MODEL 8022DR

LINE DRIVER CARD GAIN SETUP

OVERVIEW/THEORY

The 8022DR Line Driver Card has four gain control units on board, two of which are usually set up to be the complement of each other. These gain units are shown schematically in the figure below:

As identified in the figure, gain unit 1 provides any required boost on the signal passing through from point A to point B, while gain unit 2 does the same from C to D. These two gain units supply gain for the signal which passes through the system, and should be

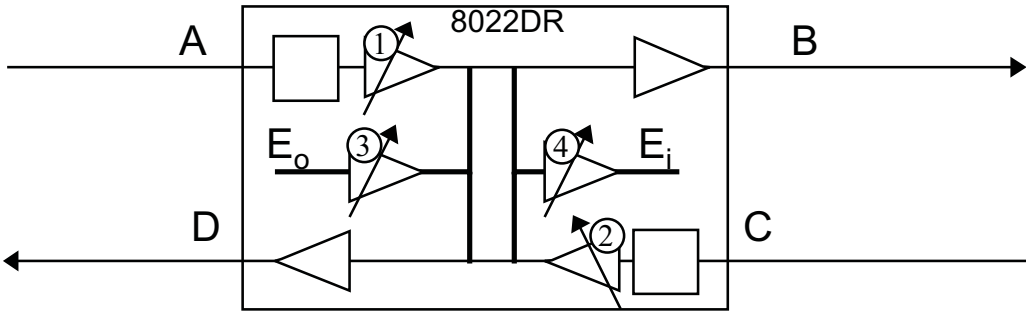


Figure 1 - 8022DR Block Diagram

set to compensate for any signal loss in the wires and load resistors leading up the 8022DR inputs (e.g., coming into points A and C).

Point E is the tie-in of any of the four 8000 audio buses to the 8022DR audio paths. These have been marked in the figure as E_o and E_i which denote the output from the 8000 and the input into the 8000, respectively. Gain units 3 and 4 handle these two parts of point E. Typically, one sets these gains to be complementary. For example, if gain unit 3 is set to +6 dB, then gain unit 4 is set to -6 dB. That is, the 8022DR paths are kept 6 dB hotter in this example than the internal 8000 audio buses for improved signal to noise ratio over the long distances.

The maximum output of the 8022DR line drivers is about +24 dBu, while the internal 8000 audio buses generally carry signals around -4 dBu. When setting up the gains, one would like to get the highest signal level possible without danger of clipping (i.e., reaching +24 dBu, given that input levels can vary somewhat, even with audio compression).

In addition to gain, the input receivers of the 8022DR card (at points A and C) have a user selectable load across the input which can be adjusted to help flatten out the frequency response of the transmission line. The high-frequency rolloff of the audio signal is due to

the capacitance introduced by the long cable runs. To counteract this high-frequency rolloff, a terminating resistance is introduced at the end of the transmission line. The addition of this resistance also acts as a resistor divider network along with the resistance of the long cable lines, and thus reduces the signal level at the end of the line. This level loss is then adjusted via the gain controls on the 8022DR card. For speech transmission, it is not necessary to achieve a perfectly flat frequency response all the way out to 20 kHz. Typically, a 3 dB bandwidth somewhat greater than 8 kHz is sufficient for speech.

PROCEDURE

The steps to be followed in setting the 8022DR card are as follows:

1. Identify the goal values for frequency response and signal levels on the transmission lines. Some typical values for speech transmission (with microphones that have compression) would be:

   A. No more than 3 dB of rolloff at 10 kHz

   B. Average level on the transmission lines of 14 dBu (i.e., 10 dB of headroom).

2. Set gain units 3 and 4 to get the desired level on the transmission lines. For the sample case, this means +18 and -18 dB (to get from a -4 dBu to a +14 dBu level and back). This is best done with the 8000 Test/Setup Toolset via the Line Driver Gains window (available under the Installation menu if one has the proper password access). One merely sets the third gain control slider, labeled “Int/Ext”, to the desired *positive* value (e.g., 18 dB in sample case). This window will automatically set gain unit 4 to the complementary value.

3. Adjust the load resistor of either point A or point C on the 8022DR card as follows:

   A. At an adjoining system, set up its 8022DR gain unit 3 and send a 500 Hz tone out this card via the Circuit Test capabilities of the 8000 Test/Setup Toolset.

