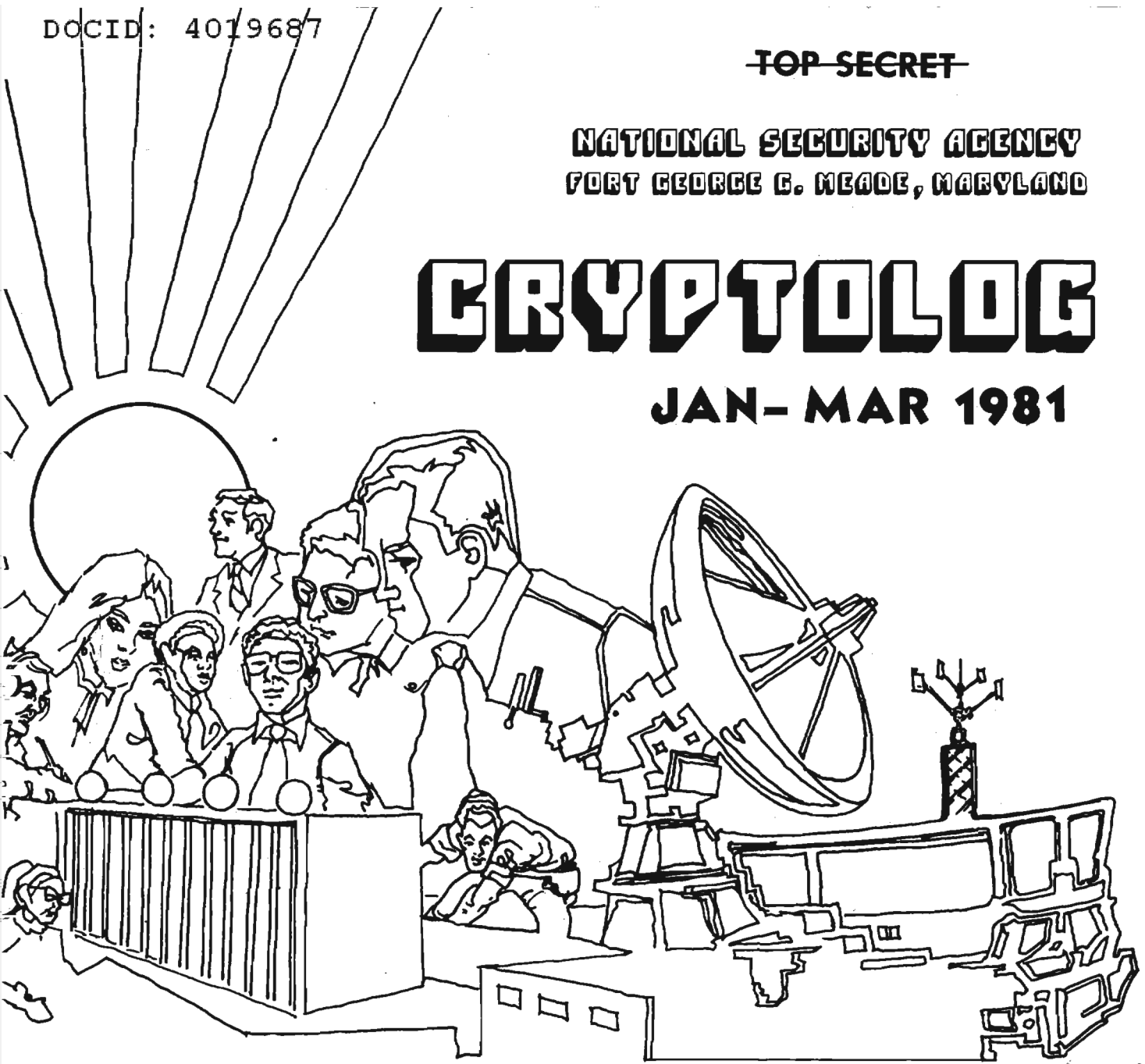


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NATIONAL SECURITY AGENCY
FORT GEORGE G. MEADE, MARYLAND

CRYPTOLOG

JAN-MAR 1981



P.L. 86-36

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SIGINT in the 80s: Two Views

At the First Annual Symposium of the Communications Analysis Association held last year, the keynote address was given by Mr. Robert E. Rich, ADDO, and the concluding remarks were presented by Mr. William Lutwiniak, then Chief, P1, Techniques and Standards. So that persons who did not attend the symposium may see the views of two eminent agency managers on the future of SIGINT in the coming decade, CRYPTOLOG is pleased to publish both of these addresses.

I. Robert E. Rich, ADDO

I appreciate the invitation from your president to talk with you this morning as you begin your first conference, although I suspect that the term "Keynote Address" is more akin to what Jimmy Carter and Ronald Reagan have been doing than to what we're up to here. After all, a keynote address is usually a long collection of rhetoric that doesn't have much to do with the real issues at hand. It's just an upbeat thing to get people in the mood to do the hard work. Forgive me if the rhetoric isn't up to the standard you've been hearing from the politicians. In any case, when [redacted] asked me to help kick off this series of meetings, it occurred to me that I wasn't really very sure what the expression "communications analysis" was intended to mean. Having done a little research—although not much analysis—I think I've discovered that it includes a fairly broad scale of the hardcore skills and activities that are most critical to our business. It embraces cryptanalysis, traffic analysis, language work, and what we usually call "special research analysis," that is, the substantive interpretation of data that normally has been put into readable English. So that covers a wide range of the specialities without which there wouldn't be any SIGINT product.

