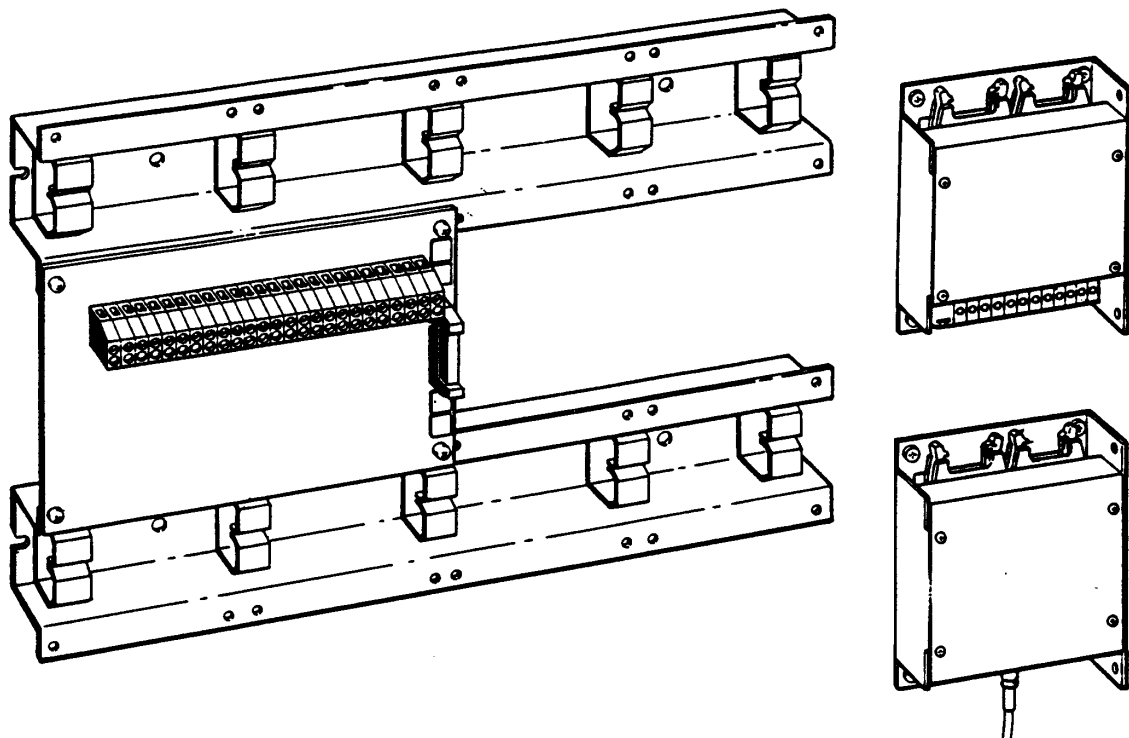


SERIAL INTERFACE TERMINATION UNITS AND PANELS



SERIAL INTERFACE TERMINATION UNITS AND PANELS

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ADDITIONAL INFORMATION

8816	STARNET User Information	T452
8845	Serial Communications User Information	T441
8847	Programmable Serial Communications User Information	T423
	Serial Links User Information	T418
	Serial Communications Manual	T457

1. INTRODUCTION

The serial interface termination units and panels provide a choice of serial communication links for the GEM80 series of controllers. Two serial ports are provided with each controller as standard. Normally, these serial ports are in RS422, but some controllers, such as the GEM80/100 and /130 are equipped with 20mA current loop serial ports. Termination units and panels are available for interfacing to either types of serial port.

Table 1.1 shows the different types of termination units and panels available, and the serial links with which they interface. Note that termination units have a metal chassis, whereas termination panels are printed circuit boards without any enclosures.

UNIT	PANEL	CONNECTION TO GEM80	INTERFACE
-	8035*	34-way Ribbon	20mA Current Loop and RS232
-	8038*	20-way Ribbon	Dual 20mA Current Loop
-	8587	26-way Ribbon	RS422 to RS485
8961	-	20-way Ribbon	20mA Current Loop to RS422
8924	-	26-way Ribbon	RS422 to 20mA Current Loop
8974	-	26-way Ribbon	RS422 to RS232
8975#	-	-	20mA Current Loop to RS232
9009	-	26-way Ribbon	RS422 to RS232 with DTR/DSR and RTS/CTS
* These panels are passive, that is they merely provide convenient cable termination points for the serial ports connected (transmit by-pass relays are included, however, see Sections 6.1, 6.2 and 7.0).			
# This unit does not connect directly with the GEM80 (see Section 4.0).			

Table 1.1 – Termination Units and Panels Currently Available

Each unit can be rail mounted, and provides a convenient anchor point for cabling up to 2.5mm². Connections are clearly marked on the units.

The 8961 and 8975 units require an external power supply. The 8961 requires +5V, and the 8975 requires ±15V. The remaining termination units obtain their power from the GEM80 power supply via the ribbon cable.

For more information consult the Serial Links User Information (Document T418) and the Serial Communications Manual (Document T457).

SERIAL INTERFACE TERMINATION UNITS AND PANELS

2. SPECIFICATION

2.1 Termination Units

Connection to 20mA, RS232 and RS485	:	Screw clamp terminals 0.5 to 2.5sq.mm cable
Speed	:	110 to 9600 bits/second
Environmental Tests	:	GEM80 standard
Weight 8924, 8961, 8974, 8975 and 9009	:	300g
Dimensions (refer to Figure 2.1) 8924, 8961, 8974, 8975 and 9009	:	145.5(H) x 118.5(W) x 34mm(D)
Mounting (Refer to Figure 2.2)	:	Quarter rack width on two mounting channels. Units may be mounted flat, or edge mounted for closer stacking. Any orientation to suit cabling.
Power Consumption from GEM80 Controller	:	20mA @ 5V 15mA @ 15V 20mA @ ±15V Internal pair current source used

2.2 Termination Panels

Connection to 20mA, RS232 and RS485	:	Screw clamp terminals 0.5 to 2.5sq.mm cable
Speed	:	110 to 9600 bits/second
Environmental Tests	:	GEM80 standard
Dimensions (Refer to Figure 2.3) 8035, 8038	:	239(H) x 156(W) x 32mm(D)
8587	:	70(H) x 263(W) x 54mm(D)
Mounting (Refer to Figure 2.2)	:	Quarter rack width on two mounting channels. Units may be mounted flat, or edge mounted for closer stacking. Any orientation to suit cabling.
8587	:	Directly onto rail types TS32 and TS35
Power Consumption from GEM80 Controller	:	20mA @ 5V 15mA @ 15V 20mA @ ±15V Internal pair current source used

