Non-Directional Beacons Heard Via SDR in Washington and Oregon

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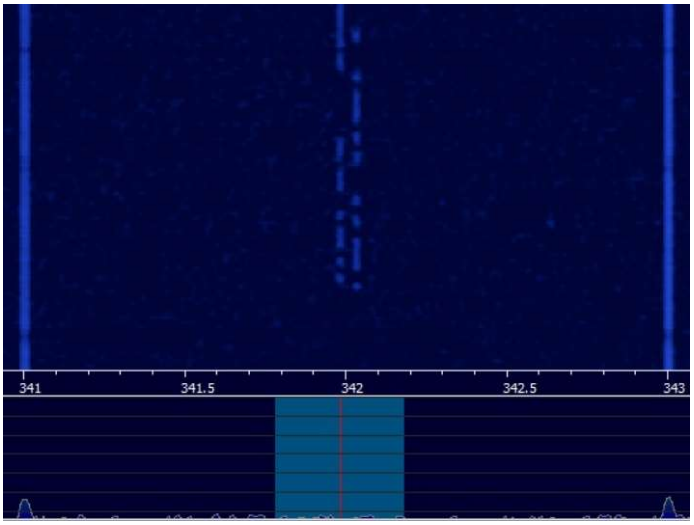
Introduction

Receiving Trans-Pacific LF/MF non-directional radio beacons in the United States is a very challenging but rewarding pastime. At my home location in Michigan I have logged exactly two NDBs in the Pacific region. One is in this log (LLD on 353 kHz in Hawaii) and the second (IPA on 280 kHz on Easter Island) is no longer on the air. This is to say that the midwestern USA is not an ideal location for this "radio sport." The West Coast is much better, especially the Pacific Northwest. That area has long been a favorite of Trans-Pacific mediumwave broadcast DXers, and when Bill Whitacre offered to let me troll through Perseus SDR recordings he made at three sites there, I jumped at the opportunity.

(A typical Australian NDB: MER 395 kHz, Merimbula NSW – Bob Coomler W7SWL)

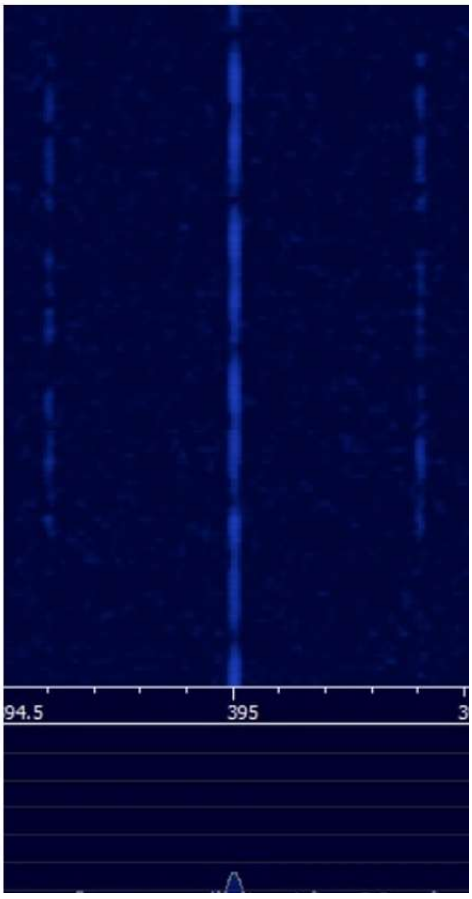
Radio hobbyists have probably DX'ed NDBs ever since they debuted in their present form shortly after World War Two. The sub-hobby didn't really take off, however, until Sheldon Remington KH6SR began publishing the short-lived but legendary *NDB DX Newsletter* in the mid-1980's. Around 2000, Alan Gale G4TMV in the United Kingdom launched the NDB List e-mail reflector, which is still going strong with about a thousand members worldwide. That led to the creation of the online RWW Database – the best and near-real time source of information about NDBs being heard in North America, Europe, and elsewhere. I relied on it as I listened

through Bill's Perseus files to find where each beacon is located, its power, and other relevant information.



