

ORDERING

SRM-9 /*/+

Miniature Sync/Async Short Range Modem

SRM-9/V.24/UP/+

Miniature Sync/Async Short Range Unpowered Modem, V.24/RS-232 interface, female connector

* Specify DTE interface:

V24 for V.24 interface, female connector

V35 for V.35 interface, female connector

X21 for X.21 interface, female connector

530 for RS-530 interface, female connector

+ Specify line interface:

RJ45 for RJ-45 jack

(Default is terminal block)

P/S-AC/9/500

9V DC / 90V to 264V AC power supply



data communications

SRM-9

*Miniature Sync/Async
Short Range Modem*



For Sales and Technical:

Pulse, Inc.
www.pulsewan.com
sales@pulsewan.com

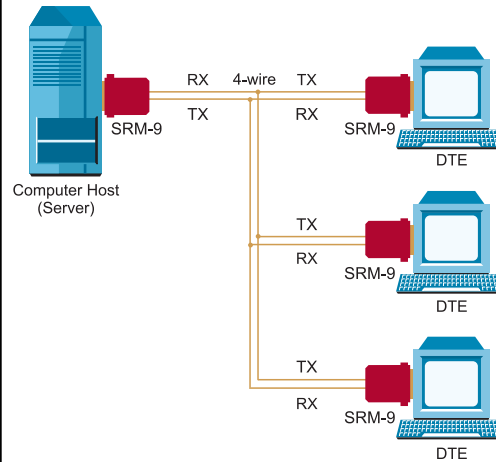
Toll Free (USA)
Tel: 888-785-7393

International:
Tel: 1-561-279-7700

FEATURES

- Synchronous or asynchronous
- Data rates up to 128 kbps sync and 115.2 kbps async
- V.54 diagnostics, including local and remote loopbacks
- Built-in BER tester in compliance with V.52
- Full or half duplex for point-to-point or multipoint applications
- Half duplex over 2-wire lines
- Internal, external or receive clock
- Controlled or continuous carrier
- V.35, V.24 / RS-232, X.21 or RS-530 interfaces available
- Isolation transformers
- Operates with an external power supply (except SRM-9/V.24/UP)
- LED indicators

APPLICATION



DESCRIPTION

- The SRM-9, Sync/Async Short Range Modem, is used for local data distribution, connecting full or half duplex sync/async DTEs to other DTEs over unconditioned 4-wire / 2-wire lines. SRM-9 operates at data rates of 32 to 128 kbps in sync mode and 9.6 to 115.2 kbps in async mode, at distances up to 16.5 km (10 miles), depending on wire gauge and data rate (see Table 1 and Table 2).

Table 1. Approximate Range Point-to-Point

Data Rate	19 AWG		24 AWG		26 AWG	
	km	miles	km	miles	km	miles
128 kbps	5.5	3.4	3.2	2.0	2	1.2
96-115.2	7.5	4.7	4.0	2.4	3	1.9
48-64	11	6.8	5.0	3.1	3.5	2.2
28.8-38.4	13.5	8.4	5.5	3.4	3.5	2.2
19.2	16.5	10.3	6.5	4.0	4.5	2.8
9.6	19	11.8	8	5	6	3.7

- Five models are available:
 - SRM-9/V.24/UP, V.24 interface (unpowered)
 - SRM-9/V.24, V.24 interface (powered)
 - SRM-9/V.35, V.35 interface
 - SRM-9/X.21, X.21 interface
 - SRM-9/530, RS-530 interface.

Each model has a 25-pin D-type connector for the DTE interface.

V.35 interface: a 45 cm cable (CBL-8H/F), with a 25-pin, male connector on one side and a 34-pin, female connector on the other side, is supplied. The package also includes two double-threaded adapter nuts for the cable fastening.

X.21 interface: a 45 cm cable, with a 25-pin male connector on one side, and a 15-pin X.21, female connector on the other side, is supplied.

