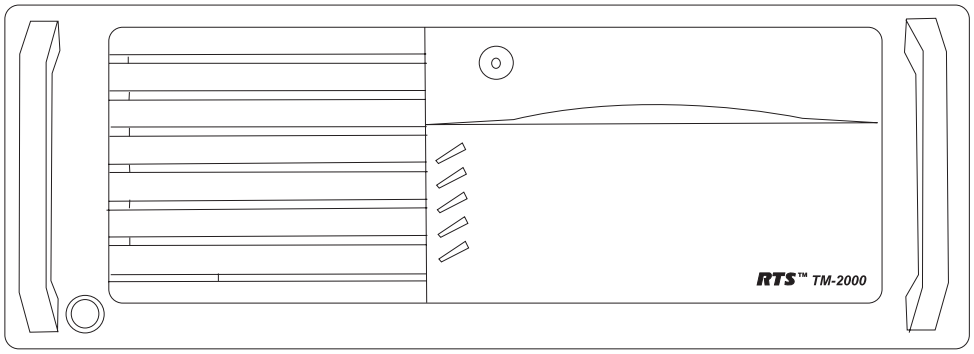
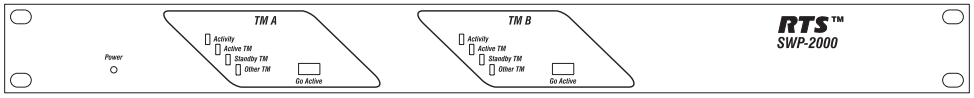
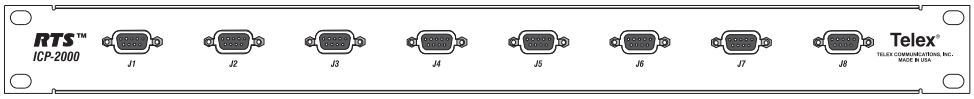
USER MANUAL

Model
TM-2000 Trunk Master
SWP-2000 Switch Over Panel
ICP-2000 Interconnect Panel

Intelligent Trunking System







RTS™

9350-7715-000 Rev C, 2/2002

PROPRIETARY NOTICE
The RTS product information and design disclosed herein were originated by and are the property of Telex Communications, Inc. Telex reserves all patent, proprietary design, manufacturing, reproduction, use and sales rights thereto, and to any article disclosed therein, except to the extent rights are expressly granted to others.

WARRANTY INFORMATION
RTS products are warranted by Telex Communications, Inc. to be free from defects in materials and workmanship for a period of three years from the date of sale.

The sole obligation of Telex during the warranty period is to provide, without charge, parts and labor necessary to remedy covered defects appearing in products returned prepaid to Telex. This warranty does not cover any defect, malfunction or failure caused beyond the control of Telex, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the Service Manual or the User Manual, defective or improper associated equipment, attempts at modification and repair not authorized by Telex, and shipping damage. Products with their serial numbers removed or effaced are not covered by this warranty.

To obtain warranty service, follow the procedures entitled “Procedure For Returns” and “Shipping to Manufacturer for Repair or Adjustment”.

This warranty is the sole and exclusive express warranty given with respect to RTS products. It is the responsibility of the user to determine before purchase that this product is suitable for the user’s intended purpose.

ANY AND ALL IMPLIED WARRANTIES, INCLUDING THE IMPLIED WARRANTY OF MERCHANTABILITY ARE LIMITED TO THE DURATION OF THIS EXPRESS LIMITED WARRANTY.

NEITHER TELEX NOR THE DEALER WHO SELLS RTS PRODUCTS IS LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND.

CUSTOMER SUPPORT
Technical questions should be directed to:

Customer Service Department
RTS/Telex,
12000 Portland Avenue South
Burnsville, MN 55337 U.S.A.
Telephone: (952) 884-4051
Fax: (952) 884-0043

RETURN SHIPPING INSTRUCTIONS
PROCEDURE FOR RETURNS
If a repair is necessary, contact the dealer where this unit was purchased.

If repair through the dealer is not possible, obtain a RETURN AUTHORIZATION from:

Customer Service Department
Telex Communications, Inc.
Telephone: (877) 863-4169
Fax: (800) 323-0498

DO NOT RETURN ANY EQUIPMENT DIRECTLY TO THE FACTORY WITHOUT FIRST OBTAINING A RETURN AUTHORIZATION.

Be prepared to provide the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

SHIPPING TO MANUFACTURER FOR REPAIR OR ADJUSTMENT
All shipments of RTS products should be made via United Parcel Service or the best available shipper, prepaid. The equipment should be shipped in the original packing carton; if that is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material. All shipments must be sent to the following address and must include the Return Authorization.

Factory Service Department
Telex Communications, Incorporated
West 1st Street
Blue Earth, MN 56013 U.S.A.

Upon completion of any repair the equipment will be returned via United Parcel Service or specified shipper collect.

Table of Contents

INTRODUCTION 4

TM-2000 DESCRIPTION 4
- Front Panel Features 4
- Rear Panel Features 4

ICP-2000 DESCRIPTION 5
- Front Panel Features 5
- Rear Panel Features 5

SWP-2000 DESCRIPTION 5
- Front Panel Features 5
- Rear Panel Features 5

UNDERSTANDING TRUNKING 6

INSTALLATION 6
- Unpacking 6
- Installing Software 6
- Rack Mounting 7
- Trunking Connections and Setup 7

SPECIFICATIONS 9
- TM-2000 9
- SWP-2000 9
- ICP-2000 9
- Environment 9
- Approvals 9

DRAWINGS 10
- Example of Non-redundant TM-2000 System 10
- Example of Redundant TM-2000 System 11
- Cable Diagrams 12-15
- Recommended Cables 15

INTRODUCTION

This manual describes the installation and operation of the TM-2000 Trunk Master, SWP-2000 Switch Over Panel, and the ICP-2000 Interconnect Panel.

TM-2000 DESCRIPTION

The RTS Trunking System manages intercommunications between separate intercom systems using intercom ports that have been reserved and interconnected between the intercom systems. Keypanels or other data devices can then communicate with various destinations in other intercom systems via the reserved intercom ports. (This is different from bus expansion, in which the entire bus system of two or more frames are interconnected to form one larger intercom system.)

The RTS Trunking System consists of an RTS Model TM-2000 and one or more RTS Model ICP-2000 Inter-Connection Panels, depending on the number of intercom systems to be trunked. A backup TM-2000 may also be added to the system to prevent downtime in the event of a failure of the main master control unit. When both main and backup control units are used, an RTS Model SWP-2000 Switchover Panel is also required.

