KT-22X0

RS-232-C
INTERFACE READER

ESYSCO AG
w w w . e s y s c o . c o m

ESYSCO AG
Sennweidstrasse 45
CH-6312 Steinhausen

Tel. +41 41 7401330
Fax +41 41 7401335
i n f o @ e s y s c o . c h

APPROVAL		

RESP. DEPT.	R & D		ORIGINATOR	LEE SANG YOUNG		
APPROVAL & CONFIRMATUON	DEPT.	Int'l Sales				
	APPROVED BY					
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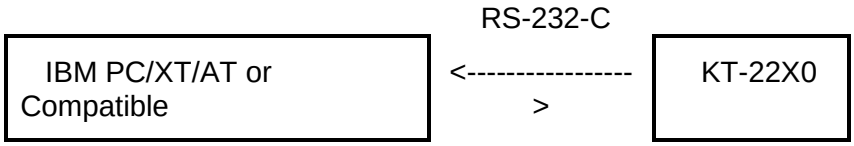
CONTECTS

1. OVERVIEW

KT-22X0 series is a compact-sized swipe type card reader with RS-232-C interface that requires no power supply.

MODEL	TRACK
KT-2210	Track 1
KT-2220	Track 2
KT-2230	Track 3
KT-2250	Track 1 / Track 2
KT-2260	Track 2 / Track 3
KT-2280	Track 1 / Track 2 / Track 3

2. SYSTEM BLOCK DIAGRAM



3. SPECIFICATIONS

3.1. Card Standards

CARD STANDARD	ISO-7811		
READING METHOD	F2F(FM)		
TRACK USED	TRACK1	TRACK2	TRACK3
	ISO I (IATA)	ISO II (ABA)	ISO III (MINTS)
READING DENSITY	210 BPI	75 BPI	210 BPI
READING CAPACITY	79 CHARACTERS (7-BIT CODE)	40 CHARACTERS (5-BIT CODE)	107 CHARACTERS (5-BIT CODE)
CARD THICKNESS	PLASTIC : 0.76 ± 0.08mm		

3.2. Environmental Requirements

3.2.1. Ambient Temperature

- Storage : -20℃ ~ 70℃
- Operating : 0℃ ~ 50℃

3.2.2. Ambient Relative Humidity

- Storage : 0 ~ 95 % RH
- Operating : 20 ~ 90 % RH (No Condensation)

3.2.3. Vibration : Amplitude 2 mm within 2G or less, 10 to 55 Hz in X, Y, Z directions for 30 min.

3.2.4. Shock : 30 G, 11 ms

3.3. Physical Characteristics

3.3.1. Dimensions : 38 mm(W) X 135 mm(D) X 45.7 mm(H)

3.3.2. Weight : 160 g

3.3.3. Power Supply : Not required. (Supplied through the RS-232-C communication line)

3.3.4. Operating Locus : Indoor only

3.4. Operational Characteristics
3.4.1. Card Feeding Speed : 20 to 120 cm/sec
3.4.2. Head Life Time : min. 500,000 passes
3.5. Jitter Card : Less than 18 %

4. INTERFACE REQUIREMENTS

4.1. RS-232-C Interface

RS-232-C Signal Name	Host PC 9 Pin	KT-22X0 9 Pin	Signal Direction	
			Host PC	KT-22X0
TXD	3	2	>>>>>	
RXD	2	3	<<<<<	
RTS	7	7	>>>>>	
SG	5	5		
DTR	4	4	>>>>>	

- 9 Pin female D-sub connector : KT-22X0
- Transmission Distance : Max. 1.5 m

4.2. DIP Switch Settings

4.2.1. Baud Rates

SW2	SW1	Baud Rate
On	On	9600
Off	On	4800
On	Off	2400
Off	Off	1200

- Default : 9600 Baud Rate

4.2.2. Parity Settings

SW4	SW3	Parity
On	Off	Odd Parity
Off	Off	Even Parity
On	On	No Parity
Off	On	No Parity

- Default : Even Parity

4.2.3. Data Length Settings

SW5	Data Bits
On	8 Bits
Off	7 Bits

- Default : 7 Bits

4.2.4. Model Settings

SW8	SW7	SW6	Model
On	On	Off	KT-2210
On	Off	On	KT-2220
On	Off	Off	KT-2230
Off	On	Off	KT-2250
Off	Off	On	KT-2260
Off	Off	Off	KT-2280

