



DESCRIPTION

The Membrane Keyboard Unit provides operator input/output interface for GEM 80 systems which may be easily tailored to suit application requirements.

The unit is designed to be mounted on control desks or panels with the minimum of forward and rear projection and connects directly to the basic I/O ribbon cable from the GEM 80 controller.

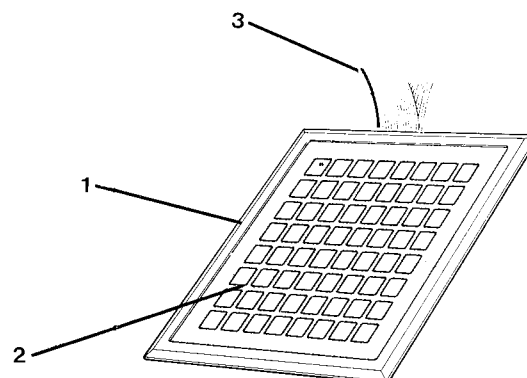
FEATURES

- Simple low cost wiring
- No external power supplies
- Environmentally sealed keypad
- Audible and visual feedback for key operation (controlled by GEM 80)
- Light emitting diodes for indication purposes
- Facilities for custom design keyboard layout, inscription, and colour combinations
- Key codes may be user defined within GEM 80 user program from standard keycode options, or user defined special options provided to special order

SPECIFICATION

Number of keys	: 64
	: arranged in an 8 x 8 matrix
Key size	: individual keys 20 x 15mm with 5mm spacing
Keyboard construction	: membrane type, sealed for life. Mechanical actuation
Individual key life expectancy	: $> 10^6$ operations
Operating force	: $< 700\text{g}$ (1.5 lb.)
Switch travel	: typically 0.2mm
Mounting	: bezel and keyboard offered up from front of panel
Overall dimensions	: 237mm x 277mm x 5mm/170mm (high x wide x front/rear projection)

