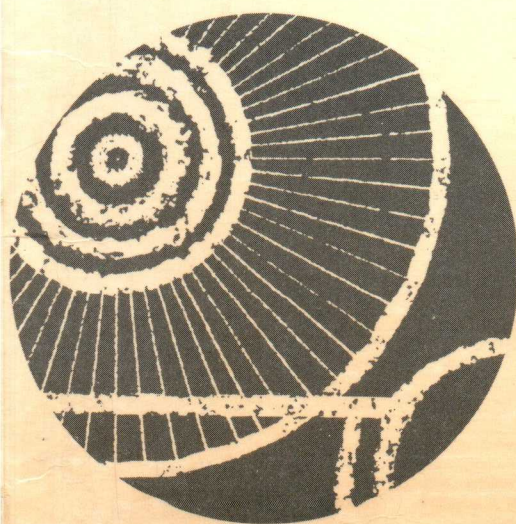


# Mullard valves and tubes

quick reference guide 1975/76



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# Mullard valves and tubes quick reference and equivalents guide 1975/76

This guide gives quick reference data on the Design and Current ranges of Mullard valves and tubes.

It also includes an equivalents guide to the valves and tubes for which Mullard types may be used as replacements.

Product information is deliberately abbreviated to give a rapid appreciation of salient characteristics, and to enable the performance of similar types to be compared quickly.

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\*Registered trade mark for television camera tubes.

# Mullard technical information service

The most important characteristics of Mullard valves and tubes are given in this guide; more comprehensive information is readily available.

## Full technical data

Individual data sheets giving complete technical data on each product may be obtained by quoting the relevant type number. In addition, laboratory reports, application notes and technical publications are issued regularly.

## Technical Handbook System

The Mullard Technical Handbook system containing complete technical data on Mullard products is made up of three sets of books, each comprising several parts. These books are easily identifiable by the colour bands on their covers:

|        |          |   |
|--------|----------|---|
| Book 1 | (blue)   | Semiconductor devices and integrated circuits |
| Book 2 | (orange) | Valves and tubes                              |
| Book 3 | (green)  | Components, materials and assemblies          |

If you require individual data sheets or any of the Mullard Technical Handbooks, they can be obtained from Mullard Limited, Central Technical Services, New Road, Mitcham, Surrey CR4 4XY (Telephone: 01-648 3471. Telex: 22194).

For the convenience of Mullard Technical Handbook users, the relevant book and part number are indicated at the top of each data table in this guide. Data sheets for some new components may still be in preparation.

## New Product Information

As a further part of the technical information service, advance details of each new product or technique are published in the Mullard Bulletin, which is sent automatically to people who have asked to be kept informed of new Mullard products.

# Index and equivalents

## Index and equivalents

The section starting opposite is an index of all Mullard valves and tubes, together with an equivalents guide of various valves and tubes for which Mullard types can be used as replacements.

For ease of reference all types are listed in alpha-numerical order in the 'Type Number Index' column which includes Mullard, CV, American/E.I.A., and types from other manufacturers.

# Status code

In view of the wide variety of Mullard types, and in order that their status may be readily assessed, the following coding has been used:

- D Design Type.** Recommended for new equipment designs.
- C Current Type.** Available for equipment production and use in existing equipment installations. No longer recommended for new equipment designs.

- M Maintenance Type.** Available for the maintenance of existing equipments only. No longer recommended for equipment production.
- O Obsolete Type.** No longer generally available, although in some cases limited stocks may still exist.
- S Special Type.** Subject to negotiation at time of ordering.



## Index and equivalents

| Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           |
|-------------------|----------------------|--------|-----------|-------------------|----------------------|--------|-----------|-------------------|----------------------|--------|-----------|
|                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |
| A28-14W           | <b>A28-14W</b>       | M      |           | B152              | † <b>ECC81</b>       | M      |           | CME2303           | <b>A59-15W</b>       | M      |           |
| A31-120W          | <b>A31-120W</b>      | M      |           | B309              | † <b>ECC81</b>       | M      |           | CME2305           | <b>A59-23W</b>       | M      |           |
| A31-410W          | <b>A31-410W</b>      | D      | 11        | B310AL/01         | <b>B310AL/01</b>     | D      | 24        | CME2308           | <b>A59-15W</b>       | M      |           |
| A31-510W          | <b>A31-510W</b>      | D      | 11        | B310BL/01         | <b>B310BL/01</b>     | D      | 24        | CME2312           | <b>A59-23W</b>       | M      |           |
| A34-510W          | <b>A34-510W</b>      | D      | 11        | B312AL/01         | <b>B312AL/01</b>     | D      | 24        | CME2313R          | <b>A59-23W/R</b>     | M      |           |
| A44-13W           | <b>A44-120W</b>      | D      | 11        | B312BL/01         | <b>B312BL/01</b>     | D      | 24        | CME2313S          | <b>A59-23W</b>       | M      |           |
| A44-120W          | <b>A44-120W</b>      | D      | 11        | B318AL/01         | <b>B318AL/01</b>     | D      | 24        | CME2413R          | <b>A61-120W/R</b>    | D      | 11        |
| A44-120W/R        | <b>A44-120W/R</b>    | D      | 11        | B318BL/01         | <b>B318BL/01</b>     | D      | 24        | CME2501           | <b>A65-11W</b>       | O      |           |
| A44-510W          | <b>A44-510W</b>      | D      | 11        | B319              | <b>PCC84</b>         | M      |           | CMG29             | <b>90CG</b>          | C      | 19        |
| A47-11W           | <b>A47-26W</b>       | M      |           | B329              | † <b>ECC82</b>       | C      | 12        | CMV29             | <b>90CV</b>          | C      | 19        |
| A47-14W           | <b>A47-14W</b>       | M      |           | B330AL/01         | <b>B330AL/01</b>     | D      | 24        | CR1100            | <b>QY5-3000A</b>     | D      | 26        |
| A47-15W           | <b>A47-14W</b>       | M      |           | B330BL/01         | <b>B330BL/01</b>     | D      | 24        | CV26              | <b>QY2-100</b>       | M      |           |
| A47-17W           | <b>A47-26W</b>       | M      |           | B339              | † <b>ECC83</b>       | M      | 12        | CV131             | † <b>EF92</b>        | M      | 12        |
| A47-18W           | <b>A47-26W</b>       | M      |           | B410AL/01         | <b>B410AL/01</b>     | D      | 24        | CV138             | † <b>EF91</b>        | M      | 12        |
| A47-25W           | <b>A47-26W</b>       | M      |           | B410BL/01         | <b>B410BL/01</b>     | D      | 24        | CV140             | † <b>EB91</b>        | M      |           |
| A47-26W           | <b>A47-26W</b>       | M      |           | B413AL/01         | <b>B413AL/01</b>     | D      | 24        | CV283             | † <b>6AL5</b>        | M      |           |
| A47-26W/R         | <b>A47-26W/R</b>     | M      |           | B413BL/01         | <b>B413BL/01</b>     | D      | 24        | CV417             | † <b>EC91</b>        | M      |           |
| A47-27W           | <b>A47-26W</b>       | M      |           | B419AL/01         | <b>B419AL/01</b>     | D      | 24        | *CV424            | <b>QQV06-40A</b>     | C      | 26        |
| A47-28W           | <b>A47-26W</b>       | M      |           | B419BL/01         | <b>B419BL/01</b>     | D      | 24        | CV426             | <b>EY51</b>          | O      |           |
| A47-28W/R         | <b>A47-26W/R</b>     | M      |           | B719              | <b>ECC85</b>         | M      |           | CV455             | † <b>ECC81</b>       | M      |           |
| A49-11X           | <b>A49-120X</b>      | M      |           | B1135             | <b>TY4-400</b>       | C      | 27        | CV491             | † <b>ECC82</b>       | C      | 12        |
| A49-15X           | <b>A49-120X</b>      | M      |           | B1152             | <b>TY5-500</b>       | D      | 29        | CV492             | † <b>ECC83</b>       | M      | 12        |
| A49-18X           | <b>A49-120X</b>      | M      |           | *B5031            | <b>ZM1020</b>        | C      | 25        | CV495             | <b>CV495</b>         | O      |           |
| A49-191X          | <b>A49-120X</b>      | M      |           | BK24              | <b>ZX1052</b>        | M      |           | CV635             | <b>TY4-350</b>       | M      |           |
| A49-120X          | <b>A49-120X</b>      | M      |           | BK24B             | <b>ZX1052</b>        | M      |           | CV850             | † <b>EF95</b>        | M      | 12        |
| A49-200X          | <b>A49-120X</b>      | M      |           | BK24C             | <b>ZX1052</b>        | M      |           | CV1351            | <b>TY4-500</b>       | D      | 27, 29    |
| A50-120W          | <b>A50-120W</b>      | D      | 11        | BK34              | <b>ZX1053</b>        | M      |           | CV1375            | <b>EF85</b>          | M      |           |
| A50-120W/R        | <b>A50-120W/R</b>    | D      | 11        | BK34B             | <b>ZX1053</b>        | M      |           | CV1376            | <b>EF80</b>          | M      |           |
| A56-120X          | <b>A56-120X</b>      | D      | 11        | BK42              | <b>ZX1051</b>        | M      |           | CV1377            | <b>GZ34</b>          | M      |           |
| A56-140X          | <b>A56-140X</b>      | M      |           | BK42B             | <b>ZX1051</b>        | M      |           | CV1535            | <b>EZ80</b>          | M      |           |
| A56-410X          | <b>A56-410X</b>      | D      | 11        | BK42C             | <b>ZX1051</b>        | M      |           | CV1741            | <b>EL34</b>          | M      |           |
| A56-500X          | <b>A56-500X</b>      | D      | 11        | BK146             | <b>ZX1053</b>        | M      |           | CV1905            | <b>QY3-65</b>        | M      |           |
| A59-11W           | <b>A59-23W</b>       | M      |           | BK146B            | <b>ZX1053</b>        | M      |           | CV1924            | <b>TY2-125</b>       | C      | 27, 29    |
| A59-12W           | <b>A59-23W</b>       | M      |           | BK168B            | <b>ZX1061</b>        | M      |           | CV2128            | <b>ECH81</b>         | M      |           |
| A59-15W           | <b>A59-15W</b>       | M      |           | *BR191            | <b>TY6-5000A</b>     | D      | 27        | CV2130            | <b>QY3-125</b>       | D      | 26        |
| A59-23W           | <b>A59-23W</b>       | M      |           | C19/7A            | <b>A47-14W</b>       | M      |           | CV2131            | <b>QY4-250</b>       | D      | 26        |
| A59-23W/R         | <b>A59-23W/R</b>     | M      |           | C19/10A           | <b>A47-14W</b>       | M      |           | CV2132            | <b>92AV</b>          | C      | 19        |
| A59-25W           | <b>A59-23W</b>       | M      |           | C19AK             | <b>A47-14W</b>       | M      |           | CV2133            | <b>90CG</b>          | C      | 19        |
| A61-120W          | <b>A61-120W</b>      | D      | 11        | C23/7A            | <b>A59-15W</b>       | M      |           | CV2134            | <b>90CV</b>          | C      | 19        |
| A61-120W/R        | <b>A61-120W/R</b>    | D      | 11        | C23/10A           | <b>A59-15W</b>       | M      |           | *CV2175           | <b>DG7-5</b>         | O      |           |
| A63-11X           | <b>A63-120X</b>      | M      |           | C23AK             | <b>A59-15W</b>       | M      |           | CV2235            | † <b>EY84</b>        | M      |           |
| A63-120X          | <b>A63-120X</b>      | M      |           | C143              | <b>QY2-100</b>       | M      |           | CV2269            | <b>CV2269</b>        | C      |           |
| A63-200X          | <b>A63-120X</b>      | M      |           | C178A             | <b>QQV06-40A</b>     | C      | 26        | CV2270            | <b>92AG</b>          | C      | 19        |
| A65-11W           | <b>A65-11W</b>       | O      |           | C1108             | <b>QY3-125</b>       | D      | 26        | CV2302            | <b>DH3-91</b>        | D      | 14        |
| A66-120X          | <b>A66-120X</b>      | D      | 11        | C1112             | <b>QY4-250</b>       | D      | 26        | CV2348            | <b>CV2348</b>        | O      |           |
| A66-140X          | <b>A66-140X</b>      | M      |           | C1136             | <b>QY4-400</b>       | D      | 26        | CV2387            | <b>CV2387</b>        | S      |           |
| A66-410X          | <b>A66-410X</b>      | D      | 11        | CAG29             | <b>92AG</b>          | C      | 19        | CV2411            | <b>CV2411</b>        | S      |           |
| A66-500X          | <b>A66-500X</b>      | D      | 11        | CAV29             | <b>92AV</b>          | C      | 19        | CV2466            | <b>QQV02-6</b>       | C      | 26        |
| *A1834            | <b>6080</b>          | M      |           | CCa               | § <b>E88CC</b>       | M      | 12        | CV2469            | <b>CV2469</b>        | S      |           |
| ACS4              | <b>QY5-3000A</b>     | D      | 26        | CEM4010           | <b>B330AL/01</b>     | D      | 24        | CV2492            | § <b>E88CC</b>       | M      | 12        |
| AR10              | <b>ZX1052</b>        | M      |           |                   | <b>B330BL/01</b>     | D      | 24        | CV2493            | § <b>E88CC/01</b>    | M      | 12        |
| AR10T             | <b>ZX1052</b>        | M      |           | *CEM4013          | <b>B318AL/01</b>     | D      | 24        | CV2522            | † <b>6AS6</b>        | M      | 12        |
| AR14              | <b>ZX1051</b>        | M      |           |                   | <b>B318BL/01</b>     | D      | 24        | CV2730            | <b>CV2730</b>        | O      |           |
| AR14T             | <b>ZX1051</b>        | M      |           | *CEM4028          | <b>B419AL/01</b>     | D      | 24        | CV2797            | <b>QQV06-40A</b>     | C      | 26        |
| AW47-90           | <b>A47-14W</b>       | M      |           |                   | <b>B419BL/01</b>     | D      | 24        | CV2798            | <b>QQV03-10</b>      | C      | 26        |
| AW47-91           | <b>A47-14W</b>       | M      |           | *CK571AX          | <b>CV2348</b>        | O      |           | *CV2901           | <b>EF86</b>          | M      |           |
| AW59-90           | <b>A59-15W</b>       | M      |           | *CK5886           | <b>CV2348</b>        | O      |           | CV2966            | <b>EY87</b>          | M      |           |
| AW59-91           | <b>A59-15W</b>       | M      |           | *CK5889           | <b>CV2348</b>        | O      |           | CV2975            | <b>EL84</b>          | M      |           |
| AX9900            | <b>TY2-125</b>       | C      | 27, 29    | CME1713R          | <b>A44-120W/R</b>    | D      | 11        | CV2984            | <b>6080</b>          | M      |           |
| AX9901            | <b>TY4-400</b>       | C      | 27        | CME1902           | <b>A47-14W</b>       | M      |           | †CV3508           | § <b>M8162</b>       | M      | 12        |
| AX9902            | <b>TY4-500</b>       | D      | 27, 29    | CME1903           | <b>A47-14W</b>       | M      |           | CV3522            | <b>QY5-500</b>       | D      | 26        |
| AX9903            | <b>QQV06-40A</b>     | C      | 26        | CME1905           | <b>A47-26W</b>       | M      |           | CV3523            | <b>QV06-20</b>       | M      |           |
| AX9904            | <b>TY6-5000W</b>     | D      | 27        | CME1907           | <b>A47-26W</b>       | M      |           | CV3926            | <b>TY6-5000A</b>     | D      | 27        |
| AX9904R           | <b>TY6-5000A</b>     | D      | 27        | CME1908           | <b>A47-14W</b>       | M      |           | CV3998            | § <b>E180F</b>       | M      | 12        |
| AX9907            | <b>QY5-3000W</b>     | D      | 26        | CME1913           | <b>A47-26W</b>       | M      |           | CV4003            | § <b>M8136</b>       | M      | 12        |
| AX9907R           | <b>QY5-3000A</b>     | D      | 26        | CME1913R          | <b>A47-26W/R</b>     | M      |           | CV4004            | § <b>M8137</b>       | M      | 12        |
| AX9908            | <b>QY5-500</b>       | D      | 26        | CME1913S          | <b>A47-26W</b>       | M      |           | CV4010            | § <b>M8100</b>       | M      | 12        |
| B109              | <b>UCC85</b>         | O      |           | CME2013R          | <b>A50-120W/R</b>    | D      | 11        | CV4011            | § <b>M8196</b>       | M      | 12        |
|                   |                      |        |           | CME2302           | <b>A59-15W</b>       | M      |           | CV4014            | § <b>M8083</b>       | M      | 12        |

