USER MANUAL

MODEL 1045

Powered High Speed Short Range Modem
RS-232 and V.35 versions

PATTON Electronics Co.

Part# 07M1045-A
Doc# 054041UA
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1.0 WARRANTY INFORMATION

Patton Electronics warrants all Model 1045 components to be free from defects, and will—at our option—repair or replace the product should it fail within one year from the first date of shipment.

This warranty is limited to defects in workmanship or materials, and does not cover customer damage, abuse or unauthorized modification. If this product fails or does not perform as warranted, your sole recourse shall be repair or replacement as described above. Under no condition shall **Patton Electronics** be liable for any damages incurred by the use of this product. These damages include, but are not limited to, the following: lost profits, lost savings and incidental or consequential damages arising from the use of or inability to use this product. **Patton Electronics** specifically disclaims all other warranties, expressed or implied, and the installation or use of this product shall be deemed an acceptance of these terms by the user.

1.1 RADIO AND TV INTERFERENCE

The Model 1045 generates and uses radio frequency energy, and if not installed and used properly—that is, in strict accordance with the manufacturer's instructions—may cause interference to radio and television reception. The Model 1045 has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection from such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation. If the Model 1045 does cause interference to radio or television reception, which can be determined by disconnecting the unit, the user is encouraged to try to correct the interference by one or more of the following measures: moving the computing equipment away from the receiver, re-orienting the receiving antenna and/or plugging the receiving equipment into a different AC outlet (such that the computing equipment and receiver are on different branches).

1.2 SERVICE

All warranty and non-warranty repairs must be returned freight prepaid and insured to Patton Electronics. All returns must have a Return Materials Authorization number on the outside of the shipping container. This number may be obtained from Patton Electronics Technical Service at **(301) 975-1007**. *Packages received without an RMA number will not be accepted.*

Patton Electronics' technical staff is also available to answer any questions that might arise concerning the installation or use of your Model 1045. Technical Service hours: **8AM to 5PM EST, Monday through Friday.**

2.0 GENERAL INFORMATION

Thank you for your purchase of this Patton Electronics product. This product has been thoroughly inspected and tested and is warranted for One Year parts and labor. If any questions or problems arise during installation or use of this product, please do not hesitate to contact Patton Electronics Technical Support at (301) 975-1007.

2.1 FEATURES

- Switch-selectable carrier control
- Synchronous or asynchronous operation
- Data rates of 32, 56 and 64 Kbps
- Distances to 6 miles
- Point-to-point or multipoint operation
- V.54 loopback tests and V.52 compliant BER tests
- Five easy-to-read LED indicators
- AC powered
- Transformer isolation
- Silicon Avalanche Diode surge protection

2.2 DESCRIPTION

The Model 1045 high speed short range modem supports synchronous and asynchronous data rates of 32, 56 and 64 Kbps. Synchronous transmit clock options are internal, external and receive loopback clock. Deriving power from a 7.5V wall-mount transformer, the Model 1045 supports distances to 6 miles over unconditioned twisted pair.

The Model 1045 incorporates two V.54 test modes (local analog loop and remote digital loop), which can be activated via the RS-232 or V.35 interface or by a tiny, externally accessible switch. Additionally, a built-in V.52 BER test generator outputs 511 and 511E bit patterns which can also be controlled by a switch on the case. Five easy-to-read LED indicators monitor power, transmit data, carrier detect, test mode and test pattern. For protection against ground loops and transient surges, the Model 1045 incorporates both isolation transformers and Silicon Avalanche Diode surge suppressors.

Housed in a miniature ABS plastic case, the Model 1045 comes equipped with a female DB-25 connector and a choice of twisted pair interfaces (RJ-11 jack or RJ-45 jack). The Model 1045 is available in an RS-232/V.24 version and a CCITT V.35 version.

3.0 CONFIGURATION

The Model 1045 provides sixteen configuration switches, which allow selection of data rates, clocking methods, V.54 test modes, character length, extended signalling rates and asynchronous or synchronous modes. This section describes switch locations and explains all possible switch configurations.

3.1 CONFIGURATION SWITCHES

The Model 1045's unique set of sixteen internal DIP switches allows configuration to an extremely wide range of applications. These switches are grouped into two eight-switch sets and are located on the inside of the unit (Figure 1). For instructions on opening the Model 1045 case, see Section 3.2.