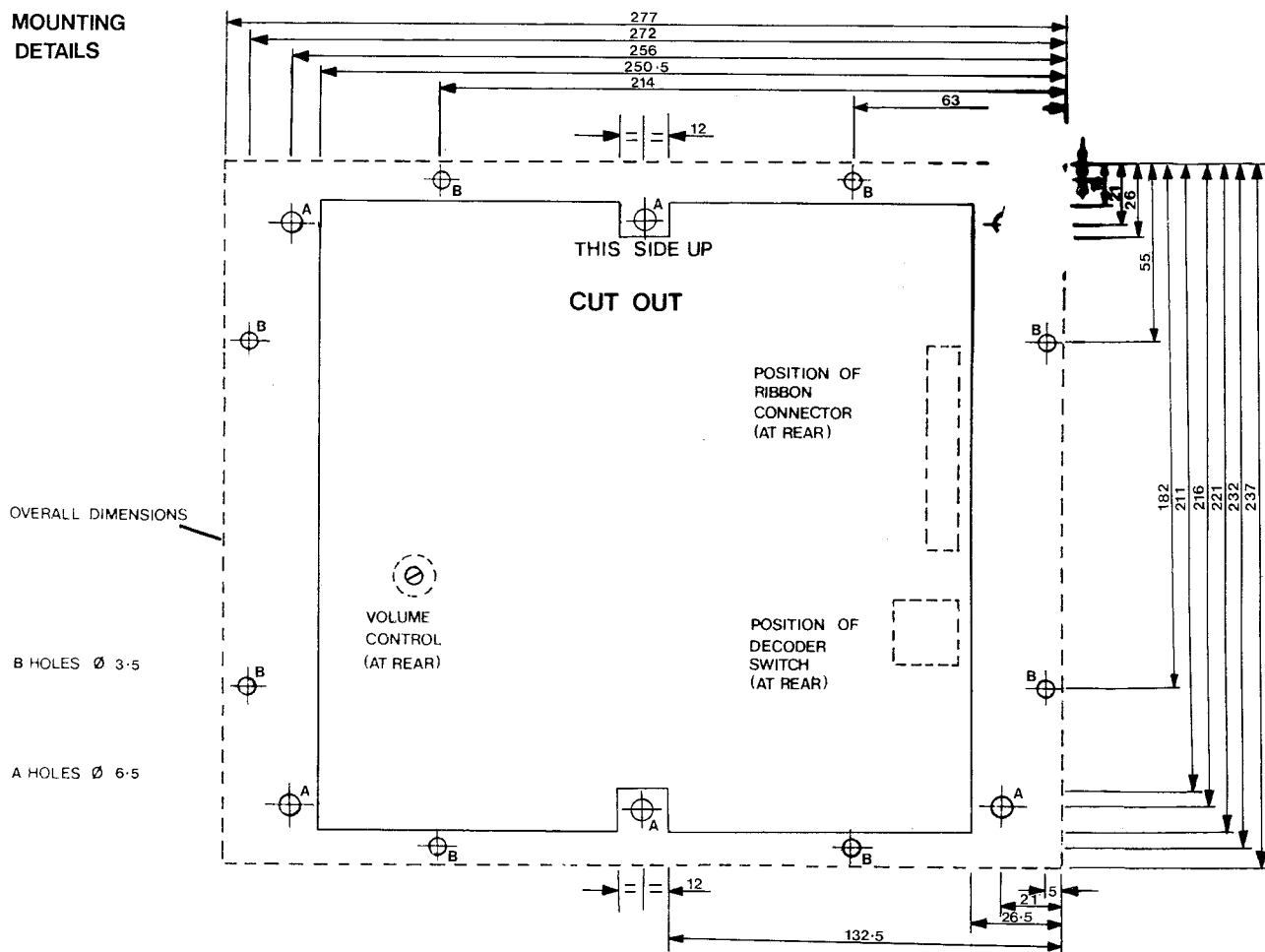
8872 Membrane Keyboard



1. Aluminium bezel (black)
2. Membrane keyboard
3. Ribbon cable

Connection	: plug/socket for basic I/O ribbon cable
	: uses 32 data bits (2 words) of basic I/O
Power consumption	: max. 250mA @ +15V from basic I/O ribbon cable
Audible feedback	: 1600Hz modulated
	: max. 86 dB(A) at 300mm (adjustable)
Light emitting diodes	: eight yellow in pre-defined positions. Where not required may be hidden
Key colours and legends	: user definable
Key codes	: choice of two standard options
	: User defined to special order
Temperature	: 0°C to 60°C operating
	: -20°C to 70°C storage
Humidity	: 10 to 95% non condensing
	Note: keyboard units supplied before mid 1983 were not suitable for high humidities
Weight	: 570g (1.26 lb.)

MOUNTING DETAILS



APPLICATION NOTES

1. UNIT ADDRESS SETTING

The setting of the switch on the rear of the unit distinguishes this unit from others on the same basic I/O ribbon cable.

Table 1 shows all the possible decoder switch settings for ribbon cables of the basic I/O highway.

The Membrane Keyboard Unit is equivalent to 32 data bits (2 words) of basic I/O, 16 bits for input (lower address) and 16 bits of output (higher address).

The unit will respond to block sensing as if all blocks were present.

2. USE OF AUDIBLE DEVICE

The unit is fitted with an audible device suitable for providing audible feedback to an operator. As the device is fitted to the rear of the keyboard unit, the volume can be severely attenuated when the unit is fitted into a desk. The audible device is not therefore suitable for use as an alarm.

Volume of the audible device is adjustable by means of a potentiometer mounted on the rear of the keyboard unit. The audible device is made to operate by bit 7 of the output word from the host GEM 80 controller.

Table 1 Decoder switch settings

First ribbon cable			Second ribbon cable		
Unit reference		Decoder switch setting	Unit reference		Decoder switch setting
Odd	Even		Odd	Even	
B1	A0	0	B17	A16	0
B3	A2	1	B19	A18	1
B5	A4	2	B21	A20	2
B7	A6	3	B23	A22	3
B9	A8	4	B25	A24	4
B11	A10	5	B27	A26	5
B13	A12	6	B29	A28	6
B14	A14	7	B31	A30	7
Third ribbon cable			Fourth ribbon cable		
Unit reference		Decoder switch setting	Unit reference		Decoder switch setting
Odd	Even		Odd	Even	
B33	A32	0	B49	A48	0
B35	A34	1	B51	A50	1
B37	A36	2	B53	A52	2
B39	A38	3	B55	A54	3
B41	A40	4	B57	A56	4
B43	A42	5	B59	A58	5
B45	A44	6	B61	A60	6
B47	A46	7	B63	A62	7

Note: If switch position 8 or 9 is used then unit cannot be addressed

3. USE OF LIGHT EMITTING DIODES

The unit is fitted with eight yellow light emitting diodes (L.E.D.'s) positioned as shown in Figure 1. Where required, windows may be provided on the overlay to make viewing possible. The LED's may be addressed from the host GEM 80 controller as shown in Table 2.