\*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

## Index and equivalents—continued

| Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           |
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|                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |
| CV4015            | §M8161               | M      | 12        | *DF703            | CV2348               | O      |           | EC91              | †EC91                | M      |           |
| CV4024            | §M8162               | M      | 12        | DG7-5             | DG7-5                | O      |           | *EC156            | EC157                | M      |           |
| CV4031            | §M8081               | M      |           | DG7-6             | DG7-6                | O      |           | EC157             | EC157                | M      |           |
| CV4044            | §M8091               | M      |           | DG7-31            | DG7-31               | C      | 14        | EC1000            | EC1000               | O      |           |
| CV4058            | §M8080               | O      |           | DG7-32            | DG7-32               | C      | 14        | EC8010            | EC8010               | O      |           |
| CV4059            | §M8097               | O      |           | DH3-91            | DH3-91               | D      | 14        | ECC81             | †ECC81               | M      |           |
| CV4063            | §M8082               | M      |           | DH7-11            | DH7-11               | M      |           | ECC82             | †ECC82               | C      | 12        |
| CV4070            | §M8099               | O      |           | DH7-78            | DH7-78               | O      |           | ECC83             | †ECC83               | M      | 12        |
| CV4076            | §M8179               | S      |           | DH109             | UABC80               | O      |           | ECC84             | EC84                 | M      |           |
| CV5072            | EZ81                 | M      |           | DH119             | UBC81                | O      |           | ECC85             | ECC85                | M      |           |
| ‡CV5183           | §M8080               | O      |           | DH719             | EABC80               | O      |           | ECC86             | ECC86                | O      |           |
| *CV5188           | §E182CC              | M      |           | DM70              | DM70                 | O      |           | ECC88             | †ECC88               | M      |           |
| ‡CV5212           | M8162                | M      | 12        | *DM71             | DM70                 | O      |           | ECC91             | †ECC91               | O      |           |
| CV5215            | ECF80                | M      |           | DM160             | DM160                | M      | 13        | *ECC186           | †ECC82               | C      | 12        |
| ‡CV5216           | §M8100               | M      | 12        | DN7-11            | DN7-11               | O      |           | ECC189            | ECC189               | O      |           |
| CV5219            | QY5-3000A            | D      | 26        | DP7-11            | DP7-11               | M      |           | ECC230            | 6080                 | M      |           |
| ‡CV4231           | §E88CC               | M      | 12        | DP7-78            | DP7-78               | O      |           | *ECC282           | †ECC82               | C      | 12        |
| CV5239            | TY7-6000A            | D      | 27, 29    | DP61              | †EF95                | M      | 12        | ‡ECC801S          | §M8162               | M      | 12        |
| CV5278            | ZM1020               | C      | 25        | DY51              | DY51                 | O      |           | ‡ECC802S          | §M8136               | M      | 12        |
| CV5354            | §E188CC              | O      |           | DY86/87           | DY87                 | M      |           | ‡ECC803S          | §M8137               | M      | 12        |
| CV5358            | ECC88                | M      |           | DY87              | DY87                 | M      |           | ECC804            | 6/30L2/ECC804        | O      |           |
| CV5377            | CV5377               | S      |           | DY802             | DY802                | C      | 13        | ECC2000           | §ECC2000             | M      |           |
| CV5397            | EC157                | M      |           | E10-12GH          | E10-12GH             | M      |           | ECF80             | ECF80                | M      |           |
| CV5412            | DM160                | M      | 13        | E10-130GH         | E10-130GH            | M      |           | ECF82             | ECF82                | O      |           |
| CV5434            | EM84                 | M      |           | E55L              | §E55L                | M      | 13        | ECF86             | ECF86                | O      |           |
| CV5472            | §E88CC               | M      | 12        | E80CC             | §E80CC               | O      |           | ECH81             | ECH81                | M      |           |
| CV5473            | QV02-6               | C      | 26        | E80CF             | §E80CF               | M      |           | ECH83             | ECH83                | O      |           |
| CV5766            | §E182CC              | M      |           | E80F              | §E80F                | O      |           | ECH84             | ECH84                | M      |           |
| CV5808            | §E55L                | M      | 13        | E80L              | §E80L                | O      |           | ECL80             | ECL80                | M      |           |
| CV5809            | §E810F               | M      | 12, 13    | †E81CC            | §M8162               | M      | 12        | ECL82             | ECL82                | M      |           |
| CV5810            | EF184                | C      | 12        | E81L              | §E81L                | M      |           | ECL83             | ECL83                | M      |           |
| CV5831            | EF183                | M      |           | †E82CC            | §M8136               | M      | 12        | ECL86             | ECL86                | M      |           |
| CV5847            | QV07-50              | C      | 26        | †E83CC            | §M8137               | M      | 12        | EF36              | EF37A                | O      |           |
| ‡CV5937           | QV06-40A             | C      | 26        | E83F              | §E83F                | O      |           | EF37              | EF37A                | O      |           |
| CV5959            | QY4-400              | D      | 26        | E84L              | E84L                 | M      |           | EF37A             | EF37A                | O      |           |
| CV5961            | CV5961               | S      |           | E86C              | §E86C                | O      |           | EF80              | EF80                 | M      |           |
| CV5989            | §E80CC               | O      |           | E88C              | §E88C                | M      |           | EF83              | EF83                 | O      |           |
| CV6087            | LA9-3B               | S      | 30        | E88CC             | §E88CC               | M      | 12        | EF85              | EF85                 | M      |           |
| CV6094            | DM160                | M      | 13        | E88CC/01          | §E88CC/01            | M      | 12        | EF86              | EF86                 | M      |           |
| CV6099            | 6929                 | C      |           | E90CC             | §E90CC               | O      |           | EF89              | EF89                 | M      |           |
| CV6122            | QY3-65               | M      |           | E92CC             | §E92CC               | O      |           | EF91              | †EF91                | M      | 12        |
| CV6123            | OZ06-20              | M      |           | E95F              | §M8100               | M      | 12        | EF92              | †EF92                | M      | 12        |
| CV6183            | YH1060               | S      | 30        | E130L             | §E130L               | M      |           | EF95              | †EF95                | M      | 12        |
| CV6189            | CV6189               | S      |           | E180CC            | §E180CC              | O      |           | EF183             | EF183                | M      |           |
| CV6223            | LB3-250B             | S      | 30        | E180F             | §E180F               | M      | 12        | EF184             | EF184                | C      | 12        |
| CV8144            | CV8144               | O      |           | E182CC            | §E182CC              | M      |           | *EF811            | EF183                | M      |           |
| CV8330            | DG7-31               | C      | 14        | E186F             | §E186F               | O      |           | EF812             | 6F23/EF812           | O      |           |
| CV8479            | TY4-400              | C      | 29        | E188CC            | §E188CC              | O      |           | *EF814            | EF184                | C      | 12        |
| CV8884            | DH7-11               | C      |           | E250              | QY4-250              | D      | 26        | EF861             | §E180F               | M      | 12        |
| CV8959            | DG7-32               | C      | 14        | E280F             | §E280F               | O      |           | *EF905            | EF86                 | M      |           |
| CV9155            | §E88C                | M      |           | E288CC            | §E288CC              | O      |           | EH90              | EH90                 | O      |           |
| CV9509            | DP7-11               | M      |           | E810F             | §E810F               | M      | 12, 13    | EIP-12            | EIP-12               | D      | 32        |
| CV9640            | Q13-110BA            | M      | 14        | E2016             | †EF92                | M      | 12        | EL34              | EL34                 | M      |           |
| CW1100            | QY5-3000W            | D      | 26        | E2157             | †ECC81               | M      |           | EL36              | EL36                 | O      |           |
| D2M9              | †6AL5                | M      |           | E2163             | †ECC82               | C      | 12        | EL81              | EL81                 | O      |           |
| D7-190GH          | D7-190GH             | D      | 14        | E2164             | †ECC83               | M      | 12        | EL84              | EL84                 | M      |           |
| D10-160GH         | D10-160GH            | D      | 14        | EEA91             | †6AL5                | M      |           | EL85              | EL85                 | O      |           |
| D13-27GH          | D13-27GH             | M      |           | EABC80            | EABC80               | O      |           | EL86              | EL86                 | O      |           |
| D13-27GM          | D13-27GM             | M      |           | EB91              | †EB91                | M      |           | EL91              | †EL91                | O      |           |
| D13-450GH/01      | D13-450GH/01         | O      |           | EBC81             | EBC81                | O      |           | EL95              | EL95                 | M      |           |
| D13-480GH         | D13-480GH            | D      | 14        | EBF80             | EBF80                | O      |           | *EL171            | EL84                 | M      |           |
| D13-500GH/01      | D13-500GH/01         | S      |           | EBF83             | EBF83                | O      |           | *EL803            | EL821                | O      |           |
| D14-120GH         | D14-120GH            | D      | 14        | EBF89             | EBF89                | O      |           | *EL803S           | §E80L                | O      |           |
| D14-121GH         | D14-121GH            | D      | 14        | *EBF171           | EBF80                | O      |           | EL821             | EL821                | O      |           |
| D14-162GH/09      | D14-162GH/09         | D      | 14        | *EBF175           | EBF89                | O      |           | EL822             | EL822                | O      |           |
| D77               | †EB91                | M      |           | *EC56             | EC157                | M      |           | EL861             | §E81L                | M      |           |
| D152              | †6AL5                | M      |           | *EC57             | EC157                | M      |           | EL5070            | EL5070               | O      |           |
| DD6               | †EB91                | M      |           | EC86              | †EC86                | M      |           | ELL80             | ELL80                | O      |           |
| *DET29            | EC157                | M      |           | EC88              | †EC88                | M      |           | EM81              | EM81                 | O      |           |

\*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

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| EM84              | <b>EM84</b>          | M      |           | M8099             | § <b>M8099</b>       | O      |           | PCC88             | <b>PCC88</b>         | O      |           |
| *EM85             | <b>EM81</b>          | O      |           | M8100             | § <b>M8100</b>       | M      | 12        | PCC89             | <b>PCC89</b>         | M      |           |
| EM87              | <b>EM87</b>          | O      |           | M8136             | § <b>M8136</b>       | M      | 12        | PCC189            | <b>PCC189</b>        | M      |           |
| *EM840            | <b>EM84</b>          | M      |           | M8137             | § <b>M8137</b>       | M      | 12        | PCC805            | <b>30L15/PC805</b>   | O      |           |
| *ES85             | <b>TY2-125</b>       | C      | 27, 29    | M8157             | § <b>M8157</b>       | M      |           | PCE800            | <b>30FL1/PCE800</b>  | O      |           |
| ES204A            | <b>TY4-400</b>       | C      | 27        | M8161             | § <b>M8161</b>       | M      | 12        | PCF80             | <b>PCF80</b>         | C      | 13        |
| ES833             | <b>TY4-350</b>       | M      |           | M8162             | § <b>M8162</b>       | M      | 12        | PCF82             | <b>PCF82</b>         | O      |           |
| EY51              | <b>EY51</b>          | O      |           | M8179             | § <b>M8179</b>       | S      |           | PCF84             | <b>PCF84</b>         | O      |           |
| *EY83             | <b>EY88</b>          | M      |           | M8196             | § <b>M8196</b>       | M      | 12        | PCF86             | <b>PCF86</b>         | M      |           |
| EY84              | † <b>EY84</b>        | M      |           | M8234             | § <b>M8234</b>       | S      |           | PCF200            | <b>PCF200</b>        | M      |           |
| EY86/87           | <b>EY87</b>          | M      |           | MC13-16           | <b>Q13-110BA</b>     | M      | 14        | PCF201            | <b>PCF201</b>        | M      |           |
| EY87              | <b>EY87</b>          | M      |           | ME1201AG          | <b>ME1201AG</b>      | M      |           | PCF800            | <b>30C15/PCF800</b>  | O      |           |
| EY88              | <b>EY88</b>          | M      |           | ME1401            | <b>CV495</b>         | O      |           | PCF801            | <b>PCF801</b>        | M      |           |
| EZ80              | <b>EZ80</b>          | M      |           | ME1402            | <b>CV2730</b>        | O      |           | PCF802            | <b>PCF802</b>        | C      | 13        |
| EZ81              | <b>EZ81</b>          | M      |           | ME1403            | <b>CV2348</b>        | O      |           | PCF805            | <b>30C18/PCF805</b>  | O      |           |
| FZ9011G           | <b>92AG</b>          | C      | 19        | ME1404            | <b>CV8144</b>        | O      |           | PCF806            | <b>PCF806</b>        | M      |           |
| FZ9011V           | <b>92AV</b>          | C      | 19        | MG13-38           | <b>MG13-38</b>       | M      | 14        | PCH200            | <b>PCH200</b>        | M      |           |
| FZ9102G           | <b>90CG</b>          | C      | 19        | MK13-16           | <b>Q13-110GU</b>     | M      | 14        | PCL82             | <b>PCL82</b>         | C      | 13        |
| FZ9012V           | <b>90CV</b>          | C      | 19        | MU13-38           | <b>MU13-38</b>       | M      | 14        | PCL83             | <b>PCL83</b>         | M      |           |
| G6C4              | § <b>M8080</b>       | O      |           | MW13-38           | <b>MW13-38</b>       | M      | 14        | PCL84             | <b>PCL84</b>         | C      | 13        |
| G25-25            | <b>G25-25</b>        | D      | 24        | MX118             | <b>MX159</b>         | C      |           | PCL85             | <b>PCL805/85</b>     | C      | 13        |
| G25-25/A          | <b>G25-25/A</b>      | D      | 24        | MX119             | <b>MX119</b>         | D      | 22        | PCL86             | <b>PCL86</b>         | C      | 13        |
| G25-50            | <b>G25-50</b>        | D      | 24        | MX120/01          | <b>MX120/01</b>      | D      | 23        | PCL88             | <b>30PL14/PCL88</b>  | O      |           |
| G25-50/A          | <b>G25-50/A</b>      | D      | 24        | MX123             | <b>MX123</b>         | D      | 23        | PCL800            | <b>30PL13/PCL800</b> | O      |           |
| G25-70            | <b>G25-70</b>        | D      | 24        | MX124/01          | <b>MX124/01</b>      | D      | 22        | PCL801            | <b>30PL1/PCL801</b>  | O      |           |
| G25-70/A          | <b>G25-70/A</b>      | D      | 24        | MX142             | <b>MX142</b>         | D      | 22        | PCL805            | <b>PCL805/85</b>     | C      | 13        |
| GA50              | <b>92AG</b>          | C      | 19        | MX145             | <b>MX145</b>         | D      | 23        | PCL805/85         | <b>PCL805/85</b>     | C      | 13        |
| GN-4              | <b>ZM1020</b>        | C      | 25        | MX146             | <b>MX146</b>         | M      |           | PD500             | <b>PD500</b>         | M      |           |
| *GR10J            | <b>ZM1040</b>        | M      |           | MX147             | <b>MX147</b>         | D      | 23        | *PE50             | <b>90CG</b>          | C      | 19        |
| GR10M             | <b>ZM1020</b>        | C      | 25        | MX148             | <b>MX148</b>         | D      | 23        | *PE54             | <b>92AG</b>          | C      | 19        |
| GS50              | <b>90CG</b>          | C      | 19        | MX149             | <b>MX149</b>         | D      | 23        | PF818             | <b>30F5/PF818</b>    | O      |           |
| GY501             | <b>GY501</b>         | M      |           | MX151             | <b>MX151</b>         | D      | 22        | PFL200            | <b>PFL200</b>        | C      | 13        |
| GZ34              | <b>GZ34</b>          | M      |           | MX152/01          | <b>MX152/01</b>      | D      | 23        | PL36              | <b>PL36</b>          | M      |           |
| *GZ40             | <b>EZ80</b>          | M      |           | MX155             | <b>MX155</b>         | M      |           | PL81              | <b>PL81</b>          | O      |           |
| HP6               | <b>EF91</b>          | M      | 12        | MX159             | <b>MX159</b>         | C      |           | PL81A             | <b>PL81A</b>         | O      |           |
| IOG-12            | <b>IOG-22</b>        | D      | 32        | MX163             | <b>MX163</b>         | D      | 22        | PL82              | <b>PL82</b>          | O      |           |
| IOG-12W/<br>UKG2  | <b>IOG-22</b>        | D      | 32        | MX164             | <b>MX164</b>         | D      | 22        | PL83              | <b>PL83</b>          | M      |           |
| IOG-13T           | <b>IOG-22</b>        | D      | 32        | MX166/01          | <b>MX166/01</b>      | D      | 23        | PL84              | <b>PL84</b>          | M      |           |
| IOG-22            | <b>IOG-22</b>        | D      | 32        | MX167/01          | <b>MX167/01</b>      | D      | 23        | PL302             | <b>30P19/PL302</b>   | O      |           |
| IOG-39            | <b>IOG-39</b>        | D      | 32        | MX168             | <b>MX168</b>         | D      | 23        | PL500             | <b>PL504</b>         | C      | 13        |
| IOG-71            | <b>IOG-71</b>        | D      | 32        | MX168/01          | <b>MX168/01</b>      | D      | 23        | PL504             | <b>PL504</b>         | C      | 13        |
| K3018             | <b>YK1191</b>        | D      | 31        | MX168/02          | <b>MX168/02</b>      | D      | 23        | PL505             | <b>PL509</b>         | C      | 13        |
| KY50              | <b>U25/KY50</b>      | O      |           | MX177             | <b>MX177</b>         | M      |           | PL508             | <b>PL508</b>         | C      |           |
| KY80              | <b>U26/KY80</b>      | O      |           | MX178             | <b>MX178</b>         | M      |           | PL509             | <b>PL509</b>         | C      | 13        |
| LA9-2             | <b>YH1060</b>        | S      | 30        | MX180             | <b>MX180</b>         | D      | 23        | PL801             | <b>30P12/PL801</b>   | O      |           |
| LA9-3B            | <b>LA9-3B</b>        | S      | 30        | MX188             | <b>MX188</b>         | D      | 22        | PL802             | <b>PL802</b>         | C      | 13        |
| LB3-250B          | <b>LB3-250B</b>      | S      | 30        | MX190             | <b>MX190</b>         | D      | 23        | PL5551A           | <b>ZX1051</b>        | M      |           |
| LB6-10            | <b>LB6-10</b>        | S      | 30        | MY13-38           | <b>MY13-38</b>       | M      | 14        | PL5552A           | <b>ZX1052</b>        | M      |           |
| LB6-25            | <b>LB6-25</b>        | S      | 30        | N77               | † <b>EL91</b>        | O      |           | PL5553B           | <b>ZX1053</b>        | M      |           |
| LB6-25A           | <b>LB6-25A</b>       | S      | 30        | N119              | <b>UL84</b>          | M      |           | PL5822A           | <b>ZX1061</b>        | M      |           |
| LN152             | <b>ECL80</b>         | M      |           | N144              | † <b>EL91</b>        | O      |           | *PL6549           | <b>QY3-65</b>        | M      |           |
| LN309             | <b>PCL83</b>         | M      |           | N152              | <b>PL81</b>          | O      |           | PM05              | † <b>EF95</b>        | M      | 12        |
| LZ319             | <b>PCF80</b>         | C      | 13        | N153              | <b>PL83</b>          | M      |           | PM07              | † <b>EF91</b>        | M      | 12        |
| M17-140W          | <b>M17-140W</b>      | D      | 15        | N154              | <b>PL82</b>          | O      |           | PM2007            | <b>XP1017</b>        | D      | 20        |
| M17-141W          | <b>M17-141W</b>      | D      | 15        | *N308             | <b>PL36</b>          | M      |           | PY33              | <b>PY33</b>          | O      |           |
| M24-101W          | <b>M24-101W</b>      | S      | 15        | N309              | <b>PL83</b>          | M      |           | PY81              | <b>PY800</b>         | M      |           |
| M28-12W           | <b>M28-12W</b>       | O      |           | N329              | <b>PL82</b>          | O      |           | PY81/800          | <b>PY800</b>         | M      |           |
| M31-120W          | <b>M31-120W</b>      | O      |           | N359              | <b>PL81</b>          | O      |           | PY82              | <b>PY82</b>          | M      |           |
| M31-131W          | <b>M31-131W</b>      | S      | 15        | N378              | <b>PL84</b>          | M      |           | PY88              | <b>PY88</b>          | C      | 13        |
| M36-11W           | <b>M36-11W</b>       | O      |           | N379              | <b>PL84</b>          | M      |           | PY301             | <b>U191/PY301</b>    | O      |           |
| M36-16W           | <b>M36-16W</b>       | O      |           | N709              | <b>EL84</b>          | M      |           | PY500             | <b>PY500A</b>        | C      | 13        |
| M38-121W          | <b>M38-121W</b>      | C      | 15        | NL1051A           | <b>ZX1051</b>        | M      |           | PY500A            | <b>PY500A</b>        | C      | 13        |
| M8080             | § <b>M8080</b>       | O      |           | OT400             | <b>TY4-350</b>       | M      |           | PY800             | <b>PY800</b>         | M      |           |
| M8081             | § <b>M8081</b>       | M      |           | PC86              | <b>PC86</b>          | M      |           | *PY801            | <b>PY800</b>         | M      |           |
| M8082             | § <b>M8082</b>       | M      |           | PC88              | <b>PC88</b>          | M      |           | Q7-100GU          | <b>Q7-100GU</b>      | S      |           |
| M8083             | § <b>M8083</b>       | M      | 12        | PC97              | <b>PC97</b>          | M      |           | Q13-110BA         | <b>Q13-110BA</b>     | M      | 14        |
| M8091             | § <b>M8091</b>       | M      |           | PC900             | <b>PC900</b>         | M      |           | Q13-110GU         | <b>Q13-110GU</b>     | M      | 14        |
| M8097             | § <b>M8097</b>       | O      |           | PCC84             | <b>PCC84</b>         | M      |           | QA2403            | <b>M8083</b>         | M      | 12        |
|                   |                      |        |           | PCC85             | <b>PCC85</b>         | M      |           | QA2406            | <b>M8162</b>         | M      | 12        |

