

Introduction to FM and Repeaters

Part I – Radio Basics; Handhelds

Handheld Radio

- Able to be *easily* held in 1 hand
- Fully self-contained: transceiver, power source, speaker, microphone, antenna
- Priority #1: EASE OF USE
 - * Basic functions can be selected and changed without significant study: volume, channel
 - * Pre-programmed (memory mode) channels can be selected without need for instructions
 - * Non-programmed channels (“VFO” mode) can be easily field-programmed without the use of a computer

- Utility:
 - * Removable battery pack; spare, dry-cell
 - * Rechargeable battery recharged without need for attached radio; “drop-in” charger
 - * Largest (most mAh) battery available
 - * Capable of external power (~12V)
 - * Capable of full-size / external antenna
 - * Water-resistant
- Antenna
 - * Quarter wave (18”-20”)
 - * External (mobile, base, tactical, fixed-tactical)
 - * Connector: SMA-M, SMA-F, BNC-F, stud, other

- Controls

- * May have “knob” controls as well as buttons or only buttons depending on radio
- * Familiarity important
- * Power – Turn the power on and off. May be part of the volume control or a separate button.
- * Channel – selects memory channel or VFO frequency
- * Volume – adjusts receive volume
- * Squelch – Eliminates receiver background noise
- * Menu – Access the radio’s menu system

- Important Menu Items

- * Receive Frequency – Sets the receiver frequency. May allow out-of-band settings for receive-only operation.
- * Step – Sets the “step” between channels. May offer 2.5, 5, 7.5, 10, 12.5, 15 and 25 kHz settings.
- * Offset / Shift – Sets the transmit offset frequency and / or direction. 2M repeaters generally + or – 600 kHz. Some may be 1 MHz or oddball. 220 MHz repeaters are almost always -1.6 MHz offset. 440 (UHF) repeaters are usually alternating +5 MHz and -5 MHz. Refer to coordinated repeater list at www.arcc-inc.org and www.metrocor.us for Metro NY, NJ and PA coordinated repeaters.

- * PL/CTCSS – “Private Line”™ or “Continuous Tone-Coded Squelch System” is a “sub audible” tone in the range of 67 to 257 Hz. REQUIRED for repeater access! Usually programmed as:
 - T or ENC to transmit a tone to access a repeater,
 - R or DEC to “block out” other activity on the channel,
 - T/R or ENC/DEC for both.
- * DPL or DCS – “Digital-Private Line”™ or Digital Coded Squelch is a continuous stream of FSK digital data, at 134.4 bits per second creating 104 standard codes, used in the same way that PL/CTCSS is be used. Programming options MAY be the same or, for some radios, applied to both transmit and receive without option for one or the other.

- Repeater Etiquette

- * Kerchunk: keying without saying anything – to “try” the repeater. Considered impolite. Key, pause ½ second and announce: “(your call) listening xxx repeater”
- * Identifying: FCC requires once every 10 minutes – all that is truly necessary. Note that it isn’t “necessary” to announce the other person’s call – just so you make sure that YOU ID with YOUR call every 10 minutes.
- * Breaking in: wait for a pause in conversation and announce your call. Don’t say “Break” unless your need is urgent.
- * Courtesy tone: Simply put; Wait for the BEEP. There to allow time for a station to break in
- * Repeater ID: Does it all by itself, usually at slightly less than 10 minutes. Wait for it to finish before keying up

- Portable Antennas

- * Dipole: A half wave antenna feed in the center

- * Quarter wave: Minimum size for an efficient antenna

- * Rubber dummy loads: Loaded, less than $\frac{1}{4}$ wave antennas

Think window size. A larger ($\frac{1}{4}$ or $\frac{1}{2}$ wave) window allows more light into the room than a tiny (4") window

- * External antennas a benefit for fixed operation

Use a short (2' max) thin jumper cable to connect between the portable and the main feedline. Advise to NOT use adapters.

$\frac{3}{8}$ " (RG8X) for 50' or less, $\frac{1}{2}$ " (9913, LMR400) for runs up to 150'

The bigger the better: more gain – bigger “ears” or window

The higher the better: “all the better to see you”

The less coax loss the better (Good coax might be expensive but you only have to put it up once if you do it right.