- SRM-9 performs diagnostic loops in compliance with ITU V.54 standard. Two V.54 loops are available: analog loop (V.54 Loop 3) and remote digital loop (V.54 Loop 2). These loops are activated either by a DIP switch or by the DTE interface Circuit 141 (pin 18) and Circuit 140 (pin 21). (Loopbacks in SRM-9/X.21 are activated by DIP switch only.) A proprietary local digital loop is available and can be activated only by the modem's switches. This loop connects the local RD to the TD. A TEST LED lights when any diagnostic loop is active.

- SRM-9 includes a built-in BERT according to the V.52 standard for testing the communication link. The internal BERT is activated by the DIP switch (PATT). The BERT checks the received data, and the error LED (ERR) lights when errors are detected.
- Asynchronous transmission is provided by internal conversion from async to sync in compliance with the ITU V.22 bis standard. Different asynchronous formats are switch-selectable.
- In synchronous mode, transmit timing can be provided by three alternative sources:
 - Internal oscillator
 - External clock
 - Loopback clock derived from the receive signal.
- The modem's carrier can be set for either continuous operation (point-to-point application) or controlled operation by the RTS signal (multipoint application or passing control signals end-to-end).
- The low transmit level minimizes crosstalk on adjacent circuits within the same cable. Data is transmitted and received at a balanced impedance, ensuring high immunity to circuit noise. Additionally, SRM-9 is coupled to the line through isolation transformers, which protect against AC or DC overvoltages.

- SRM-9/V.24/UP interface can operate without a power supply, using ultra-low power from the standard V.24/RS-232 data and control signals. When the DTE cannot provide the power required, SRM-9's power consumption can be significantly reduced by disabling the LEDs (setting via DIP switch).
- Six LED indicators are available to facilitate diagnostics: TST, DCD, TD, RTS, RD, ERR.
- The line interface is a 5-screw clip terminal block or an RJ-45 connector (see *Ordering*).



SPECIFICATIONS

- **Data Rate (Sync or Async)**
 - Sync: 32, 48, 56, 64, 96, 112, and 128 kbps
 - Async: 9.6, 19.2, 28.8, 38.4, 57.6, and 115.2 kbpsSelectable by DIP switch

- **Number of Data Bits (Async Mode)**
8, 9, 10 or 11, including 1 start and 1 stop bit, with or without parity (see *Table 2*)

Table 2. Async Character Length Setting

Start Bit	Data Bits	Parity	Stop Bit	No. of Bits
1	5	None	2	8
1	6	None	1,1.5,2	8
1	6	Odd, Even	1,1.5,2	9
1	7	None	1,1.5,2	9
1	7	Odd, Even	1,1.5,2	10
1	8	None	1,1.5,2	10
1	8	Odd, Even	1,1.5,2	11

- **Frequency Allowance (Async Mode)**
Shortening the stop bit on the receive end is selectable:
 - 12.5% allows a frequency difference between the async DTE and SRM-9 of -2.5 to +1.0%.
 - 25% allows a frequency difference between the async DTE and SRM-9 of -2.5 to +2.3%.

- **Transmission Line**
 - 4-wire unconditioned dedicated line (two twisted pairs)
 - 2-wire unconditioned dedicated line (twisted pair) for half-duplex communication only
- **Transmission Controls**
 - **DCD** (Circuit 109) turns ON after recognizing a receive signal from the line
 - **CTS** (Circuit 106) turns ON 0, 1, 8 or 68 msec (selectable) after DTE raises RTS (Circuit 105)
 - **DSR** (Circuit 107) turns ON when the modem is powered and is in normal mode or in analog loopback state. DSR turns OFF when the modem is in digital loopback state
 - **TEST** Mode (Circuit 142) turns ON when the modem is in a diagnostic loop.

Note: SRM-9/X.21 does not operate in asynchronous mode; transmission controls CTS, DSR and TEST are not used.

