1.0   Introduction

The COMMS 300 (or COMMS 300RM rack mount) Intercom unit provides a means to interface between two channels of 2-wire party-line intercom audio and two channels of 4-Wire analog line-level signals. The unit is capable of performing auto nulling for each channel with the push of a button. In addition, each of the 4-Wire input and output channel levels are monitored and displayed on easy to understand front panel VU meters. With the flip of a switch the unit can be a +28VDC party-line voltage power source while providing the 200 ohm intercom audio termination on both channels. If so desired, the party-line source and termination can be removed by just flipping the switch back. The unit can also be configured to work with either RTS party-line or Clear Com party-line equipment with the flip of a front panel control switch. This switch adjusts the output gain between the party line circuitry and the 4 Wire line level circuitry depending on which type of units one is interfacing with.
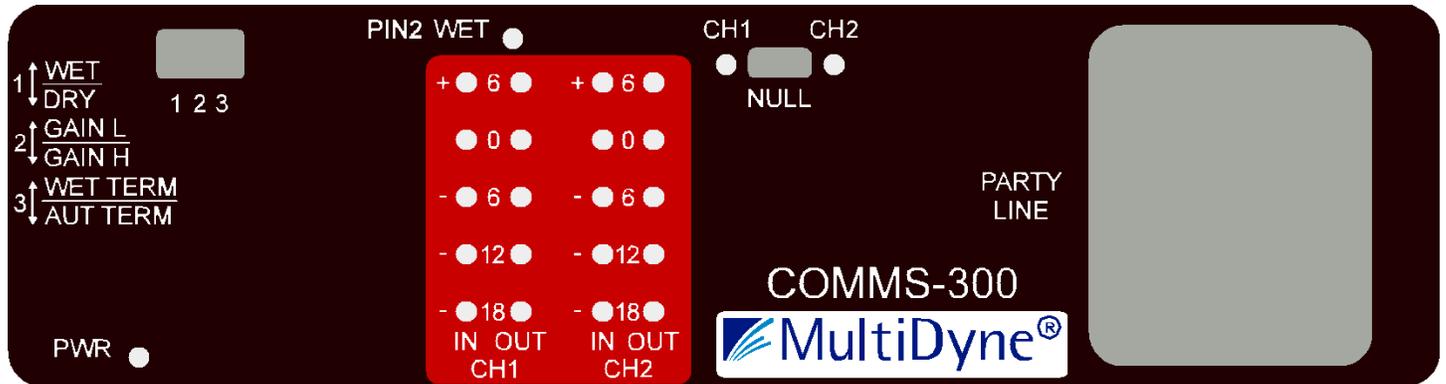

Figure 1: Front panel of the COMMS 300 Intercom

2.0   Features and Operation

This manual describes the COMMS 300 version of the Intercom, with the front panel shown in Figure 1 .

2.1   Front Panel DIP Switches

	Switch position	Switch position
Switch Number	UP	DOWN
1	WET	DRY
2	GAIN L	GAIN H
3	WET TERM	AUT TERM

Table 1: Front Panel Switch Selections for COMMS 300

2.1.1 WET/DRY Selection Switch

The Intercom can supply party-line power by moving the WET/DRY switch to the up position. With this function enabled, the unit will provide +28 VDC to pin 2 of the XLR connector of the party-line ports. When enabled, the CH1 WET LED will turn green. When selecting the WET mode, verify that the WET LED is green. If red, it means there is a short or overload on the party-line, or the wetting circuitry within the unit is defective. If the Intercom unit is to be connected to a party-line intercom system with an existing power source, then the internal power supply within the Intercom board should be turned off. This is accomplished by flipping the WET/DRY switch to DRY (down). When in DRY mode, the CH1 WET LED will go out. Pin 2 of the XLR connector will no longer provide +28VDC to the rest of the party-line.

2.1.2 RTS/CC or GAIN L/GAIN H Selection Switch

The COMMS 300 can be set to RTS or Clear Com mode. To be compatible with RTS units push the GAIN L/GAIN H switch up or push it down to be compatible with Clear Com units. This switch adjusts the gain needed to interface between the 4 Wire to 2 Wire signals and it also adjusts the gain from the 2 Wire to 4 Wire signals. It increases the gain going from a Clear Com connected 2 Wire unit to the 4 Wire side of the interface to compensate for the lower 2 Wire operating voltages of the Clear Com units as compared to RTS units. The RTS units operate at a higher voltage on the party-line side and thus require less gain when translating from 2 Wire to 4 Wire signals. When the signal originates from the 4 Wire side and translate over to the 2 Wire side the gains are opposite. Less gain is applied to a 4 Wire input as it translates to the 2 Wire side of the interface with when a Clear Com unit is present on the party-line connection as opposed to a RTS unit.

