U·M·D

Installation Manual

Printed in the United States of America.
Revision 16.

Table of Contents

IMPORTANT - READ THIS FIRST

This is a guide to the installation of the TDC Tally/Message system. We recommend that you follow this manual step by step from the beginning. This will get your system up and running in the fastest possible time.

Much of the installation involves mounting and cabling the network of Under Monitor Displays (UMDs). UMDs are compact, single-line, tri-color LED display units. Your system may use UMDs that are different models, or they may all be the same model. Some units may consist of two separate UMDs in the same housing, such as the LMS-1009. Regardless of model or size, all units are compatible and will operate on the same system.

The information in this manual is designed for use with firmware versions 1.5, 2.0 or higher. The unit's version number is shown on the display each time the unit is powered up.

Before you begin installing equipment, be sure to read the section *NETWORK CABLING* on page 6. This could save you hours of work.

UNPACK AND INSPECT YOUR ORDER

Your order was checked carefully prior to shipment. You should unpack all equipment the day it arrives and inspect it for shortages or physical damage. Contact TDC immediately if you have any questions about your order. Also, notify the carrier immediately if you think that any damage occurred to the equipment during shipping.

SYSTEM OVERVIEW

Your system consists of the following parts:

1. A dedicated control computer (IBM-PC or 100% compatible) running TDC software. The PC you use must meet certain hardware requirements. A summary of these requirements can be found at the beginning of the *Operations Manual* provided with your system software.

2. Several UMD units mounted at appropriate places throughout your control room to serve as tally/message units.

3. A protocol converter that changes RS-232 ground-reference signals to RS-422/485 differential signals. Depending on the type of system you have, this converter will either be built into the PC, or it will be a small box external to the PC. A dual port RS-422/485 communication card that resides in the PC (PC-1) and an external converter (CVT-1) are available from TDC. If your system has an external converter box, note that it must be located near the PC and that it requires its own AC power plug. See figure 3 on page 23 for pinouts of the external (CVT-1) converter box.

4. A network trunk cable that originates at the PC and that connects to all of the UMDs. Details on installing the UMD network trunk are given in the section *NETWORK CABLING* on page 6.

5. Router control cabling (optional). This is a serial cable that runs from your router or other controller to the TDC control PC. This cable provides the PC with real-time status information. The information received is used to update the UMD network.

6. The Tally Interface parallel-to-serial converter (optional). The Tally Interface is a one rack-unit space device used for serial tally/color control. It converts switch contact closures from your control room equipment to a serial input for the control PC. The Tally Interface can send tally signals to the control PC or directly to the UMD network without using a PC. For more information, see *USING THE OPTIONAL TALLY INTERFACE* on page 11.

7. Direct switch wiring to various UMDs (optional). Your system may operate with dry contact closures from your control room equipment going to the RJ45 (J3) switch input connector on the back of the UMDs rather than having switch signals from a Tally Interface unit.

NOTE: Figure 1 on page 21 provides an example of how a system is set up.

COLOR MODE & MESSAGE MODE

Each dynamic UMD can operate in ***color*** mode or in ***message*** mode. This option is switch-selectable on each UMD unit. Depending on your application and the software you are using, some or all of your UMDs may need to be set to one mode or the other. These two modes operate as follows:

- In ***color*** mode, the UMD can hold one message which is sent to the unit via the network cable using either the router or the control PC. This message is constantly displayed on the UMD. The message includes a color command which sets the text color. When a switch input is activated, it overrides this color and forces the text of the message to be shown in the color selected by the switch. Each switch input selects a different color. The 'G' input selects GREEN, the 'Y' input selects YELLOW, and the 'R' input selects RED. Note that the message text will remain in the selected color only as long as an input is active. When the input is inactive, the text returns to its default color. The RED input has priority over the other two inputs and the YELLOW input has priority over the GREEN input. If more than one input is active at the same time, the text is set to the highest priority color.

- In ***message*** mode, the UMD can hold up to 32 different messages. A message can be literal text or the contents of a message file that is created by the UMD Editor program. Messages are downloaded to the unit via the network trunk. Each message is tagged with a different page number from 0 to 31. The UMD normally displays the message in page 0. When one or more switch inputs are active, they are considered to be a binary value by the UMD. This value is the sum of each active input number, and represents a specific page. The message in the selected page is displayed on the LED screen. Note that the UMD will display the selected message only while its binary value is present at the switch inputs. When the inputs change to a different page number, the UMD immediately displays the message in the new page number. When all inputs are deactivated, the UMD again displays the default message in page 0.

UMD DRY CONTACT INPUTS

Each UMD contains an RJ45 (J3) connector that allows you to input dry contact closures on the unit. When a given switch signal is present, it can change the color of the text showing on the display if operating in ***color*** mode, or it can select one of several pre-loaded messages to be shown on the display if operating in ***message*** mode. The function of the switch inputs depends on whether a UMD is set to operate in ***color*** mode or ***message*** mode.

In ***color*** mode, there are three inputs available on the RJ45 connector for changing text color to green, yellow or red. In addition, there is a common *ground*. In ***message*** mode, there are five inputs and a common ground available for generating message numbers 1 through 31. See figure 8 on page 28 for RJ45 connector pinouts.

ONE-WAY & TWO-WAY (ANSWERBACK) OPERATION

Each UMD can operate as a one-way unit or a two-way unit. This option is switch-selectable on each unit. When a UMD operates as a one-way unit, it receives information sent to it but it doesn't issue any data of its own. It's a "receive-only" unit. When a UMD operates as a two-way unit, it receives information sent to it, then sends a short answerback message (acknowledgment) to the control PC.

UMDs are normally set for one-way operation, with no answerback. However, some systems may have one or more UMDs that should be set for two-way (answerback) operation. The *Operations Manual* will specify if any UMDs should be set for two-way operation. Otherwise, all UMDs should be set for one-way operation.

FLASH-ON-RED FEATURE

Each UMD can be set to flash when the message text is red. This option is switch-selectable on each unit. When the flash feature is enabled, the UMD screen will flash on and off continuously whenever the message text is red. When the flash feature is disabled, the UMD screen does not flash.

UMD DIP SWITCH SETTINGS

Depending on the type of system you have, some of the UMDs may need to be set for ***color*** mode, while others may need to be set for ***message*** mode. Also, each UMD must be correctly set for one-way (no answerback) or two-way (answerback) operation, and each should have its flash-on-red feature set as desired. Finally, each UMD must have a unique ID (address number) so that data sent over the network trunk can be targeted to specific UMDs.

