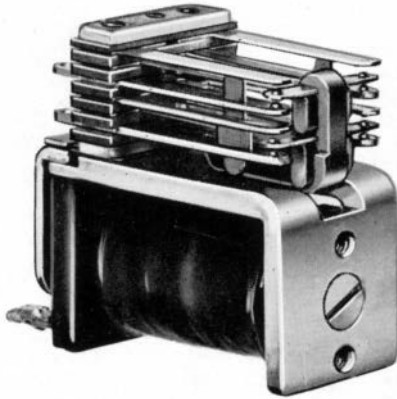


**G.E.C.**  
**Miniature**  
**Relays**

THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND

# G.E.C.

## Miniature Relays . . . .



*Normal (general purpose) type. For sealing in metal case or for inclusion in sealed equipment.*

*. . . . electro-magnetic relays of small size, light weight and simple and robust construction, developed by the G.E.C. for use in equipments required to function under conditions of considerable shock, wide temperature range and extreme climatic conditions. Sealed and low loss, low-capacitance type miniature relays are type approved by the British Ministry of Supply.*

- TYPES.** Relays are available in the following types :—
- |                                      |   |
|--------------------------------------|---|
| Sealed, normal (general purpose).    | } Flying lead type &<br>Solid tag type. |
| Sealed, heavy duty.                  |   |
| Unsealed, normal (general purpose).  |   |
| Unsealed, heavy duty.                |   |
| Unsealed, low loss, low capacitance. |   |

**CONSTRUCTION.** The armature, L-shaped polepiece and wound coil are of a design that conserves space without seriously increasing the reluctance of the magnetic circuit in comparison with other designs. Half the thickness of the pole-piece is cut away for a short distance at the armature end to form a pivot into which the armature is fitted, to pivot on flat springs anchored to the polepiece. This variation from the more conventional knife-edged pivot suspension prevents displacement of the armature by shock.

An extension of the armature is accommodated in a longitudinal slot in the long side of the polepiece. At the far end of the extension a moulded operating piece is riveted, which directly operates the moving springs of the relay.

**COILS.** The relays are normally fitted with single-wound coils, with a resistance range of 2 ohms to 7600 ohms, for operation on voltages ranging from 2.3 volts DC to 80 volts DC.

Sensitivity is from 200 to 400 milliwatts, according to the number of springs in the springsets, with a normal contact pressure of 20 grammes on both *make* and *break* contacts.

**UNSEALED TYPES.** Unsealed normal, heavy duty and low loss relays are available for inclusion in apparatus that will itself be entirely sealed, and for other applications.

Unsealed relays of all types require higher operating currents than the sealed variety as the increased insulation necessary reduces the winding space.

