*Description*	*Note*
03h	Echo requested data	7E xx 00 03 [Data...] XOR SUM
04h	Echo command acknowledged (ACK) Note:1	7E 04 00 04 SID RDR ... FB FF
05h	Echo command unacknowledged (NACK) Note:1	7E 04 00 05 FA FF
06h	Echo authentication failed (AUTHERR)	7E 04 00 06 F9 FF
07h	Echo no tags presented (NOTAG)	7E 04 00 07 F8 FF
08h	Echo not login (NOT LOGIN LEVEL2)	7E 04 00 08 F7 FF
09h	Echo CRC8 check error for ReadBlockCRC8	7E 04 00 09 XX XX
0Ah	Echo not authenticated	
0Bh	Echo authentication layer rejected	

Note 1: For ACK and NACK echo, the IO status will be appended.

7E LEN DID [ACK] [SID] [Reader Type] [Dat0] [Dat1] [Dat2] [Dat3] [Dat4] [Dat5] XOR SUM

The data format of Dat0 to Dat5 are same with command 18H status echo(2.1.2 Standby Status of the Device).

2 Command List

2.1 Operation Mode

There are two operation modes one this device.

Networking Mode:

The device will detect whether received Command 18H from Host before time out. If host sent 18H and device received the message, the device will pass tag ID to host and wait for response from host echo ACK , NACK or release commands. If host did not response code to device within 25 seconds, the device will display “network communication error!” with 7 beeps. If the device did not receive command 18H within 10 seconds, the device will automatically switch to stand-alone mode.

Release command: 04H, 05H, 84H.

Stand-alone Mode:

All access events on the device will be identified itself. The host can get transaction log via command 25H

In stand-alone mode, user can select operation mode between M4,M8 and M6. But in networking mode the user only can select M4 or M8.

2.1.1 18H Get Device Status (Event Polling)

Send	Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Destination Node ID, it refers node 1 here
Command	18	Get the current device status (Event Polling)
XOR	E6	XOR= FF^01^18 =E6
SUM	FF	SUM= 01+18+E6=FF

Echo	Value	The device respond depending on different status as follows (1) Standby status w/o event log (2) Key pressed status (3) Card flashing Status (4) Standby status with event log
Head	7E	Leading Code
Length	??	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Destination	00	Destination Node ID. 00H mean send to host (PC or AR716E)
Function Code	09	09H is echo reader status code.
Source	01	Source Node ID. (Who send);
Event	×	Type of message echo from device (please refer to 2.1.2)
Data Field	Data 0	Data 0
	Data 1	Data 1
	Data 2	Data 2
	Data 3	Data 3
	Data 4	
	Data 5	
XOR		Check byte
SUM		Check byte

2.1.2 Device Status Define

<table>
<tr><th>Event</th><th>Meaning</th><th>Description of Data Bit</th></tr>
<tr><td>20</td><td>AR721E Status</td><td>Neither card nor key event, just echo device I/O status. If event log buffer is not empty. The oldest event will be appended and followed the Data3.
*) If event log appended, the package length will more then 36(24h) bytes. Check the package length to identify if event log appended or not.</td></tr>
<tr><td>01</td><td>4/5 Keys pressed
Note :
Mode4:
5 keys pressed,
Mode8:
4 keys pressed</td><td>Data 0：Device mode. Set Bit7 while working on Mode 8.
Data 1：Input value’s MSB
Data 2：Input value’s LSB
Data 3：Undefined default value=0
Data 4：Device parameters. (Setting by command: 20＊XXX＃)
Data 5：401RO16’s parameter (24*xxx#)
Data 6：Undefined default value=0
Controllers are allow to identify the value</td></tr>
<tr><td>02</td><td>New Card Present
UID4: Tag ID Bits(39~32)
UID3: Tag ID Bits(31~24)
UID2: Tag ID Bits(23~16)
UID1: Tag ID Bits(15~08)
UID0: Tag ID Bits(07~00)</td><td>The inner code of the card is 40bits in length which can be tabled
7E xx 00 09 01 02 Dat0 UID3 UID2 Dat3 Dat4 UID1 UID0
UID4……. XOR SUM
below:
<table>
<tr><td>MSB</td><td colspan="4">Inner Code</td><td>LSB</td></tr>
<tr><td>ID</td><td colspan="2">Site Code</td><td colspan="2">Card Code</td></tr>
<tr><td></td><td>High</td><td>Low</td><td>High</td><td>Low</td></tr>
<tr><td>ID</td><td>Site Hi</td><td>Site Lo</td><td>Card Hi</td><td>Card Lo</td></tr>
<tr><td>8 Bits
39~32</td><td>8 Bits
31~24</td><td>8 Bits
23~16</td><td>8 Bits
15~08</td><td>8 Bits
07~00</td></tr>
</table>
Data 0：Time & Attendance，Bit7~Bit5 : Time & Attendance Selection
Other LSBs refer to “Exit Input”
Data 1：High byte of site code (bit 15~08)
Data 2：Low byte of card code (bit 07~00)
Data 3/4：The High / LSBs of the value input before card flashing, it would show the previous value if there is not value input before flashing
Data 5：High byte of card code (bit 15~08)
Data 6：Low byte of card code (bit 07~00)
Data 7：ID Code(Bits(39~32) of EM4001 Chi
Data 8：Bit Selection (20*xxx#)
Data 9：Bit7:1/0 From Port1/Port0
Bit6: 1/0 Setting Forced Open Alarm</td></tr>
</table>