There are two sets of DIP switches that are accessible through a cutout on the back of the UMD case. The setting of these DIP switches determine the UMD mode, answerback, flash-on-red feature, and ID. You should familiarize yourself with these DIP switches so that you can determine (and change, if necessary) the mode, answerback, flash feature, and ID number of each UMD. A table is provided in Appendix A (pages 15-16) showing all DIP switch settings.

Note: The UMDs respond to the DIP switch settings only during the power-up sequence. Changing a DIP switch setting without re-applying power will not effect a change.

NETWORK CABLING

Good network wiring is crucial to the operation of the system. Almost all system troubles are due to improper network wiring. When planning your network cable run, it is important to pay special attention to the items listed here.

- Make sure the network trunk is run in a "daisy-chain" pattern.
- Use four-wire, low-capacitance, unshielded, twisted-pair cable.
  A category 5 cable compliant with EIA/TIA 568 is best.
- Use straight-through cables, not reverse-wire cables.
- Use RJ11 connectors. The RJ11 6P4C is the recommended connector.
- Test your network cables before you install them.
- Don't use shielded cable for network wiring.
- Some networks may require signal boosters, depending on cable length and the number of UMDs on the network.

Daisy-Chain the Network Trunk

When wiring your network, you *must* use a daisy-chain cabling pattern. In a daisy-chain, there are only two "ends" to the network trunk cable: one at the control PC, and the other at the last display in the daisy-chain. (If your wiring plan creates a network trunk with more than two ends, it is not a daisy-chain pattern.) The UMD network trunk is easily daisy-chained because each UMD contains two identical RJ11 jacks connected to its serial data I/O port. This makes it easy to loop the cable through each UMD. See figure 1 on page 21 for an example of a daisy-chain setup.

Note that the CVT-1 external converter box contains three identical network connectors. Each of these provides the same data feed from the control PC. Each one has its own RS-422/485 driver circuit. This allows you to run three separate network trunks from the converter box to three different areas of your control room. However, the total number of display IDs (dual 9's count as 2) on each trunk should not exceed 20.

If your installation requires more than three trunks, you can add more trunks by using additional external converter boxes as *line splitters*. See figure 2 on page 22 for an example of splitter operation. Note that each of these trunks still must obey the "two ends" rule of a daisy-chain pattern. *Do not* connect any of the trunks together.

Use Four-Wire, Straight Through Cables

We recommend that you use a category 5 cable compliant with EIA/TIA 568. Network wiring should be four-wire (two-pair), low-capacitance, unshielded, twisted-pair cable with RJ11 plugs crimped onto each end. Each of your network cables must be wired "straight-through”. Note that this is the opposite of standard telephone cords, which have connector ends that reverse the wiring. When cabling your UMD network, be sure to purchase or fabricate straight-through cables. The network *will not work* with cables that reverse the wiring. Figure 5 on page 25 shows how to make straight-through cables.

Don't use RJ12 Connectors

If you fabricate your own cables, be sure to use RJ11 connector ends and not RJ12 connector ends. Although both seem to be identical, they are quite different. RJ12 connectors are designed for *six-wire* cable. If you insert a four-wire cable into an RJ12 connector, the wires usually become misaligned when you crimp the connector onto the cable. This renders the cable useless and will make your UMD network fail. To avoid this problem, don't use RJ12 connectors.

Test Your Cables Before You Install Them

We recommend that you determine the number of network cables you will need for your installation and fabricate or purchase the appropriate lengths beforehand. It is much easier to test the cables and replace defective ones *before* you install them.

Avoid Shielded Cable for the Network Trunk

Do not use shielded cable for your network trunk. Unlike analog audio or video circuits, digital differential signals obtain noise immunity from the twisted wire pair, not from shielding. Standard shielded cable actually degrades digital signals because of its high capacitance.

Some Networks May Require Signal Boosters

Signal loss can occur when you have a very long network trunk or when your network is driving more than twenty UMDs. If signal loss is severe, network performance may suffer. A common symptom of this condition is that one or more UMDs at the far end of the daisy-chain fail to receive all of their messages. In such cases, resistive termination and active signal boosters (available from TDC) can be added to restore clear signals throughout the network trunk. However, keep in mind that poorly functioning UMDs are almost always the result of incorrect wiring, not signal loss problems. For more information on this topic, contact your TDC representative.

> ***WARNING:*** Improperly installed network trunk cable will prevent the UMDs from working properly. Correcting this problem is very expensive and time-consuming. Be sure to consult TDC *before* you fabricate and install your network cables if you have any questions.

CONTROL PC SETUP & INITIAL TESTING

Once you have inspected the equipment and obtained the proper network cables, the next step is to set up the control computer and use it to test the UMDs.

1. Set up the control PC and plug it in.

2. If you have an internal RS-422/485 port, be sure it is set to operate as COM1. If you have an external converter box, attach it to COM1 using a PC-TO-MODEM cable. (See figures 4A and 4B on page 24 for details on how this cable is made.) Plug the external converter box power supply into an AC outlet and verify that the converter box power indicator LED is lit.

3. Turn on the control PC. After it boots up, follow the directions provided in the *Operations Manual* to install your system software onto the control PC hard drive.

4. Your TDC software package includes a PDC diskette. Please refer to the PDC manual included with this diskette for proper use and operation of the program.

5. Take one of the UMDs and plug its power supply low-voltage cord into the UMD power connector. Then, plug its power supply into an AC outlet. When power is first applied to a UMD, the model number and a "C" or "M" briefly appears on the UMD screen to indicate if the unit is in ***color*** mode or ***message*** mode. Using a straight-through data cable, connect the converter data port to either one of the two RJ11 data connectors on the back of the UMD. IMPORTANT: See figure 6 on page 26 for the location of the RJ11 connectors. *Do not* plug the data cable into the RJ45 switch input jack on the back of the UMD.

6. Examine the DIP switches on the back of the UMD to determine the ID number of the unit and to see whether the unit is set for ***color*** mode or ***message*** mode. Then, use the PDC program to send a short test message to the target UMD ID number. Make sure you specify the proper UMD mode when sending the test message or it will not work. The UMD should display the test message immediately. Move the data cable to the other RJ11 connector on the UMD and repeat the test.

7. Repeat steps 5 and 6 with each of the UMDs.

UMD PLACEMENT AND MOUNTING

UMD placement in your control room depends on the following:

- **The length of the UMD.** Some of your equipment may need a particular length UMD unit, and some equipment may need a dual UMD unit (a single case with two UMDs in it, side by side).

- **The mode of the UMD.** Some UMDs may need to be in ***color*** mode, while others may need to be in ***message*** mode.

