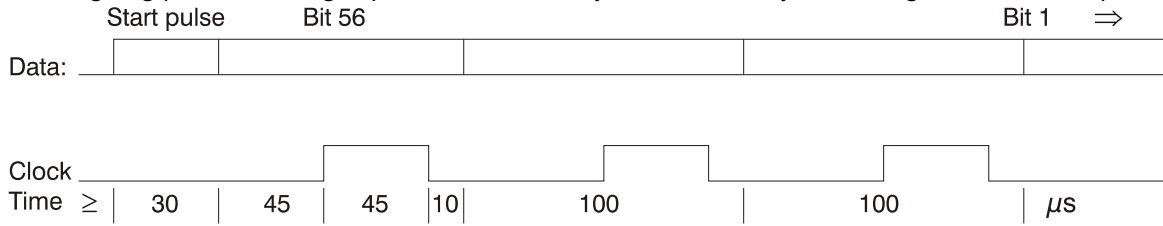


In U137/237 series weight indicators, there are two slow synchronous outputs with a common clock on J1.

J1:14	D2 Binary value, setpoints, unstable weight.	74HC11 level, inverted.	J1:01	Ground
J1:15	D1 BCD value for LED.	74HC11 level.	J1:02	0VD
	D3 If Cs02:+2. LCD data (see next page).	74HC11 level, inverted.	J1:03	+5V
J1:16	CK Common clock.	74HC11 level, inverted.		

Protocols for D1, D2 or D3. 56 bits are sent out every measurement cycle. Bit 1 is last. Each bit takes approximately 100µs. Transmission time is min. 5.6msec for 56 bits. The time may be prolonged 1ms due to interrupt!
 Clock pulse is going positive during 45µsec. The data may be read on any of the edges of the clock pulse.



Bit	D1, function.		Bit	D2, function.	
1	Digit 1:1 LS		1	Setpoint 2	Old indicators with 6803 processor have 1 and 2 interchanged.
2	Digit 1:2		2	Setpoint 1	
3	Digit 1:4		3		
4	Digit 1:8		4		
5	Digit 2:1		5		
6	Digit 2:2		6		
7	Digit 2:4		7		
8	Digit 2:8		8		
9	Digit 3:1		9		
10	Digit 3:2		10		
11	Digit 3:4		11		
12	Digit 3:8		12		
13	Digit 4:1		13		
14	Digit 4:2		14		
15	Digit 4:4		15		
16	Digit 4:8		16		
17	Digit 5:1		17	Binary Digit 1 LS	All bits 0 corresponds to zero - 4 scale intervals.
18	Digit 5:2		18	Binary Digit 2	
19	Digit 5:4		19	Binary Digit 3	
20	Digit 5:8 MS		20	Binary Digit 4	
21	Zero Z	= "0"	21	Binary Digit 5	All bits 1 corresponds to max capacity + 3 scale intervals.
22	= "0"		22	Binary Digit 6	
23	= "0"		23	Binary Digit 7	
24	= "0"		24	Binary Digit 8	
25	Net/Gross G	= "0"	25	Binary Digit 9	
26	Unstable (Motion) M	= "1"	26	Binary Digit 10	
27	Neg. Polarity NP	= "0"	27	Binary Digit 11	
28	OverRange OR	= "0"	28	Binary Digit 12	
29	Decimal point 1	= "0"	29	Binary Digit 13	
30	Decimal point 2	= "0"	30	Binary Digit 14	
31	Decimal point 3	= "0"	31	Binary Digit 15	
32	Decimal point 4 (left)	= "0"	32	Binary Digit 16 MS	
33			33		
34			34		
35			35		
36			36		
37			37		
38			38		
39			39		
40			40		
41			41		
42			42		
43			43		
44			44		
45			45		
46			46		
47			47		
48			48		
49			49		
50			50		
51			51	Overrange	
52			52	Weight between setpoints. Setpoint 1 < setpoint 2.	
53			53	Unstable weight	
54			54	Outside zero range	
55			55	Setpoint 1	
56			56	Setpoint 2	

56 bit data for D3 are found below.

