DECIBEL EXERCISES Prepared by Gary Davis KD9SB 11-11-19

1. WHAT IS THE EFFECTIVE RADIATED POWER OF A REPEATER WITH 50W TRASMITTER POWER OUTPUT, FEEDLINE 4dB LOSS, 3dB DUPLEXER LOSS, AND 6dB ANTENNA GAIN?

ANSWER: 39.7W ASSUMING THE ANTENNA GAIN IS REFERENCED TO A ½ WAVE DIPOLE. (-1dB/10)10˟ = .7943 .7943 x 50 = 39.7W

1. AN ANTENNA RADIATES A PRIMARY SIGNAL OF 500W. IF THERE IS A SECOND HARMONIC OUTPUT OF .5W, WHAT ATTENUATION OF THE SECOND HARMONIC HAS OCCURRED?

ANSWER: -30dB .5W/500W = .001 10LOG .001 = -30dB

1. THE REPEATER WITH OLD ANTENNA MEASURES 186µv AT ONE MILE. THE NEW ANTENNA MEASURES 263µv. HOW MUCH dB GAIN DOES THE NEW ANTENNA HAVE OVER THE OLD ANTENNA?

ANSWER: 3dB 263/186 =1.414 20LOG (1.414) = 3dB POWER GAIN = 1.995

372/186 = 2 20LOG (2) = 6dB POWER GAIN = 4

740/186 = 3.98 20LOG (3.98) = 12dB POWER GAIN = 15.84

NOTE: POWER GAIN = (VOLTAGE GAIN)²

1. TRANSMISSION LINE RETURN LOSS (dB) = 20LOG (p) (p) = (SWR -1/SWR +1)

TRANSMISSION LINE LOSS (dB) = 10LOG (1 -p²)

EXAMPLE: IF SWR = 3 (p) = .5 (p)² = .25

RETURN LOSS (dB) = 20LOG (.5) = -6dB

TRANSMISSION LOSS (dB) = 10LOG (1 -.25) = -1.2493dB