(U) For the remainder of this morning and during tomorrow's sessions, you'll be considering some of the important things that will be happening in the analytic environments of the next ten years. Mainly these will have to do with better ways of doing analytic work with new tools, or at least new applications of technology. And a lot of that will have to do with the incredible potential offered by computers, especially the use of computers in an interactive way—machine working with human analyst to solve problems or get results faster.

(U) You'll be hearing, I think exclusively, from members of our own community describing their own work and their own ideas, rather than from outside experts. I mention that because I think we're too inclined to look to the outside in too many hard areas when we ought to be stimulating our own people to come forward

with the results of their inspirations and their expectations for the future.

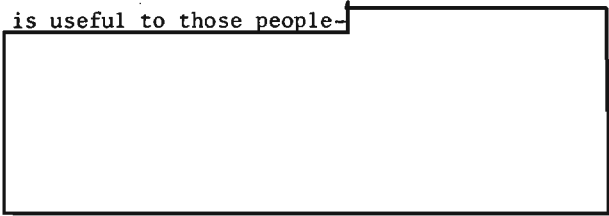
(U) To help you get started, I think the most useful thing I can do is to share some overall perceptions with you about our state of health at the moment, and to suggest some perspective about the analytic function as it relates to the other parts of the SIGINT process, and then finally to mention some trends for the future that will affect our prospects in analysis. All, of course, from my own vantage point, since there isn't much absolute truth associated with these matters, especially those which lie in the future.

~~(S)~~ First off, I will suggest to you that SIGINT now is in better shape than at any other time in our history. By that I mean that the product we're able to deliver is more useful to more customers than ever before. And that includes customers of all kinds and at all sorts of levels: the traditional ones in Washington (like the White House and State and DoD and CIA), and a wide range of military commanders in the field, and also some newer customers, such as Treasury and Energy and Commerce. Day after day, the SIGINT output

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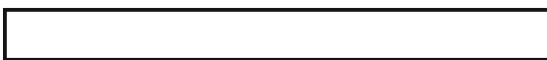
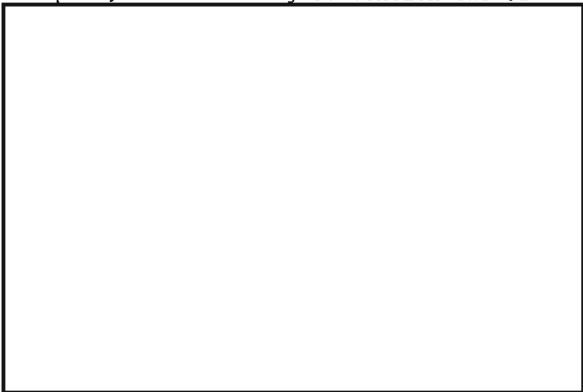
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is useful to those people-



(U) Now all that may sound like preaching to the choir. But it sometimes turns out that our people get so much engrossed in a particular speciality that they don't really appreciate the overall perspective of how well we're doing at the moment. And I hasten to add that I don't want to overstate this, because there are certainly improvements we need to make and keep making—the customers' appetite will always outstrip our ability to deliver. And the present state of affairs is also fragile; it could be dramatically changed by a number of things.

~~(TS-CCO)~~ But the point I want to make here is that the reasons for this relatively healthy state of affairs are not accidental—certainly not the result of the targets getting easier. (just the opposite is, of course, the case.) The reasons are complex, and I would just mention two of



~~(C)~~ The second thing that explains our current success is the quality of our energetic work force. The fact that we've got one that compares pretty well with other professional populations is partly luck and partly management. Luck because the nature of the business attracts people of quality; it's both demanding and rewarding from an intellectual standpoint. And when we've had to, we've been aggressive about finding and hiring good people. Some years ago we badly needed a core of first-rate mathematicians and we captured a good number who are still here. More recently we've needed numbers of linguists, and by and large, they have been found—not yet enough, but more about that later. But the point is, that, in addition to pretty good collection access, we've had the advantage of an analytic core of people who have an insatiable curiosity and drive to solve the problem and a high order of intellectual discipline. Taken together, these are the main ingredients in our present state of health.

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(U) But there's no reason for complacency about any of that. The collection picture is constantly changing and the work force is always in a state of flux (even if we have one of the lowest attrition rates in the federal government). So we need to be constantly working to maintain a favorable balance. Heavier demands are certainly going to be put on it in the future. Which brings me to the next point—namely, the trends and influences that are going to affect analytic work in the years ahead.

(U) The quality of crystal balls probably hasn't changed much over the years, and mine isn't any better than most. But I'd like to suggest several things about our target environment that seem to me likely to come about, and then describe some qualifications that those things indicate for our analytic people.

~~(C)~~ In the decade ahead I would think it almost certain that the Soviet Union will continue to occupy the predominant part of our energy. And for reasons you all understand. It's just hard to imagine an extensive enough change in the fundamental difference between the USSR and the United States during that period which might permit us to do anything very different.



