ORDERING

FOM-8H/*/+
Miniature High Speed Fiber Optic Modem

* Specify DTE connector:
V24 for V.24 interface, female
V35/F for V.35 interface, female
V35/M for V.35 interface, male
X21/F for X.21 interface, female
X21/M for X.21 interface, male
530 for RS-530 interface, female

\+ Specify fiber optic connector:
SMA for SMA connector
ST for ST connector
FC for FC connector
ST13 for 1300 nm single mode with STconnector
FC13 for 1300 nm single mode with FCconnector
(Default is 850 nm multimode)

P/S-AC/9/500
9V DC / 90 to 264V AC power supply

RAD
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FOM-8H

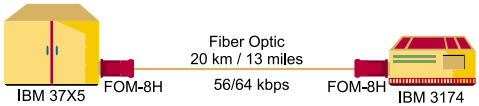
RAD

Miniature High Speed Fiber Optic Modem

FEATURES

- Synchronous or asynchronous
- Data rates: 56 or 64 kbps, selectable
- V.54 diagnostics, including local and remote loops
- Transmission range up to 20 km (13 miles) over single mode fiber, and up to 4 km (2.5 miles) over multimode fiber
- V.24/RS-232, V.35, X.21 or RS-530 interface
- Controlled or continuous carrier
- Internal, external or receive clock
- LED indicators
- Operates with an external power supply
- Miniature, lightweight, easy to install

APPLICATION



DESCRIPTION

- The FOM-8H, High Speed Fiber Optic Modem, is used in local data distribution for connecting full duplex synchronous or asynchronous terminals or controllers to high-speed computers over fiber optic cable. FOM-8H operates at data rates of 56 or 64 kbps, and at distances up to 20 km (13 miles), over single mode fiber.
- Transmit timing can be provided by three alternative sources:
  - Internal oscillator
  - Loopback clock derived from the receive signal
  - External clock derived from the terminal.

***Note**: FOM-8H/X21 has no external clock.*

- Four models are available:
  - FOM-8H/V24, V.24/RS-232 interface
  - FOM-8H/V35, V.35 interface
  - FOM-8H/X21, X.21 interface
  - FOM-8H/530, RS-530 interface.

  All models have an integral 25-pin D-type connector for the DTE interface.
  For the V.35 connector, a 45 cm (17.8") cable is supplied, with a 25-pin male connector on one side and a 34-pin, V.35 male or female connector on the other side.
  For the X.21 connector, a 45 cm (17.8") cable is supplied, with a 25-pin male connector on one side and a 15-pin, X.21 male or female connector on the other side.

- Three fiber optic interface options are available: SMA, ST or FC (see *Ordering*).
- The carrier can be configured for either continuous operation or for switched operation. When in switched operation, the carrier is controlled by the RTS signal, enabling transfer of a control signal end-to-end.
- FOM-8H performs diagnostic loops in compliance with ITU V.54 standard. Two V.54 loops are available: local analog loop (V.54, loop 3) and remote digital loop (V.54, loop 2). These loops are activated by the top panel switch or via the DTE interface signals, Circuit 141 (pin 18) and Circuit 140 (pin 21).

***Note**: FOM-8H/X.21 and FOM-8H/530 support the loops activation only via the external switch.*

- FOM-8H incorporates all the advantages of a fiber optic modem:
  - EMI/RFI immunity for cost effective savings on expensive and heavy shielding and on complex error checking routines
  - High data security: risk of eavesdropping is minimized as fibers radiate negligible power; cost of data encryption is reduced
  - Safety and electrical isolation: no spark hazard and no ground-loop noise.
- Power is supplied from an external power supply, 9V / 500 mA (center – positive; sleeve – negative).