(1)Standby Status of the Device

Echo Status Field for AR721E		Code : 20H
Data 0	Bit7 : Door Relay 1 On/Off(1/0) Bit6 : Door Relay 0 On/Off (1/0) Bit5 : Alarm Relay On/Off (1/0) Bit4 : Port 0 Arming Active/Inactive (1/0) Bit3 : Alarm Active/Inactive (1/0) Bit2 : Port 1 Arming Active/Inactive (1/0) Bit1 : Door Sensor 0 Close/Open status (0/1) Bit0 : Door Sensor 1 Close/Open status (0/1)	
Data 1	Bit7 : Forced Open Alarm 0 Bit6 : Forced Open Alarm 1 Bit5 : Exit button 1 Close/Open status (1/0) Bit4 : Exit button 1 Close/Open status (1/0) Bit3 : Temper Switch 0 Close/Open status (0/1) Bit2 : Temper Switch 1 Close/Open status (0/1) Bit1: Bit0:	
Data 2	Device parameters (Command 20＊xxx#)	
Data 3	Firmware Version	
Data 4 (*1)	DI/DO state or event log buffer	
Data 5(*1)	DI/DO state or event log buffer	
Data 4 ~ 31	If there has any transaction in the queue buffer, the device will append the last event follow the Data 3, and then the host can use command 37 to remove this log.	

*1) If there have no event log appended, Data 4 and 5 will be DO and DI status bit mapping.

2.2 04H Prompt Accepted Message

Echo	Example Value - AR721	Example Value - AR727	Description	
Head	7E	7E	Leading Code	
Length	04	09	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM	
Destination ID	01	01	Node ID of destination, the node id is 01 here	
Command Code	04	04	Informing the device to send correct message (1) A sound from the beeper (2) A flash from the green LED (3) Door opening operated by relay (4) "UID-H + UID-L" showed on LCD (AR-727H only)	
SS		A0	SS: Auxiliary Command(AR-727H only) 01: "Force On" showed on LCD, relay doesn't activate 02: "OK" showed on LCD, relay activates 03:"Force Off" showed on LCD, relay doesn't activate 13:Attaching information about lift stops available for the user A0:"UID-H + UID-L" showed on LCD	
XX		00	If the card presented is valid, please insert UID(bit15~8), others can be 0。	
XX		00	If the card presented is valid, please insert UID(bit7~0), others can be 0。	
UID-H		01	MSB of UID (AR-727H only)	"UID-H + UID-L" showed on LCD (00300 OK) 300 converts to 0x012C 0x01 will be placed in UID-H 0x2Cwill be placed in UID-L
UID-L		2C	LSB of UID (AR-727H only)	
XOR	FA	77	XOR=FF^01^04^A0^00^00^01^2C =77	
SUM	FF	49	SUM=(01+04+A0+00+00+01+2C+77)・FF=49(LSB)	

Note1: This command belongs to unresponsive commands which wouldn't respond either correct or wrong information.

