

Hardware Requirements and Reference Lists

For approval and authorisation of this document, please refer to the IECC Applications Manual Contents, RT/E/S/10040.

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Amendment Record

Issue	Date	Description
6	29/10/1999	Converted to Word format by AEA Technology Rail. Same as Issue 5.2 except appendices incorporated into body of document.
6.1	17/03/2000	Added references in sections 1.2 and 1.4 to three new monitors available for DIS.
6.2	22/03/2000	Model number for Aydin Displays CRT amended in section 1.2. Aydin Controls (UK) Ltd name changed (to Aydin Displays Ltd) and address changed in section 1.4.
6.3	07/04/2000	Minor amendments to wording of sections 1.1 and 1.1.1. Section 1.1.3 added, referring to separate document for spares holding. Section 1.2 divided into sections 1.2.1 and 1.2.2, and items added for MVME172-based systems. Backplane size corrected in item 7 of section 1.2.1. Cross-references to other items corrected in items 46, 49 and 72 of section 1.2.1. Address of Underwoods corrected in section 1.4. VERO Electronics amended to APW Electronics in sections 1.2.1 and 1.4 due to change of company name. Notes on current status of equipment availability added to section 1.2.1.
6.4	20/06/2000	Item 93 changed from Lynwood j500 to PC-based ISM Terminal. Note 6 updated. Section 1.3 updated to refer to Item 93.
6.5	25/07/2000	Typographical corrections.
6.6	11/06/2001	Updated items 80 the PC specification, 86 the flash memory board storage increased to 24Mbytes, 87 the graphics card and 89 the fan fail card. Item 8 has been updated to provide a second source for power supplies.
6.7	15/10/2001	Typographical corrections.
6.8	30/09/2002	References to PCS, RDF and IGS parts have been deleted from the parts list. The PSM parts have been added to the parts list. The parts used for the DIS PC have been updated, including a new flat screen. References to manufacturers' have been updated to include address changes and revised trading names.

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6.9	29/11/2002	<p>The words ‘(in Railway Administration)’ deleted from cover</p> <p>Full part number of KME TFT monitor given</p> <p>New KME TFT monitors added</p> <p>References to manufacturers’ have been updated to include address changes and revised trading names.</p> <p>Typographical corrections.</p> <p>Third level headings added to contents page</p>
7	14/02/2003	<p>Front sheet amended from Railtrack to Network Rail</p> <p>KME monitor 29LM181E31M/1 moved from list of free standing DIS monitors to list of monitors approved for retrofitting into a Signaller’s Workstation</p> <p>KME universal monitor added to list of monitors approved for retrofitting into a Signaller’s Workstation</p>
8	07/04/2003	<p>Network Rail front sheet amended</p> <p>References to IGS, PCS and RDF removed</p> <p>Belden 9539 9-core cable added</p>
8.1	30/06/2003	<p>Section 1.2.1 – KME monitors (29LM181UN001/2 and 19LM181UN001/2) for use in SDS added to item 68.</p>
9	24/07/2003	<p>Amended as follows in accordance with changes to supplier details and comments received from Network Rail:</p> <p>Section 1.2 - Railtrack amended to Network Rail;</p> <p>Section 1.2.1 – Rittal added as an alternative supplier for item 1 (42U Cabinet). Preferred use of MVME162 board deleted from items 12 and 13. Use of PSM logger function added to item 43 and Note 3. Notes 12 and 13 added to describe supplier name changes. Note 14 added to describe use of MVME172-213 board.</p> <p>Section 1.2.2 – Rittal added as an alternative supplier for item 1 (VME rack). MVME172-213 added to item 2.</p> <p>Section 1.4 – Gothic Crellon amended to ACAL Technology, EDS Scicon amended to EDS, Lambda amended to Coutant Lambda, Klippon Electronics amended to Weidmuller Interface, Penny & Giles Computer Products amended to Penny & Giles, Anglia Technology and Rittal added, Cellstack Systems Waterbeach address deleted, CA Designs address amended. Suppliers’ web site addresses added where available.</p>