- **Transmission Mode**
Sync or async, full or half duplex
- **Transmission Level**
0 dBm
- **Transmission Range**
Up to 16.5 km / 10 miles (see *Table 1*)
- **DTE Interface**
RS-232/V.24 (or RS-530), integral 25-pin D-type connector, female. V.35 and X.21 interfaces are provided via a mating cable, 45 cm (17.5") long, terminated with a 34-pin female connector for V.35, or a 15-pin female connector for X.21.

- **Line Interface**
5-screw clip (4-wire and ground) terminal block or RJ-45
- **Power**
Power is supplied from a standard power supply, 9V DC / 300 mA.
SRM-9/V.24/UP:
None required, uses ultra-low power from V.24/RS-232 data and control signals.
To ensure proper operation, the equipment connected to SRM-9 should provide V.24/RS-232 signals at 6V and above, on at least 4 of the following signals: 2, 4, 20 and 24, or connect +V(9) or -V(10).
If the DTE cannot provide enough power for normal operation of the unit, use SRM-9/V.24.

Note: The typical power consumption drawn from DTE is 55 mW with LED enabled (at +6V signal level).

- **Physical**
SRM-9/V.24/UP:
Length: 65 mm / 2.6 in
Height: 18 mm / 0.7 in
Width: 53.2 mm / 2.1 in
Weight: 90g / 3.2 oz
All other versions:
Length: 100 mm / 3.9 in
Height: 23 mm / 0.9 in
Width: 53 mm / 2.1 in
Weight: 140g / 4.9 oz
- **Environment**
Temperature: 0–50°C / 32–122°F
Humidity: Up to 90%, non-condensing

Declaration of Conformity

Mfr. Name: RAD Data Communications Ltd.

Mfr. Address: 12 Hanechoshet St.

Tel Aviv 69710

Israel

declares that the product:

Product Name: SRM-9

Conforms to the following standard(s) or other normative document(s):

EMC: EN 55022 (1994): Limits and methods of measurement of radio disturbance characteristics of information technology equipment.
EN 50082-1 (1992): Electromagnetic compatibility – Generic immunity standard for residential, commercial and light industry.

Supplementary Information:

The product herewith complies with the requirements of the EMC Directive 89/336/EEC. The product was tested in a typical configuration.

Tel Aviv, January 14th, 1999



Haim Karshen

VP Quality

European Contact: Rad Data Communications GmbH,
Berner Strasse 77, 60437 Frankfurt am Main, Germany

Safety Instructions



The exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

IMPORTANT

North American Users

The SRM-9 is powered by an external power supply. To reduce the risk of electric shock, fire and injury to persons, use only with a UL listed or CSA certified Class 2 power supply rated 9 VDC, 300 mA.

Instructions de Sécurité

IMPORTANT

Utilisateurs au Canada

Le SRM-9 est renforcé par un transformateur extérieur. Afin de réduire le risque d'électrocution, d'incendie ou de blessure, utiliser seulement avec un transformateur 9 Vdc, 300mA certifié Class 2 CSA ou repris sur la liste UL.

Safety Instructions (Europe)



The exclamation point within a triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

CAUTION

European Users

To reduce the risk of electric shock and fire, use only with a power supply which is approved according to EN 60950.

ACHTUNG

Installation – Bedienungsanleitung

Um das Risiko eines elektrischen Schlages oder Brandes so weit wie möglich zu vermeiden, verwenden Sie nur ein Netzteil, das gemäß der neuesten Version des Standards EN 60950 zugelassen ist.



INSTALLATION

Caution. Be careful when setting jumpers or performing any actions within the product so that you do not bend or break any components.

Installation of SRM-9 is simple and straightforward. Follow these instructions:

- To access the setup switches:
 - SRM-9/V24/UP: snap out the LED cover.
 - SRM-9/V.35, SRM-9/X.21, SRM-9/530 or SRM-9/V.24: separate the two parts of the plastic case by pressing on the sides.
- Configure the modem according to the desired mode, referring to Figure 1, Figure 2, and Table 3.)