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| QB2/250           | <b>QY2-100</b>       | M      |           | RS1046            | <b>TY6-800</b>       | D      | 29        | U25/KY50          | <b>U25/KY50</b>      | O      |           |
| QB3/200           | <b>QY3-65</b>        | M      |           | RX312AL/01        | <b>RX312AL/01</b>    | D      | 24        | U26/KY80          | <b>U26/KY80</b>      | O      |           |
| QB3/300           | <b>QY3-125</b>       | D      | 26        | RX312BL/01        | <b>RX312BL/01</b>    | D      | 24        | U43               | <b>EY51</b>          | O      |           |
| QB3-5/750         | <b>QY4-250</b>       | D      | 26        | ‡S6F12            | <b>§M8083</b>        | M      | 12        | U49               | <b>EY87</b>          | M      |           |
| QB4/1100          | <b>QY4-400</b>       | D      | 26        | SP6               | † <b>EF91</b>        | M      | 12        | *U52              | <b>GZ34</b>          | M      |           |
| QB5/1750          | <b>QY5-500</b>       | D      | 26        | SRS360            | <b>TY4-400</b>       | C      | 27        | U119              | <b>UY85</b>          | M      |           |
| QBL4/800          | <b>QY4-500A</b>      | D      | 26        | T21-105           | † <b>ECC91</b>       | O      |           | U151              | <b>EY51</b>          | O      |           |
| QBL5/3500         | <b>QY5-3000A</b>     | D      | 26        | T130-1            | <b>TY2-125</b>       | C      | 27, 29    | U153              | <b>PY800</b>         | M      |           |
| QBW5/3500         | <b>QY5-3000W</b>     | D      | 26        | T350-1            | <b>TY4-400</b>       | C      | 27        | U154              | <b>PY82</b>          | M      |           |
| QC05/35           | <b>QZ06-20</b>       | M      |           | T813              | <b>QY2-100</b>       | M      |           | U191/PY301        | <b>U191/PY301</b>    | O      |           |
| QE05/40           | <b>QV06-20</b>       | M      |           | TB2-5/300         | <b>TY2-125</b>       | C      | 27, 29    | U192              | <b>PY82</b>          | M      |           |
| QE08/200          | <b>QV08-100</b>      | C      |           | TB3/750           | <b>TY4-400</b>       | C      | 29        | *U251             | <b>PY800</b>         | M      |           |
| QQC03/14          | <b>QQZ03-10</b>      | M      |           | TB4/1250          | <b>TY4-500</b>       | D      | 27, 29    | U319              | <b>PY82</b>          | M      |           |
| QQE02/5           | <b>QQV02-6</b>       | C      | 26        | TB4/1500          | <b>TY5-500</b>       | D      | 29        | U381              | <b>UY85</b>          | M      |           |
| QQE03/12          | <b>QQV03-10</b>      | C      | 26        | TB5/2500          | <b>TY6-800</b>       | D      | 29        | U709              | <b>EZ81</b>          | M      |           |
| QQE06/40          | <b>QQV06-40A</b>     | C      | 26        | TBH6/14           | <b>TY8-15H</b>       | C      | 27, 29    | UABC80            | <b>UABC80</b>        | O      |           |
| QQV02-6           | <b>QQV02-6</b>       | C      | 26        | TBH6/6000         | <b>TY6-5000H</b>     | D      | 27        | UBC81             | <b>UBC81</b>         | O      |           |
| QQV03-10          | <b>QQV03-10</b>      | C      | 26        | TBH7/8000         | <b>TY7-6000H</b>     | D      | 27, 29    | UBF80             | <b>UBF80</b>         | O      |           |
| *QQV06-40         | <b>QQV06-40A</b>     | C      | 26        | TBH7/9000         | <b>TY8-6000H</b>     | C      | 29        | UBF89             | <b>UBF89</b>         | O      |           |
| QQV06-40A         | <b>QQV06-40A</b>     | C      | 26        | TBL6/14           | <b>TY8-15A</b>       | C      | 27, 29    | UCC85             | <b>UCC85</b>         | O      |           |
| QQV07-50          | <b>QQV07-50</b>      | C      | 26        | TBL6/4000         | <b>TY6-1250A</b>     | C      | 29        | UCH81             | <b>UCH81</b>         | M      |           |
| QQZ02-6           | <b>QQZ02-6</b>       | M      |           | TBL6/6000         | <b>TY6-5000A</b>     | D      | 27        | UCH171            | <b>UCH81</b>         | M      |           |
| QQZ03-10          | <b>QQZ03-10</b>      | M      |           | TBL7/8000         | <b>TY7-6000A</b>     | D      | 27, 29    | UCL82             | <b>UCL82</b>         | M      |           |
| QQZ03-20          | <b>YL1020/</b>       | M      |           | TBL7/9000         | <b>TY8-6000A</b>     | C      | 29        | UCL83             | <b>UCL83</b>         | M      |           |
|                   | <b>QQZ03-20</b>      |        |           | TBW6/6000         | <b>TY6-5000W</b>     | D      | 27        | UF89              | <b>UF89</b>          | O      |           |
| QQZ06-40          | <b>YL1030/</b>       | M      |           | TBW7/8000         | <b>TY7-6000W</b>     | D      | 27, 29    | UL84              | <b>UL84</b>          | M      |           |
|                   | <b>QQZ06-40</b>      |        |           | TBW7/9000         | <b>TY8-6000W</b>     | C      | 29        | UU12              | <b>EZ81</b>          | M      |           |
|                   |                      |        |           | TBW12/38          | <b>TY12-20W</b>      | M-     |           | UY85              | <b>UY85</b>          | M      |           |
| QV06-20           | <b>QV06-20</b>       | M      |           | *TC1-75           | <b>TY2-125</b>       | C      | 27, 29    | V884              | † <b>EF92</b>        | M      | 12        |
| QV06-20B          | <b>QV06-20B</b>      | M      |           | *TC2-250          | <b>TY4-400</b>       | C      | 29        | V886              | † <b>EL91</b>        | O      |           |
| QV06-20C          | <b>QV06-20C</b>      | M      |           | *TC2-300          | <b>TY4-400</b>       | C      | 29        | V1103             | <b>QQV03-10</b>      | C      | 26        |
| QV08-100          | <b>QV08-100</b>      | C      |           | TD24              | <b>QQV03-10</b>      | C      | 26        | VA50              | <b>92AV</b>          | C      | 19        |
| QY2-100           | <b>QY2-100</b>       | M      |           | TD25              | <b>QQV06-40A</b>     | C      | 26        | VP6               | † <b>EF92</b>        | M      | 12        |
| QY3-65            | <b>QY3-65</b>        | M      |           | TH813             | <b>QY2-100</b>       | M      |           | VS50              | <b>90CV</b>          | C      | 19        |
| QY3-125           | <b>QY3-125</b>       | D      | 26        | *TH7020           | <b>ZX1051</b>        | M      |           | W77               | † <b>EF92</b>        | M      | 12        |
| QY4-250           | <b>QY4-250</b>       | D      | 26        | *TH7030           | <b>ZX1052</b>        | M      |           | W719              | <b>EF85</b>          | M      |           |
| QY4-400           | <b>QY4-400</b>       | D      | 26        | *TH7040           | <b>ZX1053</b>        | M      |           | WD709             | <b>EBF80</b>         | O      |           |
| QY4-500A          | <b>QY4-500A</b>      | D      | 26        | TS51              | † <b>EF95</b>        | M      | 12        | X119              | <b>UCH81</b>         | M      |           |
| QY5-500           | <b>QY5-500</b>       | D      | 26        | TS52              | † <b>ECC91</b>       | O      |           | X719              | <b>ECH81</b>         | M      |           |
| QY5-3000A         | <b>QY5-3000A</b>     | D      | 26        | TS54              | <b>§E83F</b>         | O      |           | *XE2              | <b>CV495</b>         | O      |           |
| QY5-3000W         | <b>QY5-3000W</b>     | D      | 26        | TT10              | <b>QY2-100</b>       | M      |           | XP1000            | <b>XP1000</b>        | M      |           |
| QZ06-20           | <b>QZ06-20</b>       | M      |           | TT16D             | <b>QY3-125</b>       | D      | 26        | XP1002            | <b>XP1002</b>        | D      | 21        |
| R12               | <b>EY51</b>          | O      |           | TT23              | <b>QQV02-6</b>       | C      | 26        | XP1003            | <b>XP1003</b>        | S      |           |
| R12A              | <b>EY51</b>          | O      |           | TT24              | <b>QQV03-10</b>      | C      | 26        | XP1004            | <b>XP1004</b>        | S      |           |
| R18               | <b>EF84</b>          | M      |           | TT25              | <b>QQV06-40A</b>     | C      | 26        | XP1005            | <b>XP1005</b>        | S      |           |
| R121              | <b>EF37A</b>         | O      |           | TY2-125           | <b>TY2-125</b>       | C      | 27, 29    | XP1010            | <b>XP1010</b>        | C      | 20        |
| R144              | † <b>EF81</b>        | M      | 12        | TY3-250           | <b>TY4-400</b>       | C      | 27        | XP1011            | <b>XP1011</b>        | S      |           |
| R189              | <b>150UVP</b>        | D      | 20        | TY4-350           | <b>TY4-350</b>       | M      |           | XP1016            | <b>XP1016</b>        | D      | 20        |
| R265              | <b>6AS6</b>          | M      | 12        | TY4-400           | <b>TY4-400</b>       | C      | 29        | XP1017            | <b>XP1017</b>        | D      | 20        |
| R375              | <b>XP1003</b>        | S      |           | TY4-400C          | <b>TY4-400C</b>      | M      |           | XP1110            | <b>XP1110</b>        | D      | 20        |
| R464              | <b>56DVP</b>         | C      |           | TY4-500           | <b>TY4-500</b>       | D      | 27, 29    | XP1116            | <b>XP1116</b>        | D      | 20        |
| RK48A             | <b>QY2-100</b>       | M      |           | TY5-500           | <b>TY5-500</b>       | D      | 29        | XP1117            | <b>XP1117</b>        | D      | 20        |
| RS613             | <b>TY2-125</b>       | C      | 27, 29    | TY6-800           | <b>TY6-800</b>       | D      | 29        | XP1118            | <b>XP1118</b>        | S      |           |
| RS630             | <b>TY4-400</b>       | C      | 27        | TY6-1250A         | <b>TY6-1250A</b>     | C      | 29        | XP1143            | <b>XP1143</b>        | S      | 20        |
| RS631             | <b>TY4-500</b>       | D      | 27, 29    | TY6-5000A         | <b>TY6-5000A</b>     | D      | 27        | XP1180            | <b>XP1180</b>        | C      |           |
| *RS683            | <b>QY3-125</b>       | D      | 26        | TY6-5000H         | <b>TY6-5000H</b>     | D      | 27        | XP1230            | <b>XP1230</b>        | D      | 21        |
| RS685             | <b>QY3-125</b>       | D      | 26        | TY6-5000W         | <b>TY6-5000W</b>     | D      | 27        | XP2000            | <b>XP2000</b>        | D      | 21        |
| RS686             | <b>QY4-250</b>       | D      | 26        | TY7-6000A         | <b>TY7-6000A</b>     | D      | 27, 29    | XP2020            | <b>XP2020</b>        | D      | 21        |
| RS687             | <b>QY5-500</b>       | D      | 26        | TY7-6000H         | <b>TY7-6000H</b>     | D      | 27, 29    | XP2030            | <b>XP2030</b>        | D      | 21        |
| *RS1002           | <b>QY4-250</b>       | D      | 26        | TY7-6000W         | <b>TY7-6000W</b>     | D      | 27, 29    | XP2040            | <b>XP2040</b>        | D      | 21        |
| RS1002A           | <b>QY4-400</b>       | C      | 26        | TY8-15A           | <b>TY8-15A</b>       | C      | 27, 29    | XP2040/Q          | <b>XP2040/Q</b>      | D      | 21        |
| *RS1006           | <b>TY2-125</b>       | C      | 27, 29    | TY8-15H           | <b>TY8-15H</b>       | C      | 27, 29    | XP2041            | <b>XP2041</b>        | D      | 21        |
| RS1007            | <b>QY3-125</b>       | D      | 26        | TY8-6000A         | <b>TY8-6000A</b>     | C      | 29        | XP2041/Q          | <b>XP2041/Q</b>      | D      | 21        |
| RS1009            | <b>QQV06-40A</b>     | C      | 26        | TY8-6000H         | <b>TY8-6000H</b>     | C      | 29        | XP2050            | <b>XP2050</b>        | D      | 21        |
| *RS1012L          | <b>QY5-3000A</b>     | D      | 26        | TY8-6000W         | <b>TY8-6000W</b>     | C      | 29        | XP2230            | <b>XP2230</b>        | D      | 21        |
| *RS1012W          | <b>QY5-3000W</b>     | D      | 26        | TY12-15A          | <b>TY12-15A</b>      | C      | 27        | XP2230B           | <b>XP2230B</b>       | D      | 21        |
| RS1016            | <b>TY4-500</b>       | D      | 27, 29    | TY12-20W          | <b>TY12-20W</b>      | M      |           | XQ1010            | <b>XQ1010</b>        | D      |           |
| RS1026            | <b>TY4-400</b>       | C      | 27        | TYS4-500          | <b>TYS4-500</b>      | O      |           | XQ1020            | <b>XQ1020</b>        | C      | 16        |
| RS1029            | <b>QQV03-10</b>      | C      | 26        | TYS5-3000         | <b>TYS5-3000</b>     | O      |           |                   |                      |        |           |
| RS1036            | <b>TY5-500</b>       | D      | 29        |                   |                      |        |           | also L, R, G, B   | also L, R, G, B      |        |           |

\*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

## Index and equivalents—continued

| Type number index | Mullard replacements   |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           |
|-------------------|------------------------|--------|-----------|-------------------|----------------------|--------|-----------|-------------------|----------------------|--------|-----------|
|                   | Mullard type number    | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |
| XQ1021            | <b>XQ1021</b>          | C      | 16        | XX1050            | <b>XX1050</b>        | C      | 18        | YL1190            | <b>YL1190</b>        | M      |           |
| also R, G, B      | <b>also R, G, B</b>    |        |           | XX1052            | <b>XX1050</b>        | C      | 18        | YL1420            | <b>YL1420</b>        | D      | 26        |
| XQ1022            | <b>XQ1022</b>          | C      | 16        | XX1060            | <b>XX1063</b>        | D      | 18        | YL1430            | <b>YL1430</b>        | D      | 26        |
| XQ1023            | <b>XQ1023</b>          | C      | 16        | XX1060/01         | <b>XX1060/01</b>     | C      | 18        | YL1440            | <b>YL1440</b>        | D      | 26        |
| also L, R         | <b>also L, R</b>       |        |           | XX1060/03         | <b>XX1060/03</b>     | C      | 18        | YL1470            | <b>YL1470</b>        | D      | 26        |
| XQ1024            | <b>XQ1024</b>          | C      | 16        | XX1063            | <b>XX1063</b>        | D      | 18        | YL1520            | <b>YL1520</b>        | D      | 26        |
| also R            | <b>also R</b>          |        |           | XX1064            | <b>XX1064</b>        | D      | 18        | Z77               | † <b>EF91</b>        | M      | 12        |
| XQ1025            | <b>XQ1025</b>          | D      | 16        | XX1302            | <b>XX1302</b>        | D      | 18        | Z152              | <b>EF80</b>          | M      |           |
| also L, R         | <b>also L, R</b>       |        |           | XX1303            | <b>XX1303</b>        | D      | 18        | Z520M             | <b>ZM1020</b>        | C      | 25        |
| XQ1026            | <b>XQ1026</b>          | D      | 16        | XX1306            | <b>XX1306</b>        | D      | 18        | Z521M             | <b>ZM1021</b>        | C      | 25        |
| also R            | <b>also R</b>          |        |           | XX1307            | <b>XX1307</b>        | D      | 18        | Z522M             | <b>ZM1040</b>        | M      |           |
| XQ1032            | <b>XQ1032</b>          | D      | 17        | XX1308            | <b>XX1308</b>        | D      | 18        | Z719              | <b>EF80</b>          | M      |           |
| XQ1040            | <b>XQ1240</b>          | D      | 17        | XX1309            | <b>XX1309</b>        | D      | 18        | Z729              | † <b>EF86</b>        | M      |           |
| XQ1041            | <b>XQ1241</b>          | D      | 17        | XX1332            | <b>XX1332</b>        | D      | 18        | Z15021            | <b>TY6-800</b>       | D      | 29        |
| XQ1042            | <b>XQ1240</b>          | D      | 17        | XX1333            | <b>XX1333</b>        | D      | 18        | Z15048            | <b>TY4-400C</b>      | M      |           |
| XQ1043            | <b>XQ1241</b>          | D      | 17        | XX1360            | <b>XX1360</b>        | D      | 18        | ZA1002            | <b>ZA1002</b>        | C      | 25        |
| XQ1044            | <b>XQ1241</b>          | D      | 17        | Y25               | <b>DM70</b>          | O      |           | ZA1004            | <b>ZA1004</b>        | C      | 25        |
| XQ1070            | <b>XQ1070</b>          | D      | 16        | YD1150            | <b>YD1150</b>        | D      | 28        | ZD152             | <b>EBF80</b>         | O      |           |
| also L, R, G, B   | <b>also L, R, G, B</b> |        |           | YD1152            | <b>YD1152</b>        | D      | 28        | ZM1000            | <b>ZM1000</b>        | D      | 25        |
| XQ1071            | <b>XQ1071</b>          | D      | 16        | YD1160            | <b>YD1160</b>        | D      | 28        | ZM1001            | <b>ZM1001</b>        | D      | 25        |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YD1161            | <b>YD1161</b>        | D      | 28        | ZM1020            | <b>ZM1020</b>        | C      | 25        |
| XQ1072            | <b>XQ1072</b>          | D      | 16        | YD1162            | <b>YD1162</b>        | D      | 28        | ZM1021            | <b>ZM1021</b>        | C      | 25        |
| XQ1073 to 76      | <b>XQ1073 to 76</b>    | D      | 16        | YD1170            | <b>YD1170</b>        | D      | 28        | ZM1022            | <b>ZM1022</b>        | C      | 25        |
| also R            | <b>also R</b>          |        |           | YD1171            | <b>YD1171</b>        | D      | 28        | ZM1023            | <b>ZM1023</b>        | C      | 25        |
| XQ1080            | <b>XQ1080</b>          | D      | 16        | YD1172            | <b>YD1172</b>        | D      | 28        | ZM1040            | <b>ZM1040</b>        | M      |           |
| also L, R, G, B   | <b>also L, R, G, B</b> |        |           | YD1173            | <b>YD1173</b>        | D      | 28        | ZM1041            | <b>ZM1041</b>        | M      |           |
| XQ1081            | <b>XQ1081</b>          | D      | 16        | YD1175            | <b>YD1175</b>        | D      | 28        | ZM1042            | <b>ZM1042</b>        | M      |           |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YD1177            | <b>YD1177</b>        | D      | 28        | ZX1051            | <b>ZX1051</b>        | M      |           |
| XQ1083 to 86      | <b>XQ1083 to 86</b>    | D      | 16        | YD1180            | <b>YD1180</b>        | D      | 28        | ZX1052            | <b>ZX1052</b>        | M      |           |
| also R            | <b>also R</b>          |        |           | YD1182            | <b>YD1182</b>        | D      | 28        | ZX1053            | <b>ZX1053</b>        | M      |           |
| XQ1090            | <b>XQ1090</b>          | D      | 16        | YD1185            | <b>YD1185</b>        | D      | 28        | ZX1061            | <b>ZX1061</b>        | M      |           |
| also L, R, G, B   | <b>also L, R, G, B</b> |        |           | YD1187            | <b>YD1187</b>        | D      | 28        | ZX1062            | <b>ZX1062</b>        | M      |           |
| XQ1091            | <b>XQ1091</b>          | D      | 16        | YD1190            | <b>YD1190</b>        | S      |           | ZZ1000            | <b>ZZ1000</b>        | M      |           |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YD1192            | <b>YD1192</b>        | D      | 28        | *1M1              | <b>DM70</b>          | O      |           |
| XQ1093 to 96      | <b>XQ1093 to 96</b>    | D      | 16        | YD1193            | <b>YD1193</b>        | D      | 28        | 1M3               | <b>DM70</b>          | O      |           |
| also R            | <b>also R</b>          |        |           | YD1195            | <b>YD1195</b>        | D      | 28        | *1P37             | <b>92AG</b>          | C      | 19        |
| XQ1100            | <b>XQ1100</b>          | D      | 16        | YD1197            | <b>YD1197</b>        | D      | 28        | 1S2               | <b>DY87</b>          | M      |           |
| also L, R, G, B   | <b>also L, R, G, B</b> |        |           | YD1202            | <b>YD1202</b>        | D      | 28        | 1S2A              | <b>DY87</b>          | M      |           |
| XQ1101            | <b>XQ1101</b>          | D      | 16        | YD1203            | <b>YD1203</b>        | D      | 28        | 2B46              | <b>QV06-20</b>       | M      |           |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YD1212            | <b>YD1212</b>        | D      | 28        | 2B94              | <b>QQV06-40A</b>     | C      | 26        |
| XQ1102            | <b>XQ1102</b>          | D      | 16        | YD1213            | <b>YD1213</b>        | D      | 28        | *2M4B             | <b>GZ34</b>          | M      |           |
| XQ1103 to 04      | <b>XQ1103 to 04</b>    | D      | 16        | YD1220            | <b>TY4-400C</b>      | M      |           | 3ALP1             | <b>DG7-5</b>         | O      |           |
| also R            | <b>also R</b>          |        |           | YD1240            | <b>YD1240</b>        | D      | 28        | 3AMP1             | <b>DG7-32</b>        | C      | 14        |
| XQ1213            | <b>XQ1213</b>          | C      |           | YD1244            | <b>YD1244</b>        | D      | 28        | 3AMP1A            | <b>DG7-32</b>        | C      | 14        |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YD1300            | <b>YD1300</b>        | D      | 27        | 3BKP31            | <b>DH7-78</b>        | O      |           |
| XQ1220            | <b>XQ1220</b>          | M      |           | YD1302            | <b>YD1302</b>        | D      | 27        | 3BYP31            | <b>DH7-11</b>        | M      |           |
| to XQ1225         | <b>to XQ1225</b>       |        |           | YD1330            | <b>YD1330</b>        | D      | 27        | *3C/351H          | <b>TY4-350</b>       | M      |           |
| XQ1230            | <b>XQ1230</b>          | M      |           | YD1333            | <b>YD1333</b>        | D      | 27        | *3DT6             | † <b>6AS6</b>        | M      | 12        |
| to XQ1235         | <b>to XQ1235</b>       |        |           | YD1336            | <b>YD1336</b>        | D      | 27        | *3J/192E          | <b>TY6-5000A</b>     | D      | 27        |
| XQ1240            | <b>XQ1240</b>          | D      | 17        | YD1342            | <b>YD1342</b>        | D      | 28        | *3J/202E          | <b>TY7-6000A</b>     | D      | 27, 29    |
| XQ1241            | <b>XQ1241</b>          | D      | 17        | YD1343            | <b>YD1343</b>        | D      | 28        | *3L5T             | <b>TY7-6000A</b>     | D      | 27, 29    |
| XQ1270            | <b>XQ1270</b>          | D      | 17        | YH1060            | <b>YH1060</b>        | S      | 30        | *3Q/221E          | <b>TY12-20W</b>      | M      |           |
| to XQ1272         | <b>to XQ1272</b>       |        |           | YH1090            | <b>YH1090</b>        | S      | 30        | *3Q/252E          | <b>TY12-20W</b>      | M      |           |
| XQ1400            | <b>XQ1400</b>          | D      | 17        | YH1170            | <b>YH1170</b>        | S      | 30        | *3Q/260E          | <b>TY12-20W</b>      | M      |           |
| to XQ1402         | <b>to XQ1402</b>       |        |           | YH1172            | <b>YH1172</b>        | S      | 30        | *3Q/261E          | <b>TY12-20W</b>      | M      |           |
| XQ1410            | <b>XQ1410</b>          | S      | 16        | YH1210            | <b>YH1210</b>        | S      | 30        | *3T500A1          | <b>TY4-500</b>       | D      | 27, 29    |
| also L, R, G, B   | <b>also L, R, G, B</b> |        |           | YK1110            | <b>YK1110</b>        | D      | 31        | *3T1100           | <b>TY6-800</b>       | D      | 29        |
| XQ1411            | <b>XQ1411</b>          | S      | 16        | YK1151            | <b>YK1151</b>        | D      | 31        | *3V5T             | <b>TY7-6000W</b>     | D      | 27, 29    |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YK1190            | <b>YK1190</b>        | D      | 31        | *3V20T            | <b>TY12-20W</b>      | M      |           |
| XQ1413            | <b>XQ1413</b>          | S      | 16        | YK1191            | <b>YK1191</b>        | D      | 31        | *3V25T            | <b>TY12-20W</b>      | M      |           |
| also L, R         | <b>also L, R</b>       |        |           | YK1192            | <b>YK1192</b>        | D      | 31        | *3V202-3          | <b>TY12-20W</b>      | M      |           |
| XQ1414            | <b>XQ1414</b>          | S      | 16        | YK1210            | <b>YK1210</b>        | D      | 31        | 4-65A             | <b>QY3-65</b>        | M      |           |
| also R            | <b>also R</b>          |        |           | YL1020            | <b>YL1020/</b>       | M      |           | 4B13              | <b>QY2-100</b>       | M      |           |
| XQ1415            | <b>XQ1415</b>          | S      | 16        |                   | <b>QQZ03-20</b>      |        |           | 4CM4              | <b>PC86</b>          | M      |           |
| also L, R         | <b>also L, R</b>       |        |           | YL1030            | <b>YL1030/</b>       | M      |           | 4CX250FG          | <b>8621</b>          | O      |           |
| XQ1416            | <b>XQ1416</b>          | S      | 16        |                   | <b>QQZ06-40</b>      |        |           | 4CX250R           | <b>7580W</b>         | O      |           |
| also R            | <b>also R</b>          |        |           | YL1080            | <b>YL1080</b>        | M      |           | *4D21             | <b>QY3-125</b>       | D      | 26        |
| XQ1423            | <b>XQ1423</b>          | S      | 16        | YL1110            | <b>YL1110</b>        | D      | 26        | *4D32             | <b>QY3-65</b>        | M      |           |
| also R, G, B      | <b>also R, G, B</b>    |        |           | YL1130            | <b>YL1130</b>        | M      |           | 4DL4              | <b>PC88</b>          | M      |           |