The slow synchronous outputs may normally be extended 100m from the indicator without trouble.

There is also a fast synchronous output for the display. It is not advisable to use it more than one meter from the indicator. The data are available on J5.

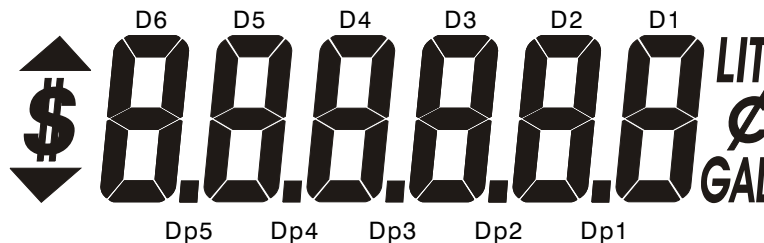
J5:3 Display data. 1 TTL level from 68HC11 port. DISP D Also available on J30.
 J5:4 Display clock. 1 TTL level from 68HC11 port. DISP CK Also available on J31.
 J5:5 Display chip enable. 1 TTL level from 68HC11 port. DISP CE Also available on J32.

It is a combined output for LCD (56 bits) and scanned LED display (16 bits).
 The timing is complex. The LED data are every 2.5ms. The clock frequency 1µs and total sending time 22µs.
 The LCD data is slower with total sending time about 1.4ms.
 The LCD is updated about 250µs after a LED update.
 The LCD chip enable signal is preceded some 10µs by a short pulse, which disables the LED.

Protocol for the **old** LCD: 7 segments (a - g). 6 digits, 1 is least significant. Dp = decimal point.

Bit	Function	Bit	Function	Bit	Function	Bit	Function	Bit	Function	Bit	Function
1	"0"	11	Digit 1 f	21	Digit 2 d	31	Digit 3 b	41	Dp 4	51	Digit 6 f
2	"0"	12	Digit 1 e	22	Digit 2 c	32	Digit 3 a	42	Digit 5 g	52	Digit 6 e
3	"0"	13	Digit 1 d	23	Digit 2 b	33	Dp 3	43	Digit 5 f	53	Digit 6 d
4	GAL	14	Digit 1 c	24	Digit 2 a	34	Digit 4 g	44	Digit 5 e	54	Digit 6 c
5	¢	15	Digit 1 b	25	Dp 2	35	Digit 4 f	45	Digit 5 d	55	Digit 6 b
6	LIT	16	Digit 1 a	26	Digit 3 g	36	Digit 4 e	46	Digit 5 c	56	Digit 6 a
7	▼	17	Dp 1	27	Digit 3 f	37	Digit 4 d	47	Digit 5 b		
8	\$	18	Digit 2 g	28	Digit 3 e	38	Digit 4 c	48	Digit 5 a		
9	▲	19	Digit 2 f	29	Digit 3 d	39	Digit 4 b	49	Dp 5		
10	Digit 1 g	20	Digit 2 e	30	Digit 3 c	40	Digit 4 a	50	Digit 6 g		

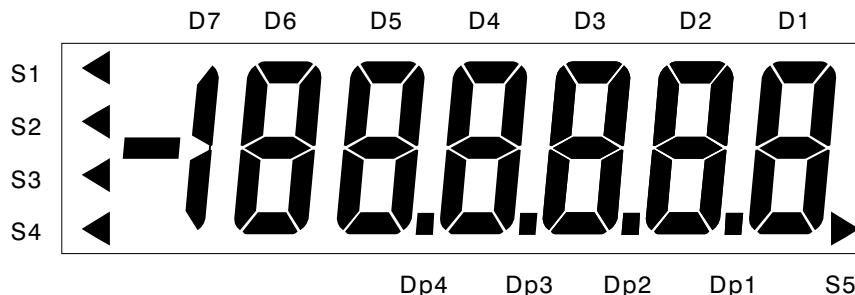
16 mm **old** LCD display for U237 series.