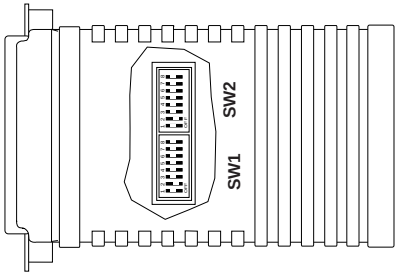


Figure 1. The inside of the Model 1045

Figure 2 shows the orientation of the switches, including the ON/OFF positions.

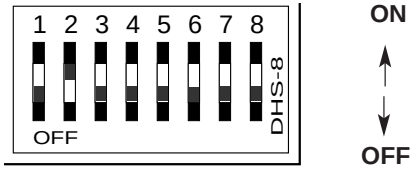
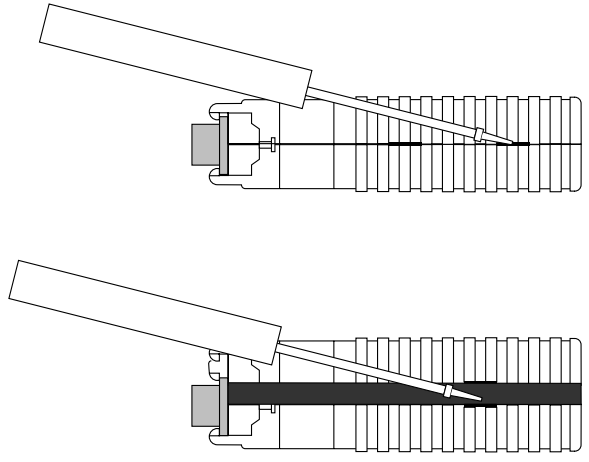


Figure 2. Close up of configuration switches

3.2 OPENING THE CASE

Open the unit by gently inserting a screwdriver into the special pry slot on the plastic case (below). You don't have to worry about breaking the plastic.



3.3 SWITCH SETTINGS

All possible settings for the Model 1045's configuration switches are presented in the summary table and descriptions below. If you have additional questions regarding configuration, contact Patton Technical Support at (301) 975-1000.

SWITCH SET SW1

The configuration switches on switch set SW1 set analog loopback, digital loopback, async./sync. modes, extended signalling rates, character length and V.54 enable/disable. The default settings are summarized in Figure 3.

SW1 SUMMARY TABLE			
Position	**Function**	**Factory Default**	
SW1-1	DTE Control of Analog Loopback	On	Enabled
SW1-2	DTE Control of Digital Loopback	On	Enabled
SW1-3	Not Used		n/a
SW1-4	Async./Sync.	Off	Sync.
SW1-5	Extended Signalling	Off	-2.5% to +1%
SW1-6	Character Length	Off }	10 bits
SW1-7	Character Length	Off }	
SW1-8	V.54 Enable/Disable	Off	Enabled

Figure 3. Summary of DIP switch settings for set SW1

SW1-1: DTE Initiation of Local Analog Loopback Test

The setting for switch SW1-1 determines whether or not the Model 1045's local analog loopback test can be initiated by raising pin 18 on the DTE.

SW1-1	Setting
On	Pin 18 initiation enabled
Off	Pin 18 initiation disabled

SW1-2: DTE Initiation of Remote Digital Loopback Test

The setting for switch SW1-2 determines whether or not the Model 1045's remote digital test can be initiated by raising pin 21 on the DTE.

SW1-2	Setting
On	Pin 21 initiation enabled
Off	Pin 21 initiation disabled

SW1-3: Not Used

SW1-4: Async./Sync.

The setting for switch SW1-4 determines whether the Model 1045 is in asynchronous or synchronous operating mode.

SW1-4	Setting
On	Asynchronous
Off	Synchronous

SW1-5: Extended Signalling Rate

The setting for switch SW1-5 determines the range of variability the Model 1045 looks for in asynchronous data rates (i.e., the actual variance from a given frequency level the Model 1045 will tolerate).

SW1-5	Setting
Off	-2.5% to +1%
On	-2.5% to +2.3%

SW1-6 and SW1-7: Character Length

Switches SW1-6 and SW1-7 are set in combination to determine the character length for asynchronous/synchronous data.

SW1-6	SW1-7	Setting
Off	On	8 bits
On	On	9 bits
Off	Off	10 bits
On	Off	11 bits

SW1-8: V.54 Enable/Disable

The setting for switch SW1-8 determines whether or not the Model 1045's V.54 circuits are enabled.

SW1-8	Setting
On	V.54 test functions disabled
Off	V.54 test functions enabled

SWITCH SET SW2

The configuration switches on switch set SW2 set data rate, clock source, carrier control and RTS/CTS delay. The default settings are summarized in Figure 4.

