Phil's SW Radio Buying Guide
VERSION 2 ©2006

Portable Review

The information below is not guaranteed to be free of errors.

1. Introduction

This guide *only* includes well performing portables. Among the poor performers were numerous single-conversion units lacking SSB and drifty analog units with digital frequency counter displays (no memories). Note: the S350DL is decent on MW (large ferrite rod). Portables are organized by **Size** in cubic inches. The "**Mem**" columns below reflect only SW memories.

2. Double Conversion

Double conversion helps reduce images. Portables without audio phasing (ss-SAM) need two bandwidths: to reduce adjacent interference simply engage the narrow filter and detune by one or two kHz. Without SAM, good SSB is necessary to reduce heavy selective fading distortion.

Radio	Rating	Cost	Size	Mem	SSB	BW	Knob	AC-Bat
KA1101	GOOD	$66	23	20	NO	2	NO	YES-NiMH
DE1102	GOOD	$64	24	133	YES	2	NO	YES-NiMH
E5	GOOD	$150	31	700	YES	2	YES	YES-NO
DE1103	GOOD	$64	32	268	YES	2	YES	YES-NiMH
YB-80	GOOD	$160	52	18	POOR	1	YES	YES-NO
YB-400PE	GOOD	$130	60	40	POOR	2	NO	YES-NO
G4000A	GOOD	$150	60	40	POOR	2	NO	YES-NO
ATS-909	GOOD	$240	69	307	40 Hz	2	YES	YES-NO

Positive attributes are green; negative are yellow; and deal-breakers are red.

The KA1101 has few memories and no SSB. The E5, YB-80, and G4000A cost more than the SW7600GR which has SAM. The YB-400PE has good audio but poor SSB and needs six "AA" type batteries. The costly ATS-909 has good SSB but poor whip sensitivity and easily breakable parts (stand and battery cover). Some E5 units are not as sensitive as the DE1103. Missing from the chart are the mediocre performing SW35, ATS-505P, ATS-606AP, and ATS-818ACS.

The DE1102 and DE1103 are classics: earphones, AC adapter, rechargeable batteries, external antenna, and cloth pouch are included. The DE1102 is an ultra-portable with good SSB and "*automatic tune scanning*" (ATS). The DE1103 combines good whip sensitivity with good immunity to external antenna overload. The downside: the DE1102 has SSB only in the "Page 9" memories. The DE1103 has no 5-kHz tuning knob step and the tuning knob doubles as the volume control. I recommend purchase of the *Degen* radios through *tquchina* or *Liypn* on eBay.

Distinction	Portable	Cost
GOOD VALUE SWL	Degen DE1102	$64
GOOD VALUE DX	Degen DE1103	$64

3. Double Conversion with SAM

SAM (Synchronous-AM) detection enhances audio by inserting a carrier that maintains phase with the incoming carrier. SAM reduces the distortion caused by selective fading.

Radio	Rating	Cost	Size	Mem	SSB	BW	Knob	AC-Bat
SW7600GR	GOOD	$146	45	100	YES	1	NO	NO-NO
E1	GREAT	$500	244	1700	10 Hz	3+*	YES	YES-NO
Sat800	GREAT	$500	1641	70	50 Hz	3	YES	YES-NO

The E1 phasing-PBT allows the analog simulation of multiple filters.

The discontinued Sat800 is a great performer but too large and heavy (15 lbs.) for easy portability. The radio uses six "D" type batteries. Reconditioned units are available for $420.

The SW7600GR is a classic: inexpensive SAM in a small package and great SSB due to its audio phasing. The downside: audio is *tinny* and batteries and AC adapter are not included. Note: a generic charge unit with batteries will cost about $18 while AC adapters run about $20.

The E1 is the highest performance portable available with: audio phasing, PBT, and 10 Hz tuning steps. The E1 has a Drake engineered SAM, informative display, and great band scanning capabilities. The downside: no MW ferrite rod, *no carry handle*, and no 5-kHz knob tuning step.

Distinction	Portable	Cost
INEXPENSIVE SAM	Sony SW7600GR	$146
TOP PERFORMANCE	Eton E1	$500

4. Discussion

Of the numerous portables I recommend four: the DE1102, DE1103, SW7600GR, and E1. These will suit most listeners. The DE1102 is good for casual SWL and the DE1103 is good for casual DX. Both come with rechargeable batteries for convenient portable usage. The SW7600GR features good sensitivity, excellent SSB, and SAM mode for pleasant broadcast listening. The E1 portable has near tabletop level performance. WARNING: E1 units serial numbered 3067 to 5462 were recalled for safety; there is a possibility of battery rupture (chemical burn and fire hazard).