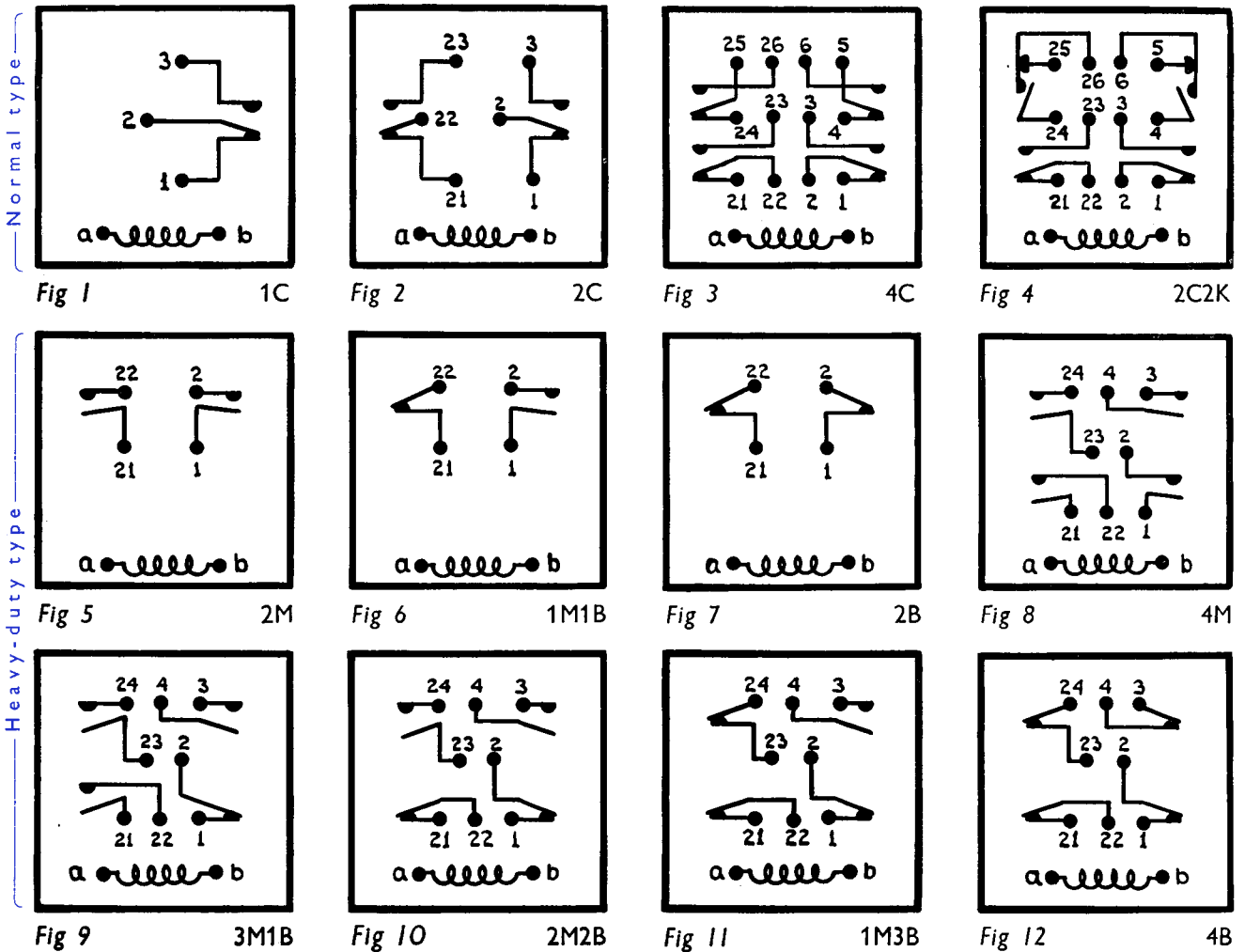
**OPERATING LIMITS.** Correct operation of the relays is ensured within an ambient temperature range of  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$  in atmospheres of relative humidity up to 100%.

The total energy that may be dissipated in heat by an operated miniature relay is approximately 1.5 watts at  $71^{\circ}\text{C}$  ambient temperature.

# Sealed types

## NORMAL AND HEAVY DUTY

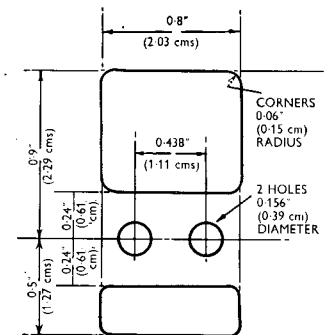
Typical schematic diagrams of springset and coil connexions for sealed miniature relays, showing lay-out of tags on tag plates



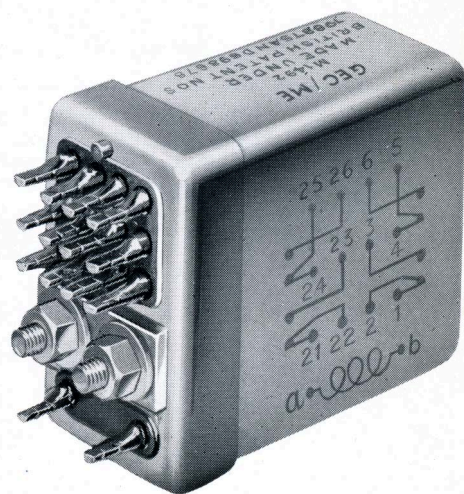
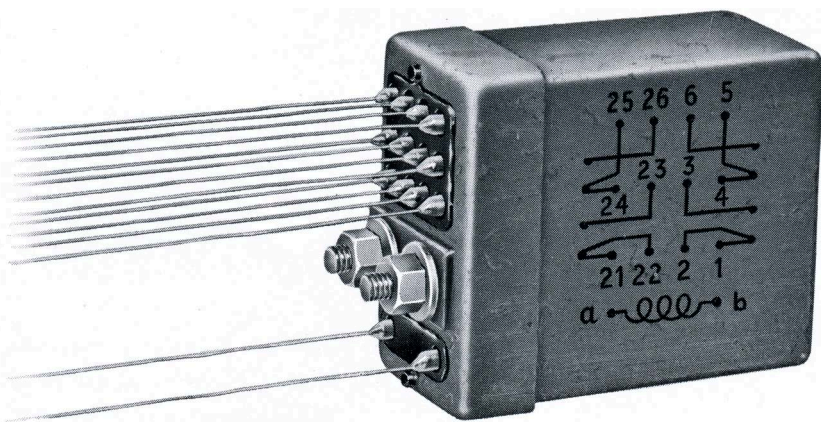
**SPRINGSETS.** For the normal and heavy-duty sealed types the springsets are built up with flat springs and the complete assembly is fixed to the armature end of the polepiece.

