

# **TW-12B System Interface**

**INSTRUCTION  
MANUAL**



**945 Camelia St. • Berkeley, California 94710 • 415-527-6666**

A NOTE TO CLEAR-COM USERS

This manual will acquaint you with the operation and care of your Clear-Com TW-12B System Interface. To help assure years of satisfaction and reliability, please read it carefully and follow the recommendations.

Upon receiving your shipment, verify that you've received the number of boxes marked as shipped on the freight receipt. Also check immediately for box damage that may have occurred during shipment. Notify the dealer and the freight carrier if you discover damages or losses, so claims may be expedited. Carefully unpack the units. We recommend you save the shipping cartons; they're useful for later reshipping.

Should you ever require service, the Clear-Com factory and your authorized Clear-Com service center knows your equipment best, and has the training and test equipment needed to restore equipment to peak performance.

Please feel free to contact your Clear-Com dealer or the Clear-Com factory for assistance at any time.

Thank you for selecting Clear-Com products.  
We assure you of our continuing interest in  
your satisfaction.

**NOTICE:**

***"While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, the information is subject to change without notice."***

1.0 Introduction: System Overview

The TW-12B is a transparent device that provides an electrically isolated interface between two intercom systems (Clear-Com and RTS, for example). The interface consists of two identical 2-wire-to-4-wire hybrid networks, with transformer isolation between them. This complete electrical isolation breaks ground loops that occur when two systems are run from separate power sources.

The TW-12B hybrid provides a wide range of null adjustments, allowing it to adapt to many different line conditions. It can handle various line lengths and impedances.

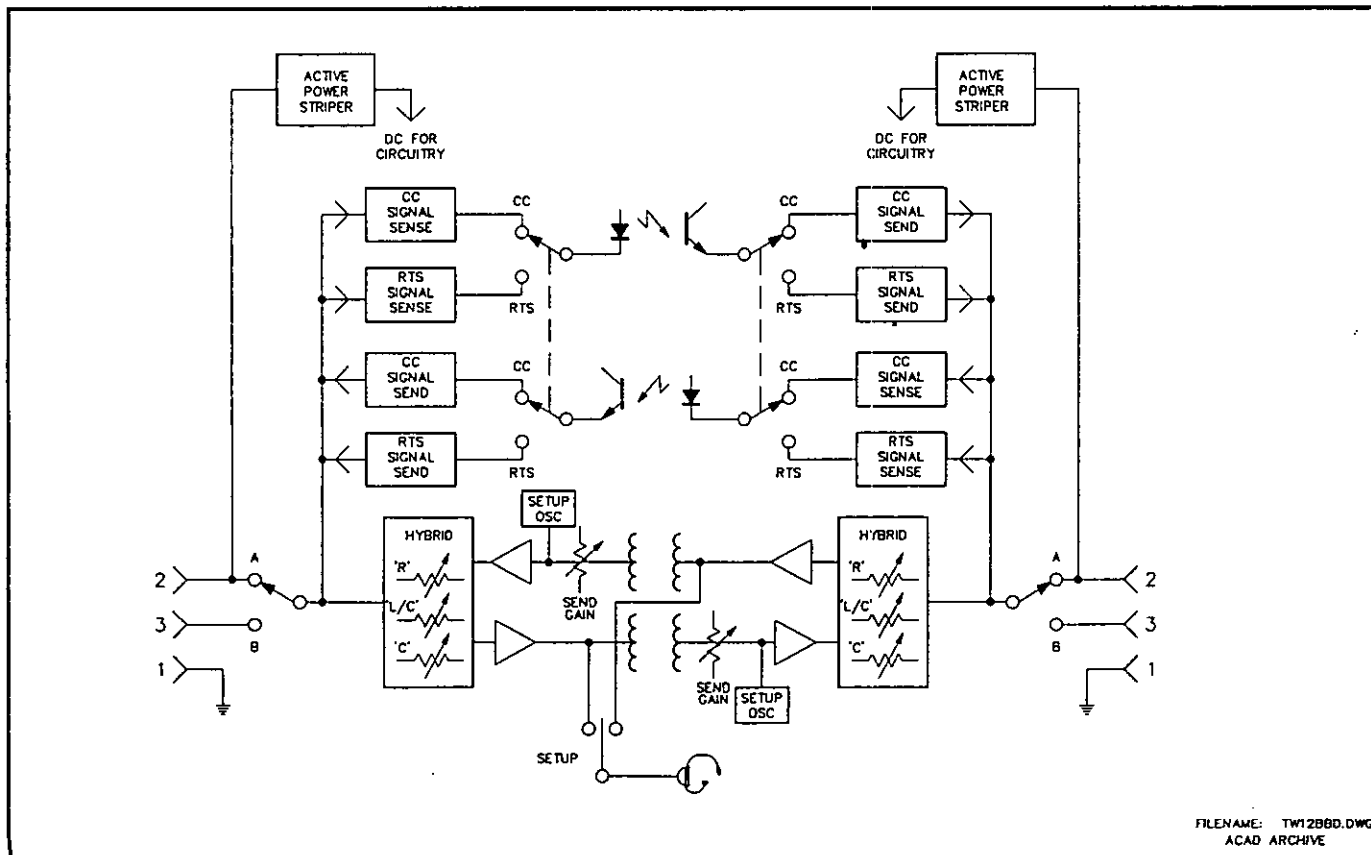
The TW-12B is designed to connect the two intercom systems in a completely transparent manner. Either "side" of the interface can connect to a Clear-Com intercom system or to an RTS intercom system, thereby