SPECIFICATIONS

- **Data Rates**
  56 or 64 kbps, selectable
- **Number of Data Bits (Async Mode)**
  8, 9, 10 or 11, including 1 start and 1 stop bit, with or without parity
- **Frequency Allowance (Async Mode)**
  Shortening of the stop bit on the receive end is switch-selectable:
  - 12.5% allows a frequency difference of -2.5 to +1.0% between the async terminal and FOM-8H
  - 25% allows a frequency difference of -2.5 to +2.3% between the async terminal and FOM-8H.
- **Transmission Line**
  Dual optical cable
- **Transmission Mode**
  Synchronous or asynchronous, full duplex
- **Transmission Controls**
  - **DCD** (Circuit 109) turns ON after recognizing the receive signal from the line
  - **CTS** (Circuit 106) turns ON 8 msec after the terminal raises RTS (Circuit 105)
  - **DSR** (Circuit 107) turns ON when the modem is powered and is in the normal mode or in analog loop state. DSR turns OFF when the modem is in digital loopback state
  - **TEST** (Circuit 142) turns ON when the modem is in one of its diagnostic loops.
- **Optical Output Levels**
  -26 dBm into 100/140 fiber
  -28 dBm into 62.5/125 fiber
  -32 dBm into 50/125 fiber
  -28 dBm into 9/125 fiber
- **Receiver Sensitivity**
  -42 dBm for 850 nm
  -44 dBm for 1300 nm
- **Operating Wavelength**
  850 nm
  1300 nm
- **Operating Range**
  Maximum range is 20 km (13 miles) over continuous single mode fiber or 4 km (2.5 miles) over continuous multimode fiber. The following fiber types are supported:
  - 100/140 fiber with attenuation of 4 dB/km
  - 62.5/125 fiber with attenuation of 3.5 dB/km
  - 50/125 fiber with attenuation of 3 dB/km
  - 9/125 fiber with attenuation of 0.5 dB/km
- **Terminal Interface**
  - V.24/RS-232-C or RS-530 integral 25-pin connector, female
  - V.35 interface is provided via a mating cable, 45 cm (17.5") long, terminated with a 34-pin male or female connector
  - X.21 interface is provided via a mating cable, 45 cm (17.5") long, terminated with a 15-pin male or female connector.

- **Optical Interface**
  SMA, ST or FC connector (see *Ordering*)
- **Power Requirements**
  9V, 500 mA
- **Physical**
  Length: 130 mm / 2.7 in
  Width: 53 mm / 2.1 in
  Height: 30 mm / 0.7 in
  Weight: 130g / 3.2 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: FOM-8H

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 standards 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 15th, 1996

Haim Karshen
Quality Manager

European Contact: RAD Data Communications GmbH, Lyoner Strasse 14, 60528 Frankfurt am Main, Germany

TÜV – Zertifizierungsanforderungen

FOM-8H

Installation – Bedieningsanleitung

Das Ausrufungsziechen Innerhalb eines gleichwinkligen Drelecks dient als Hinwels für den Benutzer auf das Vorhandensein wichtiger Anleitungen in der zum Gerãt gelieferten Dukumentation.

Leistungsaufnahme:

9 VDC, 300 mA

Die nachfolgenden Anleitungen lollen den Grundbelreib der Anlage hinsichtlich Sicherheit gewãhrleisten.

ACHTUNG!

1. Um das Risiko eines elektrischenSchlages oder Brandes so weit wie wöglich zu vermeiden, verwenden Sie nur ein Netzell, das gemäß der neusesten Version des Standards EN 60950 zugelassen ist.
2. Als stãndigen Schutz vor Brand betrieben Sie die Anlage nie mit ganz oder teilweise entfemter Abdeckung.
3. Installieren Sie die Angage nicht mit nach unten weisenden Anzeigeelementen.

TUV Certification Requirements

FOM-8H

Installation – User Instructions

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important instructions in the literature accompanying the appliance.

Electrical ratings:

9 VDC, 300 mA

The following instructions are intended to guarantee the basic operation of the equipment concerning safety.

CAUTION!

1. To reduce the risk of electric shock and fire, use only with a power supply which is approved for the latest version of EN 60950.
2. For continuous protection against risk of fire, do not operate the equipment with the enclosure completely or partially removed.
3. Do not install the equipment with indicators facing down.

UL Listing Requirements

FOM-8H

Safety Instructions

The exclamation point within an equilateral 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 FOM-8H is be 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.

Exigencies UL

FOM-8H

Instructions de Sécurité

Le point d'exclamation dans le triangle équilateral alerte l'utllisateur d'importantes instructions concernant le fonctionmement et l'entretien mentionnées dans le livre qui accompagne l'appareil.

IMPORTANT

Pour les tuillsateurs Nord Americains

Le FOM-8H 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 et repris sur la liste UL.

INSTALLATION

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

1. Open the plastic case by pressing on the points indicated on the sides.
2. Configure FOM-8H, using the 10 DIP switches located on the modem's board (see *Figure 1* and *Table 1*). You can also refer to a table attached to the inside of the plastic cover, showing the setup options of the DIP switches.