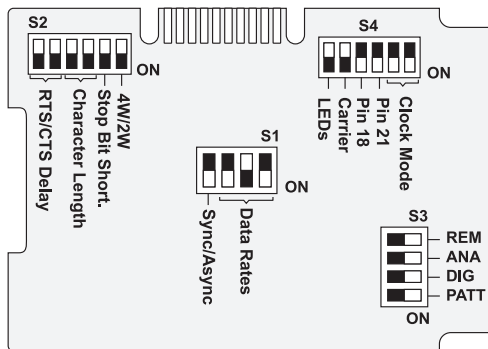


Figure 1. SRM-9/V.35, SRM-9/X.21, SRM-9/530 and SRM-9/V.24 DIP Switch Diagram

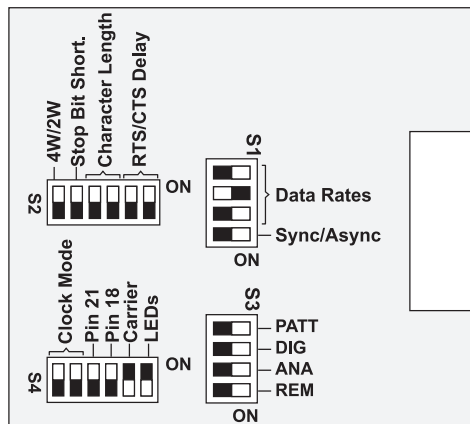


Figure 2. SRM-9/V.24/UP DIP Switch Diagram

Sync Mode (4-wire):

- Set the Sync/Async switch to Sync (S1-4 = OFF).
- Set the baud rate (S1-1, S1-2, S1-3).
- Select clock mode (S4-1, S4-2).
- Select carrier mode (S4-5).
- Set 4W/2W to 4-wire (S2-1 = OFF).

Note: EXT clock mode is not available in SRM-9/X.21.

Steps 3b through 19b describe the preparation of SRM-9 for the asynchronous operation. If you use SRM-9 in the synchronous mode only, proceed with steps 20 through 23.

Async Mode:

- Set the Sync/Async switch to Async (S1-4 = ON).
- Set baud rate (S1-1, S1-2, S1-3).
- Select clock mode (S4-1 = OFF and S4-2 = OFF).
- Select carrier mode (S4-5).
- Select async format (S2-2, S2-3, S2-4).
- Select RTS/CTS delay switches (S2-5, S2-6).

Note: SRM-9/X.21 does not operate in async mode.

When operating in asynchronous mode, SRM-9 can be configured for the 4-wire or 2-wire multidrop application. Additionally, SRM-9 can operate in half duplex 2-wire mode.

Multidrop Mode (4-wire Async):

- 9b. Set the carrier switch to controlled (S4-5 = OFF).
- 10b. Set the 4W/2W switch to the 4-wire position (S2-1 = OFF).
- 11b. Set the RTC/CTS delay to MEDIUM or LONG (S2-5, S2-6).
- 12b. Connect the line terminal as shown in *Figure 3*.

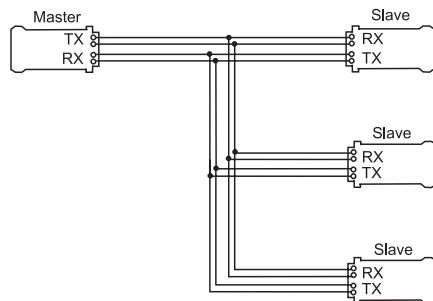


Figure 3. Multidrop Mode – 4-wire

Multidrop Mode (2-wire Async):

- 13b. Set the carrier switch to controlled (S4-5 = OFF).
- 14b. Set the 4W/2W switch to the 2-wire position (S2-1 = ON).
- 15b. Set the RTC/CTS delay to MEDIUM or LONG (S2-5, S2-6).
- 16b. Connect the line terminal as shown in *Figure 4*.

