



THIS MANUAL IS AVAILABLE FOR FREE  
COMPLIMENTS OF

**BUYMEBUYME.COM**

**TO ORDER THIS PRODUCT, PLEASE CALL TOLL-FREE  
1-877-992-8963 OR VISIT [WWW.BUYMEBUYME.COM](http://WWW.BUYMEBUYME.COM)**



# **Telephone Access Unit T-311 Product Manual**



40-400-00045, Rev. B

**Note**

This manual covers Models T-311-B-01 and T-311-C-01.

**Copyright Notice**

Copyright © 1992 - 2004 Teltone Corporation  
All Rights Reserved

**Trademarks**

Teltone is a registered trademark of Teltone Corporation.  
Windows is a registered trademark of Microsoft Corporation.  
Other company and product names may be trademarks or  
registered trademarks of their respective owners.

Teltone Corporation  
Bothell, Washington, USA  
Customer Service: 425-951-3388  
Technical Support: 425-951-3390  
Fax: 425-487-2288  
Email: [info@teltone.com](mailto:info@teltone.com)  
Website: [www.teltone.com](http://www.teltone.com)

# Contents

---

Compliance Information .....	iii
Important Safety Instructions .....	iv
Recording of Two-way Telephone Conversations .....	v
Chapter 1: Introduction .....	1
Figure 1 T-311 Telephone Access Unit.....	2
Telephone Line Control Features .....	3
Communication Features .....	3
Outgoing Call Features .....	4
Call Answering Features.....	4
Applications .....	5
Figure 2 Typical Setup for Outgoing Calls .....	5
Chapter 2: Operating Modes .....	7
Ready Mode .....	7
Active Mode .....	7
Table 1 LED Indicators .....	7
Chapter 3: Installation .....	8
Accessories .....	8
Installation .....	<b>8</b>
Figure 3 System Connections .....	9
Table 2 T-311 RS-232-C Interface .....	10
Figure 4 Remote Connector Cable and Pin Functions .....	11
Figure 5 Universal Mounting Bracket (Optional).....	12
Figure 6 Universal Mounting Shelf (Optional) .....	12
Chapter 4: Dialing Instructions.....	13
How to Dial .....	13
Sending DTMF Digits .....	13
Chapter 5: Answering Calls.....	15
Ringing Detection .....	15
Auto Answer .....	15
Security Checking.....	16
Transferring Calls .....	16
Chapter 6: Calling the T-311 .....	17
Table 3 Audible Prompts.....	17
Chapter 7: Record & Play Back Messages .....	19
Connecting the T-311 to the Recording Device .....	19
Recording from the Line .....	19

Playing Back to the Line . . . . .	19
Chapter 8: Commands . . . . .	21
Command Format . . . . .	21
Table 4 Command Set (Sheet 1 of 2) . . . . .	22
Table 4 Command Set (Sheet 2 of 2) . . . . .	23
Command Descriptions . . . . .	24
Digits/Characters for dialing . . . . .	24
Modifiers (arguments) . . . . .	24
V Verbose Mode . . . . .	28
X Call Progress Monitoring . . . . .	28
Detector toggles . . . . .	29
S Registers . . . . .	31
Table 5 S Register Summary . . . . .	32
Chapter 9: Messages . . . . .	38
Message Format . . . . .	38
Table 6 T-311 Response Messages . . . . .	<b>38</b>
Chapter 10: Configuration . . . . .	40
Command Format . . . . .	40
Saving a Configuration . . . . .	41
S Register Queries and Commands . . . . .	41
Table 7 Configuration Options . . . . .	42
Table 8 Default Configuration (by Parameter) . . . . .	42
Table 9 Default Configuration (by Code) . . . . .	43
RS-232-C Communications Link . . . . .	43
Table 10 DTMF/ASCII/DTMF Translation . . . . .	44
Appendix A: Service Information . . . . .	46
Ordering Information . . . . .	46
Warranty . . . . .	46
Troubleshooting . . . . .	47
Return for Repair Procedure . . . . .	47
Appendix B: Specifications . . . . .	48
Figure 7 T-311 Block Diagram . . . . .	50
Appendix C: Reading and Writing to Bit-Mapped S Registers . . . . .	51
Appendix D: ASCII Characters & DTMF Frequencies . . . . .	52
Table 11 T-311 ASCII Character Set . . . . .	52
Table 12 DTMF Frequencies . . . . .	53
Appendix E: Glossary . . . . .	54
Index . . . . .	55

## U.S. Regulatory Compliance

**FCC Part 68 Notice:** To comply with FCC Part 68 regulations, the following requirements must be met:

1. If the telephone company requests information on the equipment connected to their lines, please tell them:
  - a. the telephone number the equipment is connected to;
  - b. this equipment operates on standard RJ11 phone jacks;
  - c. the FCC registration number;
  - d. the ringer equivalence number (REN). The REN shows how many devices, such as phones, modems, etc. can be connected to your line. In most areas, there cannot be more than five devices (i.e., a REN of five) on a phone line. If the REN is exceeded, then your phone may not ring properly.

NOTE: Items C and D above are found on the label on any Teltone equipment connected to your telephone line.

2. These devices must not be installed on coin-operated telephone lines or party lines.
3. Repair work on this device must be done by Teltone Corporation.
4. If any trouble is experienced with this equipment, the telephone company may request that the customer disconnect the registered equipment from the telephone line to determine if the registered equipment is malfunctioning and if the registered equipment is malfunctioning, the use of such equipment shall be discontinued until the problem has been corrected.

**FCC Part 15 Class A Notice:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

## Canadian Regulatory Compliance

**Notice:** This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The Industry Canada label or the abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment. Industry Canada does not guarantee the equipment will operate to the user's satisfaction. Before installing this equipment, users should ensure that it is permissible to connect it to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by Teltone Corporation. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**Caution:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate. The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminal devices to be connected to a telephone interface without overloading the interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the REN of all devices does not exceed five (5) in most, but not all cases. Check with your local exchange carrier for the REN limit in your service area. The REN assigned to each device is located on the equipment label.

**COMPLIANCE NOTICE:** This digital apparatus does not exceed the Class A limits for Radio Noise Emissions set out in the equipment standard ICES-003 for digital apparatus.

**AVIS DE CONFORMATION:** Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectriques édicté par le ministère des Communications du Canada.

## IMPORTANT SAFETY INSTRUCTIONS

When using this product, basic safety precautions, including the following, should always be followed to reduce the risk of fire, electric shock, and injury to persons.

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. The product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply, consult your dealer or local power company. The product is designed for indoor use only.
4. To reduce the risk of electric shock, do not disassemble the product, but take it to qualified service personnel when service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the appliance is subsequently used.
5. If the product does not operate normally by following the operating instructions, or if the product has been dropped or the cabinet has been damaged, or if the product exhibits a distinct change in performance, refer servicing to qualified service personnel.
6. If the product is used in a manner other than specified in this manual, the protection provided by the product may be impaired.
7. For the purpose of removing power from the product, the power input connector is the main power disconnect point. Pull the power cord away from the connector to ensure power disconnect.
8. Adequate air flow must be maintained in order for the product to operate correctly. Do not wrap the product in blankets, paper, or other material that may impede ventilation.



**CAUTION:** THIS PRODUCT  
CONTAINS ELECTROSTATIC  
SENSITIVE DEVICES. USE  
APPROPRIATE HANDLING  
PROCEDURES.

## Recording of Two-way Telephone Conversations

This product may be used to record telephone conversations. Use in this application is subject to regulations adopted by the Federal Communications Commission, and is additionally subject to local state tariffs. Check with your local service provider to verify if any special regulations apply.

To comply with FCC regulations, this product is equipped so that it can be connected or disconnected at the will of the customer. In addition, one of the following conditions must apply:

All parties to the telephone conversation must give their consent to the recording of the conversation, and the prior consent must be obtained in writing or be part of, and obtained at the start of, the recording, or

All parties to the telephone conversation must be verbally notified at the beginning of the conversation and the notification must be recorded as part of the call, by the recording party, or

A distinctive recorder tone, repeated at intervals of approximately fifteen seconds, is required to alert all parties when the recording equipment is in use. The distinctive recording tone can be provided as part of (1) the recording equipment, or (2) registered or grandfathered protective circuitry.

**Note:** Recorder tone is not supplied by the T-311.

This page intentionally left blank.

# Chapter 1: Introduction

---

With the Teltone T-311 Telephone Access Unit computers can make and answer telephone calls, and information about those calls can be returned to the computer. While a modem only transmits data from computer to computer over telephone lines, the T-311 allows communication between called and calling parties.

This communication is made possible by the conversion of DTMF-to-ASCII and ASCII-to-DTMF. With the T-311, computers and other terminal devices can control telephone system functions such as answering and placing calls, observing call status, sending or receiving DTMF signals, “flashing” the line, and coupling audio sources, like speech synthesizers, onto the line.

For compatibility with communications software, the T-311 uses the industry-standard AT command set. It responds to commands and call processing events by sending messages to the computer.

When used in conjunction with contact management software, the T-311 is a powerful automatic dialer. Working with the records from the software database, it speeds call completion by detecting busy/reorder tone and immediately moving to the next number. The result is increased “talk time”, thereby improving the efficiency of calling agents.

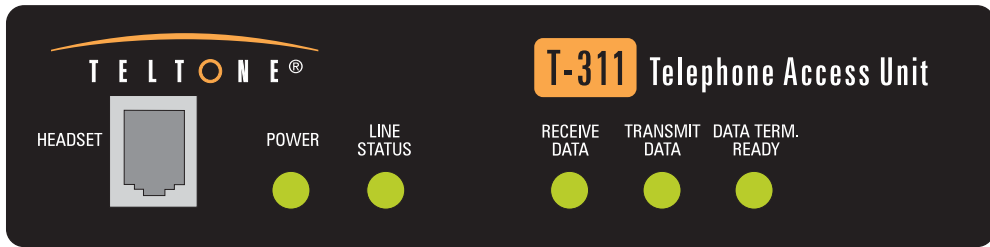
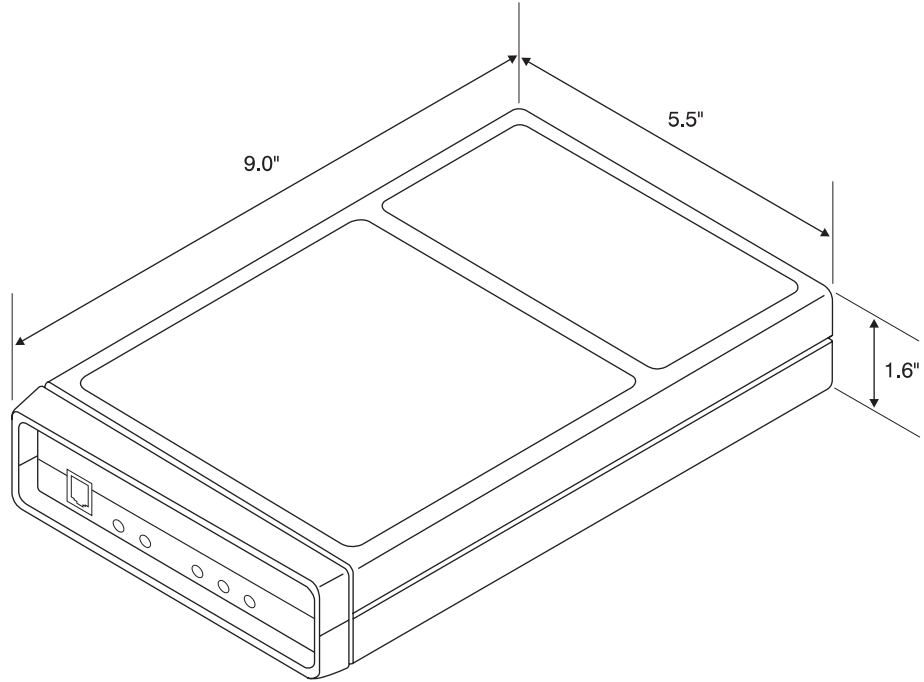
## Using This Manual

This manual is intended to assist developers with tailoring the T-311 to work with a software program.

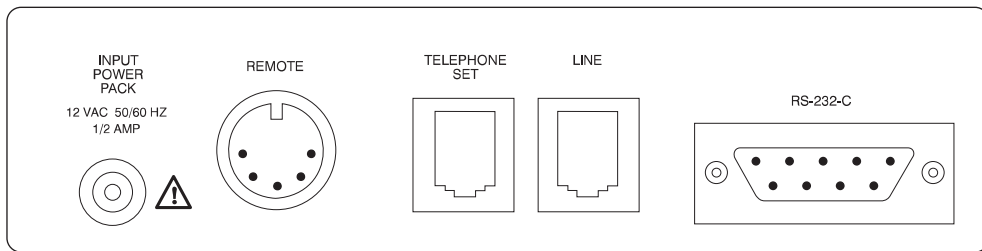
Some of the steps in the manual are not required for every application and are marked: **(Optional)**. Complete the optional steps if needed for your application.

## Manual Revisions

The information in this manual addresses T-311-B-01 units produced after October 3, 1994 . The production date is stamped on the bottom of each T-311 unit. All information related to Caller ID and Visual Message Waiting are features of the T-311-B-01 ONLY. The T-311-C-01 replaces the T-311-A-01 and is functionally the same.



Front Panel



Rear Panel

Figure 1 T-311 Telephone Access Unit

## Telephone Line Control Features

### Off-hook

The T-311 takes the line off-hook (“seizes” the line) when commanded by the computer to make or answer a call. The T-311 uses the standard ATD command to dial outgoing calls, but unlike most modems it provides full call progress monitoring.

### On-hook

The T-311 places the line on-hook (disconnects) upon command from the computer, or automatically if a caller fails the security check, loop current is lost, or inactivity timeout occurs.

### Ringing

The T-311 detects ringing on its incoming line. If response messages are enabled, the T-311 sends a RING message to the computer. The call is automatically answered if Autoanswer is enabled.

### Hold

The T-311 puts calls on hold and removes the hold when commanded by the computer.

## Communication Features

### DTMF/ASCII Conversion

After a telephone connection has been established, ASCII characters from the computer are converted to DTMF tones and forwarded to the network. In the opposite direction, DTMF digits entered at a telephone keypad are converted to ASCII characters and forwarded to the computer.

### FSK Decoding (Caller ID and VMWI) -- Only Applies to M-311-B-01 Units

The central office (telephone company) sends the FSK signals (Caller ID), after the first ring and before the second ring. Caller ID information, in single message format and multiple message format, are decoded and converted to ASCII characters to be transmitted via the RS232C port. Visual Message Waiting Indication signals are sent during on-hook idle times. These FSK messages are decoded and sent out via RS232C along with a visual indication on the front panel of the T-311, to inform the user of messages waiting in their mailbox.

### Electronic Voice

By controlling an audio source such as a recorded tape player or speech synthesizer, the computer can use the T-311 to send messages to the called party, or record messages received over the phone line.

