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Battery (Recharge Time) 16 Hours (Typ.)

AC Adapter Model AC104-12 16VDC, 5 Amps (Nominal Specifications)

Connector 4-pin, 16-pin power plug, with center conductor positive.

Physical Size 7" high x 9" wide x 1.4" thick

Weight 12 oz.

Connector Type Female BNC

Electrical

Frequency Range: 10MHz - 1000MHz continuous
Input Impedance: 50 Ohm
Filter Bandwidth: 4MHz at -3dB, constant with frequency.
Ultimate Rejection: 60 dB
Gain : +30 dB typ.
Ripple in Passband: 0.7 dB max.
Coupling: AC
Maximum Input : 1.26V (+15 dBm, 32 mW)

Power

Power Consumption: 2 watts
Input Voltage: 16 VDC
Battery: ~~10~~ Nine 2/3 AA cells in series. 12V 250mA/Hr total capacity.
Battery Discharge Time: 1.5 Hours typ.
AC Adaptor: Model AC104, 12-16VDC .5 Amps (Nominal Specification)
Connector: 2.1mm coax power plug with center conductor positive.

Physical

Size: 7" high x 3.9" wide x 1.4" thick
Weight: 12 oz
Connector Type: Female BNC

Installation of the APS104

Frequency Counter Compatibility

The APS104 will work with any frequency counter with a 10-1000 MHz frequency range. The input sensitivity of the counter will greatly effect the distance at which the transmitted signal can be counted. The Optoelectronics 2600H and 3000 Handi-Counters are ideally suited for use with the APS104. The signal strength bargraph feature is very useful when detecting signals. The BLB30 Backlight Beeper option is useful because it frees the operator from continuously monitoring the counter's display when waiting to detect a signal. The 2600HA and 2810 models do not have the signal strength bargraph and can not be fitted with the beeper option so they are somewhat less than ideal for use with the APS104. The model 2210A can be used but its sensitivity is not as good and its measurement time is not as fast.

Antenna Selection

If only a single type of antenna is available, it should be of the telescoping whip UHF/VHF type. For maximum pick up distances, the antenna used should be tuned for the frequency band of interest. For example, with cellular frequencies, a cellular type of antenna with male BNC connector is essential for best results. The model RD800 rubber duck or model GP800 ground plane antenna will give good results. The GP800 is more expensive but will give the maximum possible performance (pick up distance).

Attaching the APS104 to the Counter

The APS104 is designed to mount directly to the back of the 2600H style Handi-Counter. Velcro fasteners are provided for this purpose. Portable operation is then possible with the counter and APS104 connected in this fashion. A 6" long Male BNC to Male BNC cable is provided for connecting the output of the APS104 to the input of the counter.

Power

The APS104 can operate from the internal 12V NiCad battery pack. A 12-16VDC plug transformer is provided for 110VAC operation. (Note: this is a nominal specification for the plug transformer. The actual unit supplied will exactly match the characteristics of the APS104.) 13.8 VDC automotive power (nominal 12V) can be used but the NiCad batteries may not fully charge. To counter the short cycle memory effect that is characteristic of NiCad batteries, occasional deep cycling is recommended. Deep cycling is accomplished by discharging the batteries completely and fully recharging.

Operation of the APS104

Handi-Counters are unique in their ability to find RF transmission frequencies. Immediate response to frequencies that are 10 to 15 dB greater than the background RF level is possible. This is simply done by moving the Handi-Counter into the near field of the radio transmitter. The near field is the area close to the antenna where the field strength is high but falling off rapidly as distance increases. This is compared to the far field where the field strength is low but remains fairly constant over great distances. Handi-Counters work well at relatively close distances and can measure a transmission frequency rapidly without having to tune through the RF spectrum.

While this discussion applies to all RF frequencies, only Handi-Counters are equipped with the maximum possible broad band amplification in order to pick up an RF signal at the maximum possible distance. Additional broad band amplification can not be added because it will actually reduce sensitivity because it will drive the counter further into self oscillation. Traditional RF frequency counters that have 10 - 15 milli volt sensitivity must use a broadband amplifier between the APS104 output and the counter's input. This amplifier should have 20 dB gain. The model AP8015B is ideal for this purpose.

