GEC Electrical Projects Limited
GEC Industrial Controls Limited
GEM 80

DESCRIPTION

The lamp driver unit provides a low cost interface for driving individual lamps and indicators from a GEM 80 system.

The unit is housed in a compact steel box designed for easy mounting on control panels or inside desks. It has plug and socket connections for the wiring to the lamps and to the GEM 80 basic I/O highway ribbon cable.

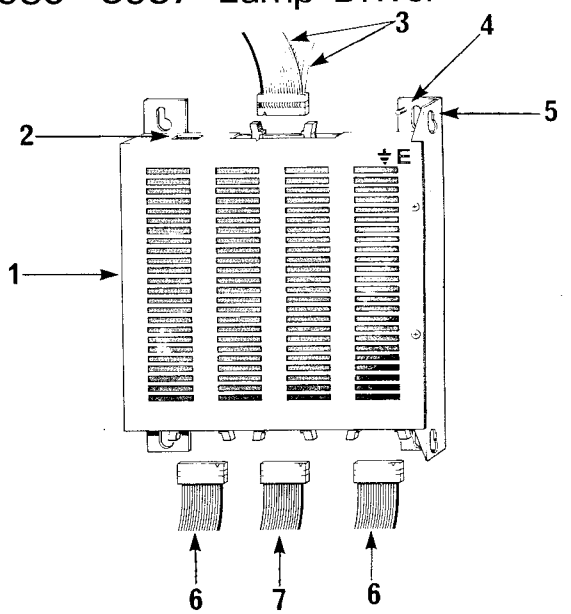
FEATURES

- Low cost
- Simple wiring to user's lamps
- Easily replaceable
- Edge or flat mounting
- Suitable for simple full wave rectified unsmoothed power supply.

SPECIFICATION

Number of outputs	:	32
Each output:-		
Load current	:	200 mA r.m.s. max.
Leakage in OFF state	:	10 μA max.
Output resistance	:	4 ohm typical at 25°C : 5 ohm typical at 60°C
Short circuit current	:	400 mA ±30%
Overload protection	:	None fitted. In the event of a sustained overload the output device will fail to open circuit.
Lamp power supplies	:	independent power input for each group of 8 outputs.
	:	each supply 60V d.c. peak maximum, 10V d.c. r.m.s. minumum.

8936-8937 Lamp Driver



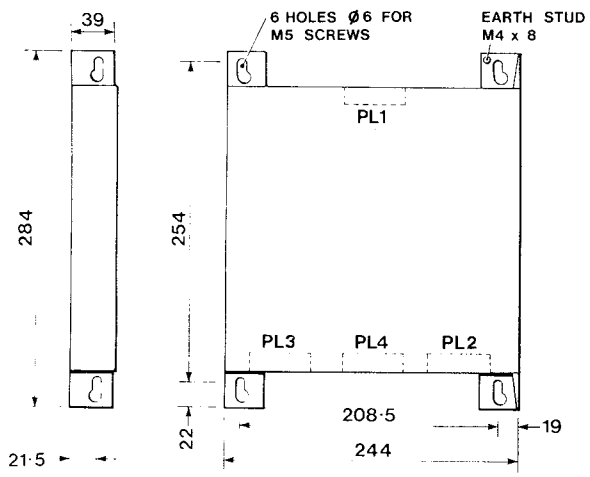
1. Folded steel box
2. Unit address setting (rotary switch accessible through window)
3. Basic I/O highway ribbon cable
4. Earth stud
5. Mounting flange
6. Plant cables each for wiring to 16 lamps
7. Lamp power supply cable

8936 = unit only; 8937 = 8936 + set of cables

Isolation	:	each group of 8 outputs isolated from each other and optically isolated from basic I/O highway.
Mounting	:	flat against horizontal or vertical surface.
	:	edgewise against vertical surface.
	:	keyhole slots for lift-off facility.
Overall dimensions	:	284 x 244 x 39 mm (high x wide x deep).
Connections	:	plug/socket (PL1) for basic I/O highway ribbon cable.
	:	pair of plug/sockets (PL2 & PL3) for plant cables.
	:	plug/socket (PL4) for power supply cable.
	:	stud for safety earth.

Cables (included in 8937)	: 2 off plant cables (non-interchangeable) comprising connector wired to 16 twisted wire pairs, woven flat for 1 metre, and 6 metre tails.
	: 1 off power supply cable comprising connector wired to 4 twisted wire pairs, woven flat for 1 metre, and 2 metre tails.
	: cores size 16/0.2 mm, identified by colour code.
Power consumption from host controller	: 190 mA @ +15V (from basic I/O highway ribbon).
Noise segregation	: plant and power cables immune to moderate electrical noise.
	: cable segregation recommended from mains and other noise radiating wires.
Temperature	: 0 to 60°C operating : -20 to 70°C storage.
Humidity	: 10 to 90% non-condensing.
Weight	: unit 1.2 kg.
	: set of cables 3.5 kg.

