TC1900

"QUICK TALK"
RS-232
Telephone Extender
User's Manual

MODEL: _____

S/N: _____

DATE: _____

Table Of Contents

Chapter 1 - Overview

Features

- ❒ **2-Wire Analog Telephone Voice to Async RS-232 Signal**

- ❒ **Redundant RS-232 (Optional)**

- ❒ **Optional Dry Contact Relay to Provide for External Alarm or Ring Connection**

- ❒ **Toll Voice Quality with Ringdown Capability**

- ❒ **FXS or FXO Switchable**

- ❒ **RS-232 Async Data Rates are 19.2Kbps, 38.4Kbps and 48Kbps**

- ❒ **LEDs Indicate Volume, Ringing Status, Hotlink and FXO/FXS**

- ❒ **FPGA Technology (Field Programmable Array) Consumes Low Power**

- ❒ **Various Power Voltage Available: 12VDC, 24VDC, or 115VAC to 240VAC.**

- ❒ **Stand Alone or Rackmount**

Description

The TC1900 "Quick Talk" is designed specifically for adding telephone connection via an existing asynchronous RS-232 channel. It supports telephone set and FXS/FXO connection. An optional RS-232 redundancy version is available.

The voice picked up by a handset's mouth piece (connected to the TC1900) is digitized by a built-in CODEC (code and decode) chip and further compressed to lower data rates. The voice data stream is converted to an asynchronous bit stream and transmitted by RS-232 transmitter. The RS-232 link can take many forms, such as a Satellite data link or one of the data channels provided by a TDM (time division multiplexer) such as the TC8116 or TC2800.

When a bit stream is received by the remote matching TC1900 the compressed voice bit stream is extracted from the asynchronous bit stream and then expanded. Finally, the expanded voice bit stream is sent to the CODEC chip to restore the voice signal. Then, the handset's ear piece converts the voice signal to sound.

When digitized voice signals are being exchanged via an RS-232 link, the status of "off-hook", "on-hook" and "ring" are also be being embedded in the bit stream. Therefore, a local TC1900 can detect remote hook status or if a "ring" signal has been sent by the remote TC1900.

For the (Optional) RS-232 Serial Link Redundancy, the TC1900 monitors the condition of the primary and secondary links at the same time. When the primary link is down, it will switch to the secondary link automatically.

The LEDs on the front panel show the power status, ringing signal, voice volume picked up by local phone's mouth piece and the voice volume received from remote peer.

The TC1900 comes standard with a local built-in dry contact relay. When the link is down, it will trigger an alarm condition which will force the dry contact relay on the TC1900 to a "close" position. The dry contact relay can be used in conjunction with an external device to monitor alarm conditions.

Optional function for the Dry Contact Relay. This feature allows the Dry Contact Relay to close and open as the telephone set rings. The user can use it to connect an additional external device so that the user can monitor the ringing when they are away from their phone. When this option is ordered, it cannot be used as a standard local dry contact relay as described on the previous paragraph.

The standard power supply is 12VDC at 500mA. Power options include 24VDC, or 115VAC or 220VAC with an external power adapter.

Since a regular telephone set is used and the TC1900 has a built-in ringing generator, the process to place a call in hotlink mode is depicted as follows:

Initiate a call: When two TC1900s (connected by an RS-232 link) are first powered up, both units are in "idle" status, which is referred to as "on-hook" status for a regular telephone set. The local TC1900 places a "call" by lifting the handset to ring the remote telephone set.

Answer the call: When a remote TC1900 is ringing by the local TC1900, the remote user can answer the call by lifting the handset.

Terminate the call: Either the local or remote user can terminate the call by placing the handset back to the hook.

Front Panel

5 Transmit & Receive Volume Indicators

4 RS-232/RS-422 baud rate indicator (note: RS-422 future release) ALT1 and ALT2: Not used

2 Status Indicators (see next page)

TC1900 TCCOMM.COM Made in U.S.A.

QUICK-TALK

Tx Rx   BAUD RATE
9.6K   48K   OFHK
19.2K   56K   RING
32K   ALT1   DATA1
38.4K   ALT2   DATA2
VOLUME

STATUS POWER
ALM   A
SYNC   B   PWR
FXS   VccA
FXO

RMTLB   BAUD3
LOCLB   BAUD2
DIS ALM   BAUD1
FXS/FXO   RING TEST
1 2 3 4 5 6 7 8

6 DIP switches:
1: remote loopback
2: local loopback
3: disable alarm
4: Set the unit as FXS or FXO.
   Up: Selects FXS
   Down: Selects FXO
5: Ring test
6, 7 & 8: baud rate selection

3 Indicators for Offhook, Ring, Data1, and Data2 (See next page)

1 Power Input & Operating Voltage Status:
PWR A: power supply from PWR A jack
PWR B: power supply from PWR B jack
VccA: +5 VDC operating voltage power supply

Figure 1. TC1900's Front Panel

Front Panel LEDs

LEDs:

POWER A: When lit, a good power source is present at power jack A (rear panel).

POWER B: When lit, a good power source is present at power jack B (rear panel).

VccA: +5V Voltage indicator. This LED should light whenever power is connected to the unit. It indicates the correct operating voltage is being derived from the power source.

ALM: Alarm indicator. When lit on Red, there is problem with the incoming electrical signal.

SYNC: When lit, it indicates valid RS-232 signal is received. When flashing, it indicates an invalid RS-232 signal is received.

FXS: When lit, it indicates the RJ-11 port for FXS is activated.
Will flash when the FXS module has a problem. If the problem persists, contact the Technical Support Department at TC Communications, Inc. @ (949) 852-1972.

FXO: When lit, it indicates the RJ-11 port for FXO is activated.

OFHK: Lit when the telephone set is offhook.

RING: Will flash when the phone rings.

DATA1: When lit, it indicates that the RS-232 link is good. It will flash when the link is down or the RS-232 cable is broken and will activate the alarm.

DATA2: *Optional*. If RS-232 serial link redundancy is ordered;
When lit, it indicates that the (Optional) RS-232 Serial Link is good. It will flash when the link is down or the RS-232 cable is broken and will activate the alarm.

If RS-232 serial link redundancy is NOT ordered;
The alarm LED will turn on only if the primary link is down. "DATA2" LED will be Off.

Baud Rate: Indicates the baud rate. Other baud rates will be released in the future.

ALT1: Not Used.

ALT2: Not Used.

Volume_Tx: When lit, it shows the voice volume from the local handset.

Volume_Rx: When lit, it shows the voice volume received from the remote unit.

