

**Field Support Manual
Video Display Unit
P816 / P818 / X3300**



**Telecommunication
and Data Systems**

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**PHILIPS TELECOMMUNICATION AND DATA SYSTEMS
CUSTOMER SERVICE DOCUMENTATION AND TRAINING
P.O. BOX 245
7300 AE APELDOORN.
THE NETHERLANDS.**

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1 GENERAL DESCRIPTION

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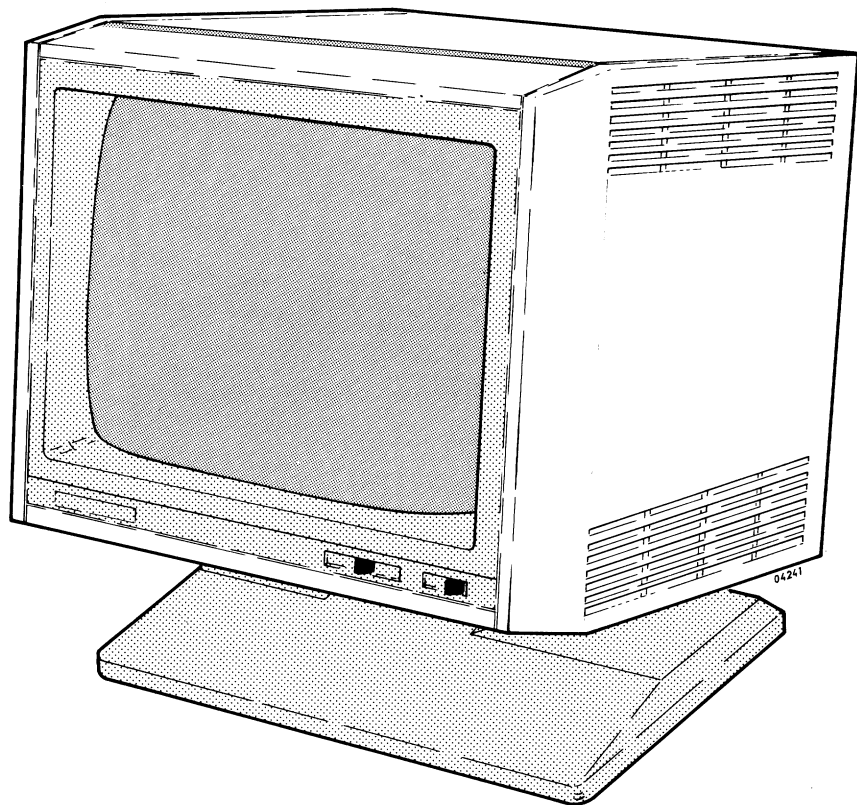
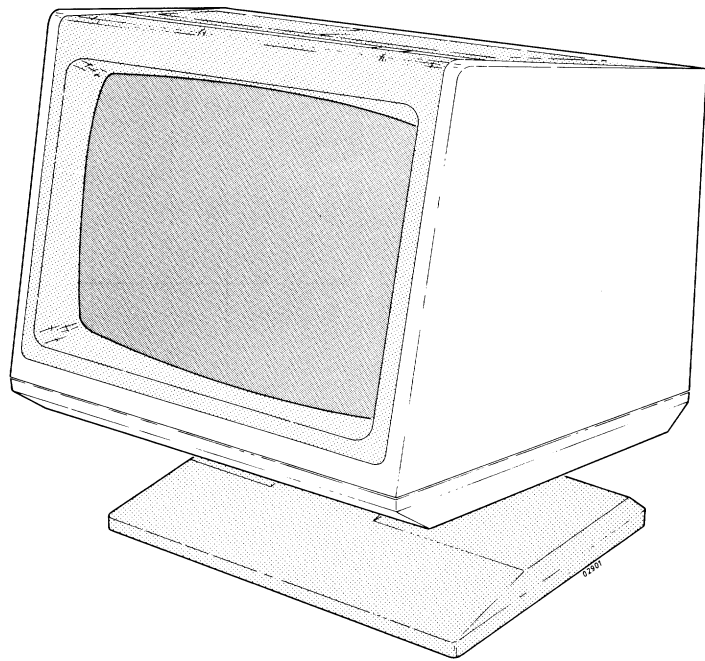
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VDU: P816/3300 (12")



VDU: P818/X3310 (15")

Figure 1.1 P816/818/X3300/3310 VIDEO DISPLAY TERMINALS

1.1 INTRODUCTION (SEE FIGURES 1.1 AND 1.2)

This manual provides technical data, maintenance procedures and details of unit operation sufficient for field support of the General Purpose VDT family, comprising: P816 and P818 models, and OEM units of the X3300 and X3310 type. An overview of the Model Versions is now given:

| COMMERCIAL CODE | 12NC NO. | WS CONTROLLER | SCREEN SIZE | CHARACTERISTICS | KEYBOARD |
|--------------------------|----------------|---------------|-------------|--------------------|----------|
| GENERAL PURPOSE | OEM | | | | |
| P816-010 | 8700-816-01001 | CRK816/18-01 | 12" | P4, Cha. Mode | P818-051 |
| P816-011 | 8700-816-01101 | " | " | P31, " | " |
| P816-020 | 8700-816-02001 | CRK816/18-02 | " | P4, Block Mode,S/S | P818-052 |
| P816-021 | 8700-816-02101 | " | " | P31, " | " |
| P818-010 | 8700-818-01001 | CRK816/18-01 | 15" | P4, Cha. Mode | P818-051 |
| P818-011 | 8700-818-01101 | " | " | P31, " | " |
| P818-020 | 8700-818-02101 | CRK816/18-02 | " | P4, Block Mode,S/S | P818-052 |
| P818-021 | 8700-818-02101 | " | " | P31, " | " |
| OEM -VT100 COMPATIBILITY | | | | | |
| X3300-001 | 8709-033-00011 | CRK-X3300 | 12" | P4, Cha. Mode | X3305 |
| X3300-002 | 8709-033-00021 | " | " | P31, " | " |
| X3310-001 | 8709-033-10011 | " | 15" | P4, " | " |
| X3310-002 | 8709-033-10021 | " | " | P31, " | " |

Table 1.1 VDU MODEL VERSIONS

The VDU's provide a visual presentation of alphabetic, numeric, symbolic graphic data. Each unit comprises: a metallic cabinet which houses a CRT screen, a workstation controller based on the CRK board with fixed firmware, a CRT Electronics board and a power supply board - the CAB2 board. As an option the unit can be fitted with a current loop adaptor board - the CVC board.

The Workstation controller the CRK board, comes in three versions: CRK 816/18-01, CRK 816/18-02, and CRK X3300, the differences between the boards appear mainly in the firmware (microprogram and character generator) with minor additions in the hardware for the CRK-X3300. These differences will be more fully defined in the relevant sections of Chapters 2 and 3.

All three VDU types have one data communication interface to realize the connection to a host computer (V24/V24 or current loop), and one interface port for the connection of a keyboard. The keyboard used to complete the VDU based workstation terminal will be the OEM keyboard P818-052, X3305 or P818-051 (reduced version of P818-052) which will be equipped with the respective keys and keytops for complete operational facility with each VDU.

The transfer of data is achieved by either character or block asynchronous exchanges with the P816/818 and X3300/X3310 versions.

The X3300 and X3310 have been specifically designed for compatibility with the DEC VT100 unit.

The P816-020/1, and P818/-020/1 have additional unit facilities over and above those of the P816-010/1 and P818-010/1, these are itemised as follows:

- possibility of Cha. or block mode.
- half or full duplex in block mode.
- split screen in block mode.
- roll up of complete screen or separate sections.
- insert or delete line.

Regarding options, it should be noted that an Auxiliary device (e.g. hard copy printer) can be connected to the VDU unit via the CRK board, this option being realized only when the respective hardware elements are present, i.e. USART and baud-rate generator, these are standard for P816/818 and X3300 Rel. 3 onwards.

With regard to mounting, this family of VDU's has been designed to be table top mounted, as an option a VDU can be mounted on a field installable swivel stand (see Figure 1.1).

This manual is divided into eight separate chapters: Chapter 1 gives details covering the Technical Parameters, External Interfaces, Applications and Installation Procedures.

Chapter 2 provides a Functional Overview detailed to block diagram level of the hardware and power supplies; the chapter also describes the Firmware and the Hardware/Software Interface (HSI).

A more detailed description of the hardware e.g. Workstation Controller (CRK), Current Loop Adaptor (CVC) and Power Supplies (CAB) is given in Chapter 3, which ends with a section comprising definitions for signal terms employed within the functional diagrams contained in Chapter 4.

Chapter 5 deals with listings, and Chapter 6 with spare parts and conversion lists. The maintenance and workshop repair procedures relating to the VDU's are covered in Chapters 7 and 8, respectively.

Furthermore, the CRT Electronics Board and CRT monitor units are fully described in Field Service Manual 5122 991 30521 FIMI Monitor 12"/15".

1.2 PHYSICAL DESCRIPTION (SEE FIGURE 1.2)

This section provides an illustrated description of the main physical features of the P816/818/X3300/3310 Video Display Unit (VDU). This also includes details of the internal arrangement i.e. location and fixing of sub-assemblies.

1.2.1 P816/X3300 (12" VERSION)

The monitor support frame comprises four preformed metallic plates which provide, when secured together by eight lock screws, the main structural support for the CRT, cabinet covers and PCB mounting racks. The CRT itself is simply screw mounted to the left and right side plates of the support frame through four mounting lugs, these being retained by a metallic strap formed around the perimeter of the CRT.

. DEFLECTION UNIT

The horizontal and vertical yoke windings, which form the deflection unit for the CRT assembly, are mounted directly onto the CRT stem being secured in position by a screw clamp.

. CRT ELECTRONICS RACK

This rack retains the CRT Electronics board, the CRK board, with two additional positions for optional boards e.g. CVC. It is located adjacent to the left side panel (when the unit is viewed from the rear). Board retention is realized with plastic slides snap-mounted in the top and bottom panels of the support frame. Each individual PCB slide has two locking clips that secure the PCB in position. Full access to the electronics rack is from the rear of the support frame with the rear and safety covers removed.

. VIDEO AMPLIFIER BOARD

This PCB contains the circuitry for final video amplification, and is directly mounted to the 7-pin interconnection located on the end face of the CRT stem.

. CRT ELECTRONICS BOARD

This PCB is located at position four of the electronics rack in proximity to the CRT, of special note is the external brightness potentiometer that extends via a mechanical linkage through the front cover below the CRT tube face.

. CRK BOARD

The CRK board is located at rack position one, the various connection ports are located on the rear most edge. The CRK is of double EURO format dimensions.

. CAB MODULE

The power supplies for the unit are generated by the CAB module, located at rack position five.

. MAINS FILTER

This sub-assembly is an integral feature of the bottom cover. The unit's ON/OFF switch is located in this area, being interconnected to its related front panel control knob by a mechanical linkage. Also mounted in the filter's rear face is the mains fuse, this is fully accessible with the rear cover in position.

. COVERS - TOP, BOTTOM, SAFETY AND REAR

The unit housing comprises a top and bottom cover within which the support frame is screw mounted, a safety and rear cover complete the housing. The safety cover which includes connector identification is screw mounted to the rear of the support frame, the rear cover being simply clip mounted inside the assembled top and bottom covers. The bottom cover includes a recess on the front/bottom edge, from which the dial type control knobs protrude.

. INTERFACE CABLING AND TERMINATORS

The external interface cables are simply clip mounted by means of hook and aperture mechanisms, being terminated with 'Berg' type connections. A plate facilitating six possible locations is mounted immediately above the mains filter assembly on the bottom cover. Internal connections are realized with multi-way ribbon type cables again terminating with 'Berg' type connections.