Mounting details:



APPLICATION NOTES

1. UNIT ADDRESS SETTING

The setting of the decoder switch determines which pair of adjacent data table locations correspond to the unit. The even reference corresponds to connector PL2, the odd reference to PL3.

Table 1 Decoder switch settings

First basic I/O ribbon			Second basic I/O ribbon		
Unit references			Unit references		
Cable at PL3	Cable at PL2	Decoder switch setting	Cable at PL3	Cable at PL2	Decoder switch setting
B1	B0	0	B17	B16	0
B3	B2	1	B19	B18	1
B5	B4	2	B21	B20	2
B7	B6	3	B23	B22	3
B9	B8	4	B25	B24	4
B11	B10	5	B27	B26	5
B13	B12	6	B29	B28	6
B15	B14	7	B31	B30	7

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

2. ADDRESSES OF INDIVIDUAL OUTPUTS

The plant cables contain a twisted pair of wires for each output, with the state number indicated by the wire colours.
The common (supply positive) in each pair is identified by white stripes. For example output B2.7 (state no. 7) is coded black with white stripes for the common, violet for the signal.

Table 2 Colour coding of plant cables

State No	Wire colour: Common (white stripes)	Wire colour: Signal (-ve)	State No	Wire colour: Common (white stripes)	Wire colour: Signal (-ve)
0	Black	Black	8	Black	Grey
1	Black	Brown	9	Black	White
2	Black	Red	10	Brown	Black
3	Black	Orange	11	Brown	Brown
4	Black	Yellow	12	Brown	Red
5	Black	Green	13	Brown	Orange
6	Black	Blue	14	Brown	Yellow
7	Black	Violet	15	Brown	Green

Cable identification : white sleeve on cable for PL2
red sleeve on cable for PL3

Table 3 Colour coding of power cable

Unit reference	State Nos	Wire colour: +ve	Wire colour: -ve (white stripes)	Remarks
Even	0 to 7	Brown	Black	Power for outputs via cable at PL2
Even	8 to 15	Red	Black	
Odd	0 to 7	Orange	Black	Power for outputs via cable at PL3
Odd	8 to 15	Yellow	Black	

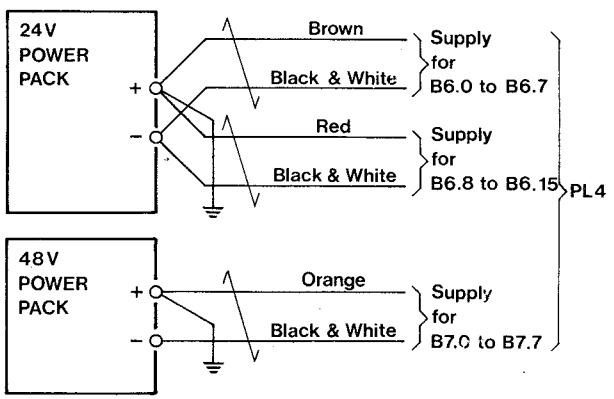
Cable identification : black sleeve on cable for PL4.
Note : The four incoming supplies can be from independent sources of different voltages, or can be connected in parallel to utilize the same supply.

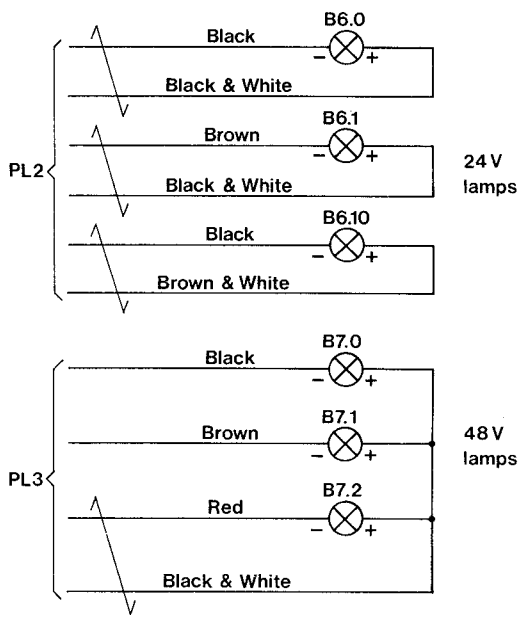
3. USER CONNECTIONS

The plant cables are intended for termination directly on the terminals of the user's lamps, indicators etc. The user can provide intermediate terminals and additional wire for any devices more than 7 metres of cable run from the unit.

