A TRUE WORD SQUARE

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Shouldn't a word square be a square array of words rather than a square array of letters? In "Magic Square Magic" in the May 2002 Word Ways, Jeremiah Farrell presented a word square in the former sense. Its novelty may have escaped the casual reader since it was presented as part of a "magic" trick; here the focus is on the square itself, with a challenge for the reader.

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AT IN SO
IS TO AN
ON AS IT
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The simplest version of this square, given at the left, consists of a 3x3 array of two-letter isograms such that (1) each row and column contains the same set of letters, and (2) if the letters are divided into two sets, AIO and NST, each pair of letters, one from each set, appears exactly once in a word. This square is undoubtedly the commonest one possible, in the sense that the rarest word in it, SO, has 1984 occurrences reported in Kucera and Francis's *Computational Analysis of Present-Day American English.*

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ART DIN EGO BUS
BIG SEA RUN DOT
SON TUG BAD IRE
DUE ROB SIT NAG
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The next square in this hierarchy is a 4x4 array of three-letter isograms an example of which is given at the left. Here, the twelve different letters are divided into three sets, AIOU, BENT and DGRS, and each pair of letters, one each drawn from two different sets, is found in exactly one word. There may possibly be commoner squares than this one; the rarest word, NAG, is the only one not listed in Kucera and Francis.

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BINT GREF LAKY dhpu MOCS
GLUM bhoy FIDS NECK PART
ESPY DAMN CURB FOLT ghik
DORK CLIP THEM BAGS fnuy
CHAF TUSK PONG MIRY BLED
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The third version forms the challenge; can one complete a 5x5 square of four-letter words possessing the same properties? Since 20 different letters of the alphabet must be used, it is a formidable task to find words satisfying both conditions. As a sample, I present the square at the left based on the letter sets AEIOU, BFKMP, HLNRS and CDGTY. Four letter-combinations (in lower case) could not be located; the other 21 are in Webster's Second or Third Unabridged dictionaries, with the exception of DORK and GREF, found in the Oxford English Dictionary.