Honorable mention goes to the DE108. This $44 *single-conversion* PLL-synthesized radio suffers from images, adjacent interference, no keypad, and poor FM but is shirt-pocket portable at 4.6 ounces and 6.7 cubic inches. The DE108 has 10 SW memories, scan tuning, a MW ferrite rod, 1.44 inch speaker, and runs ~81 hours on two "AA" type batteries. In-the-clear powerhouses (S5) from 49M to 19M can be heard. Available through Tao Qu (*tquchina* on eBay) the DE108 includes: earphones, manual, wrist strap, carry pouch, AC adapter, and 220V to 110V converter.

Distinction	Portable	Cost
GOOD VALUE SWL	Degen DE1102	$64
GOOD VALUE DX	Degen DE1103	$64
INEXPENSIVE SAM	Sony SW7600GR	$146
TOP PERFORMANCE	Eton E1	$500

Tabletop Review

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1. Introduction

Feature	RX340	NRD545	7030+	RX350	FRG100	R30C	R75	E1
Cost	$4250	$1800	$1500	$1200	$600	$590	$570	$500
Size*	1247	944	348	788	301	163	320	244

Size in cubic inches. Negative attributes are yellow and deal-breakers are red.

Recently Drake discontinued their venerable R8B and Eton released their E1. The E1, a high performance portable, replaces the quality control (QC) problem laden and discontinued Sat800 in the charts below. Tabletops are organized by **Cost**. Each radio has a niche.

2. SWL SHORTWAVE LISTENING

SWL involves reception of relatively high powered broadcast signals. SAM mode enhances reception by inserting a carrier that maintains phase with the incoming carrier. SAM reduces the distortion caused by selective fading. All the radios below can be used for SWL.

Feature	RX340	NRD545	7030+	RX350	FRG100	R30C	R75	E1
SAM	FAIR	FAIR	GOOD	POOR	NONE	NONE	GOOD	GOOD
Audio	FAIR	POOR	GOOD	FAIR	GOOD	GOOD	GOOD	GOOD
Speaker	POOR	POOR	GOOD	POOR	POOR	POOR	POOR	GOOD
Memory	100	1000	400	1024	50	100	99	1700
Display	FAIR	GOOD	FAIR	GOOD	FAIR	FAIR	GOOD	GOOD

The R75 requires modification: the stock SAM and audio are POOR.

The E1 stands out for SWL due to its Drake designed SAM, pleasant audio, big speaker, numerous memories, and informative display. The easy-to-use E1 has separate tone controls, a whip antenna, FM band reception, and can be readily powered using four "D" type batteries.

The $1500 7030+ is excellent for SWL but with prior QC issues. At one third the price the E1 has a superior display, front-mounted speaker, better ergonomics, and more memories. The 7030+ SAM produces low level *heterodynes* due to harmonic mixing at the "SYNC CAR MIXER".

The R30C can be battery operated but batteries are hard to replace and last only ~8.1 hours. The E1 can run for ~71.4 hours on alkaline batteries. The R30C has some QC issues.

The R75 has an overly fast SAM AGC, limited fidelity, and a broken SAM. *Kiwa Electronics* can fix these problems for $80 via two modifications: 1) Synchronous Detector Upgrade, and 2) High-Fidelity Audio Filter Upgrade. The R75 SAM is sideband selectable via the 9-MHz IF 2.4-kHz filter and its associated "outer" PBT control. The E1 needs no modification for great SWL.

Usage	Tabletop	Cost
SWL	Eton E1	$500

3. DX DISTANCE RECEPTION

DX involves reception of low powered signals such as hams, utilities, or broadcasts. SSB mode (ECSS: tuning DSB signals as SSB) is used due to higher sensitivity and lack of need for lock. DX receivers ideally have fine tuning steps, high stability, good filters, and multiple tools. DX varies constantly: reception depends on factors such as the antenna, time, location, gray line, skip, sunspots, solar cycles, skill, luck, etc. All the radios below can be used for DX.

Feature	RX340	NRD545	7030+	RX350	FRG100	R30C	R75	E1
Steps Hz	1	1	2.7	1	10	20	1	10
±ppm/hr	1	2	1	1	10	5	1	10
Filters	57	998	4*	34	3*	2	4+**	3+*
Sensitivity µV	0.25	0.32	0.19	0.35	0.25	0.50	0.16	0.25
DR	POOR	GOOD	GOOD	POOR	GOOD	GOOD	GOOD	FAIR
DSP NR	YES	YES	NO	YES	NO	NO	YES	NO
Noise Blanker	YES	YES	$340	FAIR	YES	NO	YES	NO
Notch	YES	AUTO		AUTO	NO	NO	AUTO	NO
RF Gain	YES	YES	YES	FAIR	NO	NO	YES	NO
Attenuator	YES	YES	YES	YES	YES	YES	YES	NO
Knob	GOOD	GOOD	GOOD	GOOD	LIGHT	LIGHT	GOOD	LIGHT
Keypad	YES	YES	REMOTE	$140	NO	NO	YES	YES
RS232	YES	YES	YES	YES	$90	NO	YES	NO

The R75 twin-PBT and E1 phasing-PBT allow the analog simulation of multiple filters.
Accepts an additional 455-kHz IF filter: ex. Collins mechanical with 100 dB ultimate rejection.