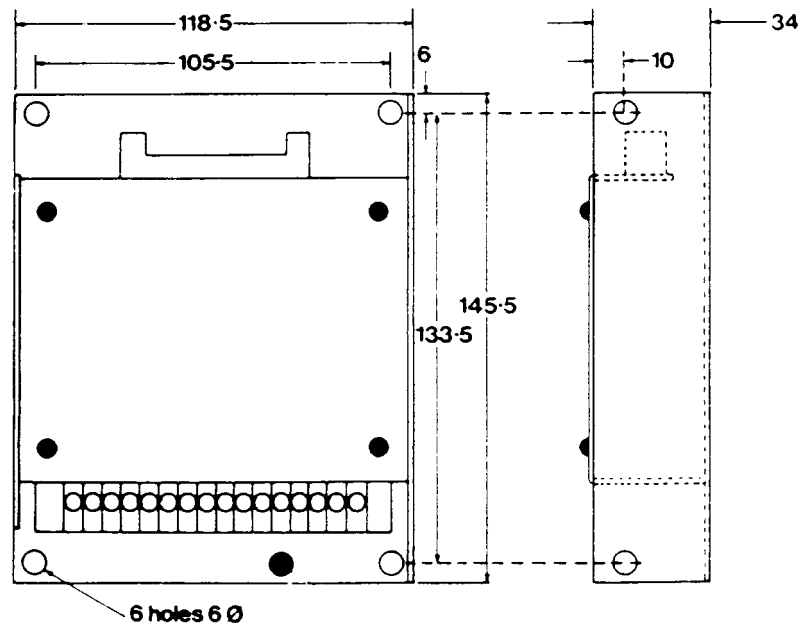


Figure 2.1 – Termination Unit: Dimension Details

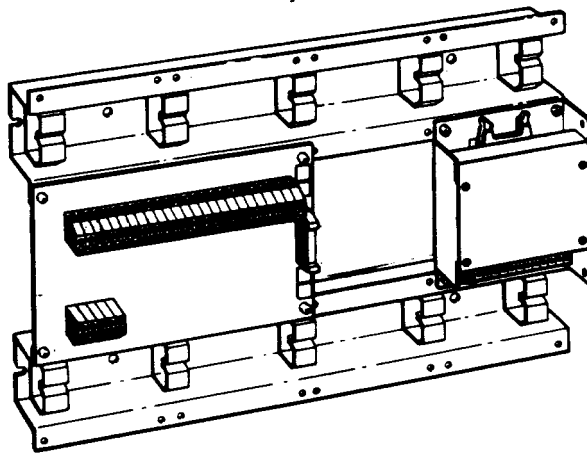


Figure 2.2 – Typical Mounting Details of Termination Unit and Panel

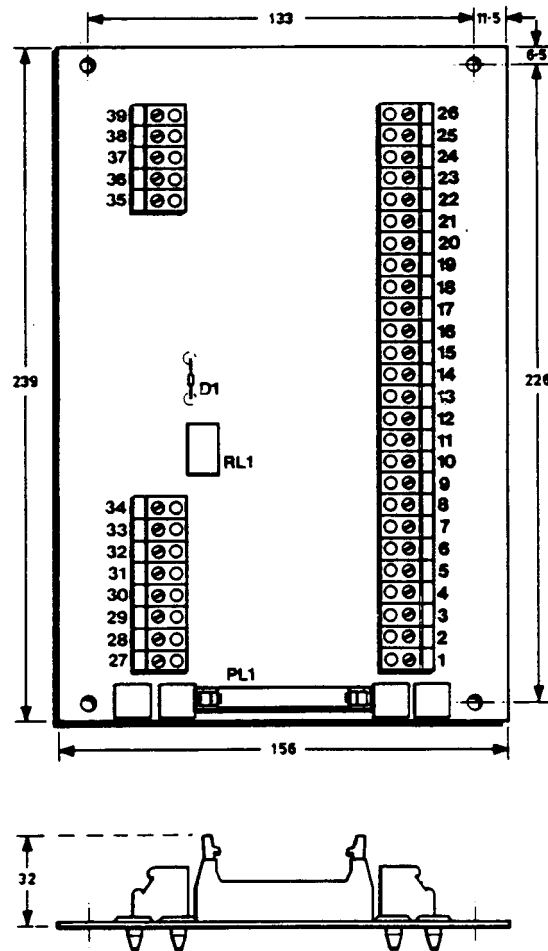


Figure 2.3 – Termination Panel – Dimension Details

3. 8924, 8974 and 9009 TERMINATION UNITS

3.1 Connection to the GEM80

There is one 26-way ribbon cable for each pair of RS422 serial ports on the GEM80 controller, serial port 1 and serial port 2 (the total number of serial ports available is dependent on the number of I/O processors that are present in the controller). Each ribbon cable can be attached to two termination units. Because the RS422 serial ports operate independently, the two termination units do not need to be the same, they can be mixed randomly.

The 26-way ribbon cable is plugged into the connector PL1 on the termination unit. There are two connector plugs on the ribbon cable, one for each termination unit. These plugs are wired in parallel, that is to say their pin-outs are common, so it is necessary to designate which serial port is connected to each termination unit. This is achieved by a link on the plant terminals on the termination unit itself. Terminals 15 and 16 are used for this purpose.

When terminals 15 and 16 are linked together, the termination unit is interfacing with serial port 2.

When there is no link between terminals 15 and 16, the termination unit is interfacing with serial port 1.

Although no damage will occur if both termination units are set to interface with the same serial port, they will obviously not function correctly.

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Each additional 26-way ribbon cable is treated in the same way. No further addressing is required since this is achieved internally within the GEM80. A simple rule to follow is that when terminals 15 and 16 are linked together, the termination unit is interfacing with an even numbered serial port.

3.2 8924: RS422 to 20mA Current Loop Termination Unit

Transmit and receive current sources are provided at the plant terminals. These allow either 2-wire or 4-wire 20mA current loops to be driven by the 8924 unit.

Figure 3.1 shows the internal arrangement and plant connections of the 8924 Termination Unit.

Both point to point and multi-drop serial links can be established. Each current source can drive one standard GEM80 control port and up to eight GEM80 tributary ports when connected as a multi-drop serial link. See Figures 3.2 and 3.3

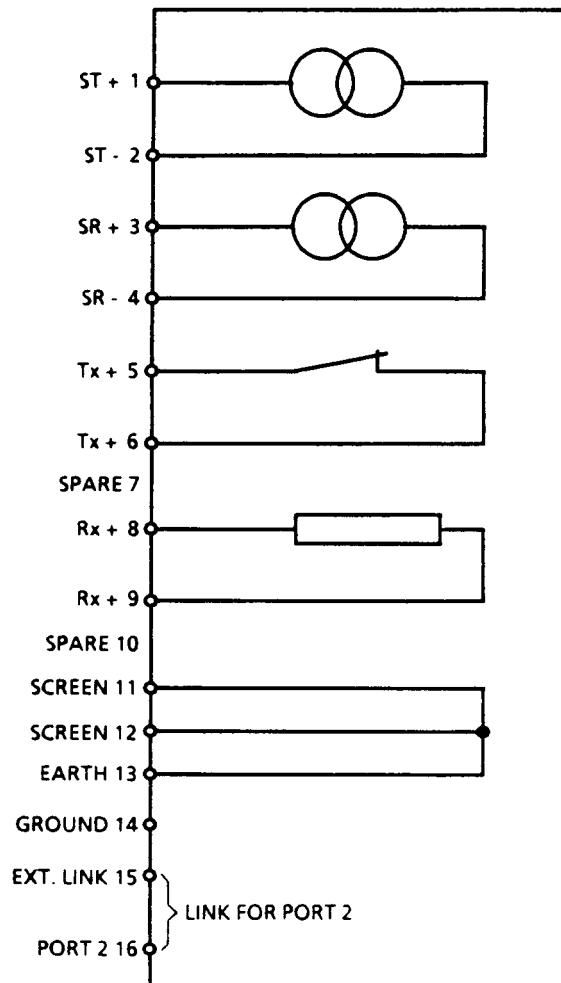


Figure 3.1 – 8924 Termination Unit: Internal Arrangement and Plant Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