\*Replacements shown are near equivalents only. †This is a Special Quality type. ‡There is a Special Quality version of this type. †Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

# Index and equivalents—continued

| Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           |
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|                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |
| *4DT6             | †6AS6                | M      | 12        | 6C4WA             | §M8080               | O      |           | 6S2               | EY87                 | M      |           |
| *4E2T             | QY3-125              | D      | 26        | 6C12              | ECH81                | M      |           | 6S2A              | EY87                 | M      |           |
| 4F21              | QY3-125              | D      | 26        | 6C16              | ECF80                | M      |           | 6T8               | EABC80               | O      |           |
| 4FY5              | PC97                 | M      |           | 6CA4              | EZ81                 | M      |           | *6T35             | TY6-800              | D      | 29        |
| 4HA5              | PC900                | M      |           | 6CA7              | EL34                 | M      |           | *6V3A             | EY88                 | M      |           |
| *4H/180E          | QY4-500A             | D      | 26        | 6CF8              | EF86                 | M      |           | 6V4               | EZ80                 | M      |           |
| *4H/181F          | QY4-500A             | D      | 26        | *6CG7             | §E80CC               | O      |           | 6X2               | EY51                 | O      |           |
| *4T17             | TY2-125              | C      | 27, 29    | 6CH6              | EL821                | O      |           | 6/30L2            | 6/30L2/ECC804        | O      |           |
| 4X500A            | QY4-500A             | D      | 26        | 6CJ6              | EL81                 | O      |           | 7AN7              | PCC84                | M      |           |
| *5A/159H          | †EF91                | M      | 12        | *6CL6             | EL822                | O      |           | 7C23              | TY6-5000A            | D      | 27        |
| 5A/160H           | †EF91                | M      | 12        | 6CM4              | †EC86                | M      |           | 7D9               | †EL91                | O      |           |
| 5A/160K           | †EF91                | M      | 12        | 6CM5              | EL36                 | O      |           | 7D10              | EL821                | O      |           |
| *5A/163K          | §E180F               | M      | 12        | *6CN7             | EBC81                | O      |           | 7DJ8              | PCC88                | O      |           |
| 5A/170K           | §E180F               | M      | 12        | 6CQ6              | †EF92                | M      | 12        | 7FC7              | PCC89                | M      |           |
| 5A/189K           | §M8083               | M      | 12        | 6CQ6S             | §M8161               | M      | 12        | *8A8              | PCF80                | C      | 13        |
| 5AR4              | GZ34                 | M      |           | 6CS6              | EH90                 | O      |           | 8D3               | †EF91                | M      | 12        |
| *5B/257           | QV06-20              | M      |           | 6CW5              | EL86                 | O      |           | *8D5              | †EF86                | M      |           |
| *5B/600A          | QY3-65               | M      |           | 6CW7              | ECC84                | M      |           | *8D8              | †EF86                | M      |           |
| *5B/700A          | QY3-65               | M      |           | 6D2               | †EB91                | M      |           | *8F66R            | QY4-400              | D      | 26        |
| 5C/100A           | QY2-100              | M      |           | 6DA5              | EM81                 | O      |           | 8GJ7              | PCF801               | M      |           |
| *5D22             | QY4-250              | D      | 26        | 6DA6              | EF89                 | M      |           | 8HG8              | PCF86                | M      |           |
| 5F22A             | QY4-250              | D      | 26        | *6DB6             | †6AS6                | M      | 12        | *8T72             | TY12-20W             | M      |           |
| 5F23A             | QY4-400              | D      | 26        | 6DC8              | EBF89                | O      |           | *8T90             | TY12-20W             | M      |           |
| *5HG8             | PCF86                | M      |           | 6DJ8              | †ECC88               | M      |           | *8T92             | TY12-20W             | M      |           |
| *5T4              | GZ34                 | M      |           | *6DK6             | †EF91                | M      | 12        | 9A8               | PCF80                | C      | 13        |
| *5T20             | TY4-400              | C      | 29        | 6DL4              | EC88                 | M      |           | 9AQ8              | PCC85                | M      |           |
| *5T21             | TY4-400              | C      | 29        | 6DL5              | EL95                 | M      |           | *9BR8             | PCF82                | O      |           |
| *5T30             | TY4-500              | D      | 27, 29    | 6DR8              | EBF83                | O      |           | 9D6               | †EF92                | M      | 12        |
| *5T31             | TY4-500              | D      | 27, 29    | 6DS8              | ECH83                | O      |           | *9D7              | EF85                 | M      |           |
| 5T33              | TY4-350              | M      |           | *6DT5             | EL81                 | O      |           | 9ED4              | PD500                | M      |           |
| *5V4              | GZ34                 | M      |           | *6DT6             | †6AS6                | M      | 12        | 9JW8              | PCF802               | C      | 13        |
| 6AB8              | ECL80                | M      |           | *6DT8             | †ECC81               | M      |           | 9U8               | PCF82                | O      |           |
| *6AC7             | EF80                 | M      |           | 6EH7              | EF183                | M      |           | 10C14             | UCH81                | M      |           |
| *6AG7             | EL821                | O      |           | 6EJ7              | EF184                | C      | 12        | 10F18             | UF89                 | O      |           |
| 6AJ8              | ECH81                | M      |           | *6EL7             | EF80                 | M      |           | 10FD12            | UBF89                | O      |           |
| 6AK5              | †EF95                | M      | 12        | *6EM5             | EL84                 | M      |           | 10L14             | UCC85                | O      |           |
| †6AK5W            | §M8100               | M      | 12        | 6ES8              | ECC189               | O      |           | 10LD12            | UABC80               | O      |           |
| *6AK6             | †EL91                | O      |           | *6EW6             | EF184                | C      | 12        | 10LD13            | UBC81                | O      |           |
| 6AK8              | EABC80               | O      |           | 6F12              | †EF91                | M      | 12        | 10P18             | UL84                 | M      |           |
| 6AL3              | EY88                 | M      |           | *6F18             | EF89                 | M      |           | 10PL12            | UCL82                | M      |           |
| 6AL5              | †6AL5                | M      |           | 6F19              | EF85                 | M      |           | 11D12             | 6080                 | M      |           |
| 6AM5              | †EL91                | O      |           | 6F21              | †EF92                | M      | 12        | 11E13             | QQV03-10             | C      | 26        |
| 6AM6              | †EF91                | M      | 12        | 6F22              | †EF86                | M      |           | 11E16             | QQV06-40A            | C      | 26        |
| †6AM6S            | §M8083               | M      | 12        | 6F26              | EF85                 | M      |           | *12A6             | CV2411               | S      |           |
| 6AQ4              | †EC91                | M      |           | 6F29              | EF183                | M      |           | *12AD5            | UF89                 | O      |           |
| 6AQ8              | ECC85                | M      |           | 6F30              | EF184                | C      | 12        | *12AD6            | ECH83                | O      |           |
| *6AR6             | EL34                 | M      |           | *6F33             | †6AS6                | M      | 12        | *12AN8            | ECH81                | M      |           |
| *6AS5             | EL81                 | O      |           | 6F50R             | QY4-500A             | D      | 26        | 12AT7             | †ECC81               | M      |           |
| 6AS6              | †6AS6                | M      | 12        | 6FD12             | EBF89                | O      |           | †12AT7WA          | §M8162               | M      | 12        |
| †6AS6W            | §M8196               | M      | 12        | 6FG6              | EM84                 | M      |           | 12AU7             | †ECC82               | C      | 12        |
| *6AS7G            | 6080                 | M      |           | 6FW8              | ECC189               | O      |           | †12AU7WA          | §M8136               | M      | 12        |
| *6AU7             | †ECC82               | C      | 12        | *6GK6             | EL84                 | M      |           | 12AX7             | †ECC83               | M      | 12        |
| 6AX8              | ECF82                | O      |           | 6GM8              | ECC86                | O      |           | †12AX7WA          | §M8137               | M      | 12        |
| 6BD7A             | EBC81                | O      |           | 6GW8              | ECL86                | M      |           | *12AZ7            | †ECC81               | M      |           |
| 6BK8              | EF86                 | M      |           | 6HG8              | ECF86                | O      |           | *12CU6            | PL36                 | M      |           |
| 6BL8              | ECF80                | M      |           | 6HU6              | EM87                 | O      |           | *12DF7            | §M8137               | M      | 12        |
| 6BM8              | ECL82                | M      |           | 6J6               | †ECC91               | O      |           | *12DM7            | †ECC83               | M      | 12        |
| *6BN4A            | †EC91                | M      |           | †6J6WA            | §M8081               | M      |           | *12DT5            | EL81                 | O      |           |
| 6BN5              | EL85                 | O      |           | 6JX8              | ECH84                | M      |           | 12DT7             | †ECC83               | M      | 12        |
| 6BQ5              | EL84                 | M      |           | 6L12              | ECC85                | M      |           | *12EN6            | EL81                 | O      |           |
| *6BR7             | EF86                 | M      |           | 6L13              | †ECC83               | M      | 12        | 14D12             | TY5-500              | D      | 29        |
| *6BR8             | ECF82                | O      |           | 6L16              | ECC84                | M      |           | 14GW8             | PCL86                | C      | 13        |
| *6BS7             | EF86                 | M      |           | 6L34              | †EC91                | M      |           | 15A6              | PL83                 | M      |           |
| *6BS8             | ECC84                | M      |           | 6LD12             | EABC80               | O      |           | 15CW5             | PL84                 | M      |           |
| *6BU8             | QQV02-6              | C      | 26        | 6LD13             | EBC81                | O      |           | 15D12             | TY6-800              | D      | 29        |
| *6BW4             | EZ81                 | M      |           | 6N8               | EBF80                | O      |           | 15DQ8             | PCL84                | C      | 13        |
| 6BX6              | EF80                 | M      |           | 6P15              | EL84                 | M      |           | 16A               | †EL91                | O      |           |
| 6BY7              | EF85                 | M      |           | 6P17              | †EL91                | O      |           | 16A5              | PL82                 | O      |           |
| *6BZ6             | †EF92                | M      | 12        | *6QL6             | EL86                 | O      |           | 16A8              | PCL82                | C      | 13        |

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| Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           |
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|                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |
| 17C8              | <b>UBF80</b>         | O      |           | 92AG              | <b>92AG</b>          | C      | 19        | 5894              | <b>QQV06-40A</b>     | C      | 26        |
| 17KW6             | <b>PL508</b>         | C      |           | 92AV              | <b>92AV</b>          | C      | 19        | 5920              | § <b>E90CC</b>       | O      |           |
| 17Z3              | <b>PY800</b>         | M      |           | 150AV             | <b>150AV</b>         | D      | 19        | 5923              | <b>TY6-5000W</b>     | D      | 27        |
| 18GV8             | <b>PCL805/85</b>     | C      | 13        | 150AVP            | <b>150AVP</b>        | D      | 20        | 5924              | <b>TY6-5000A</b>     | D      | 27        |
| 19A58             | <b>UCH81</b>         | M      |           | 150CV             | <b>150CV</b>         | D      | 19        | *5963             | § <b>M8136</b>       | M      | 12        |
| *19BG6G           | <b>PL36</b>          | M      |           | 150CVP            | <b>150CVP</b>        | D      | 20        | *5964             | § <b>E90CC</b>       | O      |           |
| 19D8              | <b>UCH81</b>         | M      |           | 150TV             | <b>150TV</b>         | D      | 19        | *5965             | § <b>E180CC</b>      | O      |           |
| 19FL8             | <b>UBF89</b>         | O      |           | 150UVP            | <b>150UVP</b>        | D      | 20        | ‡6057             | § <b>M8137</b>       | M      | 12        |
| 19SU              | <b>PY82</b>          | M      |           | 163Pen            | <b>PL82</b>          | O      |           | ‡6060             | § <b>M8162</b>       | M      | 12        |
| 19Y3              | <b>PY82</b>          | M      |           | 171DPP            | <b>UBF80</b>         | O      |           | ‡6064             | § <b>M8083</b>       | M      | 12        |
| *20D4             | <b>ECH81</b>         | M      |           | 213Pen            | <b>PL81</b>          | O      |           | ‡6065             | § <b>M8161</b>       | M      | 12        |
| 20PE11            | <b>XQ1270</b>        | D      | 17        | *403B             | § <b>M8100</b>       | M      | 12        | ‡6067             | § <b>M8136</b>       | M      | 12        |
| 20PE13            | <b>XQ1271</b>        | D      | 17        | *404A             | § <b>E180F</b>       | M      | 12        | 6075              | <b>QY5-3000W</b>     | D      | 26        |
| 20PE14            | <b>XQ1272</b>        | D      | 17        | *409A             | ‡ <b>6AS6</b>        | M      | 12        | 6076              | <b>QY5-3000A</b>     | D      | 26        |
| 21A6              | <b>PL81</b>          | O      |           | *416B             | <b>EC157</b>         | M      |           | 6079              | <b>QY5-500</b>       | D      | 26        |
| 22A               | <b>EF37A</b>         | O      |           | *435              | § <b>E180F</b>       | M      | 12        | 6080              | <b>6080</b>          | M      |           |
| *22S/200A         | <b>GZ34</b>          | M      |           | 651               | <b>ZX1052</b>        | M      |           | 6084              | § <b>E80F</b>        | O      |           |
| 25E5              | <b>PL36</b>          | M      |           | 652               | <b>ZX1051</b>        | M      |           | 6085              | § <b>E80CC</b>       | O      |           |
| 25UP22            | <b>A63-120X</b>      | M      |           | *655              | <b>ZX1053</b>        | M      |           | *6086             | § <b>E83F</b>        | O      |           |
| 27GB5             | <b>PL504</b>         | C      | 13        | 656               | <b>ZX1052</b>        | M      |           | 6096              | § <b>M8100</b>       | M      | 12        |
| *28AK8            | <b>UABC80</b>        | O      |           | 657               | <b>ZX1051</b>        | M      |           | *6098             | <b>EL84</b>          | M      |           |
| 30AE3             | <b>PY88</b>          | C      | 13        | 731A              | ‡ <b>EF95</b>        | M      | 12        | 6099              | § <b>M8081</b>       | M      |           |
| 30C1              | <b>PCF80</b>         | C      | 13        | *812              | <b>QY4-250</b>       | D      | 26        | ‡6100             | § <b>M8080</b>       | O      |           |
| 30C15             | <b>30C15/PCF800</b>  | O      |           | *812A             | <b>TY2-125</b>       | C      | 27, 29    | ‡6100/6C4WA       | § <b>M8080</b>       | O      |           |
| 30C18             | <b>30C18/PCF805</b>  | O      |           | 813               | <b>QY2-100</b>       | M      |           | §6101             | § <b>M8081</b>       | M      |           |
| 30F5              | <b>30F5/PF818</b>    | O      |           | *814              | <b>QY3-65</b>        | M      |           | ‡6101/6J6WA       | § <b>M8081</b>       | M      |           |
| 30FL1             | <b>30FL1/PCE800</b>  | O      |           | 833A              | <b>TY4-350</b>       | M      |           | 6135              | § <b>M8080</b>       | O      |           |
| 30L1              | <b>PCC84</b>         | M      |           | *860              | <b>QY3-125</b>       | D      | 26        | 6146              | <b>QV06-20</b>       | M      |           |
| 30L15             | <b>30L15/PCC805</b>  | O      |           | *865E             | <b>QV06-20</b>       | M      |           | 6155              | <b>QY3-125</b>       | D      | 26        |
| *30P4             | <b>PL36</b>          | M      |           | *925              | <b>90CV</b>          | C      | 19        | 6156              | <b>QY4-250</b>       | D      | 26        |
| 30P12             | <b>30P12/PL801</b>   | O      |           | *1513             | <b>TY5-500</b>       | D      | 29        | 6187              | § <b>M8196</b>       | M      | 12        |
| 30P16             | <b>PL82</b>          | O      |           | *1619             | <b>QV06-20</b>       | M      |           | ‡6189             | § <b>M8136</b>       | M      | 12        |
| 30P18             | <b>PL84</b>          | M      |           | 3874A             | <b>QY2-100</b>       | M      |           | *6197             | § <b>E80L</b>        | O      |           |
| 30P19             | <b>30P19/PL302</b>   | O      |           | 4065              | <b>CV495</b>         | O      |           | 6199              | <b>150AVP</b>        | D      | 20        |
| 30PL1             | <b>30PL1/PCL801</b>  | O      |           | 4066              | <b>CV2730</b>        | O      |           | 6201              | § <b>M8162</b>       | M      | 12        |
| 30PL13            | <b>30PL13/PCL800</b> | O      |           | 4068              | <b>CV2348</b>        | O      |           | 6227              | § <b>E80L</b>        | O      |           |
| 30PL14            | <b>30PL14/PCL88</b>  | O      |           | 4069              | <b>CV8144</b>        | O      |           | 6263              | <b>6263</b>          | M      |           |
| 33A               | <b>EL821</b>         | O      |           | 4440              | <b>XP1011</b>        | S      |           | 6264              | <b>6264</b>          | M      |           |
| 38A3              | <b>UY85</b>          | M      |           | 4463              | <b>XP1002</b>        | D      | 21        | 6267              | <b>EF86</b>          | M      |           |
| 39A               | ‡ <b>ECC82</b>       | C      | 12        | 4507              | <b>XP1230</b>        | D      | 21        | 6291              | <b>150AVP</b>        | D      | 20        |
| 40KG6             | <b>PL509</b>         | C      | 13        | 4517              | <b>XP1010</b>        | C      | 20        | 6292              | <b>XP2000</b>        | D      | 21        |
| 42EC4             | <b>PY500A</b>        | C      | 13        | 4522              | <b>XP2040 or</b>     |        |           | *6293             | <b>QV06-20</b>       | M      |           |
| *44A/160M         | <b>QQV03-10</b>      | C      | 26        |                   | <b>XP2041</b>        | D      | 21        | 6342A             | <b>XP1000</b>        | M      |           |
| 45B5              | <b>UL84</b>          | M      |           | 4523              | <b>XP2000</b>        | D      | 21        | 6346              | <b>ZX1051</b>        | M      |           |
| 50BM8             | <b>UCL82</b>         | M      |           | 4524              | <b>XP2030</b>        | D      | 21        | 6347              | <b>ZX1052</b>        | M      |           |
| *50MXQ            | <b>53MXQ</b>         | S      | 18        | 5551A             | <b>ZX1051</b>        | M      |           | 6348              | <b>ZX1053</b>        | M      |           |
| 50MXX             | <b>50MXX</b>         | O      |           | 5552A             | <b>ZX1052</b>        | M      |           | *6350             | § <b>E182CC</b>      | M      |           |
| *52KU             | <b>GZ34</b>          | M      |           | 5553B             | <b>ZX1053</b>        | M      |           | 6360              | <b>QQV03-10</b>      | C      | 26        |
| 53MXQ             | <b>53MXQ</b>         | S      | 18        | *5591             | § <b>M8100</b>       | M      | 12        | 6363              | <b>XP2030</b>        | D      | 21        |
| 54AVP             | <b>54AVP</b>         | C      |           | ‡5654             | § <b>M8100</b>       | M      | 12        | 6364              | <b>54AVP</b>         | C      |           |
| 54MXQ             | <b>54MXQ</b>         | S      | 18        | ‡5654/6AK5W       | § <b>M8100</b>       | M      | 12        | 6374              | ‡ <b>EY84</b>        | M      |           |
| 56AVP             | <b>56AVP</b>         | C      | 20        | ‡5654/6AK5W/      | § <b>M8100</b>       | M      | 12        | ‡6443             | § <b>M8091</b>       | M      |           |
| 56CVP             | <b>56CVP</b>         | M      |           | 6096              |                      |        |           | ‡6486             | § <b>M8196</b>       | M      | 12        |
| 56DUVP            | <b>56DUVP</b>        | C      | 20        | *5656             | <b>QQV02-6</b>       | C      | 26        | ‡6516             | § <b>M8082</b>       | M      |           |
| 56DVP             | <b>56DVP</b>         | C      |           | 5656KS            | <b>XP2000</b>        | D      | 21        | *6549             | <b>QY3-65</b>        | M      |           |
| 56DVP/03          | <b>56DVP/03</b>      | S      |           | *5687             | § <b>E182CC</b>      | M      |           | ‡6582             | § <b>M8100</b>       | M      | 12        |
| 56TUVV            | <b>56TUVV</b>        | C      | 20        | ‡5725             | § <b>M8196</b>       | M      | 12        | 6655A             | <b>XP1000</b>        | M      |           |
| 56TVP             | <b>56TVP</b>         | C      | 20        | ‡5725/6AS6W       | § <b>M8196</b>       | M      | 12        | *6677             | <b>EL84</b>          | M      |           |
| 58AVP             | <b>XP2040</b>        | D      | 21        | *5751             | § <b>M8137</b>       | M      | 12        | *6678             | <b>ECF82</b>         | O      |           |
| 58DVP             | <b>XP2041</b>        | D      | 21        | *5800             | <b>CV2730</b>        | O      |           | 6679              | § <b>M8162</b>       | M      | 12        |
| 58UVP             | <b>XP2041/Q</b>      | D      | 21        | *5814A            | § <b>M8136</b>       | M      | 12        | 6680              | § <b>M8136</b>       | M      | 12        |
| 60DVP             | <b>60DVP</b>         | D      | 21        | 5819              | <b>XP1000</b>        | M      |           | *6681             | § <b>M8137</b>       | M      | 12        |
| 60DVP/H           | <b>60DVP/H</b>       | S      | 21        | 5822A             | <b>ZX1061</b>        | M      |           | *6686             | § <b>E81L</b>        | M      |           |
| 63TP              | <b>ECL80</b>         | M      |           | 5866              | <b>TY2-125</b>       | C      | 27, 29    | 6688              | § <b>E180F</b>       | M      | 12        |
| 80MXX             | <b>80MXX</b>         | S      |           | 5867              | <b>TY4-400</b>       | C      | 29        | 6689              | § <b>E83F</b>        | O      |           |
| 90AG              | <b>92AG</b>          | C      | 19        | 5868              | <b>TY4-500</b>       | D      | 27, 29    | 6810A             | <b>56AVP</b>         | C      | 20        |
| 90AV              | <b>92AV</b>          | C      | 19        | 5876              | <b>5876</b>          | M      |           | 6903              | <b>XP1004</b>        | S      |           |
| 90CG              | <b>90CG</b>          | C      | 19        | *5886             | <b>CV2348</b>        | O      |           | 6914              | <b>6914</b>          | O      |           |
| 90CV              | <b>90CV</b>          | C      | 19        | 5893              | <b>5893</b>          | M      |           | 6922              | § <b>E88CC</b>       | M      | 12        |