(Left: The LSB signal trace of ML 343 kHz on the Japanese island Minami Torishima using HDSDR software. Just to the right is the USB ID of ELF 341 kHz at Cold Bay, Alaska.)

Chasing NDBs seriously is a very different kind of DXing. Mediumwave and shortwave listeners may envy those who seek distant beacons – stations that do nothing but identify themselves continuously. There are challenges, though. Most NDBs use very modest transmitters, often radiating 25 watts or less, using non-resonant antenna systems. It's amazing that they "get out" much at all, let alone for thousands of miles beyond their intended service range (generally less than 50 miles). The vast majority of NDBs worldwide are "AM" stations in the sense that their Morse identifications are generated by modulating the carrier with an audio tone. These are usually in the general area of 1020 Hz and 400 Hz. That means you find the CW ID apart from the carrier in relation to the audio frequency used. For example, a NDB with a carrier frequency of 370 kHz and a tone of 1020 kHz will produce "idents" at 368.98 kHz and 371.02 kHz. A 400 Hz beacon on the same frequency will have IDs at 369.6 kHz and 370.4 kHz. There are also some true A1A beacons that key the carrier as regular CW. Some of the NDBs from French Polynesia heard in Bill's Perseus files use this system, as due some in New Caledonia.



(Right: HDSDR trace of PMQ 395 kHz at Port MacQuarie, New South Wales, in Australia. Both idents of this 400 Hz NDB are visible on either side of the carrier.)

Hearing IDs from very weak beacons requires the use of very narrow CW filters with bandwidths on the order of 10 to 20 Hz. If that seems extreme, consider that a busy "cluster" frequency will often have three or more NDBs of varying strengths beeping away within a few Hertz of each other. The narrow filter goes a long way toward sorting out the mess. It also reduces noise. The NDBs using 1020 Hz modulation are especially challenging because their IDs often land only a few Hertz above or below the strong carriers of other beacons. Again, narrower filters help attenuate the unwanted signal.

Non-directional beacons also have different identification formats. Most simply send their one-, two-, or three-character identifier with a few seconds of silence between each ID. Identification cycle times vary widely but ten seconds is fairly typical. Some NDBs have long

"dashes" between IDs, known to NDB DXers as a "DAID," or "dash after ID." Examples include the A1A beacons in French Polynesia mentioned above as well as NDBs on the Japanese islands of Iwo Jima and Minami Torishima. The latter have a "DA2ID" format, meaning that the ID is sent twice between long dashes. Both these and the Polynesians have rather long DAIDs of 18 to 20 seconds that can be mistaken for open carriers unless you stay on frequency.

Trans-oceanic NDB signals often have lengthy fade cycles, on the order of 15 or 20 minutes. That requires patience. You may have to sit on their frequency and listen (or watch) until they fade up to audibility. With SDRs like the Perseus, you can often read the CW ID on the screen if the beacon is strong enough.

Following are the Trans-Pacific and Alaskan NDBs heard in the Perseus files recorded by Bill Whitacre at three locations in Oregon and Washington State during 2017. It's worth noting that many Alaskan NDBs still have AM voice modulation in addition to their CW IDs and this can often be heard well using SSB or AM mode on your receiver. These "TWEB" systems were also common in parts of the continental U.S. in the past but have now gone away pretty much everywhere but Alaska. The TWEB transmissions give continuous flight weather information in the same way as ATIS systems on VHF aviation channels.

The following logs were made using recordings made by Bill Whitacre with a Perseus SDR coupled to a D-KAZ array optimized for mediumwave broadcast DX.