   B. Measure the signal level at the input of the 8022DR card (e.g., via a single point or circuit test of the appropriate point). Note this level for comparison.

   C. At the adjoining system, change the test tone to 10 kHz.

   D. Re-measure the signal level at the input of the 8022DR card. Compare the reading at 10 kHz to that at 500 Hz. If the readings are within the desired tolerance/flatness (e.g., 3 dB for the sample case), then this step is done. Otherwise, remove the 8022DR card, add a jumper for the next lower resistance value and reinsert the 8022DR card (see the next section). The 8022DR card may be plugged in while power to the frame is still 'On', thus significantly speeding up this trial and error process. If the resistance is changed, then repeat steps A through D for this new resistance. (The readings at both 500 Hz and 10 kHz will be different due to the resistance change.)

4. Using the last reading at 500 Hz, determine the signal loss from the adjacent system to this system. This also requires a reading to be taken right at the output of the adjacent system (at its point B or D). Adjust gain unit 1 to compensate for this signal loss and verify proper signal level on the output (point B or D) after making the adjustment. This may be done via the appropriate gain slider on the Line Driver Gains window and measured via the Test window.

5. Repeat steps 3 and 4 for the other input point (driving the transmission line from a system in the other direction).
6. Save these settings to the system's INI file (via the "Save to INI File" button on the window).

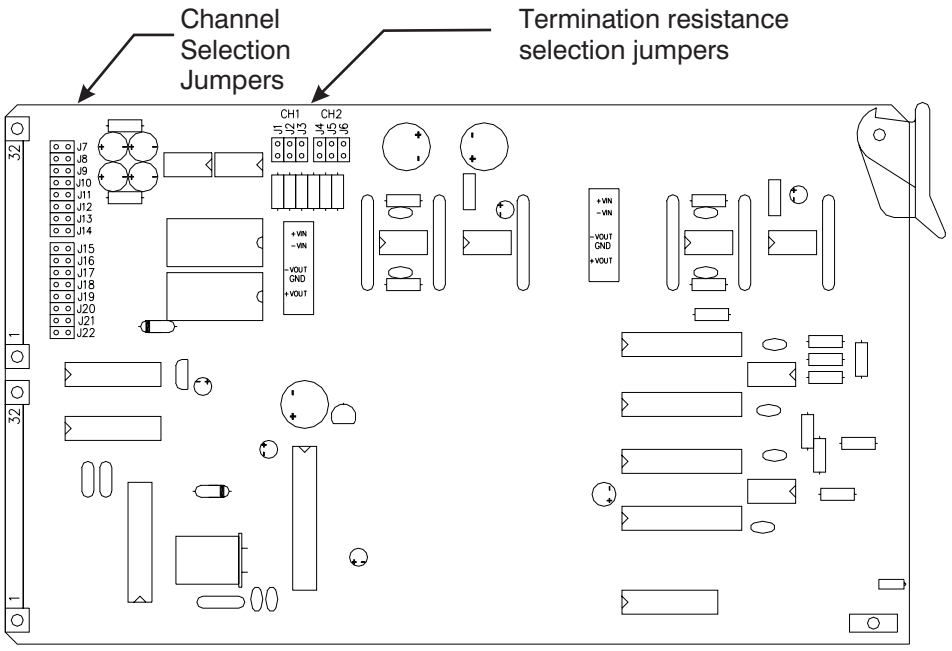


Figure 2 - 8022DR Card
Jumper Locations

ADJUSTING THE 8022DR CARD TERMINATING RESISTANCE

The terminating resistance for the 8022DR card receivers are adjusted via jumpers J1 through J3 for channel 1 and J4 through J6 for channel 2. The location of these jumpers is shown in figure 2. The jumper settings are listed in the table 1.

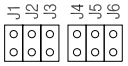
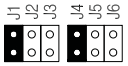
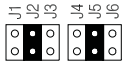
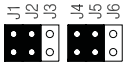
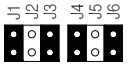
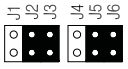
CHANNEL 1 JUMPERS	CHANNEL 2 JUMPERS	PLACEMENT DIAGRAM	TERMINATION RESISTANCE
-	-		600
J1	J4		300
J2	J5		200
J1+J2	J4+J5		150
J1+J3	J4+J6		100
J2+J3	J5+J6		86
J1+J2+J3	J4+J5+J6		75

Table 1 - Jumper Combinations to achieve selected termination resistance values

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