1.2.2 P818/X3310 (15" VERSION)

See FSM: FIMI 12"/15" 5122 991 30521

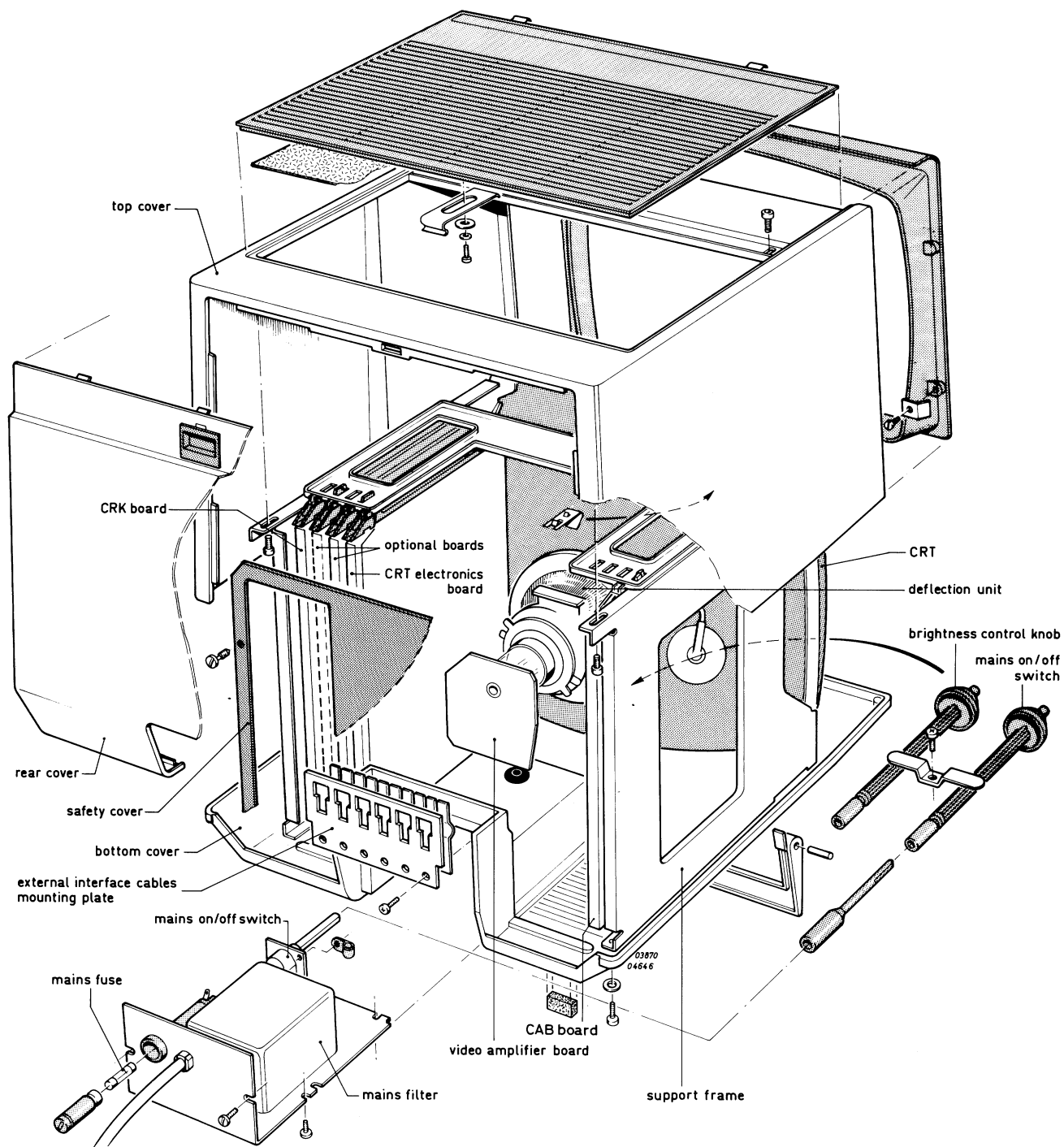


Figure 1.2 P816/X3300 GENERAL REAR VIEW

1.3 TECHNICAL DATA

1.3.1 PERFORMANCE DATA

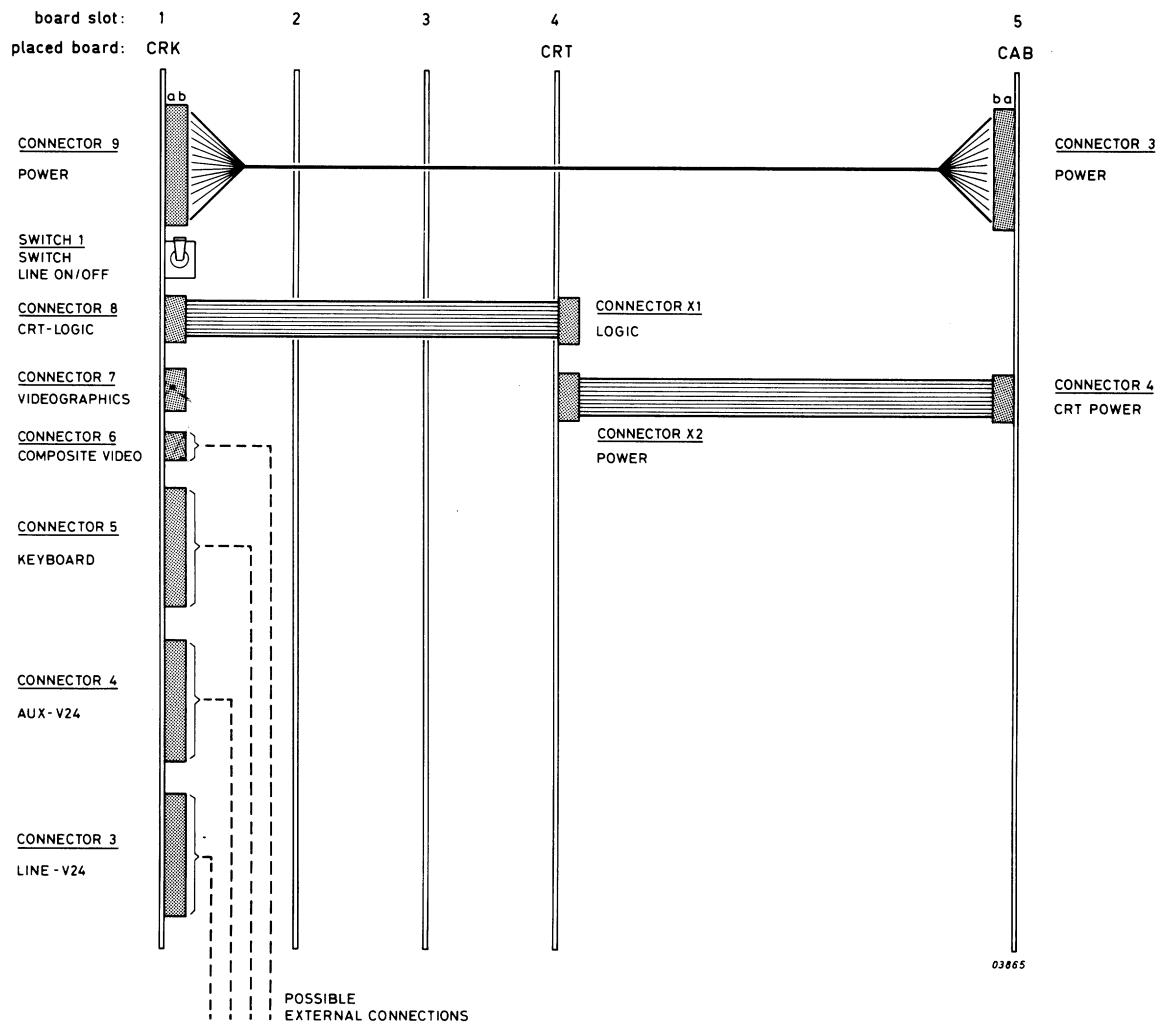
. VISUAL DISPLAY UNIT

| | |
|---|--|
| Screen Size | : P816/X3300 - 12 inch diagonal P818/X3310 - 15 inch diagonal |
| Screen Capacity | : P816/818 - 1920 cha's, 80 cha/row, 24 rows X3300/3310 - additional 25 th tab. row |
| Character Format | : 9 dots x 15 scanlines - overall matrix, 7 dots x 9 scanlines - uppercase cha., 7 dots x 15 scanlines - cha + descender/diacritic 18 dots x 15 scanlines - double width cha. matrix for X3300/3310. |
| Character Font | : CIDC Design |
| Character Size (Uppercase E single width) | : P816/X3300 - 3.36 x 2.14mm : P818/X3310 - 4.25 X 2.51mm |
| Distance Between Characters (Uppercase E) | : P816/X3300 - 0.61mm : P818/X3310 - 0.71mm |
| Distance Between Rows (upper case) | : P816/X3300 - 2.24mm P818/X3310 - 2.86mm |
| Active Display Area | : P816 - 220 x 134mm (24 rows) P818 - 258 x 168mm (24 rows) X3300 - 220 x 140mm (25 rows) X3310 - 258 x 175mm (25 rows) |
| Visual Attributes | : reverse video, underline, low intensity, blinking, blanking X3300/3310 only: double width and double height. |
| Cursor Presentation | : reverse video block cursor, X3300/3310 only: cursor will blink in a reverse video field. |
| Refresh Rate | : 50 screen rasters/sec, non-interlaced. |
| Phosphor | : P4 (white); P31 (Green) |
| External Display Controls | : Screen brightness and ON/OFF |
| Anti Reflection Facilities | : PPG bounded face plate |
| Transmission Rate Mode | : 50 - 9600 b/sec for P816/818 : 50 - 19,200 bits/sec for X3300 : Asynchronous, cha. or block |
| Dimensions | : P816/X3300: - Width - 336mm Height - 280mm Height + stand - 405mm Depth - 365mm Weight tbs P818/X3310: - tbs |

. KEYBOARD

| | |
|-------------------------|---|
| Keymatrix | : 96 normal keys (one code for key down) 8 mode keys/lock switches (max.). |
| Mode keys | : Shift, Shift 2, Capitals, Control and Cursor Lock (one code for key down, one code for key up) |
| Key rollover | : typewriter part, separate numeric keypad and mode keys: n - key rollover. function keys: two key rollover |
| Keyboard layout | : See Chapter 2. |
| Key switches | : Philips low profile keyswitch = 200 Ohms after 1 ms key down = 100 Ohms after 8 ms key down |
| Key travel | : 3 mm +0.3mm |
| Operating forces | : 0.3N at starting point 0.5N switching point 0.8N end point |
| Pre travel | : 65% of total travel |
| Row/column spacing | : 19,05 ± 1mm |
| Keytops | : stepped and sculptured |
| Double Key detection: | : 2 or more key down transitions detection during debounce time, indication of double keys given by audible alarm. |
| Key feedback | : short bleep of 20ms |
| Key debounce control | : 9 to 11ms |
| Keying speed | : 15 character/sec if same key 100 character/sec if rollover |
| Automatic repeat | : all keys except Mode Keys and Lock switches at 15 character/sec after 0,5sec delay |
| Indicators | : - 7 external controlled indicators - 1 capitals lock (key built-in) - 1 cursor lock (key built-in) both keyboard controlled - 1 audible alarm 200ms/1000Hz external and keyboard controlled. |
| Power Supply | : +5V ± 5% (at interface connector on keyboard) 125 mA average plus 10 mA for each indicator |
| Communication Interface | : - asynchronous half duplex - serial send/receive (TTL compatible) - termination of receive: 200 Ohms to VCC, 390 Ohms to Gnd. |
| Data format | : - 1 start bit (low voltage) - 8 data bits - 1 stop bit - parity odd (not tested in the keyboard) |
| Baud rate | : 1200 bit/sec ± 1% |
| Interface buffer | : 8 character first in first out memory (FIFO) for key rollover. |
| Keyboard reset | : internal by power on |
| Keyboard clock | : internal by X-tal 5,76MHz |
| Cable | : 1.5m coiled cord 2x 0,14 mm ² 132 Ohms /km (signals) 2x 0,25 mm ² 75,5 Ohms /km (power supply) |

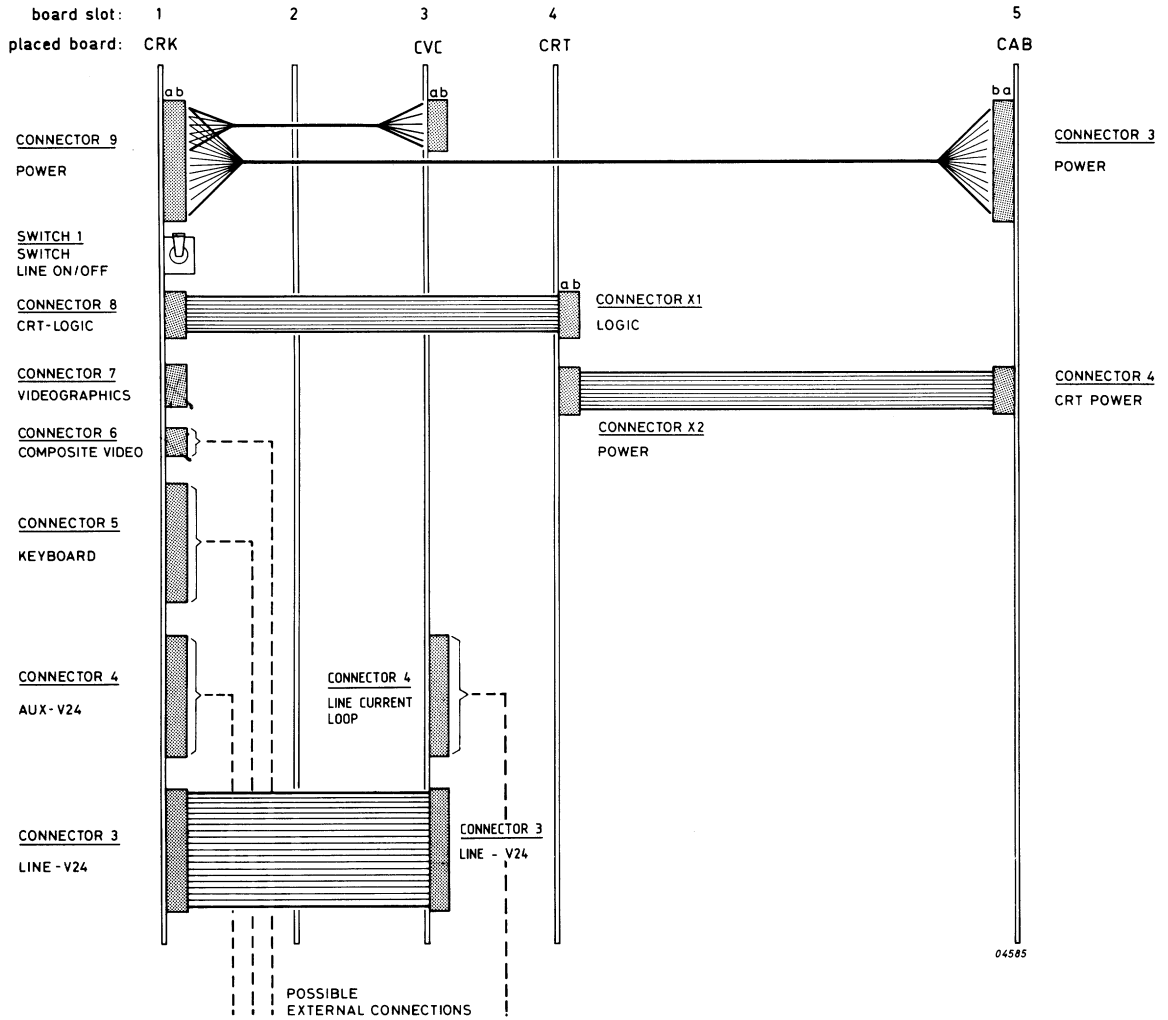
CONFIGURATION 1 - P816/ X3330



NOTE: THE SWITCH 1 FUNCTION CHANGES WITH THE X3300/ 3310 VERSIONS, BEING SIMPLY THE TEST ON/OFF CONTROL.

