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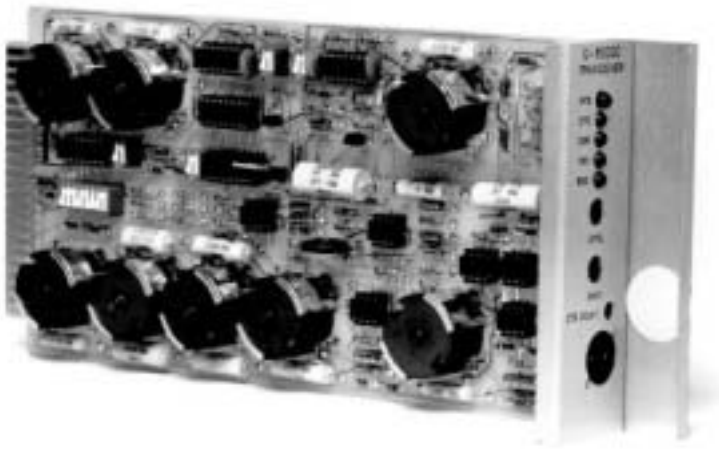
G-8000C 60 TO 600 BPS TRANSCEIVER INSTRUCTION INFORMATION

- *** EIA RS-232 INTERFACE**
- *** ADJUSTABLE RTS TO CTS DELAY**
- *** FULL OR HALF DUPLEX OPERATION**
- *** MARK OR SPACE HOLD**
- *** MODULAR**



GENERAL DESCRIPTION

The G-8000C FS Transceiver consists of a single card with a high quality tone data receiver and a standard tone transmitter mounted on it. The tone transmitter output is designed for multiplexing onto 600 ohm lines: The tone receiver uses a four coil channel filter and is intended for use on C.C.I.T.T. and similar center frequency assignments in which the channel spacing is twice the channel bandwidth. Six hundred ohms input is standard. The receiver circuit consists of a limiter circuit, a single coil discriminator, an active low pass data filter, a Schmitt trigger, and output amplifiers.

A data carrier detector circuit (DCD) is provided, the output of which can be set to change state on the loss of carrier between -10 dBm and -30 dBm. Control circuits are provided to clamp the received data (RD) output lead high or low as long as the data carrier detect output is false.

The request to send (RTS) input controls the FSK tone squelch. Also, the RTS triggers a delayed clear to send (CTS) output (40-200 ms adjustable). This RTS line can also be used in half duplex systems to clamp the receive data (RD) into mark hold during outgoing transmissions.

All data, input and output, is buffered to provide RS232 levels. Inputs (TD, RTS) require signals greater than +3 Vdc or less than -3 Vdc. Outputs (RD, DCD, CTS) will drive 3K ohm loads greater than +3 Vdc or less than -3 Vdc.

OPERATION

Three operating controls are provided on the front panel of the unit. The top potentiometer, R11, sets the signal level of the transmitter output. The receiver bias potentiometer, R44, is the second control. This bias control is set by observing a data message on the output and setting the mark and space pulses to the proper length. The control can also be set by connecting a signal generator to the receiver input and applying the center frequency signal. The bias control is then adjusted so that the output changes state for small changes of frequency away from the center frequency. The third potentiometer, R4, adjusts the delay from the RTS input to the CTS output. The carrier detector gain control, R33, is located in the center of the board.

G-8000C TRANSCEIVER TONE CHANNEL ALIGNMENT PROCEDURES

TRANSMITTER SECTION

Da-Tel Research audio tone transmitters are designed to frequency division multiplex onton standard communication links for voice and data communications. The transmitters are designed to be loaded with a 600 ohm line. Whenever checking the output of a transmitter it is essential that the transmitter be loaded with 600 ohms for correct level and frequency readings. This load can be either the communications link itself or a 600 ohm resistor on the output of the transmitter on terminals 8 and 9. When using a flat frequency or level meter it will read the composite level or frequency on the link. You will either have to remove other transmitters on the link or use a frequency selective level meter. To effectively test the G-8000C, the unit should be on a test bench or card extender it in the shelf.

The request to send input, RTS, turns the transmitter on or off depending on the input logic. The RTS line should be keyed to turn the transmitter on to check the output levels, frequencies and balance. Refer to the G-8000C Instruction Information Table of Switch Settings for your input and output logic selections.

REQUEST TO SEND ADJUSTMENT

The request to send, RTS, and clear to send, CTS, delays are adjusted with R4. Key the RTS Input at 5 Hz and monitor on a dual trace scope using the A channel. Connect the B channel to the CTS output and adjust R4 for the proper delay.

TRANSMITTER FREQUENCY TUNING

The output of the transmitter may be observed at TP4 and 5 or at the back of the rack. The oscillator coil, L1, oscillates at the mark frequency and shifts to the space when loaded with C18. The transmit data, TDX, Input turns Q1 on or off which in turn loads L1 with C18. The trasmitter may be provided with an optional divider circuit, U5. This circuit divides the oscillation frequency by a factor of 16. If the divider is provided, L1 oscillates at 16 times the frequency of the output. S5-1 switches the divider circuit out and S5-2 switches the divder circuit in. L2 adjusts the mark and space balance. The level of the mark and space frequency should be within 0.25 dBm of each other. To key the mark or space, tie the TDX input high or low according to your specific requirements. L8 is an Impedance matching and filtering coil which is adjusted at the factory.