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	<p>(S-CCO) So these are factors that will influence the analytic environment of the future, one way or the other. There's another class of influences, too, that will be important but hard to predict. An obvious one is the resource constraints we'll face. I think we haven't fared too badly in percentage of Federal budget allocated for SIGINT in recent years. We could do even better in the future, but maybe not—it's hard to know. Same thing with respect to technology. The improvement in computer power in the past decade has been almost incredible. If other, similar breakthroughs occur in the next decade, we could have great new opportunities for better analytic work. But again, it's hard to be sure.</p> <p>(S-CCO) One thing, however, does seem certain. And that is that, regardless of improvements in machine capability, good analysis will still depend on good analysts. And what is a good analyst? Some of the characteristics won't change—they'll be the same at the end of the coming decade as they've always been. I already mentioned a couple of these: great curiosity in approaching unsolved problems, coupled with good intellectual discipline so as to avoid sloppy inference and unwarranted conclusions. There are some others which will be more important in the future.</p> <p>*multi-discipline skills—a linguist is a lot better off with an understanding of the cryptanalytic work underlying the decrypted text; an SRA is better equipped</p>

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with some understanding of the target language. This has been true for a long time, will be even more relevant in the future as the need for flexibility grows.

- *the ability to deal comfortably with machine-assisted techniques, to use computers to produce necessary data bases.

- *direct familiarity, where possible, with target environment—by living there, or at least by travelling in the area. Of course, this isn't possible for some, but could be for others.

- *for some analysts, a more comprehensive grasp of special technology and terminology (nuclear proliferation, advanced weapons systems, and the like).

- *flexibility in changing from one target area to another. We'll need to develop more of this attribute, while still keeping enough analysts with long-term continuity on certain targets.

- *responsiveness and objectivity in understanding customer needs.

- *appreciation for the growing complexity of collection arrangements, so that analysis

will be able to drive collection with maximum efficiency.

~~(C-CCO)~~ The list can certainly be extended. You will be thinking about some other important aspects of it during the course of this conference. For the moment, I'd like to leave you with the thought I mentioned a minute ago, namely, that regardless of how well we come along with technological progress, such as increased computer power, and regardless of how we solve the collection problem, our success will still depend very heavily on the quality of our analytic work force. It's critically important that we keep on acquiring young people who are excited by cryptanalysis, people who can deal with traffic analytic problems, people who have exceptional linguistic talent—and preferably some who can do several of these things well. Only in that way can we hope to maintain anything like the healthy posture we enjoy at the moment.

(U) I hope your sessions at this conference are productive and stimulating to you all, and I appreciate your attention this morning. Thank you.

II. William Lutwiniak, Chief, P1

When Bill Nolte asked me to ring down the curtain on this conference, my first reaction was to demur; but he suggested I look at the topics and read the abstracts already in hand before I begged off. I did that, and decided I could add some perspective to (U) where we are now and what the 80s bode for communications analysis. I thought it might be useful for experts in P1 to give me their notions of what's in the offing for the various cryptanalytic disciplines. I also pondered over Bob Rich's opening address. When I put all this together I found I had some things to say that may be worth listening to.

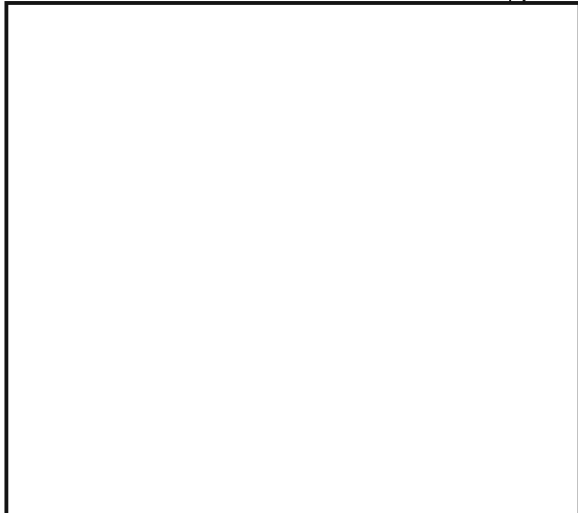
~~(TS-CCO)~~ We usually start with collection, the *sine qua non*. The technology affecting communication around the world is dynamic, driven as it is by the need for more efficient transmission. Satellite communications have been with us for some time, and we cope with them daily, more or less successfully, more and more selectively. But satellites will be going digital, and domestic satellites are in the wings—boding point-to-point traffic in bursts of hundreds of millions of bits per second. Multi-channel communications can look forward to electronic packet switching—tiny pieces of a transmission are switched electronically from channel to channel, unpredictably unless you know the algorithms. At the same time the spiralling costs of satellite communications have driven tech-

nology to look again at the HF spectrum (already saturated) with a view to overcoming multipath, jamming and other interference and of getting around the restrictions of the Maximum Utilizable Frequency. Mixed up in this is something called the WARC (World Administrative Radio Conference) in which everybody argues about who owns which parts of the radio spectrum and under what conditions. A dominant theme of WARC 79 was the need of the Third World for HF allocations, to be provided by the advanced nations, who are kind of balky at the prospect. Advances in frequency hopping, spread spectrum signals, compression coding and other techniques make the HF spectrum much more usable than

