



Zypcom Application Note

Product: Z34-SX, Z34-RX, Z34-SE, Z34-RE, Z32t-SX, Z32t-SE, Z32t-RX, Z32b-SX, Z32b-SE, Z32b-RX

Application: Leased Line Operation with Dial Backup/Auto-Restoral

Basic leased line operation can be set using DIP switches or AT commands. To use dial backup and auto-restoral features setup must be done using AT commands. Do not mix modem setup methods (AT commands and DIP switches), use only one method for modem setup. The basic synchronous and asynchronous setups below may require some fine tuning for your application.

First determine if your application is a 2-wire application (&L1) or a 4-wire application (&L2). Moreover, for synchronous mode consider your applications requirements for clock source (&Xn), line speed (S37=nn) and EIA signals (&Cn, &Sn, &Dn, &Rn). For asynchronous applications considerations are DTE port speed (%X), port speed lock (#L1), line speed (S37=nn) and flow control (&Kn).

Hardware Jumpers:

The Zypcom modems need to have their leased line jumpers (one set of jumpers for 2-wire, two sets of jumpers for 4-wire) installed per Chapter 8 section titled Mandatory Setup Procedures. Jumpers JP3 and JP4 should be in there default position which is no connection.

Leased Line Telco Cable:

Zypcom has several different leased line cables depending on the modem model. For all RX-/RE-Series modems use 91009-200 an octopus chassis cable for 2-wire (&L1) or 4-wire (&L2) operation. For the SE-Series modems use cable 91009-202 for 2-wire operation. For SX-Series use 91009-202 for 2-wire operation and use 15080-001 for 4-wire operation. On external modems all leased line telco cables are installed into the modems modular phone jack abled PHONE.

PSTN Dial Backup Telco Cable:

Modems that will backup a lost or degeade leased line require a PSTN dialup line connection also. For all RX-/RE-Series modems use 91009-200 an octopus chassis cable for PSTN dial backup operation. For the SX-/SE-Series modems use cable 15047-004 dial backup operation. On external modems all PSTN dial backup cables are installed into the modems modular jack labelled WALL.

Leased Line Dial Backup and Automatic Restoral

The modem can be configured to restore the communication link upon failure of the leased line by using the Public Switched Telephone Network (PSTN). This requires that each modem have working PSTN lines installed in the jacks marked "WALL" on the back of each modem. The originating modem (register S0=0) needs to have a telephone number for the remote modem stored in memory location 3 (AT&Z3=nnn-nnn). In addition, both modems must have dial backup enabled via register S42 (set to current value +2). The modems can also restore the communication on the leased line automatically once the line is returned to service (S17=1 S20=180).

The following are step-by-step procedures for enabling leased line operation with dial backup and auto restoral. If auto restoral is not required then remove the S17 and S20 commands from the examples below. The examples below for asynchronous applications assumes RTS/CTS flow control is supported in the device connecting to the modem.

Leased Line with Dial Backup and Auto Restoral—Answer Side Modem

The following procedure explains how to setup leased line operation with dial backup/auto restoral for an answer-side modem. Note that in the following sample command strings, &Wn writes the command settings to memory.

1. Set the EIA and speed options and any other options required for your application. For example, it is recommend that asynchronous applications use forced error controlled mode (S36=0). Often CXR (&C1) and DSR (&S1) need to be set to normal. Also, CTS should follow true carrier (&R2) for most applications but some may require CTS ON (&R0). Also, it is important to force the line speed (N0 S37=xx) your application requires and for asynchronous applications set the serial port speed and lock it (%X=9.6 #L1) so the modem ignores data at any speed except the desired modem serial port speed.

Async. Setup: 9.6Kbps serial port and force 9.6Kbps line speed

```
AT S36=0 &C1 &S1 &R2 N0 S37=17 %X=9.6 #L1 &W
```

Sync. Setup: Force 14.4Kbps line speed and use internal clock

```
AT &X0 &C1 &S1 N0 S37=19 &W
```

2. Enable dial backup (S42=2), leased line look back (S17=1) for automatic leased line restoral and set the look back timer (S20=1 to 255) on the answer-side modem. To do this, increment register S42 by two. First, interrogate the S42 register:

```
ATS42?<ENTER>
```

The modem should respond:

```
000  
OK
```

Issue the enable dial backup command (increment S42 by 2, see Chapter 6). Enable leased line look back for automatic restoral of the leased line when it is restored to operation with S17=1 and set the interval for checking (S20= 1 to 255 minutes). Normally, 2 to 3 hours (120 to 180 minutes) would be a good interval for checking to see if the leased line has been restored. The leased line look back process takes 20 seconds and will interrupt data flow during look back.

```
AT S42=2 S17=1 S20=180 &Wn<ENTER>
```

3. Issue the data type command, leased line command (&L1 for 2-wire, &L2 for 4-wire), register S0 setting, turn off echo/messages and set transmit level (on most leased lines set S35=6 but back-to-back bench testing set S35=20) then write it to memory.

For an asynchronous two-wire answer modem, type:

```
AT &Q6 &L1 S0=1 %Q1 E0 Q1 S35=6 &Wn<ENTER>
```

For a synchronous two-wire answer modem, type:

```
AT &Q3 &L1 S0=1 E0 Q1 S35=6 &Wn<ENTER>
```

NOTE: The OK message is not sent after the command in step 3 due to Q1 and &Q3 command.