RECEIVER SECTION

Refer to the receiver input terminals 20 and 19. This channel filter input is 600 ohms in band, impedance rising out of band, and can be connected across telephone lines with other channel filters at different center frequencies. The four coil filter rejects adjacent channel signals by 34 to 38 dB. Channel spacing is twice the bandwidth. The output of the filter is measured at TP9 to TP7, common. The mark and space frequency should be within 0.25 dB of each other. For quick trouble shooting, check TP13 with a scope. A square wave should be observed. This square wave is the output of U7 which is a limiter circuit. The output will be shifting depending on the input data stream.

DISCRIMINATOR ADJUSTMENT

L5 is the discriminator coil. Adjustment of L5 is done while presenting the center frequency to the receiver with a voltmeter on TP10 and TP7, common. When adjusting L5, the bias control pot, R44, on the front panel should be fully counter clockwise. The center frequency output at TP10 should be 6 Vdc, the mark should be 3.3 Vdc and the space should be 8.0 Vdc. The values should be within +/-0.5 Vdc. Adjust these values by turning the L5 coil tuning screw.

BIAS ADJUSTMENT

Bias adjustment is best done while data is being passed. The mark and space durations on TP6 and 7 should be equal and the bias pot, R44 is used to make this adjustment. If it is not possible to adjust the unit while data is being received, inject the center frequency with the bias pot fully counter clockwise. Turn R44 in a clockwise direction until TP6, the data output, changes value. This will be high to low, or low to high depending on your logic. When the logic output has changed, turn R44 counter clockwise until just before it trips again. Your target is the center of the hysteresis of R44.

CARRIER DETECTOR ADJUSTMENT

The carrier detector, CD, adjustment is R33, found in the center of the board. A card extender will be needed if the unit is in the card shelf. Inject the center frequency at a level you would expect to be 6 to 10 dB below the operating level and adjust R33 to trip at that point. TP12 is the CD output logic.

MAXIMUM LEVEL PER TONE ON A MULTILEVEL SYSTEM

Number of Tones	dB Level	Number of Tones	dB Level
1	0	13	-11.1
2	-3	14	-11.5
3	-4.8	15	-11.8
4	-6	16	-12
5	-7	17	-12.3
6	-7.8	18	-12.5
7	-8.5	19	-12.8
8	-9	20	-13
9	-9.5	21	-13.2
10	-10	22	-13.4
11	-10.4	23	-13.6
12	-10.8	24	-13.8

SPECIFICATIONS

Center frequency: 420 Hz to 20,000 Hz.

Bandwidth: 2.0 to 50% of center frequency, see Standard Frequency List.

Operating temperature: -20 degrees C to =70 degrees C, 95% humidity.

Termination: four wire, 600 ohm.

Power source: =/-12 Vdc, 40mA.

Printed circuit board size: 4.5” x 9.375”.

Maximum height of components: 1 inch.

Rear edge connector: 22 position, 5/32 spacing.

Output level: -3 dBm to -25 dBm.

TABLE OF SWITCH SETTINGS FOR THE G-8000C TRANSCEIVER

SWITCH-FUNCTION	SETTING	INPUT	RESULT
S1 - TD	1-ON 2-OFF	TD > +3 Vdc	High Freq. (LED ON)
	1-OFF 2-ON	TD > +3 Vdc	Low Freq. (LED OFF)
S2 - RTS	S2c2:Up	RTS > +3 Vdc	Tone ON (LED ON)
	S2c2:Dn	RTS > +3 Vdc	Tone OFF (LED ON)
S2 - RTS* Block DCD	S2c1:Up	RTS > +3 Vdc	DCD Forced FALSE (-12V)
	S2c1:Dn	RTS > +3 Vdc	DCD Enabled
S4 - RD	S4c1:Dn	High Freq. TP10 < 5.4 Vdc	RD > +3 Vdc (LED ON)
	S4c1:Up	High Freq. TP10 < 5.4 Vdc	RD < -3 Vdc (LED OFF)
S3 - DCD	S3c2:Up	Carrier present	DCD > +3 Vdc (LED OFF)
	S3c2:Dn	Carrier present	DCD < -3 Vdc (LED ON)
S3,4 - DCD Block	S3c1:Up; S4c2:Dn (S4c1:Up)		RD Forced > +3 Vdc (S hold)
	S3c1:Up; S4c2:Dn (S4c1:Dn)		RD Forced < -3 Vdc (M hold)
	S3c1:Dn; S4c2:Up (S4c1:Up)		RD Forced < -3 Vdc (M hold)
	S3c1:Dn; S4c2:Up (S4c1:Dn)		RD Forced > +3 Vdc (S hold)

* For receiver unsupressed during RTS, remove CR16.

Note: On SPDT Switches S2,3,4: Up = Depress Top, Dn = Depress Bottom of Switch.