COMPLETE TETRAGRAM PERMUTATIONS

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A **tetragram** is a set of four consecutive letters embedded in a word, as ETRA in 'tetragram' or AINT in 'paint'. Is it possible to take four different letters of the alphabet, rearrange these in all possible ways to form 24 different tetragrams, and embed each of these in a boldface word taken from the Merriam-Webster unabridged dictionary? The answer to this is yes; in fact, results for four such completely-permutable sets are presented below.

The solution to this problem can be carried out in two steps: (1) the identification of suitable letter-sets, and (2) the discovery of suitable Websterian words containing each tetragram. Neither task is trivial, but the first is materially aided by a published list of tetragrams found in words in the Second Edition of Webster's New International Dictionary. (This list was issued in 1963, as Appendix D in the 4th report of "Advanced Character Recognition Techniques Study" by R. B. Thomas, M. Kassler and G. Wooley, and sponsored jointly by the U.S. Army Research and Development Laboratory at Fort Monmouth and the RCA Data Systems Center at Bethesda, under Contract DA 36-039-AMC-0012(E).) The second task is largely accomplished by searching through dictionaries and reverse dictionaries for plausible words. Unable to locate a word containing IARG, I had to ask the computer for help -- **miargyrite** turned out to be the only Websterian example.

There may be additional letter-sets that can be fully permuted into tetragram-embeddable Websterian words; the list cited above omits some words from below the line, as well as words that appear only in Webster's Third. Can readers find any? It is probably fruitless to extend the study to pentagrams (involving lists of 120 words) unless one is willing to admit words from a much wider class of sources: the OED, gazetteers, and the like.

The letter-set AIRT deserves special mention; 23 of the 24 words are common enough to be found in the Merriam-Webster Pocket Dictionary (can anyone find a word containing IART in this source?).

pa**RTIA**l	m**ATRI**x	**TIRA**de
cu**RTAI**n	m**ITRA**l	s**TARI**ng
p**ARTI**cle	d**IATR**ibe	m**ARIT**al
fl**IRTA**tion	w**AITR**ess	ve**RITA**ble
AIRTight	**TIAR**a	**RATI**ng
d**IART**icular	s**TAIR**	la**RIAT**
TRIAl	mil**ITAR**y	t**RAIT**
TRAIl	s**ATIR**e	adm**IRAT**ion

spriTSAIl	plASTIc	stATIStics
ricketTSIAl	miISTAke	demITASse
pITSAw	wAIST	volTAISm
boATSIde	enthusIASTic	pancraTIASt
fIATS	SAIThe	SATIre
wAITS	intarSIATe	SITAr
STAIr	fanTASIst	parASITe
beSTIAl	TISAne	improvISATe
baRGAIn	AGRIculture	tRAGIc
oRGIAstic	mIGRAte	GARIsh
mARGIn	AIGRette	arRAIGn
vIRGAte	dIAGRam	marRIAGe
fAIRGround	GAIR	mARIGold
mIARGyrite	vestiGIARy	cIGAR
GRAIn	mAGIRics	fRIGAte
aGRIA	mIRAGe	GIRAffe

The legal tetragrams in Appendix D of "Advanced Character Rec-
ognition Techniques Study" suggested that LCIO would be a good
combination to try, and in fact I was able to locate words for
all permutations but IOLC. Although this didn't look promising,
it was on the legal tetragram list; a computer search turned up
the single example triolcous. Alas, a check of Webster's Second
indicated that this had been entered on the dictionary tape as
a keypunch error for trioicous!

ESSAYS ON CRYPTOLOGY

*Kahn on Codes, published for $19.95 by MacMillan in 1984,
is a collection of essays on cryptological subjects by David
Kahn which originally appeared in a variety of newspapers,
magazines and journals between 1969 and 1981. As a conse-
quence, the book lacks the unity of his 1967 classic The Code-
breakers, telling sometimes overlapping stories at different
depths. This, however, should not deter the cryptology buff,
for Kahn is a rare combination of skilled story-teller and
meticulous historian; he can be counted on to uncover fresh
facts illuminating even the most hackneyed tale of derring-
do. There's something here for a variety of tastes, from an
analysis of cryptologic definitions in Webster's Third (over-
all, a high rating), to a mini-biography of Herbert Yardley,
to a description of the cipher found on Ché Guevara at the
time of his death in 1967, to an incisive analysis of the va-
lue of intelligence to a German division on the Russian front
in late 1942.*