- **The ID number of the UMD.** Most systems require that certain UMD ID numbers be matched to specific pieces of equipment in the control room. For example, the RTDS package requires that the UMD ID number match the destination number of the router output to which it is attached.

UMD placement requirements vary widely for each installation. If you have any questions about where specific UMDs should be installed, please contact TDC for assistance.

Each UMD is provided with universal mounting brackets that attach to the side panels of the UMD with thumb screws. Using the brackets, UMDs can be attached to walls, shelves, rack mounts, etc.

SUPPLYING POWER TO THE UMDs

A UMD can be powered with 9 to 12v AC or DC Each UMD comes with a power pack (brick) that converts the AC wall voltage to a 9v supply. This power pack is plugged into connector P1 on the back of the UMD (See figure 6, page 26). If your control room has 12v power available you can use it instead of the power pack (brick). Connect the 12v power supply to connector P1. Polarity is unimportant because diodes in the UMD provide correct polarity automatically. You should expect each UMD to use a maximum of 45 watts (4 amps @ 12v). NOTE: When using a central power supply make sure there is at least 9 volts available at each UMD location.

INSTALLING THE NETWORK TRUNK

Starting at the PC, attach the first cable to the RS-422/485 converter and run it to the closest UMD. Attach it to one of the RJ11 connectors on the UMD. Take the next cable and attach it to the other RJ11 connector, then run it to the next UMD and attach it. Continue in this fashion until all UMDs are chained together. If you tested the UMDs and cables prior to installation, the UMD network should work properly.

USING THE OPTIONAL TALLY INTERFACE

The optional Tally Interface allows your control-room tally signals to generate real-time changes on the UMDs. It can be used in one of two different configurations:

- When your system requires a dedicated control PC (as when using RTDS or another external system controller), you connect the Tally Interface to the control PC. The Tally Interface provides tally-change data to the PC system software.

- When your system does not require a dedicated control PC, you connect the Tally Interface to the UMD network. The Tally Interface provides tally-change data directly to the UMDs without the use of a control PC.

The way you should connect the Tally Interface depends on the type of system you have. The *Operations Manual* will specify how the Tally Interface should be connected. The paragraphs below explain Tally Interface connections that are common to both types of installations followed by connection details unique to each type of installation.

Connecting the Tally Interface to Your Equipment

The information in this section applies to your Tally Interface regardless of whether you are connecting it to the control PC or to the UMD network.

The Tally Interface can accept up to 32 "wet" switch signals. These signals must provide 12v to 24v DC when activated. Each of the 32 inputs on the Tally Interface is fully opto-isolated from all other inputs, and each draws a maximum of 10mA.

There are two in-line ribbon connectors on the back of the Tally Interface. These provide the connection points for the 32 switch inputs from your equipment. For both connectors, pin 1 is on the left. Each vertical pin set is one switch input, with the ground pin on top and the +v DC pin on the bottom. Only the first 16 pin sets are used on each connector; the right-most vertical pin set is not used. Switch inputs 1 through 16 are available on the left-hand connector, and switch inputs 17 through 32 are available on the right-hand connector. Refer to figure 9 on page 29 for details.

IMPORTANT: Because each input is opto-isolated, the Tally Interface does not contain a common internal ground bus for the switch inputs. Connecting a ground return wire to one switch input does not supply grounding for any other input. This does not mean, however, that you should simply strap all of the Tally Interface ground lines together. In certain situations, doing this can cause unwanted ground loops. To ensure proper switch grounding and prevent ground loops, keep the following points in mind when making your connections to the Tally Interface:

- When you have a set of input signals coming from one piece of equipment with a common ground return, you must explicitly connect the equipment's signal ground wire to the ground pin of *every switch input* that this equipment uses.

- Do not simply strap all the Tally Interface ground pins together if you are supplying input signals from more than one piece of equipment. Doing this will cause the ground lines of different pieces of equipment to become cross-connected, forming a ground loop. Instead, strap together only the input ground pins that are receiving signal inputs from the *same* piece of equipment.

Connecting the Tally Interface to the Control PC

The information in this section applies only when you are connecting the Tally Interface to the control PC. (Note: Details on connecting signals from your equipment to the Tally Interface are provided in the previous section.)

The serial port of the Tally Interface is in RS-422/485 format so you will need a COM port on the PC that accepts RS-422/485 signals. We recommend the TDC dual-port RS-422/485 communication card for this purpose. You can also use an external RS-422/485 converter.

You should use serial port COM3 for the Tally Interface. If you have the internal dual-port RS-422/485 card, use a straight-through network cable to connect the PC port to either of the two RJ11 data connectors on the back of the Tally Interface. If you have an external converter box, connect a serial cable from COM3 of your PC to the RS-232 port of the converter. (See figures 4A and 4B on page 24 for cable pinout details.) Then, use a straight-through network cable to connect the RS-422/485 port of the converter box to either of the two RJ11 connectors on the back of the Tally Interface. Make sure that the AC power pack of the external converter is plugged in and that the pilot lamp is on. Finally, plug the power supply for the Tally Interface into a nearby AC outlet and verify that the pilot lamp of the Tally Interface is lit.

Connecting the Tally Interface to the UMD Network

The information in this section applies only when you are connecting the Tally Interface directly to the UMD network trunk. (Note: Details on connecting signals from your equipment to the Tally Interface are provided on page 11.)

When the Tally Interface is connected to the UMD network, there is no dedicated control PC. Instead, the Tally Interface itself drives the network and controls the operation of the UMDs. The commands that are sent out by the Tally Interface are a result of changes that occur on the switch signal inputs of the Tally Interface.

The RJ11 connectors on the Tally Interface are designed to connect directly to an RJ11 connector on a UMD using the standard straight-through wired network cable. This is the same type of cable one uses to daisy-chain several UMDs.

To connect a Tally Interface unit to a com port on a PC one must use a special cross-connect cable. The cross-connect cable’s pinouts are wired so that the differential output pins on the interface connect to the differential input pins on the com port. Details on how this special cable is fabricated are shown in figure 10 on page 30. Note that this is the only special cable used in the entire system. All other network cables are the normal straight-through cables as shown in figure 5 on page 25.

When the Tally Interface is used to control the displays, you must still have some way of initializing the UMDs with the messages you want them to display. To do this, you temporarily connect a PC to the UMD network, then send out the desired messages using software provided by TDC. Once all the UMD messages have been sent out, you can disconnect the PC from the network and reconnect the Tally Interface. This can be done manually or with an A-B switch box. Figure 11 on page 31 shows how a system with an A-B switch box is wired.

