



COM 364U UNIVERSAL INTERFACE

Revision number: 02.20

Please, advise us of any errors or omissions in this manual to enable us to improve our service to you.

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1. UNIVERSAL INTERFACE

The Softcon universal interface is used in a variety of applications, generally converting data from one card reader format to another, e.g. from serial to data/clock, from data/clock to Wiegand. The interface is also used in small installations as a batch reader, opening a latch (via the on-board relay) when cards match a certain criteria, e.g. the site and client code are correct, or ISO MAG cards with 10 characters are read. When data is output (as Wiegand or MAG, it is referred to as 'write' in this document).

The functions of the interface depend on the firmware (FW) loaded in the on-board processor (software in the device) and typically read data from a reader - **Barcode**, **MAG**, **Wiegand** or Dallas **Touch**, and converting it to an alternative format or serial string.

FW versions before version 2.00 were separate for each of the card type read, i.e. different versions for Barcode, MAG, Wiegand and Dallas Touch. These functions were described in the document SCS_COM364 (version 1.31 the last). No further development is done on these versions. All new development is on version 2 or later which contain all functions in one version and in thus the true universal interface. This document SCS_COM364U.booklet.doc describes the functions and setting.

Certain functions available in versions prior to version 2 are currently not available in version 2 and will be added as required. See the document SCS_COM364.booklet.doc for options available in prior versions.

Due to memory restrictions within the processor used, all types of data read and write do not fit in to one version, hence there are currently four version available, namely MAG read / MAG out; MAG read / Wiegand write; and Wiegand read / Wiegand write; Wiegand read / MAG write. All functions except the data type read and write are contained in all, i.e. the MAG read version does not read Wiegand and the Wiegand read version does not read MAG, similarly for write.

Card number read is stored in the **data read string** from location 1 to 12 (with leading zeros), to be used for serial and Wiegand or MAG write. Card data read that has a client or site code calculate a facility code (client code read * 256 + site code read), ISO reads facility from facility start to end. The largest value for facility is 65 535. For write, SD_N_Start must be > SD_N_End > 0.

NOTE THAT ALL FUNCTIONS AND COMBINATIONS HAVE NOT BEEN TESTED, SHOULD A SETTING NOT FUNCTION AS EXPECTED, EMAIL THE .BIN FILE TO SOFTCON WITH A DESCRIPTION OF THE PROBLEM.

1.1. BARCODE

These functions are to be added as required.

1.2. MAG (requires MAG version for read, and write)

All MAG card read functions available in earlier versions of COM364 have been incorporated in version 2, namely the reading of ISO MAG and the Softcon MAG formats – see read data. MAG ISO write (send) functions are available.

1.3. WIEGAND (requires Wiegand version for read, and write)

All Wiegand read and write functions are available. Note that due to memory restrictions, all types are not shipped. \$ indicates the types not included as standard. Contact Softcon to provided any other. New formats can be added on request.

Bits	Type	Structure	Supplier
44	2	8 bit client, 32 bit card, 4 bit parity.	Impro.
44	4	8 bit client, 32 bit card, 4 bit parity.	Omniscan
40	2	8 bit client, 8 site, 16 bit card, 4 bit issue (part of card), 4 bit checksum (ignored).	
37	2	1 bit parity (ignored), 8 bit client, 4 bit site, 23 bit card, 1 bit parity (ignored).	
36	2	2 bit parity (ignored), 8 bit client, 4 bit site, 21 bit card, 1 bit parity (ignored).	Chubb/GuardAll Corporate 1000.
36 \$	4	Parity, 8 bit client, 8 bit site, 18 bit card, 1 bit parity.	Lenel.
35	2	2 bit parity, 8 bit client, 4 bit site, 20 bit card, 1 bit parity.	HID new Corporate 1000.
34	2	Parity, 8 bit client, 4 bit site, 20 bit card, 1 bit parity.	
34 \$	4	0, 8 bit client, 19 bit card, 4 bit even parity, 11.	Dutch.
34	20	Parity, 32 bit card, 1 bit parity.	GSC.
32	2	Parity, 8 bit client, 4 bit site, 18 bit card, 1 bit parity.	
32 \$	4	Parity, 8 bit client, 22 bit card, 1 bit parity.	Old HID Corporate 1000 **.
32 \$	6	Parity, 8 bit client, 5 bit site, 17 bit card, 1 bit parity.	Aritech
32	20	32 bit BCD card. (Type 20). Must be dB 10.	
30	2	Parity, 8 bit client, 4 bit site, 16 bit card, 1 bit parity (parity half set, see below).	
30 \$	4	Parity, 8 bit client, 4 bit site, 16 bit card, 1 bit parity (parity on full card).	
27 \$	2	8 bit client, 16 bit card, 3 bit parity (ignored).	Indala
26	2	Parity, 8 bit client, 16 bit card, 1 bit parity.	