Figure 1.3 ELECTRICAL INTERFACES

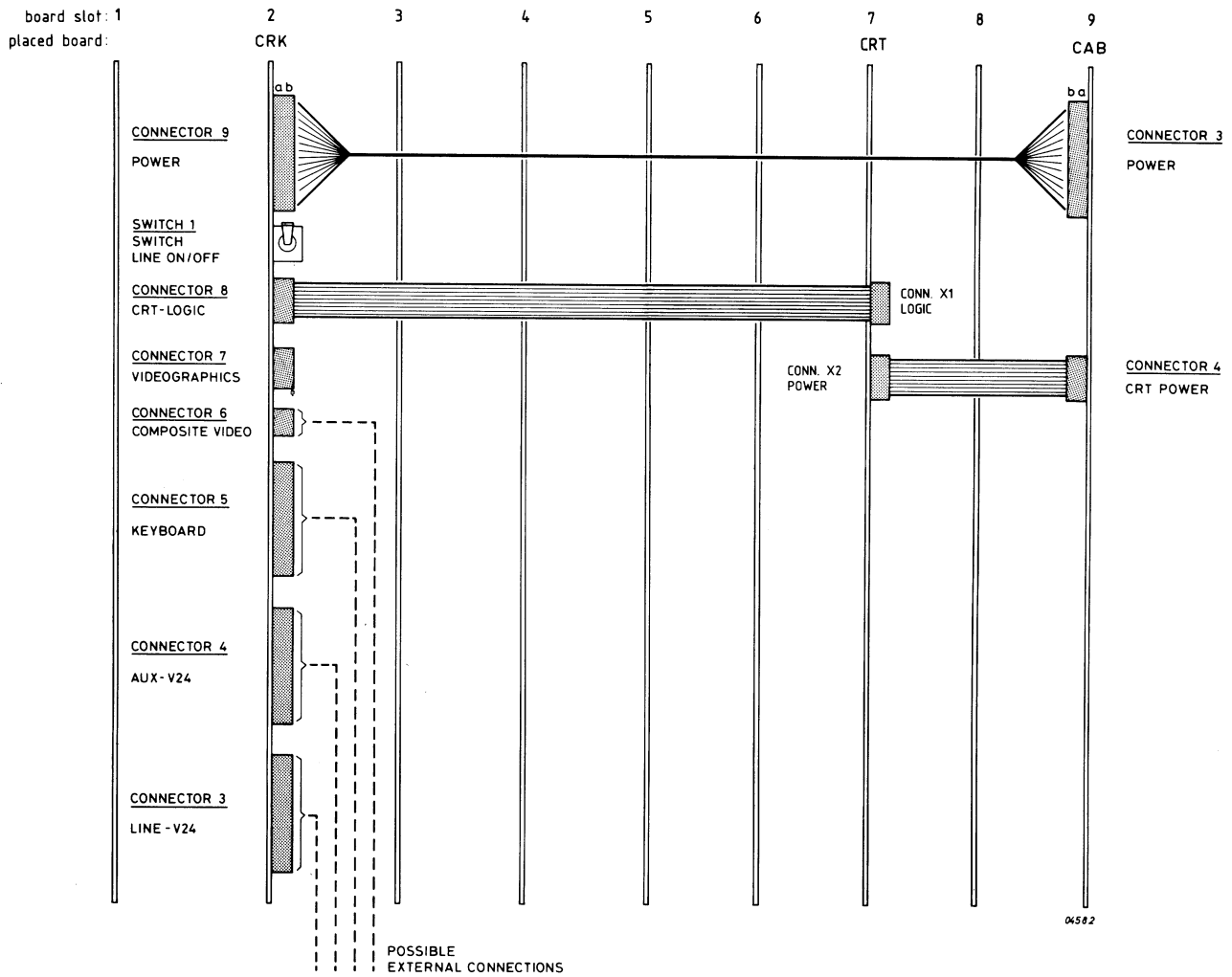
CONFIGURATION 2 - P816/ X3300 WITH CVC INSTALLED



NOTE: THE SWITCH 1 FUNCTION CHANGES WITH THE X3300/ 3310 VERSIONS, BEING SIMPLY THE TEST ON/OFF CONTROL.

Figure 1.3 ELECTRICAL INTERFACES (CONT.)

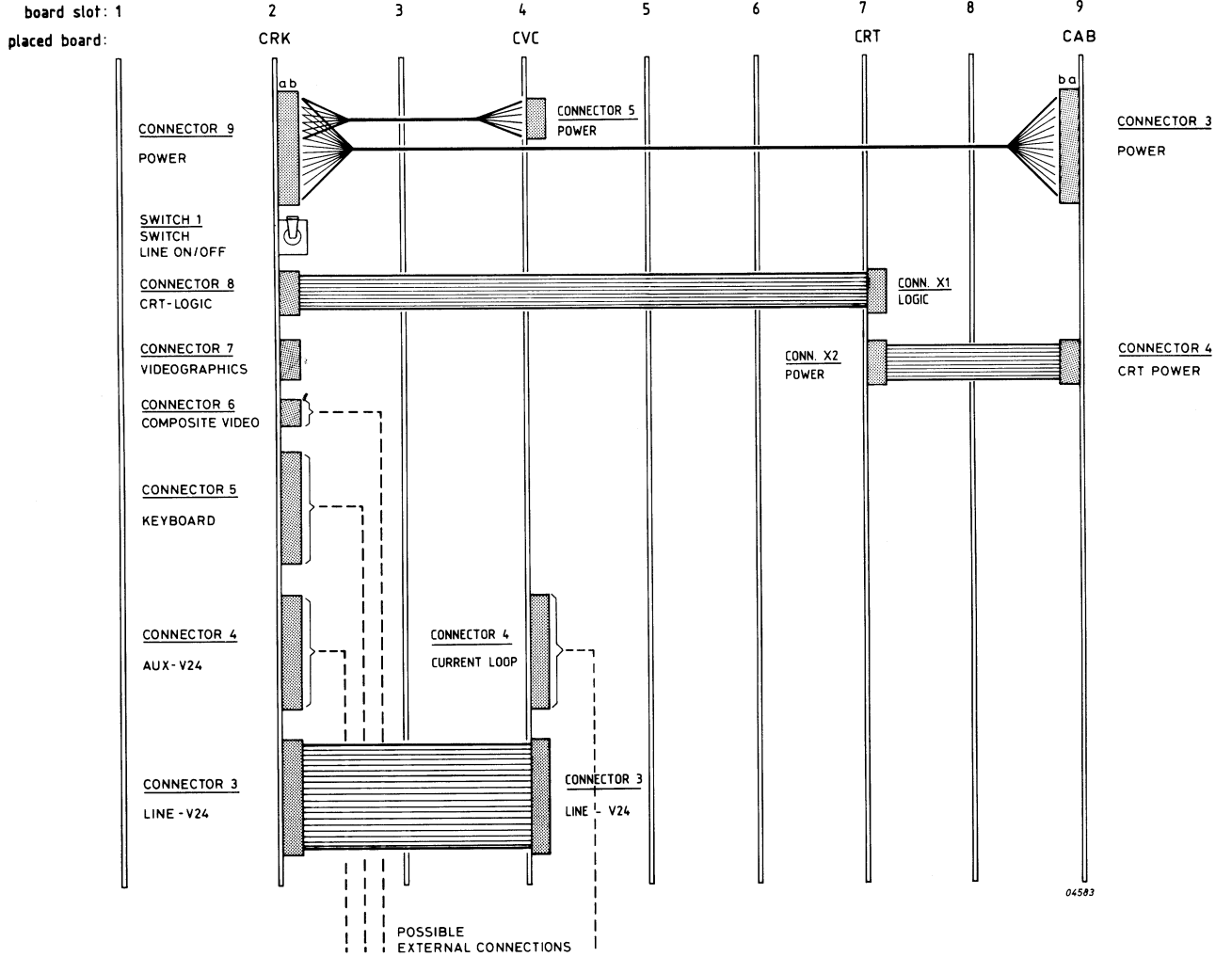
CONFIGURATION 3 - P818/ X3310



NOTE: THE SWITCH 1 FUNCTION CHANGES WITH THE X 3300/ 3310 VERSIONS, BEING SIMPLY THE TEST ON/OFF CONTROL.

Figure 1.3 ELECTRICAL INTERFACES (CONT.)

CONFIGURATION 4 - P818/ X3310 WITH CVC INSTALLED



NOTE: THE SWITCH 1 FUNCTION CHANGES WITH THE X3300/ 3310 VERSIONS, BEING SIMPLY THE TEST ON/OFF CONTROL.

Figure 1.3 ELECTRICAL INTERFACES (CONT.)

1.3.2 POWER REQUIREMENTS

The mains voltage supply requirement for the VDU are as follows:

- . 200 to 240 V \pm 10%, 50 Hz, 1.2 A RMS
- . 100 to 127 V \pm 10%, 50 Hz, 2.0 A RMS

Respective power supply input is selected by strap U-link located on the CAB.
Power Consumption 65 watts.

1.3.3 ENVIRONMENT

The display unit will function correctly under the following environmental conditions:

TEMPERATURE RANGE

- Operational : +5°C to + 40°C
- Preferred : +12°C to + 32°C
- Storage : - 40°C to + 65°C

DYNAMIC LIMIT (dTemp / dTime)

- Operating : 10°C/30 mins. max.
- Storage : 30°C/ 5 mins. max.

RELATIVE HUMIDITY (NON-CONDENSING)

- Operating : 10% to 90%
- Preferred : 20% to 90%
- Storage : 5% to 90%

AIR PRESSURE (AMBIENT)

- Operating : 700 to 1100 mbar.
- Storage : 450 to 1100 mbar.

1.4 INTERFACES

1.4.1 ELECTRICAL (SEE FIGURE 1.4)

. CRK Board - Rack Position 1 (12"), Rack Position 2 (15")

CONNECTOR 3 : function : LINE /V24
 type : MUPPC 26
 location : A4G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | A4G0 | CT101 |
| 3 | B2 | 2 | 5 | CT103L |
| 5 | B3 | 3 | 6 | CT104L |
| 7 | B4 | 4 | 7 | CT105L |
| 9 | B5 | 5 | 8 | CT106L |
| 11 | B6 | 6 | 9 | CT107L |
| 13 | B7 | 7 | BOGO | CT102L |
| 15 | B8 | 8 | 1 | CT109L |
| 17 | B9 | 9 | 2 | - |
| 19 | B10 | 10 | 3 | - |
| 21 | B11 | 11 | 4 | - |
| 23 | B12 | 12 | 5 | - |
| 25 | B13 | 13 | 6 | - |
| 2 | A1 | 14 | A4G1 | - |
| 4 | A2 | 15 | 5 | CT114L |
| 6 | A3 | 16 | 6 | - |
| 8 | A4 | 17 | 7 | CT115L |
| 10 | A5 | 18 | 8 | - |
| 12 | A6 | 19 | 9 | - |
| 14 | A7 | 20 | BOG1 | CT108.2L |
| 16 | A8 | 21 | 1 | - |
| 18 | A9 | 22 | 2 | - |
| 20 | A10 | 23 | 3 | CT111L |
| 22 | A11 | 24 | 4 | CT113L |
| 24 | A12 | 25 | 5 | - |
| 26 | A13 | 26 | 6 | DUMMY |

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 1 of 5)

CONNECTOR 4 : function : AUX /V24
type : MUPPC 26
location : COGO

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | COGO | CT101 |
| 3 | B2 | 2 | 1 | CT103A |
| 5 | B3 | 3 | 2 | CT104A |
| 7 | B4 | 4 | 3 | CT105A |
| 9 | B5 | 5 | 4 | CT106A |
| 11 | B6 | 6 | 5 | CT107A |
| 13 | B7 | 7 | 6 | CT102 |
| 15 | B8 | 8 | 7 | - |
| 17 | B9 | 9 | 8 | - |
| 19 | B10 | 10 | 9 | - |
| 21 | B11 | 11 | DOGO | - |
| 23 | B12 | 12 | 1 | - |
| 25 | B13 | 13 | 2 | - |
| 2 | A1 | 14 | COG1 | - |
| 4 | A2 | 15 | 1 | - |
| 6 | A3 | 16 | 2 | - |
| 8 | A4 | 17 | 3 | - |
| 10 | A5 | 18 | 4 | - |
| 12 | A6 | 19 | 5 | - |
| 14 | A7 | 20 | 6 | CT108.2A |
| 16 | A8 | 21 | 7 | - |
| 18 | A9 | 22 | 8 | - |
| 20 | A10 | 23 | 9 | - |
| 22 | A11 | 24 | DOG1 | - |
| 24 | A12 | 25 | 1 | - |
| 26 | A13 | 26 | 2 | DUMMY |

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 2 of 5)

CONNECTOR 5 : function : KEYBOARD/SDI
 type : MUPPC 26
 location : D6G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------------|
| 1 | B1 | 1 | D6G0 | PROTECTIVE GROUND |
| 3 | B2 | 2 | 7 | L |
| 5 | B3 | 3 | 8 | L |
| 7 | B4 | 4 | 9 | L |
| 9 | B5 | 5 | EOG0 | L |
| 11 | B6 | 6 | 1 | L |
| 13 | B7 | 7 | 2 | L |
| 15 | B8 | 8 | 3 | L |
| 17 | B9 | 9 | 4 | L |
| 19 | B10 | 10 | 5 | P5PU |
| 21 | B11 | 11 | 6 | P5PU |
| 23 | B12 | 12 | 7 | P5PU |
| 25 | B13 | 13 | 8 | P12M |
| 2 | A1 | 14 | D6G1 | KBDOUT |
| 4 | A2 | 15 | 7 | -- |
| 6 | A3 | 16 | 8 | KBDIN |
| 8 | A4 | 17 | 9 | -- |
| 10 | A5 | 18 | EOG1 | -- |
| 12 | A6 | 19 | 1 | -- |
| 14 | A7 | 20 | 2 | SPARE |
| 16 | A8 | 21 | 3 | L |
| 18 | A9 | 22 | 4 | L |
| 20 | A10 | 23 | 5 | P5PU |
| 22 | A11 | 24 | 6 | P5PU |
| 24 | A12 | 25 | 7 | P5PU |
| 26 | A13 | 26 | 8 | DUMMY |

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 3 of 5)

CONNECTOR 8 : function : CRT LOGIC
 type : MUPPC 10
 location : G4G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | G4G0 | HOR. SYNC. |
| 3 | B2 | 2 | G5G0 | VERT. SYNC. |
| 5 | B3 | 3 | G6G0 | VIDEO |
| 7 | B4 | 4 | G7G0 | VIDE (NOTE) |
| 9 | B5 | 5 | G8G0 | SPARE |
| 2 | A1 | 6 | G4G1 | L |
| 4 | A2 | 7 | G5G1 | L |
| 6 | A3 | 8 | G6G1 | L |
| 8 | A4 | 9 | G7G1 | L |
| 10 | A5 | 10 | G8G1 | DUMMY |

Note: VIDE is a graphics-signal implemented on this connector.