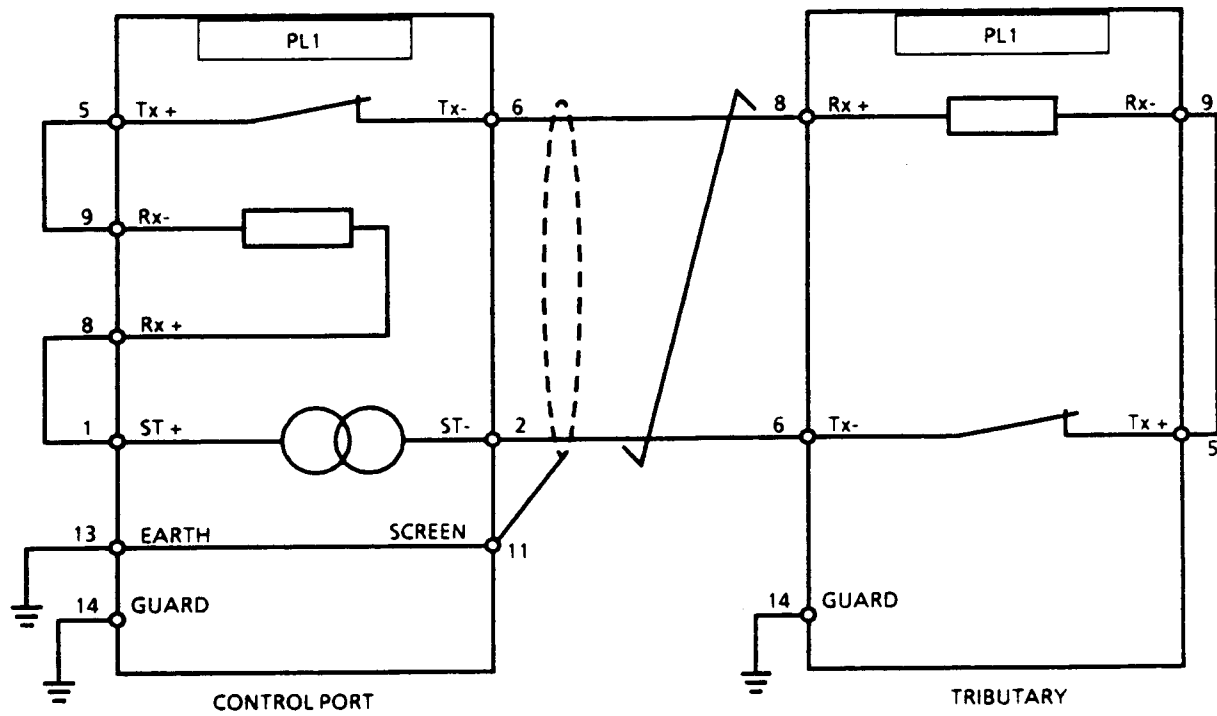


Figure 3.2a – 8924 Termination Unit: Point to Point 2 Wire Connections

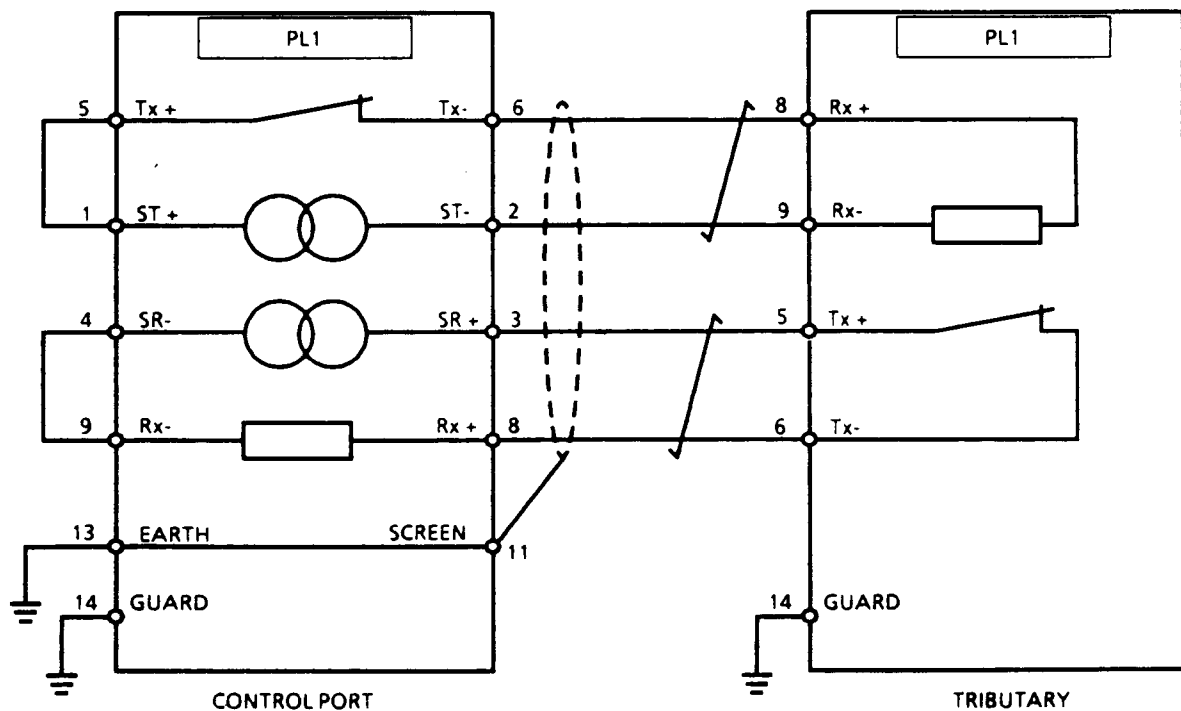


Figure 3.2b – 8924 Termination Unit: Point to Point 4 Wire Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

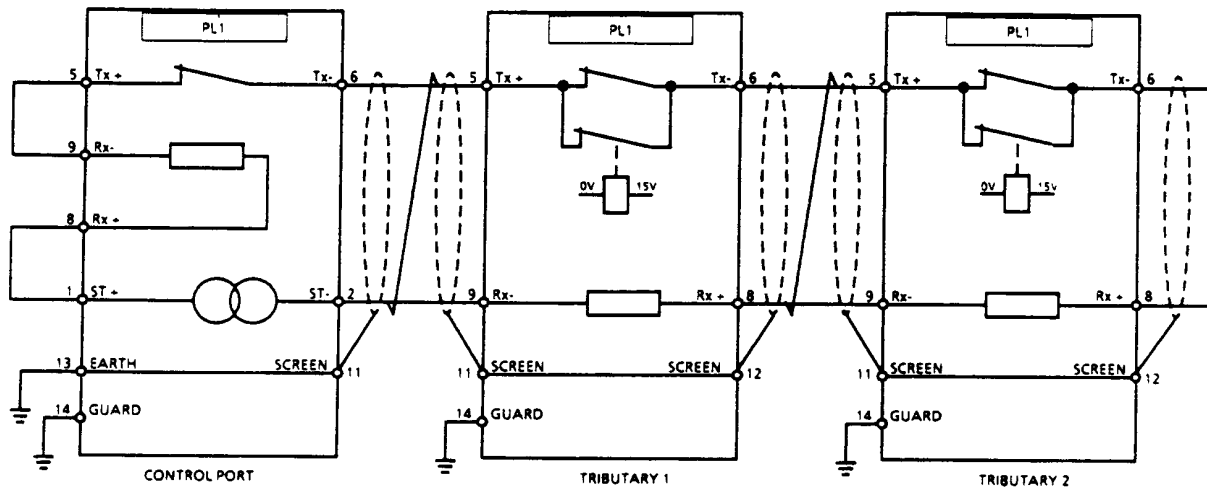


Figure 3.3a – 8924 Termination Unit: Multi-drop 2 Wire Connections

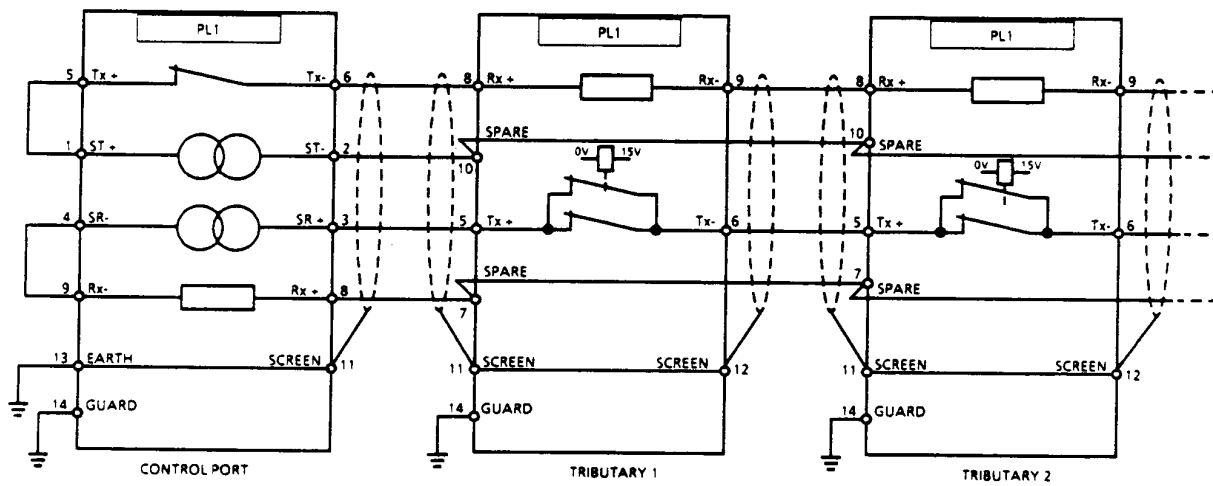


Figure 3.3b – 8924 Termination Unit: Multi-drop 4 Wire Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

3.3 8974: RS422 to RS232 Termination Unit (3-wire)

This unit can only provide a point to point serial link, such as a printer port. Figure 3.4 shows a typical 3-wire printer port connection.

Table 3.1 shows the plant connections for the 8974 unit.

Terminal	Connection
1	SPARE
2	COMMON
3	SPARE
4	COMMON
5	SPARE
6	SPARE
7	RS232 O/P
8	SPARE
9	SPARE
10	RS232 I/P
11	SPARE
12	SCREEN
13	EARTH
14	GUARD
15	EXT. LINK
16	RS232 0V (PORT 2)

Table 3.1 – 8974 Termination Unit: Plant Connections

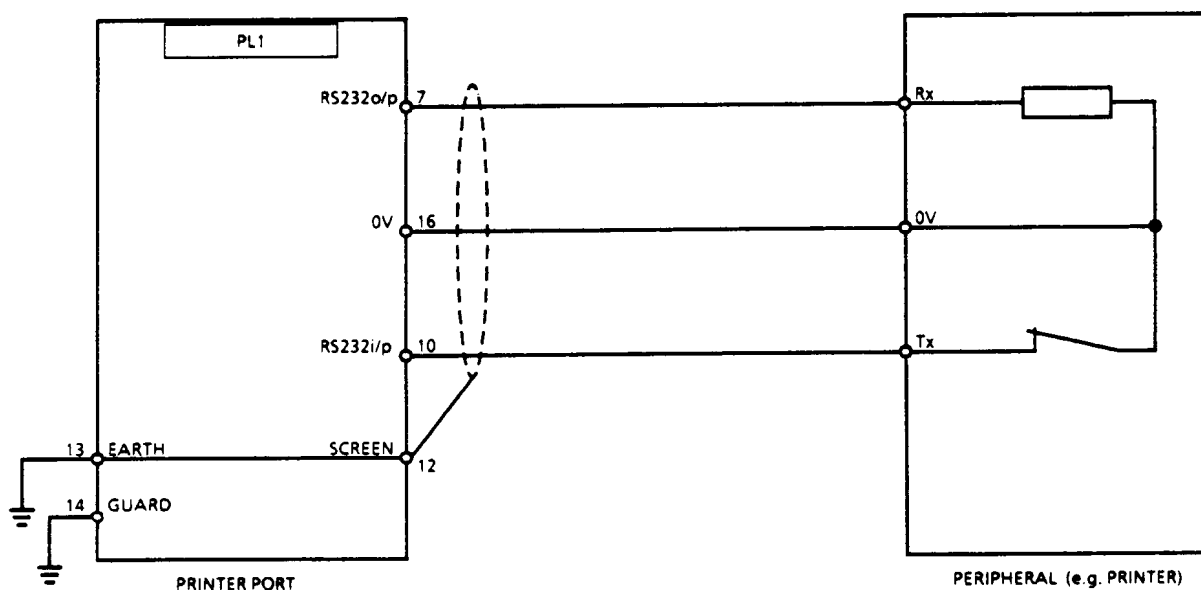


Figure 3.4 - 8974 Termination Units: Point to Point 3-wire RS232 Connections

3.4 9009: RS422 to RS232 Termination Unit (Isolated, 5-wire)

The 9009 termination unit produces an RS232 serial link which operates in a hand-shaking mode. Data terminal ready (DTR) and request to send (RTS) are handshaking signals output by the unit. Both operate in unison.