### Headset Interface

When used with a headset, the T-311 becomes a powerful and efficient “computerized telephone” for telemarketing and similar applications, relieving the user of most of the mechanics of setting up, dialing, and disconnecting calls.

The headset should meet the following requirements:

- UL and CSA approval
- Electret-type microphone (typically battery or AC powered)
- external amplifier with volume control
- modular four-wire connector (plugs into front of T-311).

**Note:** Headsets with telephone-like features duplicate some of the functions of the T-311 and may require additional programming.

## Telephone Interface

A telephone connected to the T-311 can be used two ways: (1) as an auxiliary telephone sharing the line with the T-311 (outgoing calls are dialed from the telephone set directly over the telephone and do not go through the T-311 circuitry), or (2) operating through the T-311 (outgoing calls are dialed from the computer). The second mode is identical to operation with a headset.

## Standard Commands

The industry-standard AT command set is used where applicable.

## Selectable Baud Rates

You can select a baud rate from 300 to 9600 bps to set the speed with which ASCII data is transferred between the computer and T-311. It does not refer to the rate of data transmittal across the telephone lines. See Chapter 10, "RS-232-C Communications Link" on page 43 for details.

## Outgoing Call Features

### Autodialing

The T-311 can autodial a series of programmed numbers. It can also permanently store a number string for repeated dialing with the command "ATDS". (See page 26 for more detail.)

### Tone and Pulse Dialing

To ensure the widest possible range of applications, the T-311 works with both DTMF and rotary signaling.

### Dial Tone Detection

The T-311 can detect both primary and secondary dial tones. In the autodialing mode, the T-311 can be programmed to delay dialing until it detects secondary dial tone.

### Call Progress

By detecting and analyzing standard call progress tones (e.g., reorder, busy, and audible ringing /"ringback"), the T-311 is able to return information to the computer about the status of originated calls. By detecting Special Information Tones (S.I.T.), the T-311 recognizes incomplete calls to speed placement of the next call.

## Call Answering Features

### Auto and Forced Answer

Auto answer allows unsupervised operation of the T-311; forced answer commands the T-311 to answer the call. By disabling answer altogether, the T-311 owner can ensure that the telephone line is used for making outgoing calls only.

### Security Checking on Incoming Calls

When security is enabled, the T-311 automatically disconnects callers who fail to enter the correct password in the allotted time.

### LED Indicators

The T-311 includes five LEDs. Operation of the LEDs is described in Table 1.

## Modular Connectors

For ease of installation and to promote the widest possible range of applications, all T-311 connectors are standard and modular.

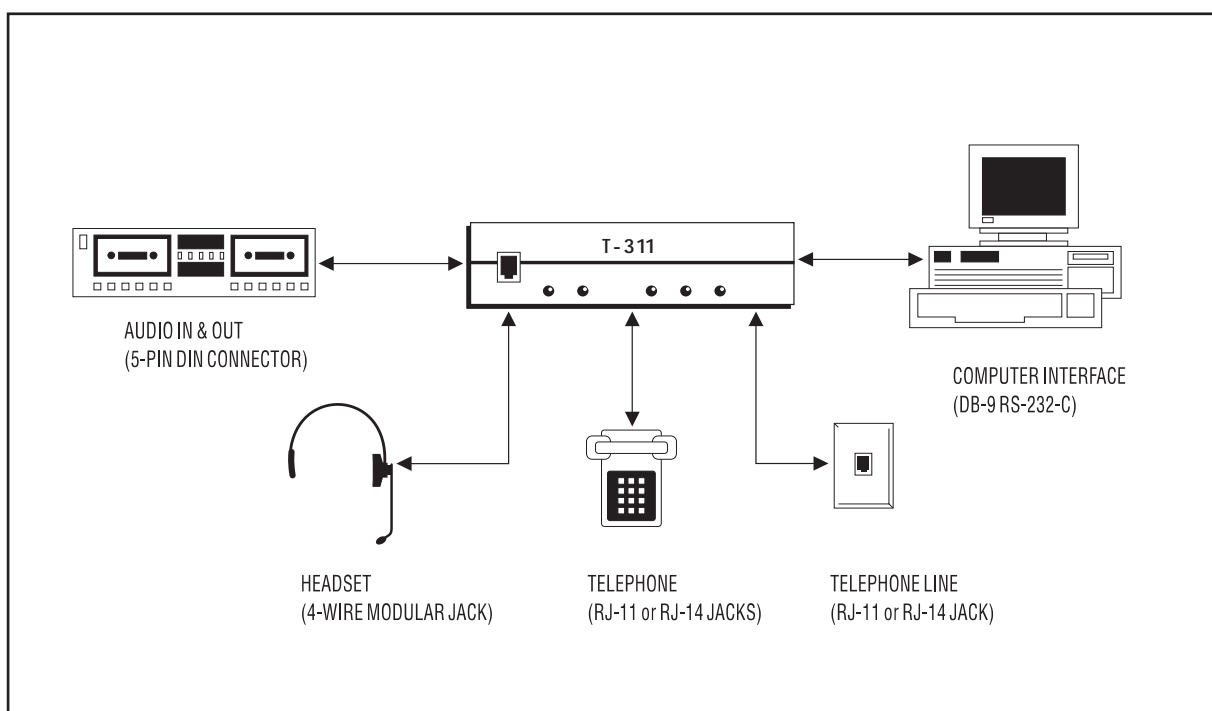
## Nonvolatile Memory

The T-311 uses EEPROM memory to store configuration data.

## Applications

The T-311 is a device marketed and intended for use in commercial, industrial, and business environments.

Applications for the T-311 fall into three basic categories: (1) Outgoing calls, (2) Incoming calls, and (3) Security for incoming calls.



**Figure 2 Typical Setup for Outgoing Calls**

## Outgoing Calls

This is the most sophisticated application for the T-311, particularly when incorporation of the proper applications software and an audio source allow the T-311 to operate without human supervision. Figure 2 shows an equipment configuration for outgoing call applications. Examples include:

- (1) Telemarketing
- (2) Autodialing with software, autodialing from a list of numbers
- (3) Automatic remote monitoring of equipment
- (4) Automatic outbound messaging
- (5) Customer service surveys
- (6) Appointment verification
- (7) Collections on receivables
- (8) Purchasing applications to solicit multiple bids.

### **Incoming Calls**

In this type of application, the caller uses the T-311 to update or verify information in a remote computer database. Examples include:

- (1) Message forwarding systems
- (2) Financial transaction systems
- (3) Alarm systems
- (4) Energy management systems
- (5) Credit card verification systems
- (6) Mail order systems.
- (7) Small Business

### **Inward Security**

The T-311's security checking feature can be used for incoming call applications like Dialback security systems or Building security systems.

## Chapter 2: Operating Modes

### Ready Mode

The T-311 enters the ready mode when: power is applied, a reset is performed using the Z command, or the DTR signal from the computer is reasserted (if that option is enabled with the &D2 command). In this mode, the T-311 is disconnected from the telephone line. While in the ready mode, the T-311 monitors the line for ringing voltage, which announces an incoming call, FSK transmissions (Caller ID) information and for loop current, which reveals the switchhook status of the auxiliary telephone. The T-311 also monitors the computer for changes in DTR and the command "AT". Commands are processed and messages returned to the computer.

### Active Mode

The T-311 enters the active mode when the line is seized. The T-311 returns to the ready mode if: dial tone is not found when making a call, a no-answer is detected, or the caller fails the security check. Otherwise, the T-311 remains in the active mode until: loop current is lost, the line is disconnected by the H command, or no-activity timeout occurs. In the active mode, the T-311 processes commands, converts DTMF to ASCII and vice versa, couples audio input onto the line, monitors for loop current, and maintains the no-activity timer.

### Active Mode Response to COD

The T-311 responds to cut-off on disconnect (COD or forced disconnect) by going on-hook. You can disable COD with the S\*2 register on page 36.

### LED Indicators

Indicator	Color	State	Description
Power ON	Green	ON	Power is applied to the T-311
Line Status	Red	ON (steady)	Line off-hook
		Slow flash	On/Off, Call on hold
		Fast flash	Rapid blinking on Incoming call (ringing)
		OFF	Idle
		Flash	Two blinks on, 2 seconds off (repeated) VMW (note 1)
Receive Data	Red	ON	Data is being received by the computer
Transmit Data	Red	ON	Data is being sent by the computer
Data Terminal Ready (DTR)	Red	ON	computer is ready to receive data, or DTR is ignored by the computer (see "Response to DTR" command, page 34).

Note 1: Visual Message Waiting transmission has been received.

## Chapter 3: Installation

---

### CAUTION:

- (1) *Never install telephone wiring during a lightning storm.*
- (2) *Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.*
- (3) *Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.*
- (4) *Use caution when installing or modifying telephone lines.*

This chapter provides a list of required accessories and information about installing the T-311. Information about compliance with FCC and DOC requirements and T-311 regulatory is listed at the front of the manual.

### Accessories

As shown in Figure 3, the T-311 must be connected to a telephone line, a computer, and a standard 120-volt AC outlet to a power transformer.

Connections to an auxiliary telephone, headset, and audio source are optional. Accessories required to make these connections include:

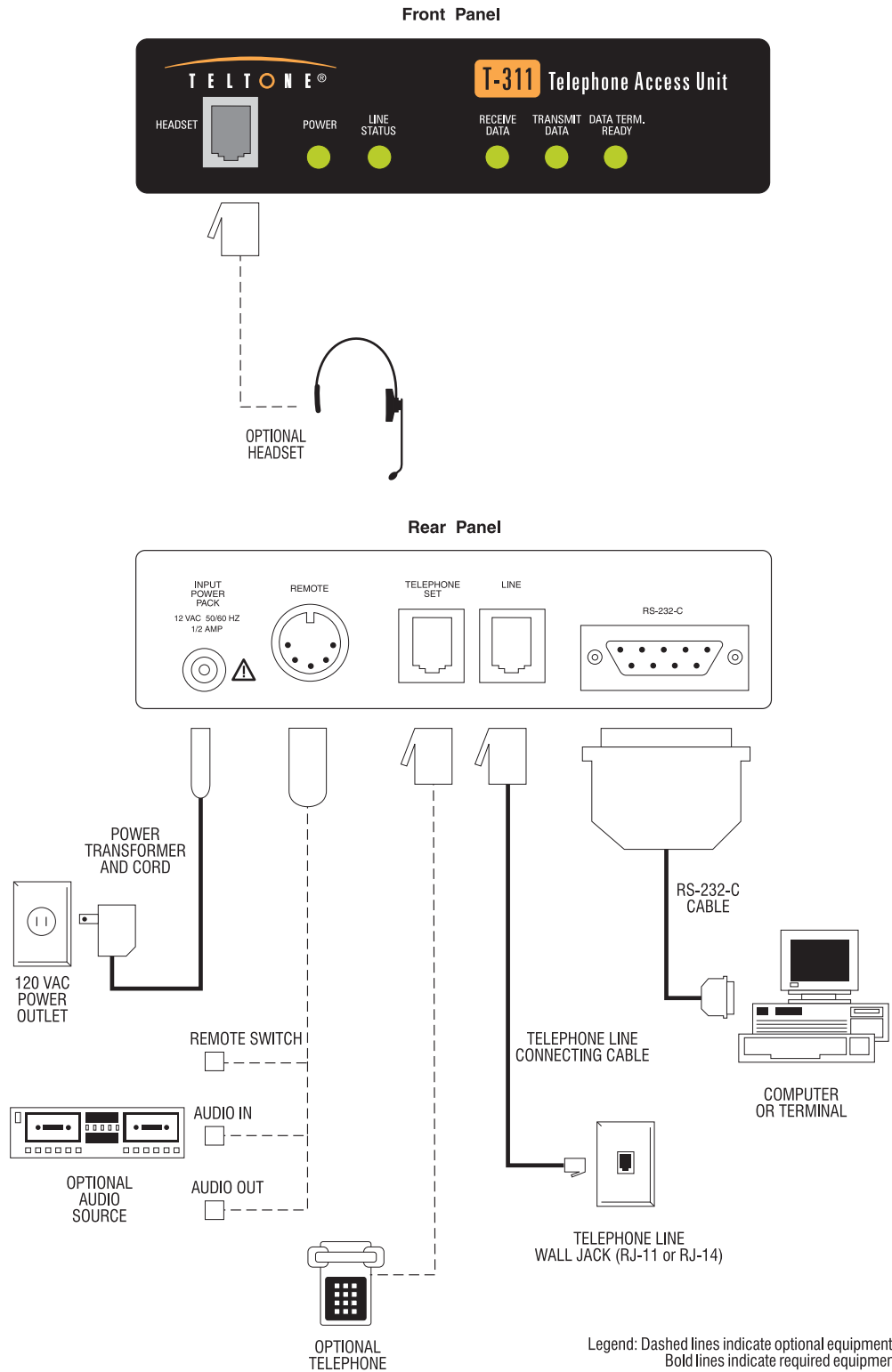
- (1) A plug-in transformer (Included with unit, P/N 610-00066-01.)
- (2) A standard 6-position modular telephone cord. (Available as an ordering option, see page 46.)
- (3) A **cable to connect the T-311's DCE interface to the RS-232-C port** of the computer. The cable should terminate on its T-311 end in a male DB-9 connector and supply the signals listed in Table 2. (A DB-9 to -25 adapter cable, P/N 742-00017-01, is available as an ordering option.)
- (4) **Remote cable** (Optional): If an audio source and/or remote control switch is used, a cable is required to connect them to the T-311. (Not supplied.) The cable should terminate on its T-311 end in a 1/2-inch diameter 5-pin DIN connector with pins at 180 degrees to the key and 3 plugs at the other end (typical of small portable tape recorder cables). The cable connections and pin functions for the remote interface are given in Figure 4.
- (5) **Wall Mounting Bracket** (Optional): For wall mounting up to four T-311 units, UM-111-401 bracket (see Figure 5) is available as an ordering option. For wall mounting up to eight units, UM-113-801 (Figure 6) is available as an ordering option.

### Installation

#### Step 1: Connect Telephone Line



- Plug one end of the modular telephone line connecting cable into the jack labeled "Line" on the back of the T-311.
- Plug the other end of the cable into the telephone line wall jack.



**Figure 3 System Connections**

<b>Table 2 T-311 RS-232-C Interface</b>		
<b>Pin number</b>	<b>Description</b>	<b>Source</b>
<b>1</b>	Data carrier detect (D)	<b>T-311</b>
<b>2</b>	Receive data (R)	<b>T-311</b>
<b>3</b>	Transmit Data (TX)	<b>Computer</b>
<b>4</b>	Data terminal ready (DTR)	<b>Computer</b>
<b>5</b>	Signal Ground (SG)	<b>Computer</b>
<b>6</b>	Data set ready (DSR)	<b>T-311</b>
<b>7</b>	Request to send (RTS)	<b>Computer</b>
<b>8</b>	Clear to send (CTS)	<b>T-311</b>
<b>9</b>	Ring indicator (RI)	<b>T-311</b>

### **Step 2: Connect Computer**

- Refer to the table above to check the RS-232-C interface.
- Plug the male DB-9 connector end of the RS-232-C cable into the T-311 jack labeled "RS-232-C".
- Plug the other end of the cable into the RS-232-C connector on the computer.