Issue	Date	Description
10	15/01/2004	<p>Amended for MVME172PA 652SE board as follows: Section 1.2.1 – All notes at the end of this section moved to a new Section 1.2.3 ‘Notes on Components’ and note 14 amended for MVME172PA 652SE board. Section 1.2.2 – Motorola MVME172PA 652SE added to Item 2 (MVME172 board). Amended for IECC PC Logger (IPL) as follows: Section 1.2.1 Items 43 and 91 amended to refer to PSM/IPL. Section 1.2.3 Note 3 amended to refer to PSM/IPL. Section 1.3 amended to refer to PSM/IPL. Other amendments as follows: Section 1.2.1 Item 73 ‘DIS Level Converter’ moved to Section 1.2.2 Item 16 and amended to include SPAD alarm. Section 2 – minor format change to table.</p>
11	26/03/2004	Amended to include DIS PC with ATX power supply, CIO-COM422/550 serial card, Colorgraphics XenterraGT8 graphics card
12	23/04/2004	Section 1.2.2 Item 17 ‘DIS Diagnostic Equipment’ added

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I IECC Hardware

I.1 HARDWARE REQUIREMENTS

The quantity of each IECC component which needs to be ordered varies according to the configuration of the IECC. For IECCs containing mixed board subsystems only (*i.e.* subsystems using a mixture of boards such as MVME101, MVME123, MVME162 *etc.*), the accompanying spreadsheet can be used to calculate the quantities required for a specified IECC configuration.

I.1.1 Hardware Requirements Spreadsheet

The hardware requirements spreadsheet is based upon a list of IECC components. It shows the quantity of each component required for each subsystem, or group of subsystems, and for the whole IECC. The calculations depend upon the IECC configuration defined by the user.

The current version of the spreadsheet is applicable to IECCs using mixed board subsystems (*i.e.* subsystems using a mixture of boards such as MVME101, MVME123, MVME162 *etc.*).

The following are specified:

- the number of SSIs and RRIIs;
- whether there is an ARS;
- whether there is a GWS;
- whether there is an ISM;
- whether there is an ECS;
- the number of DISs, SDSs, and FBSs;
- whether there is a TTP;
- whether there is a SIM;
- whether there are RRIIs, and if so, the number of RRIIs connected to each RII;
- whether there is a TDS;
- whether there is a TRW;
- the number of single and dual links to remote systems from the ECS;
- the number of monitors on each Signaller's Workstation;
- the number of bays on each Signaller's Workstation;
- the number of monitors on the Regulator's Display Workstation;
- the number of bays on the Regulator's Display Workstation;
- where applicable, the number of IECCs connected to the TTP;
- where applicable, the number of SSIs and RRIIs simulated by SIM; and
- where applicable, the number of pseudo SSIs within each RII.

Further information about the configuration of an IECC can be found in IECC 7000 and IECC 7001.

In calculating component totals the spreadsheet makes the following assumptions:

- ARS, DIS, ECS, GWS, ISM, RII, SDS and TTP are duplicated subsystems;
- the FBSs, SIM, TDS and TRW are non duplicated subsystems;
- each SSI has one connection to each Signalling network;
- each RII has one connection to each Signalling network;
- ARS requires 3 MVME211 boards per computer unit;
- each DIS or SDS requires 3 MVME211 boards per computer unit;
- FBS and SSI nodes are stored in separate cabinets;
- a TDS has 2 monitors;
- a TRW has 5 monitors (inc. GPVDU);
- the signalling display subsystems are exclusively DIS or SDS;
- DIS is installed in the Signaller's Workstations; and
- Subsystems are not based on MVME172 hardware.

The last row on the spreadsheet shows the typical rated power for each subsystem, or group of subsystems, and a total for the whole IECC.

1.1.2 Using the Spreadsheet

The spreadsheet is supplied in Excel (*.XLS) format.

The name of the IECC concerned is filled in at the top of the spreadsheet. Listed below the IECC name are the parameters which define the IECC. Values for each must be entered, using 0 to indicate that a subsystem does not exist. The values are not checked to determine if they are within the bounds stated on the spreadsheet. However, the word 'Error' will be shown if a given combination is not valid. Similarly, the word 'Warning' is shown if an unusual combination (albeit valid) is entered. It should be noted that 'Error' and 'Warning' may be shown as the user is entering values. However, on completion, these should not appear.

(a) SSIs and RRI

There must be at least one SSI or RRI and the combined total of real SSIs and pseudo SSIs must be no more than 12.

(b) ARS, ECS, GWS, ISM, SIM, TDS, TRW and TTP

The number of ARS, ECS, GWS, ISM, SIM, TDS, TRW and TTP subsystems is either 0 or 1.

(c) DISs, SDSs, and FBSs

There must be at least 1 form of signalling display subsystem, either DIS or SDS, and no more than 3. The number of RDF remote workstations should always be 0. An IECC can have all DIS driven workstations, all SDS driven workstations. If a combination of SDS and DIS driven workstations is required then separate spreadsheets must be used for the SDS and DIS items

The number of FBSs range from 0 to 16.