The corresponding input handshaking signals are data set ready (DSR) and clear to send (CTS). These signals are logically 'OR' ed together when input to the 9009 termination unit.

Different software to that used to drive the 8974 unit is required by the 9009 unit because of the additional handshaking signals used by this unit. The 9009 unit is often used to interface to printers or VDU's which will only operate in this handshaking mode.

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Table 3.2 illustrates the voltage levels of these hand-shaking signals.

Opto isolation is provided within the termination unit on all the above signals.

Only a point to point serial link can be provided by this unit. Typical connections would be printer ports, visual display units, or keyboards. Figure 3.5 shows one example of these connections.

Table 3.3 shows the plant connections for the 9009 unit.

INPUT TO 9009	OUTPUT FROM 9009	RS232 VOLTAGE LEVELS
Rx	Tx	-12V Logic '1' + 12V Logic '0'
CTS	RTS	+ 12V Ready -12V Not Ready
DSR	DTR	+ 12V On-line -12V Off-line

Table 3.2 – 9009 Termination Unit: RS232 Input/Output and Handshaking Signals

Terminal	Connection
1	SPARE
2	SPARE
3	SPARE
4	0V
5	DTR
6	RTS
7	Tx
8	DSR
9	CTS
10	Rx
11	SCREEN
12	SCREEN
13	EARTH
14	SPARE
15	EXT. LINK
16	0V (PORT 2)

Table 3.3 – 9009 Termination Unit: Plant Connections

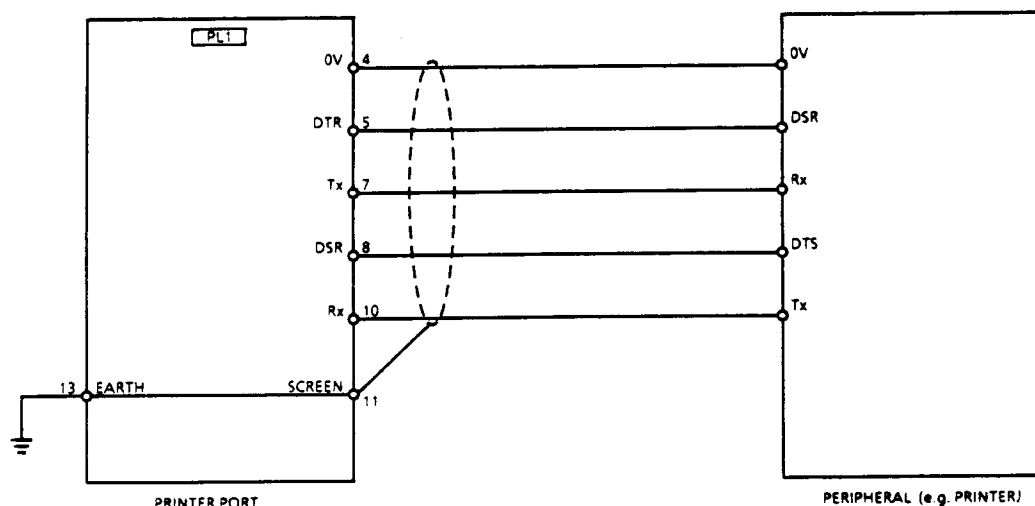


Figure 3.5 – 9009 Termination Unit: Point to Point 5-wire RS232 Connections (DTR/DTS Mode)

4. 8975: 20mA CURRENT LOOP TO RS232 TERMINATION UNIT

The 8975 termination unit does not interface directly with the GEM80, although it may be mounted alongside other units which do, and is compatible with them in every way. The 8975 interfaces between an RS232 serial link and a 20mA current loop. By using an 8975 unit, the user can connect an RS232 printer to a 20mA current loop multi-drop system. Alternatively, the 8975 unit may be used to drive a modem for serial links which operate over telephone lines.

Because the 8975 unit is not directly connected to the GEM80, an external power supply is required. This must provide +15V and –15V. All the wiring connections to the unit are made via the plant terminals (refer to Table 4.1). Figure 4.1 shows the internal arrangement of the 8975 unit. Figure 4.2 shows a typical connection to a multi-drop system.

Terminal	Connection
1	ST +
2	ST -
3	SR +
4	SR -
5	Tx +
6	Tx -
7	RS232 O/P
8	Rx +
9	Rx -
10	RS232 I/P
11	+15V SUPPLY
12	SCREEN
13	EARTH
14	GUARD
15	-15V SUPPLY
16	0V (RS232 & SUPPLY)

Table 4.1 – 8975 Termination Unit: Plant Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