### **Step 3: (Optional) Connect Telephone**

- Connect the telephone to the T-311 jack labeled "Telephone Set" using the modular cord supplied with your telephone set.

### **Step 4: (Optional) Connect Headset**

- Connect the headset to the T-311 front panel jack labeled "Headset".

### **Step 5: (Optional) Connect Remote Equipment**

- The T-311 jack labeled "Remote" may be used to monitor or record information from the telephone line. It may also be used to play back to the telephone line the output from a recorder or some other audio source. This interface uses a 5-pin DIN connector with the pin assignments identified in Figure 4. (See Chapter 7 for more information.)

### **Step 6: Enable Computer/T-311 Communications**

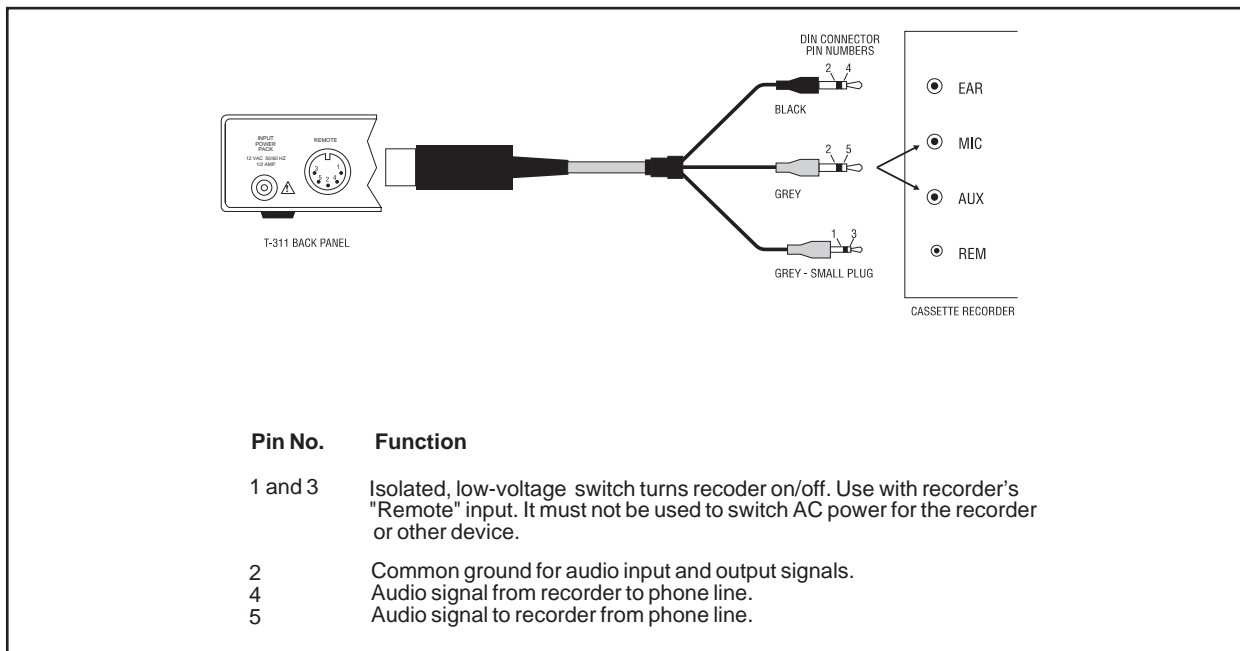
- Configure the computer to communicate at 1200 baud, using a ten-bit word: one start bit, eight data bits, parity off, and one stop bit.
- Enable the communication software which allows the computer to communicate via its RS-232-C port.

### **Step 7: Connect Power Transformer**

- Plug the cable end of the power transformer into the T-311 connector labeled "Power".
- Plug the transformer end into a 120-volt AC power outlet.
- Watch for the green POWER LED on the T-311 front panel to light. The red LED will also turn on if either (1) the computer is on, or (2) the T-311 is configured to ignore DTR ("&D" command, see Chapter 8).
- Watch for a message like the following: "T311 TAU 2.00 COPYRIGHT 1991-94 TELTONE CORP."

### **Step 8: Verify Configuration**

- From the communication software, send an AT command to the T-311.



**Figure 4 Remote Connector Cable and Pin Functions**

- If everything is configured correctly, the T-311 will respond with "OK".  
-or-
- If "OK" was not returned, the default configuration of the T-311 may not be compatible with your setup. See Chapter 10.

### Step 9: (optional) Change defaults

- If any factory default options require changing, configure the T-311 as described in Chapter 10.

### Step 10: (optional) Mount the T-311

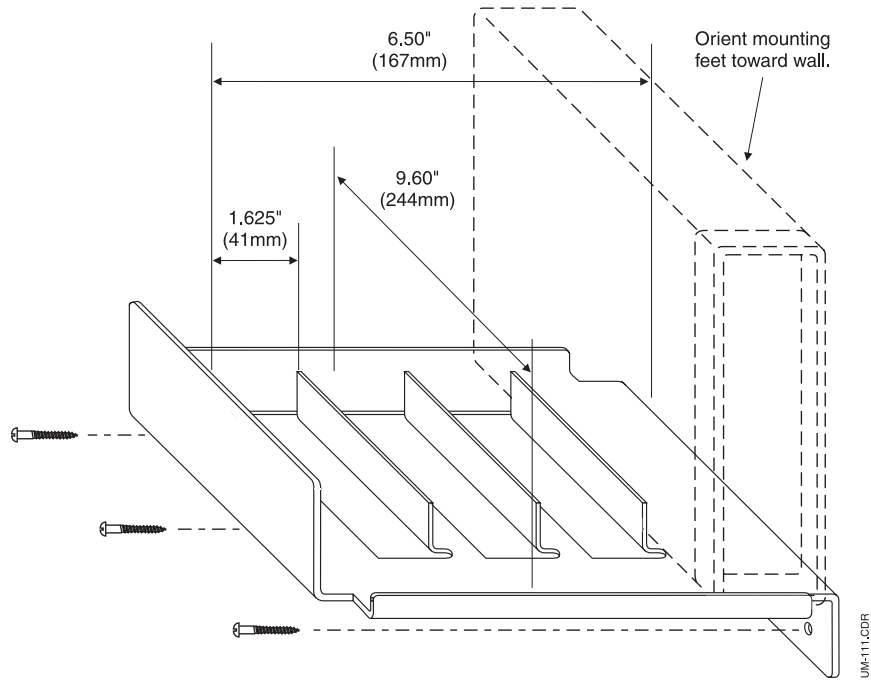
If you have ordered the mounting bracket (model UM-111-401), install the T-311 as follows.

- Use the three screws to install the bracket to a 3/4-inch-thick wood panel that is attached to a wall.
- If you are installing multiple units, insert the first T-311 in the slot closest to the wall. (The bottom of each unit should face the wall.)

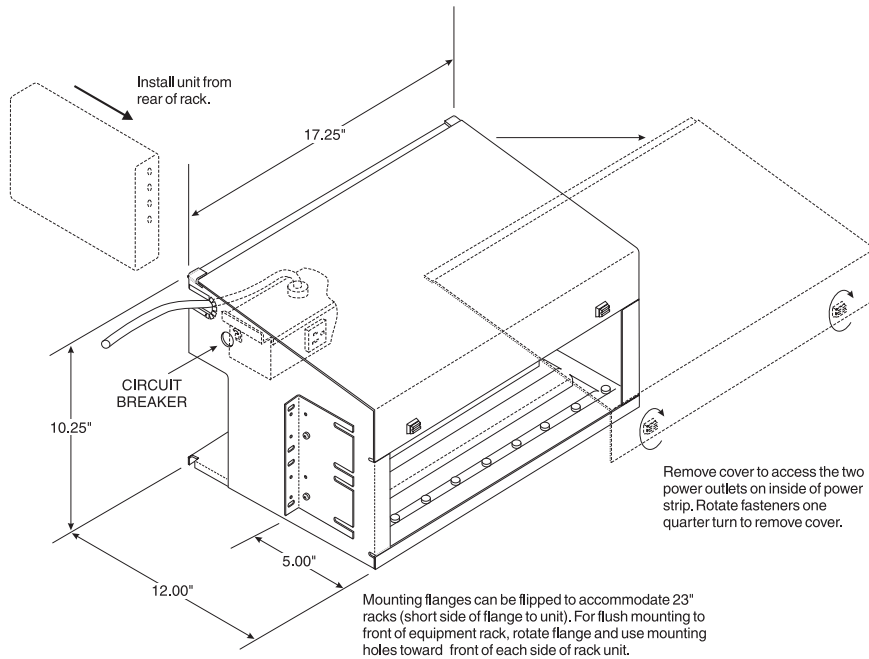
-or-

If you have ordered the mounting bracket (UM-113-801), install the T-311 as instructed in the steps below. Please note that there is space for eight transformers; six in the back of the shelf and two in the front. The shelf includes an eight outlet power strip with a 14-foot cord.

- When you remove the shelf from the box, rotate the fasteners on the front and remove the cover. Untie the power cord and run it through the slots at the back of the shelf.
- Insert the units in the shelf so that you can see the LEDs through the front of the shelf. (The space at the back of the shelf provides room to attach cabling to each device.)
- Using the mounting hardware supplied with the carrier, install it in center or front mount positions in a 19- or 23-inch rack.



**Figure 5 Universal Mounting Bracket (Optional)**



**Figure 6 Universal Mounting Shelf (Optional)**

## Chapter 4: Dialing Instructions

---

This chapter explains how to place a call and how to dial a remote device through the T-311.

### How to Dial

The T-311 allows calls to be placed by the computer operator or by software controlling the computer. If a W is embedded in the dialed number string, the T-311 monitors the line for dial tone (both primary and secondary), dials the digits in the specified manner (tone or pulse), and performs whatever operations are enabled by the X command.

For example: ATD4871515 causes the computer to tell the T-311 to go off-hook and dial the number 487-1515.

#### Step 1: Issue D Command

- Enter "ATD" followed by the telephone number and a carriage return.
- The T-311 default dialing mode is DTMF, but you can specify pulse dialing by entering a P in the dialing string (see Chapter 8, D Command), and return to tone dialing by entering T. (Other dial modifiers can be embedded in the dialing string as described in Chapter 8.) Note the following examples:

**ATD5551234<CR>** Dials the number 555-1234.

**ATDP9WT12065551234<CR>** Pulse-dials a 9, often required to access an outside line from inside a PBX. There follows a wait for secondary dial tone, and then the remainder of the number is tone-dialed: 1-(206)555-1234.

#### Step 2: Observe Call Progress

- After dialing is complete, the T-311 monitors the line for indications of call disposition. If a no-answer condition is detected, the T-311 abandons the call and returns to the ready mode. Otherwise, it remains in the active mode until disconnected.

To improve detection of call progress tones, mute the headset microphone by adding L0 to the end of the dialing string (e.g., ATDT4871515L0). The microphone will be automatically unmuted when a "VOICE" or "RB LOST" is validated.

#### Step 3: Disconnect Line

- When the call is complete, "hang up" by issuing the H command. After executing this command, the T-311 leaves the active mode and returns to the ready mode.

### Sending DTMF Digits

After a connection has been established, either by dialing or answering a call, you may need to send DTMF digits from the T-311 to use voice mail systems or entering personal identification numbers (PINs). DTMF digits are sent by issuing another D command in the same format as that used when setting up the call: **ATDn...n<CR>** (where n...n is one or more DTMF digits). Alphabetical characters may be entered by enclosing them in quotation marks, as follows: **ATD"n...n"<CR>**

The T-311 will convert any characters within quotation marks to DTMF digits so that the caller does not need to refer to a telephone keypad to determine which digits to send. The conversion is as follows:

ABC = 2  
DEF = 3  
GHI = 4  
JKL = 5

MNO = 6  
PQRS = 7  
TUV = 8  
WXYZ = 9

For example, the command **attend "telton" <CR>** will send the digits 8358663.

The entire string, including ATD and both quotation marks, can be up to 40 characters. If more characters are to be sent, multiple D commands must be issued.

Once a call has been connected, any subsequent D commands (that is, those entered while the line is off-hook), are processed in exactly the same manner as the initial D command, except that the T-311 does not wait 2 seconds for dial tone.

### **Step 1: Send One or More D commands.**

- Once a call is established, send DTMF digits or alphabetical characters as follows:
- Send DTMF digits 1 through 0, A, B, C, D, #, or \* by issuing the command

**ATD n...n <CR>**

Send alphabetical characters with the command

**ATD" n...n" <CR>**

### **Step 2: Disconnect Line**

- When data transmission is complete, "hang up" by issuing

**ATH<CR>**

## Chapter 5: Answering Calls

---

This chapter explains how to answer calls coming in to the T-311. Messages shown in this chapter are sent only if the T-311 is in V3 mode. (See page 28 for more detail.)

### Ringing Detection

#### Telephone Rings

The T-311 is enabled to detect ringing voltage when the line is not seized by either the T-311 or a telephone sharing the line with the T-311. As each burst of ringing voltage is detected, the T-311 transmits the message: **RING**

#### FSK Transmission Decode

After the first ring, while on-hook, the T-311 will decode a 1200 baud FSK message used to transmit Caller ID. This Caller ID message may be sent in either single message format (date/time/and number) or multiple message format (date/time, number and name).

#### Idle Operation

The T-311 will look for a FSK transmission while on-hook as long as ringing is not in progress. During idle periods, the T-311 will look for the **VISUAL MESSAGE WAITING** information in either single or multiple message format. This signal is used to inform the user that a message is waiting to be picked up at the Central Office voice mail location.

#### Auto or Forced Answer

If auto or forced answer occurs, the T-311 enforces two seconds of line silence as a billing delay, signals the caller with a burst of connection tone, and transmits the message: **ANSWERED**

#### Auto Hang Up Incoming Calls

After an incoming caller has hung up, the T-311 waits for five seconds of dialtone, four cycles of busy tone or reorder tone, and hangs up to prepare for the next call. (The hang up on dial tone can be disabled if Bit 6 of the S14 register is set to 1.)

#### Abandoned Call

If the caller abandons the call before answer occurs, the T-311 transmits the message: **RING LOST**

#### Auto Answer

The T-311 can answer calls automatically when the S0 register is set to a value other than 0. Auto answer occurs when the count of incoming rings equals the value set in the S0 register. (See page 32 for more information on the S0 register.)

To change current setting: Issue the command **ATS0=xx <CR>** replacing xx with the desired number of rings.

To disable auto answer: Issue the command: **ATS0=0 <CR>** (*default*)

#### Forced Answer

Forced answer allows calls to be answered manually regardless of the S0 register settings. The command to execute forced answer is A.

To answer a ringing phone: Issue **ATA<CR>**.