Note2: The information about lift can be ignored if there is no command related to stops.

2.3 05H Prompt Invalid Message

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	05	Informing the device to send wrong message (1) Two sounds from the beeper (2) Two flashes from the red LED
XOR	FB	XOR=FF^01^05 =FB
SUM	01	SUM=(01+05+FB)・FF=01(LSB)

Note: This command belongs to unresponsive commands which wouldn't respond either correct or wrong information.

2.4 09H Prompt Keying-in Password

Echo	Example Value	Description	
Head	7E	Leading Code	
Length	09	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM	
Destination ID	01	Node ID of destination, the node id is 01 here	
Command Code	09	Informing the device to send message about keying in password (1) Four sounds from the beeper Behind the command code, Data 0 should be 0x40, Data 1&2 are undefined and Data 3&4 are the number sent from the device. The number will be converted to a value with 5 digits (decimal) and showed on LCD (AR-727H only).	
Data 0	40	0x40(fixed)	
Data 1	00	Undefined, value=00 is fixed	
Data 2	00	Undefined, value=00 is fixed	
Data 3	00	Num H MSB	"Num H Num L" showed on LCD (00088 OK)
Data 4	58	Num L LSB	
XOR	EF	XOR=FF^01^09^40^00^00^00^58 =EF	
SUM	91	SUM=(01+09+40+00+00+00+58+EF) · FF=91(LSB)	

Note: This command belongs to unresponsive commands which wouldn't respond either correct or wrong information.

2.5 20H Write EEPROM

Echo	Example Value	Description
Head	7E	Leading Code
Length	0F	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	20	Write EEPROM can up to 8bytes at a time (721HV3/727HV3 can be up to 32 bytes at a time) Please refer to section 3.5 for more details
AddrH	00	Writing address in EEPROM
AddrL	80	
Bytes	08	8 bytes
Data 0	11	Byte 1
Data 1	22	Byte 2
Data 2	33	Byte 3
Data 3	44	Byte 4
Data 4	55	Byte 5
Data 5	66	Byte 6
Data 6	77	Byte 7
Data 7	88	Byte 8
XOR	DE	XOR= FF^01^20^00^80^08^11^22^33^44^55^66^77^88 =DE
SUM	EB	SUM=(01+20+00+80+08+11+22+33+44+55+66+77+88+DE) · FF=EB(LSB)

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function Cod	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.6 12H Read EEPROM

Echo	Example Value	Description
Head	7E	Leading Code
Length	07	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	12	Read EEPROM up to 8bytes at a time (721HV3/727HV3 can be up to 32 bytes at a time) Please refer to section 3.5 for more details
AddrH	00	Reading address out from EEPROM
AddrL	80	
Bytes	08	8bytes
XOR	64	XOR=FF^01^12^00^80^08 =64
SUM	FF	SUM=01+12+00+80+08+64=FF

Echo	Value	Description
Head	7E	Leading Code
Length	0D	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	02	Message sent from the device
Reader ID	01	Reader ID
Data Field	11	Data 0
	22	Data 1
	33	Data 2
	44	Data 3
	55	Data 4
	66	Data 5
	77	Data 6
	88	Data 7
XOR	74	XOR=FF^00^02^01^11^22^33^44^55^66^77^88 =74
SUM	DB	SUM=(00+02+01+11+22+33+44+55+66+77+88+74) · FF=DB(LSB)

2.7 21H Relay Control

Echo	Example Value	Description
Head	7E	Leading Code
Length	06	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	21	Relay control (on or off), no indication for it
Data	82	Activating Relay (refer to 2.7.1)
Data	00/01	Port Assignment
XOR	Xx	XOR=FF^=01^21^82 =5D
SUM	xx	SUM=(01+21+82+5D) · FF=01(LSB)

2.7.1 Relay Control Parameters

Data 0	Description	Note
0x00	Checking I/O Status	
0x01	**Data1**=(1/0)keypad lock/unlock	Only suits 6V2 or above
0x02	**Data1/2**=Interval between card flashing (about 10ms)	Only suits 6V2 or above
0x80	Activating Arming. (Enter armed state)	
0x81	Disable armed state	
0x82	Door Relay On	
0x83	Door Relay Off	
0x84	Activating Door Relay only for a certain time	＊1
0x85	Alarm Relay On	
0x86	Alarm Relay Off	
0x87	Activating Alarm Relay only for a certain time	＊1

Note1:Activating the relay for a certain time and then inactivating it. The relay time can be set from the keypad. Please refer to the operation manual for the command 02* and 03*.