COMPLETING THE INSTALLATION

Your TDC system may need to receive a serial data feed from your router or other controller. If so, you will need to connect a serial data cable from the output of your equipment to COM2 of the control PC. After you attach the cable, follow the instructions in the *Operations Manual* for details on setting up and operating your system software.

APPENDIX A - DIP SWITCH SETTINGS - SW1 & SW2

NOTE: SW1 is closest to the opening in the rear panel of the UMD. On both DIP packages, switches are numbered 1 through 8, with switch 1 on the left and switch 8 on the right. On black DIPs, switches are OFF when they are set toward you, and ON when they are set away from you (closer to the front screen of the UMD). On red DIPs, switches are OFF when they are up (↑) and ON when they are down (↓). In the following tables, "1" represents ON and "0" (zero) represents OFF.

On UMDs with two black DIPs, the highest ID number is 255. On UMDs with one black and one red DIP, the highest ID number is 511.

SW1 sets the ID number of the UMD. Each switch represents a binary number value. When a switch is ON, its value is added to the total to produce the UMD ID number. The value of each switch (from 1 to 8, respectively) is 1, 2, 4, 8, 16, 32, 64, 128. On UMDs with a red SW2, switch 1 down (↓) (on red SW2) adds 256 to the ID set by SW1. The table below shows some sample ID settings.

SW1 - ID Setting:

	Section Number 1 2 3 4 5 6 7 8	(if UMD has red SW2)
ID 1:	1 0 0 0 0 0 0 0	with (red) ***SW2*** section 1 up ↑
ID 2:	0 1 0 0 0 0 0 0	with (red) ***SW2*** section 1 up ↑
ID 3:	1 1 0 0 0 0 0 0	with (red) ***SW2*** section 1 up ↑
ID 17:	1 0 0 0 1 0 0 0	with (red) ***SW2*** section 1 up ↑
ID 18:	0 1 0 0 1 0 0 0	with (red) ***SW2*** section 1 up ↑
ID 253:	1 0 1 1 1 1 1 1	with (red) ***SW2*** section 1 up ↑
ID 509:	1 0 1 1 1 1 1 1	with (red) ***SW2*** section 1 down ↓
ID 510:	0 1 1 1 1 1 1 1	with (red) ***SW2*** section 1 down ↓

APPENDIX A (cont.) - DIP SWITCH SETTINGS

Note: Please follow the settings listed below depending on whether SW2 is *black* or *red*. (*red* DIP package: 0 = switch up ↑, 1 = switch down ↓)

(black)

SW2 - Baud Rate:

	Section Number 1 2 3 4 5 6 7 8
300:	1 0 0 - - - - -
600:	0 1 0 - - - - -
1200:	1 1 0 - - - - -
2400:	0 0 1 - - - - -
4800:	1 0 1 - - - - -
9600:	0 1 1 - - - - -

SW2 - Flash On Red:

	1 2 3 4 5 6 7 8
FLASH OFF:	- - - 0 - - - -
FLASH ON:	- - - 1 - - - -

SW2 - Answerback:

	1 2 3 4 5 6 7 8
ONE-WAY:	- - - - 0 - - -
TWO-WAY:	- - - - 1 - - -

SW2 - Operation Mode:

	1 2 3 4 5 6 7 8
COLOR:	- - - - - 0 0 1
MESSAGE:	- - - - - 1 1 0

(red)

SW2 - Baud Rate:

Fixed at 9600 baud

SW2 - ID:

Section 1 (↓) adds 256 to the ID number set by SW1

SW2 - Flash On Red:

	1 2 3 4 5 6 7 8
FLASH OFF:	- - - ↑ - - - -
FLASH ON:	- - - ↓ - - - -

SW2 - Answerback:

	1 2 3 4 5 6 7 8
ONE-WAY:	- - - - ↑ - - -
TWO-WAY:	- - - - ↓ - - -

SW2 - Operation Mode:

	1 2 3 4 5 6 7 8
COLOR:	- - - - - ↑ ↑ ↓
MESSAGE:	- - - - - ↓ ↓ ↑

APPENDIX B: UMD TROUBLESHOOTING GUIDE

If a UMD does not work, check the following:

1. Check that the UMD is plugged in and is receiving power. When power is first applied, the UMD will cycle through a diagnostic.

2. Check that the DIP switch settings are correct. Included in the power-up sequence is a readout of the DIP switch settings. The power-up sequence will first display the model number and then display the ID number setting.

The model number ends with either the letter "C" or "M". The "C" indicates that the DIP switches are set for "COLOR MODE" and the "M" indicates that the DIP switches are set for "MESSAGE MODE".

The ID number is displayed after the model number.

3. Check for a counter or a message. After completion of the power-up sequence, the UMD will display either the contents of what is stored in memory (the last message sent) or a counter. The counter will be displayed when the memory is empty. Each UMD has a battery backup to maintain memory.

4. Check the software. Please ensure that if the UMD is in "COLOR MODE", you are using the "PDC" software diskette. If the UMD is in "MESSAGE MODE", you must use the "MSG" software diskette.

5. Check that the software program is set to the correct serial port for the UMD network. Make sure that the baud rate setting of the program matches the baud rate setting on the UMD dip switches. Check that the program is configured to operate the port at 8 data bits, 1 stop, and no parity. UMDs with version 2.x firmware have a fixed baud rate of 9600.

6. Test the serial port of the computer with a known working device (such as a modem) and verify that the port is working.

7. If there is an external converter box, check that it is plugged in and that the pilot lamp is lit. Check the serial cable from the PC's COM port to the converter box to verify that it is properly connected. Make sure that the serial cable is correctly wired, as shown in figure 3 on page 23.

8. Check the RS-485 network cable from the converter box to the UMD. Make sure it is a straight-through cable and that it has been fabricated correctly. Insert and remove each network cable end from each RJ11 connector several times; this will help to ensure that the cable ends and connectors are clean and are mating properly. Make sure each cable end is plugged *firmly* into the proper connectors on the converter box and the UMDs.

9. Check the DIP switch settings on the UMD to ensure that you are sending to the correct ID number. Check which mode the UMD is in (*color* mode or *message* mode) and be sure the software is sending messages to the UMD in the correct mode.

10. The following conditions could appear in the event the backup battery is not charged:

UMD “blinks” when sent a message but does not display the message.

UMD displays “rainbow colored” characters during power-up sequence.

UMD displays “scrambled letters” during the power-up sequence.