## Security Checking

The T-311 has the capability to provide incoming call security by requiring the caller to enter a multi-digit DTMF password after the T-311 answers the call and issues a connection tone (941 Hz for 1 second).

**Note:** The T-311 will always issue the connection tone when the password requirement is enabled (\*C=1) or if Bit 3 of the S\*2 register is set to 1. In this situation, if a second T-311 is the caller, that T-311 will detect the connection tone and issue the message "T-311 CONNECT" (when V is set to V3) to its computer port.

To enable security **checking**: Issue the command **AT\*C1<CR>**

If you want computer display messages PASS and FAIL in addition to the tones, enter the default setting: **ATV3<CR>**

**Note:** Security code checking requires that DTMF detection also be enabled. To do this, enter: **ATXB<CR>** (*default*) You must also set a password. If no password is set and security checking is enabled, no caller will be able to access the T-311.

### To set the password

Issue the command: **AT\*Wn...n#<CR>**

The T-311 responds to a correct password entry with a single tone and an incorrect entry with three tones. For more information on how the T-311 handles calls with passwords enabled, see Chapter 6 (Calling the T-311.)

## Transferring Calls

A T-311 operating behind a PBX can transfer calls to another PBX station.

### Flash the line

A transfer is initiated by "flashing" the line on an established call. To do this, issue the command **ATD!<CR>**

If the flash is successful, the T-311 returns the message: **FLASH**

If the flash is unsuccessful (e.g. because an auxiliary telephone sharing the line with the T-311 is off-hook), the T-311 returns the message (if M is set to M2): **FLASH FAILURE** and the original connection is maintained.

### Dial the number

After the line is flashed, dial the other PBX station: **ATDn..n<CR>**

### Disconnect after answer

When the called party answers, hang-up the call with the command: **ATH<CR>**

## Chapter 6: Calling the T-311

This chapter provides instructions for callers using a remote telephone to place calls into a T-311 through a computer.

Table 3, below, explains the three tones you will hear when working with the T-311.

<b>Name</b>	<b>Description</b>	<b>Explanation</b>
Connection tone	Extended single burst	Security disabled: T-311 has answered. Security enabled: T-311 has answered. Enter password.
Acknowledgment tone	Brief single burst of DTMF A for duration set in S11 register	Security check has passed.
Error tone	Triple burst of DTMF D at on/off rate set in S11 register	Security check has failed. T-311 will disconnect.

### Step 1: Dial up the T-311

- Dial the telephone number to which the T-311 is connected. Although a pulse-dialing telephone may be used to call the T-311, a DTMF telephone (or a DTMF generator used with a pulse-dialing telephone) must be used to enter the password (if required) and communicate with the computer after the connection through the T-311 is established.

To call from another T-311, enter **ATDn...n<CR>** where n...n is the telephone number

### Step 2: (Optional) Enter password

- When ringback tone is heard followed by a single burst of connection tone, enter the assigned password.

**n...n#** where n...n is the password

Remember to terminate the code with a "#". You have 4 seconds to enter each digit.

If the correct password is entered in the allotted time, the T-311 responds with a burst of acknowledgment tone (see Table 3) and the connection is established. If the password is incorrect, or if the correct password is not entered in the allotted time, the T-311 responds with three short bursts of error tone and then disconnects.

### Step 3: Communicate with the computer

After the connection is established, DTMF digits you transmit via your telephone keypad are detected by the T-311 and forwarded to the computer as ASCII characters.

Depending on the application, the computer can be programmed to respond to your input in two ways:

- By issuing ASCII characters which the T-311 converts to the corresponding DTMF tones and forwards to you.
- By controlling an audio source such as a speech synthesizer or recorded tape player, the output of which the T-311 couples onto the line.

### Step 4: Hang up

When you have completed your call, hang up the telephone. You can program the T-311 to disconnect automatically in any of the following ways:

Inactivity Disconnect Timeout will occur if the T-311 does not detect any DTMF digits for the programmed period of time (0 seconds = OFF = Default), the unit will disconnect. To program this timeout period, see S10 on page 34.

Cut-off On **Disconnect** will occur if the T-311 detects an open circuit for at least 800 ms. This feature is always enabled.

Dial Tone/Reorder/Busy Disconnect will occur after five seconds of dial tone *or* four cycles of busy or reorder tone is detected on an incoming call. To program this feature, see S14, Bit 6 on page 35. The default for this feature is enabled.

## Chapter 7: Record & Play Back Messages

---

- Notes:** (1) Recording of telephone conversations is subject to FCC regulations. See page 5 for compliance requirements.  
(2) The recorder tone option is not provided by the T-311.

### Connecting the T-311 to the Recording Device

A standard cassette player interface cable, with a mating 5-pin DIN connector at one end and three cable plugs at the other is required (see Figure 5). This cable is connected as follows:

- Plug the 5-pin connector into the T-311 connecting jack labeled “Remote”.
- Connect the black cable plug to the “Earphone” jack on the recording device.
- Connect the small gray cable plug to the “Remote” jack on the recording device.
- Connect the larger gray cable plug to the “Aux” jack on the recording device. (If the recording device has no “Aux” jack, connect this cable plug to the “Mic” jack.)

### Recording from the Line

#### Step 1: Connect T-311 to Recording Device

- Connect the T-311 to the recording device as described above.

#### Step 2: Enable Record

- Enable the record function. Typically, this requires pressing both the “Play” and the “Record” buttons on the recording device. (No recording will take place until you establish a call and issue a “begin recording” command through the T-311 using **either** of the methods described in Steps 3 and 4 below.)

#### Step 3: Delayed Recording Start:

- Place a call through the T-311 by issuing a “D” command at the computer or through an application program (see Chapter 8 for more information on commands).
- Start the recording at any time after the connection is established by issuing the command **AT\*R1<CR>**.

#### Step 4: Immediate Recording Start

- If you want to start recording as soon as the call is connected, issue an “H2” command in conjunction with the “D” command. For example: **ATH2 D123-4567**.

#### Step 5: Stop Recording

- To stop the recording without terminating the call, issue the command **AT\*R<CR>**. The recording will be stopped automatically when you use an H command to hang up the line.

### Playing Back to the Line

#### Step 1: Connect T-311 to Recording Device

- See “Connecting the T-311 to the Recording Device” on page 19.

**Note:** If you need to use the “Rewind” or “Fast Forward” functions to position the message, issue an “H2” command, then rewind or fast forward, then issue an “H” command.

**Step 2: Press Play**

- Press the “Play” button on the recording device. (The message will not begin playing until you have issued a “Play” command through the T-311 (Step 4).

**Step 3: Place Call**

- Place a call through the T-311 by issuing a “D” command at the computer or through an application program. (Or, on an incoming call, proceed to Step 4.)

**Step 4: Start Playing**

- Start playing the message at any time after the connection is established by issuing the command **AT\*R2<CR>**.

**Step 5: Stop Playing**

- To stop the message without terminating the call, issue the command **AT\*R<CR>**. The recording will be stopped automatically when you use an H command to hang up the line.

## Chapter 8: Commands

---

Commands are ASCII character strings sent by the computer to the T-311. They may be issued manually—usually, at a keyboard—or automatically through software. For compatibility with existing communications software, the T-311 uses many of the Hayes AT commands. Some have been modified for use in the T-311 and new commands added to control T-311 features not available in a modem.

Table 4 summarizes each of the T-311 commands described in this chapter. The commands are listed in alphabetical order, but can be grouped in five categories, as follows:

### 1. Telephone Commands:

A	Answer
D	Dial
H	Hang up, off-hook, hold
A/	Repeat last command

### 2. Configuration commands:

E	Echo
L	Turn microphone on/off
Z	Reset
*C	Enable/disable passwords
*W	Set password nnn
*R	Remote equipment control
&F	Fetch default
&W	Write user configuration (save configuration)
&Z	Store phone number

### 3. Status Commands:

I	Display product information and version number
*A	Display line status (on/off hook, etc.)
*B	Display S register status
&D	DTR indicator
*D	Display last Caller ID message
*E	Erase last Caller ID message

### 4. Remote Equipment Control:

*R or	*R0 Turn off both remote switch and remote input to the network
*R1	Turn on remote switch
*R2	Turn on remote switch and the remote audio input

### 5. Call Progress Detection and Message Display:

Q	Message display on/off (Turn on before configuring V, M, or X.)
V	Digit code or word messages
M	Combination of call progress detection and message display
X	Call progress detection on/off

## Command Format

All commands, with the exception of REPEAT (A/), are issued in the following format: **AT** <one or more commands><CR>

**Table 4 Command Set (Sheet 1 of 2)**

Commands flagged with ¶ and all commands preceded by \* are unique to the T-311. M commands (flagged with ¶¶) function differently than the AT M commands.

Command	Function
A or A0	Answer ringing line or take line off hold
D	Dial a number
E or E0	Disable echo
E1	Enable echo ( <i>Default</i> )
H or H0	Place T-311 on-hook ( <i>Default</i> )
H1	Take T-311 off-hook
H2	Take T-311 off-hook and close remote control relay
H3	Put line on hold (or on-hook when configured for alternate disconnect)
I or I0	Display product code and rev. number
I1	Display checksum
I2	Test the T-311's internal RAM (perform a soft reset).
L OR L0	Turn microphone off
L1	Turn microphone on
M or M0¶	Display no call progress response messages
M1¶¶	Display messages until answer (without testing for loop current (call following)
M2¶¶	Display messages until answer (with testing for loop current) ( <i>Default</i> )
N	Display the stored telephone number
Q or Q0	Display messages (M and V commands must also be set) ( <i>Default</i> )
Q1	Display no messages
V or V0	Return single digit result codes
V1	Return standard AT word messages
V2	Return two-digit result codes
V3	Return T-311 word messages ( <i>Default</i> )
X or X0	Enable only response codes 0 through 4 (Dial tone and busy signal are not recognized.)
X1	(not applicable in T-311; command will function as X0)
X2	Enable dial tone detection and response codes 0 through 6
X3	Enable busy signal detection and response codes 0 through 5 and 7
X4	Enable both dial tone and busy signal detection and response codes 0 - 7
X5¶	Toggle on/off dial, busy, ringback, and reorder tones
X6	Toggle on/off the voice detector
X7	Toggle on/off the Special Information Tone (SIT) detectors
X8	Toggle on/off the DTMF detectors
X9	Toggle on/off single tone detection
XB	Enable all detectors. All call progress tones are detected and reported. ( <i>Default</i> )

Table 4 Command Set (Sheet 2 of 2)

XC	Disable all detectors
XF	Toggle on/off Caller ID & Visual Message Waiting detection
Z or Z0	Reset the T-311 using the values stored in EEPROM
Z1	Reset the T-311 RS-232C port to default values
&D or &D0	T-311 ignores DTR, DTR LED is always on
&D2	T-311 hangs up line when it detects on-to-off transition on DTR, LED follows DTR state.
&F	Fetch the default configuration and load it into RAM
&W	Write the active configuration into EEPROM
&Znnn	Store the telephone number nnn
A/	Repeat the commands stored in the command buffer
*A	Display line status
*B	Display current T-311 status (contents of all S registers)
*C or *C0	Disable password
*C1	Enable password
*D	Display the last stored Caller ID message
*R or *R0	Turn off both remote switch and remote input to the network
*R1	Turn on remote switch
*R2	Turn on remote switch and the remote audio input
*Wnnn	Set password nnn

**AT            Introduces the command string**

You can enter single or multiple commands after the AT. This is the format: AT<commands>. Spaces may be used to separate multiple commands, but are not required.

Computer users should be aware that since spaces are not stored in the command buffer, backspacing to correct a mistake in a command entry may erase more characters from the buffer than is apparent on the computer screen.

All characters following the AT (except for spaces and control characters) are stored in a command buffer, which can hold up to 40 characters.

Where multiple commands are issued in a single string, the T-311 will execute all commands as it receives them until it receives an invalid command. An error response is returned when an invalid command is received.

**Note:** The command buffer will not load spaces in the dialing string.

**<CR>**

The carriage return character, ENTER or RETURN key on most keyboards, can be changed by reprogramming Register S3. (See page 33.)

**Command Descriptions****A            Manual Answer**

This command instructs the T-311 to answer an incoming call. (The T-311 can also be configured to answer calls automatically by setting a value other than 0 in the S0 register.) When the A command is issued, the T-311 will answer the call without receiving a password, even if a password is required for automatic answer.

**A or A0    Answer**

Answer ringing line (or line on hold)

**D            Dial Command**

Tells the T-311 to dial the number that follows. For example, the command:

**ATD5551234<CR>**

This command causes the T-311 to dial the number 555-1234.

**Digits/Characters for dialing**

Any of the following digits or characters can be used with the D command:  
0-9, \*, #, A, B, C, D (or a, b, c, d) specifies the number to be dialed

**Modifiers (arguments)****T            Tone dialing**

This command specifies tone dialing (default). Remains in effect until P is encountered in a dial string. The current setting can be verified by querying Register S14 (see "S Registers", beginning on page 31).

**P            Pulse dialing**

This command specifies pulse dialing. Remains in effect until T is encountered in a dial string.

**, Pause**

This command inserts a pause in dialing for the number of seconds specified in register S8. Often inserted after the 9 when dialing out of a PBX to allow time for the dial tone to occur before dialing the number. The pause can be set between 0 and 255 seconds. Multiple commas can extend the pause beyond 255 seconds.

**! Flash**

This command inserts a switchhook “flash” into the dialing sequence (used, for example, to initiate a call transfer within a PBX).

**/ 1/8 second pause**

This command inserts a 1/8 second pause in dialing. (The comma is in 1-second increments; slash provides 1/8-second increments where greater precision in timing is required.)

**@ Wait for silence**

This command instructs the T-311 to wait for 5 seconds of silence before continuing. If no 5 second silent period is detected within the time value set in register S7, the T-311 hangs up and returns a NO ANSWER message. If 5 seconds of silence is detected, the remaining characters in the dial string are processed. This feature is useful when dialing to telephone systems that generate no dial tone or voice to acknowledge that the call is connected.

**Note:** If you enter parentheses and hyphens in the command, the T-311 will ignore them.

**W Wait for dial tone**

This command instructs the T-311 to wait for the time value set in Register S7 for a dial tone

**< Wait for connection burst**

This command instructs the T-311 to wait for the time value set in Register S7 for a connection tone burst.

**> Wait for security tone passed**

This command instructs the T-311 to wait for 2 seconds for a “security tone passed” tone.

As an example, **ATD5551234<1234#>** dials another T-311 and waits for connection tone. The second T-311 generates connection tone and waits for the password. Then the first T-311 sends the password and waits for security clearance. Then they are connected.

**; Optional delimiter**

This command may be used as an optional command delimiter.

**“ ” Dial modifiers**

This command Allows use of alphabetical characters on a computer keyboard instead of numeric characters. The T-311 converts any characters enclosed in quotes as follows:

Alpha	DTMF
ABC	2
DEF	3
GHI	4
JKL	5
MNO	6
PQRS	7
TUV	8
WXYZ	9

For example, the command ATD“AEG”5678 is equivalent to ATD2345678

### **S           Autodial Stored Number**

This command instructs the T-311 to dial the stored number. The command format is: **ATDS <CR>**  
(To program the stored number, see AT&Z.)