(d) RIIs

The number of RIIs is either 1 or 2 (0 if not used). The number of RRI per RII is between 1 and 6 (0 if not used). The number of pseudo SSIs per RII is between 1 and 8 (0 if not used). In addition, the total of the number of RRI per RII plus the number of pseudo SSIs per RII must not exceed 13.

(e) Single and Dual Remote System Links

An ECS can control up to 30 links including the link between the ECS computer units. This total can be made up from any combination of single and dual links to the remote systems. If there is not an ECS in the IECC, the number of single links and the number of dual links should be 0.

(f) Signaller's Workstation Monitors

The number of Signaller's Workstations is the same as the number of DISs or SDSs. For the purposes of the spreadsheet, Signaller's Workstations are numbered consecutively from 1 to the number of DIS or SDSs; for instance if there are 2 DISs, the workstations are referred to as workstations 1 and 2. If the corresponding DIS exists, a workstation can have between 2 and 6 monitors for DIS or between 2 and 5 for SDS; otherwise the number of monitors should be 0.

(g) Regulator's Display Workstation (RDW)

The Regulator's Display Workstation can include up to 2 monitors for each DIS or SDS in the IECC.

(h) Number of Bays

The total number of bays in the Signaller's and Regulator's Display Workstations are used to specify components for the power distribution. The number of bays should be at least the same as the total number of monitors within the IECC and usually greater.

(i) Connected IECCs

TTP can be connected to between 1 and 8 IECCs (0 if not used).

(j) Simulated SSIs and RRI

SIM can simulate between 1 and 12 interlockings (0 if not used), either SSIs or RRI.

1.1.3 Spares Holding

The IECC spares holding policy for MVME172-based subsystems is defined in the document 'D192: MVME Obsolete Board Replacement – Spares Holding', reference SAO-OBR-HD-2.

I.2 HARDWARE PARTS REFERENCE LIST

This section lists the components used in IECC. The components listed are those which are type approved. If a component is no longer available, guidance should be sought from Network Rail on the selection and type approval of the replacement component. It should not be assumed that the supplier's nominated replacement is, by default, type approved.

The suggested suppliers named below are, in most cases, not the only source of the component.

The parts list is divided into two sections. Section 1.2.1 contains components used in mixed board subsystems (*i.e.* subsystems built using a mixture of boards such as MVME101, MVME123, MVME162 *etc.*). The use of these components in mixed board subsystems is covered by the hardware requirements spreadsheet (see section 1.1.1), and the component reference numbers refer to the numbered components on the spreadsheet. Many of these components are also common to MVME172-based subsystems (*i.e.* subsystems built using the MVME172 board).

Section 1.2.2 lists the specific components used in MVME172-based subsystems, and which are not used in mixed board subsystems. The reference numbers allocated in this document to these components are currently solely for the purpose of this document. Although some of these components may have the same name (*e.g.* Status Control Panel) as corresponding components used in mixed board subsystems, the MVME172-based version of the component will differ in design and/or functionality from the mixed board version of the component.

1.2.1 Mixed Board and Common Components

1. Component: 42U Cabinet
Function: 42U cabinets, open at the front, house the ARS, DIS (if not installed in the signaller's workstation), ECS, GWS, ISM, RII and TTP subsystems and the FBS and SSI nodes.
Order Details: EMC VERAk cabinet 42U high x 600mm wide x 800mm deep
1 x 586-545114F 42U high x 600mm wide x 800mm deep EMC frame
1 x 805 530845E 600mm x 800mm Top Fantray
1 x 571-565411E 600mm wide x 800mm deep top screen – vented
1 x 571-565419L 600mm wide x 800mm deep bottom screen – vented
1 x 571-565204K 42U high x 600mm wide EMC glazed front door
1 x 571-565188D 42U high x 600mm wide EMC metal rear door
1 x 571-565289J Pair of 42U x 800mm deep EMC side panels
1 x 771-565313K 600mm wide x 800mm deep fully vented high top cover
1 x 802-563670E 3 pairs 800mm deep panel mounting support angles – zinc plated
1 x 802-563592K 2 pairs 42U high panel mounting angles – zinc plated
1 x 567-565343A VERAk adjustable foot kit
1 x 567-565408K heavy duty castor kit
1 x 567-565489F M12 lifting eye kit
1 x 802-563532F 2 off keyed alike lock – self locking (fitted to front and rear doors)
Supplier: APW Electronics Ltd.
(It is recommended that the cabinet order details are always confirmed with an APW Electronics salesperson. Cabinets may have a lead time of 12 weeks or more.)