Front Panel DIP Switches

LOCLB: This switch (SW2) turns on the Local Loopback function, so the user can hear the echo of their own voice. Refer to page 14.

RMTLB: This switch (SW1) turns on the Remote Loopback function. i.e., received RS-232 signal is transmitted out.

*Refer to Chapter 3, page 14. Testing and Troubleshooting, for Remote Loopback, and the Local Loopback tests.

DIS ALM: This switch (SW3) disables the buzzer during an alarm condition.

FXS/FXO: (Switch 4), Set the unit as FXO (down position) or FXS (up position).

BAUD1, 2 & 3: These three switches (SW6, 7 & 8) select different RS-232 transmit baud rates from 19.2Kbps, 38.4Kbps or 48Kbps. Please refer to following table 1.

	Baud1	Baud2	Baud3	
9.6K	↑	↑	↑	(For future release)
19.2K	↓	↑	↑	
32K	↑	↓	↑	(For future release)
38.4K	↓	↓	↑	
48K	↑	↑	↓	
56K	↓	↑	↓	(For future release)
ALT1	↑	↓	↓	(For future release)
ALT2	↓	↓	↓	(For future release)

Table 1. TC1900's Baud Rate Settings

Note: When either baud rate is selected, the appropriate LED on the front panel will be lit.
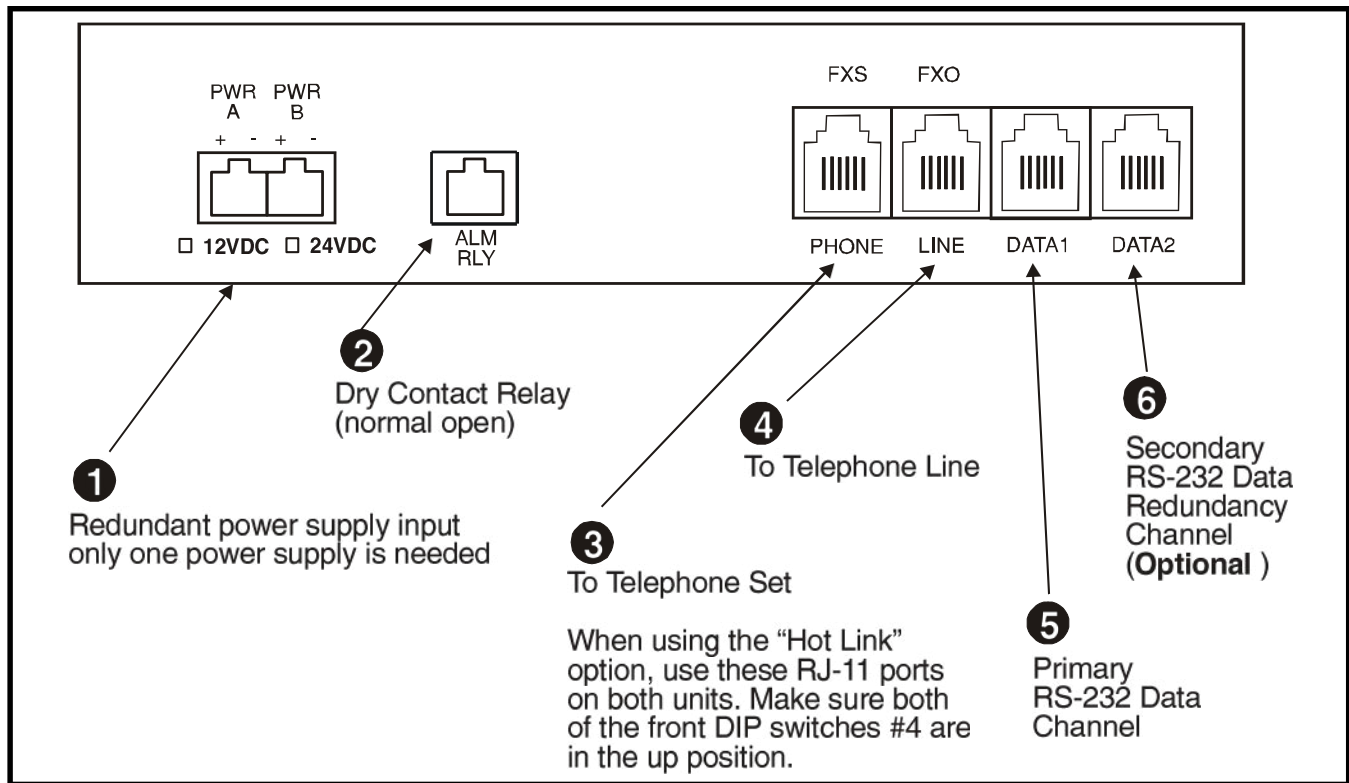
Rear Panel and Connectors

Figure 2. TC1900's Rear Panel

RJ-11 Connector for "PHONE":

Connect to a regular (conventional) 2-wire telephone. This RJ11 is used for "FXS". If a hotlink phone line is desired, then both TC1900s should connect to this "FXS" connector.

RJ-11 Connector for "LINE":

Use regular phone wire to connect the TC1900 to a dial up phone network such as phone line from Telco or PBX phone line. This RJ11 jack is used for "FXO".

RJ-11 Connector for "DATA1"

Data1 is used for the primary RS-232 data channel. RS-422 (Future release).

RJ-11 Connector for "DATA2"

Data2 is used for the (Optional) secondary RS-232 data channel. RS-422 (Future release).

Dry Contact Relay Terminal Blocks:

The Dry Contact Relay is normally in the "Open" position. The following conditions will activate the dry contact relay to a "close" status:

1. Major Alarm will be activated when the RS-232 signal is lost. This function can be disabled by setting the front panel SW3 to the "down" position.

Optional function for the Dry Contact Relay. This feature allows the Dry Contact Relay to close and open as the telephone set rings. The user can use it to connect an additional external device so that the user can monitor the ringing when they are away from their phone. When this option is ordered, it cannot be used as a standard local dry contact relay as described on the previous paragraph.

Chapter 2 - Installation

Unpacking the Unit

Before unpacking any equipment, inspect all shipping containers for evidence of external damage caused during transportation. The equipment should also be inspected for damage after it is removed from the container(s). Claims concerning shipping damage should be made directly to the pertinent shipping agencies. Any discrepancies should be reported immediately to TC Communications' Customer Service Department.