### **E           Command Echo**

This command determines whether characters you type are echoed to the computer screen. If what you type appears double on the screen, disable the echo; if you cannot see what you type, enable echo, as follows:

#### **E0           Echo off**

This command disables local command echo.

#### **E1           Echo on**

This command enables local command echo. (Default)

### **H           On-/Off-Hook Command**

This command controls the “hook” status of the telephone line connected to the T-311; that is, it is equivalent to picking up and replacing a telephone handset.

#### **H or H0    On-hook**

This command places the line on-hook (hangs up). This command cancels either an H1 or an H2. *(Default)*

#### **H1           Off-hook**

This command takes the line off-hook.

#### **H2           Off-hook/remote off**

This command takes the line off-hook and closes the remote control relay.

#### **H3           Hold**

This command puts the line on hold

**Note:** When Bit 7 of Register S\*2 is set to 1, the T-311 will ignore an H0 and hang up when it receives an H3. This configuration is used when the T-311 is controlled by drivers written for a Zoom® modem.

### **I           Internal Memory Test**

This command performs the following internal memory tests:

#### **I or I0    Product code rev.no.**

This command displays product code and revision number

#### **I1           Checksum**

This command displays a firmware checksum

#### **I2           RAM**

This command tests internal RAM (soft resets the T-311).

**L            Microphone Control**

This command turns the headset microphone on or off. Typically, the microphone is automatically muted when dialing begins and remains muted until dialing is complete. This command may be used in conjunction with the D command to keep the microphone off until a voice or other call progress response is confirmed. Will not override any subsequent hang up or D commands that reset the microphone status.

**L or L0    Microphone off**

This command turns the microphone off.

**L1           Microphone on**

This command turns the microphone on.

For example, **ATD1234567L0<CR>** would mute the microphone after the dial sequence. The microphone will be unmuted when "VOICE" or "RB LOST" is validated. To force the microphone to unmute at any time, send **ATL1<CR>** to the T-311.

**M            Call Progress Message Display Definition**

This command determines the circumstances under which messages are displayed. Please note that this command works in conjunction with the Q (message display on/off) and V (verbose mode) commands.

**Note:** The T-311 M command serves a different function than the Hayes AT M command, which operates the modem speaker.

**M or M0    No messages**

No call progress messages are displayed.

**M1           Messages (without line verification)**

Call progress messages are displayed until answer (without line verification\* (call progress)).

**M2           Messages (with line verification)**

This command displays call progress messages until answer (with line verification\*). *(Default)*

\*Line verification is used to validate on- and off-hook, flash, and dial pulse.

**N            Display Stored Number**

This command displays the telephone number that previously stored using the AT&Z command.

**Q            Quiet Mode: Display Messages on/off**

This command determines whether messages are or are not displayed. It must be enabled (Q or Q0) for the M command to operate. The format of the messages is set by the V command.

**Q or Q0    Display on**

This command Messages are displayed (as determined by M and V command settings) *(Default)*

**Q1           Display off**

This command No messages are displayed.

## V Verbose Mode

This command determines whether messages will be returned as digit codes or as words. Four options are available:

### V or V0 AT codes

This returns standard AT single-digit codes

### V1 AT words

This returns standard AT word messages

### V2 AT & T-311 codes

This returns two-digit T-311 codes

### V3 AT & T-311 words

This returns T-311 word messages (*Default*)

## X Call Progress Monitoring

This command controls the type of call progress tones the T-311 can detect.

X command settings are stored in Register S\*5. To obtain a display of the current X command settings, that is, to determine the current call progress detection capability of the T-311, enter the command as follows:

```
AT S*5?<CR>
```

### Call progress Tone Tolerance

Call progress tones must be within the following tolerances:

Busy Tone:	400 - 600 mS on time
Reorder Tone:	200 - 300 mS on time
Ringback Tone:	800 - 2600 mS on time

**Note:** The T-311 version of the X command has been extensively modified and expanded from the standard AT version.

### X or X0 Codes 0 - 4

This command enables response codes 0 through 4 (OK, RING, and ERROR, as described in Table 6.) Dial tone and busy signal are not recognized so the T-311 dials without waiting for dial tone.

#### X1

This command is not applicable in T-311; command will function as X0.

### X2 Codes 0—6

This command enables response codes 0 through 6 (OK, RING, ERROR, and NO DIAL TONE). The T-311 waits for dial tone before it begins dialing and returns a NO DIALTONE message if dial tone is not detected within 30 seconds (or the time set in S8). Busy signals are not recognized.

### X3 Codes 0, 2, 4, 7

This command enables response codes 0, 2, 4, and 7 (OK, RING, ERROR, BUSY, and REORDER). The T-311 dials without waiting for dial tone and returns a a BUSY message if a busy signal is detected.

**X4 Codes 0, 2, 4, 6, 7**

This command enables response codes 0, 2, 4, 6, and 7 (OK, RING, ERROR, NO DIAL TONE, and BUSY). The T-311 waits for dial tone before dialing and returns a NO DIALTONE message if dial tone is not detected within 5 seconds, and a BUSY message if a busy signal is detected.

**Detector toggles****X5 Call progress**

This command toggles on/off dial, busy, ringback, and reorder tones.

**X6 Voice**

This command toggles on/off the voice detector

**X7 SIT**

This command toggles on/off the Special Information Tone (SIT) detectors

**X8 DTMF**

This command toggles on/off the DTMF detectors

**X9 Single tone**

This command toggles on/off single tone detection

**XB All on**

This command enables all detectors. All call progress tones are detected and reported. (*Default*)

**XC All off**

This command disables all detectors.

**EXAMPLES:**

ATX<CR>	enables OK, RING, and ERROR
ATX5X7X8<CR>	toggles dial, busy, ringback, and reorder tones, SIT detectors, and DTMF detectors to the other state.
ATXB<CR>	enables all detectors.
ATXBX6<CR>	enables all detectors and toggles voice detector off.
ATXCX8<CR>	disables all detectors and toggles DTMF on.

The default state for X5, X6, X7, XC8, and X9 is on.

**XF**

This command toggles on/off the detector for FSK transmissions for Caller ID & VISUAL MESSAGE WAITING for -B version only..

**Z Reset Command**

This command resets the T-311 EEPROM or RS-232 port, as follows:

**Z or Z0 EEPROM**

This command resets the T-311 using the values stored in EEPROM (whether user-defined or factory values). If there are no values stored in EEPROM, the T-311 is reset with the default values (EEPROM settings).

**Z1 RS-232**

This command resets the T-311 RS-232C port to default values (the contents of registers S\*4 and S13, and bit 1 of S14, are reset to default values, that is: 1200 baud, 8-bit data word, parity off, echo off).

**&D Response to DTR**

This command determines the T-311 response to a Data Terminal Ready (DTR) signal received from the computer.

**&D or &D0 Ignore DTR, LED on**

This commands the T-311 to ignore DTR (RS-232-C pin 4) and turns the DTR LED permanently on. (*Default*)

**&D1 Not recognized by the T-311.****&D2 Hang up on transition of DTR**

This commands the T-311 to hang up the line when it detects an on-to-off transition on the DTR line. LED follows DTR state.

**&F Fetch default configuration**

This command reads the default configuration stored in EPROM into RAM, making it the active configuration. It can then be saved in EEPROM using the &W command.

**&W Write active configuration into EEPROM**

This command writes the values in RAM (that is, the current contents of the S registers) into EEPROM (nonvolatile storage). The next time the T-311 is reset, the values stored in EEPROM will be loaded. The stored number (see &Z command) is not affected.

For example, **AT&F&W** reads the factory configuration into RAM (working memory) and stores it in EEPROM

**&Z Store telephone nNumber**

This command stores a telephone number in EEPROM (nonvolatile storage).

The dial string may contain a maximum of 33 characters.

**AT&Zn...n<CR>** stores the number n...n (including dial modifiers).

The number is dialed using the command: **ATDS<CR>**

**A/ Repeat last command**

This command executes the command string stored in the command buffer, generally for redialing. It is not preceded by AT.

**\*A Display Current Line Status**

This command shows the current status of the telephone line and the headset interface. The T-311 must be in V3 mode.

This command obtains a display in the following format:

Line: Off-hook, On-hook, On Hold, or Ringing, DTMF or Pulse Dialing, Mute On or Mute Off (as controlled by T-311, not from the headset)

**\*B Display Current T-311 Status**

This command shows the current setting of all S registers, including information on the RS-232 port parameters, status of the various receivers, and which options are enabled. The T-311 must be in V3 mode.

**\*C Password Enable/Disable**

This command enables or disables security checking on incoming calls to the T-311. The password is set or changed using the \*W command.

**\*C or \*C0 Security Off**

This command disables the function. No password is required to access the T-311. (Default)

**\*C1 Security On**

This command enables the function. The T-311 requires incoming callers to enter a password.

**\*D**

This command will display the last stored Caller ID message (provided that ATV3 is used (default)), on -B version only..

**\*E**

This command clears the Caller ID buffer as displayed by \*D.

**\*R Turn Remote Control/Audio Input On/Off**

This command turns the remote control switch and audio input on or off. The audio input is the input from the remote device which is output over the network.

**\*R or \*R0 Turn Remote Control Switch and Audio Input OFF**

This command turns both remote control switch and audio input OFF (Default)

**\*R1 Turn Remote Control Switch ON and Audio Input OFF**

This command turns the remote control switch ON and audio input OFF (to record from the phone line)

**\*R2 Turn Remote Control Switch and Audio Input ON**

This command turns both remote control switch and audio input ON (to play back to the network)

**\*W Set Password**

This command sets the password for incoming calls to the T-311. A telephone *cannot* be used to set the password; it must be set through the computer. The password may be any 3 to 15 character combination of 0 - 9, \*, and A - D, and must be terminated by #, <CR>. (The # counts as one digit.)

The password is automatically saved in EEPROM. \*C must also be set to enable.

\*Wnnn#<CR> sets the password nnn.

For example, **AT\*W620ACDC\*B4#** <CR>

**S Registers**

T-311 configuration parameters are retained in S registers. Changes to the default configuration are made either by directly manipulating the contents of the S register or through another AT command, as described in Chapter 10. To read the contents of a register, issue: **AT Sxx?** ( xx is the register

number). All S registers except those identified as “read only” can be changed directly as described in Chapter 10. Table 5 is a summary of the S registers.

**Note:** Register numbers preceded by \* are unique to the T-311. Those flagged with ⇐ are variations from the Hayes S registers. All others are comparable to the corresponding Hayes S registers.

<b>Table 5 S Register Summary</b>			
<b>Register</b>	<b>Item</b>	<b>Default value</b>	<b>Value range</b>
<b>S0</b>	Number of rings for auto answer	<b>0</b>	<b>0-255</b>
<b>S1</b>	Ring counter	<b>Read only</b>	<b>NA</b>
<b>S3</b>	End-of-line character <CR>	<b>Carriage return (013)</b>	<b>0-127</b>
<b>S4</b>	Line feed character <LF>	<b>Line feed (010)</b>	<b>0-127</b>
<b>S5</b>	Backspace character	<b>Backspace (008)</b>	<b>0-32, 127</b>
<b>S6</b>	Pause before dialing	<b>2 seconds</b>	<b>0-255</b>
<b>S7</b>	Call completion timeout	<b>30</b>	<b>0-255</b>
<b>S8</b>	Pause for comma in dial string	<b>2 seconds</b>	<b>0-255</b>
<b>S10</b>	Call disconnect timeout	<b>0 (disabled)</b>	<b>1-127</b>
<b>S11</b>	DTMF dialing rate	<b>70</b>	<b>50-255</b>
<b>S13</b>	RS-232 port data format	<b>8</b>	<b>NA, bit mapped</b>
<b>S14</b>	Option configuration	<b>203</b>	<b>NA, bit mapped</b>
<b>S*0</b>	Ringback tones before disconnect	<b>0</b>	<b>0-255</b>
<b>S*2</b>	Verification and display	<b>67</b>	<b>NA, bit mapped</b>
<b>S*3</b>	Flash interval	<b>5 (hundreds of )</b>	<b>3-11</b>
<b>S*4</b>	Baud rate	<b>2 (1200 baud)</b>	<b>0-5</b>
<b>S*5</b>	Receiver status	<b>Read only</b>	<b>NA</b>
<b>S*6</b>	Telephone line status	<b>Read only</b>	<b>NA</b>
<b>S*7</b>	Head/handset status	<b>Read only</b>	<b>NA</b>

### **S0 Auto Answer**

This command holds the number of rings after which the T-311 automatically answers an incoming call. A value of 0 disables the automatic answer function.

Valid range: 0-255  
 Units: Rings  
 Default: 0

**S1 Ring Counter (Read only)**

This command counts the rings as the T-311 receives them. The register is automatically reset to 0 between calls or after 8 seconds have elapsed without a ring.

Valid range: 0-255  
 Units: Rings  
 Default: 0

**S3 End-of-line Character <CR> (command terminator)**

This command contains the value of the first newline character (CR), which is also the command terminator. (Since S3 is also the command terminator, caution is advised before changing this character.)

Valid range: 0-127  
 Units: ASCII  
 Default: 13 (ASCII CR; 0D hex)

To change the value, enter `ATS3=xx<CR>` where `xx` is the decimal equivalent of the ASCII character you want to use. See Table 11.

**S4 Line Feed Character <LF>**

This command contains the second newline character (always used in conjunction with S3).

Valid range: 0-127  
 Units: ASCII  
 Default: 10 (ASCII LF; 0A hex)

To change the value, enter `ATS4=xx<CR>` where `xx` is the decimal equivalent of the ASCII character you want to use. See Table 11.

**S5 Backspace Character**

This command contains the value of the backspace character, which must be an ASCII control character. The backspace command causes a backspace + delete + backspace to the DTE, when command echo is enabled.

Valid range: 0-32 and 127  
 Units: ASCII  
 Default: 08 (ASCII BS)

To change the value, enter `ATS5=xx<CR>` where `xx` is the decimal equivalent of the ASCII character you want to use. See Table 11.

**S6 Pause Before Dialing**

This command contains the value of the wait time after off-hook before the T-311 begins dialing. Dial tone must be present before dialing commences.

Valid range: 0-255 (When the value is set for 0, it will delay for .6 seconds.)  
 Units: seconds  
 Default: 2

**S7 Call Completion Timeout**

This command sets the amount of time that the T-311 will wait after dialing for a network response (other than dial tone) before it disconnects and returns a NO ANSWER message. A value of 0 disables this function.

Valid range: 0-255  
 Units: seconds  
 Default: 30

**S8 Pause for Comma in Dial String**

This command contains the number of the seconds the T-311 pauses when it receives a comma in a dial sequence. Multiple commas can also be entered in the dial string for longer delays.