- These settings should not be changed by the user

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Sennweidstrasse 45
CH-6312 Steinhausen
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info@esysco.ch

5. COMMUNICATIONS

5.1. Specifications

5.1.1. Transmission Type : Asynchronous, Half duplex
5.1.2. Interface : EIA RS-232-C
5.1.3. Baud rate : 1200, 2400, 4800, and 9600
5.1.4. Data length : 7 bits or 8 bits
5.1.5. Parity : None, Even, and Odd
5.1.6. Stop Bit : 2 bits

5.2. Mode Control

The reader operates in two basic modes, READY MODE and HOST CONTROLLED MODE.
Upon applying power to the reader, LEDs are lit for 250m secs, and buzzer beeps for 250m secs.

5.2.1. READY MODE

When power is first applied, the reader defaults to this mode, in which it arms itself to read. When a card is swiped readers send the data (no start / end sentinel or LRC) preceded by a track identifier and followed by CR. No data is sent to the host when an error block track is found. The Card Reader transmit the lower track first, which is Track I , Track Ⅱ, Track Ⅲ .

Single Track Reader

Result	Buzzer (msec)	Green LED (msec)	Red LED (msec)
Good	250	250	
Error	ERROR BEEP		800

Dual or Triple Track Reader

Result	Buzzer (msec)	Green LED (msec)	Red LED (msec)
T1 OR T2 OR T3 Good	250	250	
ALL Track error	ERROR BEEP		800

* ERROR BEEP : On Off On Off On
200 100 200 100 200 (msec)

After terminating the transmission and the LED and buzzer indications, the reader rearms itself to read.
Track identifiers are as follows.

Track I : " % " (25h)
Track Ⅱ : " ? " (3Fh)
Track Ⅲ : " ^ " (5Eh)

5.2.2. HOST CONTROLLED MODE

Upon receiving the Clear and Initialize command (C), the reader goes to this mode, where all actions are controlled by the host commands.

Command and response format : <STX> command (response) <ETX><BCC>

Commands and responses:

Code	Definition	Direction
A (41h)	Arm to read (but do not transmit status report)	<---- host
B (42h)	Arm to read and send status report after swipe (good or bad swipe)	<---- host
C (43h)	Clear and Initialize	<---- host
D (44h)	Turn buzzer on for 250 msec	<---- host
E (45h)	Turn buzzer on for 200 msec 3times	<---- host
F (46h)	Turn green LED on for 250 msec	<---- host
G (47h)	Turn red LED on for 800 msec	<---- host
H (48h)	Turn green LED and buzzer on for 250msec	<---- host
I (49h)	Turn Red LED and buzzer on for 800msec	<---- host
J (4Ah)	Transmit Track I data	<---- host
K (4Bh)	Transmit Track Ⅱ data	<---- host
L (4Ch)	Transmit Track Ⅲ data	<---- host
M (4Dh)	Status request	<---- host
N (4Eh)	Return to READY MODE	<---- host
' (60h)	Status report befor swipe	----> host
a (61h)	Status report - data for track 1	----> host
b (62h)	Status report - data for track 2	----> host
c (63h)	Status report - data for track 1&2	----> host
d (64h)	Status report - data for track 3	----> host
e (65h)	Status report - data for track 1&3	----> host
f (66h)	Status report - data for track 2&3	----> host
g (67h)	Status report - data for track 1&2&3	----> host
* (2Ah)	Error message (No start sentinel / No end sentinel / Parity error / LRC error)	----> host
STX (02h)	Start of text	<---> host
ETX (03h)	End of text	<---> host
EOT (04h)	End of transmission	<---> host
ACK (06h)	Acknowledgment	<---> host
NAK (15h)	Negative ACK	<---> host

* Status reports

0	1	1	0	0	B2	B1	B0

MSB LSB

B2	B1	B0	Descriptions	Command
0	0	1	Data for Track Ⅰ	a
0	1	0	Data for Track Ⅱ	b
0	1	1	Data for Track Ⅰ & Ⅱ	c
1	0	0	Data for Track Ⅲ	d
1	0	1	Data for Track Ⅰ & Ⅲ	e
1	1	0	Data for Track Ⅱ & Ⅲ	f
1	1	1	Data for Track Ⅰ & Ⅱ & Ⅲ	g

* BCC does not include STX and calculated by EXCLUSIVE OR in BCC range.