The provision of a common wire for each output simplifies the wiring to individual lamps. If, however, the user's lamps are grouped with one side commoned then only one common connection is necessary per group of 8 inputs (states 0 to 7, or 8 to 15). The unused common wires can be cut back and discarded.

4. TYPICAL CIRCUITS





Remarks:-

Unit reference B6/B7 assumes unit connected to first basic I/O ribbon and decoder setting 3.

5. CONFIGURATION DATA

Configuration data in the preset data table of the host GEM 80 controller defines which addresses are scanned on the basic I/O highway. A lamp driver unit is equivalent to a panel full of logic output blocks. It will not respond to block presence sensing.

6. NOISE SEGREGATION

The optical isolation within the lamp driver provides immunity from a moderate amount of electrical noise, typically as encountered using a "rough" d.c. supply for the lamps, and as picked up by long wires to remote lamps.

A common requirement in desks and control panels is a mixture of switches and lamps connected to contact input units and lamp driver units respectively. To avoid having to segregate the contact wiring from the lamp wiring, it is recommended that they should both be treated as noise sensitive. This would introduce the need for noise filters on the lamp supplies if they come from a noisy environment e.g. filters in the d.c. rails if a supply shared with "noisy" I/O blocks, or mains filters if a separate power pack is used. Noise pick-up would also set a practical limit on the length of wires to remote lamps.

7. EARTHING OF LAMP SUPPLIES

An earth connection should always be used to prevent the lamp supplies from "floating". If possible it is preferable to earth the positive side of the supply, so that an earth fault on the common connection to the lamps does not short circuit the power supply.

If a lamp driver shares a power supply with some I/O blocks then the negative side of the supply should be earthed, and a fuse (typically 2A) should be included in the power distribution to the lamp driver.

8. USER ASSEMBLY OF CABLES

Some users who have the appropiate tools and facilities may prefer to assemble the plant cables and power cable specifically for the application.

Table 4 Pin numbering of plant connector

State No	Pin No Signal	Pin No Common	State No	Pin No Signal	Pin No Common
				PL2 PL3	PL2 PL3
0	1	2	8	19 17	20 18
1	3	4	9	21	22
2	5	6	10	23	24
3	7	8	11	25	26
4	9	10	12	27	28
5	11	12	13	29	30
6	13	14	14	31	32
7	15	16	15	33	34

Mechanical interlock : PL2 position 17
: PL3 position 19

Table 5 Pin numbering of power connector

Unit reference	State Nos	Pin No Power input +ve	Pin No Power input -ve	Pin No Lamp test Test input	Pin No Lamp test Supply -ve	Remarks
Even	0 to 7	1	2	3	4	Outputs
Even	8 to 15	5	6	7	8	via PL2
Odd	0 to 7	9	10	11	12	Outputs
Odd	8 to 15	13	14	15	16	via PL3

Mechanical interlock : position 19
Chassis : pins 18 and 20
Internally linked : 2 to 4, 6 to 8, 10 to 12, 14 to 16

Suitable parts manufactured by Yamaichi:-

UFS-34B-01	34 way connector for PL2 & PL3.
UFS-34B cover	Optional cover.
UFS-20B-01	20 way connector for PL4.
UFS-20B cover	Optional cover.
UFS contact	One per wire. Suitable for 16/0.2 mm.
UFS polarising key	One per connector for mechanical interlock.

9. LAMP TEST

For most applications a lamp test facility may be achieved by connecting a logic input to the host GEM 80 controller, and arranging the user program to switch on the appropiate group of outputs. An "off-line" test facility may be obtained using the "write" mode of the portable programmer to force the outputs on with the controller status "halted".

If neither of the above techniques is suitable then the user can wire a local "lamp test" switch directly into the lamp driver unit, by adding extra wires to the power connector PL2. A pair of pins is provided for each group of lamps; when a contact links the pair (resistance <400 ohm) the group is switched on. The lamp test signals are 5V logic level, requiring precious metal contacts and wiring segregation from noisy wiring. If the negative side of the lamp supply is common to more than one group of lamps then the corresponding lamp test inputs can be connected in parallel to a single contact; otherwise an individual isolated contact has to be used for each group.

ORDERING CODES

1. EQUIPMENT

Lamp driver unit (excluding cables)	8936
Lamp driver equipment comprising unit type 8936, a pair of 7 metre plant cables, and a ? metre power cable.	8937

2. LOOSE ITEMS

Printed circuit assembly	8102-4002
Box	8892-4101
Plant cable for PL2 - 7 metre	40Y 2479-10
Plant cable for PL3 - 7 metre	40Y 2479-30
Power cable for PL4 - 3 metre	40Y 2486-10

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