Parity / checksums ignored where calculation is unknown (can be added).

For 30 bit type 2 cards, the bit location where the parity changes (generally at bit 15, i.e. bits 0 to 14 are even, 15 to 29 are odd) is set in EPROM at RD_30BIT (see ROM table below). Certain manufactures calculate the change from bit 14 or from 16. The byte at 01FCAH can be changed to match the manufacturer accordingly. Setting the byte to 0, ignores parity for 30 bit type 2, allowing the use of cards that differ on where parity is calculated. Note that data must be received in the correct order, i.e. the controller will not flip the data around if received the other way around (card swiped the other way).

Parity checking for any format can be disabled via the RD_PARITY setting. Not checking parity could allow misreads to pass as correct (only facility code must be correct, card number could be wrong).

Omniscan cards are 44 bit and on reading hex 6x xx xx xx, changed to 04 6x xx xx xx; 7x xx xx xx changed to 30 7x xx xx xx. Selection of Omniscan is type 4.

***WIEGAND_WRITE_DATA** set in EPROM (see ROM table below) defines the bit format of the Wiegand write generated:

```
e even parity
C Start of client code
c Client code continued
S Start of site code
s Site code continued
N Start of card number
n Card number continued
o odd parity
0 Unused (zero)
0 Unused
```

for example:

```
30 bit 'eCccccccSsssNnnnnnnnnnnnnno0000000000'
26 bit 'eCccccccNnnnnnnnnnnnnno000000000000'
```

****WIEGAND_WRITE_PARITY** defines the bits tested for parity of the Wiegand write generated (see ROM table below):

```
e even parity
o odd parity
0 Unused (zero)
```

for example:

```
30 bit '0eeeeeeeeeeeeeeeeoooooooooooo0000000000'
26 bit '0eeeeeeeeeeeeeeeeoooooooooooo000000000000'
```

Client=Facility/256 and Site=Facility mod 256. Due to memory restrictions, Client maximum is 256, site 15.

Wiegand pulse length is defined by a byte at location 1FE9H and pulse space by a byte at location 1FEAH. The length value set to 1 is 22 usec, with increments of approximately 3.2 usec and the default is 10 for 51 usec. The space value of 1 is 0.23 usec, with increments of approximately 0.22 usec and the default is 20 for 2,3 msec.

1.4. DALLAS TOUCH

These functions are to be added as required.

2. ROM SETTINGS

Data set in the EEPROM (the program memory within the micro-processor) selects the modes of operation. These settings are changed by removing the micro-processor and changing the setting using a programmer. The settings are at fixed memory locations listed below. The current setting in the memory can be viewed via a terminal (e.g. a PC running HyperTerminal) on selection of ? and display typically as below (all values are in HEX, facilities also shown in decimal). Note that selection of ? sets the serial sting in the test mode, resulting in the display of the data received from the reader in raw format and after formatting. The test mode is cancelled on power-up or by selecting the Esc key on the terminal. Selection of space while in the test mode, the display moves up by two lines.