The normal type can be fitted with one, two or four *change-over* (C) contact spring arrangements or a combination of two C and two *make-before-break* (K) with a maximum of twelve springs (two piles of six each). The springs are of nickel-silver, carrying platinum contacts.

The heavy-duty type is restricted to *make* (M) and *break* (B) contacts, with a maximum of eight springs (two piles of four each). The springs are of phosphor-bronze, carrying large sintered-silver-nickel contacts, or large silver contacts, as requested.



Mounting plate drilling, (actual size).



*A schematic diagram showing the springset and coil connexions is printed on the side and the coding and resistance value are given on the end of the case.*

**SEALING.** The method of hermetically sealing the relay in a metal case is a distinctive feature and ensures the maximum protection against the most adverse atmospheric conditions.

After adjustment and inspection, soldered connexions from the contact springs and coil tags are brought out through sealed holes in an insulating plate, which is part of the lid assembly. Special heat-resisting synthetic rubber is used for the washers and gaskets in the assembly. After the lid has been fitted under pressure to the case the joint is soldered to ensure an airtight seal.

**MOUNTING.** SEALED TYPES. A small metal plate, carrying two No. 4 B.A. screwed studs with washers and nuts, is provided on the lid to facilitate mounting on a baseplate.

## Unsealed types

## NORMAL, HEAVY DUTY AND LOW LOSS—LOW CAPACITANCE

**SPRINGSETS.** The springset of the unsealed, low-capacitance type comprises a two *change-over* (C) arrangement of silver-plated phosphor-bronze springs of special design, carrying platinum contacts. Particular attention has been paid to the provision of long leakage paths over the surfaces of the insulating material and to the minimising of the appearance of a dielectric other than air in the electrostatic field between adjacent contact springs.

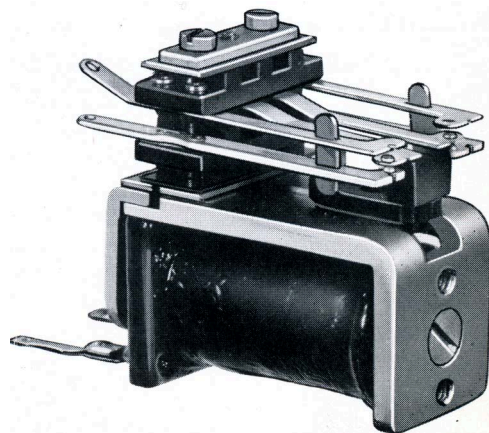
In place of the usual pile-up of springs and insulators, the springs are riveted to insulating mouldings and the assembled springset unit is fixed to the polepiece by means of screws which pass through the moulding but not through the springs.

The maximum capacitance between any two springs, or any spring and the frame is  $3\mu\text{F}$  measured at frequencies between 100kc/s and 1 Mc/s.

This type is available in the unsealed condition only, since sealing in a metal case would materially increase the capacitance and thereby defeat the main object of the special springset construction. The design of the relay, however, is such as will ensure a satisfactory performance under tropical climatic conditions. Circuit connexions are soldered directly to the contact springs and coil tags on the relay.

The springsets of the unsealed normal and heavy-duty types are the same as those employed in the corresponding sealed types.

**MOUNTING.** UNSEALED TYPES. Two No. 6 B.A. tapped holes are provided in the heel end of the polepiece to take fixing screws.