Key to "radio country" codes used: ALS=Alaska; AUS=Australia; CKS=Cook Islands; FJI=Fiji; FSM=Federated States of Micronesia; HWA=Hawaii; LHI=Lord Howe Island; MDW=Midway Island; MHL=Marshall Islands; MTS=Minami Torishima; NFK=Norfolk Island; NRU=Nauru; NZL=New Zealand; OCE=French Polynesia (Society Islands); RSE=Eastern Russia; SMA=American Samoa; TUA=French Polynesia (Tuamoto Archipelago); VOI=Iwo Jima.

Casa Sea Esta (Grayland, Washington):

YYYYMMDD	UTC	kHz	ID	LSB	USB	WATTS	CTY	Location
20170811	1106	209	CYT	1035	1035	1000	ALS	Yakataga
20170808	**1259**	**218**	**CMU**	**---**	**400**	**100**	**AUS**	**Cunnamulla, Queensland**
20170811	1059	233	ALJ	405	---	1000	ALS	Johnstone Point
20170808	**1257**	**238**	**KT**	**1020**	**1020**	**1100**	**NZL**	**Kaitaia**
20170808	**1259**	**260**	**NF**	**400**	**400**	**500**	**NFK**	**Norfolk Island**
20170811	1100	266	ICK	1040	1040	---	ALS	Annette Island
20170808	**1259**	**272**	**LHI**	**---**	**400**	**120**	**LHI**	**Lord Howe Isl and**
20170811	1106	275	CZF	1025	---	---	ALS	Cape Romanzof
20170811	1106	277	ACE	1030	---	---	ALS	Homer
20170808	**1300**	**278**	**CG**	**400**	**400**	**---**	**AUS**	**Coolangatta, Queensland**
20170811	1105	281	CRN	1030	1040	---	ALS	Sparrevohn
20170811	1106	283	DUT	1035	1035	1000	ALS	Dutch Harbor
20170808	**1256**	**302**	**BUD**	**400**	**400**	**---**	**AUS**	**Bundaberg, Queensland**
20170808	**1301**	**302**	**WYY**	**---**	**400**	**---**	**AUS**	**Wynyard, Tasmania**
20170808	**1257**	**305**	**GTH**	**---**	**400**	**500**	**AUS**	**Griffith, New South Wales**
20170808	**1257**	**311**	**NTN**	**---**	**400**	**---**	**AUS**	**Normanton, Queensland**
20170808	**1300**	**316**	**MAJ**	**---**	**1020**	**---**	**MHL**	**Majuro Atoll**
20170811	**1100**	**320**	**AI**	**---**	**1025**	**---**	**CKS**	**Aitutaki**
20170808	**1257**	**327**	**VYI**	**1030**	**1030**	**---**	**HWA**	**Kahului**
20170808	**1258**	**322**	**CI**	**1040**	**---**	**---**	**NZL**	**Chatham Islands**
20170811	**1059**	**332**	**POA**	**1010**	**1030**	**---**	**HWA**	**Pahoa**
20170808	**1304**	**338**	**MA**	**---**	**400**	**---**	**AUS**	**Mount Isa, Queensland**
20170811	1100	341	ELF	1030	1040	1000	ALS	Cold Bay