TERMINAL DISPLAY

UR V03.00		program version			
SW1___=F0	SW2___=01	Smode_=0F	Baud___=FF	Parity=0F	Xtal___=00
CLS___=FF	Led___=00	Latch_=01	PB____=00	PB_ena=00	RD_ena=00
RDtype=0E	RD_FSt=01	RD_FEn=03	RD_NSt=1E	RD_NEn=25	RDparity=00
RD_min=FF	MinQty=00	RD_max=FF	MaxQty=00	RD_30_BIT=0F	RD_Fac_=00
RDFacs=0000	0000 0000	0000 0000			
0000	0000 0000	0000 0000			
SDtype=02	SD_FSt=00	SD_FEn=00	SD_NSt=05	SD_NEn=08	SD_cc_=FF
SDclien=00	SD_sc_=00	SDsite=00	SD_Pulse=0A	SDspace=14	SD_cn_=01
SDcard=14					
E3 03 30 E1 0A 30 F2 2C FF FF FF FF FF FF 0D			serial form		
eCccccccNnnnnnnnnnnnnno00000000000000			Wiegand write format		
0eeeeeeeeeeeeeeeeo0000000000000000			Wiegand write parity		

ROM SETTINGS

NAME	SIZE	ADDRESS	DEFAULT	DESCRIPTION / OPTIONS
* WIEGAND_WRITE_DATA	40	1F50H	30bit	30 bit data, caps is Start of client, Site, Number
** WIEGAND_WRITE_PARITY	40	1F78H	30bit	30 bit parity
*** SERIAL_FORM	16	1FA0H		Serial output string format
SERIAL_MODE	1	1FB0H	0FH	Serial mode MS bit=0 Control of outputs from serial commands (see #control) 0x serial output 1x serial input 2x Matra mode xF DIP settings <u>DIP EQUIVALENT</u> x0 ;05xxxxx01?0 DIP 1-7 on x1 ends o or e >=09 digit DIP cc 0, sc F x2 <=10 digit DIP cc 0, sc E x3 >=16 digit, Bank (40-60) DIP cc 0, sc D x4 all DIP cc 0, sc C x5 data in debug mode: ASCII-HEX space CRLF "cc_xxx sc_xxx fc_xxxxx cn_xxxxx" CRLF x6 Send ROM (Dallas Touch) x7 Send PROM (Dallas Touch)
SERIAL_BAUD_RATE	1	1FB1H	FFH	Baud rate FF use DIP switch settings 03 9k6 02 4k8 01 2k4 00 1k2
SERIAL_PARITY	1	1FB2H	0FH	Serial parity xF use DIP switch settings x0 none x1 odd x2 even x3 hi x4 lo 0x Check 1x Ignore
XTAL	1	1FB3H	0	Xtal 0=11M, 1=22M
CLS_OUT	1	1FB6H	FFH	Card output active (CLS) P1-7 (same port as RED led out) FF none x0 Terminal lo x1 Terminal hi
LED_OUT_CONTROL	1	1FB7H	00H	LED control FF none x0 3-LED(Red fail,Green OK,Yellow=ready) x1 2-LED(Red fail,Green OK,Yellow(Red,green=ready) 0x Yellow steady 1x Yellow flash
LATCH_SEC	1	1FB8H	01	Latch seconds (FF not activate)