11. The conditions listed below could appear if incorrect or corrupted data was sent to a UMD (to return the UMD to its proper operating mode, perform the “UMD reset” procedure outlined in number 12):

UMD “blinks” when sent a message but does not display the message.

UMD responds but requires two transmissions to change color or message.

12. UMD RESET PROCEDURE.

Each time the UMD is switched from “COLOR MODE” to “MESSAGE MODE” or vice versa, the UMD automatically clears the memory. To change modes requires changing the DIP switch settings and re-powering the UMD.

Note: As in most telecommunications devices, switch settings take effect only on power-up. Changing the switch settings, and not re-powering the unit, will not effect a change.

To reset a UMD or to clear the contents of memory:

1. First note whether the UMD is currently in “COLOR MODE” or “MESSAGE MODE”.

    a. If it’s in “COLOR MODE” reset the DIP switches to “MESSAGE MODE”.

    b. If it’s in “MESSAGE MODE”, reset the DIP switches to “COLOR MODE”.

2. Disconnect power and then re-power the UMD in order to change to the opposite mode.

3. Reset the DIP switches to the desired mode.

4. Disconnect power and then re-power the UMD in order to change to the desired mode.

APPENDIX C: COLOR MODE OUTPUT SWITCH

The RJ45 connector on the back of the UMD has two output connections available when the unit is in COLOR mode. These are marked *COMMON* and *N.O.* They are attached to a set of relay contacts in the UMD. Whenever the message on the UMD is any color besides red, the relay is off, and the *COMMON* and *N.O.* pins are not connected. Whenever the UMD message is red, the relay is energized, and the *COMMON* and *N.O.* pins are connected. Note that this output switch is available only when the UMD is in COLOR mode. The relay contacts are not available when the UMD is in MESSAGE mode. See figure 8 on page 28 for RJ45 pinouts.

FIGURE 1 - SYSTEM CABLING

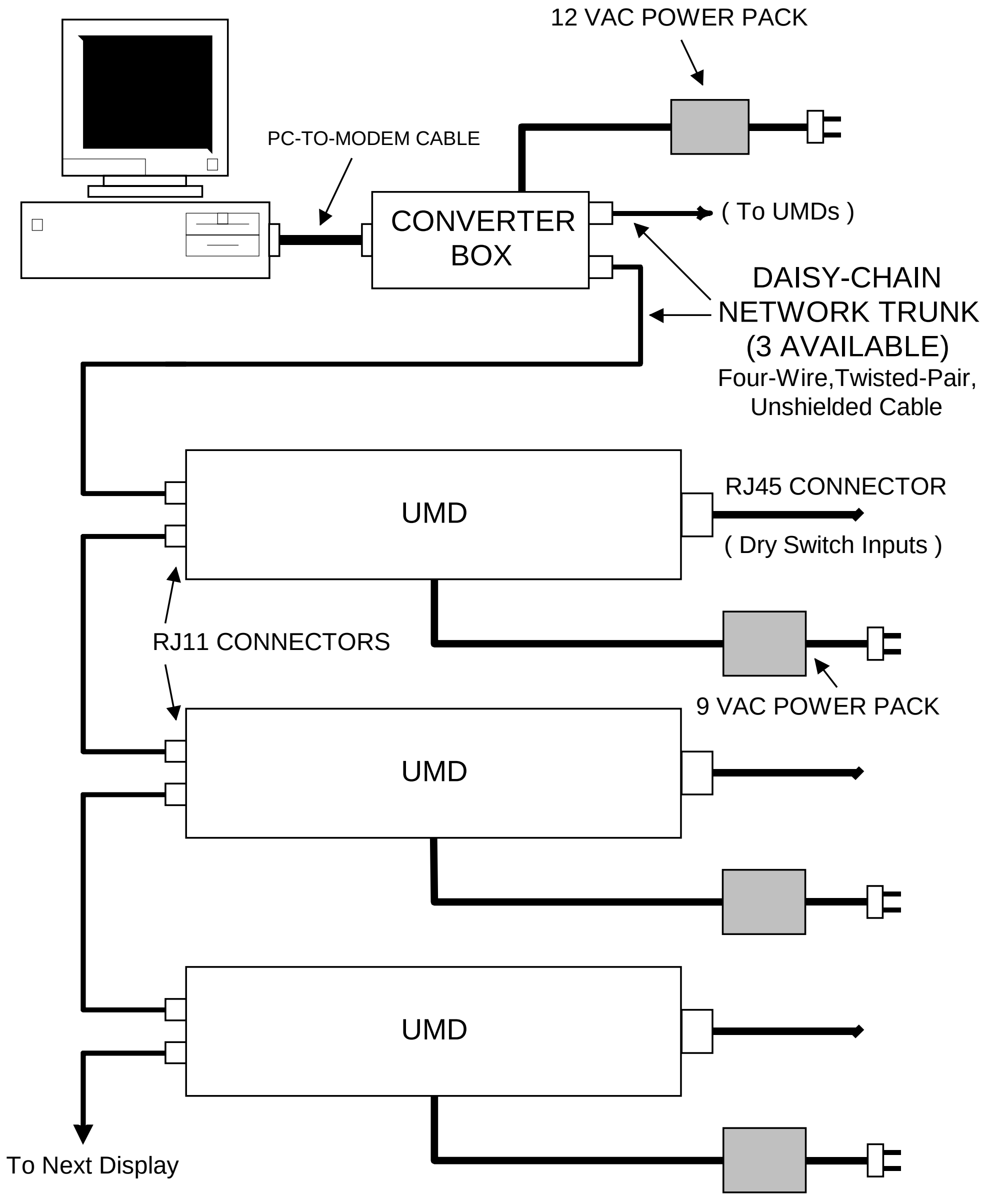
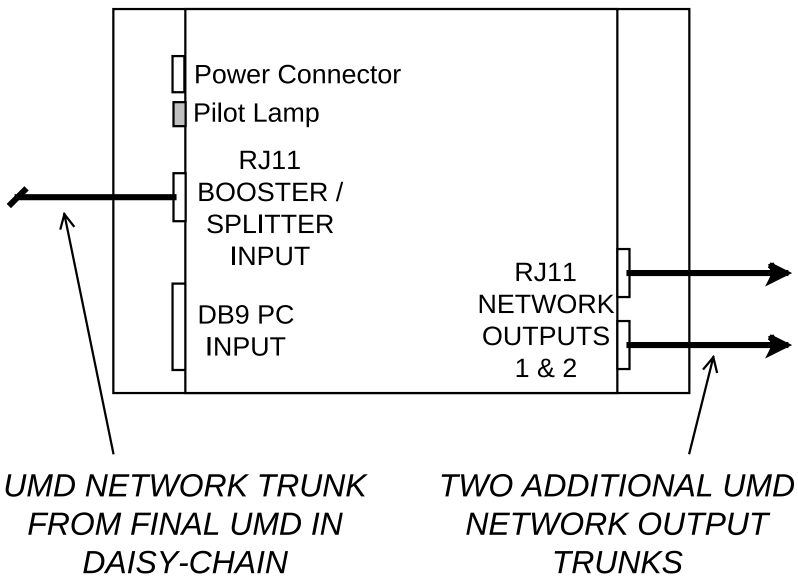
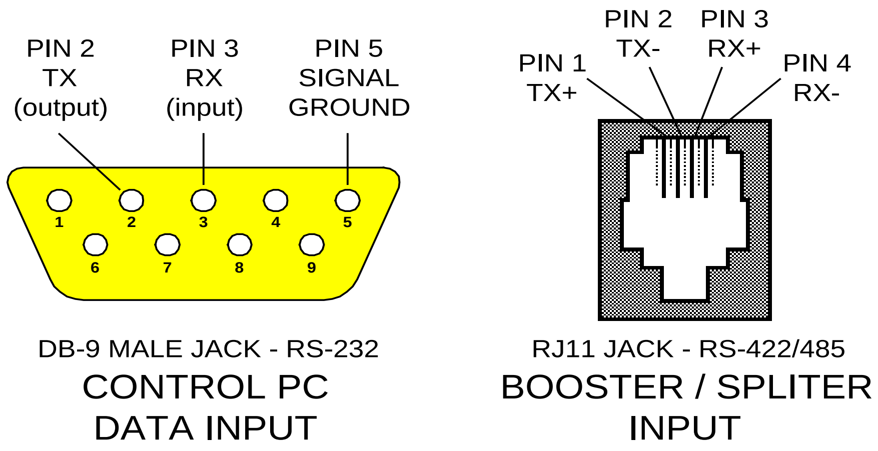