The R75 stands out for DX due to its 1 Hz tuning steps, ±1 ppm stability, dual-PBT, high sensitivity, numerous DX tools, and build quality. *WRTH* named the R75 "Best Value Tabletop" back when it cost $1040; and *Passport* calls the R75 "*first-rate for unearthing tough utility and ham signals*". The R75 comes with DSP noise reduction: aftermarket units can cost $240.

The $1800 NRD545 is plagued with poor audio: hiss, unnatural sound, and DSP noise.

The $4250 RX340 has poorer blocking, ultimate rejection, and dynamic range than the R75. *Jan Alvestad* found his modified R75 to have superior sensitivity and better audio quality than the RX340. The RX340 has poor close-in dynamic range: 46 dB at 5-kHz spacing.

The $1500 7030+ has no bandpass filters, no DDS shielding, some SSB *hiss*, and prior QC issues. The noise blanker and notch cost an additional $340. *Jan Alvestad* found his modified R75 to have superior sensitivity and a better frontend than the 7030.

Guy Atkins compared his modified R75 with his custom professional Racal RA6790GM. He found the R75 "*more flexible in tough DX situations than the RA6790GM*". He noted that the R75 was easier to operate, better on severely overlapping frequencies, and able to peak crucial voice frequencies via the twin-PBT for best intelligibility. He stated that: "*the stock filtering and twin-PBT are a powerful combination*". The RA6790GM receiver sold new for $6000 in the 1980's.

Usage	Tabletop	Cost
DX	ICOM R75	$570

4. Discussion

I previously recommended the now discontinued $1470 R8B: labeling it both the Best Performer for SWL and the Easiest for DX. The RX350D was recently discontinued as well. The R30C remains a good choice for portable DX using large antennas; its audio is very good.

DSP-IF receivers offer many digital bandwidths. Unfortunately, the RX340 and RX350 have inadequate 16-bit ADC lines which result in poor dynamic range. SAM modes on these radios and the NRD545 are mediocre and the NRD545 has poor audio. The 24-bit ADC $1500 ICOM 746Pro has 102 filters, great dynamic range, high sensitivity, and a SAM mode that *Dallas Lankford* calls "*outstanding*" because it never loses lock. This said, I doubt many will buy the 746Pro for SW even though it contains a *better* DSP-IF receive section than the RX340, NRD545, and RX350. I also doubt many will spend $675 *extra* (unit, modifications, and installation) to mate the R75 to *Robert Sherwood*'s excellent SE-3 MK III D High-Fidelity Phase-Locked AM Product Detector.

I recommend the E1 for SWL and the R75 for DX. The Eton E1 (audio phasing mated with PBT) and ICOM R75 (twin-PBT) each employ analog means to achieve multiple filter bandwidths. For both SWL and DX I recommend the modified R75 or buying both the E1 and R75. Tabletops costing $1200 to $4250 would be hard pressed to beat the $1070 E1-R75 combination. A similarly equipped 7030+ (notch, noise blanker, DSP noise reduction) would cost nearly double: ~$2080. The R75 audio can be run through the E1 auxiliary input to make use of the E1 speaker, volume, and tone controls. For the price-conscious the Kiwa modified R75 is a potent all-purpose setup. The modified R75 is superior to the E1 in build quality (tuning knob, buttons, and overall), display contrast, DSP noise reduction, IP3 values, and DX tools. Those who do mostly SWL and run indoor antennas will likely be happy with the E1. For SWL what is worth listening to hour after hour can be adequately heard using an E1 or modified R75. For DX it is hard to beat the stock R75.

What nearly universally goes *unstated* is that selective fading distortion can be minimized while using envelope detection ("AM" mode): simply select slow AGC, engage the narrow filter, and detune (or apply PBT) so that only one sideband remains. The audio will brighten maximally at approximately half the IF filter's value. During heavy fading it is better to engage SSB for so-called "ECSS" reception. SAM units become more superfluous once these two tips are followed.

The radios I did not recommend (RX340 and RX350 for dynamic range; NRD545 for audio; 7030+ for SAM/SSB noise; FRG100 and R30C for no SAM and few DX tools) are all great radios. However, most would be well served with an E1, R75, modified R75, or E1-R75 combination.

Usage	Tabletop	Cost
SWL	Eton E1	$500
DX	ICOM R75	$570
SWL + DX	Modified ICOM R75	$650
SWL + DX	Eton E1 and ICOM R75	$1070

Contact

Please direct all comments to just_rtfm@<NOSPAM>yahoo.com. dr phil :)

For additional information see the 2005 Tabletop and 2005 Portable guides.

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