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 4 of 5)

CONNECTOR 9 : function : POWER
 type : MUPPC 26
 location : H6G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | H6G0 | P5PU |
| 3 | B2 | 2 | 7 | P5PU |
| 5 | B3 | 3 | 8 | P5PU |
| 7 | B4 | 4 | 9 | P5PU |
| 9 | B5 | 5 | I0G0 | P5PU |
| 11 | B6 | 6 | 1 | P5PU |
| 13 | B7 | 7 | 2 | P5PU |
| 15 | B8 | 8 | 3 | P5PU |
| 17 | B9 | 9 | 4 | P5PU |
| 19 | B10 | 10 | 5 | P5PU |
| 21 | B11 | 11 | 6 | P12M |
| 23 | B12 | 12 | 7 | P12P |
| 25 | B13 | 13 | 8 | RSLN |
| 2 | A1 | 14 | H6G1 | L |
| 4 | A2 | 15 | 7 | L |
| 6 | A3 | 16 | 8 | L |
| 8 | A4 | 17 | 9 | L |
| 10 | A5 | 18 | I0G1 | L |
| 12 | A6 | 19 | 1 | L |
| 14 | A7 | 20 | 2 | L |
| 16 | A8 | 21 | 3 | L |
| 18 | A9 | 22 | 4 | L |
| 20 | A10 | 23 | 5 | L |
| 22 | A11 | 24 | 6 | L |
| 24 | A12 | 25 | 7 | L |
| 26 | A13 | 26 | 8 | DUMMY |

SWITCH 1 : function : ON/OFF LINE
 type : MSK01
 location : H1G1

| pin nr. | pin loc. | signal name |
|---------|----------|---------------|
| 1 | H1G1 | L(OFF LINE)*1 |
| 2 | H2G1 | ONLINE |
| 3 | H3G1 | H(ON LINE)*2 |

*1 TEST ON
 *2 TEST OFF
 |
 | For X3300/3310 version

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 5 of 5)

. CAB Board - Rack Position 5 (12"), Rack Position 9 (15")

CONNECTOR 3 : function : POWER CONNECTION TO CRK
 type : MUPPC 26
 location : A4G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | A4G0 | DUMMY |
| 3 | B2 | 2 | 5 | L |
| 5 | B3 | 3 | 6 | L |
| 7 | B4 | 4 | 7 | L |
| 9 | B5 | 5 | 8 | L |
| 11 | B6 | 6 | 9 | L |
| 13 | B7 | 7 | BOG0 | L |
| 15 | B8 | 8 | 1 | L |
| 17 | B9 | 9 | 2 | L |
| 19 | B10 | 10 | 3 | L |
| 21 | B11 | 11 | 4 | L |
| 23 | B12 | 12 | 5 | L |
| 25 | B13 | 13 | 6 | L |
| 2 | A1 | 14 | A4G1 | RSLN |
| 4 | A2 | 15 | 5 | R12P |
| 6 | A3 | 16 | 6 | P12M |
| 8 | A4 | 17 | 7 | P5PU |
| 10 | A5 | 18 | 8 | P5PU |
| 12 | A6 | 19 | 9 | P5PU |
| 14 | A7 | 20 | BOG1 | P5PU |
| 16 | A8 | 21 | 1 | P5PU |
| 18 | A9 | 22 | 2 | P5PU |
| 20 | A10 | 23 | 3 | P5PU |
| 22 | A11 | 24 | 4 | P5PU |
| 24 | A12 | 25 | 5 | P5PU |
| 26 | A13 | 26 | 6 | P5PU |

CONNECTOR 4 : function : POWER CONNECTION TO CRT
 type : I.D.Con 10
 location : D2G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| | B1 | 1 | D2G0 | P12P |
| | B2 | 2 | 3 | P12P |
| | B3 | 3 | 4 | P12P |
| | B4 | 4 | 5 | P12P |
| | B5 | 5 | 6 | P12P |
| | A1 | 6 | D2G1 | DUMMY |
| | A2 | 7 | 3 | L |
| | A3 | 8 | 4 | L |
| | A4 | 9 | 5 | L |
| | A5 | 10 | 6 | L |

Table 1.3 ELECTRICAL INTERFACE - CAB BOARD

. CRT Board - Rack Position 4 (12"), Rack Position 9 (15")

CONNECTOR X1: function : LOGIC/SIGNAL CONNECTION FROM CRK
type : I.D. CON 10
location : (FIMI MON 12"/15" Page 4.2)

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| | B1 | 1 | | HORZ. SYNC |
| | B2 | 2 | | VERT. SYNC |
| | B3 | 3 | | VIDEO |
| | B4 | 4 | | DUMMY |
| | B5 | 5 | | - |
| | A1 | 6 | | L |
| | A2 | 7 | | L |
| | A3 | 8 | | L |
| | A4 | 9 | | L |
| | A5 | 10 | | - |

CONNECTOR X2: function : POWER CONNECTION FROM CAB
type : I.D. CON 10
location : (FIMI MON 12"/15" Page 4.2)

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| | B1 | 1 | | P12P |
| | B2 | 2 | | P12P |
| | B3 | 3 | | P12P |
| | B4 | 4 | | P12P |
| | B5 | 5 | | DUMMY |
| | A1 | 6 | | L |
| | A2 | 7 | | L |
| | A3 | 8 | | L |
| | A4 | 9 | | L |
| | A5 | 10 | | - |

Table 1.4 ELECTRICAL INTERFACE - CRT BOARD

. CVC Board - If fitted: Rack Position 3 (12"), Rack Position 4 (15")

CONNECTOR 5 : function : POWER SUPPLIES FROM CAB VIA CRK
 type : CON 08A04
 location : I5B7

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | I5B7 | P5PU |
| 2 | B2 | 2 | 6 | P12M* |
| 3 | B3 | 3 | 7 | P12P |
| 4 | B4 | 4 | 8 | RSLN* |
| 5 | A1 | 5 | I5B8 | L |
| 6 | A2 | 6 | 6 | L |
| 7 | A3 | 7 | 7 | L |
| 8 | A4 | 8 | 8 | DUMMY |

* Reserved

CONNECTOR 4 : function : LINE - CURRENT LOOP
 type : CON 26A13
 location : COB7

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | COB7 | - |
| 3 | B2 | 2 | 1 | - |
| 5 | B3 | 3 | 2 | - |
| 7 | B4 | 4 | 3 | - |
| 9 | B5 | 5 | 4 | - |
| 11 | B6 | 6 | 5 | - |
| 13 | B7 | 7 | 6 | - |
| 15 | B8 | 8 | 7 | - |
| 17 | B9 | 9 | 8 | - |
| 19 | B10 | 10 | 9 | - |
| 21 | B11 | 11 | DOB7 | - |
| 23 | B12 | 12 | 1 | MDINA |
| 25 | B13 | 13 | 2 | MDOUTA |
| 2 | A1 | 14 | COB8 | MDDINB |
| 4 | A2 | 15 | 1 | - |
| 6 | A3 | 16 | 2 | MDOUTB |
| 8 | A4 | 17 | 3 | - |
| 10 | A5 | 18 | 4 | - |
| 12 | A6 | 19 | 5 | - |
| 14 | A7 | 20 | 6 | - |
| 16 | A8 | 21 | 7 | - |
| 18 | A9 | 22 | 8 | - |
| 20 | A10 | 23 | 9 | - |
| 22 | A11 | 24 | DOB8 | - |
| 24 | A12 | 25 | 1 | - |
| 26 | A13 | 26 | 2 | DUMMY |

Table 1.5 ELECTRICAL INTERFACE - CVC BOARD (SHEET 1 of 2)

CONNECTOR 5 : function : LINE/V24 FROM CRK
 type : MUPPC 26
 location : A4B7

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|---------------|
| 1 | B1 | 1 | A4B7 | - |
| 3 | B2 | 2 | 5 | CT103L |
| 5 | B3 | 3 | 6 | CT104L |
| 7 | B4 | 4 | 7 | CT105L-CT106L |
| 9 | B5 | 5 | 8 | CT106L-CT105L |
| 11 | B6 | 6 | 9 | CT107L |
| 13 | B7 | 7 | BOB7 | L |
| 15 | B8 | 8 | 1 | - |
| 17 | B9 | 9 | 2 | - |
| 19 | B10 | 10 | 3 | - |
| 21 | B11 | 11 | 4 | - |
| 23 | B12 | 12 | 5 | - |
| 25 | B13 | 13 | 6 | - |
| 2 | A1 | 14 | A4B8 | - |
| 4 | A2 | 15 | 5 | - |
| 6 | A3 | 16 | 6 | - |
| 8 | A4 | 17 | 7 | - |
| 10 | A5 | 18 | 8 | - |
| 12 | A6 | 19 | 9 | - |
| 14 | A7 | 20 | BOB8 | - |
| 16 | A8 | 21 | 1 | - |
| 18 | A9 | 22 | 2 | - |
| 20 | A10 | 23 | 3 | - |
| 22 | A11 | 24 | 4 | - |
| 24 | A12 | 25 | 5 | - |
| 26 | A13 | 26 | 6 | DUMMY |

Table 1.5 ELECTRICAL INTERFACE - CVC BOARD (SHEET 2 of 2)

1.4.2 DEFINITION OF INTERFACE TERMS

Each VDU has three external data transfer ports, these consist of the following:

- . Line Interface - Conforming to V24/V28 or Current Loop (20ma, 40mA or 60mA) if the optional CVC board is installed. The 816/818 VDU's use an asynchronous start/stop character transfer protocol or asynchronous block transfer. The X3300/3310 VDU's use an asynchronous start/stop full duplex character transfer with a selectable auto flow control given with XON/XOFF codes.
- . Keyboard Interface - Functions with TTL (SDI) levels, asynchronously in half-duplex mode. The data transfer rate is fixed at 1200 bps, with format-during transmission, always including 8 bits plus one parity bit.
- . Auxiliary Interface - Conforming to V24/28 with data transfers actioned asynchronously. Characters are formatted with 1 start bit, 7 data bits, 1 parity bit and 2 stop bits.

The definition of the interchange signals used in the interfaces are now given:

LINE INTERFACE

- . CT101 PROTECTIVE GROUND
- . CT102 SIGNAL GROUND/COMMON RETURN
- . CT103L TRANSMITTED DATA - TERMINAL TO HOST.
P816-01x, P818-01x: Asyn. Character transfer, Full Duplex Direct or Echoplex; 1 start bit, 7/8 data bits, parity bit with 1/2 stop bits. TTY type protocol with CT105L permanently ON.
P816-02x; P818-02x: Asyn. Character/Block transfer, Half or Full Duplex, Direct only; characters are formatted as per P816-01x and P818-01x. Line or full page block transfer with CT105L permanently ON for Full Duplex working, and CT105L controlled by the TRANSMIT key of the keyboard for Half Duplex working. Circuit CT105L is switched off upon completion of a transmission after a predetermined delay i.e. one character time (max. 20m sec).
X3300; X3310: Asyn.Character transfer, Full Duplex, characters are formatted as per 816-01x and P818-01x. These terminals have a selectable data transfer flow control protocol, which is operated with control codes representing XON and XOFF. Circuit CT105L is directly connected to CT106L and is ON immediately after a Power ON. Circuit CT108L is asserted at all times assuming control state I/Ps to the related control gate are operative.
- . CT104L RECEIVE DATA - HOST TO TERMINAL
Data from the Host is received via this line by the terminal, data transfer protocol and formatting are as per CT103L.
- . CT105L REQUEST TO SEND - TERMINAL TO HOST
P816/01x; P818-01x: This signal is set permanently ON at initialization time to allow Full Duplex working.
However, when the ON LINE/OFF LINE switch is in the OFF LINE position CT105L is set OFF. This signal informs the Host that the terminal is ready to transmit, the Host should respond by initiating its receive mode.

P816-02x; P818-02x: When working in Full Duplex mode this signal is controlled in the same manner as for P816-01x; P818-01x. In Half Duplex working the signal CT105L is set to the ON condition only when the TRANSMIT key (full action is ETB-CTRL=Transmit Line, ETB + CTRL = Transmit Page) has been depressed. Transmission only commences if CT106L has been set ON. When the terminal has completed the transmission of a message, indicated by an EM code (19H), the CT105L signal is switched OFF after a delay of 1 cha. time (maximum 20m sec) has expired. X3300; X3310: The CT105L signal is set permanently ON after a Power on sequence and is wired externally direct to CT106L, see next paragraph.

CT106L CLEAR TO SEND - HOST TO TERMINAL
Responses from the Host to the Terminal in reply to the CT105L signal are passed on this line. An ON state indicates that the Host is ready to receive data over the CT103L line. Linked directly to CT105L on X3300/3310 versions.

CT107L DATA SET READY-HOST TO TERMINAL
P816-01x; P818-01x; P816-02x; P818-02x: The Host system asserts this signal, Data Set Ready, to the ON condition having received CT108.2L from the Terminal. X3300; X3310: This signal is not used.