FIGURE 2 - CONVERTER BOX USED AS A SPLITTER / BOOSTER

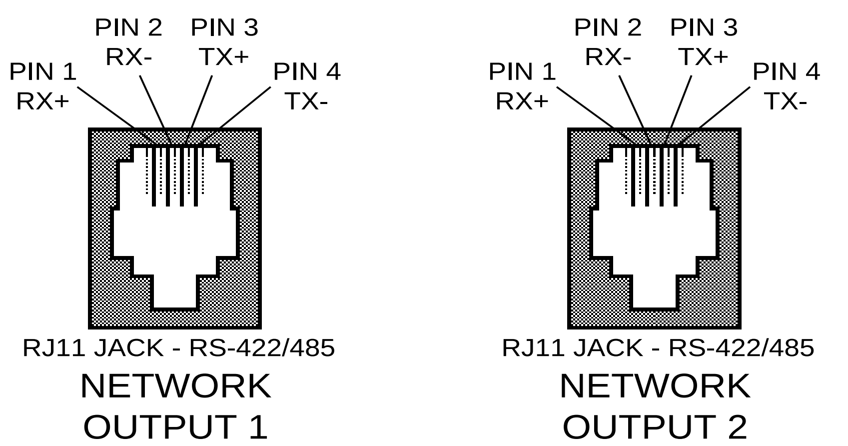


Note: For clarity, the external converter box power supply is not shown.