SW2 SUMMARY TABLE		
Position	**Function**	**Factory Default**
SW2-1	Data Rate	Off } 56 Kbps
SW2-2	Data Rate	On } 56 Kbps
SW2-3	Data Rate	Off } 56 Kbps
SW2-4	Clock Source	On } Internal
SW2-5	Clock Source	On } Internal
SW2-6	Carrier Control	Off Constantly On
SW2-7	RTS/CTS Delay	On } 7 mS
SW2-8	RTS/CTS Delay	On } 7 mS

Figure 4. Summary of DIP switch settings for set SW2

SW2-1 through SW2-3: Data Rate Setting

Switches SW2-1 through SW2-3 are set in combination to determine the asynchronous and synchronous data rate for the Model 1045.

SW2-1	SW2-2	SW2-3	Setting
On	Off	Off	64 Kbps
Off	On	Off	56 Kbps
Off	Off	On	32 Kbps

SW2-4 and SW2-5: Clock Source

Switches SW2-4 and SW2-5 are set in combination to determine the synchronous clock source for the Model 1045.

SW2-4	SW2-5	Setting
On	On	Internal transmit clock
Off	On	Receive recover clock
On	Off	External transmit clock

SW2-6: Carrier Control Method

The setting for switch SW2-6 determines whether the carrier is “constantly on” or “controlled by RTS”. This setting allows for operation in switched carrier, multipoint and/or hardware handshaking applications.

SW2-6	Setting
Off	Constantly on
On	Controlled by RTS

SW2-7 and SW2-8: RTS/CTS Delay

The combined settings for switches SW2-7 and SW2-8 determine the amount of delay between the time the Model 1045 “sees” RTS and when it sends CTS.

SW2-7	SW2-8	Setting
Off	Off	No delay
On	On	7mS
On	Off	53mS

4.0 INSTALLATION

Once the Model 1045 is properly configured, it is ready to connect to your system. This section tells you how to properly connect the Model 1045 to the twisted pair, RS-232 and V.35 interfaces.

4.1 CONNECTION TO THE TWISTED PAIR INTERFACE

The Model 1045 supports communication between two RS-232 devices or two V.35 devices at distances to 6 miles and data rates to 64 Kbps. There are two essential requirements for installing the Model 1045:

1. These units work in ***pairs***. Therefore, you must have one Model 1045 (or a compatible model) at each end of a two twisted pair interface.

2. To function properly, the Model 1045 needs two **twisted** pairs of metallic wire. These twisted pairs must be ***unconditioned***, dry, metallic wire, between 19 and 26 AWG (the higher number gauges may limit distance somewhat). Standard dial-up telephone circuits, or leased circuits that run through signal equalization equipment, or standard, flat modular telephone type cable, are *not acceptable*.

For your convenience, the Model 1045 is available with two different twisted pair interfaces: RJ-11 jack and RJ-45 jack.

4.1.1 TWISTED PAIR CONNECTION USING RJ-11 OR RJ-45

The RJ-11 and RJ-45 connectors on the Model 1045's twisted pair interface are pre-wired for a standard TELCO wiring environment (see Figure 5). The signal/pin relationships are shown on the table on the following page:

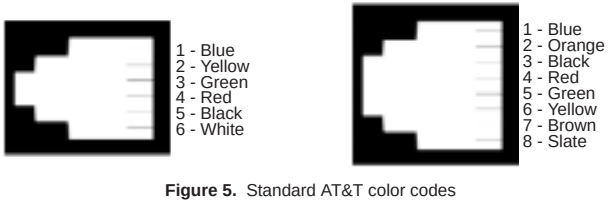


Figure 5. Standard AT&T color codes

RJ-11	SIGNAL
1	GND†
2	RCV
3	XMT
4	XMT
5	RCV
6	GND†

RJ-45	SIGNAL
1	N/C
2	GND†
3	RCV
4	XMT
5	XMT
6	RCV
7	GND†
8	N/C

†Connection to ground is optional

When connecting two Model 1045s, it is necessary to use a twisted pair "crossover" cable. The diagram below shows how a crossover cable should be constructed for an environment where both Model 1045s use a 6-wire RJ-11 connector. Similar logic should be followed when using RJ-45 connectors or a combination of the two.

SIGNAL	PIN#	PIN#	SIGNAL
GND†	1	6	GND†
RCV	2	4	XMT
XMT	3	5	RCV
XMT	4	2	RCV
RCV	5	3	XMT
GND†	6	1	GND†

†Connection to ground is optional
‡Standard color codes—yours may be different

4.2 CONNECTION TO THE RS-232 AND V. 35 INTERFACES

Once you have connected the twisted pair wires correctly, simply plug the Model 1045 directly into the DB-25 port of the RS-232 or V.35 device. After doing so, remember to insert and tighten the two captive connector screws.