CT108.2L DATA TERMINAL READY - TERMINAL TO HOST
All versions: Signal CT108.2L is asserted to the ON condition at all times except under the following conditions:

- Terminal is not powered-up, RSLN has not attained its correct level.
- Terminal is in the OFF LINE or LOCAL mode. TEST-ON for X3300/3310 versions.
P816-01x, P816-02x; P818-01x, P818-02x: When the BREAK key is depressed signal CT108.2L is sent low for 350m secs.
X3300, X3310: When the BREAK + SHIFT keys are depressed signal CT108.2L is sent low for 3.5 secs.

Note: The remaining Line Interface signals are applicable to the P816 and P818 versions only with a modem connected.

. CT109L DATA CARRIER DETECTION
An ON condition indicates that the received carrier signal at the modem is within limits.

. CT111L DATA SIGNALLING RATE SELECTOR
The ON/OFF conditions on this line are used to select one of two signalling rate (synchronous modem) or ranges (asynchronous modem). The condition is established by a strap on CRK.

. CT113L TRANSMITTER SIGNAL ELEMENT TIMING (VDU SOURCE)
Signals on this circuit provide the modem with signal element timing. CT113L is simulated by internal connection on CRK with the CT115L circuit.

. CT114L TRANSMITTER SIGNAL ELEMENT TIMING (MODEM SOURCE)
This circuit provides external timing for the CRK logic (LINE USART) transmit clock.

. CT115L RECEIVER SIGNAL ELEMENT TIMING (MODEM SOURCE)
Signals on this line form the receiver clock for the CRK logic LINE USART, this line is also directly linked with circuit CT113L.

AUXILIARY INTERFACE

- . CT103A TRANSMITTED DATA
Data from the VDU is transmitted to the auxiliary device (hard copy device), asynchronously. The data is formatted with one start bit, 7/8 data bits, 1 parity bit (odd, even, or none) and two stop bits.
- . CT104A RECEIVED DATA
Data from the auxiliary device is received on this line, data format and mode is as per CT103A.
- . CT105A REQUEST TO SEND
When the auxiliary port of VDU wishes to send, this signal is switched ON. For transmission to take place however CT106A must also be switched ON.
- . CT106A READY FOR SENDING
A response to the CT105A signal is given on this line from the auxiliary device.
- . CT107A DATA SET READY
An ON condition indicates that the auxiliary device is operable. If the auxiliary device is a line printer, CT107A usually indicates the state of the print input buffer. If CT107A is switched off during a transmission for more than four seconds the transmission sequence is automatically ended.
- . CT108.2A DATA TERMINAL READY
This signal indicates when ON that the AUX USART is ready to operate, usually set by firmware.

KEYBOARD INTERFACE (SDI)

- . KBDOUT KEYBOARD DATA OUT
Data from the VDU to the keyboard is sent on this line, formatted as 8 data bits, odd parity and one stop bit.
- . KBDIN KEYBOARD DATA IN
Data is received from the keyboard on this line, same format as per KBDOUT

1.4.3 INTERFACE SIGNAL LEVELS

LINE AND AUX INTERFACE (CCITT V24/V28 LEVELS)

Transmit: Data binary 1 = -12V
 binary 0 = +12V
 Control OFF state = -12V
 ON state = +12V
Receive : Data binary 1 = - 3V or more negative
 binary 0 = + 3V or more positive
 Control OFF state = - 3V or more negative
 ON state = + 3V or more positive

KEYBOARD INTERFACE (SDI, TTL)

Transmit: Data logic 1 = 2.4V or more
 logic 0 = 0.4V or less
Receive : Data logic 1 = 2.0V or more
 logic 0 = 0.6V or less

1.5 APPLICATION NOTES

- . P816/818-01x - These VDU's when connected with the low profile keyboard P818-051, are basic character oriented asynchronous, TTY compatible, terminals. The terminals are intended for General Purpose OEM type applications.
- . P816/818-02x - These VDU's when connected with the low profile keyboard -P818-052, are block-oriented asynchronous display terminals with full editing capabilities. Furthermore, these versions retain the possibility of working in character mode if required.
- . X3300/3310 - These VDU's when connected with the low profile keyboard - X3305, form a character oriented asynchronous terminal, being compatible with the DECVT100 terminal. Again, the application of these terminals is intended for OEM usage.

1.6 INSTALLATION DATA

1.6.1 PACKING AND UNPACKING

No special procedures are required for packing and unpacking the VDU's. However, care should be exercised when handling the unit to prevent damage to the unit, especially the CRT screen surface. It should be noted that when repacking a VDU the screen should be free from any mechanical stress or undue pressure.

1.6.2 INSTALLATION OF THE UNIT (SEE FIGURE 1.2 AND 1.3)

It is an essential requirement for the correct operation of the VDU, that the environmental conditions at the site where the unit is to be installed and operated comply within the limits specified in section 1.3.

The following installation procedure should now be observed:

- . Remove the VDU and Keyboard from their respective shipping cartons.
- . Place the VDU in the desired work area, ensuring that the immediate work surface is flat, secure and not confined so as to restrict free air flow - essential for cooling purposes.
- . Remove the rear and safety covers - the latter being removable only with the internal cables disconnected.
- . Retract the CRK board (rack position 1 - P816/X3300; rack position 2 - P818/X3310) and check the strap settings referring to sub-section 1.6.3. Once CRK has been strapped re-insert the board and secure.
- . Retract the CAB board (rack position 5 - P816/X3300; rack position 9 - P818/X3310) and check strap settings for applicable mains input range and protective/logic ground, re-insert CAB and secure.
- . Retract the CVC board, if fitted, (rack position 3 - P816/X3300; rack position 4 - P818/X3310) and check strap settings referring to sub-section 1.6.3. Once the board is strapped to conform with the Host Controller and line type connection, replace the board and secure.
- . Check that the CRT board is correctly located and secure.
- . Refit the safety cover, reconnect the internal cable interconnections (see figure 1.3) and complete external interfaces as necessary. Refit the rear cover.
- . Align Keyboard, select and mount keys tops conforming to the National Version strapped in the VDU.
- . If the optional swivel stand is to be used fit in accordance with covering instructions.
- . Connect mains power and switch the unit ON via the POWER ON/OFF switch located at the bottom/left edge of the display.
- . After approximately one minute the cursor should appear in the top-left corner position (home position). If this is not so refer to Chapter 7 for Trouble Shooting procedures.
- . Run a Test Program to establish the correct working of the VDU Terminal and connection link. e.g. P817 - DISPLAY TEST PROGRAM (via MCU3 or SCUZ board) - Procedure 12NC: 5111 991 09132.

1.6.3 U-LINK STRAP SETTINGS

Each version of the CRK board has a number of strap settings allocated to it, for this reason the strap settings for each CRK version are now given. The CAB and CVC strap settings then follow.

1.6.3.1 CRK1 - P816/18-01 (SEE FIGURE 1.4)

FUNCTIONAL STRAPS

The board should be positioned with the component side visible and all upper connectors pointing away from the operator.

The coordinate of a strap-location is indicated by means of the left most possible x-coordinate and the lowest possible y-coordinate of the pins.

For each strap a "factory installed position" is given. This position is indicated with *p*.

The positions are also shown on the component lay-out diagram (see figure 1.4).

. TRANSMISSION MODES

- Echoplex

| Function | Strap |
|----------|----------|
| Direct | B7C6 |
| Echoplex | B7C7 *p* |

- Number of data bits

| Function | Strap |
|----------------------------|----------|
| 7 data bits | B5C6 *p* |
| 8 data bits (fixed parity) | B5C7 |

- Parity Enable

| Function | Strap |
|--------------------------------|----------|
| Parity disabled (fixed parity) | B3C6 |
| Parity enabled | B3C7 *p* |

- Parity sense

| Function | Strap |
|-----------------------|----------|
| Parity odd (fixed 0) | B2C6 |
| Parity even (fixed 1) | B2C7 *p* |

- Transmission speed line

| Speed b/s | Strap | | | |
|-----------|-------|------|------|----------|
| 50 | B9C2 | C0C2 | C1C3 | C2C2 |
| 75 | B9C2 | C0C2 | C1C3 | C2C3 |
| 110 | B9C3 | C0C3 | C1C3 | C2C3 |
| 134.5 | B9C2 | C0C3 | C1C2 | C2C2 |
| 150 | B9C3 | C0C3 | C1C3 | C222 |
| 200 | B9C2 | C0C3 | C1C2 | C2C3 |
| 300 | B9C3 | C0C3 | C1C2 | C2C3 |
| 600 | B9C2 | C0C3 | C1C3 | C2C2 |
| 1200 | B9C3 | C0C2 | C1C3 | C2C3 |
| 1800 | B9C3 | C0C2 | C1C3 | C2C2 |
| 2400 | B9C3 | C0C3 | C1C2 | C2C2 |
| 4800 | B9C3 | C0C2 | C1C2 | C2C3 |
| 9600 | B9C3 | C0C2 | C1C2 | C2C2 *p* |
| 19200 | B9C2 | C0C2 | C1C2 | C2C2 |

- Stopbits line

| Function | Strap |
|------------|----------|
| 1 stopbit | C7C6 *p* |
| 2 stopbits | C7C7 |

. Full screen

| Function | Strap |
|-----------------|----------|
| Full screen off | C2C6 *p* |
| Full screen on | C2C7 |

. Roll up

| Function | Strap |
|------------|----------|
| No roll up | B2C2 *p* |
| Roll up | B2C3 |

Note: Fill screen character code is established via straps B1C2 - B7C2. Ensure that once fill screen is completed, these straps are positioned to their preferred locations. B1C2 is the MSB bit of the fill screen character.

. Transmission speed auxiliary interface

| Speed b/s | Strap | | | |
|-----------|-------|------|------|----------|
| 50 | B9D6 | B9D5 | C0D4 | B9D3 |
| 75 | B9D6 | B9D5 | C0D4 | C0D3 |
| 110 | C0D6 | C0D5 | C0D4 | C0D3 |
| 134.5 | B9D6 | C0D5 | B9D4 | B9D3 |
| 150 | C0D6 | C0D5 | C0D4 | B9D3 |
| 200 | B9D6 | C0D5 | B9D4 | C0D3 |
| 300 | C0D6 | C0D5 | B9D4 | C0D3 *p* |
| 600 | B9D6 | C0D5 | C0D4 | B9D3 |
| 1200 | C0D6 | B9D5 | C0D4 | C0D3 |
| 1800 | C0D6 | B9D5 | C0D4 | B9D3 |
| 2400 | C0D6 | C0D5 | B9D4 | B9D3 |
| 4800 | C0D6 | B9D5 | B9D4 | C0D3 |
| 9600 | C0D6 | B9D5 | B9D4 | B9D3 |
| 19200 | B9D6 | B9D5 | B9D4 | B9D3 |

. Auxiliary upper case conversion

| Function | Strap |
|--------------------------|----------|
| No conversion | B1C6 |
| Conversion to upper case | B1C7 *p* |

. Auxiliary timer (after CR + LF)

| Function | Strap |
|--------------|----------|
| 200ms delay | B9C6 *p* |
| 1100ms delay | B9C7 |

. Auxiliary parity enable

| Function | Strap |
|-----------------|----------|
| Parity disabled | C5C6 |
| Parity enabled | C5C7 *p* |

. Auxiliary parity sense

| Function | Strap |
|-------------|----------|
| Parity odd | C6C6 |
| Parity even | C6C7 *p* |

. Basic keyboard layout

| Function | Straps | | |
|----------|--------|------|-----|
| QWERTY | C4C2 | C5C2 | *p* |
| QWERTZ | C4C2 | C5C3 | |
| AZERTY | C4C3 | C5C2 | |

. National version

| Function | Straps | | |
|-------------------------------|--------|------|----------|
| Great Britain, Netherlands | C6C2 | C7C2 | E6F4 *p* |
| Germany | C6C2 | C7C3 | E6F4 |
| U.S.A. | C6C3 | C7C2 | E7F4 |

STRAPS WITHOUT FUNCTION

The following straps have no function but should be installed as indicated.

| | | | | | |
|------|------|------|------|------|------|
| C0C7 | A9E9 | FOF4 | B4C7 | B4C2 | B1C2 |
| C3C6 | B2E9 | F9F2 | C1C6 | B5C2 | |
| A3E9 | E6F3 | I6E0 | B6C6 | B6C2 | |
| A6E9 | C5B7 | D1D8 | B3C2 | B7C2 | |

TEST STRAPS

The following straps are used for test purposes. For normal use they must be placed on locations:

| | | |
|------|------|------|
| D8C7 | C0D8 | 15C5 |
| D1D5 | I9D4 | I1F9 |

PROM's

The following PROM's have to be installed:

| | | | |
|--------|--------------|-----------|---------|
| 2732 | - 031 - 5122 | 194 3823x | on A2A3 |
| 2732 | - 032 - 5122 | 194 3824x | on A9A3 |
| 2732 | - 018 - 5122 | 194 3779x | on F4F3 |
| 82S129 | - 016 - 5122 | 194 3776x | on H8B7 |
| 82S129 | - 017 - 5122 | 194 3777x | on G9E1 |
| 82S129 | - 018 - 5122 | 194 3778x | on C9C6 |

ON-LINE/LOCAL SWITCH

This switch can be used to put the terminal in local-mode. The normal on-line position is to the right, as shown in Figure 1.4 on position H1G0.