providing these combinations:  
 Clear-Com to Clear-Com  
 Clear-Com to RTS  
 RTS to RTS.

The TW-12B provides a pair of 3-pin, XLR connectors (one male, one female) for each side of the interface.

Fast, Easy & Accurate Setup

Setup of the hybrid circuitry is accomplished by adjusting four "hidden" controls located on the front panel behind two snap-off cover plates. Using a standard intercom headset as a null sensor, it is possible to obtain a near-perfect match to an intercom line at all frequencies. The test signal, a 400 Hz square wave, provides both low and high frequency material for nulling the entire bandwidth.



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Transparent Operation

After setup, the TW-12B is transparent to the user. A recessed SEND GAIN trim pot control for each side is accessible when the cover plates are in place, allowing an adjustment of +/-4dB for each side of the interface.

Call Signalling

The TW-12B interface receives Call signalling in the appropriate form (DC level for Clear-Com, 20kHz tone for RTS), decodes it, and passes it as logic to the other side of the interface, via an optical coupler. The receiving side of the interface sends the signal appropriate for the intercom type that was selected via the front panel. DC isolation of the Call signal between the two sides is obtained through the use of the optical coupler.

System Power

Each side of the interface obtains its DC power through Pin 2 of the intercom connector for that side, through an active impedance buffer that lets the line be used as an intercom line (in the 2-wire format). Each side of the interface is powered from the intercom system to which it's connected. If either side is accidentally disconnected, that side "powers down," providing no audio feed to the other side—therefore not disturbing the impedance of the system that remains connected. No termination sensing or switching is necessary to prevent the remaining portion of the interface from oscillating. The TW-12B front panel provides an LED POWER indicator for each side of the interface, which shows that a powered intercom is connected to either or both sides.

SYSTEM SPECIFICATIONS

Clear-Com format

LINE CHARACTERISTICS

Level: -13 dBv nominal

Clipping level: +3dBv min.

Impedance: greater than 10k ohms bridging

SIGNALLING

Receive: 4 VDC min. on audio line

Send: 11 VDC min. on audio line

RTS format

LINE CHARACTERISTICS

Level: 0 dBv nominal

Clipping level: +5dBv min.