Equipment Location

The TC1900 should be located in an area that provides adequate light, work space, and ventilation. Avoid locating it next to any equipment that may produce electrical interference or strong magnetic fields, such as elevator shafts or heavy duty power supplies. As with any electronic equipment, keep the unit from excessive moisture, heat, vibration, and freezing temperatures.

Power Supply

The standard power input to the TC1900s is 12VDC@500mA. Power options include 24VDC, 115VAC or 220VAC with an external power adapter. The DC power plug is a terminal block connector. Two power connectors at the rear panel, provide for power redundancy, each labeled as "PWR A" and "PWR B". If one power source fails, the other will take the full load.

Either a power adapter or power card can be utilized to supply the power to the TC1900. The terminal block connector for power can be plugged into any power jack on the rear panel. Since each TC1900 card is equipped with a power redundancy capability, the power LEDs on the front panel will light according to which power jack(s) is/are connected.

+ -
(12 VDC) @ 500mA
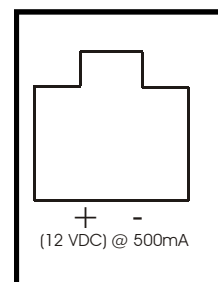
Electrical Signal Connection for RS-232

The RJ-11 connector for the RS-232 electrical signal is located on the rear panel and designated as DATA1. See the pin connections on page 10, Figures 3 and 4.

The DIP switches Setting and LEDs Status

DIP switches #1, 2, 3, and 5 on front panel should be at "off" or "up" position. Use baud rate switches #6, 7, & 8 to set the appropriate baud rate.

When power is first turned on, all the LEDs (except right most column) and buzzer should be flashing for one second. This allows the user to be sure all the LEDs are in working condition.

After one second, the "alarm" LED should be on (solid), "sync" and one of "FXS" or "FXO" LED should be on to indicate FXO or FXS setup. The flashing green LEDs will turn to solid when abnormal conditions are removed and the red LED (alarm) will be off.

Phone Line Extension Connection Diagram

This application is to extend a phone line via RS-232. Follow the connections shown in the following diagram. Connect two TC1900s via RS-232 and set one of them to FXO and the other to FXS. Connect a regular dial-up phone line to the "LINE" RJ11 of the "FXO" unit and connect a telephone set to the "PHONE" RJ11 of the FXS unit. To establish a call, the users at the remote end (FXS side) can pickup the phone and dial out to an outside phone network just like regular telephone line extended.
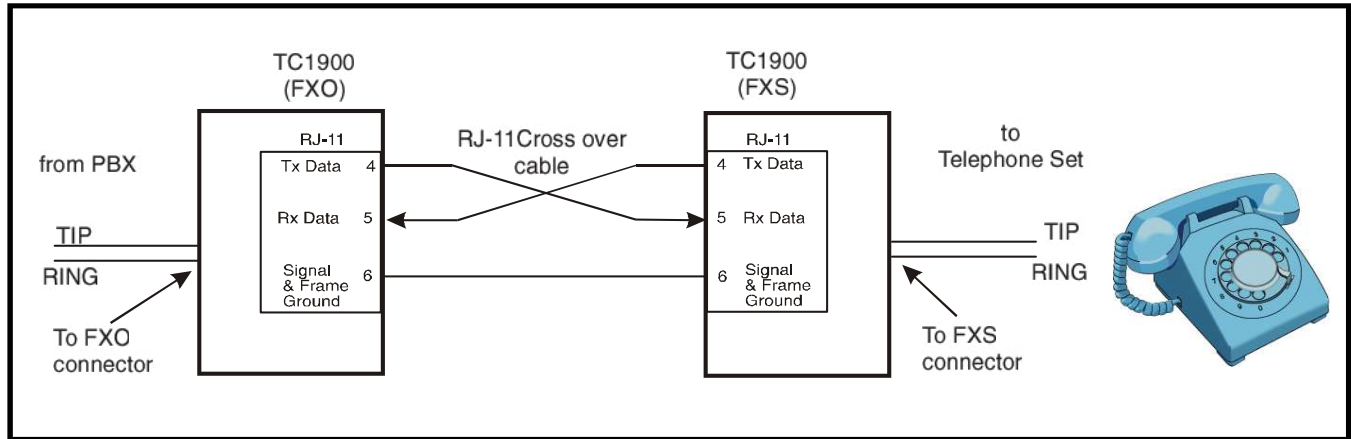

Figure 3. Typical Application Diagram - Phone Line Extender

Hotlink Phone Extension Connection Diagram

By connecting two TC1900s together using two regular telephone sets, the users at both sides of the RS-232 link can have a hotlink phone line setup. When one user lifts up the handset, the remote side phone will start to ring. When remote side user picks up the handset, the phone stops to ring and the conversation begins.

When the conversation is over, any user can replace the handset to hook to terminate the phone link. If either party places the handset to hook and the other does not hang up, the phone on hook will continue to ring.
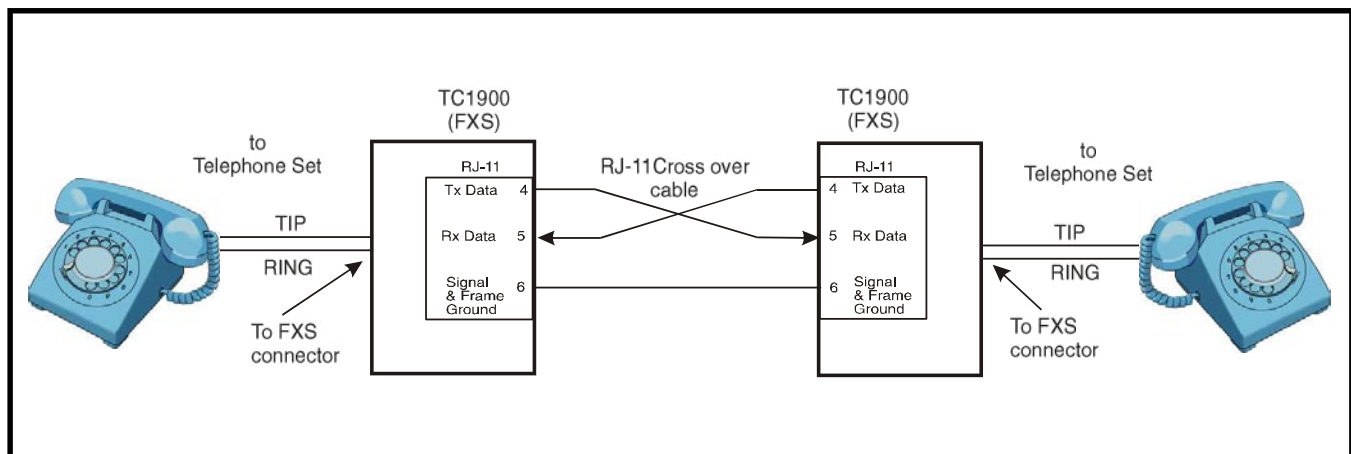