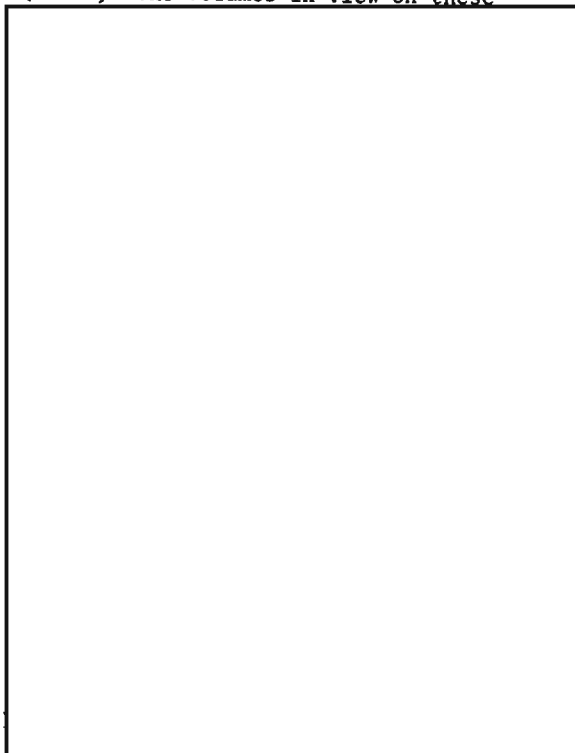
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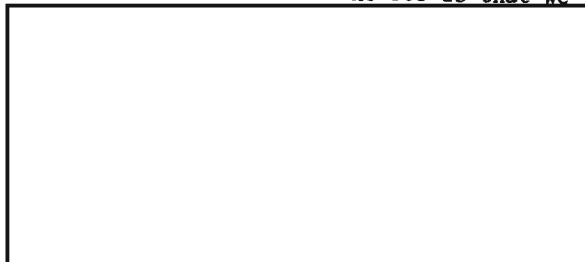
before, and considerably cheaper than satellite communications. Needless to say,



~~(S-CCO)~~ The volumes in view on these



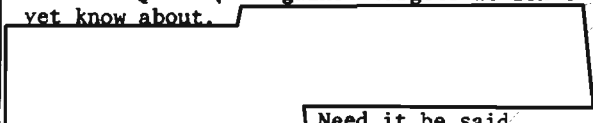
~~(S-CCO)~~ So, one view of the 80s is that we



what this conference is all about, isn't it?

~~(C)~~ Technology is the threat, and technology has to be the answer for us. We've got more and more computing power and it's getting cheaper every year. A good thing, too, since we have fewer people and more targets, and *that* won't change, except to increase. The computer is the key, but we have to tame it so that it serves the analyst rather than the other way around. This problem has been with us for some time; we've been changing our technical lifestyle to live with the computer. A smart fellow in PI points out that some time ago we stopped talking about analysis and began to speak of processing. Think about the implications of that one for a minute. We took the traffic away from the traffic analyst and put it in a computer, and he couldn't get it out without going through middlemen. The only way to tap the tremendous computer power to come—miniaturization, smarter and smarter terminals, personal portable computers—is to make that power submissive to us analysts, rather than for us to be dominated by it.

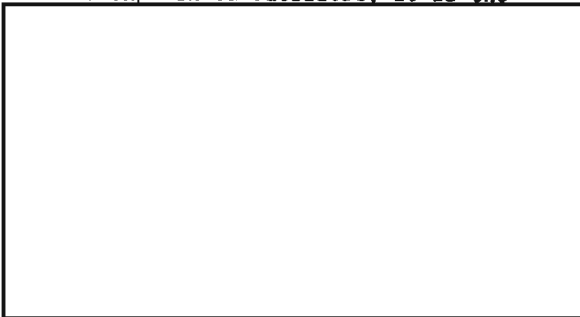
~~(C)~~ We've networked our computers, creating some painful security headaches, but we have created possibilities for a new analytic reach across problems and great opportunities for doing things we haven't even thought of yet against targets we don't yet know about.



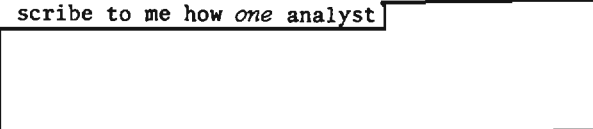
Need it be said that, in a world where computers become more and more dominant, analysts who understand how a computer does its thing (and I'm not talking about programmers, as such) will find much to do all across the SIGINT process.

~~(C-CCO)~~ We haven't really come to grips

standpoint. If there is any one thing about the entire SIGINT process that makes it so hard to explain to outsiders, it is the



~~(C-CCO)~~ I have listened to an analyst describe to me how *one* analyst



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and also take care of the technical feedback in the process. Is he a misty-eyed dreamer? But think of the skills, training and experience that one person would have to possess. That person is the analyst of the late 80s. How do we bring about the species? Just as nature does—by evolution.

~~(S-CCO)~~ That is not to say that the classical SIGINT disciplines won't continue. We'll still need cryptanalysts, traffic analysts, collection professionals, computer scientists, linguists, signals analysts, and all the others. But even these specialists will need to be versatile, comfortable in more than one discipline, comfortable with computers and microprocessors. We need to get much better at handling plain language—automatic translation remains an elusive goal, but much can be done in machine-assisted translation of the recorded word to improve the productivity of linguists. The spoken word remains relatively intractable, but I see real progress in the 80s in automatically selecting the probable best traffic to subject to the personal attention of the transcriber. The traffic analyst can already, if he is willing to learn how to get back his traffic and work his will with it. The cryptanalyst has long since harnessed the power of computers, but even he needs to fit microprocessors and personal computers into his lifestyle. For any analyst, there is an area of research which commences after pencil and paper doodling and stops short of getting to a terminal to order a computer to do something, that is a sort of wasteland of abandoned ideas and aborted projects. The personal computer has an important role to play here.