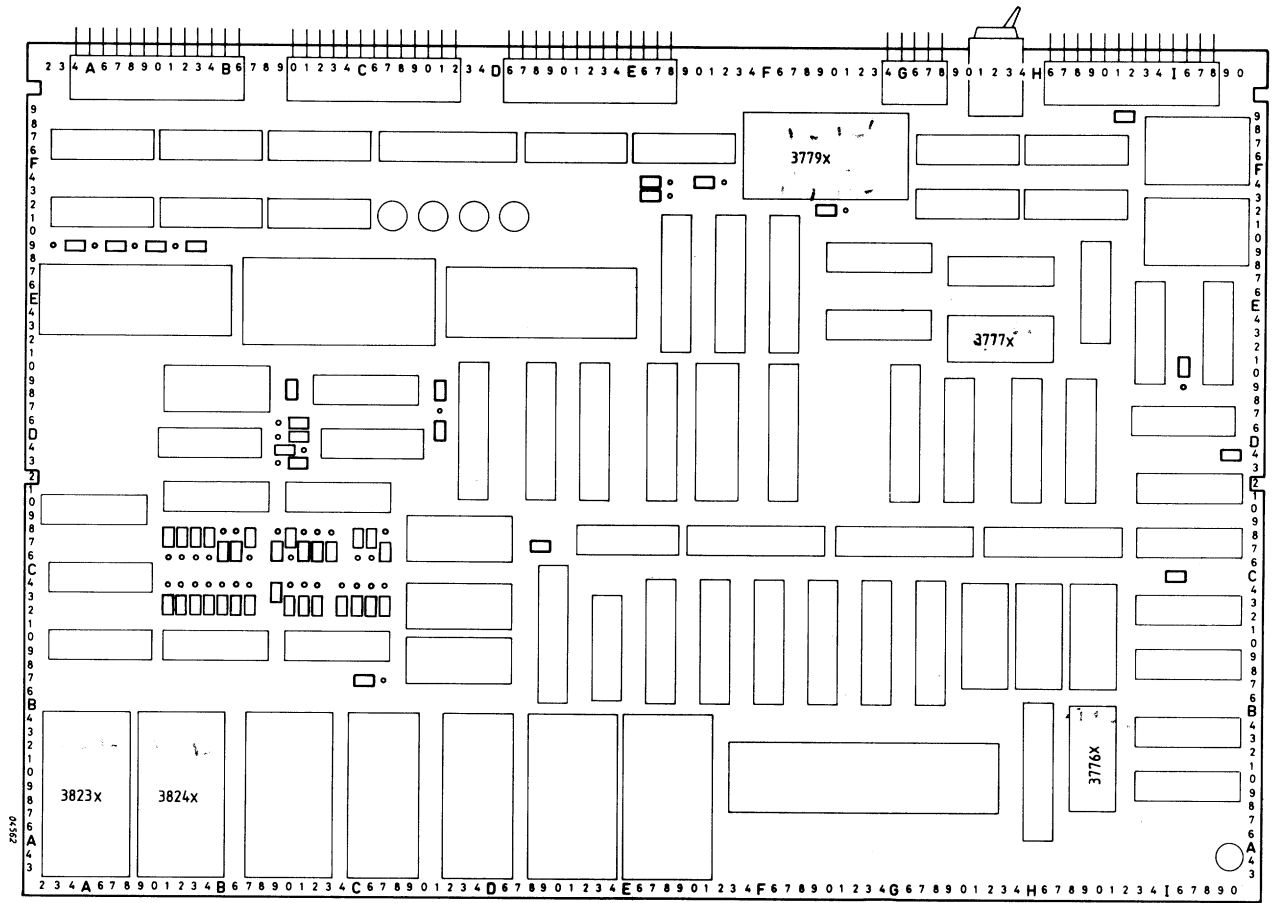


Figure 1.4 STRAP LOCATIONS CRK BOARD - P816/18-010/011

1.6.3.2 CRK1 - P816/18-02 (SEE FIGURE 1.5)

FUNCTIONAL STRAPS

. Transmission modes

- Echoplex (character mode only)

| Function | Strap |
|----------|----------|
| Direct | B7C6 *p* |
| Echoplex | B7C7 |

- Number of data bits

| Function | Strap |
|----------------------------|----------|
| 7 data bits | B5C6 *p* |
| 8 data bits (fixed parity) | B5C7 |

- Parity Enable

| Function | Strap |
|--------------------------------|----------|
| Parity disabled (fixed parity) | B3C6 |
| Parity enabled | B3C7 *p* |

- Parity sense

| Function | Strap |
|-----------------------|----------|
| Parity odd (fixed 0) | B2C6 |
| Parity even (fixed 1) | B2C7 *p* |

- Transmission speed line

| Speed b/s | Straps | | | |
|-----------|--------|------|------|----------|
| 50 | B9C2 | C0C2 | C1C3 | C2C2 |
| 75 | B9C2 | C0C2 | C1C3 | C2C3 |
| 110 | B9C3 | C0C3 | C1C3 | C2C3 |
| 134.5 | B9C2 | C0C3 | C1C2 | C2C2 |
| 150 | B9C3 | C0C3 | C1C3 | C2C2 |
| 200 | B9C2 | C0C3 | C1C2 | C2C3 |
| 300 | B9C3 | C0C3 | C1C2 | C2C3 |
| 600 | B9C2 | C0C3 | C1C3 | C2C2 |
| 1200 | B9C3 | C0C2 | C1C3 | C2C3 |
| 1800 | B9C3 | C0C2 | C1C3 | C2C2 |
| 2400 | B9C3 | C0C3 | C1C2 | C2C2 |
| 4800 | B9C3 | C0C2 | C1C2 | C2C3 |
| 9600 | B9C3 | C0C2 | C1C2 | C2C2 *p* |
| 19200 | B9C2 | C0C2 | C1C2 | C2C2 |

Note: Fill screen character code is established via straps B1C2 - B7C2. Ensure that once fill screen is completed, these straps are positioned to their preferred locations. B1C2 is the MSB bit of the fill screen character.

- Character mode

| Function | Strap |
|----------------|----------|
| Block mode | B4C6 *p* |
| Character mode | B4C7 |

- Full duplex

| Function | Strap |
|-------------|----------|
| Half duplex | C1C6 |
| Full duplex | C1C7 *p* |

- Stop bits line

| Function | Strap |
|-------------|----------|
| 1 stop bit | C7C6 *p* |
| 2 stop bits | C7C7 |

. Full Screen

| Function | Strap |
|-----------------|----------|
| Full screen off | C2C6 *p* |
| Full screen on | C2C7 |

. Roll-up upper part

| Function | Strap |
|------------|----------|
| No roll up | B1C2 |
| Roll up | B1C3 *p* |

. Roll-up lower part

| Function | Strap |
|------------|----------|
| No roll up | B2C2 |
| Roll up | B2C3 *p* |

. Insert/delete line coupled with roll up

| Function | Strap |
|-------------|----------|
| Not coupled | B6C6 *p* |
| Coupled | B6B7 |

. Transmission speed auxiliary interface

| Speed b/s | Straps | | | |
|-----------|--------|------|------|----------|
| 50 | B9D6 | B9D5 | C0D4 | B9D3 |
| 75 | B9D6 | B9D5 | C0D4 | C0D3 |
| 110 | C0D6 | C0D5 | C0D4 | C0D3 |
| 134.5 | B9D6 | C0D5 | B9D4 | B9D3 |
| 150 | C0D6 | C0D5 | C0D4 | B9D3 |
| 200 | B9D6 | C0D5 | B9D4 | C0D3 |
| 300 | C0D6 | C0D5 | B9D4 | C0D3 *p* |
| 600 | B9D6 | C0D5 | C0D4 | B9D3 |
| 1200 | C0D6 | B9D5 | C0D4 | C0D3 |
| 1800 | C0D6 | B9D5 | C0D4 | B9D3 |
| 2400 | C0D6 | C0D5 | B9D4 | B9D3 |
| 4800 | C0D6 | B9D5 | B9D4 | C0D3 |
| 9600 | C0D6 | B9D5 | B9D4 | B9D3 |
| 19200 | B9D6 | B9D5 | B9D4 | B9D3 |

. Binary number of lines in upper part

| No. of lines | Straps | | | | | |
|--------------|--------|------|------|------|------|-----|
| 0 | B3C2 | B4C2 | B5C2 | B6C2 | B7C2 | *p* |
| 1 | B3C2 | B4C2 | B5C2 | B6C2 | B7C3 | |
| 2 | B3C2 | B4C2 | B5C2 | B6C3 | B7C2 | |
| 3 | B3C2 | B4C2 | B5C2 | B6C3 | B7C3 | |
| 4 | B3C2 | B4C2 | B5C3 | B6C2 | B7C2 | |
| 5 | B3C2 | B4C2 | B5C3 | B6C2 | B7C3 | |
| 6 | B3C2 | B4C2 | B5C3 | B6C3 | B7C2 | |
| 7 | B3C2 | B4C2 | B5C3 | B6C3 | B7C3 | |
| 8 | B3C2 | B4C3 | B5C2 | B6C2 | B7C2 | |
| 9 | B3C2 | B4C3 | B5C2 | B6C2 | B7C3 | |
| 10 | B3C2 | B4C3 | B5C2 | B6C3 | B7C2 | |
| 11 | B3C2 | B4C3 | B5C2 | B6C3 | B7C3 | |
| 12 | B3C2 | B4C3 | B5C3 | B6C2 | B7C2 | |
| 13 | B3C2 | B4C3 | B5C3 | B6C2 | B7C3 | |
| 14 | B3C2 | B4C3 | B5C3 | B6C3 | B7C2 | |
| 15 | B3C2 | B4C3 | B5C3 | B6C3 | B7C3 | |
| 16 | B3C3 | B4C2 | B5C2 | B6C2 | B7C2 | |
| 17 | B3C3 | B4C2 | B5C2 | B6C2 | B7C3 | |
| 18 | B3C3 | B4C2 | B5C2 | B6C3 | B7C2 | |
| 19 | B3C3 | B4C2 | B5C2 | B6C3 | B7C3 | |
| 20 | B3C3 | B4C2 | B5C3 | B6C2 | B7C2 | |
| 21 | B3C3 | B4C2 | B5C3 | B6C2 | B7C3 | |
| 22 | B3C3 | B4C2 | B5C3 | B6C3 | B7C2 | |
| 23 | B3C3 | B4C2 | B5C3 | B6C3 | B7C3 | |

. Auxiliary upper case conversion

| Function | Strap |
|--------------------------|----------|
| No conversion | B1C6 |
| Conversion to upper case | B1C7 *p* |

. Auxiliary timer (after CR + LF)

| Function | Strap |
|--------------|----------|
| 200ms delay | B9C6 *p* |
| 1100ms delay | B9C7 |

. Auxiliary parity enable

| Function | Strap |
|-----------------|----------|
| Parity disabled | C5C6 |
| Parity enabled | C5C7 *p* |

. Auxiliary parity sense

| Function | Strap |
|-------------|----------|
| Parity odd | C6C6 |
| Parity even | C6C7 *p* |

. Basic keyboard layout

| Function | Straps |
|----------|---------------|
| QWERTY | C4C2 C5C2 *p* |
| QWERTZ | C4C2 C5C3 |
| AZERTY | C4C3 C5C2 |

. National version

| Function | Straps |
|-------------------------------|--------------------|
| Great Britain, Netherlands | C6C2 C7C2 E6F4 *p* |
| Germany | C6C2 C7C3 E6F4 |
| U.S.A. | C6C3 C7C2 E7F4 |

STRAPS WITHOUT FUNCTION

The following straps have no function but should be installed as indicated.

| | | |
|------|------|------|
| C0C6 | A9E9 | FOF4 |
| C3C7 | B2E9 | F9F2 |
| A3E9 | E6F3 | I6D9 |
| A6E9 | C5B7 | D1D8 |

TEST STRAPS

The following straps are used for test purposes. For normal use they must be placed on locations:

| | | |
|------|------|------|
| D8C7 | C0D8 | I5C5 |
| D1D5 | I9D4 | I1F9 |

PROM's

The following PROM's have to be installed:

- 2732 - 031 - 5122 194 3823x on A2A3
- 2732 - 032 - 5122 194 3824x on A9A3
- 2732 - 033 - 5122 194 3825x on B7A3
- 2732 - 018 - 5122 194 3779x on F4F3
- 82S129 - 016 - 5122 194 3776x on H8B7
- 82S129 - 017 - 5122 194 3777x on G9E1
- 82S129 - 018 - 5122 194 3778x on C9C6

ON-LINE/LOCAL SWITCH

This switch can be used to put the terminal in local-mode. The normal on-line position is to the right, as shown in Figure 1.5 position H1G0.

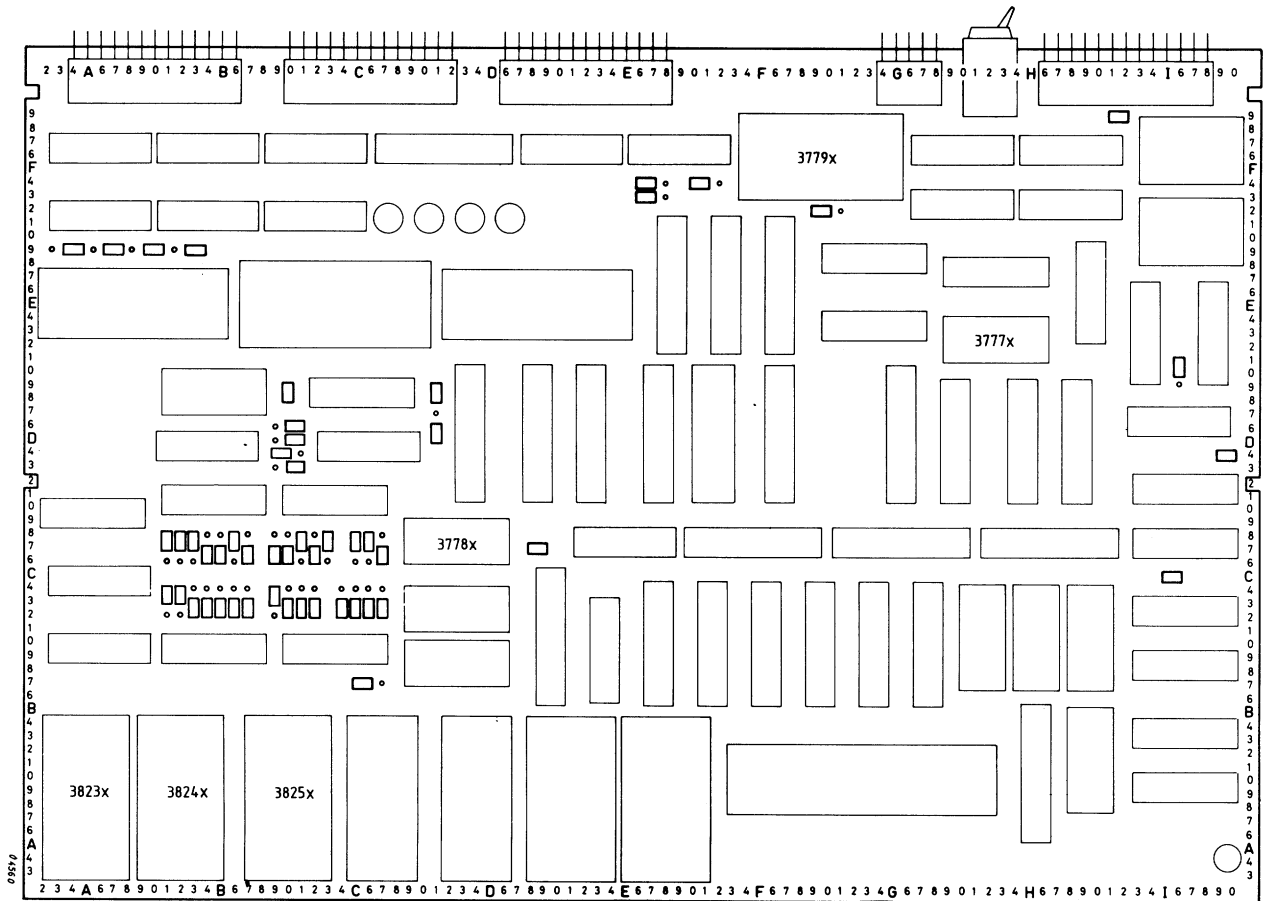


Figure 1.5 STRAP LOCATIONS CRK BOARD - P816/18-020/021

1.6.3.3 CRK1-X3300 (SEE FIGURE 1.6)

FUNCTIONAL STRAPS

. Transmission modes

- Auto XON/OFF

| Function | Strap |
|-----------------------|----------|
| Auto XON/OFF disabled | C7C2 |
| Auto XON/OFF | C7C3 *p* |