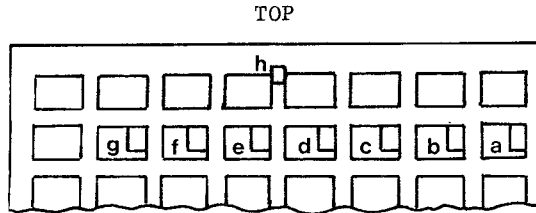


Figure 1 - Possible positions of LED's

Table 2 L.E.D. addresses			
L.E.D.	Address	L.E.D.	Address
a	Bn. 0	e	Bn. 4
b	Bn. 1	f	Bn. 5
c	Bn. 2	g	Bn. 6
d	Bn. 3	h	Bn. 7

Note: n = word address as set by decoder switch

The LED designated 'h' operates at the same time as the audible device, to provide visual feedback to the operator as well as audible feedback where required.

4. USE OF KEYBOARD INPUT

When no key is depressed on the keyboard, zero will be input to the host GEM 80 controller. On the operation of a key, the user defined code will be input on every program cycle during which the key is held depressed. Pressing a second key will have no effect until the first key is released.

5. KEYCODE

The keyboard can be supplied with either a standard set of keycodes or customer specified. It is advisable that whenever possible the standard codes be used on the grounds of cost.

Two standard sets of keycodes are available. The first, using PCB 8521-4001, gives the decimal numbers 1 to 64 (see Fig. 2).

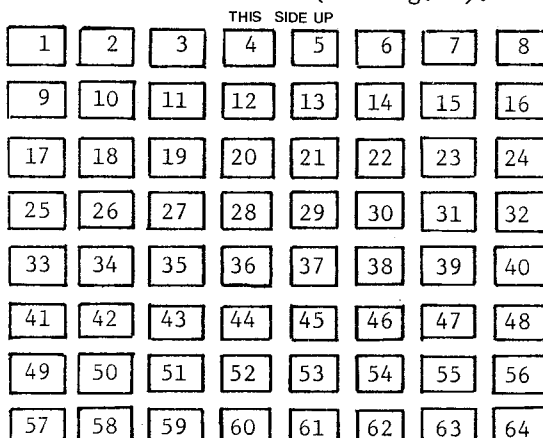


Fig. 2 - Standard keycodes (first option)

The second, using PCB 8521-4002, gives keycodes which are similar in each quarter of the keyboard but with a different bit for each quarter. Represented in hexadecimal, these are shown in Fig. 3.

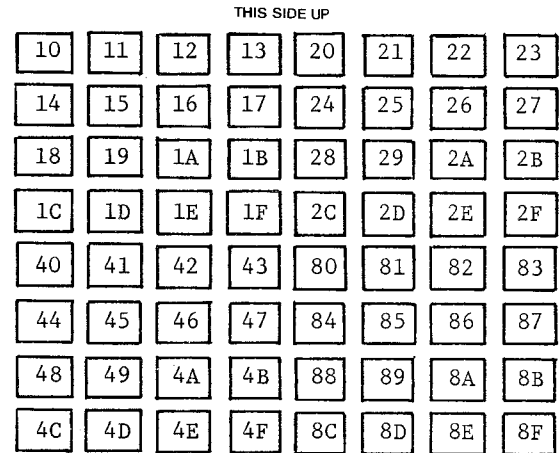
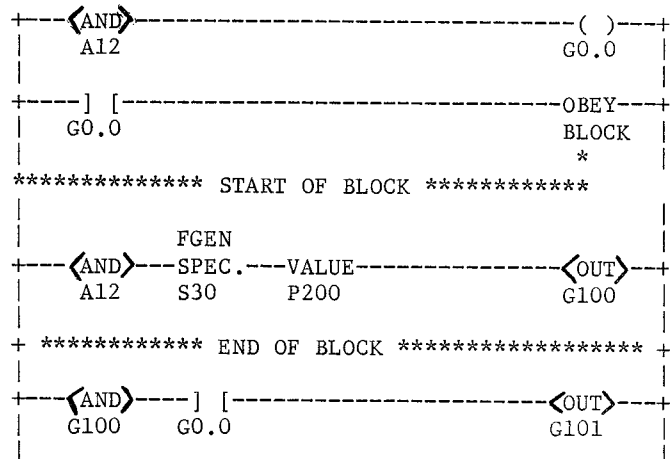