NAME	SIZE	ADDRESS	DEFAULT	DESCRIPTION / OPTIONS
PUSH BUTTON	1	1FB9H	00	Push button FF ignored x0 active when terminal lo x=0 not send simulate x1 active when terminal hi x=1 send simulate
PUSH_BUTTON_ENA	1	1FBAH	00	Push button enable on input FF ignored x0 enabled when terminal hi x1 enabled when terminal lo
RD_ENA	1	1FBBH	00	Reader enable on input FF ignored x0 enabled when input hi x1 enabled when input lo
RD_TYPE	1	1FC0H	14	Read CARD type FF MAG, use DIP switch settings 2, 4, 6, 20 Wiegand (see Wiegand table above) 08 Softcon MAG 14 ISO MAG
RD_FACILITY_START	1	1FC1H	03	Read Facility code start
RD_FACILITY_END	1	1FC2H	03	Read Facility code end
RD_NUMBER_START	1	1FC3H	13	Read Card number start
RD_NUMBER_END	1	1FC4H	17	Read Card number end
RD_PARITY	1	1FC5H	0	000FFH=Not Verify LRC sum or check-bits (ISO chars always checked)
RD_DIGITS_MINIMUM	1	1FC6H	01	Read Minimum digits 0FFH don't care 00 exactly 01 at least
RD_MINIMUM_QTY	1	1FC7H	04	Read Minimum number (for minimum 01 or 02)
RD_MAXIMUM	1	1FC8H	00	Read Maximum digits 0FFH don't care 00 exactly 01 at least
RD_MAXIMUM_QTY	1	1FC9H	00	Read Maximum number (for maximum 01 or 02)
RD_30BIT	1	1FCAH	15	Parity split for 30 bit Wiegand cards read (Oniscan=0)
RD_FAC	1	1FCBH	FFH	Read Client code detection FF use DIP switch settings 00 ignore 01 must match any facilities (client*256 + site) 02 must match range (client to site setting) 03 must DIP (client*256 + site)
**** RD_FACILITIES	8W	1FCCH	00	Read any of 8 Facility Codes if detection is 01 Read range Facility code 1 (1FCCH) to 2 (1FCEH) if detection is 02
SD_CN	1	1FDDH	01	Send Card Number FF use DIP switch setting (SW2 is 1s byte, SW1 1-4 is bits 8-11) 00 none (sent as zero) 01 use read 02 use fixed (SD_CARD)
SD_CARD	1W	1FDEH	0000	Send Card number fixed value (two bytes)
SD_TYPE	1	1FE0H	02	Send Card type (P4) FF None 00 ISO no LRC 01 ISO with LRC 02 Wiegand - format below 03 Dallas
\$ SD_FACILITY_START	1	1FE1H	01	Send Facility code start (note #1)
\$ SD_FACILITY_END	1	1FE2H	05	Send Facility code end
SD_NUMBER_START	1	1FE3H	06	Send Card number start
SD_NUMBER_END	1	1FE4H	12	Send Card number end
SD_CLIENT_CODE	1	1FE5H	01	Send Card client code FF use DIP switch setting 00 none 01 use read 02 use fixed
SD_CLIENT	1	1FE6H	00	Send Card client code fixed value
SD_SITE_CODE	1	1FE7H	01	Send Card site code FF use DIP switch setting 00 none 01 use read 02 use fixed
SD_SITE	1	1FE8H	00	Send Card site code fixed value
SD_WIEG_PULSE	1	1FE9H	10	1=22 usec, increments approximately 3.2 usec 10=51 usec
SD_WIEG_SPACE	1	1FEAH	20	1=0.23 usec, increments approximately 0.22 usec. 20= 2.3 msec

*** **SERIAL_FORMAT** Serial data output string format (on the RS232 port):

Reserved characters:

F0 start char follows

F1 end char follows

F2 separator (space) follows

E0 card number ls character 1st, followed by number of characters, followed by stuffing character (FF is no stuffing)

E1 card number ms character 1st, followed by number of characters, followed by stuffing character (FF is no stuffing)

E2 facility number ls character 1st, followed by number of characters, followed by stuffing character (FF is no stuffing)

E3 facility number ms character 1st, followed by number of characters, followed by stuffing character (FF is no stuffing)

Default 0F1H,00DH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH,0FFH

******SERIAL_BAUD_11/22M** Serial baud rate conversions when using 11M or 22M crystal (9k6=0E8H for 11M, 0D0H for 22M). These should not be changed.

*******FACILITIES** Up to 8 facility codes (client*256 + site) can be set for matching facility code read and is two bytes (word) with the most significant byte of the word first (the client code) – unused are set to 0000. E.g. facility codes 5471 and 9035 are 155F HEX and 234B HEX and set as: 1FCCH=15H, 1FCDH=5FH, 1FCEH=23H, 1FCFH=4BH. Note: use Windows calculator and set scientific mode, enter 5471 and select HEX to see 155F.