\*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

# Index and equivalents—continued

| Type number index | Mullard replacements |        |           | Type number index | Mullard replacements |        |           | Type number index | Mullard replacements   |        |           |
|-------------------|----------------------|--------|-----------|-------------------|----------------------|--------|-----------|-------------------|------------------------|--------|-----------|
|                   | Mullard type number  | Status | Data Page |                   | Mullard type number  | Status | Data Page |                   | Mullard type number    | Status | Data Page |
| 6929              | <b>6929</b>          | M      |           | 7804              | <b>TY8-15A</b>       | C      | 27, 29    | 9524B             | <b>150AVP</b>          | D      | 20        |
| 6939              | <b>QQV02-6</b>       | C      | 26        | 7807              | <b>TY12-20W</b>      | M      |           | 9526B             | <b>150UVP</b>          | D      | 20        |
| 6960              | <b>TY7-6000W</b>     | D      | 27, 29    | 7900              | <b>7900</b>          | C      |           | 9530B             | <b>54AVP</b>           | C      |           |
| 6961              | <b>TY7-6000A</b>     | D      | 27, 29    | 7983              | <b>QQZ03-10</b>      | M      |           | 9594B             | <b>XP2020</b>          | D      | 21        |
| 6977              | <b>DM160</b>         | M      | 13        | 8037              | <b>ZM1020</b>        | C      | 25        | 9595B             | <b>XP1000</b>          | M      |           |
| *7020             | <b>ZX1051</b>        | M      |           | 8042              | <b>QZ06-20</b>       | M      |           | 9596B             | <b>XP1002</b>          | D      | 21        |
| 7021              | <b>ZX1051</b>        | M      |           | 8053              | <b>XP2000</b>        | D      | 21        | 9597B             | <b>56TVP</b>           | C      | 20        |
| *7025             | † <b>ECC83</b>       | M      | 12        | 8054              | <b>XP2030</b>        | D      | 21        | 9597QB            | <b>56TUVP</b>          | C      | 20        |
| *7027             | <b>EL34</b>          | M      |           | 8055              | <b>54AVP</b>         | C      |           | 9635B             | <b>XP2230</b>          | D      | 21        |
| *7030             | <b>ZX1052</b>        | M      |           | 8108              | <b>EC157</b>         | M      |           | 9635QB            | <b>56DUVP</b>          | C      | 20        |
| 7031              | <b>ZX1052</b>        | M      |           | 8118              | <b>YL1020/</b>       | M      |           | 9656KB            | <b>XP2000</b>          | D      | 21        |
| *7040             | <b>ZX1053</b>        | M      |           |                   | <b>QQZ03-20</b>      |        |           | 9684B             | <b>56CVP</b>           | M      |           |
| 7041              | <b>ZX1053</b>        | M      |           | 8223              | <b>E288CC</b>        | O      |           | 9698B             | <b>XP1117</b>          | D      | 20        |
| *7044             | § <b>E182CC</b>      | M      |           | 8228              | <b>ZZ1000</b>        | M      |           | 9708B             | <b>XP2030</b>          | D      | 21        |
| 7062              | § <b>E180CC</b>      | O      |           | 8233              | § <b>E55L</b>        | M      | 13        | 9709B             | <b>54AVP</b>           | C      |           |
| 7064              | <b>XP2000</b>        | D      | 21        | 8254              | § <b>EC1000</b>      | O      |           | 9734B             | <b>150AVP</b>          | D      | 20        |
| 7065              | <b>150AVP</b>        | D      | 20        | 8255              | § <b>E88C</b>        | M      |           | 9734QB            | <b>150UVP</b>          | D      | 20        |
| 7092              | <b>TY6-800</b>       | D      | 29        | 8268              | <b>TY8-6000W</b>     | C      | 29        | 9758B             | <b>XP2030</b>          | D      | 21        |
| 7102              | <b>150CVP</b>        | D      | 20        | 8269              | <b>TY8-6000A</b>     | C      | 29        | 9813B             | <b>XP2020</b>          | D      | 21        |
| 7119              | § <b>E182CC</b>      | M      |           | 8348              | <b>YL1080</b>        | M      |           | 9814B             | <b>XP2020</b>          | D      | 21        |
| *7189             | <b>EL84</b>          | M      |           | 8408              | <b>YL1130</b>        | M      |           | 9815B             | <b>XP2020</b>          | D      | 21        |
| 7237              | <b>TY7-6000A</b>     | D      | 27, 29    | 8505              | <b>YL1520</b>        | D      | 26        | 9820QB            | <b>XP1230</b>          | D      | 21        |
| 7262A             | <b>XQ1032</b>        | D      | 17        | 8575              | <b>XP2230</b>        | D      | 21        | *18042            | ‡ <b>E83F</b>          | O      |           |
| 7265              | <b>56TVP</b>         | C      | 20        | 8580              | <b>YL1190</b>        | M      |           | 18503             | <b>MX146</b>           | M      |           |
| 7308              | § <b>E188CC</b>      | O      |           | 8608              | <b>EL5070</b>        | O      |           | 18504             | <b>MX147</b>           | D      | 23        |
| *7316             | § <b>M8136</b>       | M      | 12        | 8621              | <b>8621</b>          | O      |           | 18505             | <b>MX148</b>           | D      | 23        |
| *7320             | <b>EL84</b>          | M      |           | 8644              | <b>XP1117</b>        | D      | 20        | 18506             | <b>MX149</b>           | D      | 23        |
| 7378              | <b>QV08-100</b>      | C      |           | 8666              | <b>YD1170</b>        | D      | 28        | 18509             | <b>MX151</b>           | D      | 22        |
| 7527              | <b>QY4-400</b>       | D      | 26        | 8667              | <b>YD1171</b>        | D      | 28        | 18515/01          | <b>MX152/01</b>        | D      | 23        |
| 7534              | <b>E130L</b>         | M      |           | 8668              | <b>YD1172</b>        | D      | 28        | 18518             | <b>MX155</b>           | M      |           |
| 7580              | <b>7580</b>          | O      |           | 8680              | <b>YD1212</b>        | D      | 28        | 18520             | <b>MX120/01</b>        | D      | 23        |
| 7580W             | <b>7580W</b>         | O      |           | 8728              | <b>YD1150</b>        | D      | 28        | 18529             | <b>MX163</b>           | D      | 22        |
| 7609              | <b>7609</b>          | M      |           | 8730              | <b>YD1152</b>        | D      | 28        | 18536/01          | <b>MX166/01</b>        | D      | 23        |
| 7643              | § <b>E80CF</b>       | M      |           | 8731              | <b>YD1160</b>        | D      | 28        | 18545             | <b>MX145</b>           | D      | 23        |
| 7650              | <b>YL1110</b>        | D      | 26        | 8732              | <b>YD1161</b>        | D      | 28        | 18546/01          | <b>MX167/01</b>        | D      | 23        |
| 7696              | <b>XP2000</b>        | D      | 21        | 8733              | <b>YD1162</b>        | D      | 28        | 18550             | <b>MX164</b>           | D      | 22        |
| 7704              | <b>7704</b>          | C      |           | 8734              | <b>YD1173</b>        | D      | 28        | 18553             | <b>MX178</b>           | M      |           |
| 7722              | § <b>E280F</b>       | O      |           | 8735              | <b>YD1182</b>        | D      | 28        | 18555             | <b>MX177</b>           | M      |           |
| 7737              | § <b>E186F</b>       | O      |           | 8736              | <b>YD1192</b>        | D      | 28        | 55850F            | <b>XQ1240</b>          | D      | 17        |
| 7753              | <b>TY6-1250A</b>     | C      | 29        | 8752              | <b>YD1202</b>        | D      | 28        | 55875 series      | <b>55875 series</b>    | M      |           |
| 7767              | <b>XP1110</b>        | D      | 20        | 9514B             | <b>XP2230</b>        | D      | 21        | 55875-IG series   | <b>55875-IG series</b> | M      |           |
| 7788              | § <b>E810F</b>       | M      | 12, 13    | 9514S             | <b>XP2230</b>        | D      | 21        |                   |                        |        |           |

\*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

# Picture tubes

## colour picture tubes book 2 part 1

All types: Shadow mask. 3-gun. Push-through super square presentation.  $V_h=6.3V$ . B12-246 base.

| Type No.  | Deflection Angle | Screen Diagonal |      | Final Anode Voltage * |           | Typical Operating Conditions |            |                        | $I_h$ (mA) | Light Transmission (%) | Neck Diameter (mm) |
|---|------------------|-----------------|------|-----------------------|-----------|------------------------------|------------|------------------------|------------|------------------------|--------------------|
|   |                  | (cm)            | (in) | Max. (kV)             | Min. (kV) | $V_{a1}$ (V)                 | $-V_g$ (V) | Focusing Electrode (V) |            |                        |                    |
| <b>DELTA GUN TYPES</b>                              |                  |                 |      |                       |           |                              |            |                        |            |                        |                    |
| <b>A56-120X</b>                                     | 90°              | 56              | 22   | 27.5                  | 20        | 210 to 495                   | 100        | 4200 to 5000           | 900        | 55                     | 36.5               |
| <b>A56-410X</b>                                     | 110°             | 56              | 22   | 27.5                  | 20        | 210 to 495                   | 100        | 4200 to 5000           | 730†       | 55                     | 36.5               |
| <b>A66-120X</b>                                     | 90°              | 66              | 26   | 27.5                  | 20        | 210 to 495                   | 100        | 4200 to 5000           | 900        | 53                     | 36.5               |
| <b>A66-410X</b>                                     | 110°             | 66              | 26   | 27.5                  | 20        | 210 to 495                   | 100        | 4200 to 5000           | 730†       | 53                     | 36.5               |
| <b>IN-LINE GUN TYPES</b> (available from late 1975) |                  |                 |      |                       |           |                              |            |                        |            |                        |                    |
| <b>A56-500X</b>                                     | 110°             | 56              | 22   | 27.5                  | 20        | 210 to 495                   | 100        | 4000 to 4800           | 730†       | 55                     | 36.5               |
| <b>A66-500X</b>                                     | 110°             | 66              | 26   | 27.5                  | 20        | 210 to 495                   | 100        | 4000 to 4800           | 730†       | 53                     | 36.5               |

\*Absolute maximum rating system.

†Quick heating (5 seconds)

## monochrome picture tubes

All Types: 110° deflection. Short unipotential gun. Compression banded. Push-through presentation.

| Type No.          | Screen Diagonal |      | Max.* Final Anode Voltage (kV) | Typical Operating Conditions** |            | $V_h$ (V) | $I_h$ (mA) | Light Transmission (%) | Neck Diameter (mm) | Base |                        |
|-------------------|-----------------|------|--------------------------------|--------------------------------|------------|-----------|------------|------------------------|--------------------|------|------------------------|
|                   | (cm)            | (in) |                                | $V_{a1}$ (V)                   | $+V_k$ (V) |           |            |                        |                    |      | Focusing Electrode (V) |
| <b>A31-410W</b>   | 31              | 12   | 17                             | 250                            | 32 to 58   | 0 to +350 | 11†        | 140                    | 50                 | 20   | B7G special            |
| § <b>A31-510W</b> | 31              | 12   | 17                             | 130                            | 30 to 50   | 0 to +130 | 11†        | 140                    | 50                 | 20   | B7G special            |
| § <b>A34-510W</b> | 34              | 14   | 17                             | 130                            | 30 to 50   | 0 to +130 | 11†        | 140                    | 48                 | 20   | B7G special            |
| § <b>A44-510W</b> | 44              | 17   | 17                             | 130                            | 30 to 50   | 0 to +130 | 11†        | 140                    | 48                 | 20   | B7G special            |
| <b>A44-120W/R</b> | 44              | 17   | 23                             | 400                            | 36 to 66   | 0 to +400 | 6.3        | 300                    | 48                 | 28.6 | B8H                    |
| <b>A50-120W/R</b> | 50              | 20   | 23                             | 400                            | 36 to 66   | 0 to +400 | 6.3        | 300                    | 45                 | 28.6 | B8H                    |
| <b>A61-120W/R</b> | 61              | 24   | 23                             | 400                            | 36 to 66   | 0 to +400 | 6.3        | 300                    | 42                 | 28.6 | B8H                    |

\*Design maximum rating. \*\*Cathode drive. Voltages with respect to grid.

†Quick heating (5 seconds) §Available from mid 1975.

Note: In the type number the suffix/R indicates that a ring trap base is fitted to the tube. Tubes without a ring trap base are available under the same type number but with the suffix omitted.



# Receiving valves

## r. f. pentodes book 2 part 1

| Type No.   | Description               | $g_m$<br>(mA/V) | $-V_{g1}^\ddagger$<br>(V) | $\mu_{g1-g2}$ | $r_a$<br>(M $\Omega$ ) | $V_a$<br>(V) | $V_{g2}$<br>(V) | $-V_{g1}$<br>(V) | $I_a$<br>(mA) | $I_{g2}$<br>(mA) | $I_h^\dagger$<br>(mA) | Base |
|--|---------------------------|-----------------|---------------------------|---------------|------------------------|--------------|-----------------|------------------|---------------|------------------|-----------------------|------|
| * <b>EF92</b><br>(CV131)<br>*§ <b>M8161</b><br>(CV4015)  | Variable- $\mu$           | 2.45            | 27                        | 30            | 0.9                    | 200          | 200             | 2.5              | 8.25          | 2.1              | 200                   | B7G  |
| * <b>6AS6</b><br>(CV2522)<br>*§ <b>M8196</b><br>(CV4011) | Dual control              | 3.2             | —                         | —             | 0.15                   | 120          | 120             | 2.0              | 5.1           | 3.5              | 175                   | B7G  |
| * <b>EF95</b><br>(CV850)<br>*§ <b>M8100</b><br>(CV4010)  | Low Noise                 | 5.1             | —                         | 35            | 0.4                    | 180          | 120             | 2.0              | 7.7           | 2.4              | 175                   | B7G  |
| * <b>EF91</b><br>(CV138)<br>*§ <b>M8083</b><br>(CV4014)  | General purpose           | 7.6             | —                         | 70            | >0.5                   | 250          | 250             | 2.0              | 10            | 2.6              | 300                   | B7G  |
| <b>EF184</b>   | Frame grid, sharp cut-off | 15              | —                         | 60            | 0.38                   | 200          | 200             | 2.5              | 10            | 4.1              | 300                   | B9A  |
| *§ <b>E180F</b><br>(CV3998)                              | Wideband amplifier        | 16.5            | —                         | 50            | 0.09                   | 180          | 150             | 1.25             | 13            | 3.3              | 300                   | B9A  |
| *§ <b>E810F</b><br>(CV5809)                              | Wideband amplifier        | 50              | —                         | 57            | 0.042                  | 120          | 150             | 1.9              | 35            | 5.0              | 340                   | B9A  |

\*Maintenance type

§This is a Special Quality Type.

† $V_h=6.3V$ .

‡For 100:1 reduction in  $g_m$ .

## double triodes

| Type No.  | $\mu$ | $g_m$<br>(mA/V) | $r_a$<br>(k $\Omega$ ) | $V_a$<br>(V) | $-V_g$<br>(V) | $I_a$<br>(mA) | $V_h$<br>(V)    | $I_h$<br>(mA)  | Base |
|---|-------|-----------------|------------------------|--------------|---------------|---------------|-----------------|----------------|------|
| <b>ECC82</b><br>(CV491)<br>*§ <b>M8136</b><br>(CV4003)        | 17    | 2.2             | 7.7                    | 250          | 8.5           | 10.5          | { 6.3<br>12.6 } | { 300<br>150 } | B9A  |
| *§ <b>E88CC</b><br>(CV2492)<br>*§ <b>E88CC/01</b><br>(CV2493) | 33    | 12.5            | 2.65                   | 90           | 1.2           | 15            | 6.3             | 300            | B9A  |
| *§ <b>M8162</b><br>(CV4024)                                   | 60    | 5.5             | 11                     | 250          | 2.0           | 10            | { 6.3<br>12.6 } | { 300<br>150 } | B9A  |
| *§ <b>M8137</b><br>(CV4004)                                   | 90    | 1.6             | 56                     | 250          | 2.0           | 1.25          | { 6.3<br>12.6 } | { 300<br>150 } | B9A  |
| * <b>ECC83</b><br>(CV492)                                     | 100   | 1.6             | 62.5                   | 250          | 2.0           | 1.2           | { 6.3<br>12.6 } | { 300<br>150 } | B9A  |

All types have double cathodes.

\*Maintenance type.

§This is a Special Quality Type.

# Receiving valves

## triode pentodes and double pentode book 2 part 1

| Type No.         | Description                         |       | $g_m$<br>(mA/V) | $\mu$ | $V_a$<br>(V) | $V_{g2}$<br>(V) | $-V_{g1}$<br>(V) | $I_a$<br>(mA) | $I_{g2}$<br>(mA) | $V_h$<br>(V) | $I_h$<br>(mA) | Base |
|------------------|-------------------------------------|-------|-----------------|-------|--------------|-----------------|------------------|---------------|------------------|--------------|---------------|------|
| <b>PCF80</b>     | Frequency changer<br>$g_c=2.1$ mA/V | (T)   | 5.0             | 20    | 100          | —               | 2.0              | 14            | —                | 9.0          | 300           | B9A  |
|                  |                                     | (P)   | 6.2             | —     | 170          | 170             | 2.0              | 10            | 2.8              |              |               |      |
| <b>PCF802</b>    | Triode pentode                      | (T)   | 3.5             | 70    | 200          | —               | 2.0              | 3.5           | —                | 9.0          | 300           | B9A  |
|                  |                                     | (P)   | 5.5             | —     | 100          | 100             | 1.0              | 6.0           | 1.7              |              |               |      |
| <b>PCL82</b>     | Triode pentode                      | (T)   | 2.2             | 70    | 100          | —               | 0                | 3.5           | —                | 16           | 300           | B9A  |
|                  |                                     | (P)   | 7.5             | —     | 170          | 170             | 11.5             | 41            | 9.0              |              |               |      |
| <b>PCL84</b>     | Triode pentode                      | (T)   | 4.0             | 65    | 200          | —               | 1.7              | 3.0           | —                | 15           | 300           | B9A  |
|                  |                                     | (P)   | 10.4            | —     | 200          | 200             | 2.9              | 18            | 3.0              |              |               |      |
| <b>PCL86</b>     | Triode pentode                      | (T)   | 1.6             | 100   | 230          | —               | 1.7              | 1.2           | —                | 13.3         | 300           | B9A  |
|                  |                                     | (P)   | 10.5            | —     | 230          | 230             | 5.7              | 39            | 6.5              |              |               |      |
| <b>PCL805/85</b> | Triode pentode                      | (T)   | 7.0             | 63    | 100          | —               | 0                | 10.5          | —                | 17.5         | 300           | B9A  |
|                  |                                     | (P)   | 7.25            | —     | 170          | 170             | 15               | 41            | 2.7              |              |               |      |
| <b>PFL200</b>    | Double pentode                      | (AMP) | 8.5             | —     | 150          | 150             | 2.1              | 10            | 3.0              | 17           | 300           | B10B |
|                  |                                     | (OUT) | 22              | —     | 170          | 170             | 2.7              | 30            | 7.0              |              |               |      |

## power pentodes

| Type No.                    | Description            | $p_a$ max.<br>(W) | $V_a$<br>(V) | $V_{g2}$<br>(V) | $-V_{g1}$<br>(V) | $I_a$<br>(mA) | $I_{g2}$<br>(mA) | $g_m$<br>(mA/V) | $V_h$<br>(V) | $I_h$<br>(mA) | Base |
|-----------------------------|------------------------|-------------------|--------------|-----------------|------------------|---------------|------------------|-----------------|--------------|---------------|------|
| *§ <b>E810F</b><br>(CV5809) | High Slope Wideband    | 5.0 <sub>a</sub>  | 120          | 150             | 1.9              | 35            | 5.0              | 50              | 6.3          | 340           | B9A  |
| *§ <b>E55L</b><br>(CV5808)  | High Slope Wideband    | 10 <sub>a</sub>   | 125          | 125             | 3.0              | 50            | 5.5              | 45              | 6.3          | 600           | B9D  |
| <b>PL504</b>                | Monochrome line output | 12 <sub>†</sub>   | 75           | 200             | 10               | 440           | 30               | —               | 27           | 300           | B9D  |
| <b>PL509</b>                | Colour Line output     | 30                | 160          | 160             | 0                | 1400          | 45               | —               | 40           | 300           | B9D  |
| <b>PL802</b>                | Video output           | 6.0               | 170          | 170             | 1.3              | 30            | 6.5              | 40              | 16           | 300           | B9A  |

\*Maintenance type.