Fig. 3 - Standard keycodes (second option)

6. EXAMPLES

6.1 To produce bit patterns suitable for use in the user program from standard keycodes option 1.



G0.0 Key strobe (any key)

G100 Latched user code

G101 User code present during operation of key otherwise zero

P200 = 0 P202 = 1
P201 = 0 P203 = 65
 P204 = 0

P[204 + n] = User code for key n

(1 < n < 64)

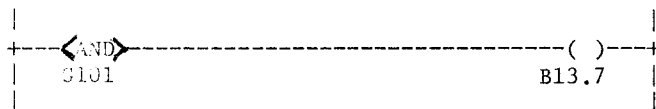
Thus, if from key 36 a user code = @3660 is required, then P240 = @3660

If a key area is not used, it is advised that the relevant P table to be set to zero.

- 6.2 To operate audible device whenever any valid key is depressed.

(Refer to the previous example; keys with no user code have zero entered into relevant P table locations).

Program Rung



7. OVERLAY SPECIFICATION

7.1 Ordering options

For speed of delivery and minimum cost, GEC recommends that customer obtains his own customized overlays. They can be obtained via GEC, but as the coloured overlays would not be manufactured by GEC itself but by a specialist supplier, it is obviously cheaper for customer to deal direct with such a supplier rather than ordering via GEC.

It is also recommended that customer orders the keyboard unit with one of the standard keycode options given in Section 5 above. Note should be taken of example 6.1 above, which shows that it is relatively simple to produce any set of keycodes within the program in the GEM 80 controller from keycode option 1, using the FGEM special function as a look-up table, without having to order the keyboard unit itself with special keycodes.

To cater for the recommended method of ordering, keyboard units to standard ordering codes (see end of this data sheet) are supplied with loose overlays. These loose overlays are plain grey, with black outlines for the key positions, and with clear keypad areas. They can be used as temporary overlays (see 7.5). When overlays to customer's own design become available, the plain overlays can be discarded and the final overlays stuck down permanently. How to do this is described in Section 8 below.

7.2 Ordering of keyboard unit with blank overlay

Customer should order a keyboard unit to ordering codes 8872-4001 or 8872-4002, depending on whether he wants keycodes to option 1 or option 2 respectively.

The keyboard units are supplied with backing paper covering the adhesive face. When assembled with the blank overlay, this backing paper should not be removed; the backing paper should only be removed when the final overlay to customer's design becomes available (see Section 8 below).

7.3 Ordering of custom designed overlay

7.3.1 Selection of overlay supplier

A supplier should be selected who has the capability of reverse side printing of polycarbonate film in a number of colours. Suitable suppliers are generally specialists in nameplate manufacture. Within the UK, GEC normally obtain overlays from:

Star Systems (RH) Ltd.,
Easton Lane,
Winchester,
Hants.,
SO23 7RR

The material required for the overlay should be specified as clear polycarbonate, 0.3mm (0.012") thick, with the inscriptions, coloured areas and background colour printed on the reverse side.

Customer should establish with the supplier what range of colours he can provide as standard, and what the preferred sizes of lettering for key inscriptions are. As an example, for Star Systems (RH) Ltd., colours available as standard are white, red, orange, yellow, green, turquoise, blue and magenta, with light grey as background colour and black as the colour for inscriptions and outlines, but other colours can be selected from the Sericol Universal Colour Guides. Also, the standard sizes of lettering for inscriptions are:

Large : 1 row of 3 characters per key
Medium : 3 rows of 6 characters per key
Small : 3 rows of 9 characters per key

If customer is obtaining his overlays from a supplier other than Star Systems, he should obtain information similar to that above of the particular supplier's colour ranges and other printing preferences.