\$ SD Facility: When either SD Client or SD Site are set to 01 (i.e. send what was read), the Client and/or site code to send is calculated as client = X / 256 and site as X MOD 256. When SD_FACILITY_START=0 or SD_FACILITY_START < SD_FACILITY_END, X is the facility code read (Client Code read * 256 + Site Code read), else (possibly only used when data read is ISO MAG). X is calculated from the digits of facility (1 to 5) in the from location SD_FACILITY_START to SD_FACILITY_END.

#CONTROL of outputs via the serial link is enabled when the MSB of the SERIAL_MODE option is zero. The control data consists of 5 ASCII characters:

Byte 1: 0 (4FH), indicating output.

Byte 2: 0 (30H), indicating port 0 at P3-4 (Relay), 1 at P4-2 (Data out) and 2 at P4-3 (Clock out).

Byte 3: 1 (31H) for on, or 0 (30H) for off.

Byte 4: On pulse length, 0 (30H) upwards. 30H is deducted from this value; the remainder is the pulse length in seconds (e.g. sending A results in 41H-30H=11H, thus 17 seconds). If byte 4 is 0, the relay remains on. Byte 4 has no effect if byte 3 is 0.

Byte 5: CR (0DH).

MAG to MAG example: Read credit card and send characters 9 to 16 out on MAG and on serial

RD_TYPE_BIT	1	1FC0H	0EH	14 ISO MAG
RD_NUMBER_START	1	1FC3H	09H	Read Card number start=9
RD_NUMBER_END	1	1FC4H	10H	Read Card number end=16
RD_LRC_CHECK	1	1FC5H	00H	Verify sum(ISO chars checked, LRC here)
RD_FAC	1	1FCBH	00H	00 ignore
SD_BIT	1	1FE0H	01H	01 ISO with LRC
SD_NUMBER_START	1	1FE3H	01H	Send Card number start
SD_NUMBER_END	1	1FE4H	08H	Send Card number end
SD_CLIENT_CODE	1	1FE5H	00H	00 none
SD_SITE_CODE	1	1FE7H	00H	00 none

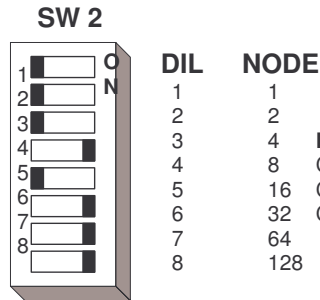
SERIAL_FORMAT Serial output string format: 0E1H,08H,30H,0F1H,00DH,0FFH,0FFH.....

3. DIP-SWITCH SETTINGS

Note that certain HW versions are manufactured without DIP switched installed.

DIP switch settings are used when enabled by the corresponding ROM settings, i.e. the setting is either fixed in ROM or set that the DIP selection is used (see ROM settings above). The baud and parity is with SW1 5 to 8. The mode is set with SW1-8 and the client and site code with SW2 and SW1 (1 to 4) respectively:

- | | | | |
|----------------------|---------------------|---|---|
| SW 1 (1 to 4) | Site code. | On = 0, off = 1. | SW1-1 is LSB (e.g. 1 and 3 off = site 5). |
| SW 1-5, 1-6 | Baud rate. | 9600 = off, off | 4800 = on, off 2400 = off, on 1200 = on, on |
| SW 1-7 | Parity. | No parity = off | Even parity = on |
| SW 1-8 | Mode. | Normal = off | Special start characters = on. |
| | | | Data is ;05xxxx01?0 where xxxxx is card number. |
| SW 2 (1 to 8) | Client code. | On = 0, off = 1. SW1-1 is LSB (e.g. 5 on = client 239). | |



PLEASE NOTE: For dipswitch settings. ON = 0 and OFF = 1

Examples
 Client Code 23 = 1,2,3,5 off
 Client Code 55 = 1,2,3,5,6 off
 Client Code 64 = 7 off