FIGURE 3 - CONVERTER BOX PINOUTS



CONVERTER / SPLITTER / BOOSTER
INPUT PORTS



CONVERTER / SPLITTER / BOOSTER
OUTPUT PORTS

FIGURE 4A - DB9 PC TO CONVERTER CABLE

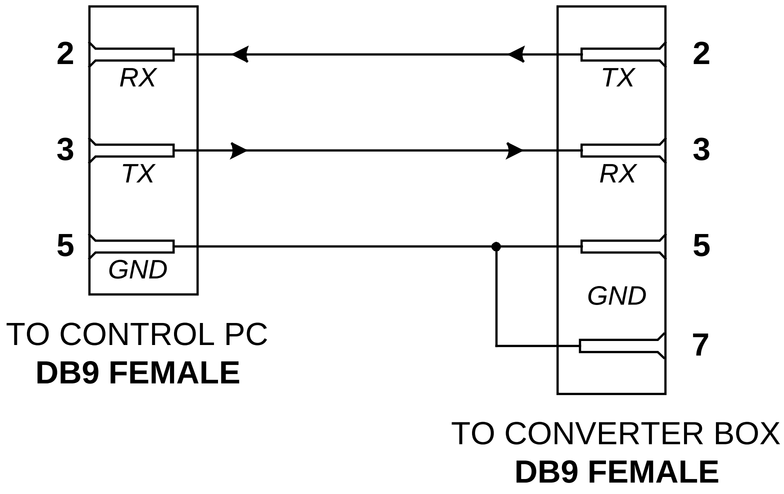


FIGURE 4B - DB25 PC TO CONVERTER CABLE

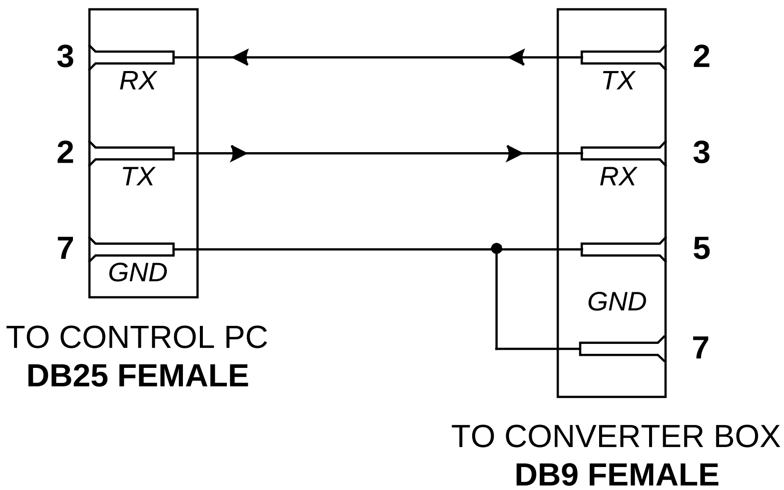
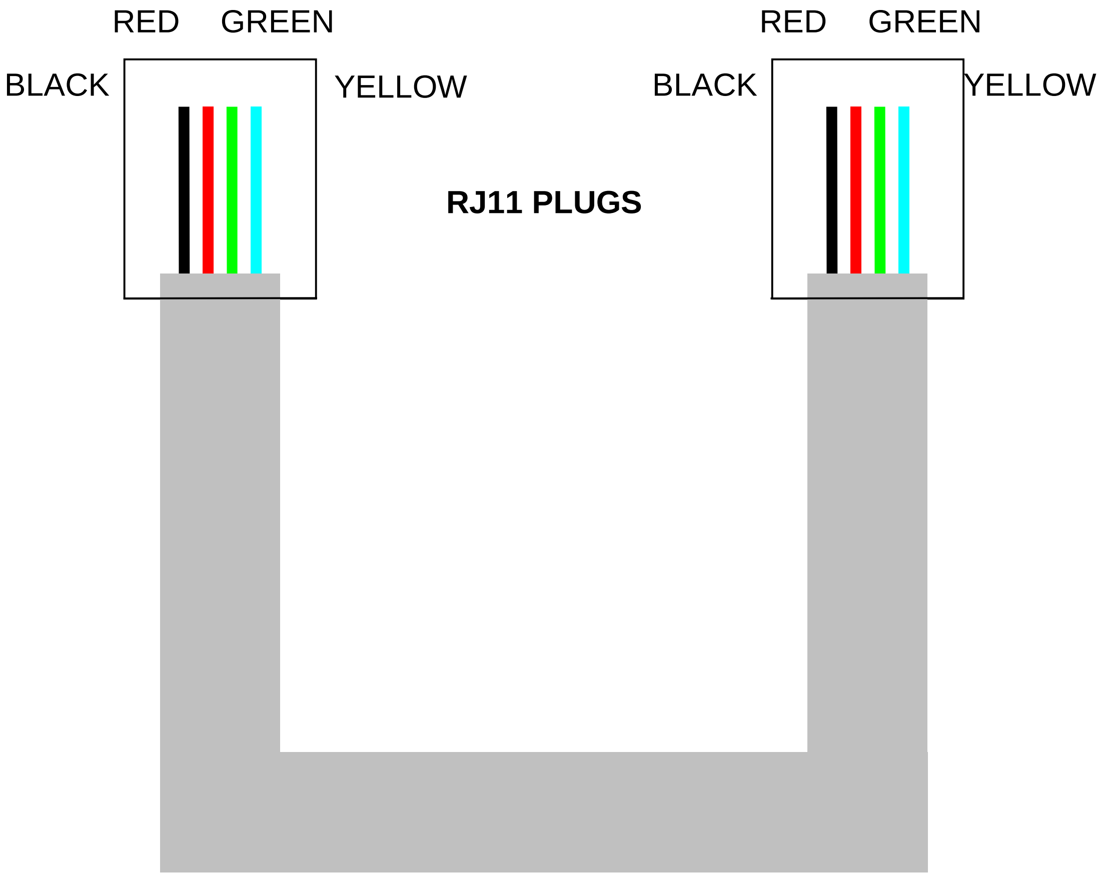


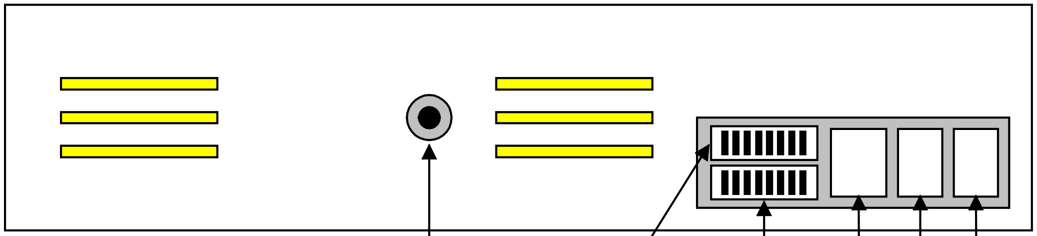
FIGURE 5 - STRAIGHT-THROUGH CABLES



When you fabricate a straight-through cable, you must make sure that the same wire colors appear in the same position at both ends of the cable. In the example shown above, the black wire is in the left-most position on both RJ11 connectors. Note that this position matching occurs when both connectors are oriented exactly the same way. In the example above, both RJ11 connector ends point up, and the locking clips are turned away from you. The wiring shown is the opposite of a standard telephone extension cord, in which the wire positions are reversed from one end to the other.

FIGURE 6 - UMD REAR VIEW COMPONENTS

UMD - REAR VIEW - COMPONENT LOCATION



J1: RJ11 Connector. Serial data I/O loop-through. See page 27.

J2: RJ11 Connector. Serial data I/O loop-through. See page 27.

J3: RJ45 Connector. Switch Inputs. See page 28.

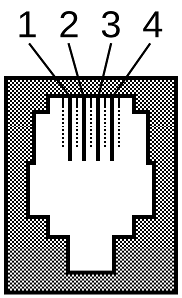
SW1: DIP Switch 1. ID number selection. See page 15.

SW2: DIP Switch 2 (if black). Baud rate & mode selection. See page 16.

DIP Switch 2 (if red). ID increase by 256 & mode selection. See page 16.

P1: Power Connector. 9-12v input @ 4 amps.

FIGURE 7 - CONNECTOR PINOUTS - J1 & J2



RJ11 JACK

For J1 and J2 the pinouts are identical:

1: TX (+)

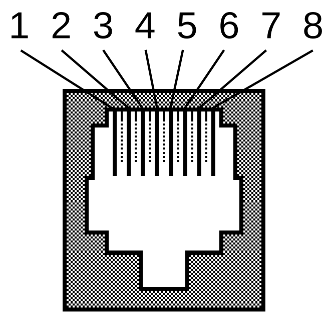
2: TX (–)

3: RX (+)

4: RX (–)

NOTE: UMDs expect a 10-bit async serial byte in RS-485 data format, with 1 start bit, 8 data bits, no parity, and 1 stop bit. The baud rate in displays with firmware up to rev. 1.9 is switch-selectable from 300 baud to 9600 baud. The baud rate in displays rev. 2.0 or higher is fixed at 9600. For maximum performance, we recommend 9600 baud.