Front Panel Features

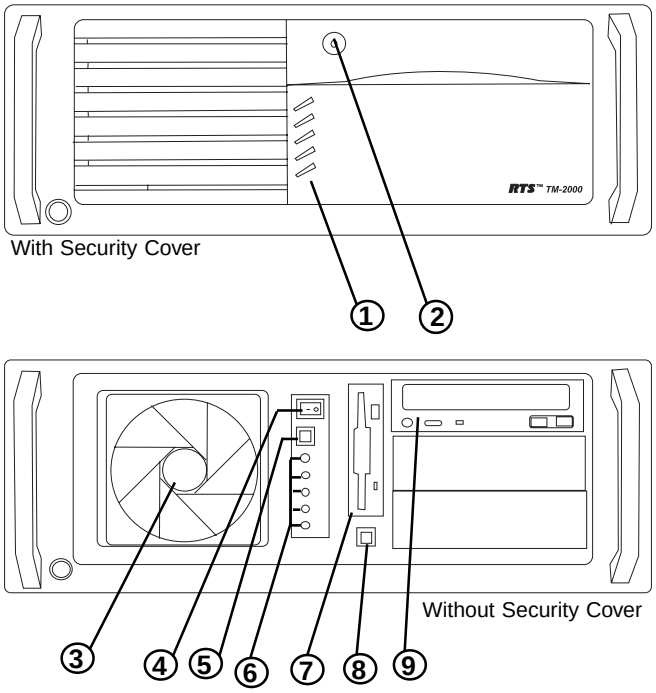


Figure 1 *- TM-2000 front panel features.*

1. Status indicators for power, hard drive, fan, system temperature.
2. Front security panel lock.
3. Cooling fan.
4. Power switch (front).
5. System reset switch.
6. Status indicators (from top to bottom): Power, Hard Disk, Fan Failure, Over Temperature 1, Over Temperature 2.
7. Floppy drive.*
8. System over temperature alarm silence switch.
9. CD-ROM drive.*

***Used only for factory service.**

Rear Panel Features

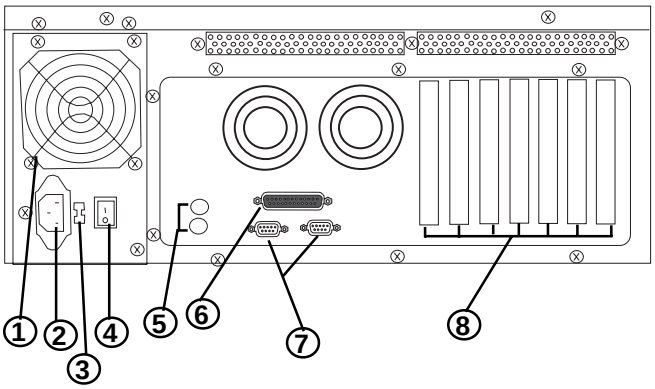


Figure 2 *- TM-2000 rear panel features.*

1. Power supply fan.
2. AC power connector.
3. AC voltage selector switch.
4. Power switch (rear).
5. Keyboard and mouse connectors.*
6. Parallel port connector. See note below.
7. Serial (COM) port connectors. See note below.
8. Card slots containing: (a) RS-485 communication card(s) using SCSI type II connector. See note below. (b) Networking connector using RJ-45 connector. See note below. (c) Video monitor connector* using 15 pin D-Sub connector.

***Used only for factory service.**

Note: The exact location of cards and connector designations can vary from unit to unit. The diagram provided is for general feature locations only. Follow the designated labels found on your particular unit(s).

ICP-2000 DESCRIPTION

The ICP-2000 is a 1RU breakout panel that converts the SCSI type II connection provided from the TM-2000 communication card(s) into 9-pin D-Sub connections. Each RS-485 communication card on the TM-2000 has 8 ports provided on the SCSI type II connector. The ICP-2000 breaks these 8 ports into individual 9-pin D-Sub connections. There are two SCSI type II connectors on the ICP-2000. These two connectors allow both a primary and redundant TM-2000 to be connected. The connectors are wired in parallel, so it does not matter which connector the primary TM-2000 and (if present) redundant TM-2000 are plugged into. The ICP-2000's connectors are labeled from left to right J1, J2, J3....J8. These will correspond from low number to high number of the ports associated with the cable plugged into the ICP-2000. For example: If the cable plugged into an ICP-2000 had ports 1-8 on it, then J1 would be port 1, J2 port 2, up to J8 being port 8. If the cable plugged into an ICP-2000 had ports 9-16 on it, then J1 would be port 9, J2 port 10, up to J8 being port 16. It is important to note that in systems using VDP panels, port 1 is reserved for connection to the VDP controller and should not be connected to an ADAM or ADAM CS system.

Front Panel Features

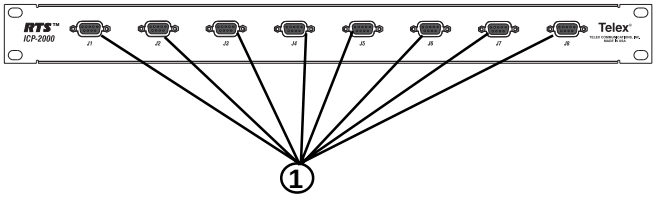


Figure 3 - *ICP-2000 front panel features.*

1. 9-pin female D-Sub connector. Each connector is dedicated to an RS-485 communications port carried on the SCSI type II cable from the TM-2000.

Rear Panel Features

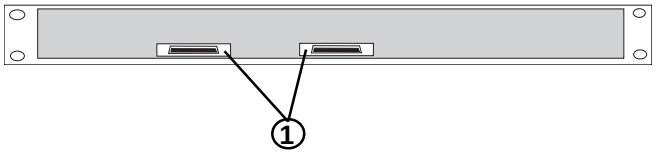


Figure 4 - *ICP-2000 rear panel features.*

1. SCSI type II connectors. These are wired in parallel, so it does not matter which connector is used with a TM-2000 even in redundant systems. The SCSI type II cables are included with the TM-2000 or with an add-on RS-485 port card for the TM-2000.

SWP-2000 DESCRIPTION

The SWP-2000 is a 1RU switch over panel that provides common connections for TrunkEdit and TrunkSupervisor software packages (via serial connections to a Windows® based PC), status monitoring of both TM-2000 units and control of both TM-2000 units when used in a redundant configuration.

Front Panel Features

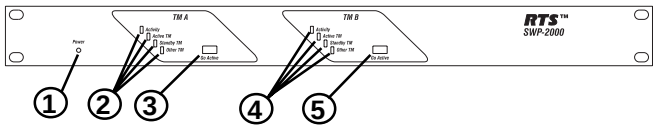


Figure 5 *- SWP-2000 front panel features.*

1. Power LED. Indicates that the SWP-2000 has power.
2. TM A Status LEDs. Indications for: Activity, Active TM, Standby TM, Other TM. The Activity LED indicates activity on the TM-2000 associated with the TM A inputs. Active TM LED indicates which TM-2000 (either A or B) is active. Standby TM LED indicates which TM-2000 (either A or B) is in standby. Other TM LED indicates green if TM B is talking, red if not, and off if the system is not configured for a backup TM-2000.
3. TM A Go Active control switch. Forces the TM-2000 associated with the TM A inputs to become the active trunk master.
4. TM B Status LEDs. Indications for: Activity, Active TM, Standby TM, Other TM. The Activity LED indicates activity on the TM-2000 associated with the TM B inputs. Active TM LED indicates which TM-2000 (either A or B) is active. Standby TM LED indicates which TM-2000 (either A or B) is in standby. Other TM LED indicates green if TM A is talking, red if not, and off if the system is not configured for a backup TM-2000.
5. TM B Go Active control switch. Forces the TM-2000 associated with the TM B inputs to become the active trunk master.