Figure 4. Typical Application Diagram for Hotlink

RS-232 Serial Link Redundancy Connection Diagram (Optional)

The following diagram depicts the RS-232 serial link redundancy virtual connections. Data1 RJ-11 connector is for the primary RS-232 data channel while DATA2 RJ-11 connector is for the secondary RS-232 data channel (optional). You can use the serial link redundancy for both the Phone Line and Hotlink set up.
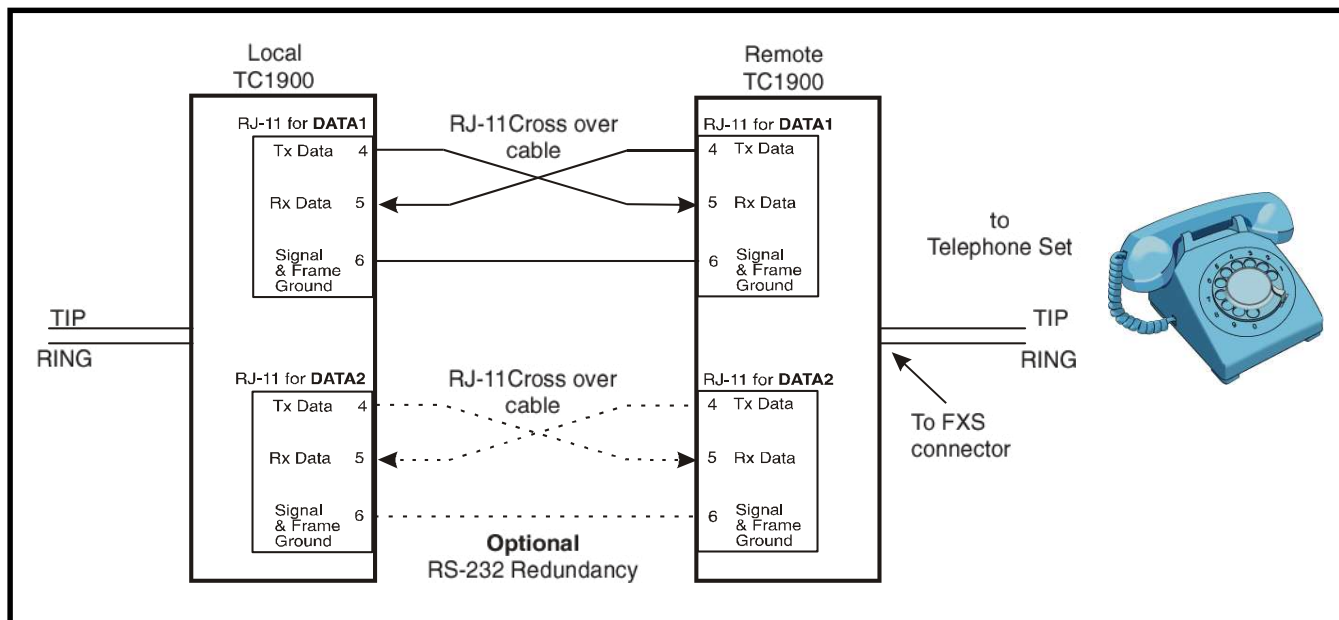
Figure 5. Typical Application Diagram - Phone Line Extender

Electrical Signal Connection and Pin Assignment for Phone
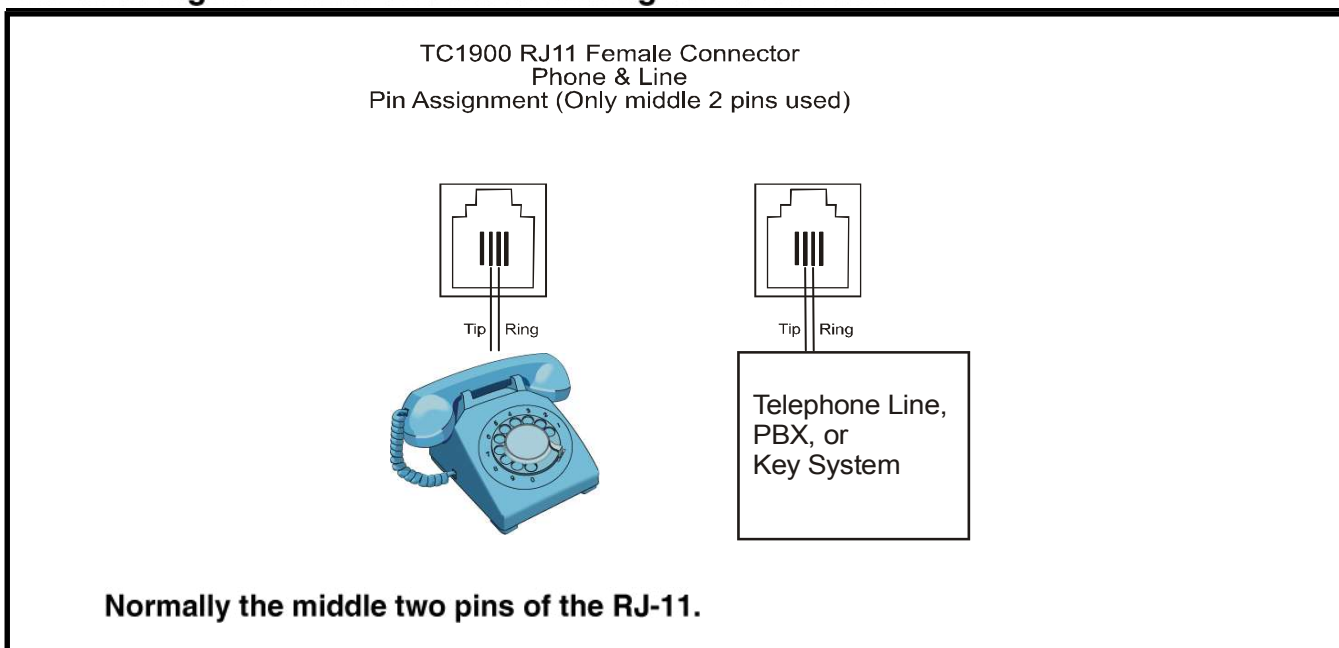
Figure 6. Phone/Line (RJ-11F) Connection Diagram

Figure 6 shows how the TC1900 connects to the phone or PBX as in Figures 3 and 4. TC1900's phone Jack and Line Jack use the middle two pins to connect to telephone or PBX's Tip and Ring.