*Low loss, low capacitance, unsealed type.*

## Operating Data for Springset Combinations

Nominal coil voltage DC	Coil resistance ohms, $\pm 5\%$	Operating current in milliamps					
		Normal, sealed			Heavy duty, sealed		Low capacitance unsealed
		1C	2C	4C4K 2C2K	2M, 1M1B or 2B	4M, 3M1B, 2M2B, 1M3B or 4B	
1.3	2	310	360	410	360	410	380
6	40	72	85	89	85	89	85
12	180	32	38	39.7	38	39.7	42
24	670	18	21	21.4	21	21.4	23
48	2500	10	11	11.5	11	11.5	14
65	5000	6.5	7.5	9.5	7.5	9.5	11
80	7600	5.3	6.0	8.5	6.5	8.5	6.5

## SPARK QUENCHING

Spark - quench protection should be given to contacts that are required to operate in inductive circuits. The most effective spark-quench comprises a paper-dielectric capacitor with a non-inductive resistor, which may be inherent in or external to the capacitor. Suitable capacitors and resistors are listed in Sections CC and RS of the G.E.C. Telecommunication Apparatus Catalogue.

### Contact Rating

Type	Maximum current carried by contacts at various voltages	
	Amps.	Volts
Normal, sealed and unsealed	$\left\{ \begin{array}{l} 0.1 \\ 1 \end{array} \right.$	300 volts DC or AC, R.M.S. 60 volts DC
Heavy duty, sealed and unsealed } large silver contacts	$\left\{ \begin{array}{l} 2 \\ 4 \end{array} \right.$	60 volts DC 30 volts AC
Heavy duty, sealed and unsealed } silver nickel contacts	$\left\{ \begin{array}{l} 2 \\ 4 \\ 4 \end{array} \right.$	300 volts DC 300 volts AC, R.M.S. 60 volts DC or AC, R.M.S.
Unsealed, low capacitance.	$\left\{ \begin{array}{l} 0.1 \\ 0.1 \\ 1 \end{array} \right.$	300 volts DC 50 volts AC, R.M.S. up to 300 Mc/s. 60 volts DC

### Voltage Rating for Coil and Springset Insulation

All types	Maximum working voltage	Flash test voltage
Coil insulation	110 volts DC	500 volts AC, R.M.S.
Springset insulation	300 volts DC	1000 volts AC, R.M.S.

### Dimensions and Weights

Type	Overall height, springs over coil		Width		Overall length		Maximum weight	
	ins	cms	ins	cms	ins	cms	ozs	kg
Sealed	1 $\frac{3}{4}$	4.45	1	2.54	2 $\frac{1}{2}$	6.35	5	0.142
Unsealed	1 $\frac{1}{8}$	4.29	$\frac{7}{8}$	2.23	2 $\frac{3}{16}$	5.56	3	0.085

The overall length of the sealed types includes the fixing studs, but not the lead-out wires. These are bare tinned-copper wire 12ins. (30.5cms) long, No. 23 S.W.G. for Normal types and No. 20 S.W.G. for Heavy-Duty types.