Rear Panel Features

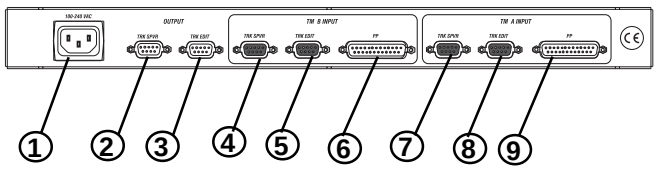


Figure 6 *- SWP-2000 rear panel features.*

1. AC power.
2. TrunkSupervisor connector. Provides connection to the COM port of the external PC running TrunkSupervisor software.
3. TrunkEdit connector. Provides connection to the COM port of the external PC running TrunkEdit software

4. Trunk Master A TrunkSupervisor connector. Connects to COM port 2 of the TM-2000 assigned to be Trunk Master A.
5. Trunk Master A TrunkEdit connector. Connects to COM port 1 of the TM-2000 assigned to be Trunk Master A.
6. Trunk Master A parallel port. Connects to parallel printer port of the TM-2000 assigned to be Trunk Master A. Provides control from the SWP-2000 to the TM-2000 and LED status monitoring of the TM-2000 on SWP-2000 front panel.
7. Trunk Master B TrunkSupervisor connector. Connects to COM port 2 of the TM-2000 assigned to be Trunk Master B.
8. Trunk Master B TrunkEdit connector. Connects to COM port 1 of the TM-2000 assigned to be Trunk Master B.
9. Trunk Master A parallel port. Connects to parallel printer port of the TM-2000 assigned to be Trunk Master A. Provides control from the SWP-2000 to the TM-2000 and LED status monitoring of the TM-2000 on SWP-2000 front panel.

UNDERSTANDING TRUNKING

In a trunking system, the audio lines (not data) of one or more intercom ports are interconnected between two separate intercom systems. The system administrator in each intercom system then places restrictions on these ports to prohibit them from being assigned to any keys. This reserves the ports for exclusive use as trunking lines. A special RS-485 data link is also connected from each intercom system to the trunk master for exchange of system control signals. Once the interconnections are completed, the trunk master is programmed, using TrunkEdit, to recognize the individual intercom systems.

After the trunk master has been programmed, system administrators or keypanel users in each intercom system may request lists of persons, party lines etc. from the other intercom systems for purposes of key assignment just as they would in their own intercom system. After keys are assigned, keypanel operators can activate them to talk or listen just like in their own intercom system. There is no apparent difference to keypanel operators, but what actually occurs in the system electronics is slightly different.

When a keypanel operator activates a key to talk to a destination located in another intercom system, the intercom system's master controller does not act itself to close any crosspoints, but rather, it sends this information to the trunk master via the data connection. The trunk master then checks for an available trunk line. If one is available it notifies the master controllers in the affected intercom systems to establish the communication path using the trunk line that it specifies. If no trunk lines are available, the trunking system will notify the master controller in the caller's intercom system, which will then send a "busy" signal to the calling keypanel.

If more than two intercom systems are interconnected, additional trunk lines must be reserved and interconnected between the systems. However, it is not always necessary that two intercom systems be directly interconnected as long as there is a path not more than one system away to connect the two systems. The trunking system can be programmed to permit "cascaded" trunking in which a pathway is established through an intermediate intercom system to connect two endpoints.

Note: The system and its software only support a single level of cascade. For example: System A wants to talk to System C, but it does not have a direct connection to System C. System B has both a connection to System A and to System C. System A can talk to System C by going through (cascading) System B. However, it would be impossible for System A to talk to System D if it had to go through both System B and System C to do so, because that would require two levels of cascade.

INSTALLATION

Unpacking

Please report any damage to the shipper or Telex immediately.

Installing Software

There are two software packages that can be used with an external PC connected to the TM-2000. The TrunkEdit software package is included with the TM-2000 system. This package provides the user with the ability to program (configure) and monitor the TM-2000. The other software package called TrunkSupervisor is available as a separate add-on at an additional cost. TrunkSupervisor is an advanced monitoring package for trunked systems.

Both packages require the following minimum system:

Windows® 95 with Internet Explorer 4.01 SR2
64MB Memory
20MB Free Hard Disk (not including swap file)
TrunkEdit: One free serial (COM) port.
TurnkSupervisor: One free serial (COM) port, or two frre serial (COM) ports if an AutoTIMS unit is to be monitored.

Note: A minimum of two serial ports are required to run both software packages at the same time on the same computer. Three serial ports are required if an AutoTIMS unit is to be monitored by TrunkSupervisor.

Follow the instructions printed on the software disk(s) to install the software.

TrunkEdit works with a PC attached to COM port 1 of the TM-2000 or via the TRK EDIT port of the SWP-2000.

Figure 7 *- Serial (COM) port labels on TM-2000.*

TrunkSupervisor works with a PC attached to COM port 2 of the TM-2000 or via the TRK SPVR port of the SWP-2000. See Figure 7 for an example of how COM port 1 and 2 are labeled on the TM-2000.

Rack Mounting

Install the TM-2000(s), ICP-2000(s), and SWP-2000 (if used) in the equipment rack. The units do not have special ventilation requirements. If a redundant system is being configured it is recommended that the SWP-2000 be installed between the two TM-2000s. Mount the ICP-2000 panel(s) either above or below the TM-2000(s).

Trunking Connections and Setup

1. Identify the correct wiring diagram for your system. For non-redundant TM-2000 systems use example system in Figure 10. For redundant TM-2000 systems use the example system in Figure 11. Connect the trunking system components using the appropriate wiring diagram. Consult the appropriate figures as indicated in Figures 10 and 11 for specific cable wiring diagrams.

Note: Follow the labels as placed on the TM-2000 for the specific locations of network cards and RS-485 communication cards/port numbers. See Figure 8 for an example of card/port labeling. Figure 9 depicts how the ports are mapped to the ICP-2000 panels. Caution: On most systems Port 1 can be used for trunking. On special systems that use Video Delegate Panels (VDP), Port 1 is reserved for use with the VDP panels. Standard systems ship from the factory without VDP support, so Port 1 is safe to use for trunking.

