Clear-Com
COMMUNICATION SYSTEMS

CLEAR-COM ENCORE

TW-12C   SYSTEM INTERFACE

INSTRUCTION MANUAL

TW-12C System Interface Instruction Manual
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IMPORTANT SAFETY INSTRUCTIONS

Please read and follow these instructions before operating this product.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Only use attachments/accessories specified by the manufacturer.
10. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
11. Unplug this apparatus during lightning storms or when unused for long periods of time.
12. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
13. **WARNING:** To reduce the risk of fire or electric shock, do not expose this product to rain or moisture.

Please familiarize yourself with the safety symbols in Figure 1. When you see these symbols on this product, they warn you of the potential danger of electric shock if the station is used improperly. They also refer you to important operating and maintenance instructions in the manual.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

This symbol alerts you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol informs you that important operating and maintenance instructions are included in the literature accompanying this product.

Figure 1: Safety Symbols

EMC AND SAFETY

The TW-12C System Interface meets all relevant CE and FCC specifications set out below:

EN55103-1 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 1: Emissions.

EN55103-2 Electromagnetic compatibility. Product family standard for audio, video, audio-visual, and entertainment lighting control apparatus for professional use. Part 2: Immunity.

And thereby compliance with the requirement of Electromagnetic Compatibility Directive 2004/108/EC and Low Voltage Directive 2006/95/EC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

OPERATION

INTRODUCTION

Congratulations on choosing this Clear-Com product. Clear-Com was established in 1968 and remains the market leader in providing intercoms for entertainment, educational, broadcast and industrial applications. The ruggedness and high build-quality of Clear-Com products defines the industry standard. In fact, many of our original beltpacks and main stations are still in daily use around the world.

We recommend that you read through this manual completely to better understand the functions of the SB-704. If you encounter a situation or have a question that this manual does not address, contact your dealer or call Clear-Com directly. Our applications support and service people are standing by to assist you. (Refer to Chapter 5, "Warranty" for contact information.) Thank you for selecting Clear-Com for your communications needs.

THE CLEAR-COM CONCEPT

Clear-Com is a closed-circuit intercom system that consistently provides high-clarity communication in high-noise and low-noise environments. A basic system consists of a single- or multi-channel power supply or main station connected to various single- or multi-channel remote stations, such as beltpacks and loudspeaker stations.

Clear-Com manufactures a wide variety of both portable and fixed-installation units. All are compatible with each other. Clear-Com intercom systems can also interface with other communication systems and devices.

SYSTEM OVERVIEW

The TW-12C is a transparent device that provides an electrically isolated interface between two intercom systems (ClearCom and RTS, for exanple). 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-12C 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-12C 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-12C 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 controls located on the front panel. Use a standard intercom headset or headphones with a 1/8" mini jack 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.
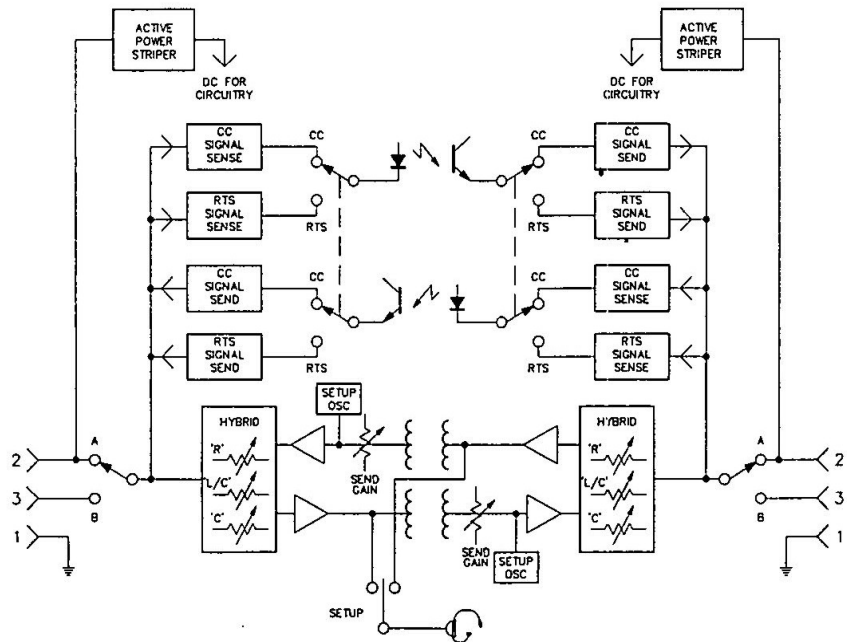

Figure 1-1: TW-12C Block Diagram

TRANSPARENT OPERATION

After setup, the TW-12C is transparent to the user. A GAIN trim pot control for each side is available allowing an adjustment of +/- 4dB for each side of the interface.