7.3.2 Specification of overlay printing details

Appendix 1 gives a dimensioned drawing showing the positions of keypads and LED windows as used on the blank overlays supplied with keypad units to ordering codes 8872-4001 and 8872-4002. It is recommended that customer uses similar sizes for his own overlays, and that he photocopies this sheet to act as part of his specification to the overlay supplier.

Note that the only active positions where keys can be depressed are in the centres of the rectangles. It is therefore not recommended for customer to amalgamate the rectangles to form large size keys or bars, as dead areas would exist, corresponding in position to areas between pads, which would be annoying to the operator. It is therefore recommended that customer specifies single size keys only, and indicates the relative importance of different keys by colour, size of inscription, or the use of surrounds.

Besides the colours, inscriptions and any other printing details, customer should also indicate where windows (areas left free of printing) are required for LED's to show through. The positions of these are also shown in the drawing which forms appendix 1.

7.3.3 Overlay size

It is essential that the overlay be the correct size, trimmed correctly so that any windows line up with the LED's. If there is any doubt as to whether the overlay supplier can trim the overlay exactly, the overlay should be ordered slightly oversize, and customer should trim it to the exact size using a sharp modelling knife.

7.4 Non-standard keyboards

It is generally recommended that customer orders keyboard units with keycodes to standard options 1 or 2 as given in Section 5 above.

Where customer considers that the additional cost of non-standard keycodes is justified, he should take a photocopy of the sheet included as Appendix 2, and include this information with his order. Note that each individual keycode must comprise 8 bits, and be defined as two hexadecimal characters, in a similar way to that shown in Figure 3 above for standard keycode option 2. Note also that a keycode of zero will give no response, as zero is what is read by the GEM 80 controller when no key is depressed.

8. FIXING THE OVERLAY TO THE KEYBOARD

Once the customer has procured his final overlay and (if necessary) trimmed it to size, he may fix it permanently to the keyboard.

WARNING:

Sticking the overlay to the keyboard is not difficult, but requires a little care. If not done correctly, bubbles may arise between the overlay and the keyboard, and certain keys may then fail to operate. It is not possible subsequently to remove the overlay and restick it.

7.5 Temporary Overlay

The keypad comes complete with an overlay, with clear keypad areas, and two overlay worksheets.

A temporary overlay can be made as follows:

- Complete the worksheet with the required colours and inscriptions.
- Fit the worksheet below the overlay so that the keypad areas are aligned. (Taping the bottom edges of the overlay and worksheet together will aid fitting to the keypad.

Do not remove the backing paper from the keypad.

The overlay + worksheet is then fitted to the keypad by trapping them under the bezel.

Changes will inevitably need to be made to the overlay before the design is finalised. This can easily be done by changing the worksheet (the worksheet supplied with the keypad can be copied to provide extra sheets if required). When the design has been finalised then the final overlay can be specified and fixed as shown in Sections 7.3 and 8.

PROCEDURE:

- With the backing paper still covering the keyboard, place the overlay on top of it, and align correctly.
- Hold the overlay down in its aligned position with the palm of the left hand face downwards so as to hold down the left three quarters or thereabouts.

- Still holding the overlay aligned with the left hand, lift the right hand edge of the overlay with the right hand, and tear off a strip of the backing paper down the right hand edge of the keyboard about 40mm (1.5") wide.
- Still holding the overlay aligned with the left hand, stick down the right hand edge of the overlay where the adhesive has been exposed, stroking it down towards the right hand edge of the keyboard with the edge of the right hand.
- Now that the right hand edge of the overlay has been fixed in the correct alignment, the left hand may be removed.
- Lift the unsecured portion of the overlay with the right hand, and remove the remainder of the backing paper with the left hand.
- Now, taking the unsecured portion of the overlay in the left hand, stroke it down towards the left with the edge of the right hand, spreading it down carefully so as not to trap any bubbles.