Valid range: 0-255  
 Units: seconds  
 Default: 2

**S10 Call Disconnect Timeout**

This command sets the amount of time the unit must detect no activity on the line before disconnecting the call. A value of 0 disables the function.

Valid range: 0-255  
 Units: seconds  
 Default: 0

**S11 DTMF Dialing Rate**

This command contains the duration of DTMF tones. The spacing between the tones is always the same value. The longer the duration, the slower the dialing.

Valid range: 50-255  
 Units: milliseconds  
 Default: 70

**S13 Data Word Format**

This command stores the parity information for T-311 data. Changes to this register are made by re-mapping the bits, as described in Appendix C. Also see the appendix for information on reading the contents of this register. The default data word format is an 8-bit data word, with parity set to "off" (ignore parity). The status of bit 4 (Response to DTR) affects the T-311's recognition of other bits as follows:

When bit 4 is set to off and parity is on, bit 5 is ignored.

When bit 4 is off and parity is off, bit 3 is ignored.

When bit 5 is set to "on", bits 2 and 3 are ignored.

Position	Value	Function
BIT 0	—	Not used
BIT 1	0	Not used
BIT 2	0	Parity off ( <i>default</i> )
BIT 2	1	Parity on
BIT 3	0	Odd parity
BIT 3	1	Even parity ( <i>default</i> )
BIT 4	0	7 data bits ( <i>default</i> )
BIT 4	1	8 data bits
BIT 5	0	BIT 8 = 0 (SPACE PARITY) ( <i>default</i> )
BIT 5	1	BIT 8 = 1 (MARK PARITY)
BIT 6	—	Not used
BIT 7	—	Not used

To display the current contents of this register, issue the command `ATS13?<CR>`. The default response is 8. To turn on even parity, send: `ATS13=12<CR>`.

## S14 User Configuration

Stores configuration values that may be changed by the user with AT commands, as indicated below. (The contents of S14 can also be changed directly by remapping the bits as described in the appendix.) Also see the appendix for information on reading the contents of this register.

Position	Value	Function	Set by Command
BIT 0	0	Hayes Result Codes/messages	V, V0, or V1
BIT 0	1	T-311 Result Codes/messages	V2 or V3 <b>(default)</b>
BIT 1	0	Local Character Echo Off	E0
BIT 1	1	Local Character Echo On	E1 <b>(default)</b>
BIT 2	0	Status Display On	Q, Q0 <b>(default)</b>
BIT 2	1	Status Display Off	Q1
BIT 3	0	Status Codes Sent	V, VO, V2
BIT 3	1	Status Messages Sent	V1, V3 <b>(default)</b>
BIT 4	0	Not used	
BIT 5	0	Tone-dialing	T (in D command dial string; for example ATDTn...n) <b>(default)</b>
BIT 5	1	Pulse-dialing	P (in D command dial string; for example ATDPn...n)
BIT 6	0	Enable Tone Disconnect	Disconnects incoming call on dial, busy, or reorder tone.
BIT 6	1	Disable Tone Disconnect	Do not disconnect incoming call on dial, busy, or reorder tone. <b>(default )</b>
BIT 7	0	Answer Mode	(Status bit)
BIT 7	1	Originate Mode	(Status bit) <b>(default)</b>

To display the current contents of this register, issue the command **ATS14?<CR>**. The default response is 203 (see the appendix for more information).

To change to pulse dialing, enter the command **ATS14=235**, or simply dial **ATDPn...n<CR>**.

## S\*0 Ringback Tones Before Disconnect

This register holds the number of ringbacks the T-311 is to detect before it disconnects the line and returns a NO ANSWER message.

Valid range: 0-255  
 Units: Rings  
 Default: 0 (disabled; the T-311 will disconnect if a call is unanswered within the time set by S7)

## S\*2 Verification and Display

This register stores several option settings including: the message display conditions defined by the M command, whether or not the T-311 will return acknowledgment tone on answer, the T-311 response to a Data Terminal Ready (DTR) signal from the computer, enabling or disabling security checking, and the disconnect sequence.

Position	Value	Function	Set by command
BIT 0	0	Line Verification Off	M, M0, M1
BIT 0	1	Line Verification On	M2 <b>(default)</b>
BIT 1	0	Message Display Disabled	M, M0
BIT 1	1	Message Display Enabled	M1, M2 <b>(default)</b>

BIT 2	—		Not Used
BIT 3	0	No Connection Tone On Answer	<b>(default)</b>
BIT 3	1	Connection Tone On Answer	
BIT 4	0	Dtr Recognized As Always On	&D, &D0 <b>(default)</b>
BIT 4	1	System Hangs Up On On-to-off Transition Of Dtr	&d2
BIT 5	0	Security Checking Off	*C or *C0 <b>(default)</b>
BIT 5	1	Security Checking On	*C1
BIT 6	0	COD Recognition Disabled	
	1	COD Recognition Enabled	<b>(default)</b>
BIT 7	0	Normal Disconnect Sequence	(default)
	1	Alternate Disconnect Sequence	

- To display the current contents of this register, enter `ATS*2?<CR>`. The default response is 67 (see the appendix for more information).
- To enable the password, enter `AT*C1<CR>`. The response to a query command would then be 99.

### S\*3 Flash interval

This register sets the duration for an outgoing switchhook flash.

Valid range: 3-11  
 Units: hundreds of milliseconds  
 Default: 5 (that is, 500 ms)

### S\*4 Baud Rate

This register holds the baud rate for the communication port.

Valid range: 0-5  
 where:  
 0 = 300 baud  
 1 = 600 baud  
 2 = 1200 baud  
 3 = 2400 baud  
 4 = 4800 baud  
 5 = 9600 baud

Default: 2 (1200 baud)

To change both baud rate and parity, the S\*4 and S13 registers may be set within the same AT command. For example, to change to 9600 baud with even parity, enter: `ATS*4=5S13=12<CR>`

### S\*5 Receiver Status (read only)

This register stores call progress detection values, which can be changed using the X command. See the appendix for information on reading the contents of this register.

**Note:** X6 through X9 are toggle on/off commands.

Position	Value	Function	Set by command
BIT 0	1	Dial Tone	X2, X4, X5, or XB
BIT 1	1	Busy/reorder	X3, X4, X5, or XB
BIT 2	1	Ringback	X5 or XB
BIT 3	1	CID & VMW	XF or XB
BIT 4	1	Voice	X6 or XB

BIT 5	1	Sit	X7 or XB
BIT 6	1	DTMF Receiver	X8 or XB
BIT 7	1	Single Tone Detection	X9 or XB

- To display the contents of this register, enter `ATS*5?<CR>`. The default response is 247.
- To change, for example to toggle SIT off, enter `ATX7<CR>`, giving a query response of 215.

### **S\*6 Line Status (read only)**

This register displays the current status of the T-311 telephone line. See the appendix for information on reading the contents of this register.

Position	Function
BIT 0	Line Off-hook
BIT 1	Line On Hold
BIT 2	Ring Incoming
BIT 3	Reserved
BIT 4	Reserved
BIT 5	Reserved
Bit 6	Reserved
Bit 7	Message Waiting

**Note:** 1 = active; 0 = idle

### **S\*7 Headset/Handset Status (read only)**

This register displays the current status of the headset interface. See the appendix for information on reading the contents of this register.

Position	Value	Function
BIT 0	0	Hook Status (on/off Hook)
BIT 1	1	Microphone Off
	0	
BIT 2	0	Headset Mode
	1	Sending DTMF, Sending From Remote, or Idle
BIT 3	0	Remote Switch
BIT 4	0	DTMF
BIT 5	0	External Audio
BIT 6	0	Spare
BIT 7	—	Spare

**Note:** 1 = enabled; 0 = disabled

## Chapter 9: Messages

Messages are ASCII character strings transmitted by the T-311 to the computer for the purpose of providing information about T-311 operation. Messages may be formatted for display on a computer or printer, or for reading by an applications program running on the computer.

### Message Format

T-311 response messages are listed in Table 6.

The T-311 will return either a limited set of messages based on the standard AT message set or a complete set of T-311 messages. The latter supports capabilities in the T-311, such as extended call progress monitoring and security checking, that are not present in modems. For both message sets, either digit-code-only messages (which serve the needs of applications programs), or digit-code-plus-English-word messages, may be specified. These options are determined by the setting of the V28 command, as follows:

V or V0	AT messages, digit code only
V1	AT messages, words
V2	T-311 messages, digit code only (two digits)
V3	T-311 messages, words

Table 6 T-311 Response Messages			
Digit Code	Word Code	X Commands Enabled	Description
<b>Standard "AT" Commands</b>			
0	OK	0,1,2,3,4	Non-dial command successful
2	Ring	0,1,2,3,4	Incoming ring
4	Error	0,1,2,3,4	Error in command line
6	No dial tone	2,4	No dial tone or second dial tone detected
7	Busy	3,4	Busy signal detected
8	No answer	3,4	No answer
9	Not used		Command or S register not used in T-311
<b>T-311 COMMANDS</b>			
<b>System Messages</b>			
00	OK	All	Non-dial command successful
01	Status MD=...	All	System parameter status report
04	Error	All	Command error
05	Copyright notice...	All	T311 TAU 2.01 Copyright 1991-94 Teltone Corp.
09	Not used	All	Specified AT command or S register not supported
<b>Call Answering Messages</b>			
10	Ring	All	Incoming ring received
11	Ring Lost	All	Incoming ring lost
12	Answered	All	Line answered
16	Pass	All	Password was accepted
17	Fail	All	Password was not accepted
18	No ringing detected	All	Specified AT command or S register not supported
<b>Call Falling Messages</b>			
20	Dial Tone	X2,X4,X5	Found dial tone
21	Busy	X3,X4,X5	Found busy signal
22	Ringback	X5	Found ringback tone
23	RB Lost	X5	Ringback tone ceased
24	Reorder	X3, X5	Found reorder tone
25	Voice	X6	Voice detected
26	SIT	X7	Special Information Tones detected
29	T-311 Connect	X8	Detected T-311 answer tone

Table 6 T-311 Response Messages			
Digit Code	Word Code	X Commands Enabled	Description
30	No dial tone	X2,X4,X5	No dial tone found
31	No answer	X5	Ringback count exceeded
32	Lost	—	Encountered unknown event
Line Control Messages			
40	Seized	All	Line seized
41	Seize Failure	All	Failed to draw loop current
42	Disconnect	All	Line has been disconnected
43	Disconnect Failure	All	Loop current failed to drop
44	Line not available	All	Line already seized
45	No loop current	All	Loop current dropped unexpectedly
46	Line on hold	All	Line on hold
47	Line 1 selected	All	Line is set to current line
54	Line not available	All	Line already seized
60	—	All	(Reserved for future use)
61	No activity	All	No activity timeout reached
62	Flash	All	Flash line
63	Flash failure	All	Loop current failed to flash
64	Phone off-hook	All	Loop current appeared (series phone off-hook)
65	Phone on-hook	All	Loop current gone
66			Single message format (Caller ID) Multiple message format (Caller ID)
67	VMS		Visual Message -Single message format Visual Message - Multiple message format

## Chapter 10: Configuration

---

T-311 configuration parameters are retained in S registers in the T-311 memory. On initial powerup of the unit, the S registers contain factory default values.

You can change some default parameters by issuing a command to the S register. Others (specifically, those flagged in Tables 8 and 9), are made via AT commands. For example, the E command is used to enable or disable local echo, and its status is stored as bit 1 of register S14.

Table 7 lists the configuration options, the AT commands or S registers used to change them, and the command format. Table 8 lists the configurable parameters and their default settings alphabetically and Table 9 provides the same information listed by command code.

### Command Format

All commands, with the exception of REPEAT (A), are issued in the following format: **AT** <one or more commands><**CR**>

For more information see Chapter 8.

#### FSK Message Format

When a Caller ID/Visual Message Waiting (CID/VMW) message has been received and decoded by the T-311-B-01 it will immediately be transmitted to the serial port if the following conditions are true: 1. The CID/VMW outputs are enabled via the ATXF command (default = enabled). 2. The verbosity level is set to three (default = ATV3). 3. There are no other serial messages being output. If another message is being output (e.g. "RING") the T-311-B-01 will wait until that message is complete before outputting the CID/VMW message. The ASCII message string format for Caller ID will be as follows:

With a valid telephone number:

```
XYIDT_MM/dd_HH:mm_(AAA)XXX-LLLL_NNNNNNNNNNNNNNNN_CXY
```

With out-of-area call:

```
XYIDT_MM/dd_HH:mm___OUT_OF_AREA_____CXY
```

With private call:

```
XYIDT_MM/dd_HH:mm_____PRIVATE_____CXY
```

(message is always 51 characters long)

where:

ID = ASCII "ID" signifying caller ID message to follow

T = ASCII "S" for single message format,

ASCII "M" = multiple message format

\_ = ASCII space (20h)

MM = month (e.g. "01" for January, "12" for December)

dd = day of month (e.g. "02" for 2nd day of month)

HH = hour of the day in 24 hour format (e.g. "14" = 2 PM)

mm = minutes

AAA = digits of area code

XXX = digits of exchange

LLLL = line number

NN...NN = name if multiple message format, spaces if single message format

C = ASCII "G" for good checksum, ASCII "B" for bad checksum

X = carriage return character as defined by S3 register (default = 0Dh)

Y = line feed character as defined by S4 register (default = 0Ah)

Items in the phone number and name fields will be right justified (spaces added) if the number or name is less than the number of characters shown. If the number does not have an area code, the parenthesis will be replaced with spaces. If the number is less than 5 digits the "-" will be replaced with a space.

The ASCII message string format for Visual Message Waiting will be:

XYVMT\_NNN\_CXY

(message is always 13 characters long)

where:

VM = ASCII "VM" signifying visual message waiting to follow

T = ASCII "S" for single message format,

ASCII "M" = multiple message format

\_ = ASCII space (20h)

NNN = ASCII "\_ ON" for indicator on, ASCII "OFF" for indicator off

C = ASCII "G" for good checksum, ASCII "B" for bad checksum

X = carriage return character as defined by S3 register (default = 0Dh)

Y = line feed character as defined by S4 register (default = 0Ah)

## Saving a Configuration

When you have finished entering all your configuration changes, issue the command to save the configuration: **AT&W<CR>**

If you want to restore the factory settings temporarily (that is, write them into RAM, enter: **AT&F<CR>**)

To restore the factory settings permanently, enter **AT&F&W<CR>**. Your user configuration would be overwritten.

## S Register Queries and Commands

To read the contents of a register, issue the following command:

**AT Sxx? <CR>** where xx is the register number.

The T-311 will return a decimal number between 0 and 255. In the case of bit-mapped registers (S13, S14, S\*2, S\*5, S\*6, and S\*7) the number represents the sum of up to 8 binary conditions. See Appendix C for an explanation.

**Note:** Register numbers preceded by \* are unique to the T-311.

To change the contents of a register by addressing the register directly, issue the following command:

**AT Sxx=nnn...<CR>**

Where xx is the register number and nnn is the value to be entered.