CALL SIGNALLING

The TW-12C interface receives Call signalling in the appropriate form (DC level for Clear-Com, 20k Hz 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 is connected. If either side is accidentally disconnected, that side "powers down", providing no audio feed to the other side and 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-12C 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.

INSTALLATION

TW-12C SETUP & ADJUSTMENT

SETUP

Install the TW-12C in a 19-inch rack

The TW-12C rear panel contains a paralleled pair of connectors (male and female) for each side of the interface.
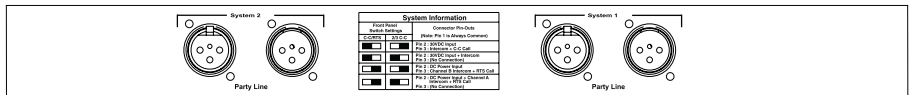

Figure 2-1: TW-12C Rear Panel

Connect the two intercom systems to the rear panel connectors. Refer to Figure 2-2 below:

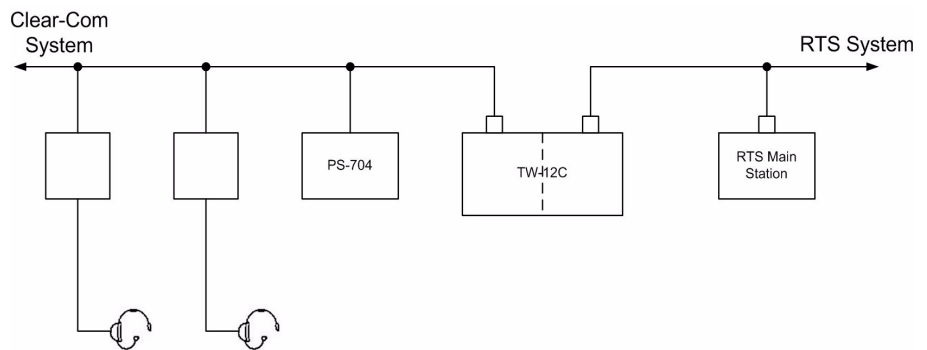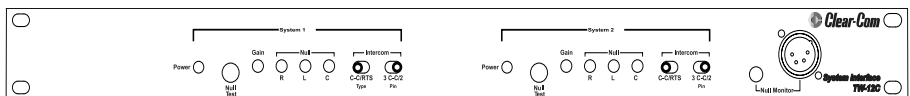*Figure 2-2: TW-12C System Block Diagram*

Figure 2-3: TW-12C Front Panel

1. On the side labelled SYSTEM 1, set the "C-C/RTS Type"switch to the appropriate position (Clear-Com or RTS system).
2. Set the "3 C-C/2 Pin" switch to select the intercom channel to be used by that side.
3. On the side labelled SYSTEM 2, set the "C-C/RTS Type" and "3 C-C/2 Pin" 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
C-C/RTS	2/3 C-C	
[■ □]	[□ ■]	Pin 2 - 30VDC Input Pin 3 - Intercom+CC Call
[■ □]	[■ □]	Pin 2 - 30VDC Input+Intercom Pin 3 - (No Connection)
[□ ■]	[□ ■]	Pin 2 - DC Power Input Pin 3 - Chan. 2 Intercom+RTS Call
[□ ■]	[■ □]	Pin 2 - DC Power Input+Chan. 1 Intercom+RTS Call Pin 3 - (No Connections)

Figure 2-4: Pin Connections

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

Warning: Pin 1 and the connector shield of cables connected to the TW-12C SHOULD NOT be connected together.

SYSTEM ADJUSTMENT: HYBRID NULL

You can connect the output side of the hybrid network to the headset jack on the TW-12C front panel by pressing the Null Test 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:

1. Connect a standard intercom headset into the front panel headset socket.
2. Press the Null Test 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.
3. While pressing the Null Test button, adjust the "R" control on the SYSTEM 1 side, for a minimum audible tone in the headset.
4. While pressing the Null Test button, adjust the "L" control on the SYSTEM 1 side for a minimum audible tone in the headset.
5. While pressing the Null Test button, adjust the "C" control on the SYSTEM 1 side for a minimum audible tone in the headset.

6. Repeat steps 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 "R" control is fully counter-clockwise, the line has double terminations or an excessive resistive load on it. If the "R" control is fully clockwise, then the line has no termination.

• If the "L" control 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 "L" control should be slightly off its center of travel. The "L" control corrects for the low-frequency inductive and capacitive elements that the intercom system presents to the line.