System Start Up and Operation for "hotlink"

1. Apply the power by plugging the power plug into any power jack on the rear panel. The power source can be from a power adapter or from a power card (installed either on the left or right side of the rack).

2. The "PWR A" or "PWR B" LEDs on the front panel will light according to which power jack (A or B) is connected. Both LEDs will light when power redundancy is utilized.

3. The "Vcc" LED should also light, indicating an adequate operating voltage is being derived from the power source.

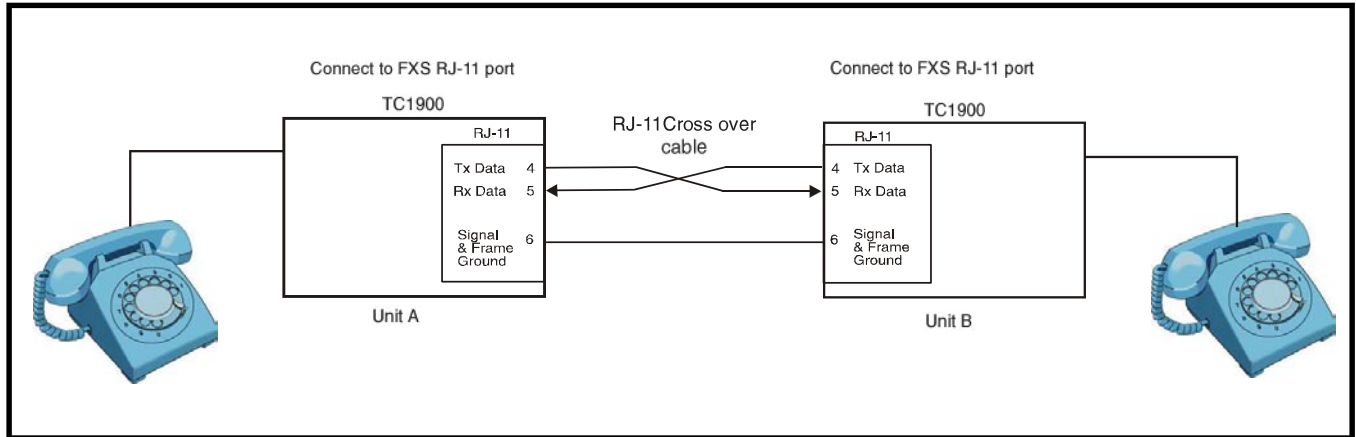4. Connect Unit A to Unit B back to back according to Figure 7 below.

Figure 7. RJ11 Cable for "hotlink" of the TC1900s

5. Connect to FXS RJ-11 connectors on the rear of both Unit A and Unit B. NOTE: This cable will be provided for testing purposes only.

6. Communication is setup between TC1900 peers, the "alarm" LED will be off, the green "sync" LED should be on to indicate good RS-232 is received.

7. Lift up local phone's handset and observe the remote TC1900's "ring" LEDs start to flash.

8. Once the remote phone rings, the remote user can answer the call by picking up the remote handset.

9. When both parties communicate, the front panel "volume" LEDs should indicate the transmit and receive volume.

10. When one of the parties replace the handset to hook to terminate the communication, both units will turn into "idle" state.

*Note: The TC1900 **FXS** configured unit(s) will ring the phone channel during initialization, and the phone set connected on the FXS channel should ring 10 seconds after power up.*

System Start Up and Operation for "Line Extender"

1. Apply the power by plugging the power plug into any power jack on the rear panel. The power source can be from a power adapter or from a power card (installed either on the left or right side of the rack).

2. The "PWR A" or "PWR B" LEDs on the front panel will light according to which power jack (A or B) is connected. Both LEDs will light when power redundancy is utilized.

3. The "Vcc" LED should also light, indicating an adequate operating voltage is being derived from the power source.

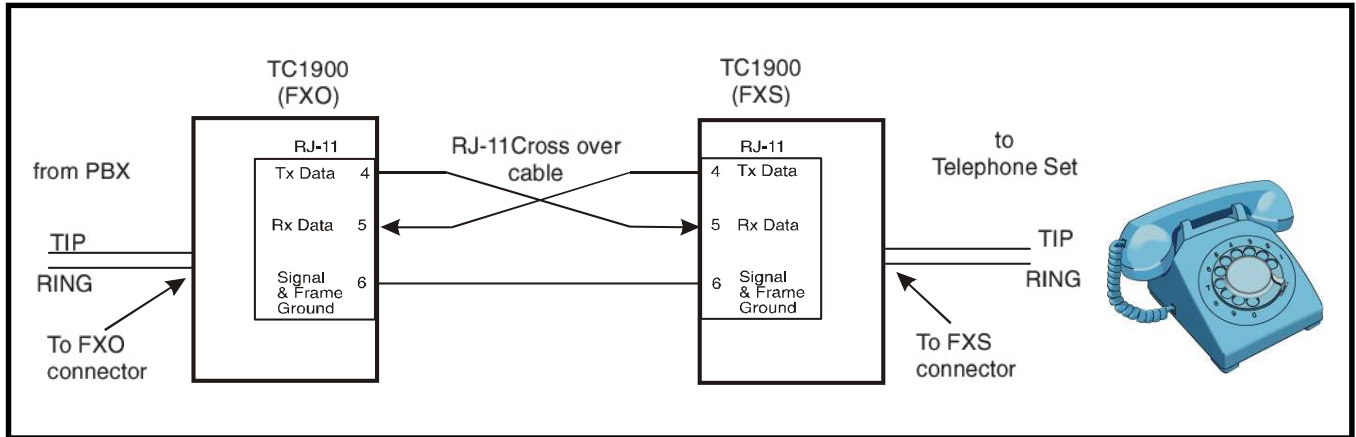4. Connect Unit A and Unit B as shown on Figure 8 below.

Figure 8. RJ11 Cable for "Line Extender" of the TC1900s

6. Communication is setup between TC1900 peers, the "alarm" LED will be off, the green "sync" LED should be on to indicate good RS-232 is received.

7. To establish a call, lift up the phone's handset on the FXS side and dial out to an outside phone network just like a regular telephone line extended.