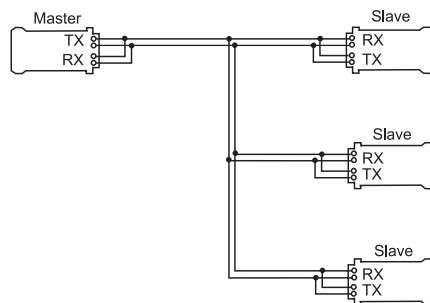


Figure 4. Multidrop Mode – 2-wire

Half Duplex Mode (2-wire Async):

- 17b. Set the carrier switch to controlled (S4-5 = OFF).
- 18b. Set the 4W/2W switch to the 2-wire position (S2-1 = ON).
- 19b. Connect the line terminal as shown in *Figure 5*.



Figure 5. Half Duplex 2-wire

20. Close the unit:
 - SRM-9/V.24/UP: Snap the LED cover back into place.
 - SRM-9/V.35, SRM-9/X.21, SRM-9/530 and SRM-V.24: Press the two halves of the case together.

21. Connect the line:

- For terminal block:
 - Connect the 4-wire STP line to the terminal block screw, transmit pair to XMT and receive pair to RCV, in full duplex mode, as shown in *Figure 6*.
 - Connect the cable shield to the GND clip.

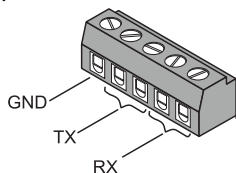


Figure 6. Connecting the Line to the Terminal Block

- For RJ-45 connector:
Plug the cable into the RJ-45 jack (see *Figure 7*).

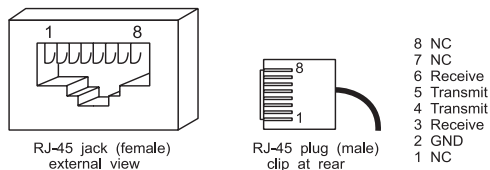


Figure 7. RJ-45 Connector Pinout

22. Connect the DTE:

- Plug the SRM-9/V.24 or SRM-9/530 directly into the 25-pin connector of the DTE or computer port, and fasten the screws on each side of the modem connector.

- Plug the SRM-9/V.35, SRM-9/X.21 via the mating cable into the 25-pin connector of the DTE.

Use the two double-threaded adapter nuts, supplied with the unit to connect the SRM-9/V.35 female port to the male connector of the mating cable (CBL-8H/F) as shown in *Figure 8*.

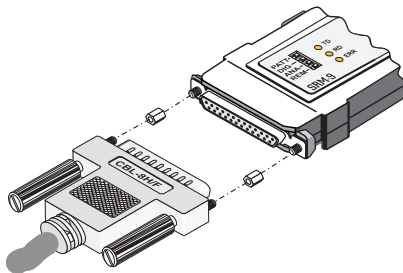


Figure 8. Connecting SRM-9/V.35 to the CBL-8H/F Cable

23. Connect the external power supply to SRM-9/V.35, SRM-9/X.21, SRM-9/530 or SRM-9/V.24 and then plug it into the main power supply.