OR
Order Details: TS8 EMC Cabinet
Rittal Part Number TS8012009
(This part number includes all items necessary for a 42U cabinet to the required specification.)
Supplier: Rittal Ltd.
2. Component: 27U Cabinet
Function: A 27U cabinet, open at the front, is used to house the SIM.
Order Details: As item 1, with part numbers amended where necessary for 27U height.
Supplier: APW Electronics Ltd.
3. Component: 21U Cabinet
Function: 21U cabinets, open at the front, are used to house FBS and TDS.
Order Details: As item 1, with part numbers amended where necessary for 21U height.
Supplier: APW Electronics Ltd.

4. Component: Status Control Panel
Function: LEDs on this panel indicate the computer unit acting as Master or Standby, and “watchdog” LEDs flash on and off while the computer units are working. The computer units can be “changed over” manually using the changeover button on the panel.
Order Details: 3858/100000/1
Supplier: BAeSEMA (see Note 2 in Section 1.2.3).
5. Component: Peripherals Panel for FBS
Function: To house FBS peripherals.
Order Details: As required
Supplier: Ceetak Elmside Ltd.
6. Component: VME Sub-rack Assembly
Function: Each computer unit is housed in a single sub-rack.
Order Details: Modular Microrack System
Desk top or rack mount version designed to accept 6U x 160mm deep cards, size 6U x 19-inch x 500mm including:
- top and bottom ventilated covers
- 350 watt NMX354 power supply unit
- 21 slot 6U VMExcel backplane with ABG connectors
- no cooling
- IEC mains input
- supplied assembled tested and wired.
Supplier: APW Electronics Ltd.
(Subracks may have a lead time of up to 12 weeks)
7. Component: VME Sub-rack Assembly with Rear Fan Panel
Function: A fan panel is required to force cool computer unit boards if the boards are housed in adjacent slots (ECS and SIM and possibly RII).
Order Details: Modular Microrack System
Desk top or rack mount version designed to accept 6U x 160mm deep cards, size 6U x 19-inch x 500mm including:
- top and bottom ventilated covers
- 350 watt NMX354 power supply unit
- 21 slot 7U VMExcel backplane with ABG connectors
- rear fan panel with variable speed fans and fan fail indication
- IEC mains input
- supplied assembled tested and wired.
Supplier: APW Electronics Ltd.
(Subracks may have a lead time of up to 12 weeks)

8. Component: Power Supply Unit Spares
 Function: Each sub-rack assembly, see items 6 and 7, contains a power supply unit. This item is the additional spares.
 Order Details: 350 watt NMX354 power supply unit. (see Note 9 in Section 1.2.3)
 Supplier: APW Electronics Ltd.
 Or
 Order Details: 350 watt NMX354-1224EV (see Note 9 in Section 1.2.3)
 Supplier: Powerbox Ltd.
 Or
 Order Details: 350 watt Sirius CSF350E1 5/12 12B 24C
 Supplier: Coutant Lambda Ltd.
9. Component: Rear Fan Panel Spares
 Function: These are spares for the VME sub-rack assemblies with rear fan panels, see item 7. They also enable the VME sub-rack assembly spares to be converted into VME sub-rack assembly with rear fan panel spares.
 Order Details: Rear fan panel with variable speed fans and fan fail indication
 Supplier: APW Electronics Ltd.
10. Component: MVME025 Board
 Function: This board controls communication between other boards in the computer unit. There is one MVME025 board in each subsystem's computer unit, except for the TTP.
 Order Details: Motorola MVME025 (bus arbiter)
 Supplier: ACAL Technology Ltd. (see Notes 1 and 12 in Section 1.2.3).
11. Component: MVME101 Board
 Function: This board controls the communication of the computer unit with the network or with other devices. Each MVME101 board has 2 ports by which it can be connected to the network or the devices. There can be more than one MVME101 board in a computer unit.
 Order Details: Motorola MVME101 (MC68000 CPU 8MHz)
 Supplier: As item 10 (see Note 1 in Section 1.2.3).
12. Component: MVME162 Board
 Function: This board houses the main processor. It is used to execute the software stored on the computer unit's memory boards.
 Order Details: Motorola MVME162-010 (MC68040 CPU 25MHz + 4MB)
 Supplier: As item 10 (see Note 1 in Section 1.2.3).
13. Component: MVME123 Board
 Function: This board houses the main processor on many of the subsystems. It is used to execute the software stored on the computer unit's memory boards.
 Order Details: Motorola MVME123 (MC68010 CPU 12.5MHz + 512KB)
 Supplier: As item 10 (see Note 1 in Section 1.2.3).