8. Once the remote phone rings, the remote user can answer the call by picking up the remote handset.

9. When both parties communicate, the front panel "volume" LEDs should indicate the transmit and receive volume.

10. To terminate the call, simply hang up.

Lightning/Surge Warning Note:

If copper cable(s) connected to TC1900 unit(s) are located outside buildings or enclosures (even at minimal distances), TC1900 units may be damaged by lightning and/or electrical power surges.

Adding protective devices (surge suppressors/lighting protectors) to each copper cable that is exposed to potential lightning strikes or power surges is highly recommended. Please be aware that adding such protective devices can't guarantee 100 percent protection for connected electronic equipment. You should contact a professional lightning/surge protection consultant for specific questions regarding your application.

Chapter 3 - Testing & Troubleshooting

General

The RJ-11 cable connector are frequently the source of various problems. Check out the connectors, cable, and pin connections first. Once installation of the TC1900 is complete, it is a good idea to perform a Local Loopback test to verify that the TC1900 is working properly.

Local Loopback Testing

The purpose of this test is to verify the input/output connections, handset signal input receiver, and output voice driver.

Set the "LOCLB" DIP switch (SW2) to the "down" position. You should be able to hear your own voice (echo).
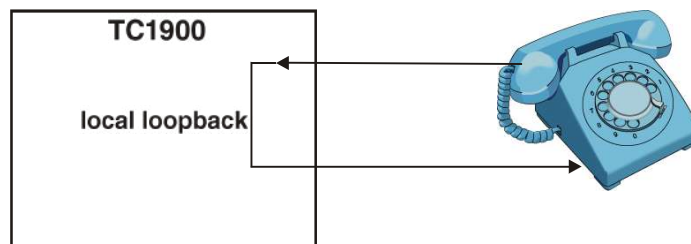
Remote Loopback Testing

The purpose of remote loopback test is to verify the RS-232 connection. Once the front DIP switch #1 is pushed down, the unit's received RS-232 signals will be looped back to the originator as shown in the following diagram.
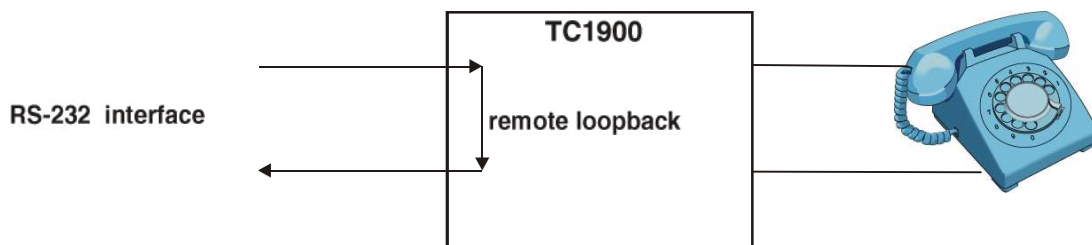
Appendix A

Return Policy

To return a product, you must first obtain a Return Material Authorization number from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please provide a description of the problem and any results of diagnostic tests that have been conducted.

Warranty

Damages by lightning or power surges are not covered under this warranty.

All products manufactured by TC Communications, Inc. come with a five year (beginning 1-1-02) warranty. TC Communications, Inc. warrants to the Buyer that all goods sold will perform in accordance with the applicable data sheets, drawings or written specifications. It also warrants that, at the time of sale, the goods will be free from defects in material or workmanship. This warranty shall apply for a period of five years from the date of shipment, unless goods have been subject to misuse, neglect, altered or destroyed serial number labels, accidents (damages caused in whole or in part to accident, lightning, power surge, floods, fires, earthquakes, natural disasters, or Acts of God.), improper installation or maintenance, or alteration or repair by anyone other than Seller or its authorized representative.

Buyer should notify TC Communications, Inc. promptly in writing of any claim based upon warranty, and TC Communications, Inc., at its option, may first inspect such goods at the premises of the Buyer, or may give written authorization to Buyer to return the goods to TC Communications, Inc., transportation charges prepaid, for examination by TC Communications, Inc. Buyer shall bear the risk of loss until all goods authorized to be returned are delivered to TC Communications, Inc. TC Communications, Inc. shall not be liable for any inspection, packing or labor costs in connection with the return of goods.

In the event that TC Communications, Inc. breaches its obligation of warranty, the sole and exclusive remedy of the Buyer is limited to replacement, repair or credit of the purchase price, at TC Communications, Inc.'s option.

To return a product, you must first obtain a Return Material Authorization (RMA) number and RMA form from the Customer Service Department. If the product's warranty has expired, you will need to provide a purchase order to authorize the repair. When returning a product for a suspected failure, please fill out RMA form provided with a description of the problem(s) and any results of diagnostic tests that have been conducted. The shipping expense to TC Communications should be prepaid. The product should be properly packaged and insured. After the product is repaired, TC Communications will ship the product back to the shipper at TC's cost to U.S. domestic destinations. (Foreign customers are responsible for all shipping costs, duties and taxes [both ways]. We will reject any packages with airway bill indicating TC communications is responsible for Duties and Taxes. To avoid Customs Duties and Taxes, please include proper documents indicating the product(s) are returned for repair/retest).

Limitation of Liability

1. In no event shall the total liablility of TC Communications, Inc. to purchaser and/or end user for all damages including but not limited to compensatory, consequential and punitive damages, exceed the total amount paid to TC Communications, Inc. by purchaser for the goods from which the claim arose, in no event shall TC Communications, Inc. be responsible for indirect and consequential damages.

Continue on next page.

Limitation of Liability (Cont.)

2. In no event shall liability attached to TC Communications, Inc. unless notice in writing is given to TC Communications, Inc. within ten days of the occurrence of the event giving rise to such claim.

3. TC Communications, Inc. shall not be responsible for delays or non-deliveries directly or indirectly resulting from or contributed to by foreign or domestic embargoes, seizure, fire, flood, explosion, strike, act of God, vandalism, insurrection, riot, war, or the adoption or enactment of any law, ordinances, regulation, or ruling or order or any other cause beyond the control of TC Communications, Inc.

4. TC Communications, Inc. shall not be responsible for loss or damage in transit and any claims for such loss or damage shall be filed by the purchaser with the carrier.

Limitation of Liability (Cont.)