20170808	**1259**	**346**	**TG**	**---**	**1020**	**---**	**NZL**	**Tauranga**
20170811	1059	350	VTR	---	1020	---	ALS	McGrath
20170811	**1103**	**352**	**RG**	**1020**	**---**	**---**	**CKS**	**Rarotonga**
20170811	**1101**	**353**	**LLD**	**400**	**400**	**---**	**HWA**	**Lenai**
20170811	1103	355	AUB	1030	---	---	ALS	King Salmon
20170809	**1259**	**355**	**NI**	**1025**	**---**	**---**	**NRU**	**Nauru**
20170808	**1303**	**356**	**HID**	**400**	**400**	**---**	**AUS**	**Horn Island, Queensland**
20170808	**1257**	**364**	**MI**	**1020**	**---**	**---**	**FJI**	**Momi**
20170811	**1100**	**366**	**PNI**	**1020**	**1020**	**---**	**FSM**	**Pohnpei**
20170808	**1304**	**372**	**RU**	**400**	**400**	**50**	**OCE**	**Raiatea, French Polynesia**
20170808	**1303**	**373**	**HHI**	**---**	**1060**	**100**	**HWA**	**Wahiawa**
20170808	**1259**	**374**	**BML**	**400**	**400**	**---**	**AUS**	**Bromelton, Queensland**
20170811	**1001**	**376**	**NP**	**0**	**0**	**200**	**TUA**	**Napuka, French Polynesia**
20170808	**1303**	**377.5**	**MO**	**400**	**---**	**100**	**OCE**	**Moorea, French Polynesia**
20170811	1059	379	IWW	---	1050	1000	ALS	Kenai
20170808	**1259**	**380**	**SU**	**400**	**400**	**---**	**AUS**	**Sunshine Coast, Queensland**
20170811	1106	382	JNR	1025	1040	---	ALS	Unalakleet
20170811	**1102**	**383**	**MK**	**0**	**0**	**---**	**TUA**	**Makemo, French Polynesia**
20170808	**1304**	**384**	**BB**	**---**	**400**	**50**	**OCE**	**Bora Bora, French Polynesia**
20170811	1101	385	OCC	1025	1035	---	ALS	Yakutat
20170808	**1259**	**385**	**AL**	**1020**	**---**	**---**	**FJI**	**Malolo**
20170811	1105	385	EHM	---	1030	100	ALS	Cape Newenham
20170808	**1300**	**389**	**GFN**	**400**	**400**	**---**	**AUS**	**Grafton, New South Wales**
20170811	1103	390	HBT	1030	---	---	ALS	Sand Point
20170811	1104	391	EEF	---	1040	---	ALS	Sisters Island
20170808	**1304**	**393**	**UKS**	**---**	**990**	**---**	**FSM**	**Kosrae Island**
20170811	1106	394	RWO	1030	1030	---	ALS	Kodiak
20170808	**1304**	**395**	**PMQ**	**400**	**400**	**---**	**AUS**	**Port MacQuarie, NSW**
20170811	**1101**	**400**	**MDY**	**400**	**---**	**---**	**MDW**	**Midway Island**
20170811	**1104**	**403**	**TUT**	**960**	**960**	**2000**	**SMA**	**Tutuila**
20170811	1101	414	IME	---	1025	---	ALS	Sitka
20170811	1103	429	BTS	1050	1030	---	ALS	Dillingham
20170811	1005	524	MNL	1060	---	---	ALS	Valdez
20170811	1103	525	ICW	1000	1020	25	ALS	Nenana
20170811	1105	529	SQM	1025	---	400	ALS	Level Island

Grayland Motel, WA:

YYYYMMDD	UTC	kHz	ID	LSB	USB	WATTS	CTY	Location
20170222	1002	223	AFE	1040	---	---	ALS	Kake
20170222	0959	229	AKW	1035	---	---	ALS	Klawock
20170222	1000	251	OSE	1030	1030	1000	ALS	Bethel
20170222	**1502**	**360**	**OX**	**---**	**1020**	**1250**	**VOI**	**Iwo Jima (DA2ID)**
20170222	**1006**	**366**	**PNI**	**1020**	**1020**	**---**	**FSM**	**Pohnpei**
20170222	**1005**	**393**	**UKS**	**---**	**990**	**---**	**FSM**	**Kosrae Island**
20170222	1005	396	CMJ	1040	1040	---	ALS	Ketchikan
20170222	1503	404	GCR	1020	---	---	ALS	Cordova
20170222	0959	411	ILI	1020	---	---	ALS	Iliamna
20170222	**1506**	**437**	**OG**	**1020**	**1020**	**---**	**RSE**	**Ohka**
20170222	**1005**	**505**	**SL**	**400**	**400**	**---**	**RSE**	**Yuzhno-Sakhalinsk**
20170222	**1500**	**907**	**UB**	**1020**	**1020**	**---**	**RSE**	**Ust Bolsheretsk**