## ORDERING INFORMATION

SEALED RELAYS											
Catalogue Numbers						Catalogue Numbers					
Flying Leads	Solid Tags	Type	Nominal Voltage	Coil Resistance	Contacts	Flying Leads	Solid Tags	Type	Nominal Voltage	Coil Resistance	Contacts
MR1018	MR1418	Normal	1.3	2	1C	MR1096	MR1496	Hy. Duty	24	670	1M1B
MR1078	MR1478	"	6	40	1C	MR1062	MR1462	"	48	2500	1M1B
MR1086	MR1486	"	12	180	1C	MR1070	MR1470	"	65	5000	1M1B
MR1094	MR1494	"	24	670	1C	MR1186	MR1586	"	80	7600	1M1B
MR1022	MR1422	"	48	2500	1C	MR1208	MR1608	"	1.3	2	2B
MR1108	MR1508	"	65	5000	1C	MR1156	MR1556	"	6	40	2B
MR1152	MR1552	"	80	7600	1C	MR1217	MR1617	"	12	180	2B
MR1009	MR1409	"	1.3	2	2C	MR1153	MR1553	"	48	2500	2B
MR1077	MR1477	"	6	40	2C	MR1205	MR1605	"	65	5000	2B
MR1085	MR1485	"	12	180	2C	MR1181	MR1581	"	80	7600	2B
MR1100	MR1500	"	24	670	2C	MR1193	MR1593	"	1.3	2	4M
MR1013	MR1413	"	48	2500	2C	MR1163	MR1563	"	6	40	4M
MR1052	MR1452	"	65	5000	2C	MR1119	MR1519	"	12	180	4M
MR1127	MR1527	"	80	7600	2C	MR1113	MR1513	"	24	670	4M
MR1025	MR1425	"	1.3	2	4C	MR1135	MR1535	"	48	2500	4M
MR1076	MR1476	"	6	40	4C	MR1147	MR1547	"	65	5000	4M
MR1084	MR1484	"	12	180	4C	MR1206	MR1606	"	80	7600	4M
MR1092	MR1492	"	24	670	4C	MR1063	MR1463	"	1.3	2	2M2B
MR1008	MR1408	"	48	2500	4C	MR1079	MR1479	"	6	40	2M2B
MR1102	MR1502	"	65	5000	4C	MR1087	MR1487	"	12	180	2M2B
MR1130	MR1530	"	80	7600	4C	MR1095	MR1495	"	24	670	2M2B
MR1050	MR1450	"	1.3	2	2C2K	MR1066	MR1466	"	48	2500	2M2B
MR1082	MR1482	"	6	40	2C2K	MR1053	MR1453	"	65	5000	2M2B
MR1090	MR1490	"	12	180	2C2K	MR1182	MR1582	"	80	7600	2M2B
MR1093	MR1493	"	24	670	2C2K	MR1164	MR1564	"	6	40	4B
MR1017	MR1417	"	48	2500	2C2K	MR1165	MR1565	"	12	180	4B
MR1107	MR1507	"	65	5000	2C2K	MR1146	MR1546	"	24	670	4B
MR1210	MR1610	"	80	7600	2C2K	MR1194	MR1594	"	48	2500	4B
MR1174	MR1574	"	12	180	4K	MR1184	MR1584	"	80	7600	4B
MR1167	MR1567	"	24	670	4K	MR1178	MR1578	"	6	40	3M1B
MR1207	MR1607	"	48	2500	4K	MR1215	MR1615	"	12	180	3M1B
MR1054	MR1454	Hy. Duty	1.3	2	2M	MR1129	MR1529	"	24	670	3M1B
MR1081	MR1481	"	6	40	2M	MR1116	MR1516	"	48	2500	3M1B
MR1089	MR1489	"	12	180	2M	MR1148	MR1548	"	65	5000	3M1B
MR1099	MR1499	"	24	670	2M	MR1199	MR1599	"	80	7600	3M1B
MR1058	MR1458	"	48	2500	2M	MR1183	MR1583	"	6	40	1M3B
MR1180	MR1580	"	65	5000	2M	MR1223	MR1623	"	12	180	1M3B
MR1213	MR1613	"	80	7600	2M	MR1168	MR1568	"	24	670	1M3B
MR1059	MR1459	"	1.3	2	1M1B	MR1221	MR1621	"	48	2500	1M3B
MR1080	MR1480	"	6	40	1M1B	MR1154	MR1554	"	65	5000	1M3B
MR1088	MR1488	"	12	180	1M1B	MR1155	MR1555	"	80	7600	1M3B

C—Change-over, K—Make-before-break, M—Make, B—Break.

The above list is typical of the wide range of relays that can be supplied. The Company will be pleased to give immediate attention to specific enquiries.

The Catalogue Numbers quoted above supersede those in leaflet MRL1A.

UNSEALED RELAYS			
Cat. No.	Nominal Voltage	Coil Resistance	Contact
MR1074	1.3	2	2C
MR1083	6	40	2C
MR1091	12	180	2C
MR1097	24	670	2C
MR1071	48	2500	2C

### ENQUIRIES AND ORDERS

*When these are cabled, catalogue numbers will suffice. In written confirmation please quote the type, the operating coil-voltage and the spring combinations.*

For all telecommunication equipment consult:—

**THE GENERAL ELECTRIC CO. LTD. OF ENGLAND**

TELEPHONE, RADIO AND TELEVISION WORKS	COVENTRY	ENGLAND
Coventry 52152 (15 lines)	New Standard A.B.C. (5th Edition) Bentley, Western Union	"Springjack Coventry"

HEAD OFFICE: MAGNET HOUSE Temple Bar 8000 (90 lines)	KINGSWAY Cables: "Polyphase London"	LONDON "Electricity, Westcent, London"
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THE LARGEST BRITISH ELECTRICAL MANUFACTURING ORGANISATION



## MINIATURE RELAYS

The following cross-reference table is issued to assist customers to obtain readily the G.E.C. catalogue number equivalent to given Service reference numbers.