Appendix B

If the TC1900's are purchased with other TC Communication's products, (such as TC2800, 8116, and 8300…etc.) The cable assembly (shown in Figure 8) will be provided for connection between TC1900 and other TC products. Figure 9 provides the pin assignment and proper connection between the RJ-11 connectors.
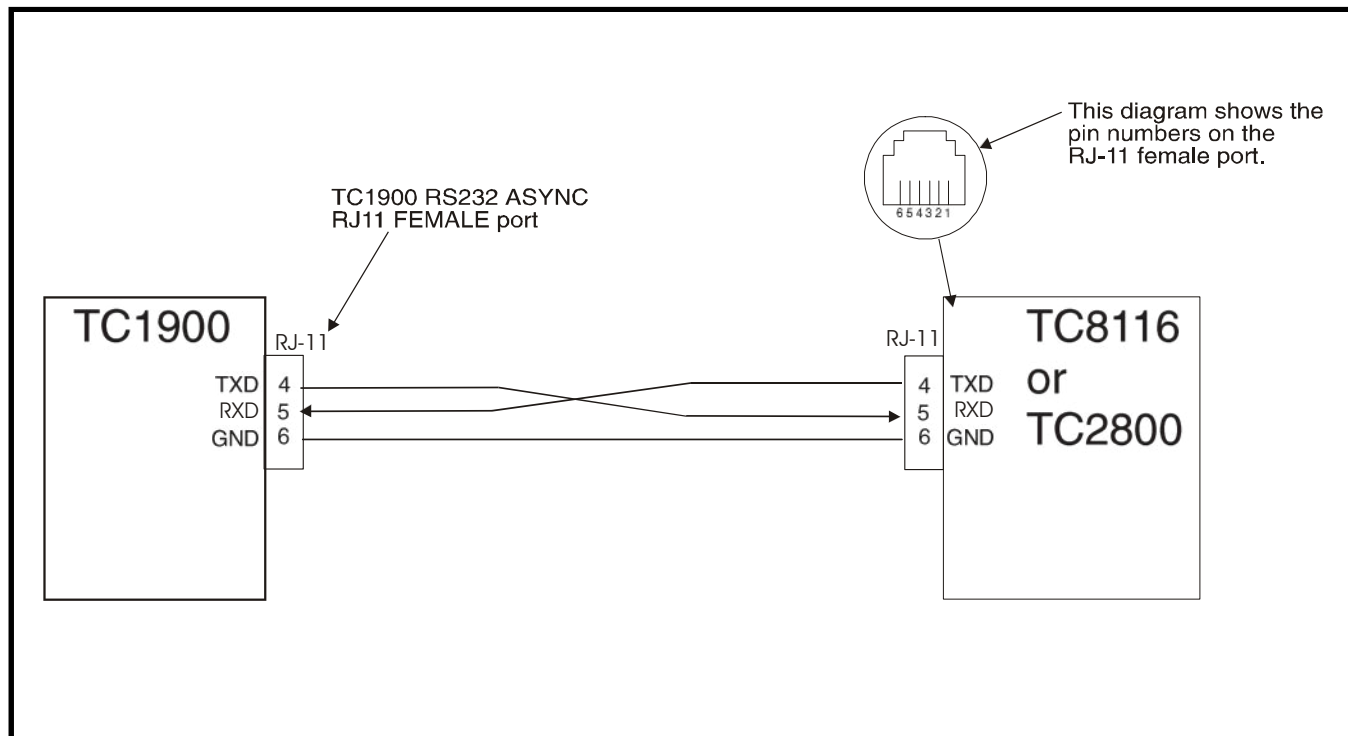

Figure 9. RS-232 (RJ-11) Connections Diagram

Note: The TC2800 and TC8116 can handle maximum up to 38.4Kbps RS-232 signal. Therefore, the TC1900 in this case cannot be set to 48Kbps and 56Kbps.

Appendix C

Application Example 1: Hotlink Phone via RS-232 Async Channel

A typical application is to convert a data channel to a voice channel. As shown in the following diagram, the TC8116 or TC2800 is an eight channel async RS-232 time division multiplexer. By connecting a TC1900 to one of the data channels and using a regular telephone set, the users at both sides of the fiber link can have a hotlink phone line setup. When one user lifts up the handset, the remote side phone will start to ring. When remote side user picks up the handset, the phone stops ringing and the conversation begins.

When the conversation is over, any user can replace the handset to hook to terminate the phone link.

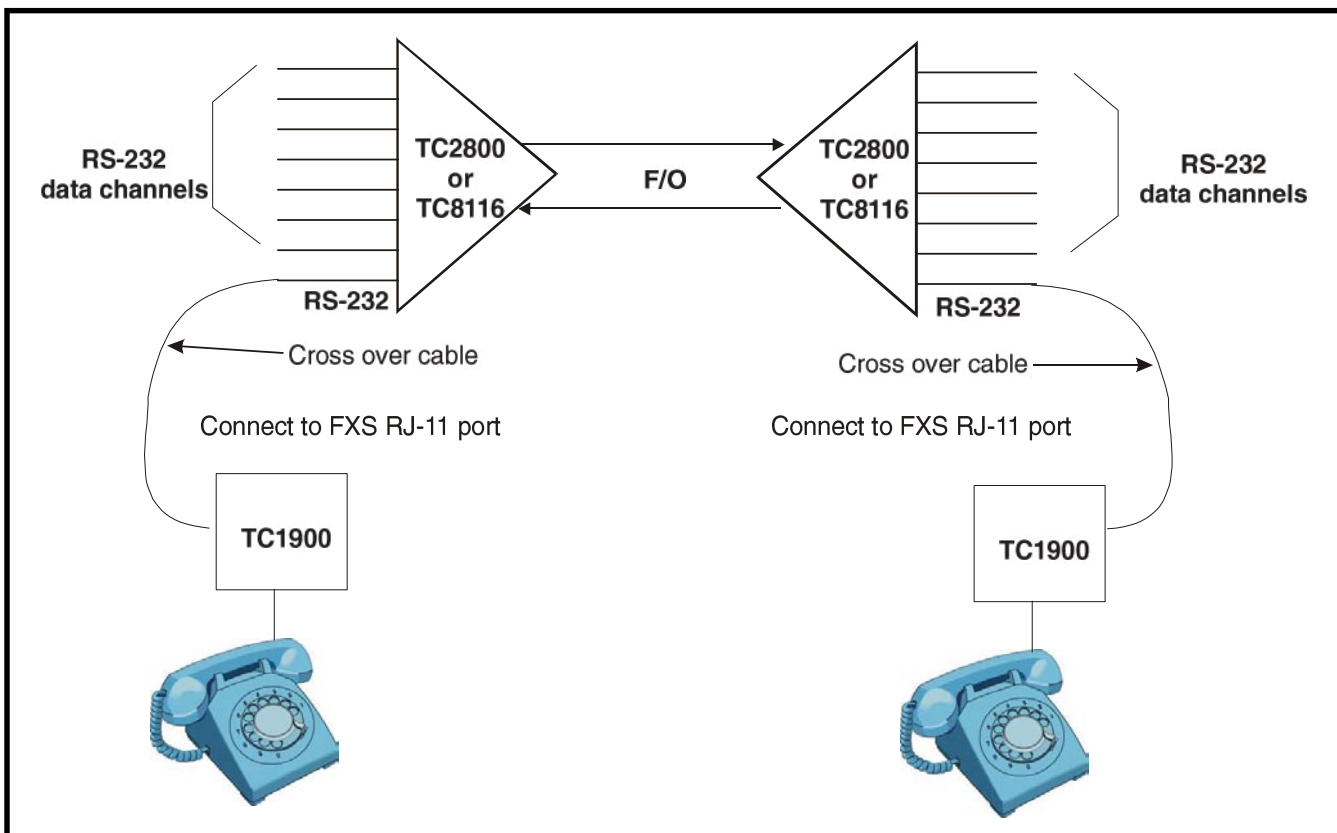For detail connection between the TC1900 and the TC2800/TC8116, refer to Appendix B.