<sub>a</sub>Absolute Maximum Rating.

§This is a Special Quality Type.

†See published data.

## high voltage diodes

| Type No.      | Description      | P.I.V. max.<br>(kV) | $I_a$ (av) max.<br>(mA) | $V_h$<br>(V) | $I_h$<br>(mA) | Base |
|---------------|------------------|---------------------|-------------------------|--------------|---------------|------|
| <b>PY88</b>   | Booster diode    | 6.6                 | 220                     | 30           | 300           | B9A  |
| <b>PY500A</b> | Booster diode    | 5.6                 | 440                     | 42           | 300           | B9D  |
| <b>DY802</b>  | E.H.T. rectifier | 25                  | 0.5                     | 1.4          | 575           | B9A  |

## voltage indicator tube

| Type No.                                | Type of Indication | Indicating Condition                   | $V_g$<br>(V) | $I_a$<br>( $\mu$ A) | $V_{a(b)}$<br>(V) | $V_f$<br>(V) | $I_f$<br>(mA) | Base     |
|---|--------------------|--|--------------|---------------------|-------------------|--------------|---------------|----------|
| *§ <b>DM160</b><br>(CV5412)<br>(CV6094) | Fluorescent column | Max. light output<br>Min. light output | 0<br>-3.0    | 585<br><5.0         | 50                | 1.0          | 30            | Wired-in |

\*Maintenance type

§This is a Special Quality Type.

# Electro-optical devices

## instrument tubes book 2 part 1

| Type No.                       | Description or Application  | Screen Dia. |                         | Deflection Sensitivity (V/cm) |   | Abs. Max. Final Anode Voltage (kV) | Operation |            | Post Defl. Acc. | I <sub>h</sub> at 6.3V (mA) | Base                 |
|--------------------------------|---|-------------|-------------------------|-------------------------------|---|------------------------------------|-----------|------------|-----------------|-----------------------------|----------------------|
|                                |   | (cm)        | (in)                    | S <sub>y</sub>                | S <sub>x</sub>  |                                    | y-plates  | x-plates   |                 |                             |                      |
| <b>DH3-91</b>                  | Simple oscilloscopes<br>General purpose monitor   | 3           | 1                       | 45                            | 53<br>(V <sub>a1</sub> +a <sub>3</sub> +y''=500V)                         | 1.0                                | Asym.     | Sym.       | None            | 300                         | B8G                  |
| <b>D7-190GH</b>                | Inexpensive oscilloscopes<br>Monitoring devices   | 7           | 3                       | 12                            | 29<br>(V <sub>a1</sub> +a <sub>3</sub> =1.0kV)                            | 2.2                                | Sym.      | Sym.       | None            | 300                         | Special 14-pin 55566 |
| <b>DG7-31</b><br><b>DG7-32</b> | General purpose monitors  | 7           | 3                       | 21.8                          | 37.8<br>(V <sub>a1</sub> +a <sub>3</sub> =500V)                           | 0.8                                | Sym.      | Asym. Sym. | None            | 300                         | B12A                 |
| <b>D10-160GH</b>               | Inexpensive oscilloscopes<br>Read-out devices   | 10          | 4                       | 14                            | 33<br>(V <sub>a1</sub> +a <sub>3</sub> =1.5kV)                            | 2.2                                | Sym.      | Sym.       | None            | 300                         | Special 14-pin 55566 |
| <b>D13-480GH</b>               | Inexpensive oscilloscopes<br>Read-out devices   | 13          | 5                       | 15                            | 31<br>(V <sub>a1</sub> +a <sub>3</sub> =2.0kV)                            | 2.2                                | Sym.      | Sym.       | None            | 300                         | Special 14-pin 55566 |
| <b>D14-120GH</b>               | Short length<br>High sensitivity  | 14          | 4½ × 4<br>(Rectangular) | 4.2                           | 15.5<br>(V <sub>a1</sub> +a <sub>3</sub> =1.5kV<br>V <sub>a4</sub> =10kV) | 11                                 | Sym.      | Sym.       | Yes             | 300                         | Special 14-pin 55566 |
| <b>D14-121GH</b>               | As D14-120GH except<br>for side connections<br>to x and y plates  | 14          | 4½ × 4<br>(Rectangular) | 4.2                           | 15.5<br>(V <sub>a1</sub> +a <sub>3</sub> =1.5kV<br>V <sub>a4</sub> =10kV) | 11                                 | Sym.      | Sym.       | Yes             | 300                         | Special 14-pin 55566 |
| <b>D14-162GH/09</b>            | High sensitivity medium-<br>band oscilloscopes.<br>Internal graticule with<br>external picture rotation<br>coil assy. | 14          | 4½ × 4<br>(Rectangular) | 4.2                           | 15.5<br>(V <sub>a1</sub> +a <sub>3</sub> =1.5kV<br>V <sub>a4</sub> =10kV) | 11                                 | Sym.      | Sym.       | Yes             | 300                         | Special 14-pin 55566 |

## flying spot scanner tubes

| Type No.                             | Description   | Screen Dia. |      | Resolution (Lines) | V <sub>a</sub> | -V <sub>g</sub> | I <sub>h</sub> at 6.3V (mA) | Base |
|--------------------------------------|---|-------------|------|--------------------|----------------|-----------------|-----------------------------|------|
|                                      |   | (cm)        | (in) |                    | (kV)           | (V)             |                             |      |
| <b>Q13-110BA</b><br><b>Q13-110GU</b> | Magnetic Tube with metal-backed screen<br>Magnetic Tube for colour television with<br>metal-backed screen | 13          | 5    | >1000              | 25             | 50 to 100       | 300                         | B12A |

## projection tubes

| Type No.   | Description  | Fluorescence                  | Screen Dia. |      | V <sub>a</sub> | I <sub>a</sub> (pk) | -V <sub>g</sub> | I <sub>h</sub> at 6.3V (mA) | Base |
|--|--|-------------------------------|-------------|------|----------------|---------------------|-----------------|-----------------------------|------|
|  |  |                               | (cm)        | (in) | (kV)           | (mA)                | (V)             |                             |      |
| <b>MG13-38</b><br><b>MU13-38</b><br><b>MW13-36</b><br><b>MY13-38</b> | Projection Tubes with metal-<br>backed screen for high brightness<br>large area displays | Green<br>Blue<br>White<br>Red | 13          | 5    | 50             | 2.5                 | 100 to 170      | 660                         | B12A |



# Electro-optical devices

## television monitor tubes book 2 part 1

All Types: Magnetic Deflection. Electrostatic Focusing. Metal-backed Rectangular Screen.

| Type No.        | Description  | Screen diagonal (cm) | Screen diagonal (in) | Deflection Angle (deg.) | Max. Final Anode Voltage (kV) | Typical Operating $V_{a1}$ (kV) | Typical Operating $-V_g$ (V) | Conditions Focusing Electrode (V) | $V_h$ (V) | $I_h$ (mA) | Base |
|-----------------|--|----------------------|----------------------|-------------------------|-------------------------------|---------------------------------|------------------------------|-----------------------------------|-----------|------------|------|
| <b>M17-140W</b> | Television viewfinder tube                                   | 17                   | 7                    | 70                      | 16                            | 400                             | 32 to 62                     | 0 to +400                         | 6.3       | 300        | B8H  |
| <b>M17-141W</b> | As M17-140W but with reinforced faceplate                    | 17                   | 7                    | 70                      | 18                            | 400                             | 32 to 62                     | 0 to +400                         | 6.3       | 300        | B8H  |
| <b>M24-101W</b> | Precision television studio monitor with reinforced envelope | 24                   | 9½                   | 90                      | 16                            | 600                             | 32 to 85                     | 0 to +400                         | 6.3       | 300        | B8H  |
| <b>M31-131W</b> | Precision television studio monitor with reinforced envelope | 31                   | 12                   | 90                      | 16                            | 600                             | 32 to 85                     | 0 to +400                         | 6.3       | 300        | B8H  |
| <b>M38-121W</b> | Precision television studio monitor with reinforced envelope | 38                   | 15                   | 110                     | 18                            | 400                             | 40 to 85                     | 0 to +400                         | 6.3       | 300        | B8H  |

## data display tubes

Preferred screen variants of the preceding television monitor tube types are available for data display applications.

## designation of preferred Mullard phosphors

| Present System (Pro-Electron) | Old System | Fluorescent colour | Phosphorescent colour | Persistence  | Equivalent JEDEC designation |
|-------------------------------|------------|--------------------|-----------------------|--------------|------------------------------|
| BA                            | C          | Purplish-blue      | —                     | Very short   | —                            |
| BE                            | B          | Blue               | Blue                  | Medium short | P11                          |
| BF                            | U          | Blue               | —                     | Medium short | —                            |
| GH                            | H          | Green              | Green                 | Medium short | P31                          |
| GK                            | G*         | Yellowish-green    | Yellowish-green       | Medium       | —                            |
| GM                            | P          | Purplish-blue      | Yellowish-green       | Long         | P7                           |
| GR                            | —          | Green              | Green                 | Long         | P39                          |
| GU                            | —          | White              | White                 | Very short   | —                            |
| W                             | W          | White              | —                     | —            | P4                           |
| X                             | X          | Tri-colour screen  | —                     | —            | P22                          |
| YA                            | Y          | Yellowish-orange   | Yellowish-orange      | Medium       | —                            |

\*Used in projection tubes.

# Electro-optical devices

## \*Plumbicon camera tubes book 2 part 2

| Basic Type No.  | Quality Grade | Application |      | Spectral Response Cut-off (nm) | Loading | Max. Overall Length (mm) |
|---|---------------|-------------|------|--------------------------------|---------|--------------------------|
| <b>17.7mm dia. Plumbicon tube</b>                             |               |             |      |                                |         |                          |
| <b>XQ1423</b>   | Sub-broadcast | B/W         | RGB  | 850                            | Rear    | 108                      |
| <b>25.4mm dia. Plumbicon tubes—standard range</b>             |               |             |      |                                |         |                          |
| † <b>XQ1070</b>   | Broadcast     | B/W         | LRGB | 650                            | Front   | 172                      |
| † <b>XQ1071</b>   | Industrial    | B/W         | RGB  | 650                            | Front   | 172                      |
| <b>XQ1072</b>   | Medical       | —           | —    | 650                            | Front   | 172                      |
| † <b>XQ1073</b>   | Broadcast     | B/W         | R    | 900                            | Front   | 172                      |
| † <b>XQ1074</b>   | Industrial    | B/W         | R    | 900                            | Front   | 172                      |
| ‡ <b>XQ1075</b>   | Broadcast     | B/W         | R    | 750                            | Front   | 172                      |
| ‡ <b>XQ1076</b>   | Industrial    | B/W         | R    | 750                            | Front   | 172                      |
| <b>25.4mm dia. Plumbicon tubes—technically advanced range</b> |               |             |      |                                |         |                          |
| <b>XQ1080</b>   | Broadcast     | B/W         | LRGB | 650                            | Rear    | 170                      |
| <b>XQ1081</b>   | Industrial    | B/W         | RGB  | 650                            | Rear    | 170                      |
| <b>XQ1083</b>   | Broadcast     | B/W         | R    | 900                            | Rear    | 170                      |
| <b>XQ1084</b>   | Industrial    | B/W         | R    | 900                            | Rear    | 170                      |
| ‡ <b>XQ1085</b>   | Broadcast     | B/W         | R    | 750                            | Rear    | 170                      |
| ‡ <b>XQ1086</b>   | Industrial    | B/W         | R    | 750                            | Rear    | 170                      |
| <b>XQ1090</b>   | Broadcast     | B/W         | LRGB | 650                            | Front   | 170                      |
| <b>XQ1091</b>   | Industrial    | B/W         | RGB  | 650                            | Front   | 170                      |
| <b>XQ1093</b>   | Broadcast     | B/W         | R    | 900                            | Front   | 170                      |
| <b>XQ1094</b>   | Industrial    | B/W         | R    | 900                            | Front   | 170                      |
| ‡ <b>XQ1095</b>   | Broadcast     | B/W         | R    | 750                            | Front   | 170                      |
| ‡ <b>XQ1096</b>   | Industrial    | B/W         | R    | 750                            | Front   | 170                      |
| § <b>XQ1100</b>   | Broadcast     | B/W         | LRGB | 650                            | Front   | 170                      |
| § <b>XQ1101</b>   | Industrial    | B/W         | RGB  | 650                            | Front   | 170                      |
| § <b>XQ1102</b>   | Medical       | —           | —    | 650                            | Front   | 170                      |
| § <b>XQ1103</b>   | Broadcast     | B/W         | R    | 900                            | Front   | 170                      |
| § <b>XQ1104</b>   | Industrial    | B/W         | R    | 900                            | Front   | 170                      |
| <b>30mm dia. Plumbicon tubes—standard range</b>               |               |             |      |                                |         |                          |
| <b>XQ1020</b>   | Broadcast     | B/W         | LRGB | 650                            | Rear    | 220                      |
| <b>XQ1021</b>   | Industrial    | B/W         | RGB  | 650                            | Rear    | 220                      |
| <b>XQ1022</b>   | Medical       | —           | —    | 650                            | Rear    | 220                      |
| <b>XQ1023</b>   | Broadcast     | B/W         | LR   | 850                            | Rear    | 220                      |
| <b>XQ1024</b>   | Industrial    | B/W         | R    | 850                            | Rear    | 220                      |
| ‡ <b>XQ1025</b>   | Broadcast     | B/W         | LR   | 750                            | Rear    | 220                      |
| ‡ <b>XQ1026</b>   | Industrial    | B/W         | R    | 750                            | Rear    | 220                      |
| <b>30mm dia. Plumbicon tubes—technically advanced range</b>   |               |             |      |                                |         |                          |
| <b>XQ1410</b>   | Broadcast     | B/W         | LRGB | 650                            | Rear    | 220                      |
| <b>XQ1411</b>   | Industrial    | B/W         | RGB  | 650                            | Rear    | 220                      |
| <b>XQ1413</b>   | Broadcast     | B/W         | LR   | 850                            | Rear    | 220                      |
| <b>XQ1414</b>   | Industrial    | B/W         | R    | 850                            | Rear    | 220                      |
| ‡ <b>XQ1415</b>   | Broadcast     | B/W         | LR   | 750                            | Rear    | 220                      |
| ‡ <b>XQ1416</b>   | Industrial    | B/W         | R    | 750                            | Rear    | 220                      |

\*Registered trade mark for television camera tubes

†Can be supplied without anti-halation disc denoted by suffix /01 to type number

‡Supplied with infrared filter on disc.

§Supplied without anti-halation disc.

# Electro-optical devices

## vidicon camera tubes book 2 part 2

| Type No.                               | Application and description                       |   | Min. Resolution Capability (TV lines) | Length (mm) |
|--|---|---|---------------------------------------|-------------|
| <b>17.7mm dia. vidicon tubes</b>       |   |   |                                       |             |
| <b>XQ1270</b>                          | General purpose                                   | Integral mesh. For high definition, low cost miniature cameras. | 400                                   | 108         |
| <b>XQ1271</b>                          | General purpose                                   | Separate mesh. For high definition miniature cameras.           | 550                                   | 108         |
| <b>XQ1272</b>                          | General purpose                                   | Separate mesh. With electrostatic focus for miniature cameras.  | 550                                   | 108         |
| <b>25mm dia. vidicon tubes</b>         |   |   |                                       |             |
| <b>XQ1240</b>                          | Industrial, medical and broadcast General purpose | Separate mesh. For high definition monochrome and colour use.   | 1000                                  | 159         |
| <b>XQ1241</b>                          |   |   |                                       |             |
| <b>XQ1032</b>                          | Industrial and general purpose                    | Integral mesh. For low cost cameras.                            | 500                                   | 130         |
| <b>25mm dia. silicon vidicon tubes</b> |   |   |                                       |             |
| <b>XQ1400</b>                          | Low light level                                   | Separate mesh vidicon with mosaic silicon diode array.          | 700                                   | 159         |
| <b>XQ1401</b>                          | broadcast and                                     |   |                                       |             |
| <b>XQ1402</b>                          | industrial  |   |                                       |             |

*Note:*—All vidicon and Plumbicon tubes are focused and deflected magnetically with the exception of the XQ1272 which has electrostatic focusing and magnetic deflection.

*Type Numbers:*—No letter suffix for black/white application; L suffix for luminance; R for red image; G for green image; B for blue image. Where a /01 suffix is also used, the complete type number of an example would be XQ1070/01G.

## camera tube deflection assemblies

| Type No.         | Tube Size (mm) | Loading              | Tube  | Typical operating parameters    |                                  |                    |                                  | Electrode Voltages (V)                      |
|------------------|----------------|----------------------|---|---------------------------------|----------------------------------|--------------------|----------------------------------|---|
|                  |                |                      |   | Line Deflection Current (mAp-p) | Frame Deflection Current (mAp-p) | Focus Current (mA) | Alignment Current at 2gauss (mA) |   |
| <b>AT1102/01</b> | 25             | Front                | Vidicon   | 170                             | 24                               | 17                 | —                                | V <sub>g4</sub> =300                        |
| <b>AT1103</b>    | 25             | Front                | Plumbicon   | 250                             | 38                               | 26                 | 10.5                             | V <sub>g3</sub> =600 V <sub>g4</sub> =840   |
| <b>AT1113/01</b> | 30             | Rear                 | Plumbicon   | 225                             | 35                               | 100                | ±5                               | V <sub>g2</sub> =600                        |
| <b>AT1113/03</b> | 30             |                      | 3 AT1113/01 assemblies with matched electrical parameters |                                 |                                  |                    |                                  |   |
| <b>AT1115/01</b> | 25             |                      | 3 AT1119/01 assemblies with matched electrical parameters |                                 |                                  |                    |                                  |   |
| <b>AT1116</b>    | 25             | Front                | Plumbicon   | 330                             | 48                               | 105                | 7.5                              | V <sub>g3</sub> =600 V <sub>g4</sub> =950   |
| <b>AT1117</b>    | 15.9           | Rear                 | Plumbicon   | 140                             | 25                               | —                  | 7.5                              | V <sub>g2,4</sub> =300 V <sub>g5</sub> =600 |
| <b>AT1119/01</b> | 25             | Rear                 | Plumbicon   | 295                             | 36                               | 32                 | 7.5                              | V <sub>g3</sub> =475 V <sub>g4</sub> =750   |
| <b>AT1132/01</b> | 30             | Rear                 | Plumbicon   | 225                             | 35                               | 25                 | ±5                               | V <sub>g3</sub> =600                        |
| <b>KV12</b>      | 17.7           | Refer to data sheets |   |                                 |                                  |                    |                                  |   |
| <b>KV19B</b>     | 17.7           | Refer to data sheets |   |                                 |                                  |                    |                                  |   |

## camera tube sockets

| Tube Size (mm)           | Part No.       |
|--------------------------|----------------|
| <b>15.9</b>              | 9390 225 10000 |
| <b>17.7</b>              | 9390 225 10000 |
| <b>25</b>                | TE1004         |
| <b>30</b> standard range | 56021          |
| <b>30</b> advanced range | 56026          |

# Electro-optical devices

## intensified camera tubes—'intensicons' book 2 part 2

| Type No.     | Description   | Screen Dia. (mm) | Photocathode Type | Sensitivity (na/lx) | Resolution (TV lines) |
|--------------|---|------------------|-------------------|---------------------|-----------------------|
| <b>53MXQ</b> | Magnetically deflected vidicon with single stage electrostatically focused image intensifier    | 25               | S25               | 1300                | >500                  |
| <b>54MXQ</b> | Magnetically deflected vidicon with 2-stage electrostatically focused cascade image intensifier | 25               | S25               | 60ma/lx             | >350                  |

## image intensifier tubes

All devices have fibre optic input and output windows with S25 photocathode.