Ex: Get I/O status

Send: 7E 05 DID 21 00 XOR SUM

Echo: Same as status echo of polling(18H) command

2.8 23H Write Device Real Time Clock

Echo	Example Value	Description
Head	7E	Leading Code
Length	0B	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	23	Writing in the device time
SEC	00	Second
MIN	01	Minute
HR	02	Hour
WEEK	03	Day of a week
DAY	04	Date
MON	05	Month
YEAR	06	Year
XOR	DA	XOR=FF^01^23^00^01^02^03^04^05^06 =DA
SUM	13	SUM=(01+23+00+01+02+03+04+05+06+DA) · FF=13(LSB)

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.9 24H Read Device Real Time Clock

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	24	Reading out the device time
XOR	DA	XOR=FF^01^24 =DA
SUM	FF	SUM=01+24+DA=FF

Echo	Value		Description
Head	7E	Leading Code	
Length	11	Data Length Indicator which denotes the length from Node to the end including XOR and SUM	
Node	00	The value 00 is fixed, the message would be sent to PC from the device	
Function	03	Response to the request	
Reader ID	01	Reader ID	
Data Field	0A	Data 0	Second
	16	Data 1	Minute
	0D	Data 2	Hour
	06	Data 3	Day of a week
	09	Data 4	Date
	0C	Data 5	Month
	05	Data 6	Year
	63	Data 7	Firmware Version 6V3
	27	Data 8	Door Number High byte (Used for 701Client huge door mode)
	01	Data 9	Door Number Low Byte
	01	Data 10	Firmware Identify Code (Ver6.6 and later) 00: Is standard firmware
	26	Data 11	Reader Type
XOR	AE	XOR=FF^00^03^01^0A^16^0D^06^09^0C^05^63^27 =AE	
SUM	89	SUM=(00+03+01+0A+16+0D+06+09+0C+05+63+27+AE) · FF=89(LSB)	

2.11 25H Get the lasted event Log of Device

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicates which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	25	Reading events from the device
XOR	DB	XOR=FF^01^25 =DB
SUM	01	SUM=(01+25+DB) · FF=01(LSB)

If there have no any events will echo command 0x04 and the package length will less then 0x0B, otherwise will echo message package in message format.

2.12 37H Delete the lasted transaction

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	37	Clearing events from the device
XOR	C9	XOR=FF^01^37 =C9
SUM	01	SUM=(01+37+C9) · FF=01(LSB)

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledge (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.13 2DH Empty Device transaction queue

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	2D	Clearing all events from the device
XOR	D3	XOR=FF^01^2D =D3
SUM	01	SUM=(01+2D+D3) · FF=01(LSB)

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledge (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.17 81H Resetting Device

Echo	Example Value	Description
Head	7E	Leading Code
Length	07	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	81	Resetting the device (AR-727H only)
Dat0	46	ASCII 'F'
Dat1	41	ASCII 'A'
Dat2	43	ASCII 'C'
XOR		
SUM		

*) This command will reset the controller and without any return data

2.19 83H Setting Card Content

Echo	Value	Description	
Head	7E	Leading Code	
Length	0E	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM	
Destination ID	01	Node ID of destination, the node id is 01 here	
Command Code	83	Setting card content (AR-721H / AR-727HV3 only)	
Addr H	00	User Address – High	Addr H Addr L=0x01(00001)
Addr L	01	User Address - Low	User Address : 00001
Site H	04	Site Code – High	Site Hi Site Lo = 0x441 (01089)
Site L	41	Site Code – Low	Site Code 01089
Card H	EA	Card Code – High	Card Hi Card Lo = 0xEA4B (59979)
Card L	4B	Card Code – Low	Card Code 59979
PIN H	04	PIN – High	PIN H PIN L=0x4D2(1234)
PIN L	D2	PIN – Low	PIN 1234
Mode	02	Card or PIN	Access Mode(Bit 1~0)
			0 Invalid
			1 Read Only
			2 Card or PIN
			3 Card + PIN
		Bit7: Set to enable Anti passback	
Zone	01	Selecting the 1st Time Zone (63 Time Zones for selection)	
Group		Bit mapping of Door Group. (B0:WG1, B1:WG2, B3:WG3, B4:WG4) ※ for AR721E only.	
XOR	xx	XOR=FF^01^83^00^01^04^41^EA^4B^04^D2^02^01 =4D	
SUM	xx	SUM=(01+83+00+01+04+41+EA+4B+04+D2+02+01+4D) · FF=25(LSB)	