~~(G)~~ Bob Rich pointed out that our most important resource is the quality of our analytic workforce. The technology that is and will be available in the 80s means little unless we use it effectively and imaginatively, and it is up to this workforce to do just that. It isn't as if we have any choice—all of us analysts must become more versatile and more effective. We've got to improve our quality, because our quantity won't increase. We must learn to use new tools, and indeed play an active role in choosing and specifying those new tools. We must find means to exchange information and document new analytic techniques. This has always been a problem in the past, but now we are evolving into a world of computer networks, terminal sub-systems featuring mini-computers and microcomputers which will make up the analyst's

"SIGINT Target Station." The old vehicles—*C-Liners, Dragon Seeds, Saints*—could be revived, but will they do? We're no longer talking about pencil-and-paper techniques, easy to describe and publish; we're talking about how to choose from and apply a set of several programs and many modules which sort, select, reformat some subset of an analyst's own data base. The techniques may involve specialized program language to retrieve and compare two fields of different records based on the contents of a third field, flagging the records with shorthand code for further treatment. How do we record, publish and disseminate these? How do we give each other the benefits of our own improvements?

~~(C)~~ The crystal ball is murky; all one can say for certain about the 80s for the communications analyst is that they will bring challenges. Only the dim shape of those challenges can be discerned, but it is clear that we analysts will have to evolve into a SIGINT world far more automated and computerized than the one we have today. The main challenge is to make automation and computers work for us analysts, rather than vice versa. And there is a challenge here for management: it must foster the environment and climate to permit the evolution of a new species.

* * * * *

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SOLUTION TO NSA-CROSTIC No. 31.

From "Q. E. D. - 2 Hours, 41 Minutes," by Lambros D. Callimahos. NSA Technical Journal, Fall 1973.

"Spencer Akins: Letter to Birkhan."

"Your letter indicates that the purpose of your entering into communication with this office on the subject of the Kryha cipher machine is to make known its merits for consideration for use in the military service. This device has already been well studied and, I regret to advise, was found unsuitable for adoption in the military service."

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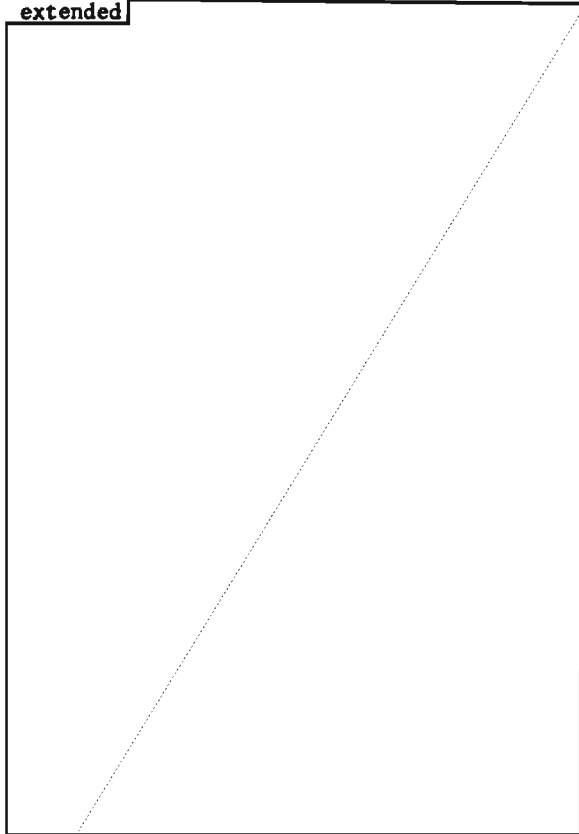
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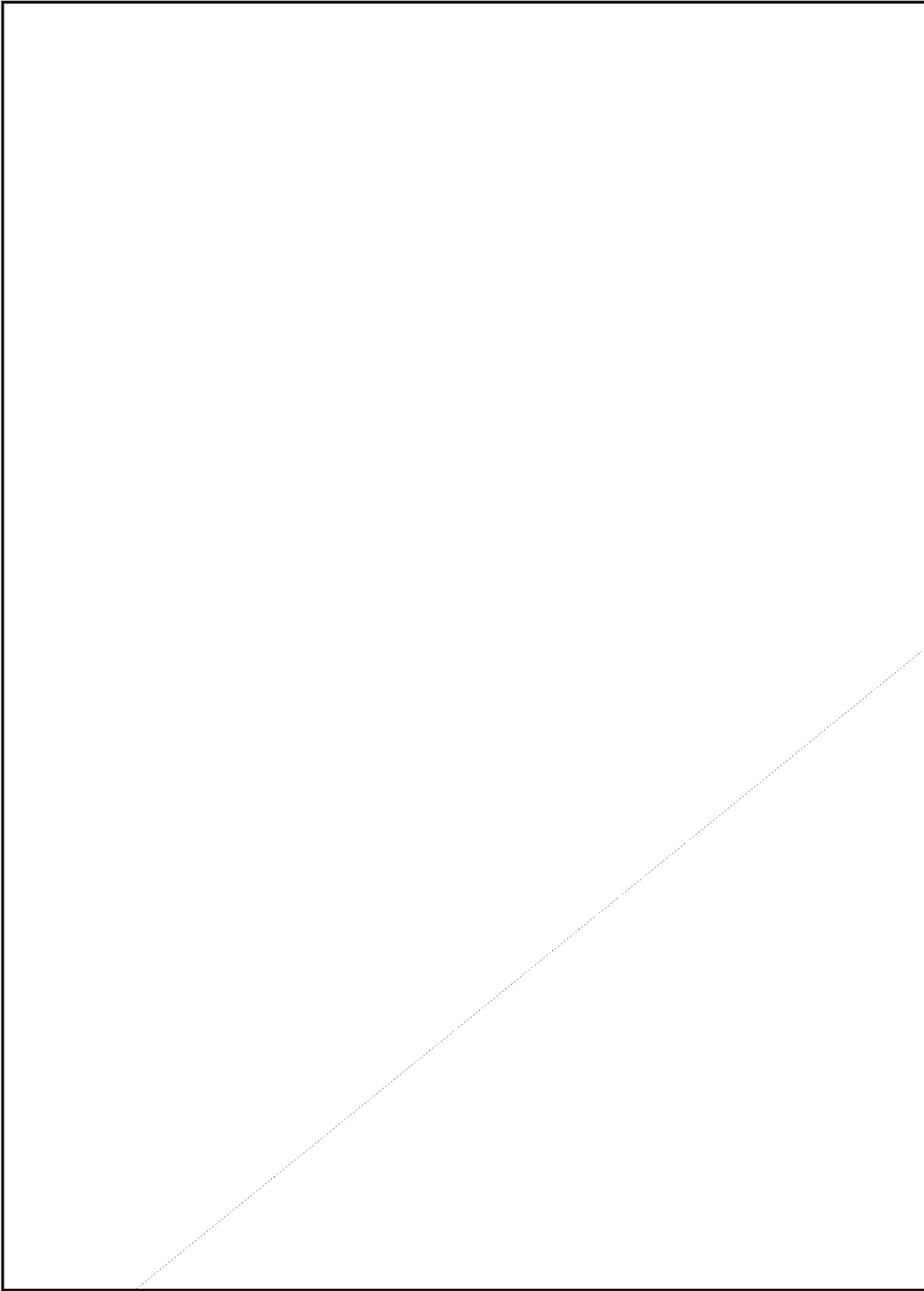
The kittiwake is a small, far-ranging gull (genus *Rissa*), native to the sheer cliff shorelines of Britain, and named in imitation of its cry. Its range, at least in name, will soon be extended