STX	CARD DATA	ETX	BCC	CR

<----------
->
Range of BCC

6. TRANSMISSION PROTOCOL

6.1. Ready Mode

6.1.1. Track I,II,III Good All

Host | KT-22X0

<STX>N<ETX><BCC> ---------->
<---------- <STX><EOT><ETX><BCC>
(READY MODE)
(Card Swipe)
<---------- "%" + Data + <CR>
<---------- "?" + Data + <CR>
<---------- "^" + Data + <CR>
(Control LED and Buzzer)

6.1.2. Track I Error, Track II Good, Track III Good

Host | KT-22X0

(Card Swipe)

<---------- "?" + Data + <CR>
<---------- "^" + Data + <CR>
(Control LED and Buzzer)

ESYSCO AG
Sennweidstrasse 45
CH-6312 Steinhausen
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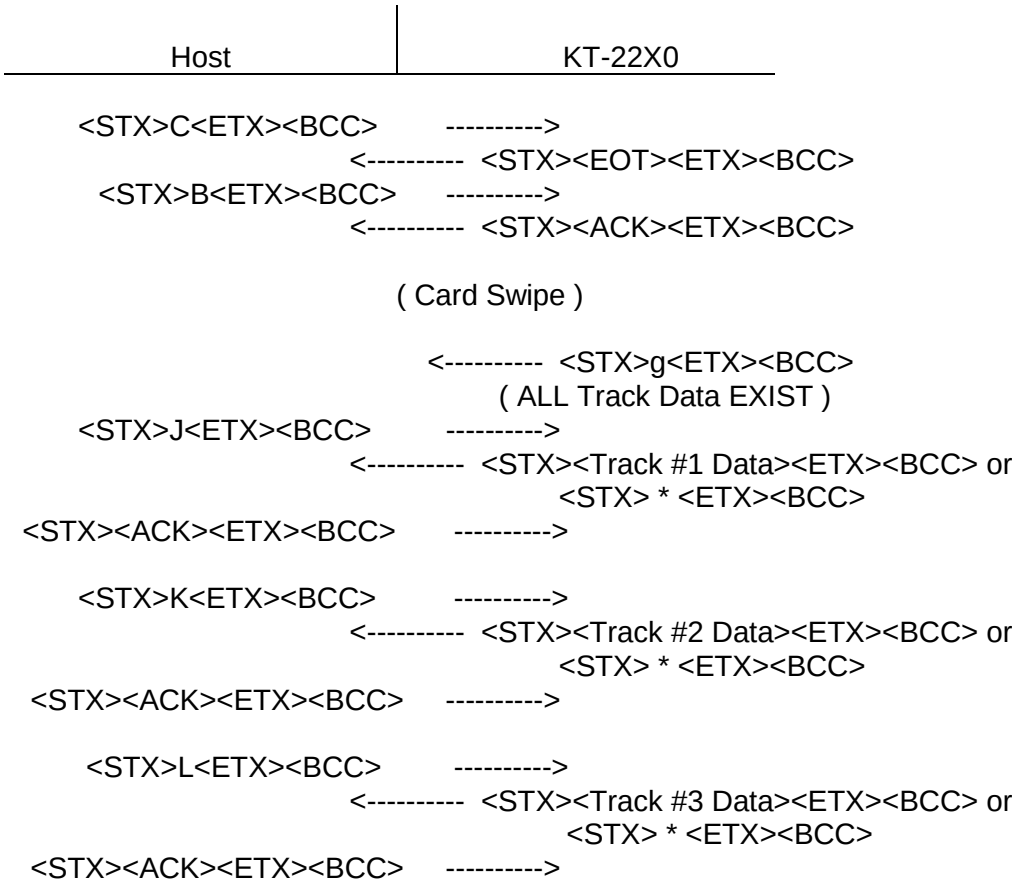
Fax +41 41 7401335
info@esysco.ch

6.2. Host Controlled Mode

6.2.1. Read and Send Status Report



6.2.2. Arm to Read (Do not transmit status report)

Host	KT-22X0
<STX>A<ETX><BCC> ---------->	
	<---------- <STX><ACK><ETX><BCC>
	(Card Swipe)
<STX>M<ETX><BCC> ---------->	
	<---------- <STX>g<ETX><BCC>
<STX>J<ETX><BCC> ---------->	
	<---------- <STX><Track #1 Data><ETX><BCC> or <STX> * <ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	
<STX>K<ETX><BCC> ---------->	
	<---------- <STX><Track #2 Data><ETX><BCC> or <STX> * <ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	
<STX>L<ETX><BCC> ---------->	
	<---------- <STX> <Track #3 Data><ETX><BCC> or <STX> * <ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	