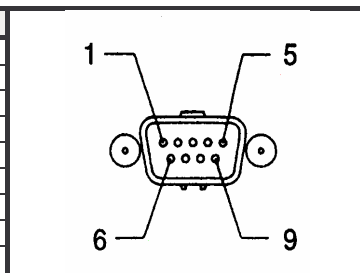
SWITCH	8	7	6	5	4	3	2	1
VALUE	128	64	32	16	8	4	2	1
E.g.								
53	0	0	1	1	0	1	0	1
82	0	1	0	1	0	0	1	0

If client=255 (SW 2 all off) and site=15 (SW 1, 1 to 4 off), client and site is ignored and data string contains the client and site code and card number. Client=0 (SW 2 all on) and site=0 (SW 1, 1 to 4 on), client and site is ignored and data string contains 5 digits card number. Any other client and site code settings are checked and the data is only sent if the client and site codes of the cards are correct – data is 5 characters card number. When parity errors are read from the reader or the client or site are incorrect (except site/client set to 0 or 255/15), the red LED is displayed, else green is displayed and the latch is opened.

4. CONNECTIONS

P1 (reader in)		P3		P4 (reader out)	
1	Reader supply	1	+12V	1	Supply +12V
2	Data / Low bits / Barcode	2	Ground	2	Data out (Low bits)
3	Clock / High bits / Touch	3	Latch (relay)	3	Clock out (High bits)
4	Reader ground	4	Latch (relay)	4	Ground
5	Green LED	5	Reader enable input (= P4-6)	5	Yellow LED input (= P3-6)
6	Yellow LED	6	Push button input (= P4-5)	6	Green LED input (= P3-5)
7	Red LED (cls out)			7	Red LED input

P2 (db9 female)	
1	RS 422 RX / RS485
2	RS 232 RX
3	RS 232 TX
4	+5V
5	Ground
6	RS 422 /RX
7	RS 232 RTS
8	RS 422 TX
9	RS 422 /TX

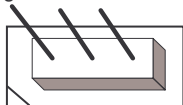


Note that cable to PC is male to female cross-over (not 1 to 1)

5. LINK FIELDS

PLEASE NOTE: Pin no 1 is indicated by a diagonal line in the bottom left-hand corner on the PC board.

E.g.



E1 – Comms. Mode
1 - 2 : RS 232
2 - 3 : RS 485

E2 – Reader Supply
1 - 2 : +5V
2 - 3 : +12V

E3 – Reader Format
1 - 2 : Wiegand / Mag
2 - 3 : Touch

6. HW REVISION HISTORY.

- B491 1997-02-05 Wiegand/mag - RS 232 Interface concept release.
- B492 1997-02-07 Removed RP1 (4k7) from DIL SW 1, port A of the uP has internal pull up.
 Swap high/low - bits on connector P1, pin 2 & 3, Swap green/yellow led outputs on connector P1 pins 5 & 6.
 Increase dat/clk output connector P4 from 2 pins to 4 pins to include Card Present and GND.

B493	1997-09-07	Add Push - Button input & pull - up resistor & screw terminal. Add Action Complete input & pull-up & screw terminal. Add 10 Ohm resistor x 2 in series with data & /data. Add 100nF between signal ground and a mounting pad.
B494	1997-10-20	Include a X - OR gate & link field in the HI - bits input to facilitate barcode reader input.
B495	1997-11-03	Include RS -422 transceiver, and 2 x 10 ohm series resistors. Add diode protection for barcode input. Removed diode protection for barcode input. Make PCB to fit two PCBs on a CR – 351 transformer cover plate. Added 4k7 pull-up network to uP port 1, to accommodate CMOS 8952 micro controllers.