ORDERING CODES

EQUIPMENT

Each of the following kits comprises a keypad, an electronics PCB and a bezel. The PCB is fixed to the rear of the keypad by mounting studs and nuts. The bezel is supplied as a loose item. Electrical connections are by ribbon cables and plug/socket connectors.

Membrane keyboard unit, with 8872-4001
keycodes to standard option 1;
supplied with loose grey overlay,
black inscription showing key
positions only without designations.

Membrane keyboard unit, with 8872-4002
keycodes to standard option 2;
supplied with loose grey overlay,
black inscription showing key
positions only without designations.

Membrane keyboard unit, with 8872-xxxx
custom designed overlay and/or
non-standard keycodes (special
order only) (allocated
by GEC)

Overlay Worksheet (Pads) ICE 153

SPARES

PCB only, including EPROM for 8521-4001
keycodes to standard Option 1

PCB only, including EPROM for 8521-4002
keycodes to standard Option 2

PCB only, including EPROM for 8521-xxxx
non-standard special keycodes (last four
digits
allocated
by GEC)

Keypad only (no overlay or PCB) 78801/214

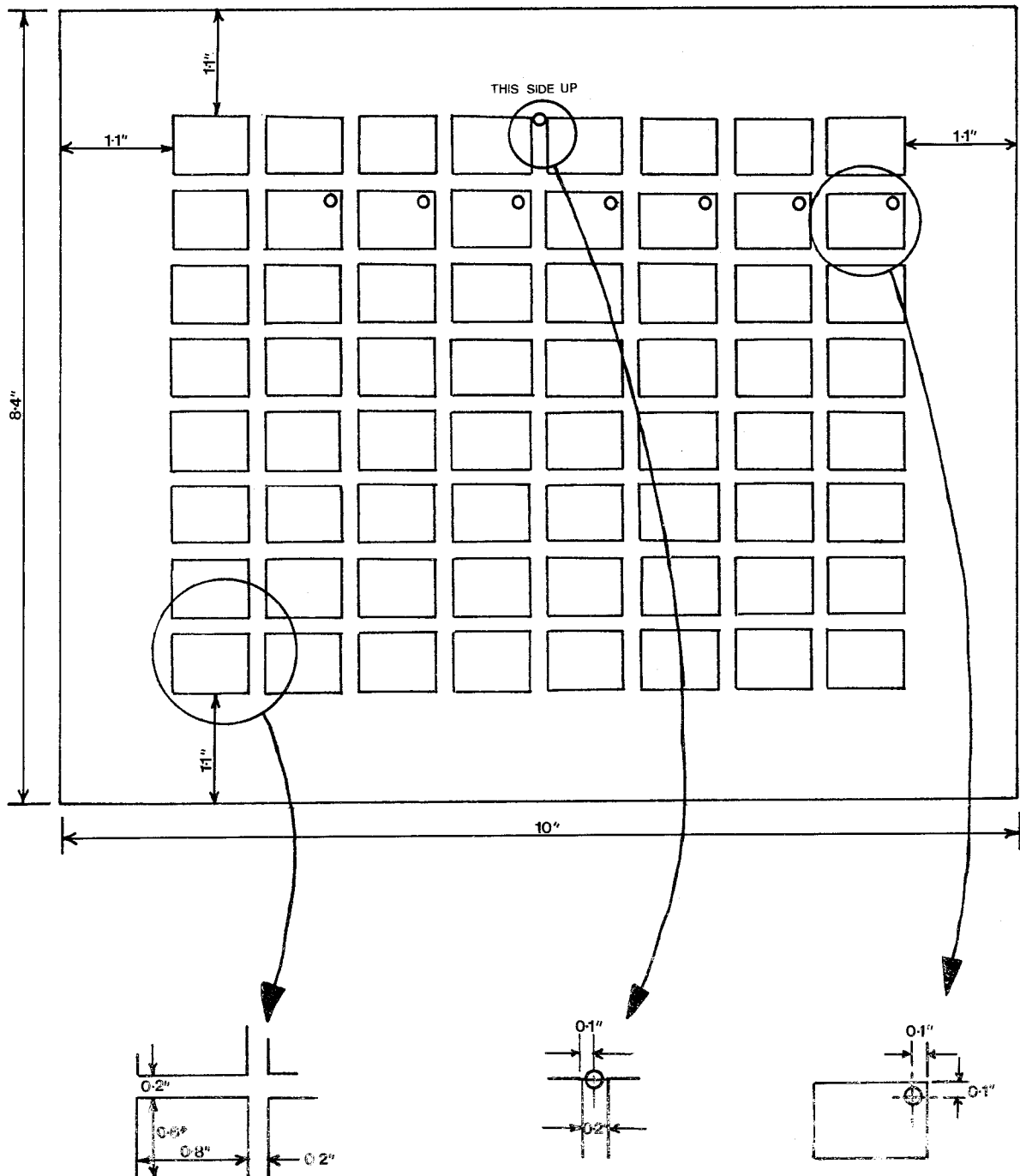
Bezel 78801/208

8872 MEMBRANE KEYBOARD

Appendix 1

Dimensions, Custom Inscriptions and Colours

1.1 Dimensions



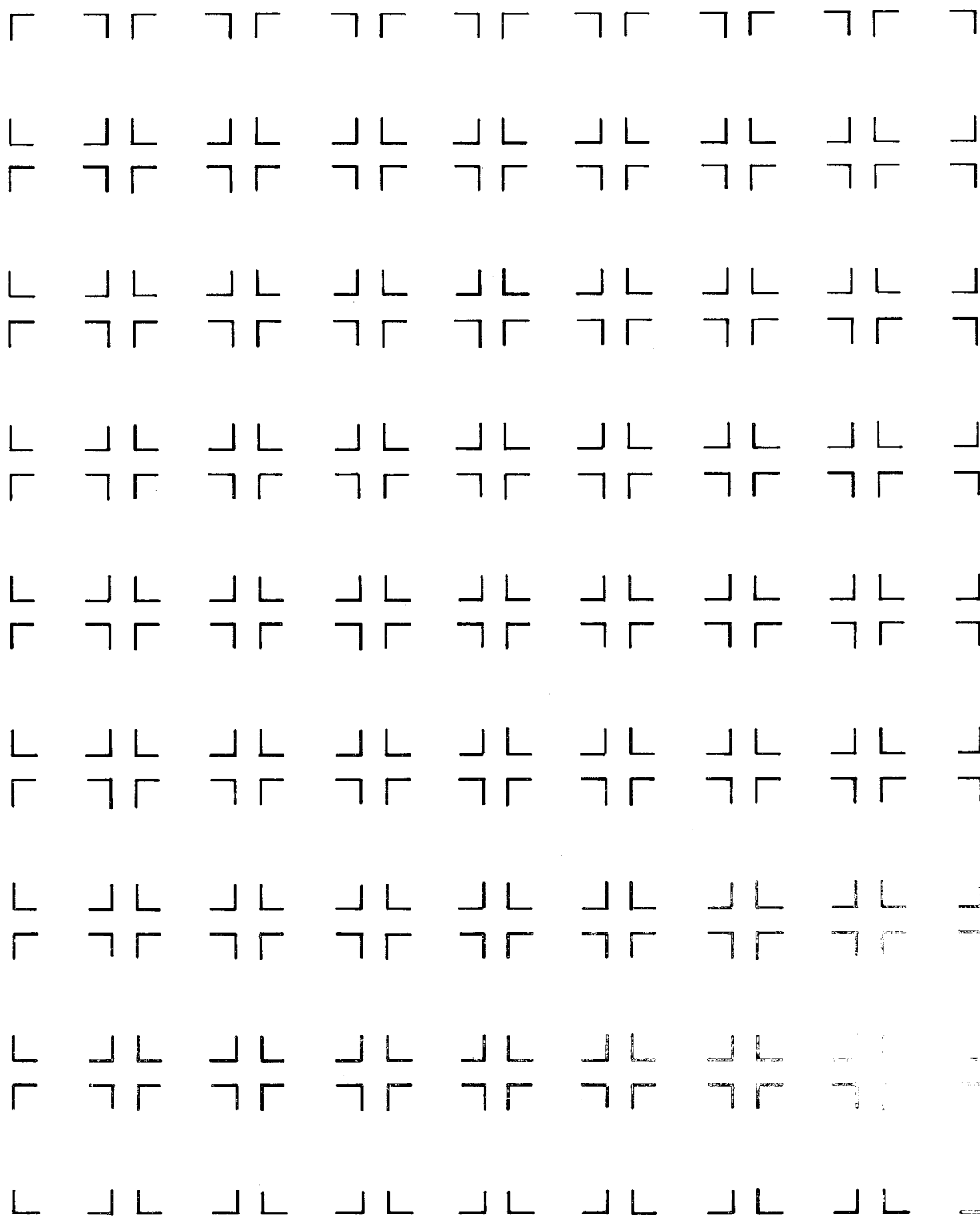
Overlay Dimensions (in inches; 1" = 25.4mm)