4.2.1 CONNECTION TO A "DTE" DEVICE

The Model 1045 is wired as a DCE, and therefore "wants" to plug into a DTE such as a terminal, PC or host. A direct connection to the RS-232 or V.35 DTE port is most desirable. If you must use a cable to connect the Model 1045 to the DTE port, make sure it is a *straight through* cable of the shortest possible length—we recommend 6 feet or less.

4.2.2 CONNECTION TO AN RS-232 “DCE” DEVICE

Since the Model 1045 is wired as a DCE, you cannot connect it directly to another DCE such as a modem, multiplexer or printer. If you need to connect the Model 1045 to another RS-232 DCE device, you must use a *null modem cable* wired according to diagram below. We recommend a cable of the shortest possible length, preferably 6 feet or less.

Connection to Model 1045† DB-25 Pin No.	Connection to DCE Device DB-25 Pin No.
1	1
2	3
3	2
4	8
8	4
6	20
20	6
17	24
24	17
7	7

†Note: When connected to another DCE device, the Model 1045 should be configured for “external clock” (see Section 3.3).

4.2.3 CONNECTION TO A V.35 “DCE” DEVICE

For details on connecting the Model 1045 to a V.35 DCE, please contact Patton Electronics Technical Support at (301) 975-1007.

5.0 OPERATION

Once the Model 1045 is properly configured and installed, it should operate transparently—as if it were a standard cable connection. Section 5.0 describes reading the LED status monitors, powering-up and using the built-in V.52 and V.54 test modes. The Model 1045 is powered by a 7.5V DC external wall mount transformer. To power up the unit, connect the power supply cord to the power jack on the rear of the Model 1045 and plug the power adapter into the wall. There is no ON/OFF switch.

5.1 FRONT PANEL SWITCHES

During normal operation, both front panel switches should be in the “normal” center position. To operate a test mode, see Section 5.3.

5.2 LED STATUS MONITORS

The Model 1045 features five front panel LEDs that monitor transmit data, carrier detect, two test modes and power. Figure 6 shows the front panel location of each LED. Following Figure 6 is a description of each LED’s function.

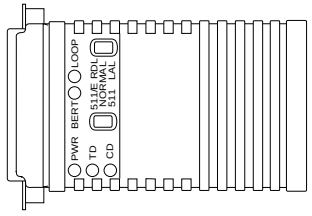


Figure 6. Model 1045’s LED indicators and test switches

PWR = Glows green when the Model 1045 is powered up.
TD = Glows red for a “space” on transmit data.
CD = Glows red for high on carrier detect.
BERT = Glows red when bit errors occur in test mode (511 pattern); Lights when 511/E test pattern has been selected.
LOOP = Glows red when the Model 1045 is in remote digital loopback or local analog loopback mode.

5.3 TEST MODES

The Model 1045 offers two V.54 test modes to evaluate the condition of the modems and the communication link. These tests can be activated physically from the front panel, or via the interface. Note: V.54 test modes on the Model 1045 are available for point-to-point applications only.

5.3.1 Local Analog Loopback (LAL)

The Local Analog Loopback (LAL) test checks the operation of the local Model 1045, and is performed separately on each unit. Any data sent to the local Model 1045 in this test mode will be echoed (returned) back to the user device. For example, characters typed on the keyboard of a terminal will appear on the terminal screen. To perform a LAL test, follow these steps:

A. Activate LAL. This may be done in one of two ways: First, by moving the front panel toggle switch DOWN to “LAL”. Second, by raising pin 18 on the interface. (Note: Make sure DIP switch SW1-8 is OFF). Once LAL is activated, the Model 1045 transmit output is connected to its own receiver. The “test” LED should be lit.

B. Verify that the data terminal equipment is operating properly and can be used for a test. If a fault is indicated, call a technician or replace the unit.

C. Perform a BER (bit error rate) test on each unit. If the BER test equipment indicates no faults, but the data terminal indicates a fault, follow the manufacturer’s checkout procedures for the data terminal. Also, check the interface cable between the terminal and the Model 1045.

5.3.2 Remote Digital Loopback (RDL)

The Remote Digital Loopback (RDL) test checks the performance of both the local and remote Model 1045s, and the communication link between them. Any characters sent to the remote Model 1045 in this test mode will be returned back to the originating device. For example, characters typed on the keyboard of the local terminal will appear on the local terminal screen after having been passed to the remote Model 1045 and looped back. To perform an RDL test, follow these steps:

A. Activate RDL. This may be done in two ways: first, by moving the front panel toggle switch UP to “RDL”. Second, by raising pin 21 on the interface. (Note: Make sure SW1-8 is OFF).