Extended red performance is available. Lower cost tubes for use in industrial applications can be supplied on request.

| Type No. | Image Dia. (mm) | Input Dia. (mm) | Input Surface | Description and Operation | Photocathode Sensitivity at 2856K ( $\mu\text{A/lm}$ ) | Luminance Gain | Resolution at Screen Centre (line prs./mm) |
|----------|-----------------|-----------------|---------------|---------------------------|--|----------------|--|
|----------|-----------------|-----------------|---------------|---------------------------|--|----------------|--|

### electrostatically focused inverter types

|                  |    |    |       |   |     |         |    |
|------------------|----|----|-------|---|-----|---------|----|
| <b>XX1050</b>    | 25 | 25 | Plane | Single stage alone. Gain dependent on power supply  | 230 | >100    | 60 |
| <b>XX1060/01</b> | 25 | 25 | Plane | 3-stage with integral high voltage multiplier. ABC characteristic. External oscillator required | 275 | 70 000  | 30 |
| <b>XX1060/03</b> | 25 | 25 | Plane |   | 300 | 100 000 | 30 |
| <b>XX1063</b>    | 25 | 25 | Plane | 3-stage with integral converter/high voltage multiplier. Full ABC characteristic                | 275 | 60 000  | 30 |
| <b>XX1064</b>    | 25 | 25 | Plane |   | 300 | 100 000 | 30 |

### electrostatically focused inverter micro-channel-plate types

|               |    |    |         |  |     |         |    |
|---------------|----|----|---------|--|-----|---------|----|
| <b>XX1302</b> | 18 | 18 | Plane   | Intensifier alone. Gain dependent on external power supply   | 225 | 50 000  | 30 |
| <b>XX1303</b> | 18 | 18 | Concave |  | 225 | 50 000  | 30 |
| <b>XX1306</b> | 18 | 18 | Plane   | Intensifier with integral converter/high voltage multiplier  | 225 | <50 000 | 30 |
| <b>XX1307</b> | 18 | 18 | Concave |  | 225 | <50 000 | 30 |
| <b>XX1308</b> | 18 | 18 | Plane   | Full ABC characteristic  | 225 | 80 000  | 30 |
| <b>XX1309</b> | 18 | 18 | Concave |  | 225 | 80 000  | 30 |
| <b>XX1360</b> | 25 | 25 | Plane   | Intensifier with integral converter/high voltage multiplier. Full ABC characteristic. Gain variable by external controls | 225 | >50 000 | 28 |
| <b>XX1332</b> | 40 | 50 | Plane   | Intensifier with integral converter/high voltage multiplier. Full ABC characteristic                                     | 230 | >50 000 | 20 |
| <b>XX1333</b> | 40 | 50 | Concave |  | 230 | >50 000 | 20 |

# Photosensitive devices

## photoemissive tubes book 2 part 2

| Type No.                | Description | Photocathode                      |                            | Sensitivity† |        | Max. Anode Supply Voltage (V) | Max. Cathode Current (μA) | Max. Dark Current (μA) | Max. Dark Current at Anode Supply Voltage (V) | Base |
|-------------------------|-------------|-----------------------------------|----------------------------|--------------|--------|-------------------------------|---------------------------|------------------------|---|------|
|                         |             | Projected Area (cm <sup>2</sup> ) | Surface                    | (μA/lm)      | at (V) |                               |                           |                        |   |      |
| <b>92AV</b>             | Vacuum      | 2.1                               | Caesium antimony           | 45           | 85     | 100                           | 25 nA/mm <sup>2</sup>     | 0.05                   | 85  | B7G  |
| <b>92AG</b>             | Gasfilled   | 2.1                               | Caesium antimony           | 130          | 85     | 90                            | 12.5 nA/mm <sup>2</sup>   | 0.1                    | 85  | B7G  |
| <b>90CV</b><br>(CV2134) | Vacuum      | 3.0                               | Caesium on oxidised silver | 20           | 50     | 250                           | 10                        | 0.05                   | 100   | B7G  |
| <b>90CG</b><br>(CV2133) | Gasfilled   | 3.0                               | Caesium on oxidised silver | 125          | 90     | 90                            | 2.0                       | 0.1                    | 90  | B7G  |

† Sensitivity measured with the whole cathode area illuminated by a lamp of colour temperature 2700K and with a series resistor 1MΩ.  
 Note: Caesium/antimony cathode is particularly sensitive to daylight and bluish light. Caesium/oxidised silver cathode is particularly sensitive to incandescent light and near infrared radiation.

## photoemissive tubes for photometry

| Type No.     | Min. Useful dia. (mm) | Photocathode Surface       | ‡ Luminous Sensitivity |      | Max. Anode Supply Voltage (V) | Cathode Current per mm <sup>2</sup> of the Photocathode (μA/mm <sup>2</sup> ) | λ at max. Response (μm) | Max. Envelope Temperature (°C) |
|--------------|-----------------------|----------------------------|------------------------|------|-------------------------------|---|-------------------------|--------------------------------|
|              |                       |                            | Typical (μA/lm)        | Min. |                               |   |                         |                                |
| <b>150CV</b> | 26                    | Caesium on oxidised silver | 20                     | —    | 100                           | 0.05  | 0.8                     | 60                             |
| <b>150TV</b> | 26                    | Caesium antimony           | 150                    | 100  | 100                           | 0.05  | 0.42±0.03               | 60                             |
| <b>150AV</b> | 30                    | Caesium antimony           | 60                     | 35   | 100                           | 0.05  | 0.42±0.03               | 60                             |

‡ Measured with a tungsten ribbon lamp having a colour temperature of 2850K.



# Photosensitive devices

## photomultipliers book 2 part 2

| Type No.      | Description   | Photocathode Diameter (mm)     | Surface                           | Sensitivity (A/lm) | Av. Anode Sensitivity at $V_b$ (kV) | Cathode Sensitivity ( $\mu$ A/lm) | No. of Stages | Time Characteristic Rise Time (ns) |
|---------------|---|--------------------------------|-----------------------------------|--------------------|-------------------------------------|-----------------------------------|---------------|------------------------------------|
| <b>XP1110</b> | Intended for scintillation counting under limited dimensional conditions                        | 14                             | Caesium antimony                  | 250                | 1.8                                 | 65                                | 10            | 2.5                                |
| <b>XP1116</b> | Rugged construction Suitable for industrial equipment   | 14                             | Caesium on oxidised silver        | 20                 | 1.8                                 | 20                                | 10            | 3.0                                |
| <b>XP1117</b> | Rugged construction Suitable for Laser applications   | 14                             | Sodium potassium caesium antimony | 100                | 1.8                                 | 100                               | 9             | 3.0                                |
| <b>XP1143</b> | Intended for measurement of very short light pulses of high luminous flux                       | Useful Area 280mm <sup>2</sup> | Caesium antimony                  | 0.45               | 3.5                                 | 45                                | 6             | 1.5                                |
| <b>150AVP</b> | General purpose tube suitable for flying spot scanning, spectrometry and scintillation counting | 32                             | Caesium antimony                  | 700                | 1.8                                 | 70                                | 10            | 3.5                                |
| <b>150UVP</b> | As 150AVP but with quartz window for UV applications  | 32                             | Caesium antimony                  | 700                | 1.8                                 | 70                                | 10            | 3.5                                |
| <b>150CVP</b> | Tube with S1 photocathode   | 32                             | Caesium on oxidised silver        | 100                | 1.8                                 | 25                                | 10            | 3.5                                |
| <b>XP1010</b> | Low noise Intended for X and $\gamma$ ray spectrometry  | 32                             | Caesium antimony                  | 700                | 1.8                                 | 80                                | 10            | 3.5                                |
| <b>XP1016</b> | General purpose applications in red and near infrared   | 32                             | Sodium potassium caesium antimony | 400                | 1.8                                 | 140                               | 10            | 3.5                                |
| <b>XP1017</b> | Extended red response version of XP1016   | 32                             | Sodium potassium caesium antimony | 500                | 1.8                                 | 210                               | 10            | 3.5                                |
| <b>56AVP</b>  | Very high gain and uniform electron transit time  | 42                             | Caesium antimony                  | 6500               | 2.2                                 | 65                                | 14            | 2.0                                |
| <b>56DUVP</b> | For spectrometry with very low luminous flux. Ultraviolet response                              | 42                             | Potassium caesium antimony        | —                  | —                                   | 45                                | 14            | 2.0                                |
| <b>56TVP</b>  | Tube with Trialkali photocathode for use with Laser applications                                | 42                             | Sodium potassium caesium antimony | 11 500             | 2.5                                 | 115                               | 14            | 2.0                                |
| <b>56TUVP</b> | Intended for use where high sensitivity in the visible and ultraviolet region is required       | 42                             | Sodium potassium caesium antimony | 11 500             | 2.5                                 | 115                               | 14            | 2.0                                |

# Photosensitive devices

## photomultipliers (cont.) book 2 part 2

| Type No.  | Description   | Photocathode    |                                   | Av. Anode Sensitivity (A/lm) | Sensitivity at $V_b$ (kV) | Cathode Sensitivity ( $\mu$ A/lm) | No. of Stages  | Time Characteristic Rise Time (ns) |
|---|---|-----------------|-----------------------------------|------------------------------|---------------------------|-----------------------------------|----------------|------------------------------------|
|   |   | Diameter (mm)   | Surface                           |                              |                           |                                   |                |                                    |
| <b>XP1002</b>                                   | Trialkali photocathode for Laser applications                           | 44              | Sodium potassium caesium antimony | 400                          | 1.8                       | 150                               | 10             | 4.0                                |
| <b>XP2020</b>                                   | Intended for applications requiring good time resolution                | 45              | Potassium caesium antimony        | —                            | —                         | —                                 | 12             | 1.5                                |
| <b>XP1230</b>                                   | Scintillation counting  | 45              | Potassium caesium antimony        | —                            | —                         | —                                 | 12             | 1.6                                |
| <b>*XP2230</b><br><b>*XP2230B</b>               | Applications requiring very high gain and short time characteristics    | 45              | Potassium caesium antimony        | —                            | —                         | —                                 | 12             | 0.6                                |
| <b>XP2000</b><br><b>XP2030</b><br><b>XP2050</b> | Venetian blind types for detection and measurement of nuclear radiation | 44<br>68<br>111 | Potassium caesium antimony        | 60<br>60<br>20               | 1.8<br>1.8<br>1.5         | 80<br>80<br>80                    | 10<br>10<br>10 | 7.0<br>9.0<br>16                   |
| <b>†XP2040</b>                                  | Fast time response for pulse counting with UV window                    | 110             | Caesium antimony                  | —                            | —                         | 70                                | 14             | 2.0                                |
| <b>†XP2041</b>                                  | Fast time response bi-alkali cathode with UV window                     | 110             | Potassium caesium antimony        | —                            | —                         | —                                 | 14             | 2.0                                |
| <b>60DVP</b>                                    | Scintillation counting. Large size                                      | 200             | Potassium caesium antimony        | —                            | —                         | 65                                | 12             | 2.5                                |
| <b>60DVP/H</b>                                  | As 60DVP but with plano-concave glass adaptor                           |                 |                                   |                              |                           |                                   |                |                                    |

\*XP2230 has glass base, XP2230B has Jedec B20 base.

† These types, with suffix /Q, can be supplied with a quartz adaptor (transmission down to 200nm) and a metal container.

# Particle and radiation detectors

## high current G-M tubes book 2 part 2

| Type No.     | Gamma Sensitivity at 10mR/h <sup>60</sup> Co Source (counts/min) | Wall Thickness (mg/cm <sup>2</sup> ) | Recommended Working Voltage (V) | Max.* Background (counts/min) | Dead Time (approx.) (μs) |
|--------------|--|--------------------------------------|---------------------------------|-------------------------------|--------------------------|
| <b>MX163</b> | 250  | 80 to 100                            | 550                             | 1                             | 11                       |
| <b>MX151</b> | 1200   | 80 to 100                            | 575                             | 2                             | 15                       |
| <b>MX188</b> | †1200  | 400                                  | 400                             | 10                            | 20                       |
| <b>MX119</b> | 5700   | 400                                  | 600                             | 20                            | 35                       |
| <b>MX164</b> | 6000   | 32 to 40                             | 575                             | 12                            | 45                       |

\*Shielded with 50mm lead and 3mm aluminium.

†At 5mR/h (<sup>226</sup>Ra source).

## liquid sample G-M tubes

| Type No.        | Liquid Capacity (ml) | Wall Thickness (mg/cm <sup>2</sup> ) | Recommended Working Voltage (V) | Max.* Background (counts/min) | Dead Time (approx.) (μs) |
|-----------------|----------------------|--------------------------------------|---------------------------------|-------------------------------|--------------------------|
| <b>MX124/01</b> | 9 to 10              | 30                                   | 450                             | 50                            | 100                      |
| <b>MX142</b>    | 4.6 to 7             | 15                                   | 420                             | 20                            | 110                      |

\* Shielded with 50mm lead and 3mm aluminium.

# Particle and radiation detectors

## end window beta G-M tubes book 2 part 2

| Type No.          | Window Diameter (mm) | Window Thickness (mg/cm <sup>2</sup> ) | Recommended Working Voltage (V) | Max.* Background (counts/min) | Dead Time (approx.) (μs) |
|-------------------|----------------------|--|---------------------------------|-------------------------------|--------------------------|
| <b>MX147</b>      | 9                    | 2 to 3                                 | 500                             | 10                            | 90                       |
| <b>MX168</b>      | 17                   | 2.5 to 3                               | 420                             | 30                            | 100                      |
| <b>MX168/01</b>   | 17                   | 1.5 to 2.5                             | 420                             | 30                            | 100                      |
| <b>MX168/02</b>   | 17                   | 2.5 to 3                               | 420                             | 30                            | 100                      |
| <b>MX190</b>      | 17                   | 1.5 to 2                               | 550                             | 15                            | 150                      |
| † <b>MX152/01</b> | 19.8                 | 1.5 to 2                               | 600                             | 8                             | 65                       |
| <b>MX148</b>      | 19.8                 | 1.5 to 2                               | 575                             | 15                            | 175                      |
| <b>MX123</b>      | 24.1                 | 1.5 to 2.5                             | 600                             | 25                            | 60                       |
| <b>MX149</b>      | 27.8                 | 2.5 to 3.5                             | 575                             | 25                            | 190                      |
| † <b>MX166/01</b> | 27.8                 | 1.5 to 2                               | 600                             | 12                            | 60                       |
| <b>MX167/01</b>   | 51                   | 3.5 to 4                               | 900                             | 45                            | 45                       |

\*Shielded with 50mm lead and 3mm aluminium.

†Small quantities suitable for anticoincidence applications in conjunction with a guard tube may be available on request to Mullard Ltd.

## gamma sensitive G-M tubes

| Type No.        | Gamma Sensitivity (counts/min) | Recommended Working Voltage (V) | Max.* Background (counts/min) | Dead Time (approx.) (μs) |
|-----------------|--------------------------------|---------------------------------|-------------------------------|--------------------------|
| <b>MX180</b>    | 2 200‡                         | 425                             | 60                            | 100                      |
| <b>MX120/01</b> | 6 800‡                         | 420                             | 90                            | 200                      |
| <b>MX145</b>    | 13 000‡                        | 420                             | 160                           | 200                      |

\* Unshielded.

‡ At 1.0mR/h Radium source.

# Particle and radiation detectors

## channel electron multipliers book 2 part 2

| Type No.                               | Description   | Max. Operating Voltage (kV) | Output               | Nominal Resistance ( $\Omega$ ) | Nominal Gain                  | †Nominal Background Pulse Count Rate (pulse/s) | †Pulse Height Distribution Resolution |
|--|---|-----------------------------|----------------------|---------------------------------|-------------------------------|--|---------------------------------------|
| <b>B310AL/01</b><br><b>B310BL/01</b>   | Planar spiral tube of internal diameter 1.25mm  | 4.0                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.3 \times 10^8$<br>at 3kV   | 0.1<br>at 3kV                                  | 0.5                                   |
| <b>B312AL/01</b><br><b>B312BL/01</b>   | Planar spiral tube of internal diameter 1.25mm with effective aperture of $2 \times 8$ mm     | 4.0                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.3 \times 10^8$<br>at 3kV   | 0.2<br>at 3kV                                  | 0.5                                   |
| <b>RX312AL/01</b><br><b>RX312BL/01</b> | As B312 types except input cone turned through $90^\circ$                                     | 4.0                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.3 \times 10^8$<br>at 3kV   | 0.2<br>at 3kV                                  | 0.5                                   |
| <b>B318AL/01</b><br><b>B318BL/01</b>   | Planar spiral tube of internal diameter 1.25mm with effective aperture of 4mm                 | 4.0                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.3 \times 10^8$<br>at 3kV   | 0.25<br>at 3kV                                 | 0.5                                   |
| <b>B330AL/01</b><br><b>B330BL/01</b>   | C-shaped tube of internal diameter 1.25mm   | 4.0                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.5 \times 10^8$<br>at 2.5kV | 0.1<br>at 3kV                                  | 0.5                                   |
| <b>B410AL/01</b><br><b>B410BL/01</b>   | Planar spiral tube of internal diameter 2.2mm   | 3.5                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.5 \times 10^8$<br>at 2.5kV | 0.1<br>at 2.5kV                                | 0.5                                   |
| <b>B413AL/01</b><br><b>B413BL/01</b>   | Planar spiral tube of internal diameter 2.2mm with effective aperture of $3.5 \times 15.5$ mm | 3.5                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.7 \times 10^8$<br>at 2.5kV | 0.25<br>at 2.5kV                               | 0.5                                   |
| <b>B419AL/01</b><br><b>B419BL/01</b>   | Planar spiral tube of internal diameter 2.2mm with effective aperture of 9mm                  | 3.5                         | Open-ended<br>Closed | $3 \times 10^9$                 | $1.7 \times 10^8$<br>at 2.5kV | 0.25<br>at 2.5kV                               | 0.5                                   |

† Above an equivalent threshold of  $2 \times 10^7$  electrons.

‡ At a modal gain of  $10^8$  and 1000 pulse/s.

All the above channel electron multipliers can be vacuum baked to  $400^\circ\text{C}$  and will replace the types without the suffix/01.

## channel electron multiplier plates

| Type No.      | Description   | Channel Diameter ( $\mu\text{m}$ ) | Diameter of disc (mm) | Thickness of Disc (mm) | Current Gain at 1kV | Max. Current Output at 1kV ( $\mu\text{A}$ ) | Resistance ( $\Omega$ ) | Channel Pitch ( $\mu\text{m}$ ) |
|---------------|---|------------------------------------|-----------------------|------------------------|---------------------|--|-------------------------|---------------------------------|
| <b>G25-25</b> | An array of channel electron multipliers fused into the shape of a disc | 25                                 | 27.1                  | 1.0                    | 1000                | 1.0  | approx. $5 \times 10^7$ | 31                              |
| <b>G25-50</b> |   | 25                                 | 53                    | 1.0                    | 1000                | *  | approx. $1 \times 10^7$ | 31                              |
| <b>G25-70</b> |   | 25                                 | 70                    | 1.0                    | 1000                | *  | approx. $5 \times 10^6$ | 31                              |

\* For linear operation the output current should not exceed 0.1 of standing current.

Note 1: Pairs of plates of the same diameter for high gain applications ( $> 10^5$ ) are obtainable under type numbers G25-25/A, G25-50/A and G25-70/A.

Note 2: Special shapes of plates and certain types of phosphor screens are available on application.