2.1.3 OFF/AUTOTERM or WET TERM/AUT TERM Selection Switch

The Intercom can be set to the AUTOTERM mode by pushing the WET TERM/AUT TERM switch down. When this selections is chosen, the unit will look at both party-line channels to see if they contain the +28 VDC wetting voltage. For channel 1 the unit's internal circuitry will remove the internal 200 ohm terminating resistor if the unit is sourcing the +28 VDC or if it is externally wetted. For Ch2, it will remove the 200R only if the channel is externally wetted. (Ch2 cannot be internally wetted). If the WET TERM is selected, then if the Intercom is providing the +28 VDC (WET/DRY switch set to WET), both channels will be terminated. If the Intercom is not providing the +28 VDC (WET/DRY switch set to DRY) then the terminations on both channels are removed.

2.2 Auto Nulling

Auto nulling is done to achieve maximum return loss between the 4 Wire input and the 4 Wire output channels. Auto nulling can be and should be done whenever there's been changes made to the party-line connections. To auto null Channel 1 slide the NULL switch to the left momentarily and release. Observe that the null CH1 status LED glows orange while the nulling process is taking place. The COMMS 300 will also produce a 24khz Mic Kill tone. RTS compatible beltpacks will respond to this tone and automatically kill the mic input. If you have another type of beltpack, be sure to turn off the mic input or the null will be poor. The process should last about 20 seconds after which time the LED will turn green if successful or red if a null was not able to be obtained. Wait for the auto nulling process to complete on one channel before attempting to do it on the other channel. Repeat

these steps for nulling Channel 2 by momentarily sliding the switch to the right while observing the CH2 LED alongside it. During the auto nulling process there will be tones of 1khz, 300hz, 3khz and 1khz again on each of the party line channels. After the nulling process is complete, you will need to re-enable your mic inputs.

If two or more COMMS 300 intercom units are used as part of the 2 Wire system they should be nulled to prevent an audio feedback path that may cause an audio oscillation. This is evidenced by the VU LEDs being maxed, as well as an audio squeal, howling or whistle. Once the units are nulled, this should go away. But it can also return if one of the beltpacks or other loads are changed or disconnected from one or both ends. Then the oscillation will return since the load that the intercom has been nulled for is suddenly gone, and the resulting lack audio return loss will result in feedback.

Note that if the party line has been altered after a null has been done, the status LEDs will not update on their own. They do not monitor status on a continuous basis. They only reflect the result of the last nulling procedure, so it will be necessary to perform the nulling procedure again. This is commonplace in the industry, as it is impossible to measure the depth of the null on a continuous basis without asserting mic kill and injecting tones.

2.3   VU Meters

The Intercom unit contains four 5-segment LED VU meters on the front panel. The first set displays the 4 Wire input levels for Channel 1 as well as the 4 Wire output levels for Channel 1. The second set of VU meters display the input and output levels associated with Channel 2. The nominal 4 Wire input level for either version of Intercom is +4dBu which should correspond to the lower four LEDs for an input channel turning green with the top LED off (0 LED represents 4dbu). If the input is 6 db or more over the nominal input value then the top LED will light yellow indicating clipping could be on the verge of occurring. The output VU meters function in the same manner as the input meters. To maintain accuracy of the meters, the system should always be renulled if any of the party-line connections are changed.

2.4   CONNECTOR INTERFACES and PINOUTS

CONNECTOR	DESCRIPTION
FRONT PANEL XLR CONNECTOR	PIN 1 SHIELD(GND) PIN 2 CH 1 PIN 3 CH 2

The party-line interface can operate stand alone or interconnected with an existing intercom system. If so chosen, the Intercom unit can provide the source of the 28 VDC required to run an intercom setup on PIN 2 of the XLR. The user can enable this mode by way of one of the four front panel DIP switch selections. In addition, the user can also choose to have the unit provide 200 ohm termination resistors to each of the two party-line channels at PINS 1 & 2 or not on the party-line XLR connector. See the above description in Section 2.1.3 for how the termination logic works. If the unit is supplying the DC power for the party-line, the CH1 WET LED will be

green (if it is red, then there is either an overload condition somewhere in the party-line circuit or an internal problem with the unit).