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledge (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.20 87H Reading Card Content

Echo	Example Value	Description	
Head	7E	Leading Code	
Length	07	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM	
Destination ID	01	Node ID of destination, the node id is 01 here	
Command Code	87	Reading the card content	
Addr H	00	User Address – High	Addr H Addr L=0x02(00002)
Addr L	02	User Address - Low	User Address : 00002
Nums	01	Number of cards	
XOR	7A	XOR=FF^01^87^00^02^01 =7A	
SUM	05	SUM=(01+87+00+02+01+7A) · FF=05(LSB)	

Echo	Value	Description		
Head	7E	Leading Code		
Length	0D	Data Length Indicator which denotes the length from Node to the end including XOR and SUM		
Node	00	The value 00 is fixed, the message would be sent to PC from the device		
Function	03	Response to the request		
Reader ID	01	Reader ID		
Data Field	04	Data 0	Site Code – High	Site Hi Site Lo = 0x441 (01089)
	41	Data 1	Site Code – Low	Site Code : 01089
	EA	Data 2	Card Code – High	Card Hi Card Lo = 0xEA4B (59979)
	4B	Data 3	Card Code – Low	Card Code : 59979
	04	Data 4	PIN – High	PIN H PIN L=0x4D2(1234)
	D2	Data 5	PIN - Low	PIN : 1234
	02	Data 6	Access Mode	Card or PIN
	0B	Data 7	Time Zone	11st Time Zone Selected
	03	Data8	Door Group	
		Data8	High Tag ID (bit41~38)	For Sony Tag Only
		Data9	High Tag ID (bit37~32)	For Sony Tag Only
XOR	C6	XOR=FF^00^03^01^04^41^EA^4B^04^D2^02^0B =C6		
SUM	27	SUM=(00+03+01+04+41+EA+4B+04+D2+02+0B+C6) · FF=27(LSB)		

2.21 84H Stopping Waiting for Response

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	84	Stopping waiting for response. When the controller receives events from the device (reader), the device will wait for the response- ACK or NACK from the controller, otherwise the device will show error message in 2.5 sec. Note: This command is unresponsive command which wouldn't respond either correct or wrong information.
XOR	7A	XOR=FF^01^84 =7A
SUM	FF	SUM=01+84+7A=FF

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.22 85H Clearing All Card Content

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	85	Clearing all card content, this requests 10 sec. to process (AR-721H / 727HV1 / 721QFM Only)
XOR	7B	XOR=FF^01^85 =7B
Option	0x01	Set Bit0 to clear all normal tag ID Set Bit1 to clear all black tag ID *) Only 721Q(Ver6.6 and later)/323D(Ver6.8 and later) supported
SUM	01	SUM=(01+85+7B) · FF=01(LSB)

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.23 86H Resetting Anti-pass-back

Echo	Example Value	Description
Head	7E	Leading Code
Length	04	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination ID	01	Node ID of destination, the node id is 01 here
Command Code	86	Restoring the initial setup of anti-pass-back (AR-721H / 727HV3 only)
XOR	78	XOR=FF^01^86 =78
SUM	FF	SUM=01+86+78=FF