B. Perform a BER (bit error rate) test on the system.

C. If the BER test equipment indicates a fault, and the Local Analog Loopback test was successful for both Model 1045s, you may have a problem with the twisted pair line between the modems. You should then check the twisted pair line for proper connections and continuity.

5.3.3 Using the V.52 BER Test Independently

The V.52 BER test can be used independently of the V.54 loopback tests. This requires two operators: one to initiate and monitor the test at the local Model 1045, and one at the remote Model 1045. To use the V.52 BER test by itself, both operators should simultaneously follow these steps:

1. Locate the “511/511E” toggle switch on the front panel of the 1045 and move it DOWN. This activates the V.52 BER test mode and transmits a “511” test pattern to the other unit. If any errors are present, the receiving modem’s red “Error” LED will blink sporadically. Note: For this test to function, the “511” switch on both Model 1045s must be on.

2. If the test indicates no errors are present, move the V.52 toggle switch UP, activating the “511/E” test with errors present. If the test is working properly, the receiving modem's red “Error” LED will glow. A successful “511/E” test will confirm that the link is in place, and that the Model 1045’s built-in “511” generator and detector are working properly.

5.4 POWER-DOWN

Turn off the Model 1045 by unplugging the AC power adapter from the wall. There is no power switch on the Model 1045.

APPENDIX A

SPECIFICATIONS

Transmission Format: Sync. or async.

Transmission Line: Unconditioned twisted pair 19 - 26 AWG

Clocking: Internal, external or receive loopback

Distance: To 6 miles

Interfaces: EIA RS-232, CCITT V.24, CCITT V.35

Data Rates: 32, 56 and 64 Kbps (switch selectable)

Isolation: Minimum 1500 V RMS via isolation transformers

Surge Protection: 600W power dissipation at 1 mS and response time of 1 pS

Control Signals: **"**Constantly on" or "Controlled by RTS"

RTS/CTS Delay: No delay, 7mS, 53mS

Connectors: DB-25 female or male on RS-232/V.35 side; RJ-11 or RJ-45 on line side

Power Supply: 7.5V DC wall mount transformer

Temperature Range: 0-60°C (32-140°F)

Altitude: 0-15,000 feet

Humidity: Up to 95% non-condensing

Dimensions: 3.55" x 2.1" x .80"

Weight: 2 oz.

APPENDIX B

PIN CONFIGURATIONS

DIRECTION	RS-232 PIN-OUT REFERENCE (DB-25)		DIRECTION
		1 - (FG) Frame Ground	Common
From Model 1045	Transmit Clock - 15	2 - (TD) Transmit Data	To Model 1045
		3 - (RD) Receive Data	From Model 1045
From Model 1045	Receive Clock - 17	4 - (RTS) Request to Send	To Model 1045
To Model 1045	Local Analog Loopback - 18	5 - (CTS) Clear to Send	From Model 1045
		6 - (DSR) Data Set Ready	From Model 1045
To Model 1045	Data Term. Ready (DTR) - 20	7 - (SG) Signal Ground	Common
From Model 1045	Remote Digital Loopback - 21	8 - (CD) Carrier Detect	From Model 1045
To Model 1045	External Clock - 24		
From Model 1045	Test Mode - 25		

DIRECTION	CCITT V.35 PIN-OUT REFERENCE (DB-25)		DIRECTION
		1 - (FG) Frame Ground	Common
To Model 1045	Transmit Data B - 14	2 - Transmit Data A	To Model 1045
From Model 1045	Transmit Clock A - 15	3 - Receive Data A	From Model 1045
From Model 1045	Receive Data B - 16	4 - (RTS) Request to Send	To Model 1045
From Model 1045	Receive Clock A - 17	5 - (CTS) Clear to Send	From Model 1045
To Model 1045	Local Loopback (LAL) - 18	6 - (DSR) Data Set Ready	From Model 1045
		7 - (SG) Signal Ground	Common
To Model 1045	Data Term. Ready (DTR) - 20	8 - (CD) Carrier Detect	From Model 1045
To Model 1045	Remote Loopback (RDL) - 21	9 - Receive Clock B	From Model 1045
		11 - External Clock B	To Model 1045
To Model 1045	External Clock A - 24	12 - Transmit Clock B	From Model 1045
From Model 1045	Test Mode - 25		

APPENDIX C

BLOCK DIAGRAM