Handi-Counters and other counters with additional broadband amplification will self oscillate even when no signal is present. There is no real meaning to the constantly changing display. When a real signal is being counted then the display will stabilize and there will be a strong signal indication on the signal strength bargraph. It takes some time to develop a feel for using a counter to detect signals.

The table below gives actual test data showing the distances that various transmitters can be picked up with and without using the APS104.

Typical APS104 Performance

Transmitter Type	Counter only	Counter/APS104
Cordless Phone	1 foot	120 feet
CB Radio	25 feet	500 feet
VHF two way radio	80 feet	1/4 mile
Cellular phone	20 feet	250 feet

The APS104 was designed to increase pick up distances by blocking all but 4 MHz of RF spectrum. This also permits additional broad band gain to be added.

If two transmitters are operating at the same time within the pass band and they appear to have the same signal strength, then the bargraph will display a strong signal indication but the counter display will not stabilize. To compensate you must move physically closer to the transmitter of interest until the counter sees its signal as 10 to 15 dB greater in strength.

Multipath cancellation. The distance at which the signal can be detected may be much greater than the distance at which it can be counted. At 850 MHz the wave length is about 35 cm and multipath cancellations can repeat at very close intervals. As you decrease the distance then the problem goes away. If you are in a vehicle then best results can be obtained when you come to a complete stop and the transmitter also stops motion. Always operate the counter on the fastest measurement interval possible. Use the display hold switch as necessary. It is helpful to know the available frequencies in the area to assist in determining when you have an accurate reading.

MODEL APS104 ACTIVE PRESELECTOR

Bill Of Materials

July 15, 1991 13:37:00

rev 4

Item Quantity Reference

Part

1	1	A1	FILTER ASSEMBLY, 1300MHz
2	1	A2	VCO, V600S002 X
3	1	BT1	BATTERY, 4 CELL 2/3AA NiCad
	1	BT2	BATTERY, 5 CELL 2/3AA NiCad
4	4	CR1,CR2,CR3,CR4	1N4148 Leadless
5	1	CR5	1N4752A Leadless
6	1	CR6	1N4004 Leadless
7	1	CR7	T1 LED
8	4	C1,C3,C16,C20	3.3pF 0805 CHIP
9	2	C2,C18	6.8pF 0805 CHIP
10	9	C4,C5,C7,C8,C10,C11,C13,C14,C21	47pF 0805 CHIP
11	1	C31	4.7uF TANT. CHIP
12	6	C9,C23,C24,C25,C26,C27	.1uF 1206 CHIP
13	4	C12,C21,C22,C32	33UF TANT. CHIP
14	5	C28,C29,C30,C31	1000 pF 0805 CHIP
	1	C6	1000 pF 1206 CHIP
15	1	C17	1.5 pF 0805 CHIP
16	1	C19	1 pF 0805 CHIP
17	2	J1,J2	BNC, UG1094U
18	1	J3	POWER JACK
19	6	L3,L4,L5,L6,L9,L10	100UH
20	2	M1,M2	SRA3500
21	1	Q1	2N2222, SOT
22	4	R1,R5,R6,R10	390 0805 CHIP
23	2	R2,R4	180 0805 CHIP
24	1	R3	30 0805 CHIP
25	2	R11,R14	100 0805 CHIP
26	4	R8,R9,R15,R22	100K 1206 CHIP
27	2	R16,R17	120K 0805 CHIP
28	1	R18	30K 0805 CHIP
29	1	R19	750K 630K 0805 CHIP
30	2	R7, R20	47 1206 CHIP
31	2	R21,R23	1.8K 1206 CHIP
32	1	SW1	SPDT MINI TOGGLE
33	4	U1,U2,U3,U4	MAR7
34	1	U5	LM7555
35	1	U6	LM10N
36	1	VR1	10K KNOBPOT (5K, 50K, 100K may be supplied)
37	1		CABINET ASSEMBLY
38	1		12-16 VDC PLUG TRANSFORMER
39	1		Wire harness with connector
40	1		Socket Pins, .025" sq, strip of 5
41	1		Set of brass shields.