- Number of data bits

| Function | Strap |
|-------------|----------|
| 7 data bits | C6C2 *p* |
| 8 data bits | C6C3 |

- Parity Enable

| Function | Strap |
|-----------------|----------|
| Parity disabled | C5C2 |
| Parity enabled | C5C3 *p* |

. Parity sense

| Function | Strap |
|-------------|----------|
| Parity odd | C4C2 |
| Parity even | C4C3 *p* |

- Transmission speed line

| Speed b/s | Straps | | | |
|-----------|--------|------|------|----------|
| 50 | B9C2 | C0C2 | C1C3 | C2C2 |
| 75 | B9C2 | C0C2 | C1C3 | C2C3 |
| 110 | B9C3 | C0C3 | C1C3 | C2C3 |
| 134.5 | B9C2 | C0C3 | C1C2 | C2C2 |
| 150 | B9C3 | C0C3 | C1C3 | C2C2 |
| 200 | B9C2 | C0C3 | C1C2 | C2C3 |
| 300 | B9C3 | C0C3 | C1C2 | C2C3 |
| 600 | B9C2 | C0C3 | C1C3 | C2C2 |
| 1200 | B9C3 | C0C2 | C1C3 | C2C3 |
| 1800 | B9C3 | C0C2 | C1C3 | C2C2 |
| 2400 | B9C3 | C0C3 | C1C2 | C2C2 |
| 4800 | B9C3 | C0C2 | C1C2 | C2C3 |
| 9600 | B9C3 | C0C2 | C1C2 | C2C2 *p* |
| 19200 | B9C2 | C0C2 | C1C2 | C2C2 |

. New line mode

| Function | Strap |
|------------------------|----------|
| New line mode disabled | C7C6 *p* |
| New line mode | C7C7 |

. Auto wrap mode

| Function | Strap |
|-------------------------|----------|
| Auto wrap mode disabled | C6C6 |
| Auto wrap mode | C6C7 *p* |

. Cursor blink in reverse video

| Function | Strap |
|-----------------------|----------|
| Cursor blink disabled | C5C6 |
| Cursor blink | C5C7 *p* |

. Margin bell

| Function | Strap |
|-----------------|----------|
| Margin bell off | C3C6 *p* |
| Margin bell on | C3C7 |

. Auto repeat mode

| Function | Strap |
|-----------------|----------|
| Auto repeat off | C2C6 |
| Auto repeat on | C2C7 *p* |

. Standard intensity

| Function | Strap |
|-------------------------|----------|
| High intensity standard | C1C6 *p* |
| Low intensity standard | C1C7 |

. National version

| Function | Strap |
|----------------|----------|
| United Kingdom | C0C6 *p* |
| America | C0C7 |

. Tabs on default

| Function | Strap |
|---------------------------|----------|
| No tabs at power on | B9C6 *p* |
| Standard tabs at power on | B9C7 |

. Basic layout keyboard

| Function | Straps |
|----------|---------------|
| QWERTY | B6C6 B7C6 *p* |
| QWERTZ | B6C6 B7C7 |
| AZERTY | B6C7 B7C6 |

. Keyclick

| Function | Straps |
|--------------|----------|
| Keyclick off | B5C6 *p* |
| Keyclick on | B5C7 |

. Auxiliary interface present

| Function | Straps | |
|-----------------------------|--------|----------|
| No auxiliary interface | B4C6 | A5E9 *p* |
| Auxiliary interface present | B4C7 | A6E9 |

- Transmission speed auxiliary interface

| Speed b/s | Straps | | | |
|-----------|--------|------|------|----------|
| 50 | B9D6 | B9D5 | COD4 | B9D3 |
| 75 | B9D6 | B9D5 | COD4 | COD3 |
| 110 | COD6 | COD5 | COD4 | COD3 |
| 134.5 | B9D6 | COD5 | B9D4 | B9D3 |
| 150 | COD6 | COD5 | COD4 | B9D3 |
| 200 | B9D6 | COD5 | B9D4 | COD3 |
| 300 | COD6 | COD5 | B9D4 | COD4 |
| 600 | B9D6 | COD5 | COD4 | B9D3 |
| 1200 | COD6 | B9D5 | COD4 | COD3 |
| 1800 | COD6 | B9D5 | COD4 | B9D3 |
| 2400 | COD6 | COD5 | B9D4 | B9D3 |
| 4800 | COD6 | B9D5 | B9D4 | COD3 |
| 9600 | COD6 | B9D5 | B9D4 | B9D3 |
| 19200 | B9D6 | B9D5 | B9D4 | B9D3 *p* |

. Extended functions (from release 2 onwards)

Note: For release 1 these straps have the same pre-installed position, but are not functional.

. Extended functions enable

| Function | Straps | |
|-----------------------------|--------|-----|
| Extended functions disabled | B3C6 | *p* |
| Extended functions enabled | B3C7 | |

. Row/character mode

| Function | Straps | |
|----------------|--------|-----|
| Character Mode | B1C6 | *p* |
| Row Mode | B1C7 | |

. Blank character code

| Function | Straps |
|------------|----------|
| Null Code | B2C6 |
| Space Code | B2C7 *p* |

MPR-prom size

| Function | Straps |
|---|--------|
| 2732 MPR-PROMS (release 1) | C5C7 |
| 2764 MPR-PROMS (from release 2 onwards) | C6C7 |

STRAPS WITH PREDEFINED FUNCTION

The following straps have functions but should be installed as indicated.

A3E9 I6D9 F9F2
A9E9 E6F4
B2E9 E7F3
D1D8 F0F4

STRAPS WITHOUT FUNCTION (CDPS)

The following straps have no function and their position is don't care.

B1C2 B4C2 B7C2
B2C2 B5C2
B3C2 B6C2

TEST STRAPS

The following straps are used for test purposes. For normal use they must be placed on locations:

D8C7 COD8 I5C5
D1D5 I9D4 I1F9

PROM's

The following PROM's have to be installed:

Release independant:

2732 - 024 - 5122 194 3816x on F4F3
82S129 - 021 - 5122 194 3830x on H8B7
82S129 - 022 - 5122 194 3831x on G9E1
82S129 - 023 - 5122 194 3832x on C9C6

Release 1:

2732 - 025 - 5122 194 38171 on A2A3
 2732 - 026 - 5122 194 38181 on A9A3
 2732 - 027 - 5122 194 38191 on B7A3

Release 2:

2764 - 003 - 5122 194 38421 on A2A3
 2764 - 004 - 5122 194 38431 on B7A3

TEST SWITCH

This switch can be used to put the terminal in testmode. The test-off position is to the right, as shown in Figure 1.6, position H1G0.

MISCELLANEOUS

The following components have to be installed:

AM2917 on location F0D1

If the auxiliary interface is serviced by the uprogram.

8251A on location B7E2

4702B on location B1D7

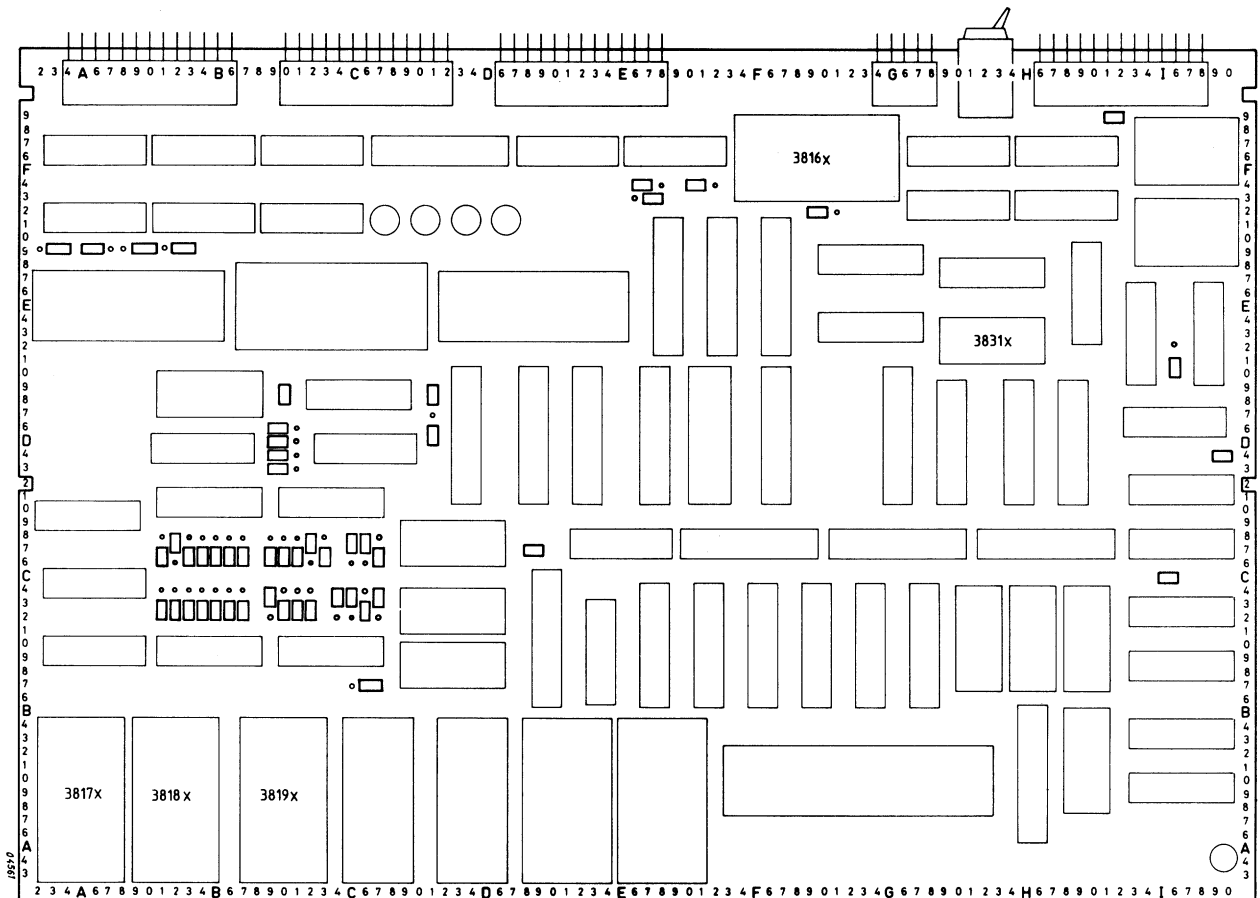


Figure 1.6 STRAP LOCATIONS CRK BOARD - X3300/X3310

1.6.3.4 CVC - CURRENT LOOP ADAPTOR (SEE FIGURE 1.7 AND 1.8)

FUNCTIONAL STRAPS

. Transmitter in 4 - wire connection

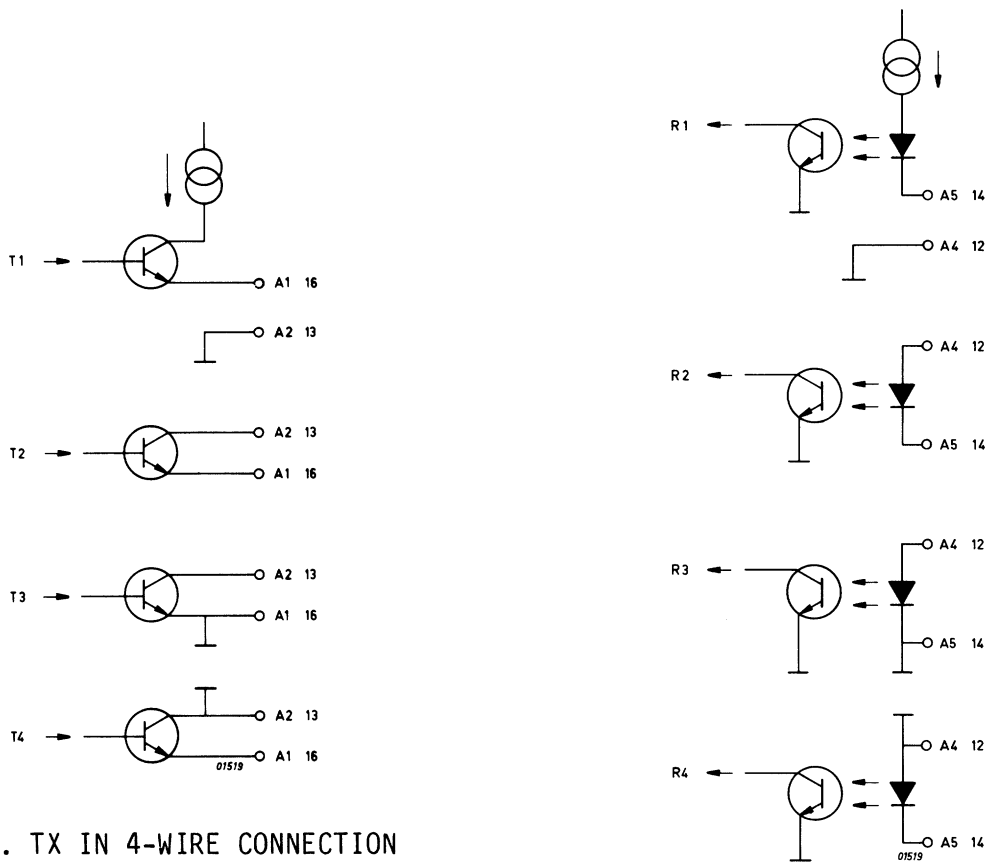
| Configuration | Straps | Figure 1.7: Diagram |
|------------------------------------|--------------------|---------------------|
| with current source 20mA | C1, D2, F2, G1, HO | T1 |
| with current source 40mA | C2, D1, F2, G1, HO | T1 |
| with current source 60mA | C2, D2, F2, G1, HO | T1 |
| without current source, floating | C1, D1, FO, G2, H1 | T2 |
| without current source, - grounded | C1, D1, F1, G2, HO | T3 |
| without current source, + grounded | C1, D1, F2, G2, HO | T4 |