Figure 8 *- TM-2000 RS-485 port and networking labels.*

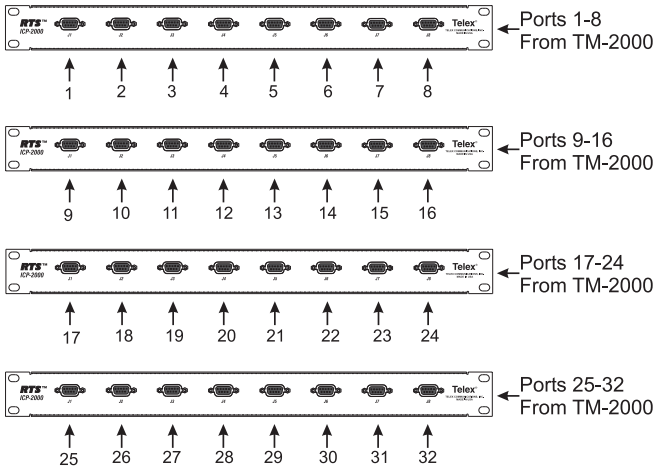


Figure 9 *-ICP-2000 port mapping from TM-2000.*

2. Interconnect one or more intercom audio ports between the intercom systems. These ports will be used for trunking communication only. Figure 10 and 11 indicate the specific cable wiring diagrams.

Note: The number of trunk lines that you setup should be based on the number of persons that need to communicate with other intercom systems, and on the critical nature of their communication. On the other hand, there may be additional expense involved with running trunk lines (when using leased lines for example) and you will want to keep the number of lines to a minimum. You may be able to get by with fewer trunk lines than the number of potential users. For example: If two keypanels need to have access to another intercom system, but only one of those keypanels has a critical need, you may be able to get by with one trunk line. You can just set the trunk priorities for the two users (as described in the following paragraphs) so that the one with the critical need has a higher priority. Also keep in mind that the trunking system can create a communication path by "cascading" through a third intercom system if that system has trunk lines to the other two systems. If frequent busy signals are encountered during normal use, you may have to allocate more trunk lines. A busy signal is normally indicated by an alphanumeric key display that alternates between the normal key assignment and a double asterisk indication.

3. Within each intercom system, run the **ADAMedit** intercom configuration software. Do the following:

   Enable Trunking Support
   To enable trunking support place a check mark in box next to Enable Trunking Support option. This option is located under the **|Options|** **|Preferences|** menu item under the **Advanced** tab.

   Send the changes to the frame and save the file.

   Shutdown **ADAMedit**.

Repeat this for every intercom system that is to be trunked.

4. Once **ADAMedit** is restarted, click the **KP** button on the toolbar. Then select the port that you want to set as a trunking port: either enter the port number in the "**Port**" box and press Enter, or select the name of the port in the "**Alpha**" box. When the keypanel setup screen for that intercom port appears, uncheck all of the **Scroll Enable** check boxes. Then, send your changes to the intercom system. For further assistance with keypanel setup, click the **KP** button on the toolbar, then press the F1 key on the computer keyboard and select "**Get Help on Keypanel Setup**".

   Also using **ADAMedit** within each intercom system, select which intercom ports, party lines etc. will be scrollable and assignable in other intercom systems. To make intercom ports scrollable and assignable, click the **KP** button on the toolbar, select an intercom port, then check the **Scroll Enable** check boxes as desired. (Press the F1 key to get further help with keypanel setup, including additional scroll enable information.) To make other types of functions (party lines, IFBs etc.) scrollable, click the appropriate button on the **ADAMedit** toolbar as indicated, then select a specific destination and check its **Scroll Enable** check boxes. For further assistance setting up any of these destinations, press the F1 key while viewing the appropriate setup screen.

PL button	Party Lines
IFB button	IFBs
SL button	Special Lists
GPI Out button	General Purpose outputs
ISO button	Camera ISOs

   Be sure to send your changes to the intercom system and save the file before exiting **ADAMedit**.

5. Run the **TrunkEdit** Software and configure the trunking system. Click on the bar labeled **Intercom** on the left side of the screen and then click on the **Setup** icon. A table displaying setup information for each intercom system will be displayed. On initial setup this table will be empty. Do the following:

   Enter a unique four character name for each trunked intercom system under the **Name 4** column of the setup table. You can also enter unique six and eight character names under the **Name 6** and **Name 8** columns, but these are optional.

   Select the baud rate for each intercom system. The baud rate can be changed by right clicking anywhere along an intercom system's entry in the table. A pop-up menu will display. Select the correct baud rate by moving the pointer to the **Select Baud Rate** entry and clicking on the correct rate. For locally trunked systems (i.e. connected via cable only), **38.4K** should be selected. For remote trunked systems (i.e. connected via leased line, fiber, etc...), **9600** should be selected.

   Select the RS-485 COM port to be used from the TM-2000 to each intercom system. The COM port can be changed by right clicking anywhere along an intercom system's entry in the table. A pop-up menu will display. Select the correct COM port by moving the pointer to the **Select COM Port** entry and clicking on the desired COM port.

   Send the changes to the TM-2000 and save the file.

6. Click on the bar labeled **Trunk** on the left side of the screen and then click on the Definitions icon. A table displaying trunk definitions will be displayed. On initial setup this table will be empty. Do the following:

   Right click on a trunk entry under the **Icom 1** column. Select **Choose New Assignment** from the pop-up menu that appears. Select the intercom system that is desired for this end of the trunk line. Repeat the same for the **Icom 2** column in the same line except choose an intercom system different than that selected for **Icom 1**. This defines which two intercom systems (**Icom 1** and **Icom 2**) will be trunked via this entry in the table.

   Right click in either the **Port** or **Alpha** entry associated with the **Icom 1** entry you just made and select the **Choose New Assignment** from the pop-up menu that appears. Select the **Port** or **Alpha** to be used for the audio trunk line from the system named in the **Icom 1** column. Do the same for the **Port** or **Alpha** entry associated with the **Icom 2** entry except select the **Port** or **Alpha** from the **Icom 2** system for the audio trunk line.

   If this particular trunk line is to be cascadeable (i.e. usable to connect two other adjacent systems), then be sure to set the **Cascade** flag. To set or clear the **Cascade** flag right click on the **Cascade** entry for the trunk line and select **Set Cascade Flag** or **Clear Cascade Flag** from the pop-up menu that appears.

   Repeat this procedure for each intercom system audio trunk line that will be needed. When finished send the changes to the TM-2000 and save the file.

7. Run the **ADAMedit** software. Within each intercom system, assign keypanel keys as required to communicate with destinations in other intercom systems. This is basically the same as assigning keys in the local intercom system, except that you will have to select an intercom system first when making assignments. Press the **KP** button on the toolbar to access keypanel setup. Then,

select the intercom port where you want to add a key assignment that will communicate with a remote intercom system. If you use the **Key Assignment Select** screen to assign keys, proceed as for normal key assignment, except that you should select an intercom system before selecting a scroll list. Press the F1 key on the computer keyboard to get help on keypanel setup.