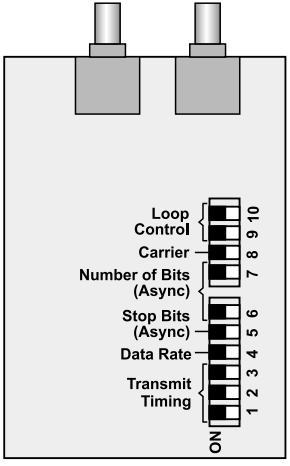


Figure 1. FOM-8H DIP Switch Location

Note*: The ten switches are mounted on two separate blocks (see Figure 1). The first block has six switches and the second has four. Table 1 relates to these switches as one group, numbered 1 to 10.*

Table 1. DIP Switch Selection

Switch Identity	Function	Possible Settings	Factory Setting
XMT Timing	Selects timing clock and async mode	S1 S2 S3 ON OFF OFF OFF OFF OFF OFF OFF ON OFF ON OFF	External **Internal** Receive Async
Data Rate	Selects data transmit rate	S4 ON – 56 kbps OFF – 64 kbps	64
Async Length	Selects the amount of stop bit shortening to be used in async mode	S5 ON – 12.5% OFF – 25%	25%
	Selects character length in async mode (see *Table 2*)	S6 S7 No. of bits OFF OFF 8 OFF ON 9 ON OFF 10 ON ON 11	10 bits
Carrier	Selects carrier – constantly ON, or controlled by RTS	S8 ON – Constantly ON OFF – Controlled	ON
Loop Activation from DTE Interface	Enables DTE control of analog loop (pin 18)	S9 ON – Enable OFF – Disable	Disable
	Enables DTE control of remote digital loop (pin 21)	S10 ON – Enable OFF – Disable	Disable

Note: *The factory setting for XMT Timing is Internal.*

Sync Mode

3a. Set the XMT timing (INT, EXT, RCV), using S1, S2 and S3.

4a. Set the data rate to 56 kbps or 64 kbps, using S4.

5a. Set the carrier to be constantly ON or controlled by RTS, using S8.

Note*: S5, S6 and S7 switches are not relevant for sync operation.*

Async Mode

3b. Set the XMT timing to async mode, using S1, S2 and S3.

4b. Set the data rate, using S4.

5b. Set the frequency allowance and the character length according to *Table 1*, *Table 2* and *Figure 1*, using S5, S6 and S7.

6b. Set carrier to be constantly ON or the controlled by RTS, using S8.

Note*: Personal computers working at high speed in async mode operate at 57.6 kbps (instead of 56 kbps). In such cases the PC should be set to two stop bits and FOM-8H should be configured for a character length with one stop bit. The data rate of FOM-8H should be set to 56 kbps.*

Table 2. Asynchronous Character Length Setting

Start Bit	Data Bits	Parity	Stop Bits	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

7. Close the case by pressing the two halves of the cover together.
8. Plug the modem into the connector of the terminal or computer port, and fasten with the screws on each side of the modem connector.
9. Remove the plastic dust caps from the fiber optic connectors and connect the cables to the unit as follows:
   - TX on the local FOM-8H to RX on the remote FOM-8H
   - RX on the local FOM-8H to TX on the remote FOM-8H.
10. Connect the external power supply to FOM-8H and then plug it into the mains supply.

OPERATION

FOM-8H operates as long as power is connected to the unit and the PWR LED is lit.

Test Mode

FOM-8H performs two V.54 loopbacks: analog loopback (ANA) (V.54, loop 3) and remote digital loopback (REM) (V.54, loop 2), for all interfaces (see *Figure 2* and *Figure 3*). Both loopbacks can be activated by setting the top panel 3-position switch to ANA or REM. Alternatively, you can activate the loopbacks by raising the DTE interface pin 18 (ANA), and pin 21 (REM) (X.21 and RS-530 loopbacks can be controlled only via the top panel switch). When using FOM-8H/V.35 with the mating cable (DB-25 to 34-pin) the loop activating pins are pin JJ for ANA and pin HH for REM.

The TST LED lights, and pin 25 (pin KK in FOM-8H/V.35) is on when the modem is in a diagnostic loopback.

S9 and S10 (see *Table 1*) control activation of both loopbacks from the DTE interface.

Figure 2. Analog Loop (ANA)

The analog loopback tests the local modem only. The XMT signal to the line is returned to the receiver.

Figure 3. Remote Digital Loop (REM)

The remote digital loopback tests the local modem, the line and the remote modem.

To return to normal operation, set the top panel switch to the NORM position, or, if using the DTE interface for the loopback activation, lower the pins. The TST LED and pin 25 will turn off automatically.