Figure 10. Typical Application Diagram for Hotlink

In this example, the TC8116 or TC2800 can be replaced with a user's RS-232 device. Figure 10 shows how the user's device is connected to the TC1900's RS-232 port.

Appendix D

Application Example 2: Dial Up Phone Extension via RS-232 Async Channel

This application is to extend a dial-up phone line via an existing data channel. As shown in the following diagram, the TC8116 or TC2800 is an eight channel async RS-232 time-division multiplexer. By connecting a TC1900 to one of the data channels and a regular dial-up phone line (to "LINE" RJ-11 jack and slide), the users at the remote end can pick up the phone and dial out to an outside phone network just like a regular telephone line extended.
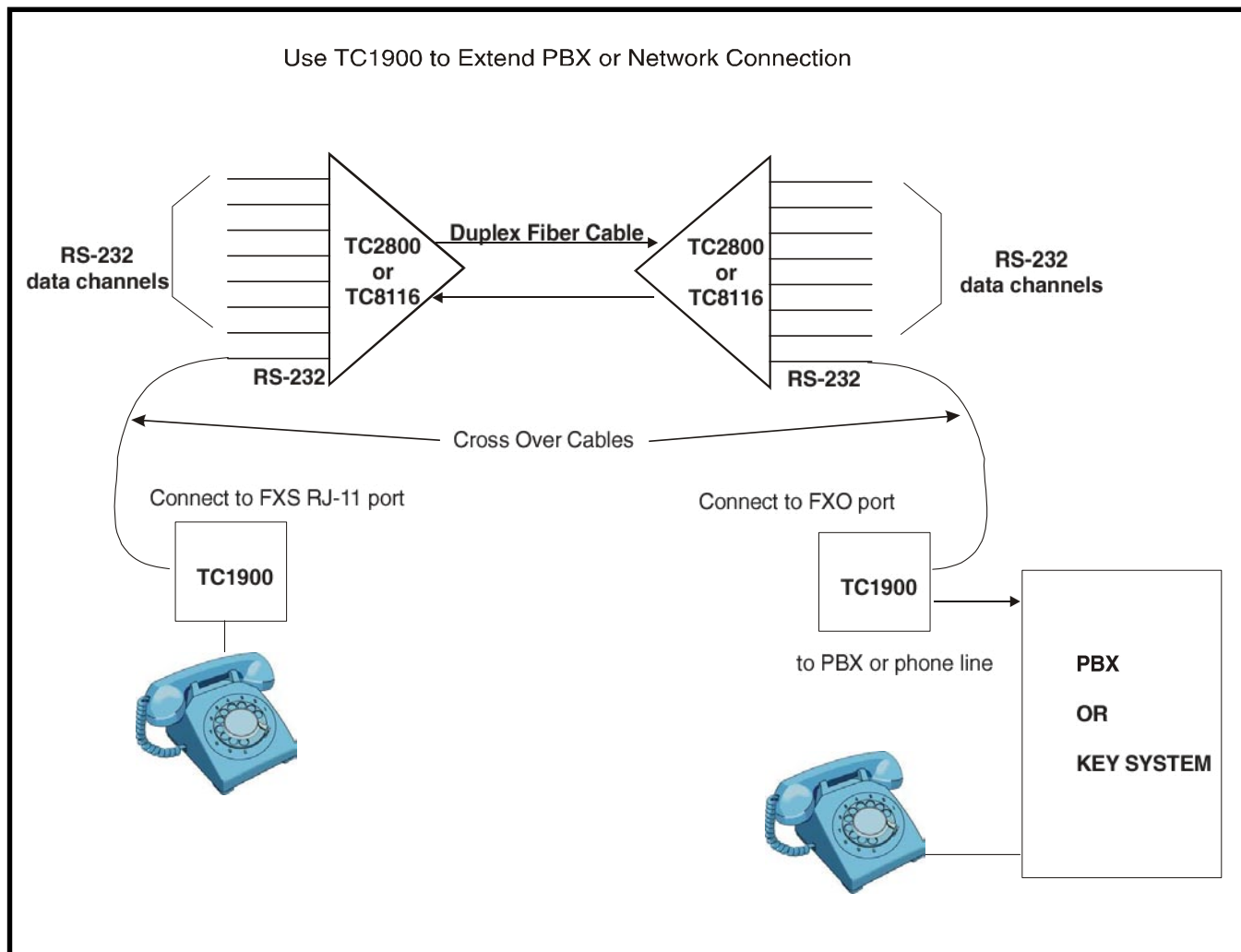
Use TC1900 to Extend PBX or Network Connection

Figure 11. Typical Application Diagram - Phone Line Extender

Appendix E

Glossary

FXO-Foreign Exchange Office.

FXO configuration is required for a plain old telephone service (POTS) to generate a call to the telephone network.

FXS-Foreign Exchange Station.

FXS configuration is required for a telephone network to generate a call to a plain old telephone set.

Hotlink-direct connected phone line.

PBX-Private Branch Exchange.

A telephone exchange device owned by private entity.

Ringdown-provide ringing signal.

RS-232 Async-clock timing is embedded in the signal itself.

RS-232 Sync- clock and data are transmitted separately

Toll quality voice-voice frequency is restricted within 300Hz to 3.4KHz.