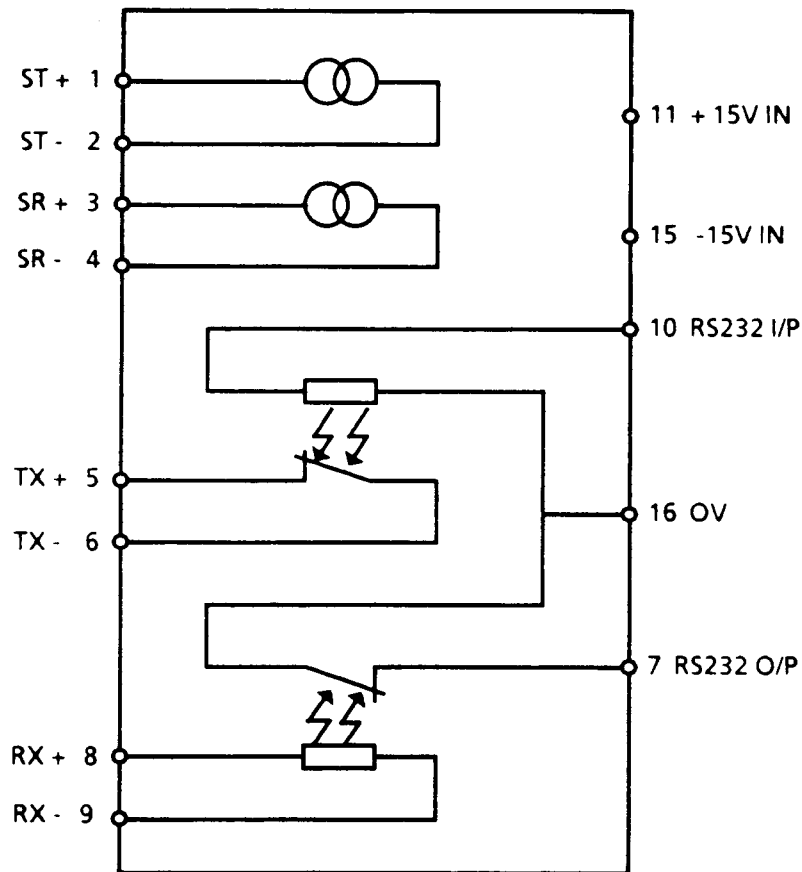


Figure 4.1 – 8975 Termination Units: Internal Arrangement

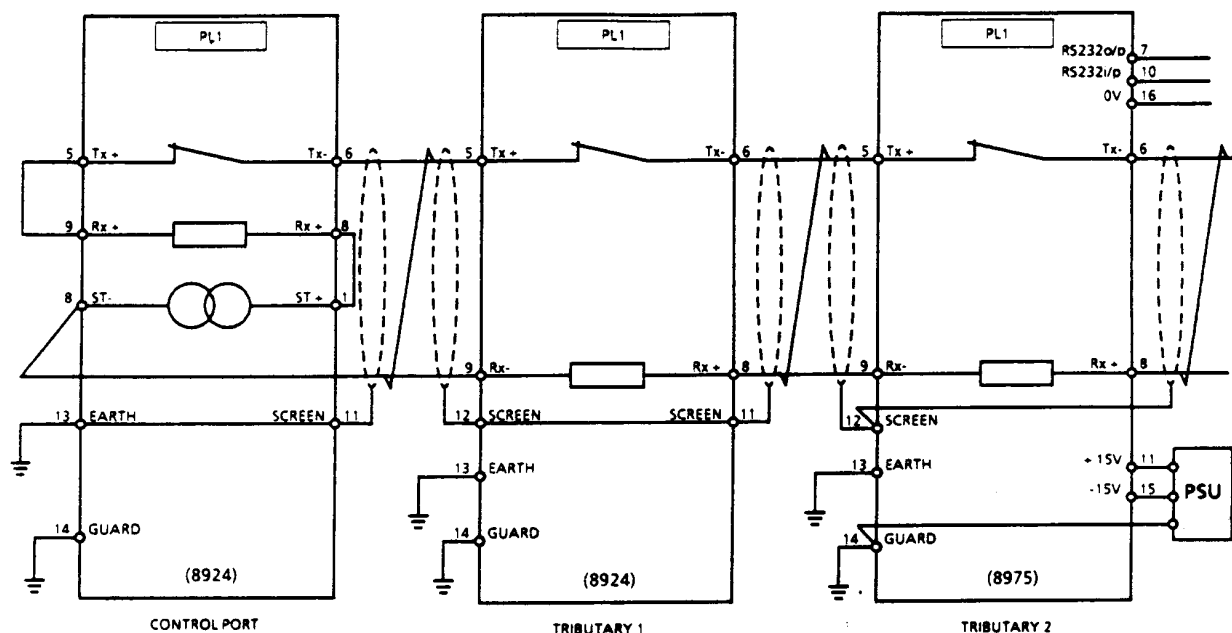


Figure 4.2 – 8975 Termination Unit: Serial Link Connection to Multi-drop

5. 8961: 20mA CURRENT LOOP TO RS485 TERMINATION UNIT

SERIAL INTERFACE TERMINATION UNITS AND PANELS

The 8961 unit interfaces between a 20mA current loop serial link and an RS422 serial port. Connection to the unit is via a 20-way ribbon cable. Two serial ports are available on the ribbon cable, and both these are driven by the 8961 unit.

A set of screw terminals are provided for connecting up the two serial ports. Table 5.1 shows these connections. Note that both Ports 1 and 2 have the transmit lines duplicated; either may be used. Two Faston terminals are provided for the external power supply that is required by the unit, and these are also shown in Table 5.1. The power supply required is +5V at 350mA.

Dimensions and mounting details are the same as those for the other termination units.

Terminal	Connection
1	EARTH
2	EARTH
3	SCREEN
4	SCREEN
5	TxA PORT 1A
6	TxB PORT 1A
7	TxA PORT 1B
8	TxB PORT 1B
9	RxA PORT 1
10	RxB PORT 1
11	TxA PORT 2A
12	TxB PORT 2A
13	TxA PORT 2B
14	TxB PORT 2B
15	RxA PORT 2
16	RxB PORT 2
F1	+ 5V
F2	0V

Table 5.1 – 8961 Termination Unit: Plant Connections

The 8961 unit is most often used to interface to GEMSTART CCU RS485 Serial Link. A typical example of such a connection is shown in Figure 5.1. For clarity, the terminals for Port 1B and 2B have been omitted.

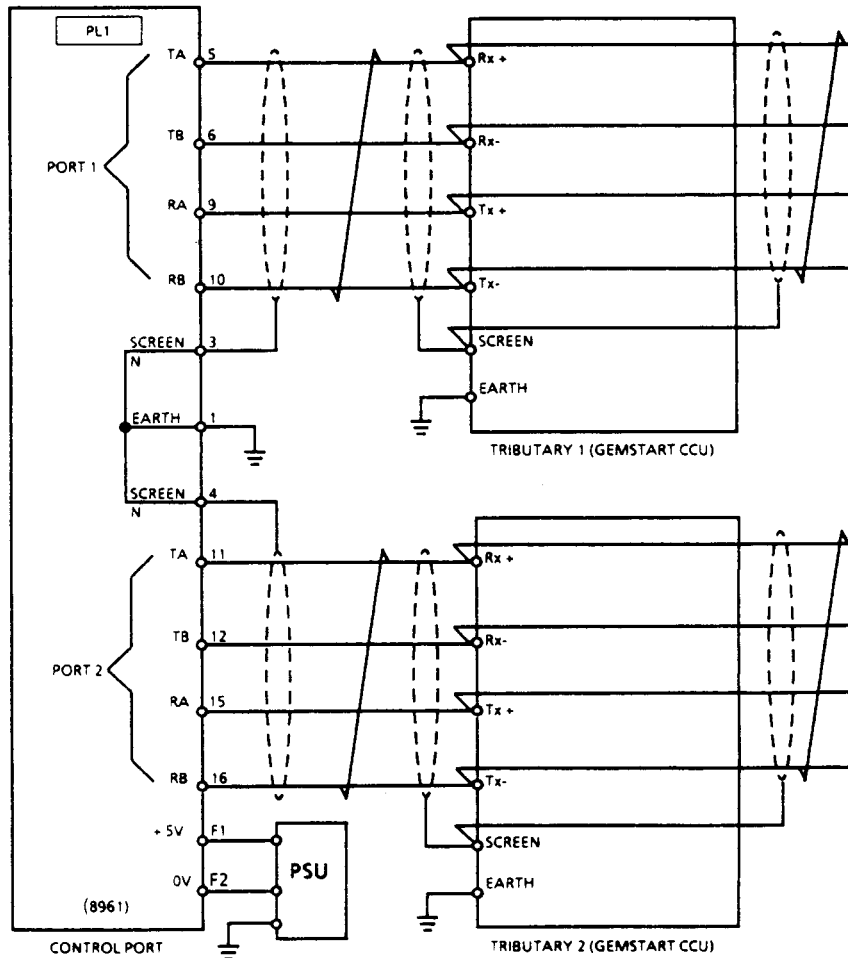


Figure 5.1 – 8961 Termination Units: 2 port, 4 wire RS422 Connection

6. TERMINATION PANELS

The 8035 and 8038 termination panels are used in conjunction with the Serial Communications Module (8331) and Programmable Serial Communications Module (8333). The panels are not marketed separately, but are included as part of the equipment kits for the above modules (see 8845 and 8847 User Information, Documents T441 and T423).

The 8857 Termination Panel converts an RS422 serial port to an RS485 serial port. Although it is compatible with the 8924 termination unit, and can be connected to the GEM80 standard RS422 serial port, the normal use for the 8857 panel is as an interface for the STARNET processor module (8218). This panel is usually included as part of the equipment kit of the above module (see 8816 User Information, Document T452).

6.1 8035 Termination Panel

The 8035 termination panel is supplied with either the 8331 Serial Communications Module, or the 8333 Programmable Serial Communications Module. These modules are supplied with equipment kits which include a backplane, cables, connectors, and a termination panel. The 8035 panel, together with the relevant backplane, connects to the RS232 and 20mA current loop serial ports that are provided by the above modules.

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Screw terminals are mounted in three blocks. Terminals 1 to 26 carry the RS232 serial port, with terminals 22 to 26 duplicated in another block as terminals 35 to 39. This allows the user the option of using either a 3-wire RS232 connection, on terminals 35 to 39, or a 5-wire RS232 connection using DTR/DSR and CTS/RTS on terminals 1 to 26. The third block of terminals are numbered 27 to 34 and carry the 20mA current loop serial port (see Table 6.1).

A transmit by-pass relay for the 20mA current loop serial port is provided at RL1 (see Section 7.0). This is only required when the serial port is connected to a multi-drop serial link.

When the 8035 panel is connected to an 8331 Serial Communications Module, both the serial ports are available to the user. However, when the panel is connected to an 8333 Programmable Serial Communications Module, the 20mA current loop serial port can only be used as a programming port for the 8333 module (see the 8845 and 8847 User Information Documents T441 and T423).

Terminal	Legend	Function
1	Comm.Scen.	Earthing of screens
2	Signal Ground	Common 0V
3	Signal Ground	Common 0V
4	Tx Timing Out	Clock Output
5	Signal Ground	Common 0V
6	Rx Timing In	Clock Input
7	Signal Ground	Common 0V
8	Tx Timing In	Clock Input
9	Screen	Terminal for screens
10	Signal Ground	Common 0V
11	C.T.S.	Clear to Send I/P
12	Signal Ground	Common 0V
13	R.T.S.	Request to Send O/P
14	Signal Ground	Common 0V
15	DTR	Data Terminal Ready
16	Signal Ground	Common 0V
17	DSR	Data Set Ready I/P
18	+12V	Logic '0' for SIG.DET
19	Signal Ground	Common 0V
20	Sig. Det	Signal Detector
21	+12V	Logic '0' for SIG.DET
22	Screen	Terminal for screens
23	Signal Ground	Common 0V
24	RXD	Receive Input
25	Signal Ground	Common 0V
26	TXD	Transmit Output
27	SR-	)
28	SR+	)
29	ST+	)
30	Tx-	)
31	Tx+	)
32	Rx+	)
33	ST-	)
34	Rx-	)
		Programming Port (normally open circuit)
35	Screen	)
36	Signal Ground	)
37	RXD	)
38	Signal Ground	)
39	TXD	)
		Replica of 22 to 26

Table 6.1 – 8035 Termination Panel: Terminal Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Figure 6.1 shows a typical connection of an 8035 to an 8331 module, while Figure 6.2 shows a connection to an 8333 module. Figure 6.3 shows a typical connection of an 8035 panel to a printer with both 5-way and 3-way working.