FIGURE 8 - CONNECTOR PINOUTS - J3



RJ45 JACK

J3 pinouts when UMD is in COLOR mode:

1:	Ground	***5:***	No Connection
2:	Red	***6:***	No Connection
3:	Yellow	***7:***	Relay N. O. (normally open)
4:	Green	***8:***	Relay COMMON

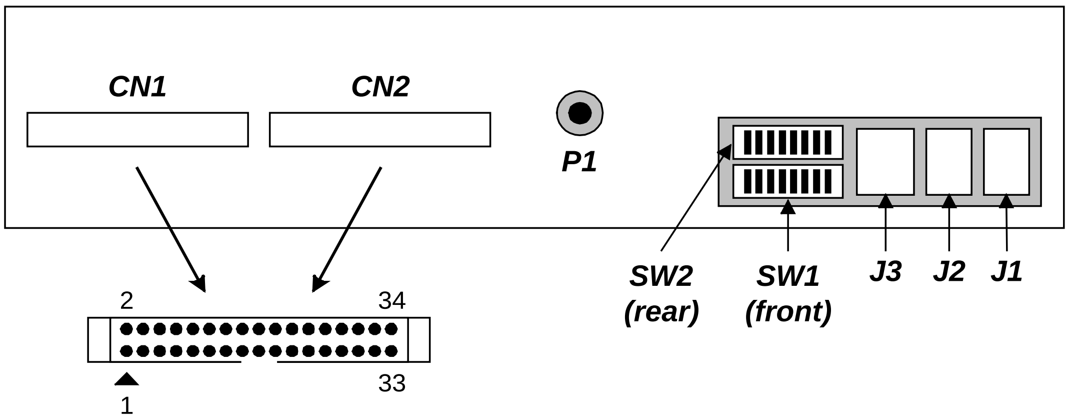
J3 pinouts when UMD is in MESSAGE mode:

1:	Ground	***5:***	2
2:	16	***6:***	1
3:	8	***7:***	No Connection
4:	4	***8:***	No Connection

J3 pinouts when UMD is in TRIPLE mode (default color must be green):

1:	Ground	***5:***	Section 1 Yellow
2:	Section 1 Red	***6:***	Section 2 Yellow
3:	Section 2 Red	***7:***	Relay N. O. (normally open)
4:	Section 3 Red	***8:***	Relay COMMON

FIGURE 9 - TALLY INTERFACE COMPONENTS & PINOUTS



CN1: PIN 1 = +IN01
PIN 2 = -IN01
PIN 3 = +IN02
PIN 4 = -IN02
:
:
PIN 31 = +IN16
PIN 32 = -IN16
PIN 33 *N/C*
PIN 34 *N/C*

CN2: PIN 1 = +IN17
PIN 2 = -IN17
PIN 3 = +IN18
PIN 4 = -IN18
:
:
PIN 31 = +IN32
PIN 32 = -IN32
PIN 33 *N/C*
PIN 34 *N/C*

SW 1 - Baud Rate:

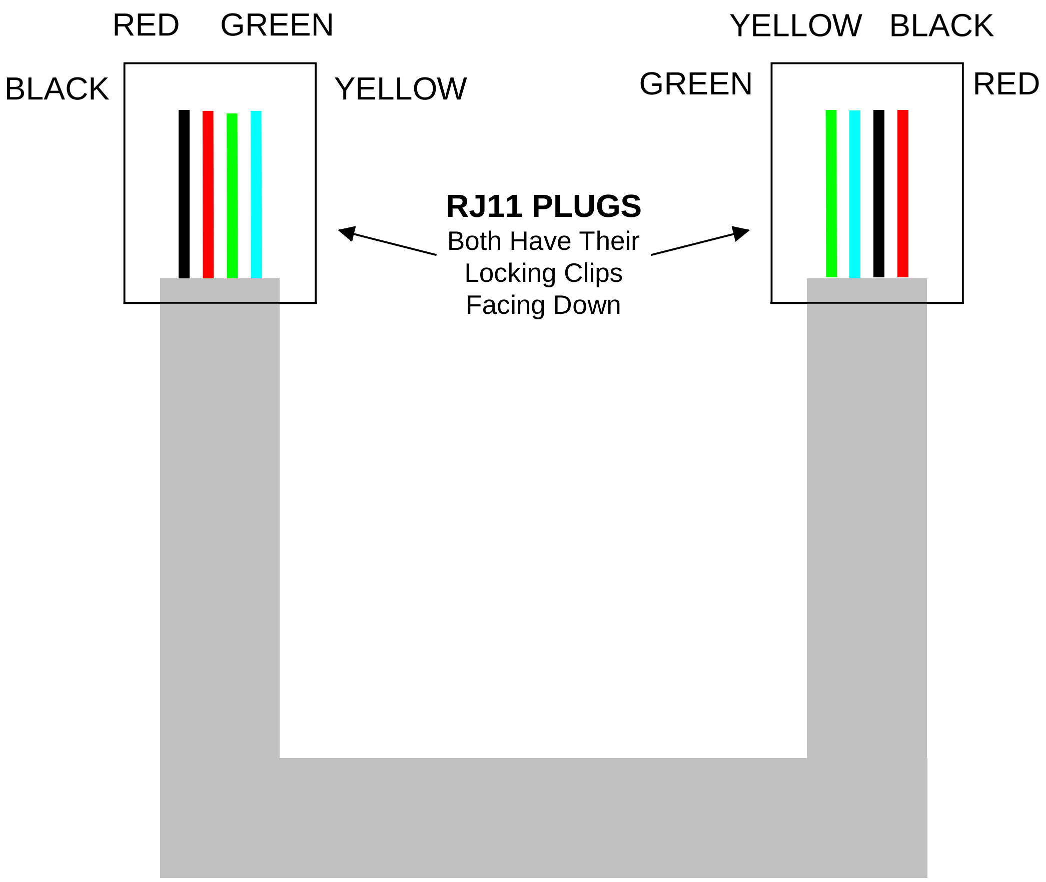
	Switch Number: 1 2 3 4 5 6 7 8
300:	1 0 0 - - - - -
600:	0 1 0 - - - - -
1200:	1 1 0 - - - - -
2400:	0 0 1 - - - - -
4800:	1 0 1 - - - - -
9600:	0 1 1 - - - - -

SW 1 - CN Asserted When:

	Switch Number: 1 2 3 4 5 6 7 8
No Voltage	- - - - 0 - - -
Voltage	- - - - 1 - - -

***SW 2 -** Not used.*

FIGURE 10 - TALLY INTERFACE CROSS-CONNECT CABLE



This drawing shows the special cross-connect cable that is used to connect the Tally Interface unit to a PC com port. This cable cross-connects pin 1 to pin 3, and pin 2 to pin 4. The cross-connection occurs in both directions. ***WARNING:*** This is not a regular network cable. *This cable is only used for connecting a Tally Interface unit to a PC com port.* To make a normal straight-through network cable, see figure 5 on page 25.

FIGURE 11 - PC & TALLY INTERFACE A-B SWITCH BOX CABLING