Florence (Sans Souci), OR:

YYYYMMDD	UTC	kHz	ID	LSB	USB	WATTS	CTY	Location
20170809	1004	233	ALJ	405	---	1000	ALS	Johnstone Point
20170809	1004	251	OSE	1030	1030	1000	ALS	Bethel
20170809	0959	266	ICK	1040	1040	---	ALS	Annette Island
20170809	0959	277	ACE	1030	1030	---	ALS	Homer
20170809	**1258**	**278**	**CG**	**400**	**400**	**---**	**AUS**	**Coolangatta, Queensland**
20170809	1004	283	DUT	1035	1035	1000	ALS	Dutch Harbor
20170809	**1301**	**305**	**GTH**	**---**	**400**	**500**	**AUS**	**Griffith, New South Wales**
20170809	**1256**	**316**	**MAJ**	**---**	**1020**	**---**	**MHL**	**Majuro Atoll**
20170809	**1303**	**320**	**AI**	**---**	**1025**	**---**	**CKS**	**Aitutaki**
20170809	**1258**	**322**	**CI**	**1040**	**---**	**---**	**NZL**	**Chatham Islands**
20170809	**1300**	**327**	**VYI**	**1030**	**1030**	**---**	**HWA**	**Kahului**
20170809	**0700**	**332**	**POA**	**1020**	**1020**	**---**	**HWA**	**Pahoa**
20170809	1006	341	ELF	1030	1040	1000	ALS	Cold Bay
20170809	**1303**	**343**	**ML**	**1020**	**1020**	**1250**	**MTS**	**Minami Torishima (DA2ID)**
20170809	1001	350	VTR	1020	1020	---	ALS	McGrath
20170809	**0959**	**352**	**RG**	**1020**	**---**	**---**	**CKS**	**Rarotonga**
20170809	**0704**	**353**	**LLD**	**400**	**400**	**---**	**HWA**	**Lanai**
20171209	**0705**	**355**	**NI**	**1025**	**---**	**---**	**NRU**	**Nauru**
20170809	**1300**	**358**	**OA**	**400**	**400**	**50**	**TUA**	**Rangiroa, French Polynesia**
20170809	**1003**	**366**	**PNI**	**1020**	**1020**	**---**	**FSM**	**Pohnpei**
20170809	**1300**	**370**	**HAO**	**400**	**400**	**---**	**TUA**	**Hao Atoll, French Polynesia**
20170809	1006	382	JNR	1025	1040	---	ALS	Unalakleet
20170809	1004	385	OCC	1025	1035	---	ALS	Yakutat
20171209	0704	390	HBT	1025	1025	---	ALS	Sand Point
20170809	0702	391	EEF	1040	---	---	ALS	Sisters Island
20170809	**1259**	**393**	**UKS**	**990**	**990**	**---**	**FSM**	**Kosrae**
20170809	**1304**	**395**	**PMQ**	**400**	**400**	**---**	**AUS**	**Port MacQuarie, NSW**
20170809	**1300**	**400**	**MDY**	**400**	**---**	**---**	**MDW**	**Midway Island**
20170809	**1302**	**403**	**TUT**	**960**	**---**	**2000**	**SMA**	**Tutuila**
20170809	1003	414	IME	---	1025	---	ALS	Sitka
20170809	**1304**	**486**	**LTV**	**400**	**400**	**49**	**AUS**	**Latrobe Valley, Victoria**
20170809	1004	525	ICW	1000	1020	25	ALS	Nenana

(Left: VYI 327 kHz near Kahului, Hawaii, courtesy of Bob Coomler W7SWL.)

Resources for NDB DXing:

http://www.classaxe.com/dx/ndb/rww/signal_list

NDB List e-mail reflector:

http://www.ndblist.info/