NOTE: To return the modem to its factory default after &Q3 has been sent to the modem perform a power reset (Chapter 4).

4. Turn power off and then on. After about five seconds the commands take effect and the modem goes off-hook and begins sending answer tone once the FAX LED goes out.

5. In synchronous mode the modem serial port speed will match the line rate and adjust automatically. In asynchronous communication, the modem's serial port speed must be set to match the speed of the device connected to the modem. Therefore, set the terminal that you will use to configure the modem to the same speed as the device that will ultimately be connected to the modem. To verify terminal speed, type AT<ENTER> and then AT&V<ENTER>. Look at the value of %X command in the Active Profile, this is the speed your terminal is set to currently.

Leased Line with Dial Backup and Auto Restoral—Originate Side

The following procedure explains how to set leased line operation with dial backup and automatic restoral for the originate-side modem.

1. Set the EIA and speed options and any other options required for your application. For example, for forced error controlled asynchronous communication (S36=0). Often CXR (&C1) and DSR (&S1) need to be set to normal. Also, CTS should follow true carrier (&R2) for most applications but some may require CTS ON (&R0). Also, it is important to force the line speed (N0 S37=xx) your application requires and for asynchronous applications set the serial port speed and lock it (%X=9.6 #L1) so the modem ignores data at any speed except the desired modem serial port speed.

Async. Setup: 9.6Kbps serial port and force 9.6Kbps line speed

```
AT S36=0 &C1 &S1 &R2 N0 S37=17 %X=9.6 #L1 &W
```

Sync. Setup: Force 14.4Kbps line speed and use internal clock

```
AT &X0 &C1 &S1 N0 S37=19 &W
```

2. Enable dial backup (S42=2), leased line look back (S17=1) for automatic leased line restoral and set the look back timer (S20=1 to 255) on the answer-side modem. To do this, increment register S42 by two. First, interrogate the S42 register:

```
ATS42?<ENTER>
```

The modem should respond:

```
000  
OK
```

Issue the enable dial backup command (increment S42 by 2, see Chapter 6). Enable leased line look back for automatic restoral of the leased line when it is restored to operation with S17=1 and set the interval for checking (S20= 1 to 255 minutes). Normally, 2 to 3 hours (120 to 180 minutes) would be a good interval for checking to see if the leased line has been restored. The leased line look back process takes 20 seconds and will interrupt data flow during look back.

```
AT S42=2 S17=1 S20=180 &Wn<ENTER>
```

3. Store the dial backup telephone number in memory location 3. For example, type:

```
AT&Z3=T9,7832535<ENTER>
```

4. Issue the data type command, leased line command (&L1 for 2-wire, &L2 for 4-wire), register S0 setting (S0=0 for originate side modems) , turn off echo/messages and set transmit level (on most leased lines set S35=6 but back-to-back bench testing set S35=20) then write it to memory.

For an asynchronous two-wire answer modem, type:

```
AT &Q6 &L1 S0=0 %Q1 E0 Q1 S35=6 &Wn<ENTER>
```

For a synchronous two-wire answer modem, type:

```
AT &Q3 &L1 S0=0 E0 Q1 S35=6 &Wn<ENTER>
```

NOTE: The OK message is not sent after the command in step 4 due to Q1 and &Q3 command.

NOTE: To return the modem to its factory default after &Q3 has been sent to the modem perform a power reset (Chapter 4).

5. Cycle power by turning it on and off. After about 3 to 5 seconds, the modem goes off-hook, waits for answer tone and completes the modem handshake (If &D2 had been set, the modem would require DTR to perform this function, DTR is not needed for the DTR default &D0.) The modem's serial port speed will match the line rate and adjust automatically in synchronous communication. In asynchronous communication, the serial port speed matches the speed of the %X command.

Upon leased line failure, the originating modem goes off-hook and dials the telephone stored in memory location 3. If the answering modem has been properly configured, it answers the call, initiating the handshaking sequence to restore communication.

When a leased line connection is broken or is bad (fails two modem retrains) and modem can not retrain successfully, the CXR LED goes out. After about 90 to 120 seconds, the originate-side modem goes off-hook to connect to the PSTN line and dials memory location 3, attempting to re-establish the communication link. If the originate modem does not connect to the answer modem, the originate modem attempts a call every 90 to 120 seconds, until successful or until the leased line is repaired.

Once the modem is in dial backup operation as indicated by the flashing SYN LED, the modem can automatically look back to the leased line connection to see if it is back in operation. S-registers S17 and S20 control this feature. Register S17 enables (S17=1) or disables (S17=0) the leased line look back

feature. S-register S20 controls the intervals of look back in minutes (S20=1 to 255 minutes, with 0 disabling the interval feature). During look back the data flow is interrupted and lost. The look back process takes 20 seconds and if it is determined that the leased line is operational the it will take another 30 to 45 seconds to re-handshake on the leased line.

Caution: *Dial backup (SYN LED flashing) should only be used in environments where personnel can monitor the line. This will ensure that the modem does not go off-hook after a leased line failure on a Friday night, for example, and remain on the backup line throughout the weekend—when no one is actually using the connection.*

If you do not want to use the auto restoral feature then when the telephone company reports that the leased line is restored, you can switch from dial backup communication to leased line communication by pressing the <DATA>. The modem goes on-hook temporarily and then off-hook to reconnect to the leased line. If you have any problems with the above information please call Zypcom Technical Support at 510-783-2501.