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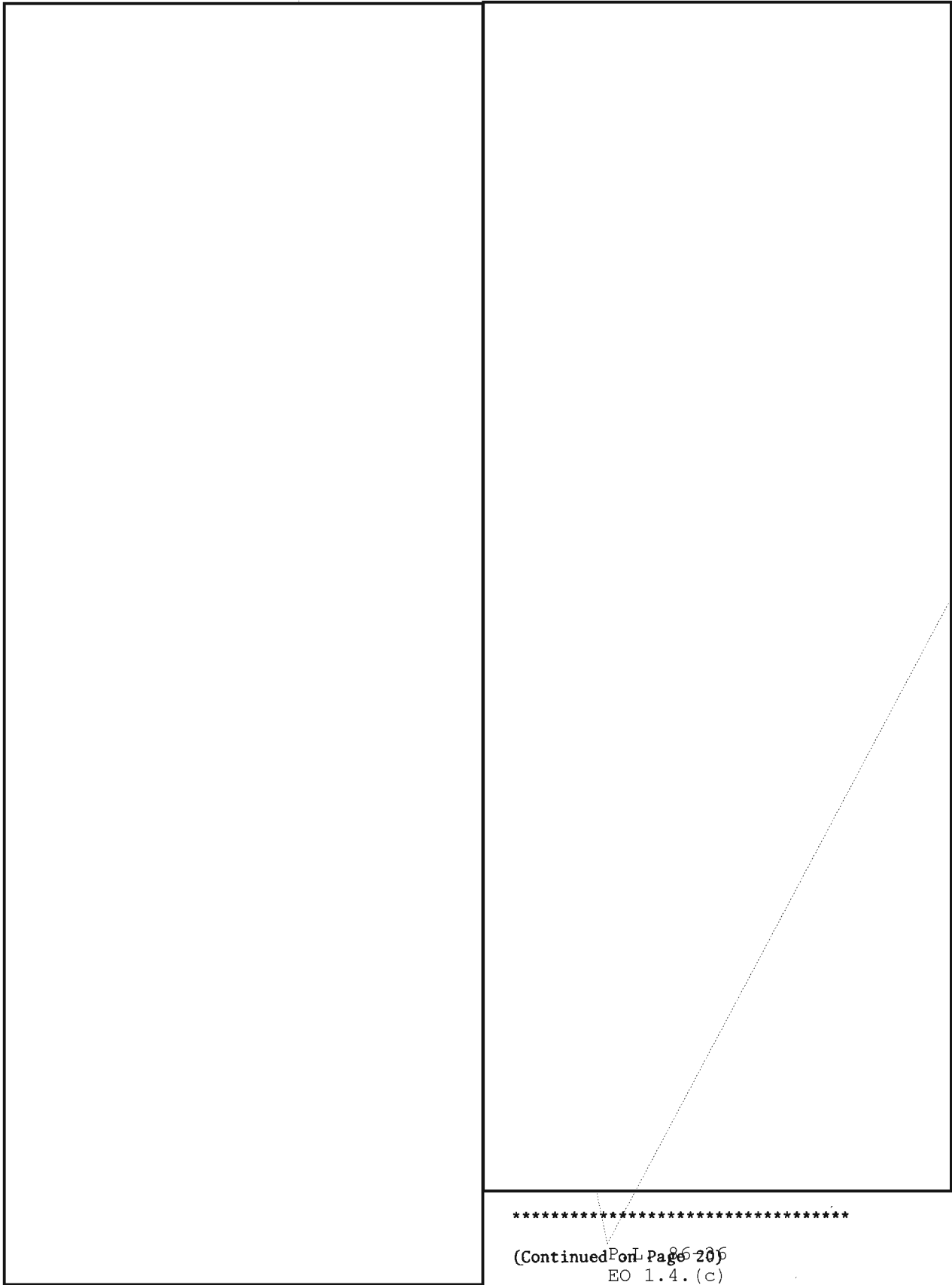