Protocol for the **new** LCD: 7 segments (a - g). 6½ digits, 1 is least significant. Dp = decimal point.

Bit	Function	Bit	Function	Bit	Function	Bit	Function	Bit	Function	Bit	Function
1	"0"	11	Digit 1 g	21	Digit 2 e	31	Digit 3 a	41	Digit 5 c	51	Digit 6 g
2	"0"	12	Dp 1	22	Digit 2 d	32	Digit 3 f	42	Digit 6 b	52	- (Minus)
3	"0"	13	Digit 1 e	23	Digit 2 a	33	Digit 4 c	43	Digit 5 g	53	Digit 7
4	Digit 1 c	14	Digit 1 d	24	Digit 2 f	34	Digit 5 b	44	Digit 6 c	54	Digit 6 e
5	S6	15	Digit 1 a	25	Digit 3 c	35	Digit 4 g	45	Digit 5 e	55	Digit 6 a
6	Digit 1 b	16	Digit 1 f	26	Digit 4 b	36	Dp 4	46	Digit 5 d	56	Digit 6 f
7	S3	17	Digit 2 c	27	Digit 3 g	37	Digit 4 e	47	Digit 5 a		
8	S4	18	Digit 3 b	28	Dp 3	38	Digit 4 d	48	Digit 5 f		
9	S1	19	Digit 2 g	29	Digit 3 e	39	Digit 4 a	49	Digit 6 d		
10	Digit 2 b	20	Dp 2	30	Digit 3 d	40	Digit 4 f	50	S2		

16 mm **new** LCD display for U237 series.



These displays have backlight.

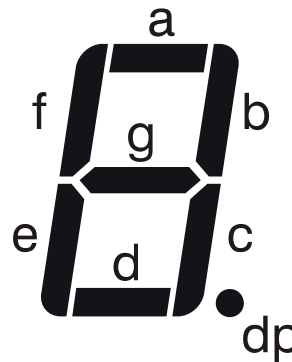
Board connector.

1	0VD	3	DISP D	5	DISP CE	7	Backlight -V
2	+5V, max 3mA	4	DISP CK	6		8	Backlight +V. Typical 80mA at 5V.

Protocol for the scanned LED display.

Bit

- 1
- 2 Digit 5 Most significant
- 3 Digit 4
- 4 Digit 3
- 5 Digit 2
- 6 Digit 1
- 7 Sign and indicators
- 8 Buzzer.
- 9 Segment a ZERO
- 10 Segment b NET
- 11 Segment c COUNT
- 12 Segment d MOTION (unstable)
- 13 Segment e Opt. indicator 1
- 14 Segment f Opt. indicator 2
- 15 Segment g Minus
- 16 Decimal point



Optional displays.

More information of optional remote displays is found in B01680.

Optional interface boards.

- U1278 Parallel BCD output board.
- U2390 Isolated DA board with 0 - 20mA, 4 - 20mA or 0 - 5V output.
- U1375 Setpoint unit with 2 relays.
- U1730 Isolated setpoint unit with 2 semiconductor DC relays and hold.
- U2384 Universal output board with 4 semiconductor DC relays.

All except U1278 and U1375 may be mounted inside the indicator, one in U137 series and two in U237 series. U1624 is a metal box, in which the boards may be mounted, when used outside the indicator.

U1278 Parallel BCD output board.

Isolated BCD board with sign, motion (unstable), net and overrange on 28 open collector outputs (ULN2004). There are also output for data valid, input for output disable and suppression diodes for inductive loads. This board is connected to synchronous output type 1. Max ratings of the open collector outputs are V_{CE} max. 50V, I_C max. 250mA. Dimensions 99x90x23mm.

1 corresponds to low (conducting) output in ULN 2004.
 D5 is the most significant digit.
 Output NEG, negative sign = 0.
 Output M, motion (unstable) = 0.
 Output OR, overrange = 0.
 Output NET, net = 0.
 Output TS from suppression diodes for inductive loads.
 Output DATV for data valid. Output for data valid has the CMOS level of the external 5 to 15V.
 Input OUTE. The outputs are enabled by strapping the input OUTE to 0. In this way more outputs may be connected in parallel and one selected.