Be sure to send your changes to the intercom system and save the file before exiting **ADAMedit**.

SPECIFICATIONS

TM-2000

Height: 7.0” (177mm)
Width: 19.0” (483mm)
Depth: 18.5” (470mm)
Weight: 48.7 lbs (22.1 kg)
Power: 115/230VAC (switch selected), 50/60 Hz, 2.6A

SWP-2000

Height: 1.75” (44mm)
Width: 19.0” (483mm)
Depth: 5.3” (133mm)
Weight: 5.2 lbs (2.4 kg)
Power: 100-240 VAC, 47-63 Hz, 0.4 A

ICP-2000

Height: 1.75” (44mm)
Width: 19.0” (483mm)
Depth: 1.0” (25.4mm)
Weight: 5.2 lbs (2.4 kg)

Environment

Operating Temperature:	0°C to 50°C
Storage Temperature:	-20°C to 75°C
Humidity:	0 to 95% non-condensing

Approvals

UL, FCC, CE

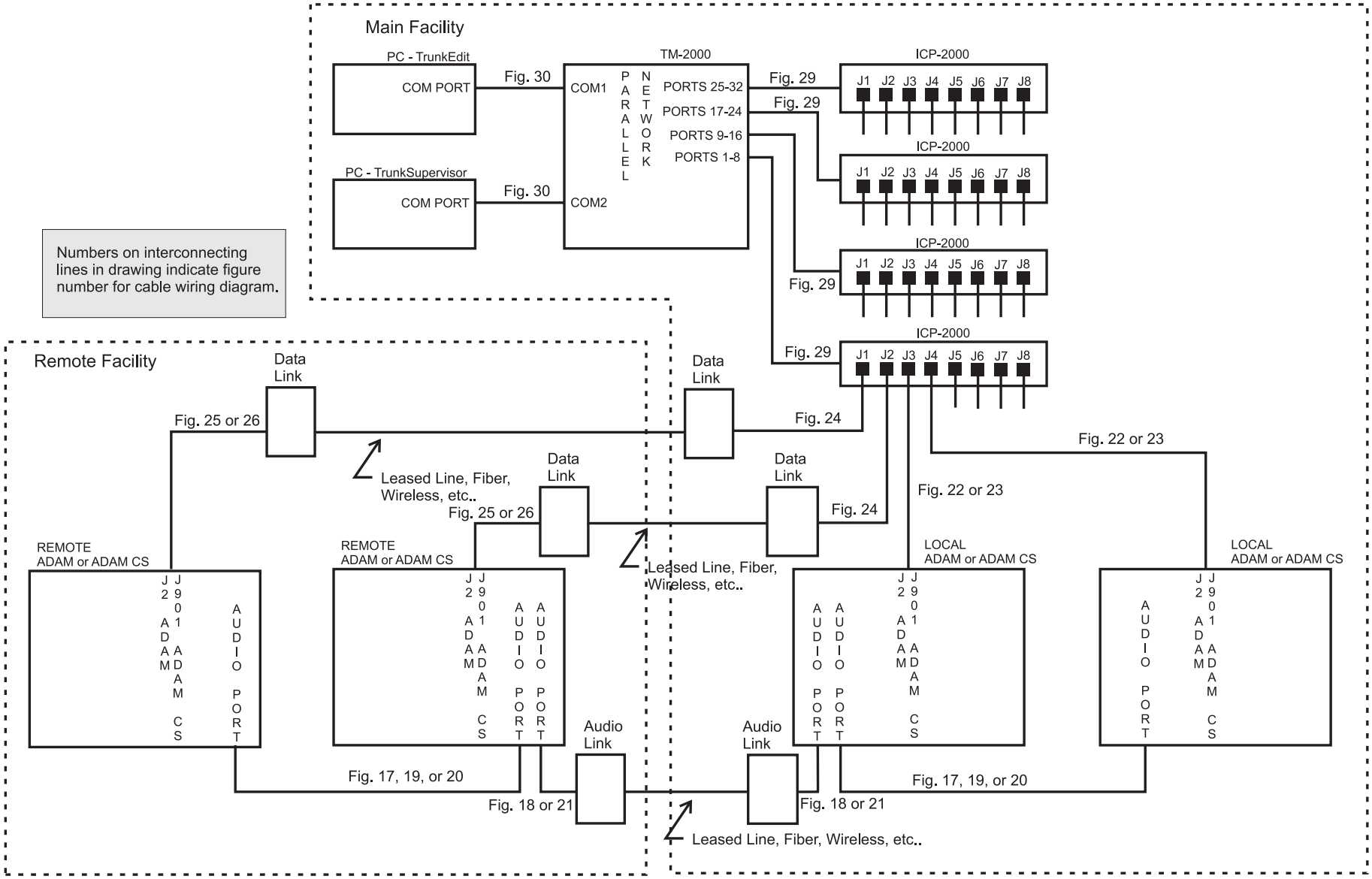


Figure 10 *- Example of a non-redundant TM-2000 system.*

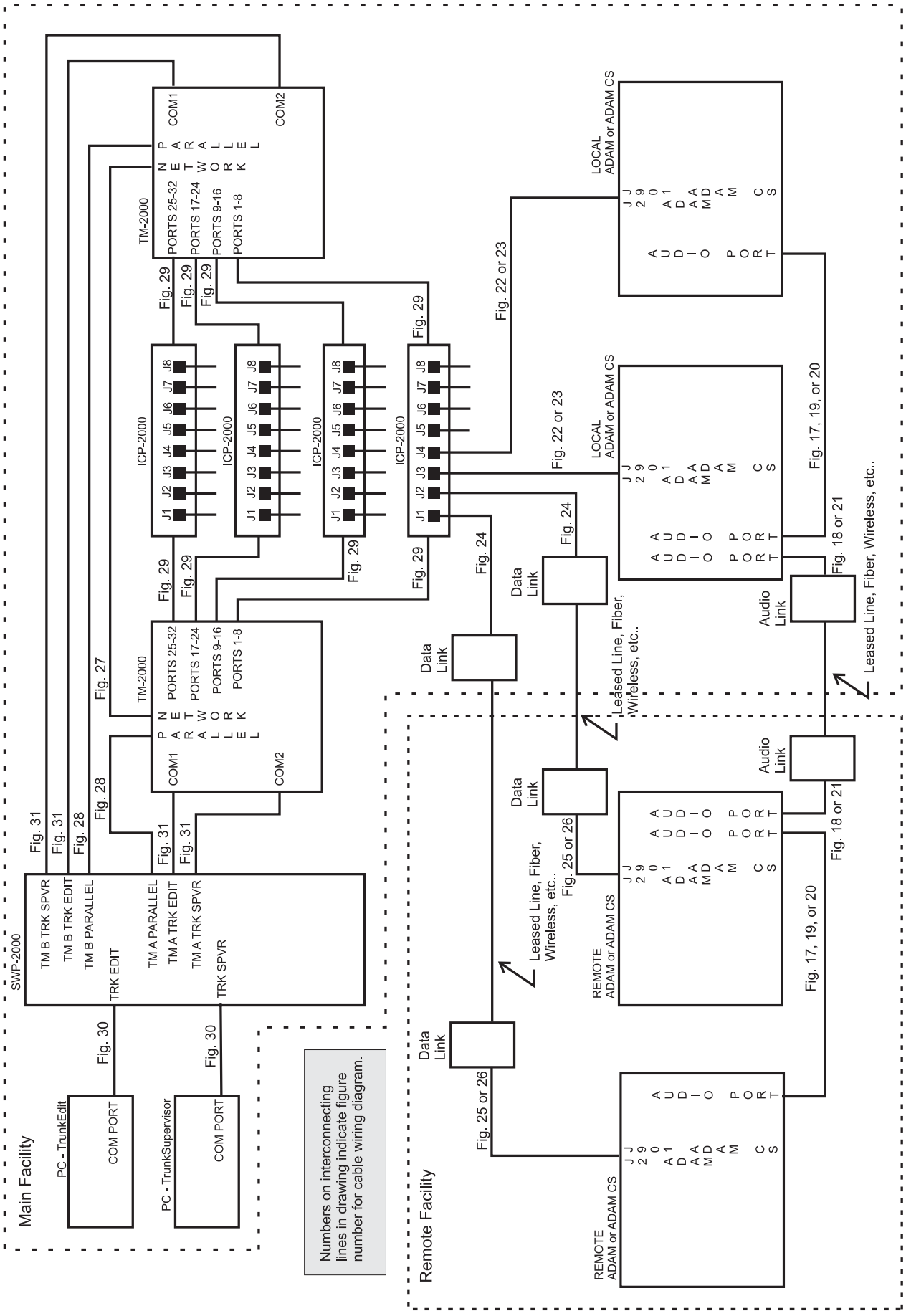


***Figure 11** - Example of a redundant TM-2000 system.*

IMPORTANT!

When connecting to an ADAM CS back panel, use only low-profile cable connectors such as AMP Part No. 747516-3 (Telex Part No. 59926-678).