R.C.S.C. Number	Inter-Service Cat. No.	G.E.C. Cat. No.	R.C.S.C. Number	Inter-Service Cat. No.	G.E.C. Cat. No.
SM5 — N1	5945 — 99 — 053 — 0001	MR.1076	SM5 — N54	5945 — 99 — 011 — 9258	MR.1574
SM5 — N2	„ 0002	MR.1084	SM5 — N55	„ 9259	MR.1567
SM5 — N3	„ 0003	MR.1092	SM5 — N56	„ 9260	MR.1552
SM5 — N4	„ 0004	MR.1008	SM5 — N57	„ 9261	MR.1527
SM5 — N5	„ 0005	MR.1009	SM5 — H1	5945 — 99 — 053 — 0021	MR.1054
SM5 — N6	„ 0006	MR.1077	SM5 — H2	„ 0022	MR.1059
SM5 — N7	„ 0007	MR.1085	SM5 — H3	„ 0023	MR.1063
SM5 — N8	„ 0008	MR.1100	SM5 — H4	„ 0024	MR.1081
SM5 — N9	„ 0009	MR.1013	SM5 — H5	„ 0025	MR.1080
SM5 — N10	„ 0010	MR.1082	SM5 — H6	„ 0026	MR.1079
SM5 — N11	„ 0011	MR.1090	SM5 — H7	„ 0027	MR.1089
SM5 — N12	„ 0012	MR.1093	SM5 — H8	„ 0028	MR.1088
SM5 — N13	„ 0013	MR.1017	SM5 — H9	„ 0029	MR.1087
SM5 — N14	„ 0014	MR.1018	SM5 — H10	„ 0030	MR.1099
SM5 — N15	„ 0015	MR.1078	SM5 — H11	„ 0031	MR.1096
SM5 — N16	„ 0016	MR.1086	SM5 — H12	„ 0032	MR.1095
SM5 — N17	„ 0017	MR.1094	SM5 — H13	„ 0033	MR.1058
SM5 — N18	„ 0018	MR.1022	SM5 — H14	„ 0034	MR.1062
SM5 — N19	„ 0019	MR.1050	SM5 — H15	„ 0035	MR.1066
SM5 — N20	„ 0020	MR.1025	SM5 — H21	5945 — 99 — 011 — 9262	MR.1454
SM5 — N21	„ 0355	MR.1052	SM5 — H22	„ 9263	MR.1459
SM5 — N31	5945 — 99 — 011 — 9237	MR.1476	SM5 — H23	„ 9264	MR.1463
SM5 — N32	„ 9238	MR.1484	SM5 — H24	„ 9265	MR.1481
SM5 — N33	„ 9239	MR.1492	SM5 — H25	„ 9266	MR.1480
SM5 — N34	„ 9240	MR.1408	SM5 — H26	„ 9267	MR.1479
SM5 — N35	„ 9241	MR.1409	SM5 — H27	„ 9268	MR.1489
SM5 — N36	„ 9242	MR.1477	SM5 — H28	„ 9269	MR.1488
SM5 — N37	„ 9243	MR.1485	SM5 — H29	„ 9270	MR.1487
SM5 — N38	„ 9244	MR.1500	SM5 — H30	„ 9271	MR.1499
SM5 — N39	„ 9245	MR.1413	SM5 — H31	„ 9272	MR.1496
SM5 — N40	„ 9246	MR.1482	SM5 — H32	„ 9273	MR.1495
SM5 — N41	„ 9247	MR.1490	SM5 — H33	„ 9274	MR.1458
SM5 — N42	„ 9248	MR.1493	SM5 — H34	„ 9275	MR.1462
SM5 — N43	„ 9249	MR.1417	SM5 — H35	„ 9276	MR.1466
SM5 — N44	„ 9250	MR.1418	SM5 — H36	„ 9277	MR.1519
SM5 — N45	„ 9251	MR.1478	SM5 — H37	„ 9278	MR.1513
SM5 — N46	„ 9252	MR.1486	SM5 — H38	„ 9279	MR.1573
SM5 — N47	„ 9253	MR.1494	SM5 — H39	„ 9280	MR.1572
SM5 — N48	„ 9254	MR.1422		„ 10F/16903	MR.1113
SM5 — N49	„ 9255	MR.1450		„ 10F/17215	MR.1108
SM5 — N50	„ 9256	MR.1425		„ 5UC/5407	MR.1102
SM5 — N51	„ 9257	MR.1452	5D/1937	„	MR.1526

The G.E.C. catalogue numbers given above are those shown in Catalogue Leaflet MRL1B, and supersede those in Catalogue Leaflet MRL1A.

Information about the complete range of G.E.C. Miniature Relays will be supplied on application.

**THE GENERAL ELECTRIC COMPANY LIMITED OF ENGLAND.**

**TELEPHONE, RADIO AND TELEVISION WORKS, COVENTRY, ENGLAND.**