Below in Fig. 2 is shown the rear panel DB25 connector. It has balanced line-level 4 wire inputs and outputs for Ch1 and Ch2. It has two sets of pinouts for the partyline, connected in parallel, so that a loop-thru connection can be provided. These DB25 party line pins are connected in parallel with the front panel XLR pins described above, and function identically. The DB25 connector is compatible with off the shelf Tascam audio snake cables, such as Switchcraft model DB25M-XLRMXLRF.
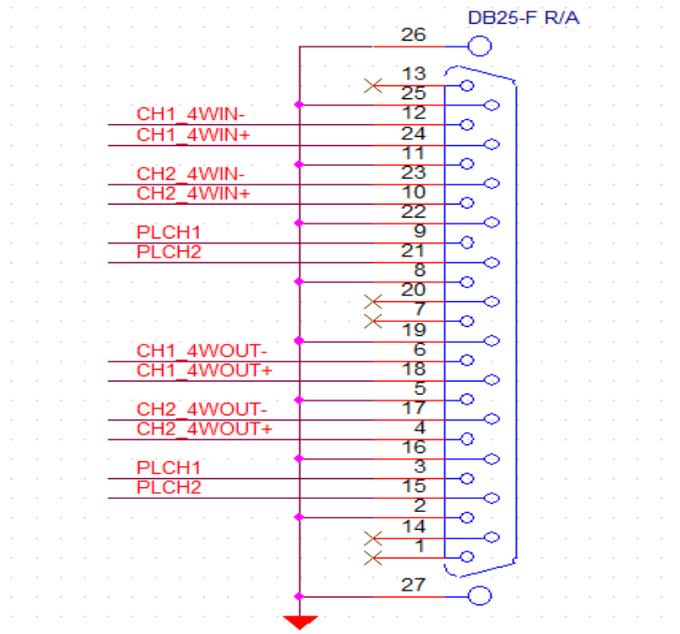
Figure 2: Rear panel DB25 connector of the COMMS 300 Intercom

3   SPECIFICATIONS

General Audio:

Frequency Response: ±2.5 dB, 100 Hz to 8 kHz

Distortion (THD+N): <TDB%, measured at 1 kHz, 4-wire input to 2-wire interface

Signal-to-Noise Ratio: >TBD dB, measured at 1 kHz, 4-wire input to 2-wire interface

2-Wire Party-Line Intercom Interface:

Type: 2-channel party-line, unbalanced (pin 1 common; pin 2 DC with channel 1 audio; pin 3 channel 2 audio)

Compatibility: single- and dual-channel intercom systems such as from RTS® and Clear-Com®

Impedance–Normal: >20 k ohms

Impedance–2-Wire (PL) Power Source Mode: 200 ohms

Nominal Level: –10 dBu RTS, -14dbu Clear Com

"Mic Kill" Signal: 24 kHz, ±1%

2-Wire Power Source: 28 Vdc nominal, 750 mA maximum

Hybrids: 2

Topology: 3-section analog circuitry compensates for resistive, inductive, and capacitive 2-wire party-line loads

Nulling Method: automatic upon user initiation, processor implements digital control of analog circuitry; settings stored in non-volatile memory Nulling Line Impedance Range: 120 to 350 ohms

Nulling Cable Length Range: 0 to 3200 feet

Trans-Hybrid Loss: >35 dB, typical at 1000 Hz

4-Wire Inputs: 2

Type: capacitor-coupled

Impedance: 20 k ohms

Nominal Level: +4 dBu

Maximum Level: +22 dBu

4-Wire Outputs: 2

Type: capacitor-coupled

Impedance: <50 ohms nominal

Nominal Level: +4 dBu

Maximum Level: +20 dBu into 2 k ohms

Power requirements

Connector Type: Coaxial, negative sleeve, Switchcraft 712 compatible

Power: 9 to 24VDC, < 25W depending of number of beltpacks connected

4 Appendix: Summary of Internal Termination State vs. Mode Selection

EXTERNAL WETTING PRESENT (Y/N)	UNIT MODE WET/DRY	UNIT MODE AUTOTERM (ON/OFF)	CHANNEL 1 INTERNAL TERMINATION APPPLIED (Y/N)	CHANNEL 2 INTERNAL TERMINATION APPPLIED (Y/N)
N	DRY	OFF	N	N
N	DRY	ON	Y	Y
Y	DRY	OFF	N	N
Y	DRY	ON	N	Y
N	WET	OFF	Y	Y
N	WET	ON	Y	N