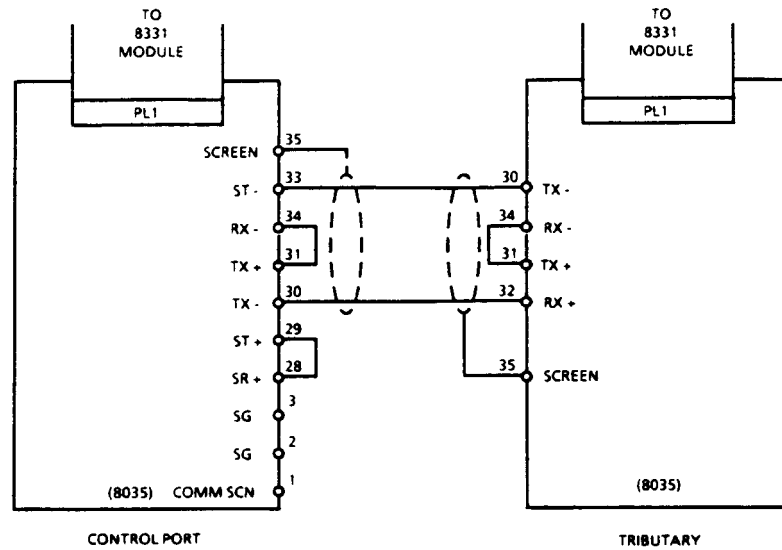


Figure 6.1 – 8845-4102 Serial Communications Equipment

Incorporating 8035 Termination Panels (point-to-point serial link using 20mA port)

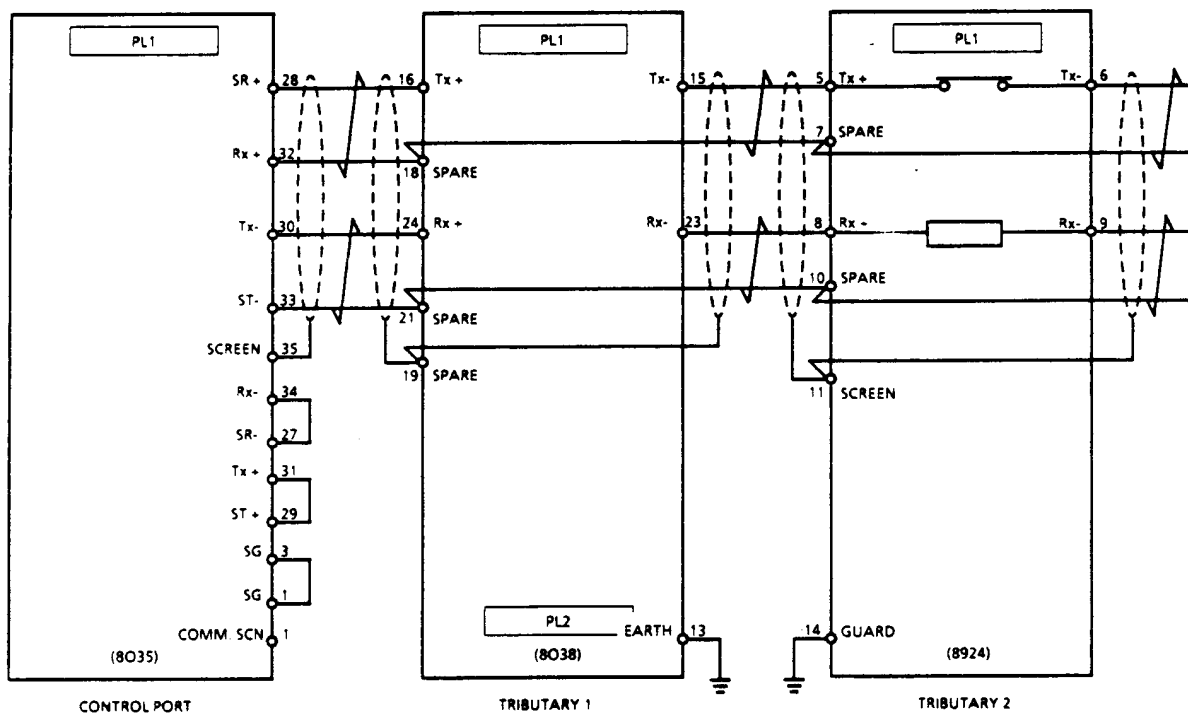


Figure 6.2 – 8847-4002 Programmable Serial Communications Equipment

Incorporating an 8035 Termination Panel (multi-drop serial link remote programming)

SERIAL INTERFACE TERMINATION UNITS AND PANELS

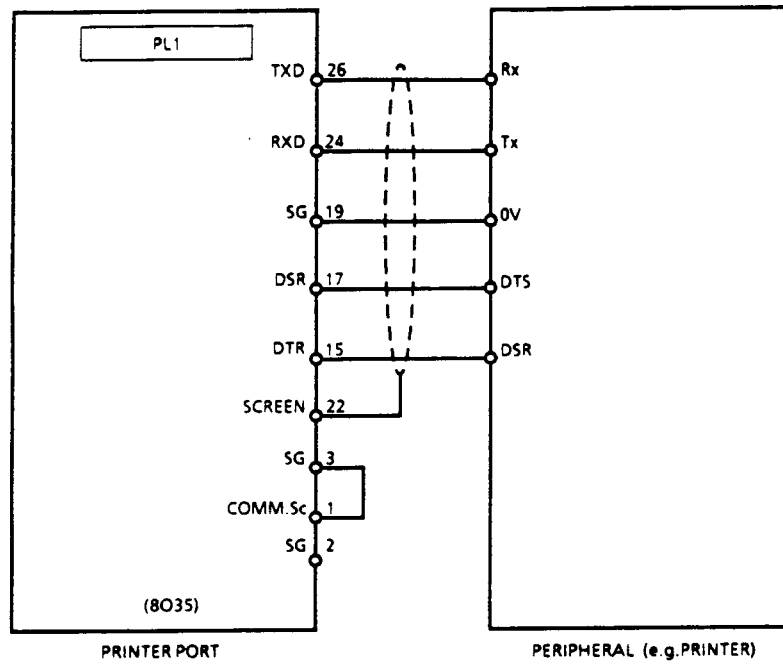


Figure 6.3a – 8035 Termination Panel: 5-way Working

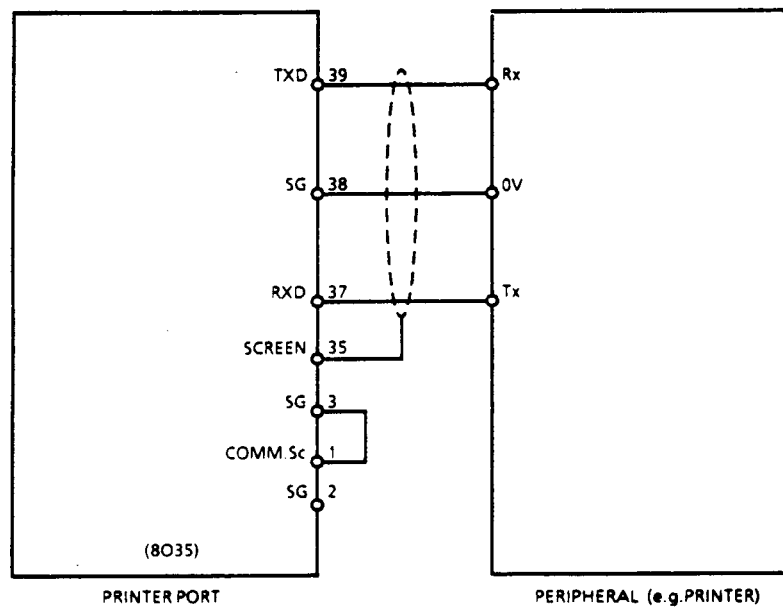


Figure 6.3b – 8035 Termination Panel: 3-way Working

SERIAL INTERFACE TERMINATION UNITS AND PANELS

6.2 8038 Termination Panel

The 8038 termination panel is supplied as part of the equipment kits with the 8331 Serial Communications Module and the 8333 Programmable Serial Communications Module. The 8038 panel, together with the relevant backplane, connects to the two 20mA current loop serial ports provided by the above modules.

Screw terminals are provided in two blocks. Terminals 1 to 25 carry the two 20mA current loop serial ports provided by the serial communications modules, and terminals 26 to 30 are provided for a remote programming feature using the System Programmer (see Table 6.2). Normally, terminals 26 to 30 are left open circuit when the 8038 is included as part of a serial communications equipment kit. However, the 8038 panel can be included as part of a remote programming facility with a GEM80 controller.

When the 8038 panel is connected to an 8331 Serial Communications Module, both the serial ports are available to the user. However, when the panel is connected to an 8333 Programmable Serial Communications Module, only the serial port on terminals 14 to 25 can be used. The serial port on terminals 1 to 13 can only be used as a programming port for the 8333 module (see the 8845 and 8847 User Information Documents T441 and T423).