See Appendix C for more information on changing the values of bit-mapped registers.

Table 7 lists the configuration options, the AT commands or S registers used to change them, and the command format.

Table 7 Configuration Options				
Parameter	Options	Command/ Register	Format	Default
<b>computer Communications</b>				
Baud rate	300-9600 bps	S*4	ATS*4=n	2
Parity	on/off, 7-8 bits, start/stop	S13	ATS13=n	8
Echo	on/off	E	ATE, E1	E1
Carriage return	0-127 decimal ASCII equivalent	S3	ATS3=	13
Line feed	0-127 decimal ASCII equivalent	S4	ATS4=	10
Backspace	0-32 and 127 decimal ASCII equivalent	S5	ATS5=	08
<b>Call Answering</b>				
Auto answer	on/off, number of rings	S0	ATS0=n	off
Password	on/off set code number	*C *W	AT*C, *C1 AT*...n#	off no number
<b>Dialing Out</b>				
Dial string: Pause before dialing to wait for dial tone	0-255 seconds	S6	ATS6=n	2 seconds
Pause for comma	0-255 seconds	S8	ATS8=n	2 seconds
DTMF dialing rate	50-255 milliseconds	S11	ATS11=n	70
Call Disconnect: Call completion timeout	0-255 seconds	S7	ATS7=n	30 sec
Call disconnect timeout	0-255 seconds	S10	ATS10=n	0
Rings before disconnect	0-255 rings	S*0	ATS*0=n	0
Store and autodial number Store number Dial stored number	33 characters —	&Z S	AT&Z=n...n	no number —
<b>Messages</b>				
Message display	on/off	Q	, Q1	on
Message format	digit or verbose	V		V3
Message definitions	which call progress is reported	M		M2
Call progress monitoring	which call progress is detected	X		B (all)

Table 8 lists the parameters and their default settings alphabetically.

Table 8 Default Configuration (by Parameter)		
Parameter	Default	State
Auto answer	S0=0	Disabled
Backspace character	S5=08	ASCII 08
Baud rate	S*4=2	1200 baud
Call completion timeout	S7=30	30 seconds
Call disconnect timeout	S10=0	Disabled
Call progress monitoring ⇐		All detectors enabled
Carriage return character	S3=13	ASCII 13
DTMF dialing rate	S11=70	70
Echo on/off ⇐	E1	On
Line feed character	S4=10	ASCII 10
Message display definition ⇐	M2	Messages are displayed until answer (with line testing)
Message display on/off ⇐	Q	Enabled
Message format ⇐	V3	T-311 word result codes are returned
Parity information	S13=8	8-bit data word, parity off
Password definition ⇐	*W	No password entered
Password enable/disable	*C	Disabled
Pause before dialing	S6=2	2 seconds

Parameter	Default	State
Pause for comma in dial string	S8=2	2 seconds
Rings before disconnect	S*0=0	Disabled
Store phone number ←	&Z	No number

† Use the indicated AT command to change the parameter.

Table 9 shows the configurable parameters and their default settings listed by command code.

Parameter	Default	State
Echo on/off ←	E1	On
Message display ←	M2	Messages are displayed until answer (with line testing)
Message display on/off ←	Q	Enabled
Message ←	V3	T-311 word result codes are returned
Call progress monitoring ←		All detectors enabled
Store phone number ←	&Z	No number
Password enable/enable ←	*C	Disabled
Password definition ←	*W	No password entered
Auto answer	S0=0	Disabled
Carriage return character	S3=13	ASCII 13
Line feed character	S4=10	ASCII 10
Backspace character	S5=08	ASCII 08
Pause before dialing	S6=2	2 seconds
Call completion timeout	S7=30	30 seconds
Pause for comma in dial string	S8=2	2 seconds
Call disconnect timeout	S10=0	Disabled
DTMF dialing rate	S11=70	70 mS
Parity information	S13=8	8-bit data word, parity off
Rings before disconnect	S*0=0	Disabled
Baud rate	S*4=2	1200 baud

Use the indicated AT command to change the parameter.

## RS-232-C Communications Link

The T-311 is linked to the computer via a DB-9 (9-pin) EIA RS-232-C asynchronous serial interface. In the T-311 implementation of this interface, four signals are used to exchange data with the computer:

TX (Transmitted data from computer to T-311)

(Received data from T-311 to computer)

(Data Terminal Ready; signal from computer to T-311 indicating that computer is ready to transfer and receive data)

RI (Ring Indicator; signal from T-311 indicating that ringing is being detected)

**Note:** By RS-232-C convention, the T-311 is classified as “” and the computer as “DTE”. Signals are always designated with reference to the DTE device.

## Data Word Format

Data is transmitted via the TX and RX signals at selectable rates between 300 and 9600 baud. Data words are ten bits long, consisting (in order of transmission) of one start bit, seven or eight data bits representing a standard ASCII character, an optional parity bit, and one stop bit. The following formats are supported:

Format		S13 Value
1 start bit, 7 data bits, even parity,	1 stop bit	12
1 start bit, 7 data bits, odd parity,	1 stop bit	4
1 start bit, 8 data bits, no parity,	1 stop bit	8
1 start bit, 7 data bits, "Mark",	1 stop bit	48
1 start bit, 7 data bits, "Space",	1 stop bit	16

TX Input. The T-311 receives data from the computer via the TX input. Any character which does not fall into one of the following data types is also ignored:

(1) **Commands** are ASCII strings, beginning with AT and ending with a carriage return (CR) or the character programmed in register S3, transmitted by the computer for the purpose of controlling T-311 operation. Commands are described in detail in Chapter 8.

(2) **Data Characters** are transmitted using the ATD command (**Note:** this differs from Teltone T-310 operation, in which data is not sent in command mode.) For example, the data string 12345 is sent by the command ATD12345<CR> where <CR> is normally carriage return. A maximum of 40 characters may be sent; if a large block of data is to be sent, then multiple ATD commands must be issued. If the DTMF receiver is enabled, the DTMF digits sent will be echoed back to the computer. This feature allows the user to monitor when one block of data is complete and a new ATD command can be issued.

**Note:** If a new command is issued before the current command is complete, the new command will interrupt the first.

RX Output. The T-311 transmits data to the computer via the RX output. The following types of data are output by the T-311. See "echo feature" on page 26.

(1) **Messages** are ASCII character strings, ending with a carriage return and line feed (in V1 and V3 mode), transmitted to the computer to provide information about T-311 operation. Messages are described in detail in Chapter 4.

(2) **Data Characters** are DTMF signals received by the T-311 from the network, converted to their ASCII equivalents (see Table 10), and transmitted to the computer as described in the DTMF/ASCII conversion section of Chapter 2.

Input DTMF Signal (to T-311)	ASCII Character			Output DTMF Signal (from T-311)
	Code	Dec	Hex	
0	0	48	30	0
1	1	49	31	1
2	2	50	32	2
3	3	51	33	3
4	4	52	34	4
5	5	53	35	5
6	6	54	36	6
7	7	55	37	7
8	8	56	38	8
9	9	57	39	9

<b>Table 10 DTMF/ASCII/DTMF Translation</b>				
<b>Input DTMF Signal (to T-311)</b>	<b>ASCII Character</b>			<b>Output DTMF Signal (from T-311)</b>
	<b>Code</b>	<b>Dec</b>	<b>Hex</b>	
*	*	42	2A	*
#	#	35	23	#
A	A	65	41	A
B	B	66	42	B
C	C	67	43	C
D	D	68	44	D
—	a	97	61	A
—	b	98	62	B
—	c	99	63	C
—	d	100	64	D

## Appendix A: Service Information

---

### Ordering Information

#### **T-311-B-01**

T-311 Telephone Access Unit. Includes 12 VAC power transformer and manual.

The T-311-B-01 supports Caller ID and Visual Message Waiting.

#### **T-311-C-01**

T-311 Telephone Access Unit. Includes 12 VAC power transformer and manual.

#### **UM-111-401**

Universal Mounting Bracket for wall mounting up to four T-311 units.

#### **UM-113-801**

Universal Mounting Shelf for rack mounting up to eight T-311 units. Includes a power strip.

#### **742-00017-01**

DB-9(male) to DB-25(female) RS232C Cable

#### **CA-7F**

7 ft. Modular Cord (required for connecting T-311 to telephone line)

#### **740-00053-17**

25 ft. Modular Cord (required for connecting T-311 to telephone line)

#### **610-00066-01**

12 VAC Power Transformer (spare)

### Warranty

Teltone warrants this product to be free from defects in material and workmanship for a period of two years, given proper installation and usage. At its sole discretion, Teltone will repair or replace free of charge any unit found to be defective during the warranty period. Units found to be defective beyond the warranty period will be repaired or replaced at a flat.

## Troubleshooting

If you experience difficulty operating your T-311, follow these steps:

- Disconnect your T-311 from the telephone line, connect a telephone in its place, and attempt to place a call. If you are successful, the difficulty is probably not in the line.
- Verify that the computer is working properly, along with its RS-232-C cable and communications software (if required). Use the receive and transmit data LED's on the front panel to assist in troubleshooting. Contact Teltone for help, if needed.
- Return your T-311 to Teltone for repair as instructed in the next section.

## Return Procedures

If a unit is found to be defective, contact Teltone customer service to obtain a RMA (Return Material Authorization) number and shipping instructions. When returning units, provide the following information:

- Unit model number, unit part number, and serial number (obtained from the Unit ID label).
- Teltone RMA number
- All available fault information
- Complete shipping and billing address
- Repair purchase order

## Appendix B: Specifications

This chapter provides technical specifications for the T-311, a block diagram, and information on reading and writing to bit-mapped S registers.

<b>Loop Line Interface</b>	
Return loss (complies with VG2 of TR-NPL-000335, Iss. 1, June 1986)	
Echo return loss ( )	>15 dB (500-2500 Hz) (Off-hook condition) > 5 dB (500-2500 Hz) (On hold condition)
Singing return loss, low ( )	> 9 dB (200-500 Hz) (Off-hook condition) > 5 dB (200-500 Hz) (On hold condition)
Singing return loss, high ( )	> 9 dB (2500-3400 Hz) (Off-hook condition) > 5 dB (2500-3400 Hz) (On hold condition)
Longitudinal balance	>60 dB (300-3200 Hz)
<b>Power Input Requirements</b>	
Use only UL listed power transformer rated 120 VAC, 60 Hz, 10 W input; 12 VAC, 250 mA output, available from Teltone.	
Input voltage range	12 VAC $\pm$ 10%
Current requirements	0.25 Amperes maximum
<b>Data Port ( RS-232-C)</b>	
Protocol	Asynchronous ASCII, 1 start bit, 7 data bits, 1 parity bit, 1 stop bit
Baud rates supported	300, 600, 1200, 2400, 4800, 9600
Parity supported	Space (bit 8=0), Mark (bit 8=1), Even, Odd, or Parity Off
<b>Remote Interface</b>	
Control Switch Characteristics	
Maximum controlled voltage	20 VAC or DC
Maximum on-state current	100 mA
Maximum off-state leakage	<10 $\mu$ a
Audio Input (From Remote)	
Maximum input level without clipping	1
Input impedance	>10 K ohms
Audio Output (To Remote)	
Maximum output level	1.2
Output impedance	Output impedance <4 K ohms
<b>Network Transmit Audio Level</b>	
Maximum output level	-9 dBm averaged over 3 seconds
<b>Call Progress Tone Receivers</b>	
Call Progress Tone receiver	
Response range	-2 to -30 dBm/frequency
Frequency detect range	340 to 640 Hz
Tones detected:	
Dial tone	Continuous
Busy	0.5 second on, 0.5 second off
Ringback	2 seconds on, 4 seconds off
Reorder	0.25 second on, 0.25 second off
Special information tone (S.I.T.) receiver:	
Response range	
Short pulse duration detect	0. to -24 dBm0
Long pulse duration detect	274 $\pm$ 5%
S.I.T. frequencies detected	380 ms $\pm$ 5% 950, 1400, 1800 Hz $\pm$ 50 Hz

<b>DTMF Signaling</b>	
Transmitter: Maximum output level Frequency tolerance Dialing delay Digit signal length Interdigit time Maximum twist Receiver: Response range (level) Minimum response (time, all signals) Must not respond (time) Minimum digit separation Maximum digit interruption (hit) time Maximum twist (high tone to low tone) Frequency tolerance Confirmation tones: Connection tone Acknowledgement tone Error tone	-9 dBm averaged over 3 seconds $\pm 1.5\%$ of nominal 70 ms after start signal Programmable: 50 to 255 ms $\pm 5$ ms Same as digit signal length 3 dB -5 to -30 dBm/frequency $\geq 40$ ms $\leq 20$ ms 40 ms 10 ms 6 dB $\pm (1.5\% + 5)$ Hz 1 second burst of 941 Hz tone One burst of DTMF A, duration set by register S11 Triple burst of DTMF D, on/off timing set by register S11
<b>FSK Receiver</b>	
Frequencies:   Logical 1 Logical 0 Baud Rate Response Range	1200 $\pm$ 12 Hz 2200 $\pm$ 22 Hz 1200 $\pm$ 1% Baud -12 to -32dBm (1) -12 to 36dBm (0)

<b>MECHANICAL SPECIFICATIONS</b>	
Dimensions	5.5"W x 1.5"H x 9.0"D (140 x 38 x 229 mm)
Headset port	Modular headset connector. Use with headset amplifiers with UL/CSA certification and compatibility and volume control. Minimum voltage: 1.85 V at 400 $\mu$ with 20 mA loop current.