The board is optoisolated, and must be fed with an external 5 VDC (max 10 mA) to 15 VDC (max 35mA).

Interface to indicator, 5 pin wafer.

- 1 SYNC D1 input
- 2 +5V
- 3 0V
- 4 SYNC CK input
- 5 Ground

34p flat cable connector			
Pin 1	D1:1	Pin 18	D1:2
2	D1:4	19	D1:8
3	D2:1	20	D2:2
4	D2:4	21	D2:8
5	D3:1	22	D3:2
6	D3:4	23	D3:8
7	D4:1	24	D4:2
8	D4:4	25	D4:8
9	D5:1	26	D5:2
10	D5:4	27	D5:8
11		28	
12		29	
13	NET	30	M
14	NEG	31	OR
15	TS	32	OUTE
16	0V	33	+5-15V
17	DATV	34	Ground

U2390 Isolated DA board with 0 - 20mA, 4 - 20mA or 0 - 5V output.

The board must be fed with an external isolated supply, 16 - 35V, min 30 mA. Output set (JP2;JP3): (OFF;ON) 0 - 5V. (OFF;OFF) 0 - 20mA. (ON;ON) 4 - 20mA. (ON;OFF) 4 - 24mA. Max 9V. No output at negative weight. Resolution: 16 bits or 1 part in 65,536 or 15 ppm. ppm = parts per million. Monotonicity 1 bit. Max error: 0.15%. Max offset at 0 or 4mA: 0.05%. Linearity: Better than $\pm 0.012\%$ or ± 120 ppm, typical ± 20 ppm. Temperature drift: Max ± 50 ppm/ $^{\circ}$ C, typical ± 20 ppm/ $^{\circ}$ C. Dimensions: 66x82mm. May be mounted inside the indicator.

- J1 2x8p socket.
- 1 Ground
- 3 +5VD
- 14 SYNC D2
- 16 SYNC CL
- J2 15p D-sub male
- 1 + Current out
- 2 0 - 5V out
- 3 0V signal
- 4 Ground
- 13 External 16 - 35 VDC
- 14 0V power
- 15 Ground

U1375 Setpoint unit with 2 relays.

This is a small, 89x90mm, low price board with 2 relays for the setpoints in the type 2 synchronous output. It may not be mounted inside the indicator. Shielded cables must be used.

With the optional case U1624, 104x100x36mm, the board may be used outside the indicator.

J1 5p wafer.	J2 15p D-sub male		
1 Ground	1 Setpoint 2 Common	6 Setpoint 1 NC	11 Optional out
2 SYNC CL	2 Setpoint 2 NO	7 Optional common	12 Optional out
3 SYNC D2	3 Setpoint 2 NC	8 Optional NO	13 +5V out
4 0V	4 Setpoint 1 Common	9 Optional NC	14 0V
5 +5V	5 Setpoint 1 NO	10 Optional out	15 Ground

NO means open and NC closed to common, when the weight is below the setpoint.

For older indicators with 6803 processor, Setpoint 1 and 2 are interchanged.

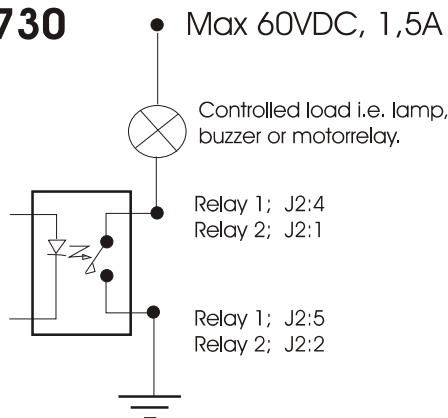
Relay specification: Max current: 3A. Voltage: 10 μ V to 250V. AC line voltage not recommended because of high disturbance level and negative influence on life. Up to 24VDC is recommended. Isolation resistance: 10¹¹ohm.