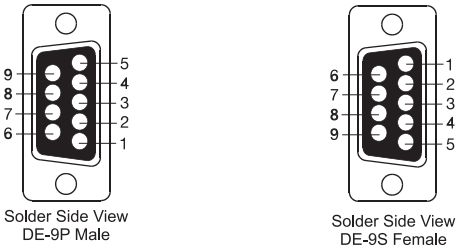


Figure 12 *- 9-pin D-sub connector pinouts.*

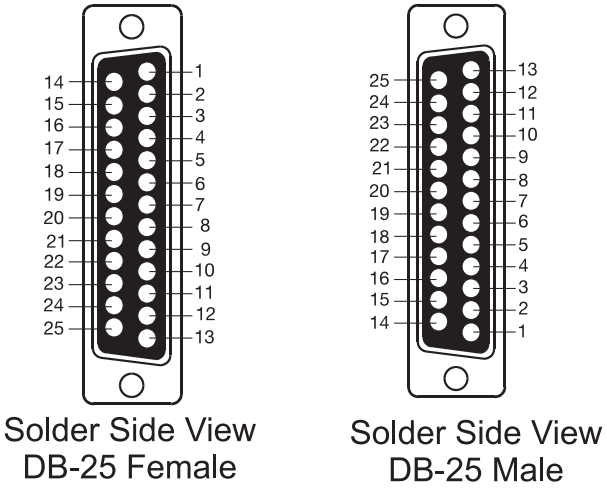


Figure 13 *- 25 pin D-sub connector pinouts.*

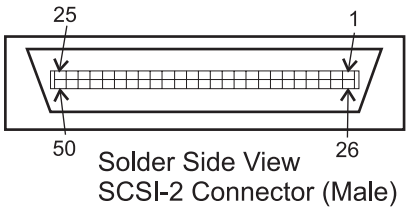


Figure 14*- 50 pin SCSI type II connector pinout.*

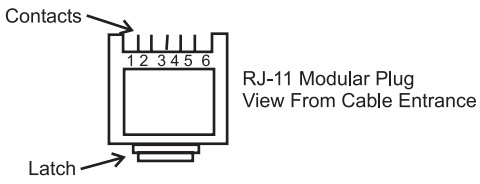


Figure 15*- RJ-11 connector pinout.*

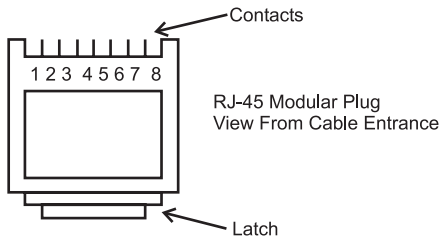


Figure 16 *- RJ-45 connector pinout.*

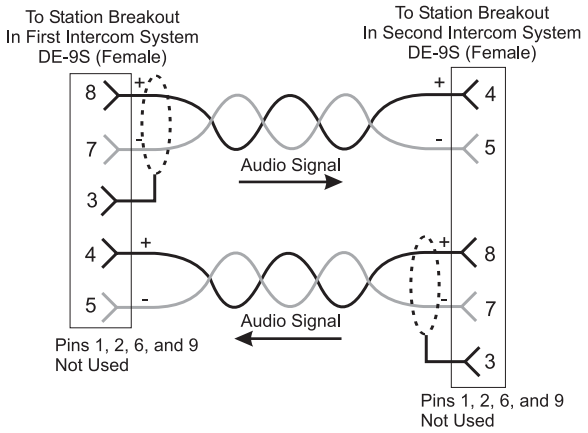


Figure 17 *- DE9S to DE9S audio cable.*

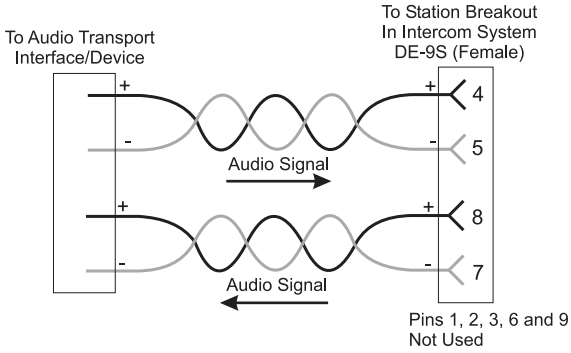


Figure 18 *- DE-9S to unspecified device audio cable.*

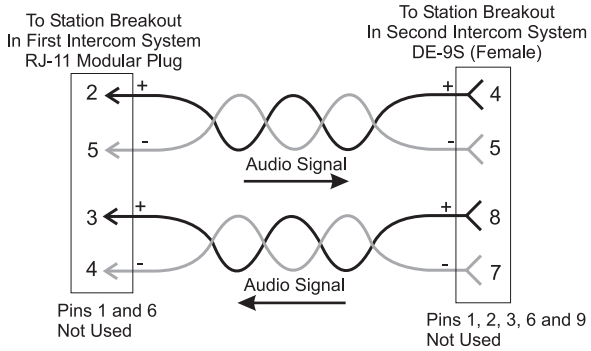


Figure 19 *- RJ-11 to DE-9S audio cable.*

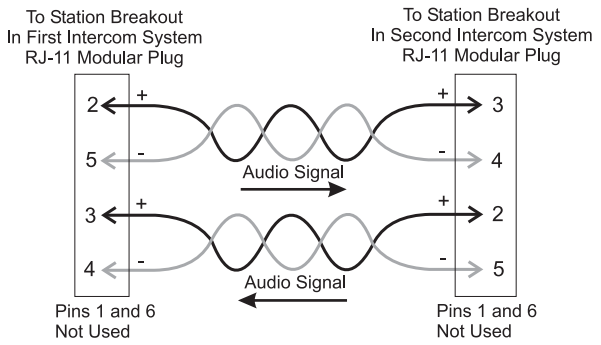