. Receiver in 4-wire connection

| Configuration | Straps | Diagram |
|------------------------------------|--------------------|---------|
| with current source 20mA | A1, B2, J1, KO, L2 | R1 |
| with current source 40mA | A2, B1, J1, KO, L2 | R1 |
| with current source 60mA | A1, B1, J1, KO, L2 | R1 |
| without current source, floating | A2, B2, J2, K1, LO | R2 |
| without current source, - grounded | A2, B2, J2, KO, L1 | R3 |
| without current source, + grounded | A2, B2, J2, KO, L2 | R4 |

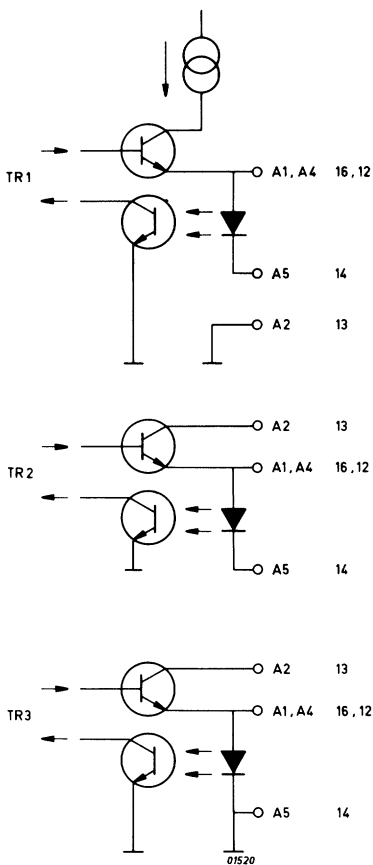
. Transmitter and receiver in 2-wire connection

| Configuration | Straps | Diagram |
|------------------------------------|--|---------|
| with current source 20mA | A2, B2, C1, D2, F2, G1, H2, J2, KO, LO | TR1 |
| with current source 40mA | A2, B2, C2, D1, F2, G1, H2, J2, KO, LO | TR1 |
| with current source 60mA | A2, B2, C2, D2, F2, G1, H2, J2, KO, LO | TR1 |
| without current source, floating | A2, B2, C1, D1, FO, G2, H2, J2, K1, LO | TR2 |
| without current source, - grounded | A2, B2, C1, D1, FO, G2, H2, J2, KO, L1 | TR3 |



a. TX IN 4-WIRE CONNECTION

b. RX IN 4-WIRE CONNECTION



c. TX AND RX 2-WIRE CONNECTION

Figure 1.7 CURRENT LOOP CONFIGURATIONS

STRAP SETTINGS FOR SPECIFIC APPLICATIONS

. P816/818/X3300/3310 - P851 with RLCU Board

Configuration

Straps

TX: with current source 20mA C1, D2, F2, G1, H0 - (T1)

RX: with current source 20mA A1, B2, J1, K0, L2 - (R1)

Note: R1 (1.2K) on RLCU Board must be short circuited.

. P816/818/X3300/3310 - P852: TTY CONNECTION

Configuration

Straps

TX AND RX: with current source 20mA A2,B2, C1, D2, F2, G1, H2, J2,
K0, L0 (TR1)

. P816/818/X330/3310 - P852,P854, P856 with AMA8C Board

Configuration

Straps

TX: with current source 20mA C1, D2, F2, G1, H0 - (T1)

RX: with current source, floating A2, B2, J2, K1, L0 - (R2)

STRAP POSITION CONVENTION

o o o - Denotes '0'

o o o - Denotes '1'

o o o - Denotes '2'

EXAMPLE: STRAPS SHOWN IN DIAGRAM DENOTE:
A2, B2, C2, D2, F2, G2, H2, J2, K2, L2

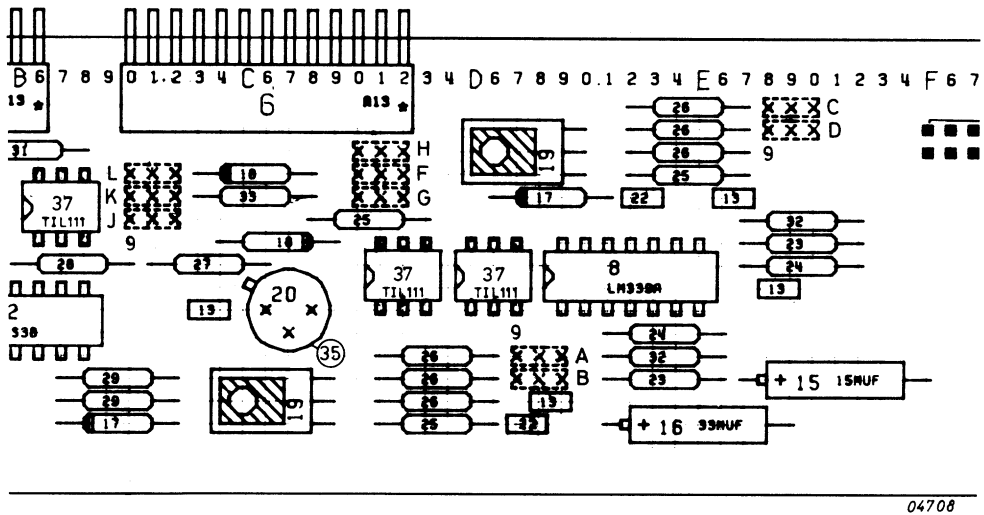


Figure 1.8 STRAP LOCATIONS CVC BOARD

1.6.3.5 POWER SUPPLY STRAPS

- CAB2 BOARD FUNCTIONAL STRAPS (FIGURE 1.9)

. MAINS VOLTAGE SELECTION

The CAB2 board can be driven by 110VAC or 220VAC, the strap when in the 110VAC position inserts a voltage doubler circuit.

| Mains I/P Voltage | Strap position |
|-------------------|--------------------|
| 220VAC 110VAC | G2 I4-8 F6-9 I7 |

. GROUNDING

The CAB2 Board retains the grounding strap for VDU, which can assume one of three possibilities: Floating, Direct or via an RC network (3.9nF/1Kohm).

| Grounding | Strap position |
|----------------------------------|----------------------|
| Direct Floating RC Network | A7A5 A8A5 A9A5 |

. TEST STRAP

The test strap at H9B6 should be in position for normal operation and the strap pins at I6B6 should be open circuit.

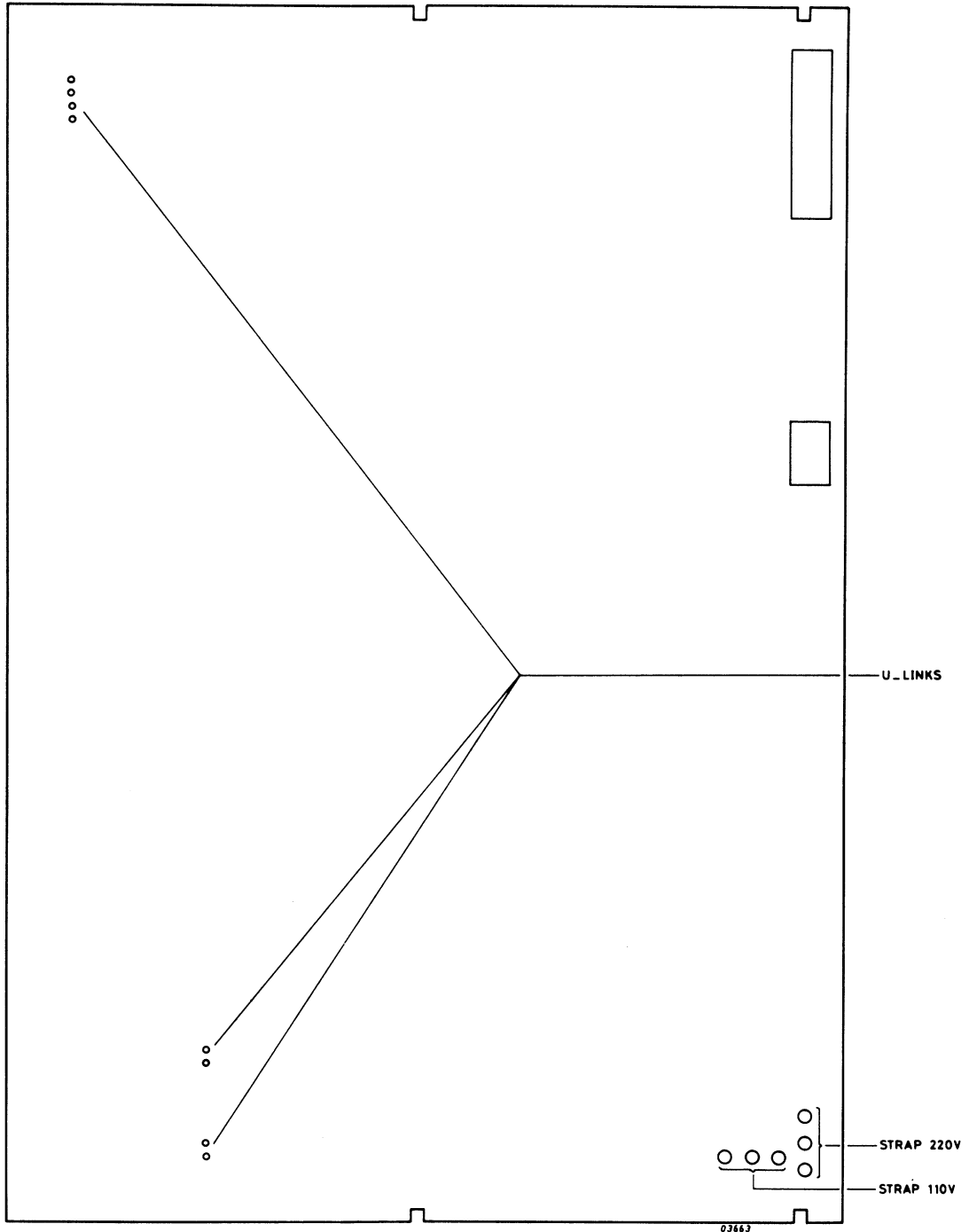


Figure 1.9 CAB2 - LOCATION OF U-LINKS

CONNECTOR 9 : function : POWER
 type : MUPPC 26
 location : H6G0

| Cable nr. | Coordinate | pin nr. | pin loc. | signal name |
|-----------|------------|---------|----------|-------------|
| 1 | B1 | 1 | H6G0 | P5PU |
| 3 | B2 | 2 | 7 | P5PU |
| 5 | B3 | 3 | 8 | P5PU |
| 7 | B4 | 4 | 9 | P5PU |
| 9 | B5 | 5 | I0G0 | P5PU |
| 11 | B6 | 6 | 1 | P5PU |
| 13 | B7 | 7 | 2 | P5PU |
| 15 | B8 | 8 | 3 | P5PU |
| 17 | B9 | 9 | 4 | P5PU |
| 19 | B10 | 10 | 5 | P5PU |
| 21 | B11 | 11 | 6 | P12M |
| 23 | B12 | 12 | 7 | P12P |
| 25 | B13 | 13 | 8 | RSLN |
| 2 | A1 | 14 | H6G1 | L |
| 4 | A2 | 15 | 7 | L |
| 6 | A3 | 16 | 8 | L |
| 8 | A4 | 17 | 9 | L |
| 10 | A5 | 18 | I0G1 | L |
| 12 | A6 | 19 | 1 | L |
| 14 | A7 | 20 | 2 | L |
| 16 | A8 | 21 | 3 | L |
| 18 | A9 | 22 | 4 | L |
| 20 | A10 | 23 | 5 | L |
| 22 | A11 | 24 | 6 | L |
| 24 | A12 | 25 | 7 | L |
| 26 | A13 | 26 | 8 | DUMMY |

SWITCH 1 : function : ON/OFF LINE
 type : MSK01
 location : H1G1

| pin nr. | pin loc. | signal name |
|---------|----------|---------------|
| 1 | H1G1 | L(OFF LINE)*1 |
| 2 | H2G1 | ONLINE |
| 3 | H3G1 | H(ON LINE)*2 |

*1 TEST ON
 *2 TEST OFF

For X3300/3310 version

Table 1.2 ELECTRICAL INTERFACE - CRK BOARD (SHEET 5 of 5)