Table 3. DIP Switch Selection

Switch	Switch Identity	Function	Possible Settings					Factory Setting	
S1-4	Sync/ Async	Selects synchronous or asynchronous mode	ON	Asynchronous				Synchronous	
			OFF	Synchronous					
S1-1, 2, 3	Baud Rates (kbps)	Selects data transmit rate	<u>S1-1</u>	<u>S1-2</u>	<u>S1-3</u>	<u>Async</u>	<u>Sync</u>	64 kbps	
			OFF	OFF	OFF	N/A	128		
			OFF	OFF	ON	115.2	96		
			OFF	ON	OFF	N/A	64		
			OFF	ON	ON	57.6	48		
			ON	OFF	OFF	38.4	32		
			ON	OFF	ON	28.8	112		
			ON	ON	OFF	19.2	56		
			ON	ON	ON	9.6	N/A		
S4-1,2	Clock Mode	Selects XMT clock source in sync mode	<u>S4-1</u>	<u>S4-2</u>				Internal	
			OFF	OFF	Internal				
			OFF	ON	External				
S4-3	Pin 21 REM	Enables DTE control of remote digital loop	ON	Enable				Disable	
			OFF	Disable					
S4-4	Pin 18 ANA	Enables DTE control of analog loop	<u>S4-4</u>					Disable	
			ON	Enable					
			OFF	Disable					

Table 3. DIP Switch Selection (Cont.)

Switch	Switch Identity	Function	Possible Settings	Factory Setting
S4-5	Carrier	Selects carrier to be Constantly ON or Controlled by RTS	<u>S4-5</u> ON Constantly ON OFF Controlled	Const. ON
S4-6	LEDs	Enables signal status LED indicators	<u>S4-6</u> ON Enable Light OFF Disable Light	Enable Light
S2-1	4W/2W	Selects 2-wire (for half-duplex or multipoint configuration) or 4-wire operation	<u>S2-1</u> ON 2-wire operation OFF 4-wire operation	4-wire
S2-2,3,4	Async Format	Selects the amount of bit stop shortening	<u>S2-2</u> ON 25% OFF 12.5%	12.5%
		Selects character length in asynchronous mode	<u>S2-3</u> <u>S2-4</u> <u>No. bits</u> OFF OFF 8 OFF ON 9 ON OFF 10 ON ON 11	8 bits
S2-5,6	RTS/CTS Delay	Selects RTS/CTS delay	<u>S2-5</u> <u>S2-6</u> <u>No. msec</u> OFF OFF 0 OFF ON 1 Short ON OFF 8-10 Medium ON ON 69-83 Long	0
S3-1	PATT	Controls BER test mode	see <i>Operation</i>	OFF
S3-2	DIG	Controls local digital loop	see <i>Operation</i>	OFF
S3-3	ANA	Controls local analog loop	see <i>Operation</i>	OFF
S3-4	REM	Controls remote digital loop	see <i>Operation</i>	OFF

OPERATION

- **Normal Operation**

For normal operation, make sure that the test and diagnostic switches (S3-1, S3-2, S3-3 and S3-4) are set to OFF. If the attached DTE does not use pin 18 and pin 21, or if the cable between SRM-9 and the DTE does not contain those pins, set S4-3 and S4-4 to the DIS position (OFF) (see Table 3).

- **Tests and Diagnostics**

BERT Test Mode V.52

BERT enables testing of the local modem and the communication line. When the PATT external switch is activated (S3-1 = ON), the modem generates and transmits standard V.52 pattern (511-bit pseudo-random) and checks its response. If errors are detected, the ERR indicator LED will light. The test can be carried out in local analog loopback, in remote digital loop, or in normal point-to-point operation, opposite a remote SRM-9 modem.

V.54 Diagnostics

SRM-9 features diagnostic loops according to ITU V.54. The modem performs local analog loopback (ANA), local and remote digital loopback (DIG, REM). All tests are controlled by switches S3-2, S3-3, S3-4. ANA and REM can be also activated by DTE interface pin 18 (ANA) and pin 21 (REM).

The TST LED lights and pin 25 (Circuit 142) is ON when performing the diagnostics.



Figure 9. Local Analog Loop (ANA)

The ANA V.54 loopback (Loop 3) tests the local SRM-9 only. The XMT signal is returned to the receiver (see Figure 9).



Figure 10. Remote Digital Loop (REM)

The REM V.54 loopback (Loop 2) tests the remote modem and the communication link (see Figure 10).

To return to normal operation, set the test switches to OFF. If testing via DTE interface, lower the loopback activation pins.