• If the "C" control is fully counter-clockwise, this indicates a very short line (under ten feet) and can be ignored. If the "C" control is fully clockwise, this indicates an excessively long line (over 5000 feet). The "C" control compensates for cable capacitance.

Repeat steps 2 through 6 for the SYSTEM 2 side (press the Null Test button for SYSTEM 2 and adjust the "R", "L", and "C" controls for that side).

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

GAIN ADJUSTMENT

The GAIN adjustment pots allow a gain trim of +/- 4dB. The mid-pot position is calibrated for a gain of 0dB. 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 GAIN settings. With a good null of the hybrids, it is possible to have +4 dB gain on both sides. If the system oscillates or tends to be unstable, perform the Hybrid Null Adjustment procedure described above.

2 SPECIFICATIONS

TW-12C SYSTEM INTERFACE

CLEAR-COM FORMAT

LINE CHARACTERISTICS
Max Level Before Clipping :   >=3dBu
Impedance: >=10KΩ

SIGNALLING
Receive: <=4 VDC
Send: >=11VDC

RTS FORMAT

LINE CHARACTERISTICS
Max Level Before Clipping :   >=5dBu
Impedance: >=10KΩ

SIGNALLING TONE
Send frequency: 20kHz ±100Hz
Receive frequency: 20kHz ±500Hz
Send level: >=-6dBu
Receive level: <=-25dBu

GENERAL CHARACTERISTICS

Frequency response:
Party Line - Party Line   200-8KHz

Distortion
Party Line - Party Line   <=0.2%

Max Gain
ClearCom - RTS   >=9dB
ClearCom - ClearCom   >=4dB
RTS - ClearCom   >=-1dB
RTS - RTS   >=4dB

Min Gain
ClearCom - RTS   <=1dB
ClearCom - ClearCom   <=-4dB
RTS - ClearCom   <=-9dB

RTS - RTS	<=-4dB

Power Requirements

Input Voltage Range	20-30VDC
Input Current (average)	<=50mA

Rear Panel Connectors

Rear panel:	(2) XLR3M (1 per channel)
	(2) XLR3F (1 per channel)

Front Panel Connectors

Headset	(1) XLR4M
TS1 Earphone	(1) 3.5mm Jack Socket

Front Panel Controls and Indicators

Power	(2) Green LED (1 per channel)
Null Test Button	(2) Buttons (1 per channel)
Gain Level Adjust	(2) Controls (1 per channel)
Null Adjust	(6) Controls (3 per channel)
Connection Type Switch	(2) Switches (1 per channel)
Pin Connection Select Switch	(2) Switches (1 per channel)

Dimensions

1.75"H x 19"W x 7.25" D
(45 x 483 x 185 mm)

Weight

5.63 lbs. (2.56 Kg)

Notice About Specifications

While Clear-Com makes every attempt to maintain the accuracy of the information contained in its product manuals, that information is subject to change without notice. Performance specifications included in this manual are design-center specifications and are included for customer guidance and to facilitate system installation. Actual operating performance may vary.

LIMITED WARRANTY

Vitec Group Communications (VGC) warrants that at the time of purchase, the equipment supplied complies with any specification in the order confirmation when used under normal conditions, and is free from defects in workmanship and materials during the warranty period.

During the warranty period VGC, or any service company authorized by VGC, will in a commercially reasonable time remedy defects in materials, design, and workmanship free of charge by repairing, or should VGC in its discretion deem it necessary, replacing the product in accordance with this limited warranty. In no event will VGC be responsible for incidental, consequential, or special loss or damage, however caused.

VGC offers 24 x 7 customer support if you have an Extended Warranty or Service Contract.

Return Material Authorization (RMA) numbers are required for all returns.

Both warranty and non-warranty repairs are available.

WARRANTY PERIOD

The product may consist of several parts, each covered by a different warranty period. The warranty periods are:

- Cables, accessories, components, and consumable items have a limited warranty of 90 days.

- Headsets, handsets, microphones, and spare parts have a limited warranty of one year.

- UHF wireless IFB products have a limited warranty of one year.

- UHF wireless intercom systems have a limited warranty of three years.

- All other Clear-Com and Drake brand systems and products, including beltpacks, have a limited warranty of two years.

The warranty starts at the time of the product's original purchase. The warranty start date for contracts which include installation and commissioning will commence from the earlier of date of the Site Acceptance Test or three months from purchase.

TECHNICAL SUPPORT

To ensure complete and timely support to its customers, VGC's User Support Center is staffed by qualified technical personnel. Telephone and email technical support is offered worldwide by the User Support Center.

The User Support Center is available to VGC's customers during the full course of their warranty period. Telephone support during the warranty period will be offered at no charge between 09:00 and 17:00 according to the customer's local time zone.