Two transmit by-pass relays are provided for at RL1 and RL2. These are required when the 8038 panel is being used in a multi-drop system. RL1 is required for port 1 on terminals 14 to 25, and RL2 for port 2 on terminals 1 to 13 (see Section 7.0).

Terminal	Legend	Function
1	ST-	20mA Serial Port 2
2	TX-	
3	TX+	
4	ST+	
5	Spare	
6	Spare	
7	Screen	
8	Spare	
9	SR-	
10	Rx-	
11	RX+	
12	SR+	
13	Common Screen	
14	ST-	20mA Serial Port 1
15	TR-	
16	TX+	
17	ST+	
18	Spare	
19	Spare	
20	Screen	
21	Spare	
22	SR-	
23	Rx-	
24	Rx+	
25	SR+	Remote Programming Port
26	Screen	
27	Rx+	
28	TX+	
29	ST+	
30	SR+	

Table 6.2 – 8038 Termination Panel – Terminal Connections

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Figure 6.4 shows a typical connection of an 8038 to an 8331 module, while Figure 6.5 shows a connection to an 8333 module. Figure 6.6 shows the 8038 panel used as part of a remote programming facility for a GEM80 controller.

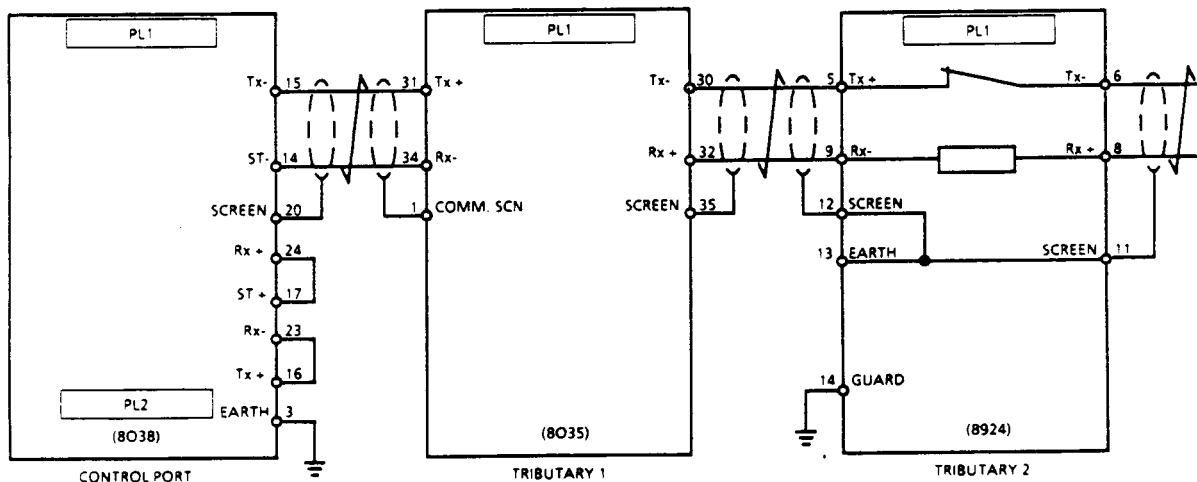


Figure 6.4 – 8845-4101 Serial Communications Equipment

Incorporating an 8038 Termination Panel (Multi-drop Serial Link)

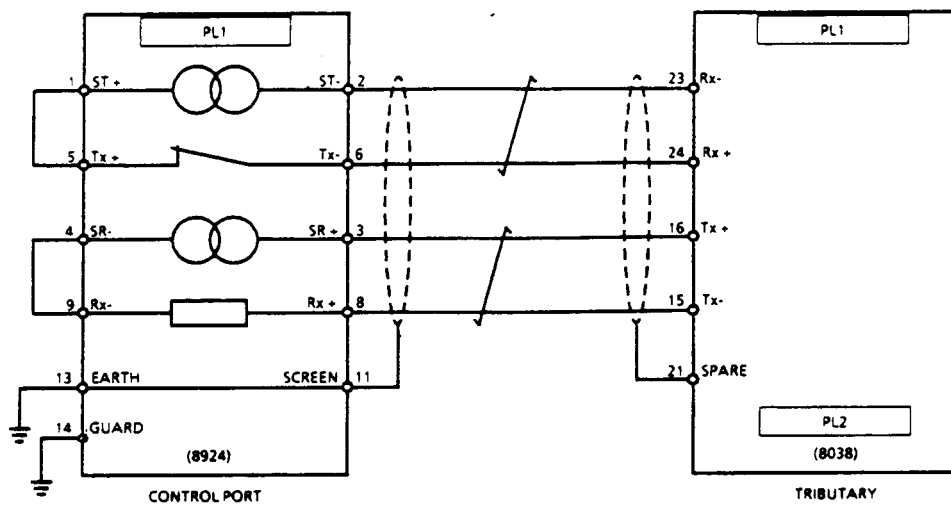


Figure 6.5 – 8847-4001 Programmable Serial Communications Equipment

Incorporating an 8038 Termination Panel (point to point serial link)

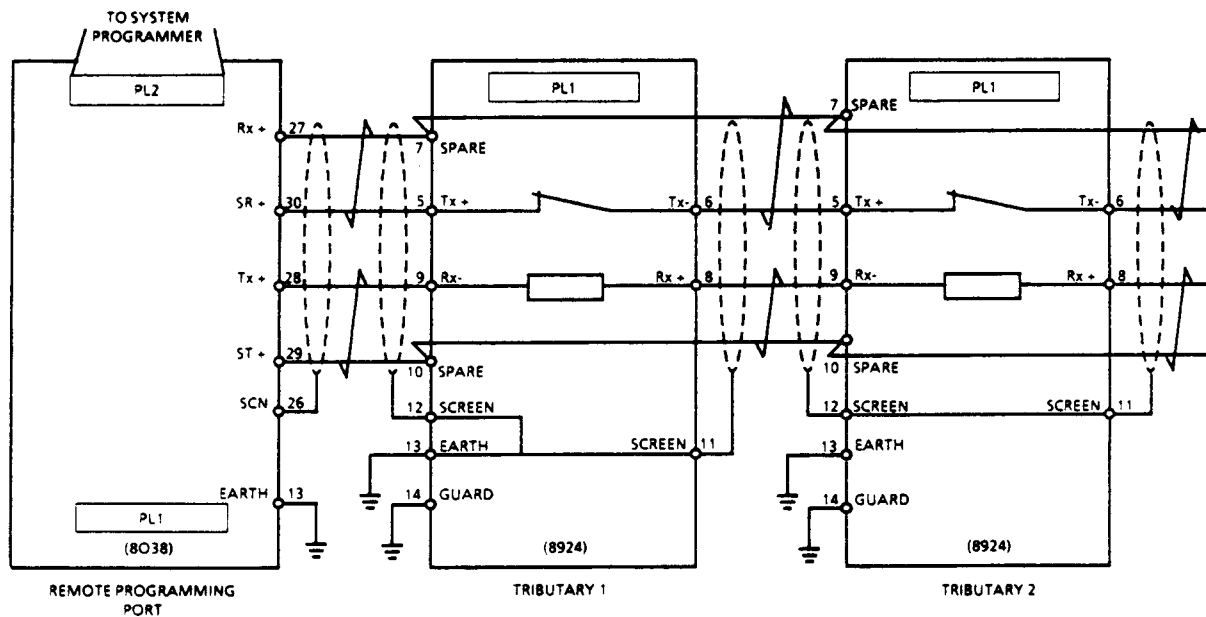


Figure 6.6 – An 8038 Termination Panel used as part of a Remote Programming Facility with a System Programmer

6.2 8587 Termination Panel

The 8587 termination panel is intended chiefly for communication between STARNET modules. The 8587 converts an RS422 serial port to an RS485 serial port, and connects directly to the 26-way serial link ribbon cable produced by the GEM80.

Two serial ports are available on the ribbon cable. To identify which serial port is being interfaced with, a link must be added to Terminal Block 1 (refer Table 6.3).

When there is no link between terminals 1 and 2, the termination panel is interfacing with serial port 1.

When terminals 1 and 2 on Terminal Block 1 are linked together, the termination panel is interfacing with serial port 2.

One 8587 panel is required for each RS422 serial port, so two panels must be connected in parallel on the serial link ribbon cable. When more than one serial link ribbon cable is available, a simple rule to follow is that when terminals 1 and 2 on Terminal Block 1 are linked together, the termination panel is interfacing with an even numbered serial port.

Each 8587 panel may be connected to 31 other similar panels in a multi-drop system.

Although RS485 is a 2-wire standard, the 8587 panel can operate in both 2-wire and 4-wire configurations. As additional link must be inserted on the panel when configured for 2-wire working. This link is also required when the panel is connected to a 4-wire multi-drop system as a tributary (or secondary). This link allows the 8587 panel to tri-state its output lines when not transmitting and so allow other units to use it.

Table 6.3 illustrates the plant connections for the 8587 termination panel. Note that the screw terminals are divided into three blocks. Terminal Block 3 carries the transmit and control lines for the RS485 serial port, Terminal Block 2 carries the receive lines for the RS485 serial port, and Terminal Block 1 is used for the serial port selection.