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.24 2AH Setting Time Zone

Echo	Example Value	Description		
Head	7E	Leading Code		
Length	24	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM		
Destination ID	01	Node ID of destination, the node id is 01 here		
Command Code	2A	Setting Time Zone		
IDX	01	Initial time zone, the initial time zone is the 1st here		There are 63 time zones for selection (01h~3Fh) Value=00h : Auto-shift setup (please refer to 2.24.1)
Sets	01	Number of time zone to setup		
Data 0	40	Ends data here		The time zone to connect next set of time zone Bit7 : Allows exiting on holidays Bit6 ～Bit0 : The time zone to connect next set of time zone
Data 1	00	Priority of time zone, users are only allowed to pass when their card level > time zone level		
Data 2	01	Sun.	Beginning Time (08:00) 0x1E0	32bytes within the data, the first two bytes are Link and Level Data 0 : Link Data 1 : Level Data 2 Data 3 : Beginning time on Sunday 08:00 refers to 8 a.m., Namely 480 minutes (0x1E0) Data 4 Data 5 : End time on Sunday Data 6 Data 9 : Monday Data 10 Data 13 : Tuesday Data 14 Data 17 : Wednesday Data 18 Data 21 : Thursdays Data 22 Data 25 : Friday Data 26 Data 29 : Saturday Data 30 : Reserved Data 31 : Reserved
Data 3	E0			
Data 4	03		End Time (18:00) 0x384	
Data 5	84			
Data 6	01	Mon.	Beginning Time (08:00) 0x1E0	
Data 7	E0			
Data 8	03		End Time (18:00) 0x384	
Data 9	84			
Data 10	01	Tue.	Beginning Time (08:00) 0x1E0	
Data 11	E0			
Data 12	03		End Time (18:00) 0x384	
Data 13	84			

Data 14	01	Wed.	Beginning	
Data 15	E0		Time (08:00) 0x1E0	
Data 16	03		End Time	
Data 17	84		(18:00) 0x384	
Data 18	01	Thu.	Beginning	
Data 19	E0		Time (08:00) 0x1E0	
Data 20	03		End Time	
Data 21	84		(18:00) 0x384	

Data 22	01	Fri.	Beginning	
Data 23	E0		Time (08:00) 0x1E0	
Data 24	03		End Time	
Data 25	84		(18:00) 0x384	
Data 26	01	Sat.	Beginning	
Data 27	E0		Time (08:00) 0x1E0	
Data 28	03		End Time	
Data 29	84		(18:00) 0x384	
XOR	BE	XOR=FF^01^2A^01^01^0C^00^01^E0^03^84^01^E0^03^84^01^E0^03 ^84^01^E0^03^84^01^E0^03^84^01^E0^03^84^01^E0^03^84^00 ^00 =BE		
SUM	CF	SUM=(01+2A+01+01+0C+00+01+E0+03+84+01+E0+03+84+01+E0+03+ 84+01+E0+03+84+01+E0+03+84+01+E0+03+84+01+E0+03+84 +00+00+BE) · FF=CF(LSB)		

2.24.1 Auto-shift Setup

When the value of time zone is 00, it refers to auto-shift		
Beginning Time	End Time	Description
00:00	00:00	Always On Duty
23:59	23:59	Always Off Duty
00:01	00:01	Duty status depends on the last setting and will be fixed on it
Example		
08:00	18:00	(Overtime Setup) Before 08:00→ On Duty，Before 18:00→ Off Duty，After 18:00 Off OVT
08:00	23:59	(Non-overtime Setup) Before 08:00→ On duty，Before 23:59→ Off Duty

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.25 2CH Setting Holidays

Echo	Example Value	Description	
Head	7E	Leading Code	
Length	12	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM	
Destination	01	Node ID of destination, the node id is 01 here	
Code	2C	Setting Holidays (AR-721H / 727HV3 only)	
IDX	00	First set of holidays	120 days available to setup for holiday, sorting before download and put the small date first then follow zero to fill all filed.
Sets	06	Number of holidays, 06 refers to 6-day holiday	
Data 0	0C	December	Set 00
Data 1	01	1	Dec. 1
Data 2	0C	December	Set 01
Data 3	02	2	Dec. 2
Data 4	0C	December	Set 02
Data 5	03	3	Dec. 3
Data 6	0C	December	Set 03
Data 7	04	4	Dec. 4
Data 8	0C	December	Set 04
Data 9	05	5	Dec. 5
Data 10	0C	December	Set 05
Data 11	06	6	Dec. 6
XOR	D3	XOR=FF^01^2C^00^06^0C^01^0C^02^0C^03^0C^04^0C^05^0C^06 =D3	
SUM	63	SUM=(01+2C+00+06+0C+01+0C+02+0C+03+0C+04+0C+05+0C+06 +D3) · FF=63(LSB)	