Figure 20 *- RJ-11 to RJ-11 audio cable.*

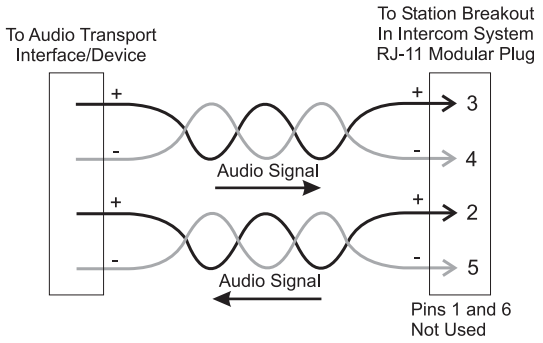


Figure 21 *- Unspecified device to RJ-11 audio cable.*

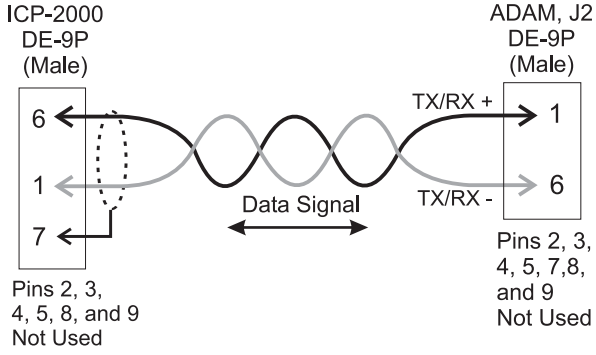


Figure 22 *- ICP-2000 to ADAM RS-485 data cable.*

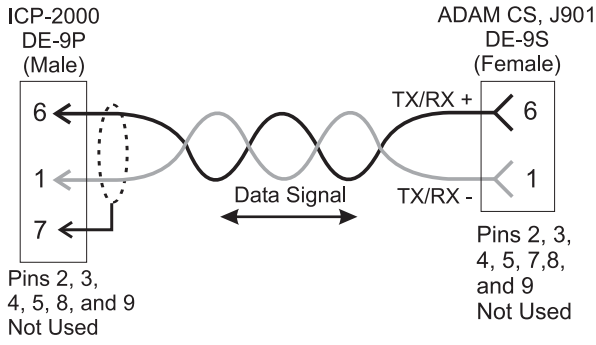


Figure 23 *- ICP-2000 to ADAM CS RS-485 data cable.*

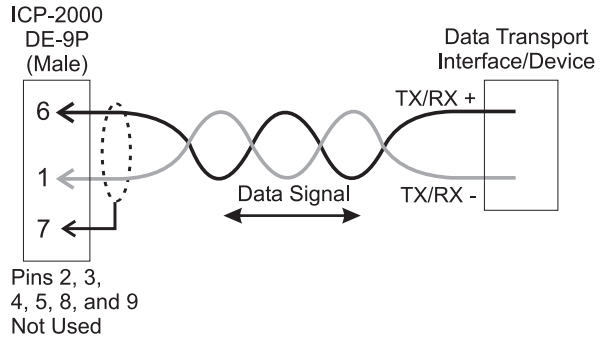


Figure 24 *- ICP-2000 to unspecified device RS-485 data cable.*

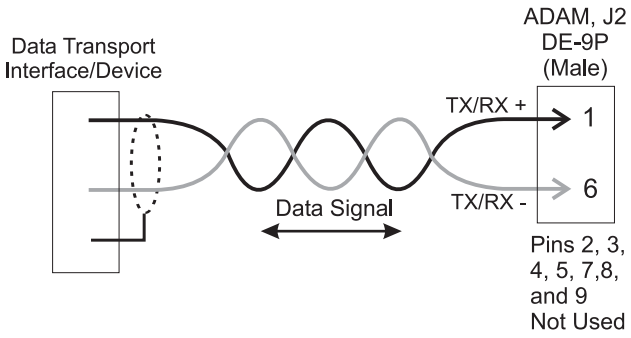


Figure 25 *- ADAM to unspecified device RS-485 data cable.*

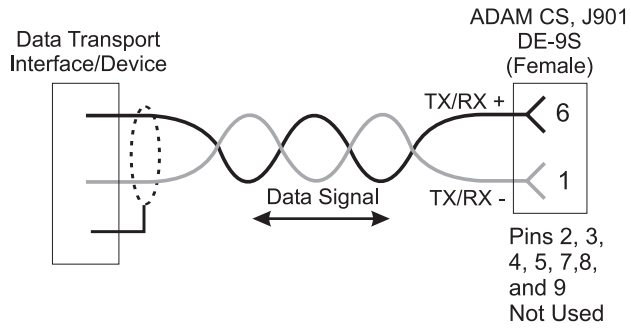


Figure 26 *- ADAM CS to unspecified device RS-485 data cable.*

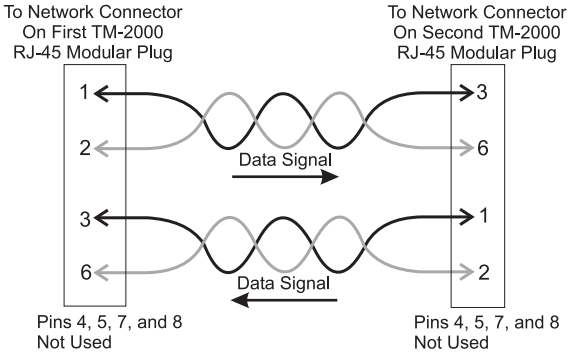


Figure 27 *- TM-2000 to TM-2000 network linking (standard networking crossover) cable.*