7. FW REVISION HISTORY.

V2.00	2005-APR-22	Universal version.
V2.01	2005-APR-28	Wiegand out pulse length set at location 1FEAH (default 10=51 usec) and space at 1FEBH (default 20=2,3 msec).
V2.02	2005-MAY-15	EPROM setting change: 8 facilities in ROM.
V2.03	2005-AUG-15	ISO output. Versions for output type. Remove Wiegand formats old corporate 1000, Dutch 34 bit (add on request).
V2.04	2005-AUG-25	44bit only LSB when 1st byte 0
V2.05	2005-SEP-16	Correct Wiegand if type not 02
V2.06	2005-OCT-10	Wiegand length MS 1st to serial - use last digits
V2.07	2005-NOV-09	Correct LED control.
V2.08	2005-NOV-27	Omniscan 44 bit Wieg, C_RD_30_PARITY=0 (change MS to 04H or 30H if read 6x xx xx xx or 7x xx xx xx)
V2.09	2006-NOV-01	LEDs not pulse (HID had problem). Display Client and site in test mode
V2.10	2006-NOV-24	Only check Wiegand parity when C_RD_CHECK=0. Send simulate card number read, DIP or fixed. Send simulate on PButton
V2.20	2006-DEC-01	Batch card types to new CR standard decode. Omniscan type 4.

8. PARTS LIST

Comp	Part number	Description	Remarks	Qty.
	B 495	Universal interface		1
R1 - 3	330 ohm.25W 10%	Carbon resistor	Taped only	4
R4	4K7.25W 10%	Carbon resistor	Taped only	5
R5 - 8	10 ohm.25 W 10%	Carbon resistor	Taped only	4
R9 - 10	1K.25W 10%	Carbon resistor	Taped only	2
R11 - 14	4K7.25W 10%	Carbon resistor	Taped only	
R15	330 ohm.25W 10%	Carbon resistor	Taped only	
RP1 - 2	2K2 Res. network	10 Pin 9R		1
C1	100nf 50V	Ceramic capacitor	5mm pitch taped only	3
C2	10uf 16V	Tantalum capacitor	5mm pitch taped only	6
C3	100nf 50V	Ceramic capacitor	5mm pitch taped only	
C4 - 7	10uf 16V	Tantalum capacitor	5mm pitch taped only	
C8 - 9	22pf 50V	Ceramic capacitor	2.5mm pitch taped only	2
C10	100nf 50V	Ceramic capacitor	5mm pitch taped only	
C12	10uf 16V	Tantalum capacitor	5mm pitch taped only	
C11	1000uf 25V	Electrolytic capacitor	Axial	1
LED1	Green	5mm LED		1
HOLDER	Holder	Q62902-b155-f222	Electrocomp	1
XL1	11.0592 MHz LP	Crystal	Low profile, solder in	1
RELAY1	HA1DC 12V	Relay		1
SW1 - 2	8Way	DIL switch		2
IC1	MAX232	RS 232 TX/RX		1
IC2	75176	RS 485 TX/RX		2
IC3	74LS86	Quad 2-input EX-OR gater		1
IC4	ULN2803	Octal darlington driver		1
IC5	74LS14	Hex schmitt trigger inverter		1
IC6	MAX690	U P watchdog 4,75V		1
IC7	AT89C52	ATMEL MCU		1
IC8	75176	RS 485 TX/RX		
SOCK IC	8 pin DIL	Tulip type, gold plated, solder		3
SOCK IC	14 pin DIL	Tulip type, gold plated, solder		2
SOCK IC	16 pin DIL	Tulip type, gold plated, solder		1
SOCK IC	18 pin DIL	Tulip type, gold plated, solder		1
SOCK IC	40 pin DIL	Tulip type, gold plated, solder		2
P1	7 Way MOLEX	Straight PCB solder, locking ramp		2
P2	DB9	Female PCB Solder R/A		1
P3	ETB-1102	2-Way terminal PCB		3
P4	7 Way MOLEX	Straight PCB solder, locking ramp		
	7 Way MOLEX	Housing		2
	7 Way MOLEX	Inserts		14
	Pin wafer	0.1" square pin wafer		11
E1 - 3	Shunt	5mm gold plated shunt		3
REG1	7805	5V regulator	T0-220 pack	1
		Bush & washer	For T0-220 pack	1