Operational life: 1W > 10⁸, 3W > 10⁷, 30W > 10⁶, 50W > 10⁴ switching operations.

U1730 Isolated setpoint unit with 2 semiconductor DC relays and hold.

This is a small, 81x65mm, low price board with 2 semiconductor output relays for the setpoints in the type 2 synchronous output. There is also a common holding input for both outputs. The board can be mounted inside U237 series indicator. Shielded cables must be used.

J1 2x8p socket.	J2 15p D-sub male		
1 Ground	1 Setpoint 2 + Max 60V	6	11 Hold -
2 0V	2 Setpoint 2 - Max 1.5A	7 Optional +	12
3 +5V	3	8 Optional -	13 +5V out
14 SYNC D2	4 Setpoint 1 + Max 60V	9	14 0V
16 SYNC CL	5 Setpoint 1 - Max 1.5A	10 Hold +5-30V, 10kohm	15 Ground

U1730**U2384 Universal output board with 4 semiconductor DC relays.**

This board may be used to receive any 4 consecutive data on D1 or D2 by a variable shift register. In order to get There are 4 outputs with isolated semiconductor DC relays (max 60V and max 1.6A) and 4 TTL level outputs.

The board can be mounted inside U237 series indicator. Shielded cables must be used.

J1 2x8p socket.	J2 15p D-sub male		
1 Ground	1 Output 1 + Max 60V	6 Output 3 - Max 1.5A	11 Output 7 TTL
2 0V	2 Output 1 - Max 1.5A	7 Output 4 + Max 60V	12 Output 8 TTL
3 +5V	3 Output 2 + Max 60V	8 Output 4 - Max 1.5A	13 +5V out
14 SYNC D2	4 Output 2 - Max 1.5A	9 Output 5 TTL	14 0VD
16 SYNC CL	5 Output 3 + Max 60V	10 Output 6 TTL	15 Ground

The 2 first bits (1 & 2) of the protocol are not available and the third bit is received on output 1 by setting all switches on S1 on. S1:1 off represents 1 bit delay, S1:2 off 2 bits delay and so on to S1:6 off 32 bits delay.

E.g. If bit 52 is wanted on output 1 (53, 54 and 55 on outputs 2, 3 and 4), the delay 52 - 2 = 50 must be set with S1, which means S1:6, S1:5, and S1:2 off (32 + 16 + 2 = 50).

U1731 RS232, synchronous outputs, optoisolated Tare and Print/Test input. 25p D-sub male.

J1:	RS232, synchronous outputs, optoisolated Tare and Print/Test input. 25p D-sub male. Option U1731.	
1	GND Ground/shield.	
2	TD	Transmit Data.
3	RD	Receive Data.
5	CTS	Clear To Send input.
7	OVD Digital zero.	Note! This interface is not isolated from the indicator zero.
11	+5V	Max recommended load 25mA.
12	SYNC CK	Synchronous output, clock signal. HCMOS level.
13	SYNC D1	Synchronous output, type 1. For displays. HCMOS level.
14	SYNC D2	Synchronous output, type 2. For setpoints, analog output etc. HCMOS level.
16	TARE	Optoisolated input for Print/Test. 12 - 30V.
19	PRINT/TEST	Optoisolated input for Tare. 12 - 30V.
20	DTR	Data Terminal Ready output.

Setpoints.

By pushing {ZERO} and {TARE} simultaneously is possible to enter 2 setpoints (Must be an even number). First setpoint 1 is displayed and after {ZERO} setpoint 2, which is indicated by COUNT PCS on. Keyboard functions:

{ZERO}	Shifts between setpoints.
{NET/GROSS}	Selects the digit position. In sign position, the NET indicator blinks.
{COUNT}	Increments the digit value and changes sign at setpoints.
{PRINT/TEST}	Prints the sequence and leaves it.
{F} {F}	Leaves the sequence.