Impedance: greater than 10k ohms bridging

SIGNALLING TONE

Send frequency: 20kHz +/-100Hz

Receive frequency: 20kHz +/-500Hz

Send level: -6dBv min.

Receive level: -30dBv min.

General Characteristics

Frequency response: 200-10k Hz, +/-3dB

Nulling capability (Clear-Com & RTS)

Line length: 0 to 4,000 feet

Line impedance: 120-600 ohms

Low frequency: L & C of the RTS TW (2-wire) line

Depth of Null: greater than 30dB, 200-8k Hz

Isolation

Side to side: greater than 10 Meg. ohms

Either side to chassis: greater than 10 Meg. ohms

Power consumption: approx. 50 mA at 20-30 VDC

Connectors

Front panel: headset, (1) 4-pin male, D4M

Rear panel: (4) 3-pin XLRs— 2 male, 2 female. Each side

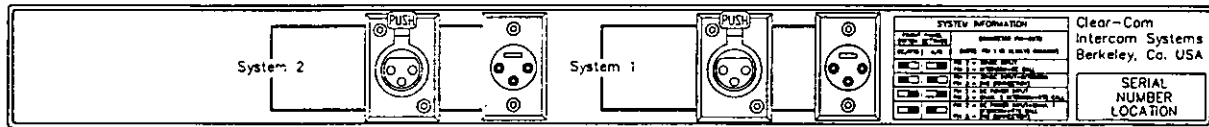
has one each male and female for loop-through

Dimensions: 1.75"H x 19"W x 6"D (44 x 483 x 152 mm)

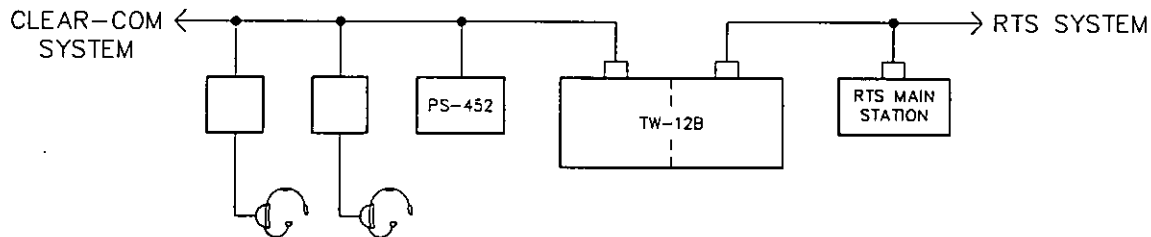
2.0 TW-12B Setup & Adjustment

2.1 SETUP

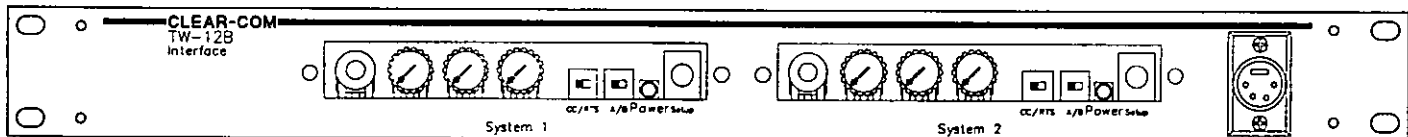
2.1.1. Install the TW-12B in a 19-inch rack.



2.1.2. The TW-12B rear panel contains a paralleled pair of connectors (male and female) for each side of the interface. Connect the two intercom systems to the rear panel connectors. Refer to "typical system" block diagram below:



2.1.3. Remove the control cover plates (they snap off) from the TW-12 front panel.



(continued)

TW-12B Setup, continued

- 2.1.4. On the side labelled SYSTEM 1, set the CC/RTS switch to the appropriate position (Clear-Com or RTS system).
- 2.1.5. Set the "A/B" switch to select the intercom channel to be used by that side.
- 2.1.6. On the side labelled SYSTEM 2, set the CC/RTS and A/B switches to the appropriate selections.