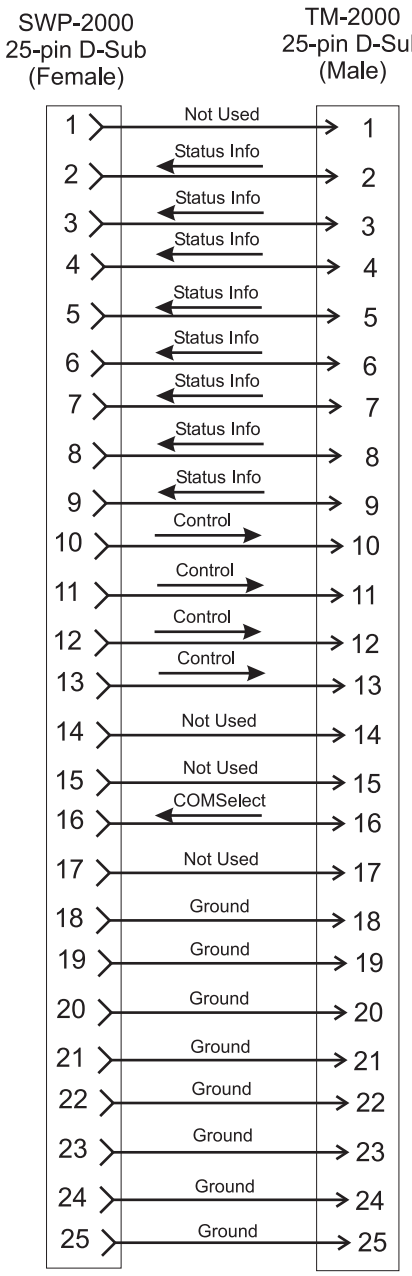
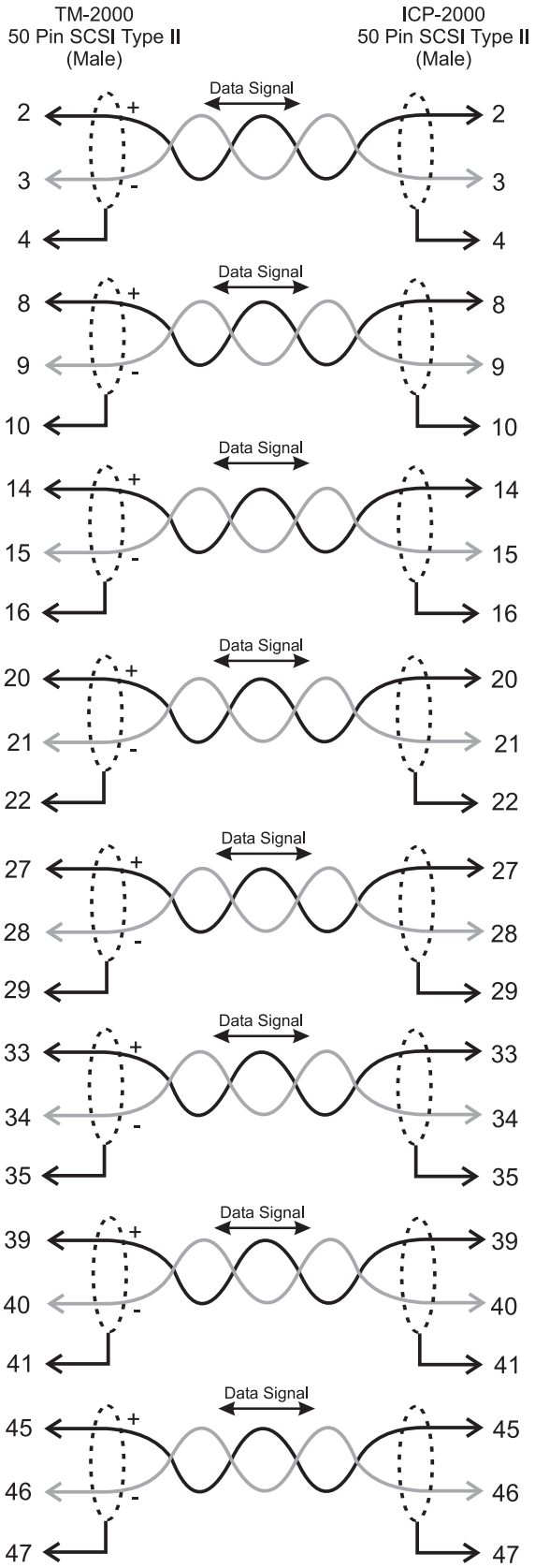


Figure 28 *- TM-2000 to ICP-2000 RS-485 COM ports cable.*



Pins 1, 5-7, 11-13, 17-19, 23-26, 30-32, 36-38, 42-44, and 48-50 Not Used

Figure 29 *- TM-2000 to SWP-2000 parallel port status and control cable.*

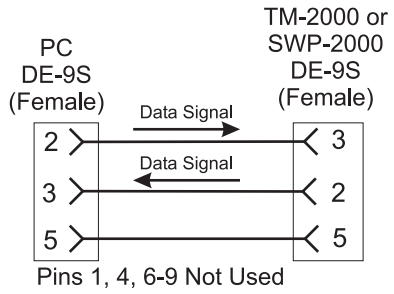


Figure 30 *- PC (TrunkEdit/TrunkSupervisor) to TM-2000 or SWP-2000 RS-232 data cable.*

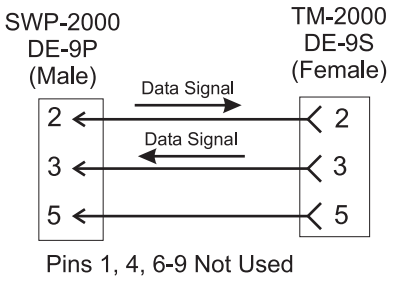


Figure 31 *- SWP-2000 to TM-2000 (TrunkEdit/ TrunkSupervisor) RS-232 data cable.*

Recommended Cables

1. For cables using RJ-11 connections use Catagory 5 (CAT5) network cable or similar cable.

2. For RJ-45 connectors use Catagory 5 (CAT5) network cable. RJ-45 Crossover (TM-2000 to TM-2000 network) cables can be purchased pre-made from a computer dealer

3. For audio cables use Belden 8723 or similar type with two twisted pairs with shield/drain wires.

4. For individual RS-232 or RS-485 data cables used Belden 8451 or similar type with single twisted pair with shield/drain wire. DO NOT EXCEED 50 FEET RUN LENGTH WITH RS-232 CABLES! RS-232 cables can be purchased pre-made from a computer dealer. Use an RS-232 wired “Straight Through” for SWP-2000 to TM-2000 connections. Us an RS-232 wired “Null Modem” for PC to TM-2000/SWP-2000 connections.

5. For TM-2000 to ICP-2000 RS-485 cables use the supplied cables.

6. For TM-2000 to SWP-2000 status/control cables use 25 conductor shielded cable. DO NOT EXCEED 10 FEET RUN LENGTH WITH THE CABLE.