Selected Local 2M Repeaters

NJ County / City	Tx Call	Output	Input	PL
Atlantic / Absecon	N2HQX	147.210	+	123.0
Atlantic / Brigantine	KA2OOR	146.715	-	91.5
Atlantic / Buena	KE2CK	146.805	-	118.8
Atlantic / Egg Harbor	W3BXW	146.640	-	131.8
Atlantic / Egg Harbor Twp.	K2BR	146.745	-	146.2
Atlantic / Galloway Twp.	AG2NJ	147.165	+	91.5
Atlantic / W. Atlantic City	W2HRW	146.985	-	146.2
Burlington / Chatsworth	KC2QVT	145.470	-	127.3
Burlington / Medford Twp.	K2AA	145.290	-	91.5
Burlington / Robbinsville	KX2D	147.075	+	71.9
Burlington / Westampton	KC2QVT	147.150	+	127.3
Burlington / Willingboro	WB2YGO	146.925	-	131.8
Camden / Blackwood	K2EOC	146.895	-	192.8
Camden / Camden	W3PHL	146.820	-	131.8
Camden / Cherry Hill	NJ2CH	145.370	-	91.5
Camden / Pine Hill	K2UK	146.865	-	131.8
Camden / Runnemede	WA2WUN	147.225	+	192.8
Camden / Waterford Wks	W2FLY	145.210	-	71.9
Camden / Waterford Wks	WA3BXW	147.345	+	127.3
Camden / Winslow	K2AX	145.150	-	91.5
Cumberland / Bridgeton	KC2TXB	147.255	+	179.9
Cumberland / Hopewell	KC2WJE	146.475	+	
Cumberland / Vineland	WA2WUN	145.490	-	179.9
Gloucester / Monroe Twp.	K2DX	145.390	-	91.5
Gloucester / Pitman	W2MMD	147.180	+	131.8
Hunterdon / Cherryville	WB2NQV	147.375	+	151.4
Hunterdon / Holland Twp.	WA2GWA	146.850	-	151.4
Hunterdon / Mt. Kipp	WB2NQV	147.015	+	151.4
Mercer / Allentown	K2UQ	147.105	+	123.0
Mercer / Lawrenceville	N2RE	146.460	+	131.8
Mercer / West Trenton	W2ZQ	146.670	-	131.8
Salem / Pennsville	N2KEJ	146.625	-	131.8
Sussex / Newton	W2LV	147.210	+	151.4
Sussex / Newton	W2LV	147.300	+	151.4
Sussex / Newton	W2LV	147.330	+	151.4
Sussex / Vernon	W2VER	146.925	-	151.4
Warren / Columbia	WB2NMI	146.475	+	110.9
Warren / Washington	W2SJT	146.820	-	110.9

Pa. County / City	Tx Call	Output	Input	PL
Berks / Pine Grove	AA3RG	145.1700	-	110.9
Berks / Pine Grove	AA3RG	146.6400	-	82.5
Berks / Pottstown	K3ZMC	147.2100	+	131.8
Berks / Reading	K3TI	145.4900	-	114.8
Berks / Reading	W3BN	146.9100	-	131.8
Berks / Reading	WB3FPL	147.1800	+	110.9
Bucks / Doylestown	AB3YZ	145.2500	-	114.8
Bucks / Doylestown	WA3EPA	145.3500	-	131.8
Bucks / Fairless Hills	W3BXW	147.3000	+	131.8
Bucks / Hilltown	W3HJ	145.3300	-	131.8
Bucks / Hilltown	W3HJ	147.3900	+	100
Bucks / Morrisville	WB0YLE	145.2500	-	103.5
Bucks / Perkasio	W3AI	145.3100	-	131.8
Bucks / Southampton	W3SK	146.7900	-	131.8
Bucks / Upper Bucks	N3ITN	146.8050	-	127.3
Bucks / Warminster	K3DN	147.0900	+	131.8
Bucks / Warrington	WA3ZID	147.0000	+	
Chester / Paoli	WB3JOE	145.1300	-	131.8
Chester / Parkesburg	WA3GMS	146.9850	+	94.8
Chester / Pocopson	W3EOC	146.4900	+	D*
Chester / Valley Forge	W3PHL	146.7600	-	131.8
Chester / West Chester	W3EOC	146.9400	-	131.8
Delaware / Darby	WB3JOE	147.3600	+	131.8
Delaware / Media	W3AWA	145.2300	-	131.8
Delaware / Newtown Square	WB3JOE	147.0600	+	131.8
Delaware / Newtown Square	W3DI	147.1950	+	100
Lehigh / Allentown	W3OI	146.9400	-	71.9
Lehigh / Allentown	W3OI	147.1350	+	71.9
Lehigh / Allentown	WA3VHL	147.2250	+	151.4
Montgomery / Eagleville	AA3E	146.8350	-	88.5
Montgomery / Hatfield	WA3RYQ	147.3300	+	
Montgomery / Horsham	K3JJO	147.1650	+	162.2
Montgomery / Meadowbrook	WA3UTI	146.7150	-	131.8
Montgomery / Souderton	N3ZA	145.1900	-	131.8
Montgomery / Stowe	KB3OZC	145.2500	-	100
Montgomery / Wyndmoor	K3PDR	146.6100	-	D*
Northampton / Bethlehem	K3LPR	146.7750	-	136.5
Northampton / Lehigh Valley	N3LWY	146.6550	-	136.5
Northampton / Nazareth	W3OK	145.1100	-	151.4
Northampton / Nazareth	W3OK	146.7000	-	151.4