Instruction Manual

for

MODEL 24D

SPECTRUM TRACKING ADAPTER

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CHAPTER 15

SPECIFICATIONS

15-1. Frequency Multiplier Section

The frequency multiplier consists of a "digital oscillator" whose frequency is proportional to an input frequency. The input frequency represents the equivalent of a once per revolution tachometer signal. The digital oscillator is used to generate the timing signal necessary to convert a spectrum analyzer's horizontal axis to "orders" rather than frequency. It is also used to generate a frequency equal to the once per rev input for external triggering of the spectrum analyzer and driving an optional strobe light. This output can be phase shifted relative to the tach input. In addition, the digital oscillator can be manually tuned.

A. Pulses Per Rev Divider

Division by 1 through 99 available via two digit thumbwheel switch. The output is used as a 1/rev input to the multiplier. The maximum output not to exceed 120,000 RPM.

B. Tach Inputs

1) TTL Levels: Logic 0 = > 0V, < +0.8V
Logic 1 = > +3V, < +5V
Transition Time: 1 usec or faster.
Maximum Frequency: 11,880 KRPM when pulses per rev divider set to 99.
Minimum Pulse Width: Not less than 10 usec.

2) AUX: Analog- Accepts a unipolar or bipolar analog tach input which has a minimum amplitude of 100 mv RMS. This input is AC coupled through a 300 RPM high pass filter. The maximum DC input is ±20VDC. Input impedance = 100 K ohm.

3) TBPF (Tracking Bandpass Filter): The output of a built-in tracking bandpass filter can be used as a source of tachometer input. See TBPF section for complete details.

C. Outputs

1) TRACK: A TTL output signal which has a frequency proportional to that of the digital oscillator and to the number of orders selector switch. This output is used as a track input to the spectrum analyzer.

2) TRIG: A TTL output signal which has a frequency equal to that of the digital oscillator and which has a phase relationship to the TACH input that is a function of the phase selector switches.

3) STROBE: Same as Trig above.

D. Controls

1) LOOP: OPEN- This mode allows the digital oscillator to be manually tuned.
CLOSED- In this mode, the digital oscillator will lock onto and track a once per rev input.

2) TUNE: Allows the user to manually adjust the frequency of the digital oscillator via a continuously variable control with three different levels of sensitivity (fine, medium, and coarse).

3) Order Selection: This control selects the correct multiplier output necessary to change the spectrum analyzer's horizontal axis from frequency to orders. The possible order displays available are 1, 2, 4, 5, 8, 10, 20, 25, 40, 50, 80, 100, 200, and 400.

4) Phase Selection: This control gives the user the ability to phase shift the TRIG and STROBE outputs from 0 to 360° in 32 steps (≈ 11°/step).

E. Indicators

1) Strobe: A five digit LED display indicating the frequency of the strobe output in CPM (RPM).

2) Signal Present: A yellow lamp indicating that a tach signal is being received.

3) Within Range: A green lamp indicating that the once/rev signal is within range.

4) Loop Locked: A red lamp indicating that the digital oscillator's frequency is within a few percent of the once/rev input.

F. Miscellaneous

1) Slew Rate: in Hz/Sec = $A^2/200$, A = Multiplier's input frequency in Hz.

2) Acquisition Time: Less than 8 cycles of the multiplier's input frequency.

15-2. TLPF Section

The Tracking Low Pass Filter (TLPF) is a continuously variable lowpass anti-aliasing filter whose cutoff frequency is a function of the frequency of the strobe output and the orders selection switch.

A. Max Cutoff Frequency: 20 kHz.

B. Filter Characteristics: Seven pole, six-zero elliptic lowpass filter with 75 dB out-of-band rejection and less than 0.2 dB of pass band ripple.

C. Input Select

1) NORMAL: Input Signal AC coupled into the TLPF (-3 dB at less than 0.5 Hz). Input Impedance = 100 K ohms. DC Max Input = ± 50VDC.

2) ICP: Same as normal with the addition of a 4 ma constant current source. (Used with ICP Piezoelectric Accelerometer).

D. Output Select

1) BYPASS: Passes to the output BNC the AC coupled input signal.

2) FILTERED: Passes to the output BNC the lowpass filtered input signal.

E. Miscellaneous

1) Controls: Two gain controls are available to amplification of input signal prior to the TLPF. The gain selections are x1, x3, x10, and x30.

2) Indicators: A filter error lamp is illuminated when the filter cutoff frequency exceeds 20 kHz.

3) Automatic Tracking Range: Greater than 1000:1.

15-3. TBPF Section

The Tracking Bandpass Filter (TBPF) is a 1/3 octave band-pass filter centered at the frequency of the strobe output. This filter can be used to extract a frequency component from a vibration signal source. The frequency component can be used as a once per rev tachometer input to the Multiplier Section.

A. Filter Shape: Six pole Chebyshev 1/3 OCTIVE ANSI CLASS III.

B. Filter Range: Tuneable between 30 RPM to greater than 12,000 RPM as a function of the strobe output frequency.

C. Input Select

1. NORMAL: Input signal AC coupled into the TBPF (-3dB at less than 0.5Hz). Input impedance = 100 K ohms. DC Max Input = ± 50 VDC.

2. ICP: Same as normal with the addition of a 4 ma constant current source. (Used with ICP Piezoelectric Accelerometer.)

3. TLPF: The output of the TLPF can be selected as an input to the TBPF.

D. OUTPUT: The output of the TBPF is available as a tach input (via the tach select switch) to the Multiplier Section.

15-4. IEEE 488

An IEEE 488 interface is provided to allow digital communication to external devices.

A. Function: Remote sense of the strobe frequency and remote sense of the setting of number of orders selector switch.

B. Configuration: Simple talker/listener requiring external bus controller.

C. Identifier: Eight position rear panel switch of which five positions are used (AD0 through AD4) as the device address.

D. Input Commands

1) "OB": Outputs five digits of strobe frequency in ASCII characters.

2) "OR": Outputs five ASCII characters of orders information with the following format: "RSXXX" where XXX indicates the orders switch setting.

E. GET: A group execute trigger (GET) is accepted (via a BNC connector) to allow an external device to inhibit the further updating of the internal register that stores the strobe frequency for outputting via the IEEE 488. The assertion of the GET input has no effect on any other Option 24D functions. This allows the freezing of an instantaneous RPM value and allows that value to be read out at some later time.

15-5. DC of Rate

A DC voltage is provided to be used as a driving source to an analog plotter as a function of the strobe frequency. The Output Range is 0V to 5V DC corresponds to 0 RPM to 10,000 RPM.

15-6. Miscellaneous Section

Weight: 9 lbs. (4.08 kg.)

Size: Length- 16 in. (40.64 cm.)
Width- 9 in. (22.86 cm.)
Height- 4.5 in. (11.43 cm.)

Power: 90-130 VAC, 45-450 Hz
180-260 VAC, 45-450 Hz (available)

Operating Temperature: 0°C to 55°C

Storage Temperature: -55°C to +85°C