6.3. Control LED and BUZZER

Host	KT-22X0
<STX>D<ETX><BCC> or <STX>E<ETX><BCC> ---------->	
	<---------- <STX><EOT><ETX><BCC>
	(Turn buzzer on for 250 or 200msec 3 times)
<STX>F<ETX><BCC> or <STX>G<ETX><BCC> ---------->	
	<---------- <STX><EOT><ETX><BCC>
	(Turn green/red LED on for 250 or 800msec)

6.4. Return to READY Mode

Host	KT-22X0
	(Host Controlled Mode)
<STX>N<ETX><BCC> ---------->	
	<---------- <STX><EOT><ETX><BCC>
	(Ready Mode)

6.5. Status Report

Host	KT-22X0
<STX>A<ETX><BCC> ---------->	
	<---------- <STX><ACK><ETX><BCC>
<STX>M<ETX><BCC> ---------->	
	<---------- <STX>'<ETX><BCC>
	(Card Swipe)
<STX>M<ETX><BCC> ---------->	
	<---------- <STX>c<ETX><BCC> or
	(Track I,II)
	<STX>f<ETX><BCC> or
	(Track II,III)
	<STX>e<ETX><BCC> or
	(Track I,III)
	<STX>g<ETX><BCC>
	(Track I,II,III)
<STX>J<ETX><BCC> ---------->	
	<---------- <STX><Track #1 Data><ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	
<STX>M<ETX><BCC> ---------->	
	<---------- <STX>f<ETX><BCC>
<STX>K<ETX><BCC> ---------->	
	<---------- <STX><Track #2 Data><ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	
<STX>M<ETX><BCC> ---------->	
	<---------- <STX>d<ETX><BCC>
<STX>L<ETX><BCC> ---------->	
	<---------- <STX><Track #3 Data><ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	

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6.6. Host Controlled,Cancel

Host	KT-22X0
<STX>B<ETX><BCC>	---------->
	<---------- <STX><ACK><ETX><BCC>
<STX>C<ETX><BCC>	---------->
	<---------- <STX><EOT><ETX><BCC>
	(Cancel Read Mode)

6.7. Invalid Command

6.7.1. General

Host	KT-22X0
<STX>INVALID DATA<ETX><BCC>	---------->
	<---------- <STX><NAK><ETX><BCC>

6.7.2. Invalid BCC

Host	KT-22X0
<STX>B<ETX><INVALID BCC>	---------->
	<---------- <STX><NAK><ETX><BCC>

6.7.3. Ready Mode, Not Execute Command

Host	KT-22X0
<STX>N<ETX><BCC>	---------->
	<---------- <STX><EOT><ETX><BCC>
	(Ready Mode)
<STX>M<ETX><BCC>	---------->
	<---------- <STX><NAK><ETX><BCC>
<STX>D<ETX><BCC>	---------->
	<---------- <STX><NAK><ETX><BCC>
<STX>F<ETX><BCC><CR>	---------->
	<---------- <STX><NAK><ETX><BCC>

6.7.4. Read Track I,II,Host Controlled Mode, Invalid Order Command

Host	KT-22X0
<STX>B<ETX><BCC> ---------->	
	<---------- <STX><ACK><ETX><BCC>
	(Card Swipe)
	<---------- <STX>c<ETX><BCC>
<STX>K<ETX><BCC> ---------->	
	<---------- <STX><NAK><ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	
<STX>J<ETX><BCC> ---------->	
	<---------- <STX><NAK><ETX><BCC>
<STX><ACK><ETX><BCC> ---------->	

- NOTE ON HOST CONTROL MODE
  1. When clear commnd "C" (43h), is sent to cancle command "B" (42h) after a card is swiped, it takes readers about 0.5 sec, to respond to clear command.
  2. The lower Track, data should always be transmitted first, when a reader has data for both Tracks in it's buffer.
  3. The data in the reader's buffer will be damaged if the reader receives <ACK> or <NAK> before the lower Track data are transmitted.
  4. A reader will respond with <NAK>, if the next byte of a command or response is not received within 1 second after <STX>.

7. DIMENSIONS.