<b>ENVIRONMENTAL SPECIFICATIONS</b>	
Storage temperature	-20 to +60 degrees C
Operating temperature	0 to +50 degrees C
Humidity	95% ()

<b>REGULATORY COMPLIANCE</b>	
Safety	
United States	UL 1459
Canada	CSA C22.2 No. 225-M90
EMC	
United States	FCC Part 15, Class A
Telecom	
United States	FCC Part 68 Certification Number: AHHUSA-65423-MA-E
Canada	Industry Canada CS-03 Registration Number: 344 4419 A
FCC and Industry Canada REN	0.3A / 0.5B

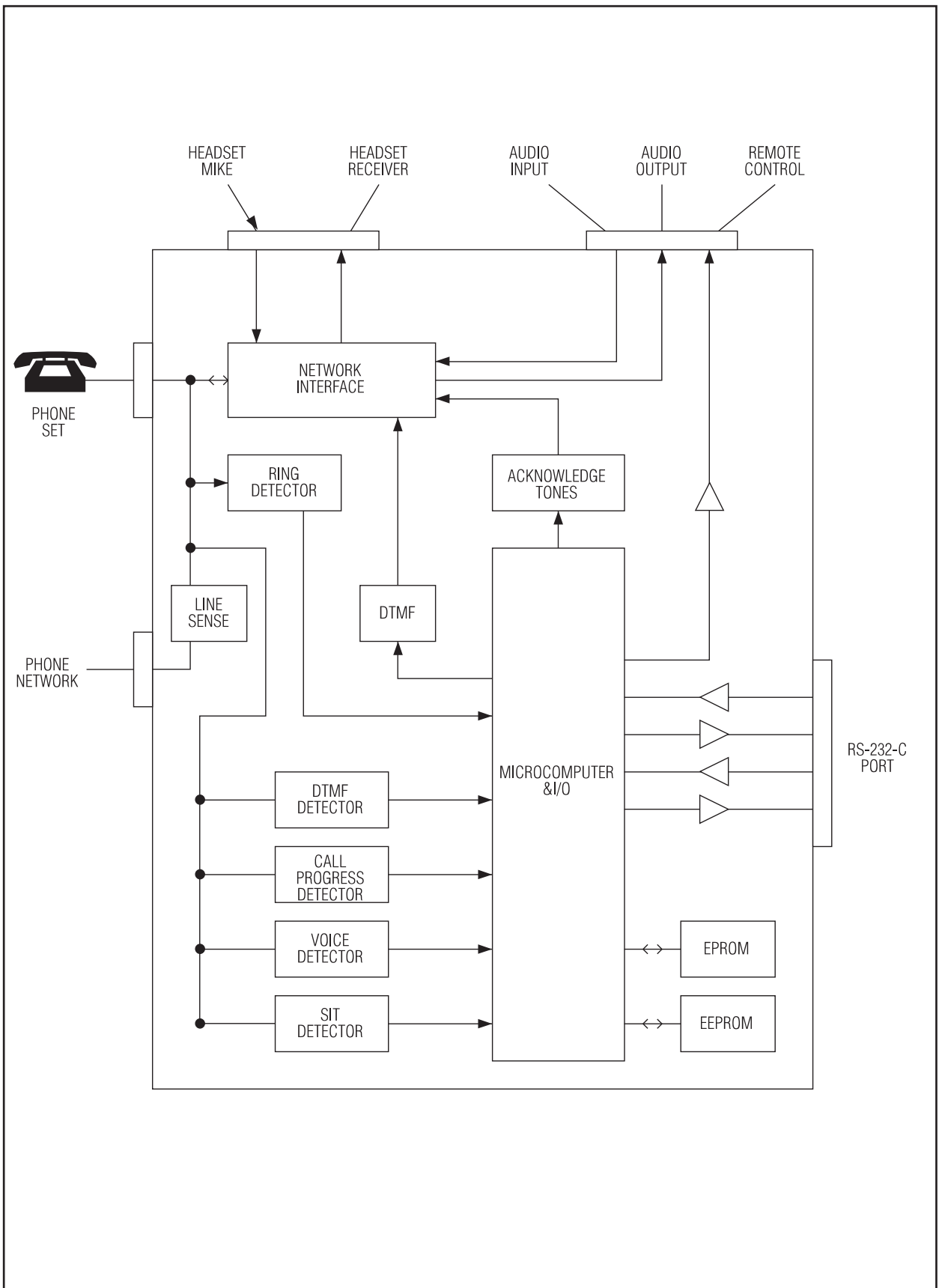


Figure 7 T-311 Block Diagram

## Appendix C: Reading and Writing to Bit-Mapped S Registers

---

Registers S13, S14, S\*2, S\*5, S\*6, and S\*7 are “bit-mapped registers”, that is, each stores information about up to eight binary (.e., on/off) conditions. Each condition is mapped to a bit position with the following binary value:

BIT 0 = 1 (binary 00000001)  
BIT 1 = 2 (binary 00000010)  
BIT 2 = 4 (binary 00000100)  
BIT 3 = 8 (binary 00001000)  
BIT 4 = 16 (binary 00010000)  
BIT 5 = 32 (binary 00100000)  
BIT 6 = 64 (binary 01000000)  
BIT 7 = 128 (binary 10000000)

### Reading S Registers

When you request the current setting of one of these registers with the command `?`, the T-311 responds with a number between 0 and 255. This represents the sum of the binary values of all bits set to 1 in that register, expressed as a decimal number.

For example, Register S13 maps the data word format using bits 2 - 5. If you requested the current setting of S13 with the command **ATS13?**, and if the default data word format were in effect (i.e., parity off, 7 data bits), the T-311 would respond with 8 (indicating that bit 3 is set to 1 and all other bits are 0 or ignored).

If parity were set to on (Bit 2 = 1 = (4)), even parity (Bit 3 = 1 = (8)), the T-311 would respond with 12, the sum of bits 2 and 3 (.e., 4 + 8).

The simplest way to decode these S register values is by a continuous subtraction process. That is:

- If the T-311 response to a query is a number between 128 and 255, then bit 7 = 1. Subtract 128 (the binary value of Bit 7) from the number. If the response is 200, for example,  $200 - 128 = 72$ .
- If the remainder is a number between 64 and 127, then bit 6 = 1. Subtract 64 from the remainder. Using the same example,  $72 - 64 = 8$ . The remainder of 8 indicates that Bit 3 is set to 1. Bits 0, 1, 2, 4, and 5 are 0.

### Writing to S13 and S14 Registers

To change the contents of register S13, add the decimal value of the bit position to change a bit to 1 or subtract the decimal value of the bit position to change a bit to 0.

For example, to turn parity on (change bit 2 to 1), add  $4 + 8 = 12$  and enter the command:  
`ATS13=12<CR>`

Register S14 can be remapped in the manner, or changed using the AT commands indicated on page 35.

## Appendix D: ASCII Characters & DTMF Frequencies

Table 11 T-311 ASCII Character Set

Code	Dec	Hex	Code	Dec	Hex	Code	Dec	Hex	Code	Dec	Hex
	0	00	SP	32	20	@	64	40	@	96	60
	1	01	!	33	21	A	65	41	a	97	61
	2	02	"	34	22	B	66	42	b	98	62
Ctrl C	3	03	#	35	23	C	67	43	C	99	63
	4	04	\$	36	24	D	68	44	d	100	64
	5	05	%	37	25	E	69	45	e	101	65
	6	06	&	38	26	F	70	46	f	102	66
	7	07	'	39	27	G	71	47	g	103	67
Ctrl H	8	08	(	40	28	H	72	48	h	104	68
	9	09	)	41	29	I	73	49		105	69
Ctrl J	10	0A	*	42	2A	J	74	4A	j	106	6A
	11	0B	+	43	2B	K	75	4B	k	107	6B
	12	0C	,	44	2C	L	76	4C	l	108	6C
Ctrl M	13	0D	-	45	2D	M	77	4D	m	109	6D
	14	0E	.	46	2E	N	78	4E	n	110	6E
	15	0F	/	47	2F	O	79	4F	o	111	6F
	16	10	0	48	30	P	80	50	p	112	70
	17	11	1	49	31	Q	81	51	q	113	71
	18	12	2	50	32	R	82	52	r	114	72
	19	13	3	51	33	S	83	53	s	115	73
	20	14	4	52	34	T	84	54	t	116	74
	21	15	5	53	35	U	85	55	u	117	75
	22	16	6	54	36	V	86	56	v	118	76
	23	17	7	55	37	W	87	57	w	119	77
	24	18	8	56	38	X	88	58	x	120	78
	25	19	9	57	39	Y	89	59	y	121	79
	26	1A	:	58	3A	Z	90	5A	z	122	7A
	27	1B	;	59	3B	[	91	5B	{	123	7B
	28	1C	<	60	3C	\	92	5C		124	7C
	29	1D	=	61	3D	]	93	5D	}	125	7D
	30	1E	>	62	3E	^	94	5E	~	126	7E
	31	1F	?	63	3F	—	95	5F	DEL	127	7F

<b>Table 12 DTMF Frequencies</b>		
<b>Signal</b>	<b>Low frequency</b>	<b>High frequency</b>
<b>0</b>	<b>941</b>	<b>1336</b>
<b>1</b>	<b>697</b>	<b>1209</b>
<b>2</b>	<b>697</b>	<b>1336</b>
<b>3</b>	<b>697</b>	<b>1477</b>
<b>4</b>	<b>770</b>	<b>1209</b>
<b>5</b>	<b>770</b>	<b>1336</b>
<b>6</b>	<b>770</b>	<b>1447</b>
<b>7</b>	<b>852</b>	<b>1209</b>
<b>8</b>	<b>852</b>	<b>1336</b>
<b>9</b>	<b>852</b>	<b>1447</b>
<b>*</b>	<b>941</b>	<b>1209</b>
<b>#</b>	<b>941</b>	<b>1447</b>
<b>A</b>	<b>697</b>	<b>1633</b>
<b>B</b>	<b>770</b>	<b>1633</b>
<b>C</b>	<b>852</b>	<b>1633</b>
<b>D</b>	<b>941</b>	<b>1633</b>

## Appendix E: Glossary

---

**ASCII**

American Standard Code for Information Exchange. Coding method used by small computers to convert letters, numbers, punctuation marks, and other characters into digital form that can be recognized by computers.

**Call progress tones**

Tone information sent from the central office to tell the caller of the progress of a call; for example, ringback, busy, and reorder tones.

**DTMF**

Dual-tone multifrequency. Pushbutton telephone signaling.

**LED**

Light-emitting diode. A semiconductor diode that emits light when a current is passed through it. Used for status and information displays on electronic devices.

**Loop current**

The DC current that flows through telephone wires when a line is off-hook.

**Parity bit**

A binary bit appended to a data word to make the sum of bits in every word always odd or always even. Parity bits are checked at the sending and receiving ends as a means of detecting errors in transmission of data.

**RS-232-C**

Standard developed by Electrical Industries Association (EIA) to define the type of signals and mechanical connections used between data communication devices.

# Index

- A**
- Answer
    - how to .....15
  - Answer calls
    - auto .....4
    - forced .....4
  - Applications
    - incoming calls .....6
    - outgoing calls .....5
  - ASCII
    - conversion .....1,3,52
  - Auto Answer
    - change setting .....15
    - disable .....15
  - Auto hangup
    - on incoming calls .....15
  - Autodialing .....4
- B**
- Baud rate .....42,43,48
    - S\*4 .....32
    - selectable .....4
  - Baud Rate .....36
  - Busy Tone
    - tolerances .....28
- C**
- Call progress .....4
  - Call Progress
    - monitoring .....28
  - Call Progress
    - tone tolerances .....28
  - Call Progress Monitoring
    - See X Commands
  - Calling the T-311
    - communicate with PC .....17
    - hangup .....17
    - how to dial .....17
    - how to enter password .....17
  - COD .....18,36
    - detection of .....7
  - Commands .....22
    - answer .....24
    - call progress .....21
    - configuration .....21
    - description .....24
    - dial .....24
    - display .....30
    - fetch defaults .....30
    - five types of .....21
    - format .....21
    - hangup on DTR .....30
    - ignore DTR .....30
    - manual answer .....24
    - password .....31
    - remote control .....21
    - remote control/audio input .....31
    - repeat last command .....30
    - reset .....29
    - RS-232 .....29
    - security .....31
    - set password .....31
    - standard .....4
    - status .....21
    - store telephone number .....30
    - T-311 status .....31
    - telephone .....21
    - write to EEPROM .....30
- Commands**
- response to DTR .....30
- Configuration**
- in S register .....40
  - saving .....41
- Connections** .....5
- D**
- Detectors
    - all on/off .....29
    - call progress .....29
    - EEPROM .....29
  - Dial tone
    - detection of .....4
  - Dial/Reorder/Busy Tone
    - disconnect .....18
  - Dialing
    - digits/characters .....24
    - pulse .....4
    - tone .....4
  - DTMF
    - conversion .....1,3
- E**
- Electronic voice .....3
- F**
- Factory defaults
    - restoring .....41
  - FCC regulations .....19
  - Forced answer .....15
  - Forced disconnect
    - See COD
  - FSK
    - Decoding .....3
- H**
- Headsets
    - connecting .....10
    - requirements .....3
- I**
- Inactivity disconnect .....18
  - Incoming calls .....6
    - security .....4
  - Installation
    - procedure .....8
- L**
- LEDs .....4
- M**
- Memory
    - nonvolatile .....5
  - Messages
    - foramt .....38
  - Modifiers

1/8 second pause.....	25	Response Messages.....	38
AT codes .....	28	Return for repair	
autodial number .....	26	U.S. customers.....	47
call progress monitoring.....	28	Return procedures	
checksum .....	26	U.S. customers.....	47
command echo .....	26	Ringback Tone	
delimiter .....	25	tolerances.....	28
dial .....	25	Ringback Tone.....	4
display .....	27	detection .....	15
display number.....	27	detection of .....	15
DTMF .....	29	on incoming line .....	3
echo off .....	26	RING LOST.....	15
echo on .....	26	RS-232 port.....	15
flash .....	25	voltage.....	7
hold .....	26	Ringback Detection.....	15
memory test .....	26	Abandoned call .....	15
messages.....	27	Auto hangup on incoming calls .....	15
microphone .....	27	auto/forced answer.....	15
on-hook/off-hook .....	26	telephone rings .....	15
pause .....	25	RS-232 Communications Link	
pulse .....	24	TX, RX, DTR, RI .....	43
quiet mode .....	27	<b>S</b>	
RAM .....	26	S Registers.....	31
revision number.....	26	auto answer.....	32
single tone.....	29	backspace character .....	33
SIT .....	29	baud rate .....	36
tone dialing.....	24	call completion timeout .....	33
verbose mode .....	28	call disconnect timeout.....	34
voice.....	29	comma in dial string .....	34
wait for connection burst .....	25	configuration.....	40
wait for dial tone .....	25	Data Word Format.....	34
wait for security tone .....	25	DTMF dialing rate.....	34
wait for silence .....	25	end-of-line .....	33
<b>O</b>		headset/handset .....	37
Off-hook .....	3	line feed character.....	33
On-hook .....	3	line status.....	37
Ordering Information .....	46	pause before dialing.....	33
Outgoing calls .....	5	powerup .....	40
<b>P</b>		queries and commands.....	41
Password.....	16, 17	receiver status.....	36
enable/disable .....	31	ring counter .....	33
requirements .....	31	ringback before disconnect .....	35
See Also Security		user configuration.....	35
set .....	31	verification and display.....	35
Prompts		Safety	
acknowledgment tone .....	17	instructions .....	iv
connection tone.....	17	Security .....	31
error tone .....	17	checking.....	16
Prompts		enable checking .....	16
audible.....	17	incoming calls .....	6
Pulse dialing.....	4	See Also Password	
<b>R</b>		<b>T</b>	
Recording		Telephone	
connecting the T-311 .....	19	T-311 interface .....	4
See Also FCC regulations		Tolerance	
from the line .....	19	call progress tones.....	28
immediate start .....	19	frequency .....	49
playing back to the line.....	19	Tone dialing.....	4
stop .....	19	Transferring Calls	
Two-way conversations .....	v	disconnect after answer .....	16
Reorder Tone		flash line.....	16
tolerances.....	28	how to dial.....	16
Response Codes.....	28	Troubleshooting.....	47

**V**

V Commands .....28,38

Verbose Mode  
    See V Commands

**W**

Warranty .....46

**X**

X Commands .....28