

Coherent PSK Sub-Carrier Demodulator

Model 742

Features

- **BPSK (QPSK Optional)**
- **Tunable Sub-carrier**
⇒ 1 kHz to 10 MHz
- **Tunable Data Bandwidth**
⇒ 1 kHz to 10 MHz
- **Tunable Sub-Carrier Filtering**
⇒ 1 kHz to 10 MHz
- **Tunable Loop Bandwidth**
⇒ 1 Hz to 32 kHz
- **Four Input Connections**
- **Selectable Input Impedance**
⇒ Low = 50 Ohms
⇒ High = 10k Ohms
- **Status Indications**
⇒ Loss of signal
⇒ Sub-carrier Synchronization
⇒ Digital Loop Deviation
- **Remote Control**
⇒ RS-232
⇒ IEEE-488

General Description

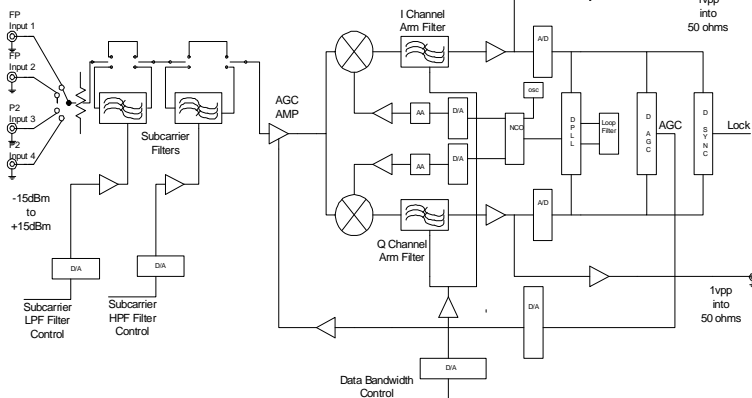
The model 742 Sub-Carrier Demodulator performs coherent demodulation of Binary Phase Shift Keyed (BPSK) and optionally, Quadrature

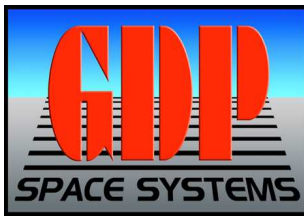


Phase Shift Keyed (QPSK) sub-carriers. The input sub-carrier frequency range is from 1 kHz to 10 MHz. Four input connections are provided from which, one is program selected to be applied to the demodulator. The input impedance is selectable to be either 50Ω (optional 75Ω) or 10KΩ. Band-pass filtering of the input signal is accomplished by programming the cutoff points of a Sub-Carrier High-Pass and a Low-Pass filter. The filters attenuate adjacent sub-carriers allowing the model 742 to operate with wide-band input signals containing many sub-carriers. The high and low-pass filters are independently bypassed if desired.

The model 742 employs a Costas Loop to achieve coherent carrier recovery and automatic gain control (AGC). The input signal is multiplied by the sine and cosine of a local oscillator (NCO) resulting in a spectrum that is filtered to provide the data and phase error indication. The data and phase error channels are sampled, converted

to equivalent digital values and subsequently processed by a Digital Phase Lock Loop (DPLL), a Digital Sync Detector (DSD) and a Digital AGC circuit. Phase differences between the input sub-carrier and the NCO are corrected by the DPLL while the DSD detects carrier phase synchronization and provides lock status. The Digital AGC circuit produces a wide dynamic range of more than 30dB.





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SPECIFICATIONS

Function	Characteristic
Modulation	BPSK and QPSK Option
Input Sources	4
Input Impedance Selection	50Ω (optional 75Ω); 10kΩ
Input Amplitude Dynamic Range	30dB (-15 dBm to +15 dBm std. Other ranges optional)
Sub-Carrier Frequency Range	1 kHz to 10 MHz
Sub-Carrier Tuning Resolution	32 bits
Sub-Carrier Accuracy	50 ppm std.; 10 ppm optional
Sub-Carrier High Pass Filter Cut-Off Frequency	1 kHz to 1 MHz or Bypass
Sub-Carrier Low Pass Filter Cut-Off Frequency	10kHz to 10MHz or Bypass
Data Bandwidth	Bessel Characteristics Double Sided Bandwidth (-3dB) 1 kHz to 10 MHz
Loop Bandwidth	1 to 32767 Hz Damping factor 0.707
Carrier Tracking Performance	2 times LBW setting 6 dB Eb/No to maintain reliable phase lock
Implementation Loss	0.5 dB
Outputs	
Data (I & Q)	0.5 Vpp into 50 Ohms
Local Oscillator	0.5 Vpp into 50 Ohms
Status Indications	Signal Loss, Sub-Carrier Lock, Loop Deviation
Remote Control	RS-232, IEEE-488



Ordering Information

MD742-00	Basic Unit	OP742-10	Pre-Wire Chassis for Modulator
OP742-01	QPSK Option	OP742-11	Modulator Installed
OP742-02	10ppm Subcarrier Option	OP742-12	PCM Bit Synchronizer Installed
OP742-03	Special AGC Range Option	OP742-13	IF Down Conversion (Spec. Freq.)
OP742-04	Special DBW Option	OP742-15	329/321 Remote Control
		OP742-89	Chassis Slides

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