The following chart describes the functions of the pins on the rear panel connectors:

SYSTEM INFORMATION		
FRONT PANEL SWITCH SETTINGS		CONNECTOR PIN-OUTS (NOTE: Pin 1 is Always Common)
CC/RTS	A/B	
<input type="checkbox"/>	<input type="checkbox"/>	Pin 2 • 30VDC Input Pin 3 • Intercom+CC Call
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pin 2 • 30VDC Input+Intercom Pin 3 • (No Connection)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Pin 2 • DC Power Input Pin 3 • Chan. 2 Intercom+RTS Call
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Pin 2 • DC Power Input+Chan. 1 Intercom+RTS Call Pin 3 • (No Connection)

- 2.1.7. When the TW-12B is properly connected to a powered intercom system, the LED power indicator for that side should be illuminated.

**WARNING**

Pin 1 and the connector sheath of all cables connected to the TW-12B SHOULD NOT be connected together!

## 2.2 System Adjustment: Hybrid Null

You can connect the output side of the hybrid network to the headset jack on the TW-12B front panel by pressing the SETUP button. This enables an internal oscillator on the input of the network. Use a standard intercom headset to obtain a near-perfect match to an intercom line at all frequencies. The test signal is a 400 Hz square wave that provides low- and high-frequency content for nulling the entire bandwidth.

To make the adjustment:

- 2.2.1. With control access panel removed from the front panel, connect a standard intercom headset into the front panel headset jack.
- 2.2.2. Press the SETUP button on the SYSTEM 1 side. You should hear a tone in the headset, unless the circuitry is already nulled properly. If you do not hear a tone, continue with the procedure to verify proper setup.
- 2.2.3. While pressing the SETUP button, adjust the WHITE knob on the SYSTEM 1 side, for a minimum audible tone in the headset.
- 2.2.4. While pressing the SETUP button, adjust the BLUE knob on the SYSTEM 1 side for a minimum audible tone in the headset.
- 2.2.5. While pressing the SETUP button, adjust the YELLOW knob on the SYSTEM 1 side for a minimum audible tone in the headset.
- 2.2.6. Repeat steps 2.2.3, 4 and 5 until you obtain a complete null.

NOTE— If an almost-complete null cannot be obtained, chances are something is wrong with the intercom line feeding that side:

— if the WHITE pot is fully counter-clockwise, the line has double terminations or an excessive resistive load on it. If the WHITE pot is fully clockwise, then the line has no termination.

— if the BLUE pot is fully turned in either direction, most likely there is a problem in the intercom line connected to that side. When a Clear-Com system is connected, the blue pot should be slightly off its center of travel. The blue pot corrects for the low-frequency inductive and capacitive elements that the intercom system presents to the line.

— if the YELLOW pot is fully counter-clockwise, this indicates a very short line (under ten feet) and can be ignored. If the yellow pot is fully clockwise, this indicates an excessively long line (over 5000 feet). The yellow pot compensates for cable capacitance.

- 2.2.7. Repeat steps 2.2.2 through 6 for the SYSTEM 2 side (press the SETUP key for SYSTEM 2 and adjust the WHITE, BLUE, and YELLOW knobs for that side).

Setup is now complete, and the TW-12B is ready to operate.

### 2.3 SEND GAIN Adjustment

The SEND GAIN adjustment pots allow a send gain trim of  $\pm 4$ dB. The mid-pot position is calibrated for a gain of 0 dB. This is the nominal setting for normal operation. If you prefer a small boost or cut in gain in either direction, this control allows for it.

**CAUTION:** If you do not obtain a good null of the hybrid network, the system might oscillate with some SEND GAIN settings. With a good null of the hybrids, it is possible to have +4dB gain on both sides. If the system oscillates or tends to be unstable, perform the Hybrid Null Adjustment procedure described above in Section 2.2.