In addition, for customers who purchase an Extended Warranty or Service Contract, 24-hour customer support is offered immediately upon purchase of

such agreement. For more information, contact your authorized dealer, distributor, or sales representative.

Instructions for reaching VGC's User Support Centers are given below.

Telephone for Europe, Middle East and Africa: +49 40 6688 4040

Telephone for the Americas and Asia: +1 510 337 6600

Email: vitec.support@AVC.de

Once the standard warranty period has expired, the User Support Center will continue to provide telephone support if you have purchased an Extended Warranty or Service Contract. In these cases, you will have access to telephone support 24 hours per day, 7 days per week.

WARRANTY REPAIRS AND RETURNS

Before returning equipment for repair, contact a User Support Center to obtain a Return Material Authorization (RMA). VGC representatives will give you instructions and addresses for returning your equipment. You must ship the equipment at your expense, and the support center will return the equipment at VGC's expense.

For out-of-box failures, use the following contact information:

Europe, Middle East and Africa

Tel: +44 1223 815000 Email: customerservicesEMEA@vitecgroup.com

North America, Canada, Mexico, Caribbean & US Military

Tel: +1 510 337 6600 Email: customerservicesUS@vitecgroup.com

Asia Pacific & South America

Tel: +1 510 337 6600 Email: customerservicesAPAC@vitecgroup.com

VGC has the right to inspect the equipment and/or installation or relevant packaging.

NON-WARRANTY REPAIRS AND RETURNS

For items not under warranty, you must obtain an RMA by contacting the User Support Center. VGC representatives will give you instructions and addresses for returning your equipment.

You must pay all charges to have the equipment shipped to the support center and returned to you, in addition to the costs of the repair.

EXTENDED WARRANTY

If you purchase an Extended Warranty, you are also given access free of charge to the User Support Center 24 hours a day, 7 days a week.

You can purchase an extended warranty at any time during the first two years of ownership of the product. The purchase of an extended warranty extends to five

years the warranty of any product offered with a standard two-year warranty. The total warranty period will not extend beyond five years. Any purchase of an extended warranty provides 24 x 7 customer support in addition to the warranty immediately upon purchase of the warranty extension.

Note: VGC does not offer warranty extensions on UHF wireless intercom systems, or on any product with a 1-year or 90-day warranty.

SERVICE CONTRACT

VGC also offers service contracts that provide 24 x 7 telephone support, advance replacements, training, proactive maintenance, on-site visits, and no charge for repair or replacement of equipment. For more information, contact your authorized dealer, distributor, or sales representative.

LIABILITY

THE FOREGOING WARRANTY IS VGC'S SOLE AND EXCLUSIVE WARRANTY. THE IMPLIED WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER REQUIRED IMPLIED WARRANTY SHALL EXPIRE AT THE END OF THE WARRANTY PERIOD. THERE ARE NO OTHER WARRANTIES (INCLUDING WITHOUT LIMITATION WARRANTIES FOR CONSUMABLES AND OTHER SUPPLIES) OF ANY NATURE WHATSOEVER, WHETHER ARISING IN CONTRACT, TORT, NEGLIGENCE OF ANY DEGREE, STRICT LIABILITY OR OTHERWISE, WITH RESPECT TO THE PRODUCTS OR ANY PART THEREOF DELIVERED HEREUNDER, OR FOR ANY DAMAGES AND/OR LOSSES (INCLUDING LOSS OF USE, REVENUE, AND/OR PROFITS). SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR THE LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. IN ANY EVENT, TO THE MAXIMUM EXTENT PERMITTED UNDER APPLICABLE LAW, VGC'S LIABILITY TO CUSTOMER HEREUNDER SHALL NOT UNDER ANY CIRCUMSTANCES EXCEED THE COST OF REPAIRING OR REPLACING ANY PART(S) FOUND TO BE DEFECTIVE WITHIN THE WARRANTY PERIOD AS AFORESAID.

This warranty does not cover any damage to a product resulting from cause other than part defect and malfunction. The VGC warranty does not cover any defect, malfunction, or failure caused beyond the control of VGC, including unreasonable or negligent operation, abuse, accident, failure to follow instructions in the manual, defective or improperly associated equipment, attempts at modification and repair not approved by VGC, and shipping damage. Products with their serial numbers removed or defaced are not covered by this warranty.

This warranty does not include defects arising from installation (when not performed by VGC), lightning, power outages and fluctuations, air conditioning failure, improper integration with non-approved components, defects or failures

of customer furnished components resulting in damage to VGC provided product.

This limited warranty is not transferable and cannot be enforced by anyone other than the original consumer purchaser.

This warranty gives you specific legal rights and you may have other rights which vary from country to country.