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HOW TO IMPROVE YOUR PROMOTION POTENTIAL

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The new Performance Planning, Evaluation and Counselling program (PPEC), put into effect in January 1981, should make it easier for you to see what is in your records and to know what your supervisor expects of you. However, as with past systems, A LOT WILL STILL BE UP TO YOU. While the following suggestions won't guarantee you a promotion, they can help you stay ahead of whoever is in second place. (That statement and the following are my personal suggestions.)

First, you must know what your job is, and do it well; keep your boss happy; support your organization; and, be a conscientious, dependable employee. Competition is keen, so you must go that extra step, be a bit more creative, work a little harder, and produce a little more to stay ahead of your peers.

Second, make sure your personnel records are accurate and current. These records represent you during many important reviews, as, for instance, when management is considering candidates for key positions or special assignments. Also, promotion boards select or reject people for promotion largely on the basis of the data contained in their records. Pay particular attention to assuring that the following are correctly represented:

— Your education. If you've received a certificate or degree of any kind since you entered on duty, you must complete the Employee Education Record, Form 4694, and forward it through channels to get that important achievement entered in your records. This does not happen automatically. If you've taken courses but have not received your degree, be sure these are recorded.

— Your COSC and suffix. If you are a supervisor, be sure the suffix is "S".

— Your certifications. Also be sure that you have the required combination of certifications and job title for your next promotion. If in doubt, check it out with your supervisor or personnel representative. You should continue professional and self-improvement activities, such as education and training, so that you will keep your mind active, grow in ability and stature, and improve your chances of being given increased responsibilities and promotions.

— Performance Appraisals. These ratings are very important in comparing competing candidates for promotion. Be sure you do everything within your power to achieve the best ratings you can. Also verify that your ratings are correctly recorded in the data base. If you were rated in the top six percent, be sure that is correctly recorded. On the other hand, if you find yourself in a situation where you cannot earn high ratings no matter how hard you try, consider transferring to a new organization, job or career field.

— Personnel Summary. If these are required for your grade, be sure yours is accurate and current. YOU must prepare your Personnel Summary and keep it up to date, making sure it reflects your current job achievements, awards, education, overseas assignments, and so forth. (For an excellent guide, read [redacted] article, "Some Tips on Getting Promoted," in the December, 1978 CRYPTOLOG. Virginia's article has had a positive effect upon Personnel Summaries, but it is unbelievable how many senior people still neglect this important matter.)

Third and finally, you should consider the following list of general suggestions:

— Be conscientious and provide responsible and timely service to everyone you support.

— Continually search for and identify ways to improve individual and aggregate effectiveness.

— Be realistic and think positively; don't spend a lot of energy finding fault or specifying reasons why something can't be done. Rather, find ways to excel in spite of obstacles.

— Do thorough and complete work. Don't pass half-finished answers to your boss and others and expect them to do the work for you.

— Always try to do professional, high-quality work.

— Take the initiative in doing things which must be done; don't wait for someone to get you started.

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— Keep your boss posted on things you think he should be aware of. He should reciprocate.

— Support your boss in solving the organization's problems.

— Meet deadlines and let people know if there are obstacles which may prevent that.

— Create a good image for yourself and your organization.

— Be a good team member, involving others, training and helping them, recognizing and using their strengths and tolerating or helping eliminate their weaknesses.

— Be sensitive to the needs and limitations of your audience. Know when it is necessary to summarize or simplify things so that busy people can look, comprehend, and know what we want them to do, so that they can act quickly.

— Be a company-person while you are at

work; put the organization's goals ahead of your personal goals.

— When you have questions or problems, or you aren't sure what's expected, discuss these concerns with your boss.

— And, very important, as a first order of business on any new job, *train your own replacement*. Not only does this insure the presence of someone who can back up your work in your absence, but it also leaves you free to accept a new assignment—possibly, a step up—with minimum inconvenience to the organization.

You may wish to add items which are important in your particular situation, but which have not been included here.

I am tempted to close with, "Good luck!" But I am confident that you won't need much luck to get promoted if you make a serious effort to follow these suggestion. Moreover, these ideas should help you to continue to earn your true economic worth quicker than most.