The figure shows the positions of the eight LED's. Where these are to be visible, circular areas as shown must be free of printing so as to provide transparent windows. These areas should be 0.12" (3mm) diameter.

1.2 Layout, Inscriptions and Borders

An example of how to fill this in is shown on the next page. The user is recommended to photocopy this page as required.

THIS SIDE UP



Example of the use of the form on the previous page.

THIS SIDE UP

PRODUCT	SELECT		SIGN ON	SIGN OFF			START DEPOSITOR FEED	STOP DEPOSITOR FEED
RECIPE ROUTE			ENTER	CANCEL			DEPOSITOR CLEANDOWN	DEPOSITOR SHUT DOWN
RECIPE RATIO								
% RE MELT			7	8	9		MOULDS 70% SPEED	MOULDS 100% SPEED
TEMPER	STAGE		4	5	6		MOULD RUN INCH	MOULD STOP INCH
	SET TEMP		1	2	3			
MOULDS	SET SPEED		0				RETURN TO TANK 5	CANCEL TANK 5 RETURN
SHAKER			ALARM ACCEPT	ALARM RESET	DISPLAY PAGE			

1.3 Membrane Keyboard Colours

An example of how to fill this form in is shown on the next page. The user is recommended to photocopy this page as required.

THIS SIDE UP

Background colour (other than light grey) =

Inscription colour (other than black) =

INSTRUCTIONS:

1. Indicate colours required by inserting codes provided into the relevant areas of the grid above.
2. If non-standard colours required indicate in table 1, providing relative Sericol Universal Colour Guide references (SCG).
3. If no colour is indicated for a key area, that area will be the same colour as the background.
4. To indicate that a l.e.d. is to be visible indicate by means of 'X' in the boxes provided within the relevant keys.

Example:-

Red key with visible l.e.d.



Colour	Code
White	W
Yellow	Y
Orange	O
Red	R
Magenta	M
Blue	B
Turquoise	T
Green	G
Black	Bk

Example of the use of the form on the previous page.

THIS SIDE UP

O	O		W	W		G	R
O			R	R		O	O
O							
O			Y	Y	Y	O	O
O	O		Y	Y	Y	G	R
	O		Y	Y	Y		
O	O		Y			W	W
O			R	R	W		

Background colour (other than light grey) =

Inscription colour (other than black) =

INSTRUCTIONS:

1. Indicate colours required by inserting codes provided into the relevant areas of the grid above.
2. If non-standard colours required indicate in table 1, providing relative Sericol Universal Colour Guide references (SCG).
3. If no colour is indicated for a key area, that area will be the same colour as the background.
4. To indicate that a l.e.d. is to be visible indicate by means of 'X' in the boxes provided within the relevant keys.

Example:-

Red key with visible l.e.d.

R	X
---	---

Colour	Code
White	W
Yellow	Y
Orange	O
Red	R
Magenta	M
Blue	B
Turquoise	T
Green	G
Black	Bk

8872 MEMBRANE KEYBOARD

Appendix 2

SPECIAL KEYCODES

The user is recommended to photocopy this page as required.

THIS SIDE UP

INSTRUCTIONS:

1. Indicate codes required by insertion in the relevant positions of the grid above.
2. Use hexadecimal codes with prefix @.
3. For unused keypad i.e. code = @ 00 indicate thus,

Example:-

Code to be generated is @ 16.

@ 16



Note The Company's policy is one of continuous development and improvement and therefore the right is reserved to supply products which may differ in detail from those described and illustrated in this publication. All our products and materials are sold subject to Conditions of Sale available from us on request

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