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.26 88H Set Extend Parameter

2.26.1 Read

Echo	Example Value	Description
Head	7E	Leading Code
Length	12	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination	01	Node ID of destination, the node id is 01 here
Code	88	Set extend parameters of user access date
Sub Code	00	00 : Read, 01: Write
Data	00	User Index High (bit 15~08)
	01	User Index Low (bit 07~00)
	00	How many records high byte (bit 15~08)
	01	How many records low byte (bit 07~00)
XOR		
SUM		

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Data		First record of begin year. (Each record take 8 bytes)
		Month of begin
		Day of begin
		Year of end
		Month od end
		Day of end
		0xFF
		0xFF
		Second record of begin year
		…
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

2.26.2 Write

Echo	Example Value	Description
Head	7E	Leading Code
Length	12	Data Length Indicator which denotes the length from Destination ID to the end including XOR and SUM
Destination	01	Node ID of destination, the node id is 01 here
Code	88	Set extend parameters of user access date
Sub Code	01	00 : Read, 01: Write
Data		User Index High (bit 15~08)
		User Index Low (bit 07~00)
		How many records high byte (bit 15~08)
		How many records low byte (bit 07~00)
		First record begin year
		Begin month
		Begin day
		End year
		End month
		End day
		0xFF (Must be 0xFF)
		0xFF (Must be 0xFF)
		Second record begin year
		…
XOR		
SUM		

Echo	Value	Description
Head	7E	Leading Code
Length	05	Data Length Indicator which denotes the length from Node to the end including XOR and SUM
Node	00	The value 00 is fixed, the message would be sent to PC from the device
Function	04	Command Acknowledged (ACK)
Reader ID	01	Reader ID
XOR	FA	XOR=FF^00^04^01 =FA
SUM	FF	SUM=00+04+01+FA=FF

3 Data Structure

3.2Structure of Time Zone :

```
Struct   DS_ZONE  {
    Unsigned char   link；              //Bit 7 refers to free pass on holidays

    Unsigned char   level；             //While card level＜ZONE level→ Pass Denied

    Unsigned int16   Time[7][2]        //Minute as a unit to set
    Unsigned char   rev[2]
    }；
```

Data 0 : Link				
Data 1 : Level				
	Beginning Time		End Time	
	High	Low	High	Low
Sunday	Data 2	Data 3	Data 4	Data 5
Monday	Data 6	Data 7	Data 8	Data 9
Tuesday	Data 10	Data 11	Data 12	Data 13
Wednesday	Data 14	Data 15	Data 16	Data 17
Thursday	Data 18	Data 19	Data 20	Data 21
Friday	Data 22	Data 23	Data 24	Data 25
Saturday	Data 26	Data 27	Data 28	Data 29
Data 30 : Reserved				
Data 31 : Reserved				

63 time zones available to setup, Time Zone 0 refers to Auto-shift

3.3 Data Structure of Holidays :

```
Struct DS_HOLI  {
    Unsigned char       month；
    Unsigned char       data；
    }；
```

Set 00		Set 01		·····	Set xx	
Month	Date	Month	Date		Month	Date
Data 0	Data 1	Data 2	Data 3		Data xx	Data xx

120 days available to setup for holiday

3.4 Data Structure of Anti-pass-back:

//Bit mapping to each user. Bit0 of byte0 is user 0 , bit7 of byte1 is user 15,etc.

//If set Enable[0] to 0xFF , the user from 0～7 need anti-pass-back check.

//If set Initial[0] to 0xFF , the user from 0～7 can access reader in free anti-pass-back

// state one times.

```
Struct DS_ANTIPASS  {
    Unsigned char   Enable[1024 /8]；    //Start from EEPROM address 8448(Dec)
    Unsigned char   Initial[1024 /8]；    // Start from EEPROM address 8576(Dec)
    }；
```

Enable

1024 bits (1024 users)																				
Byte1 (8 users)								Byte2								Byte3								……. Byte128
User Address 7～0								User Address 15～8								User Address 31～16								
0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0	