Figure 6.7 shows an example of a 2-wire point to point link and Figure 6.8 shows an example of a 4-wire serial link using the 8587 termination panel.

SERIAL INTERFACE TERMINATION UNITS AND PANELS

Terminal Board	Terminal	Legend
TB1	1	Link for channel 2
	2	
TB2	1	RXA
	2	RXA
	3	RXA
	4	RXB
	5	RXB
	6	RXB
TB3	1	RZØ
	2	Screen
	3	Screen
	4	Screen
	5	System Earth
	6	2-wire
	7	2-wire
	8	TZØ
	9	TXA
	10	TXA
	11	TXA
	12	TXB
	13	TXB
	14	TXB
	15	DIRA
	16	DIRB

Table 6.3 – 8587 Termination Panel: Terminal Connections

Termination resistors are provided on the panel. These resistors are of such a value so as to match the nominal impedance of the cable. These resistors should be used to prevent signal reflections on the cable, which could cause distortion. Information on the size of resistors for different lengths of cable, and for different transmission speeds, can be found in the STARNET User Information (Document T452).

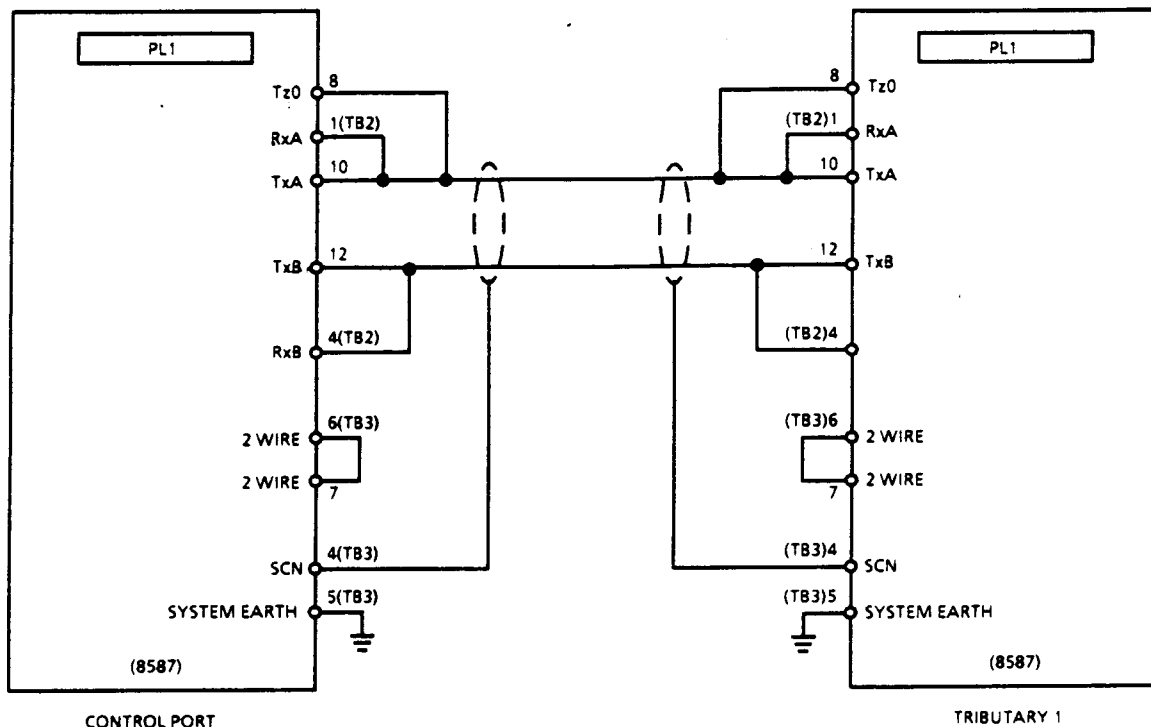


Figure 6.7 – 2-wire Point to Point Serial Link using 8587 Termination Panels

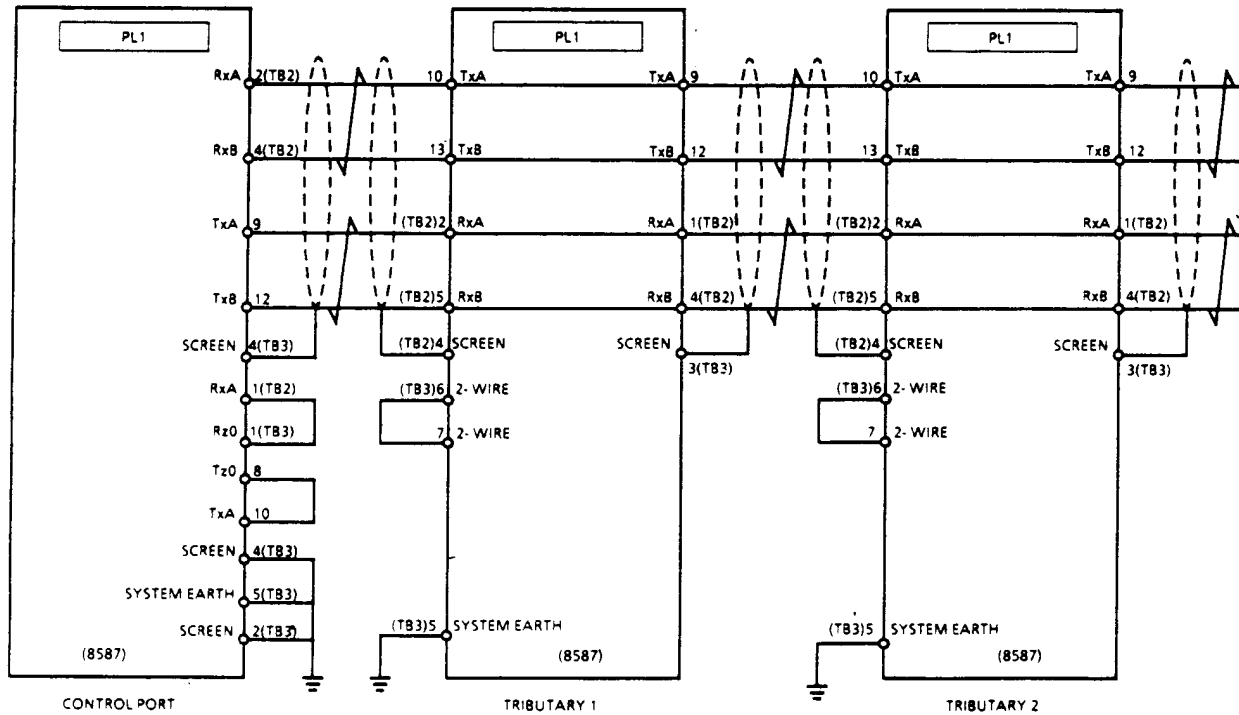


Figure 6.8 – 4-wire Serial Link using 8587 Termination Panels

7. TRANSMIT BY-PASS RELAY

On the 8035, 8038, 8924 and 8975 units a by-pass relay is provided with its normally closed contacts across the transmit (Tx+ /Tx-) terminals. This maintains the continuity in the transmit circuit for multi-drop 20mA current loop applications when the local power is off.

When the local power is present, the relay energises and opens the contacts, permitting normal transmission from the unit.

Local power off continuity in the receive circuit is maintained via the opto diode.

A typical 4-wire multi-drop link is represented.

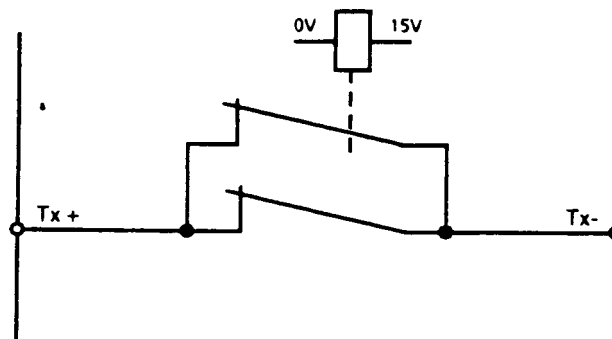


Figure 7.1 – By-pass Relay Circuit for 20mA Current Loop

SERIAL INTERFACE TERMINATION UNITS AND PANELS

8. ORDERING CODES

RS422 to 20mA Current Loop Termination Unit	8924-0000
20mA Current Loop to RS422 Termination Unit	8961-0000
RS422 to RS232 Termination Unit (3-wire)	8974-4002
RS422 to RS232 Termination Unit (Isolated, 5-wire)	9009-4001
20mA Current Loop to RS232 Termination Unit	8975-0000
Mounting Channel (up to 4 Termination Units may be Mounted flat between a pair of channels)	8959-0000
20mA Current Loop and RS232 Termination Panel	8035-0000
Dual 20mA Current Loop Termination Panel	
2 Ports, Port 1 Tributary (i.e. includes by-pass relay)	8038-4002
2 Ports, Both Control (i.e. no by-pass relay)	8038-4003
RS422 to RS485 Termination Panel	8587-0000



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