# Cold cathode devices

## indicator tubes book 2 part 1

| Type No.      | Description  | Characters Displayed           | Character Height (mm) | Minimum Supply Voltage (V) | Maintaining Voltage (V) | Recommended Cathode Current (mA) | Base           |
|---------------|--|--------------------------------|-----------------------|----------------------------|-------------------------|----------------------------------|----------------|
| <b>ZM1000</b> | In line, side-viewing indication                             | Numbers 0-9                    | 14                    | 170                        | —                       | 2.5                              | Special 14-pin |
| <b>ZM1001</b> | In line, side-viewing indication                             | Characters +, —, ~, X, Y, Z    | 10 to 14              | 170                        | —                       | 2.5                              | Special 14-pin |
| <b>ZM1020</b> | In line, end-viewing indication<br>Incorporates a red filter | Numbers 0-9                    | 15.5                  | 170                        | 140                     | 2.0                              | B13B           |
| <b>ZM1022</b> | As ZM1020 but without red filter                             |                                |                       |                            |                         |                                  |                |
| <b>ZM1021</b> | In line, end-viewing indication<br>Incorporates a red filter | Characters A, V, Ω, +, —, %, ~ | 15.5                  | 170                        | 140                     | 2.0                              | B13B           |
| <b>ZM1023</b> | As ZM1021 but without red filter                             |                                |                       |                            |                         |                                  |                |

## switching diodes

| Type No.      | Description  | Ignition Voltage (V) | Maintaining Voltage (V) | Extinction Voltage (V) | I <sub>k</sub> (mA) | Base        |
|---------------|--|----------------------|-------------------------|------------------------|---------------------|-------------|
| <b>ZA1002</b> | Neon filled subminiature switching diode with a large and stable difference between ignition and maintaining voltage | 170                  | 109                     | —                      | 3.5                 | Flying Lead |
| <b>ZA1004</b> | Neon filled subminiature switching diode for use with control voltages > 6V  | 90                   | —                       | 83.5                   | 1.0                 | Flying Lead |

# Transmitting tubes

## telecommunications power tetrodes book 2 part 4

| Type No.                     | Description  | Approx. Output at Full Ratings (W) | Max. Frequency at Full Ratings (MHz) | Max. Frequency at Reduced Ratings (MHz) | $p_a$ Max. (W) | $V_a$ Max. (V) | $V_{g2}$ Max. (V) | $I_k$ Max. (mA) | $V_f$ or $V_h$ (V) | $I_f$ or $I_h$ (A) | Base    |
|------------------------------|--|------------------------------------|--------------------------------------|---|----------------|----------------|-------------------|-----------------|--------------------|--------------------|---------|
| <b>QY3-125</b><br>(CV2130)   | Radiation cooled                                     | 375                                | 120                                  | 200                                     | 125            | 3 000          | 400               | 300             | 5.0                | 6.5                | B5F     |
| <b>YL1110</b>                | External anode<br>Forced-air cooled<br>Ceramic/metal | 800                                | 400                                  | 1 215                                   | 700            | 2 500          | 1 200             | 650             | 6.3                | 7.85               | Coaxial |
| <b>QY4-500A</b>              | External anode<br>Forced-air cooled                  | 930                                | 110                                  | 220                                     | 500            | 4 000          | 500               | 440             | 5.0                | 13.5               | Special |
| <b>QY4-250</b><br>(CV2131)   | Forced-air cooled                                    | 1 000                              | 75                                   | 120                                     | 250            | 4 000          | 600               | 420             | 5.0                | 14.1               | B5F     |
| <b>QY4-400</b><br>(CV5959)   | Forced-air cooled                                    | 1 100                              | 110                                  | —                                       | 400            | 4 000          | 600               | 420             | 5.0                | 14.5               | B5F     |
| <b>QY5-500</b>               | Radiation cooled                                     | 1 760                              | 75                                   | 110                                     | 500            | 5 000          | 700               | 600             | 10                 | 9.9                | B5K     |
| <b>YL1440</b>                | Forced-air cooled<br>Ceramic/metal                   | 2 250                              | 250                                  | —                                       | 1 500          | 4 000          | 600               | 1 200           | 4.2                | 55                 | Coaxial |
| <b>QY5-3000A</b><br>(CV5219) | Forced-air cooled                                    | 4 100                              | 75                                   | 220                                     | 3 000          | 5 000          | 800               | 1 300           | 6.3                | 32.5               | Special |
| <b>QY5-3000W</b>             | Water cooled   |                                    |                                      |   |                |                |                   |                 |                    |                    |         |
| <b>YL1470</b>                | Forced-air cooled<br>Ceramic/metal                   | 5 700                              | 110                                  | —                                       | 6 000          | 7 000          | 1 000             | 4 500           | 6.3                | 120                | Coaxial |
| <b>YL1420</b>                | Forced-air cooled<br>Ceramic/metal                   | 6 300                              | 250                                  | —                                       | 6 000          | 6 000          | 1 000             | 4 500           | 6.3                | 120                | Coaxial |
| <b>YL1430</b>                | Forced-air cooled<br>Ceramic/metal                   | 13 000                             | 250                                  | —                                       | 12 000         | 8 000          | 1 000             | 8 500           | 8.0                | 120                | Coaxial |
| <b>YL1520</b>                | External anode<br>Forced-air cooled<br>Ceramic/metal | 27 500                             | 250                                  | —                                       | 18 000         | 9 000          | 1 000             | 9 000           | 11.5               | 120                | Coaxial |

## double tetrodes

| Type No.                     | Approx. Output at Full Ratings (W) | Max. Frequency at Full Ratings (MHz) | Max. Frequency at Reduced Ratings (MHz) | $p_a$ max. (W) | $V_a$ max. (V) | $V_{g2}$ max. (V) | $I_k$ max. (mA)         | $V_h$ (V)   | $I_h$ (A)    | Base |
|------------------------------|------------------------------------|--------------------------------------|---|----------------|----------------|-------------------|-------------------------|-------------|--------------|------|
| <b>QQV02-6</b><br>(CV2466)   | 5.8                                | 500                                  | —                                       | 2 × 3.0        | 250            | 200               | 2 × 45<br>( $I_a$ max.) | 6.3<br>12.6 | 0.6<br>0.3   | B9A  |
| <b>QQV03-10</b><br>(CV2798)  | 16                                 | 100                                  | 225                                     | 2 × 5.0        | 300            | 200               | 2 × 50                  | 6.3<br>12.6 | 0.83<br>0.42 | B9A  |
| <b>QQV06-40A</b><br>(CV2797) | 90                                 | 200                                  | 500                                     | 2 × 20         | 600            | 300               | 2 × 120                 | 6.3<br>12.6 | 1.8<br>0.9   | B7A  |
| <b>QQV07-50</b><br>(CV5847)  | 103                                | 200                                  | 500                                     | 2 × 25         | 750            | 300               | 2 × 150                 | 6.3<br>12.6 | 1.8<br>0.9   | B7A  |

# Transmitting tubes

## telecommunications power triodes book 2 part 4

| Type No.  | Approx. Output at Full Ratings (kW) | Max. Frequency at Full Ratings (MHz) | Max. Frequency at Reduced Ratings (MHz) | $p_a$ max. (kW)   | $V_a$ max. (kV) | $I_k$ max. (A) | $V_f$ or $V_h$ (V) | $I_f$ or $I_h$ (A) | Base |
|---|-------------------------------------|--------------------------------------|---|-------------------|-----------------|----------------|--------------------|--------------------|------|
| <b>TY2-125</b><br>(CV1924)  | 0.39                                | 150                                  | 200                                     | 0.135             | 2.5             | 0.25           | 6.3                | 5.4                | B5F  |
| <b>TY4-400</b>  | 1.2                                 | 100                                  | —                                       | 0.35              | 4.0             | 0.49           | 5.0                | 14                 | B5F  |
| <b>TY4-500</b>  | 1.69                                | 100                                  | 120                                     | 0.45              | 4.0             | 0.65           | 10                 | 9.9                | B5K  |
| <b>TY6-5000A</b><br>(CV3926)<br><b>TY6-5000W</b><br><b>TY6-5000H</b>  | 6.9                                 | 75                                   | 220                                     | 5.0<br>6.0<br>6.0 | 6.0             | 1.85           | 12.6               | 33                 | —    |
| <b>TY7-6000A</b><br>(CV5239)<br><b>TY7-6000W</b><br><b>TY7-6000 H</b> | 10                                  | 30                                   | —                                       | 6.0               | 7.2             | 2.8            | 12.6               | 33                 | —    |
| <b>TY8-15A</b><br><b>TY8-15H</b>                                      | 17.7                                | 30                                   | —                                       | 10<br>15          | 8.0             | 5.5            | 6.3                | 130                | —    |
| <b>TY12-15A</b>   | 41                                  | 30                                   | —                                       | 15                | 13              | 5.8            | 8.0                | 130                | —    |

Suffixes A, W and H to power triode type numbers indicate forced-air, water cooled and water cooled (integral helix) respectively.

## triodes for television translator service

| Type No.      | Description | Typical Power Output At Frequency |       | Max. Frequency | $p_a$ max. (W) | $V_a$ max. (kV) | $I_a$ max. (mA) | Intermodulation Product (dB) |
|---------------|-------------|-----------------------------------|-------|----------------|----------------|-----------------|-----------------|------------------------------|
|               |             | (W)                               | (MHz) | (GHz)          |                |                 |                 |                              |
| <b>YD1300</b> | Amplifier   | 35                                | 780   | 1.0            | 300            | 2.0             | 200             | —52                          |
| <b>YD1302</b> | Amplifier   | 55                                | 780   | 1.0            | 325            | 2.0             | 250             | —54                          |
| <b>YD1330</b> | Amplifier   | 220                               | 860   | 1.0            | 1800           | 3.5             | 700             | —52                          |
| <b>YD1333</b> | Amplifier   | 100                               | 860   | 1.0            | 900            | 3.5             | 550             | —56                          |
| <b>YD1336</b> | Amplifier   | 220                               | 860   | 1.0            | 1800           | 3.5             | 550             | —53                          |

# Transmitting tubes

## triodes for industrial heating book 2 part 4

ceramic/metal construction range of high efficiency external anode power triodes

| Type No.  | Cooling  | Approx. Output at Full Ratings (kW) | Max. Frequency at Full Ratings (MHz) | Max. Frequency at Reduced Ratings (MHz) | $p_a$ Max. (kW) | $V_a$ Max. (kV) | $I_k$ Max. (A)    | $V_r$ (V)         | $I_r$ (A)        | Base                          |
|---|--|-------------------------------------|--------------------------------------|---|-----------------|-----------------|-------------------|-------------------|------------------|-------------------------------|
| <b>YD1240</b><br><b>YD1244</b>                  | Forced-air<br>Forced-air                               | 2.7                                 | 250                                  | —                                       | 1.5             | 5.5             | 1.4               | 6.3               | 33               | Coaxial                       |
| <b>YD1150</b><br><b>YD1152</b>                  | Forced-air<br>Water (helix)                            | 4.5                                 | 160                                  | 220                                     | 2.5             | 7.2             | 1.4               | 6.3               | 33               | Coaxial                       |
| <b>YD1160</b><br><b>YD1161</b><br><b>YD1162</b> | Forced-air<br>Water (separate jacket)<br>Water (helix) | 8.8                                 | 120                                  | 220                                     | 5.0             | 7.2             | 2.8               | 6.3               | 66               | Coaxial                       |
| <b>YD1170</b><br><b>YD1171</b><br><b>YD1172</b> | Forced-air<br>Water (separate jacket)<br>Water (helix) | 15.4                                | 120                                  | —                                       | 10              | 7.2             | 5.0               | 5.8               | 130              | Coaxial                       |
| <b>YD1173</b><br><b>YD1175</b><br><b>YD1177</b> | Forced-air<br>Forced-air<br>Water (helix)              | 13.2<br>26.5<br>26.5                | 50<br>120<br>120                     | —<br>—<br>—                             | 10<br>10<br>15  | 12<br>12<br>12  | 2.5<br>5.0<br>5.0 | 5.4<br>5.8<br>5.8 | 65<br>130<br>130 | Coaxial<br>Coaxial<br>Coaxial |
| <b>YD1180</b><br><b>YD1182</b>                  | Forced-air<br>Water (integral jacket)                  | 30                                  | 100                                  | —                                       | 15<br>20        | 9.0             | 7.5               | 7.0               | 175              | Coaxial                       |
| <b>YD1185</b><br><b>YD1187</b>                  | Forced-air<br>Water (integral jacket)                  | 50                                  | 100                                  | —                                       | 15<br>20        | 14.4            | 7.5               | 7.0               | 175              | Coaxial                       |
| <b>YD1192</b><br><b>YD1193</b>                  | Water (integral jacket)<br>Vapour cooled               | 60                                  | 30                                   | —                                       | 40<br>40        | 9.6             | 14.5              | 8.4               | 235              | Coaxial                       |
| <b>YD1195</b><br><b>YD1197</b>                  | Forced-air<br>Water (integral jacket)                  | 90                                  | 100                                  | —                                       | 30<br>40        | 14.4            | 14.0              | 8.4               | 235              | Coaxial                       |
| <b>YD1202</b><br><b>YD1203</b>                  | Water (integral jacket)<br>Vapour cooled               | 120                                 | 30                                   | —                                       | 80              | 14.0            | 24                | 12.3              | 255              | Coaxial                       |
| <b>YD1212</b><br><b>YD1213</b>                  | Water (integral jacket)<br>Vapour cooled               | 240                                 | 30                                   | —                                       | 120             | 16.8            | 34                | 12.6              | 380              | Coaxial                       |
| <b>YD1342</b><br><b>YD1343</b>                  | Water (integral jacket)<br>Vapour cooled               | 480                                 | 30                                   | —                                       | 240             | 19.2            | 55                | 14                | 555              | Coaxial                       |



# Transmitting tubes

## triodes for industrial heating (cont.) book 2 part 4

| Type No.   | Description   | Approx. Output at Full Ratings (kW) | Max. Frequency at Full Ratings (MHz) | Max. Frequency at Reduced Ratings (MHz) | $p_a$ Max. (kW) | $V_a$ Max. (kV) | $I_k$ Max. (A) | $V_f$ or $V_h$ (V) | $I_f$ or $I_h$ (A) | Base          |
|--|---|-------------------------------------|--------------------------------------|---|-----------------|-----------------|----------------|--------------------|--------------------|---------------|
| <b>TY2-125</b><br>(CV1924)   | R.F. Power Triode for general purpose industrial heating applications                       | 0.39                                | 150                                  | 200                                     | 0.135           | 2.5             | 0.25           | 6.3                | 5.4                | B5F           |
| <b>TY4-400</b>   | Radiation cooled Triode for pre-heating and plastic welding and induction heating equipment | 1.3                                 | 100                                  | —                                       | 0.4             | 4.0             | 0.48           | 5.0                | 14                 | B5F           |
| <b>TY5-500</b>   | Radiation cooled Triode for general purpose industrial heating applications                 | 1.5                                 | 50                                   | —                                       | 0.5             | 5.0             | 0.77           | 5.0                | 32.5               | 4-pin Special |
| <b>TY4-500</b>   | Radiation cooled Triode for general purpose industrial heating applications                 | 1.69                                | 100                                  | 120                                     | 0.45            | 4.0             | 0.65           | 10                 | 9.9                | B5K           |
| <b>TY6-800</b>   | Radiation cooled Triode for general purpose industrial heating applications                 | 2.7                                 | 50                                   | —                                       | 0.8             | 6.0             | 1.05           | 6.3                | 32.5               | 4-pin Special |
| <b>TY6-1250A</b>   | External anode Power Triode for general purpose industrial heating applications             | 4.1                                 | 50                                   | —                                       | 2.1             | 7.0             | 2.3            | 6.3                | 65                 | —             |
| <b>TY8-6000A</b><br><b>TY8-6000W</b><br><b>TY8-6000H</b>             | External anode Power Triodes for general purpose industrial heating applications            | 7.2                                 | 50                                   | —                                       | 6.0             | 8.0             | 2.5            | 12.6               | 33                 | —             |
| <b>TY7-6000A</b><br>(CV5239)<br><b>TY7-6000W</b><br><b>TY7-6000H</b> | External anode Power Triodes for general purpose industrial heating applications            | 8.25                                | 55                                   | 85                                      | 6.0             | 7.2             | 2.8            | 12.6               | 33                 | —             |
| <b>TY8-15A</b><br><b>TY8-15H</b>                                     | External anode Power Triodes for general purpose industrial heating applications            | 14.3                                | 30                                   | —                                       | 10<br>15        | 8.0             | 5.0            | 6.3                | 130                | —             |

Suffixes A, W and H to the type number indicate forced-air cooled, water cooled and water cooled (integral helix) respectively.

# Microwave tubes

## communications travelling wave tubes book 2 part 4\*

| Type No.       | Description                        | Frequency Band | Min. Power Output (sat.) (W) | Frequency Range (GHz) | Typical Operation as Amplifier |                 |                    |                        |                        | Mount Type No. |
|----------------|------------------------------------|----------------|------------------------------|-----------------------|--------------------------------|-----------------|--------------------|------------------------|------------------------|----------------|
|                |                                    |                |                              |                       | Noise Factor (dB)              | Power Gain (dB) | Helix Voltage (kV) | Collector Voltage (kV) | Collector Current (mA) |                |
| <b>YH1210</b>  | U.H.F. TV transposer amplifier     | U.H.F.         | 200                          | 0.47 to 0.86          | —                              | 30              | 3.5                | 3.5                    | 850                    | 55380          |
| <b>YH1090</b>  | Telecommunications power Amplifier | 4GHz           | 25                           | 3.4 to 4.2            | 24                             | 42              | 2.2                | 1.3                    | 60                     | 55329 or 55332 |
| <b>YH1170</b>  | Telecommunications power Amplifier | C              | 22                           | 5.8 to 8.5            | 27                             | 39              | 2.8                | 1.3                    | 55                     | 55337          |
| <b>YH1172</b>  |                                    | C              | 22                           | 7.0 to 8.5            | 24                             | 45              | 3.1                | 1.4                    | 53                     | 55361          |
| <b>LB6-10</b>  | Telecommunications power Amplifier | C              | 10                           | 5.9 to 6.5            | 25                             | 35              | 2.65               | 1.7                    | 40                     | P6L4           |
| <b>LB6-25</b>  | Telecommunications power Amplifier | C              | 25                           | 5.9 to 6.5            | 28                             | 38              | 3.4                | 2.2                    | 45                     | P6L11          |
| <b>LB6-25A</b> | Telecommunications power Amplifier | 6GHz           | 20                           | 6.4 to 7.2            | 28                             | 38              | 3.5                | 2.2                    | 45                     | P6L11A         |

## radar travelling wave tubes

| Type No.                    | Description                      | Frequency Band | Min. Power Output (sat.) (W) | Frequency Range (GHz) | Typical Operation as Amplifier |                 |                    |                        |                        | Mount Type No. |
|-----------------------------|----------------------------------|----------------|------------------------------|-----------------------|--------------------------------|-----------------|--------------------|------------------------|------------------------|----------------|
|                             |                                  |                |                              |                       | Noise Factor (dB)              | Power Gain (dB) | Helix Voltage (kV) | Collector Voltage (kV) | Collector Current (mA) |                |
| <b>LB3-250B</b><br>(CV6223) | Broadband pulsed power Amplifier | S              | 250                          | 2.7 to 3.3            | —                              | 32              | †                  | †                      | 800                    | S3L1           |
| <b>YH1060</b><br>(CV6183)   | Broadband low power Amplifier    | X              | 0.002                        | 9.0 to 10             | 8                              | 25              | 1.2                | 1.3                    | 0.4                    | Packaged       |
| <b>LA9-3B</b><br>(CV6087)   | Broadband low power Amplifier    | X              | 0.001                        | 7.0 to 11.5           | 22                             | 30              | 1.3                | 1.4                    | 0.55                   | Packaged       |

† Peak Pulse Cathode Voltage = —5.0kV, other electrodes grounded.

\* Transferred from Book 2 Part 5 to Book 2 Part 4 from July 1975.

## Microwave tubes

### u.h.f. high power klystrons — c.w. operation book 2 part 4

| Type No.  | Description            | Power Output (kW) | Frequency Range (MHz)                  | Cooling | Focusing System  | Beam Voltage (kV) | Collector Voltage Depression (kV) | Beam Current (A) |
|---|------------------------|-------------------|--|---------|------------------|-------------------|-----------------------------------|------------------|
| <b>YK1210</b>                                   | Multi-cavity Amplifier | 1.15              | 11 800 to 12 200                       | Air     | Permanent magnet | 10.5              | 0                                 | 0.4              |
| <b>YK1151</b>                                   | Multi-cavity Amplifier | 23                | 470 to 860                             | Air     | Permanent magnet | 20 to 24          | 4.0                               | 3.6 to 3.0       |
| <b>YK1190</b><br><b>YK1191</b><br><b>YK1192</b> | Multi-cavity Amplifier | 45<br>45<br>45    | 470 to 610<br>590 to 720<br>700 to 860 | Vapour  | Electromagnet    | 22                | —                                 | 6.2              |

### S-band high power klystron — pulse operation

| Type No.      | Description                   | Power Output (kW) | Frequency Range (MHz) | Cooling | Focusing System | Beam Voltage (kV) | Beam Current (A) |
|---------------|-------------------------------|-------------------|-----------------------|---------|-----------------|-------------------|------------------|
| <b>YK1110</b> | Pulsed Multi-cavity Amplifier | 6000*             | 2993 to 3003          | Water   | Electromagnet   | 210*              | 100*             |

\* Peak values. Pulse duration 2.2.µs Pulse repetition rate 50 pulse/s.

## heating magnetrons

New types of heating magnetrons are in development.  
Please contact Mullard Limited for further information.

# Vacuum products

## ionisation gauges book 2 part 4\*

| Type No.      | Description  | Tubulation† | Pressure Range (torr)           | Gauge Factor | Max. Bake-out Temperature (°C) |
|---------------|--|-------------|---------------------------------|--------------|--------------------------------|
| <b>EIP-12</b> | Evaporation ion pump incorporating Bayard-Alpert gauge | W           | $10^{-3}$ to $10^{-10}$         | 12           | 450                            |
| <b>IOG-22</b> | Double filament ionisation gauge head                  | K           | $10^{-3}$ to $10^{-10}$         | 12           | 450                            |
| <b>IOG-39</b> | Ionisation gauge head                                  | —           | $10^{-1}$ to $10^{-7}$          | 5.5          | ‡                              |
| <b>IOG-71</b> | Ionisation gauge                                       | W           | $10^{-3}$ to $5 \times 10^{-8}$ | 20           | 450                            |

\* Transferred from Book 2 Part 2 to Book 2 Part 4 from July 1975.  
‡ Not bakeable—sealed with gasket supplied.

† K="Kovar" type sealing glass.  
W=Tungsten sealing glass.





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