1：Enable Anti-pass-back

0：Disable Anti-pass-back

Initial

1024 bits (1024 users)																				
Byte1 (8 users)								Byte1 (8 users)								Byte1 (8 users)								……. Byte128
User Address 7～0								User Address 7～0								User Address 7～0								
0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0	

1：Initial Enabling

0：Non-initial Eabling

Current state

1024 bits (1024 users)																				
Byte1 (8 users)								Byte1 (8 users)								Byte1 (8 users)								……. Byte128
User Address 7～0								User Address 7～0								User Address 7～0								
0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	1	1	1	0	0	

1：Entry Door

0：Exit Door

3.5 Memory Layout of AR-721E:

The capacity of EEPROM of AR-721E can be up to 256Kbits. The first 30 bytes are system parameters as tabled below

Address	Description	Function	Bytes
00h	System Flag	Reserved	6
06h	Port 0 Option 0		1
07h	Port 0 Option 1		1
08h	Door Number of Port 0		1
09h	Reader Type	Don't change	1
0Ah	Port 0 Option 3		1
0Bh	Controller Operation Mode	Must be 4, 6, or 8	1
0C～0Dh	Mode 6 Access Password		2
0E～11h	Master Password		4
12～13h	Port 0 Door Relay Time	Base on 10ms	2
14～15h	Alarm Relay Time	Base on 10ms	2
16h	Port 0 Option 2		1
17h	Port 0 Option 4		1
18～19h	Port 1 Door Close Delay Time	Base on 10ms	2
1A～1Bh	Alarm Delay Time	Base on 10ms	2
1C～1Dh	Port 0 Door Close Delay Time	Base on 10ms	2
1E～1Fh	Arming Password		2
26 ~ 27h	Start time of Open Zone Set 1	Base on Minute: 01:20 = 0050h	
28 ~ 29h	Stop time of Open Zone Set 1	"	
2A ~ 2Bh	Start time of Open Zone Set 2	"	
2C ~ 2Dh	Stop time of Open Zone Set 2	"	
2Eh	Weekly table bit of Open Zone1	Available on weekday table	
2Fh	Weekly table bit of Open Zone2	Bit1 for Sun, bit7 for Sat	
…			
36H	Door Number of Port 1		
37H	Port 1 Option 0		
38H	Port 1 Option 1		
39H	Port 1 Option 2		
3AH	Port 1 Option 3		
3BH	Port 1 Option 4		
3C~3DH	Port 1 Door Relay Time		

Address	Function		bytes
0000h~00FFh	System Parameters		256
0100h～30FFh	UID of User 0 to 3071	Each UID has 32bits	12288
3100h～48FFh	PIN of User 0 to 5119	Each PIN has 16bits	6144
4900h～60FFh	Access Mode and Zone		6144
6100h～627Fh	Enable flag of Anti-pass-back		384
6280h～63FFh	Initial flag of Anti-pass-back		384
6400h～657Fh	Current State flag of Anti-pass-back		384
6580h～65FFh	Reserved		
6600h～6DFFh	Time ZONE DB from 0 to 63		384
6E00h～6EF0h	Holiday table		240
	reserved		16
6F00h ~ 9EFFh	Lift stop information 6F00h bit0: Floor0, bit7: Floor7 6F01h bit0: Floor8, bit7:Floor15 …	* For 3072 users mode only	12288
9F00h ~ F9FFh	Message information (1568)		25088
FA00h ~ FBFFh	Reserved		

	Option 0	
B7	Enabling Anti-pass-back	
B6	0 : Exit Door 1 : Entry Door	
B5	1 : Master Reader	
B4	1 : Enabling RTE button (Request to Exit)	
B3	0 (Fixed)	
B2	1/0: En/Disable Auto-open Time zone under AR716E	
B1	Auto Locking when Door Closed	
B0	Time & Attendance 0 : Enabled 1 : Disabled	

	Option 1	
B7	Enable Force Open Alarm	
B6	Skip PIN Check for Card and PIN Access Mode	
B5		
B4		
B3		
B2		
B1		
B0		

	Option 2	
B7	Enable Bell Function(#)	
B6	Enable Close Door /Egress Will Stop Alarm	
B5	Global Free Cards	
B4/3		
B2		
B1		
B0	Enable Door relay will active at open time zone, don't wait card flash	