CLA'NCS Film Series

The following foreign-language films are scheduled for showing to interested Agency personnel. These presentations, which are jointly sponsored by the Crypto-Linguistic Association and the National Cryptologic School, are shown in the Friedman Auditorium at 0930 hours on the days indicated. The films are unclassified.

Thursday, 14 May "Wozzeck" (German)

Thursday, 25 June "Border Street" (Polish)

All personnel are invited to attend.

NPA-Crostic No. 32

by D. H. W.

This puzzle uses cryptic definitions: puns, anagrams, constructions, etc. If you are not familiar with this form, call CRYPTOLOG on 1103s, and you will be sent a **run-down on definitions** of this type. **Good luck!**

- A. Put away the swords, Heather said
209 219 86 62 189 191 215
 - B. Ornithogalum thyrsoides (2 wds)
92 76 113 146 155 79 163 88 119 132 24 60 199
143 250 54 4 106 12 176 239
 - C. Surrey town located above U.S. Marine
142 33 158 130 240 228 145 248 29 9 180
 - D. Twins age fast at new museum (2 wds)
84 178 202 169 95 127 100 56
 - E. "And so he mediates, twice near
The tides that wash on old Algier"
(2 wds)
111 14 94 105 247 123 152 131 173 148 201 52 245
226 23 237
 - F. Head of Metro and DDE visit Douglas
230 154 227 253
 - G. Get Helen Kennedy.
184 135 89 112 235
 - H. "Does it hurt?" "___ I laugh." (2 wds)
164 6 91 63 186 223 107 128
 - I. Hilaire Belloc hero usually has
yellowish hue
26 97 2 224 21 68 65 182
 - J. Twenty-four hours ago he was a
steady rye drinker
232 77 238 210 137 7 25 241 73
 - K. Wrapped in the wads of bandage
222 214 225 190 136 171 149
 - L. Not on hand
37 109 144 67 87 117 213
 - M. It's the wonderful lather we feel
leads to such a state of perfection
(comp)
20 151 66 121 140 98 203 236 194 254 217 138
 - N. "Bonnie ___" (2 wds)
133 30 22 17 118 167 251 61 208 177 160 75 81
 - O. Wearily I left to see my solicitor
104 19 47 166 3 34
 - P. Disregard
69 179 170 200 206 168
 - Q. Double checker of a tergiversation
159 147 114 45 42 162 70 141 96 78 244 53 211
- 15
- R. Restive; not asleep (var.)
188 1 231 183 50 27 10 57

UNCLASSIFIED

S. Worse than a vile sea monster

212 71 80 41 116 153 83 110 55

T. Indian town for two idiots

229 156 72 46 125 85

U. Large ice sheet in Antarctica (var.)
(2 wds)

49 5 129 122 103 31 187 243 216 40

V. To make the stout weed tender,
he boiled it longer than anyone else

64 58 174 204 218 197 32 48 101

W. I betrayed him when I saw him swipe
a cheddar cheese

234 192 99 124 205 195 18

X. Smelly seat in church?

150 39 35 207

Y. Remark directed at Dr. I.Q. (8 wds)

233 28 102 242 43 181 172 90 185 161 139 59 82

252 220 36 16 157 198 246 93 193 8 108 115

126 165 196

Z. The salamander went home

221 120 74 38

Z1. Develop a large state in the mind

11 51 134 13 44 175 249

1 R	2 I	3 O	4 B	5 U	6 H	7 J	8 Y	9 C	10 R	11 Z1	12 B	13 Z1	14 E
15 Q	16 Y	17 N	18 W	19 O	20 M	21 I	22 N	23 E	24 B	25 J	26 I	27 R	28 Y
29 C	30 N	31 U	32 V	33 C	34 O	35 X	36 Y	37 L	38 T	39 X	40 U	41 S	42 Q
43 Y	44 Z1	45 Q	46 T	47 O	48 V	49 U	50 R	51 Z1	52 E	53 Q	54 B	55 S	56 D
57 R	58 V	59 Y	60 B	61 N	62 A	63 H	64 V	65 I	66 M	67 L	68 I	69 P	70 Q
71 S	72 T	73 J	74 Z	75 N	76 B	77 J	78 Q	79 B	80 S	81 N	82 Y	83 S	84 D
85 T	86 A	87 L	88 B	89 G	90 Y	91 H	92 B	93 Y	94 E	95 D	96 Q	97 I	98 M
99 W	100 D	101 V	102 Y	103 U	104 O	105 E	106 B	107 H	108 Y	109 L	110 S	111 E	112 G
113 B	114 Q	115 Y	116 S	117 L	118 N	119 B	120 Z	121 M	122 U	123 E	124 W	125 T	126 Y
127 D	128 H	129 U	130 C	131 E	132 B	133 N	134 Z1	135 G	136 K	137 J	138 M	139 Y	140 M
141 Q	142 C	143 B	144 L	145 C	146 B	147 Q	148 E	149 K	150 X	151 M	152 E	153 S	154 F
155 B	156 T	157 Y	158 C	159 Q	160 N	161 Y	162 Q	163 B	164 H	165 Y	166 O	167 N	168 P
169 T	170 P	171 K	172 Y	173 E	174 V	175 Z1	176 B	177 N	178 D	179 P	180 C	181 Y	182 I
183 R	184 G	185 Y	186 H	187 U	188 R	189 A	190 K	191 A	192 W	193 Y	194 M	195 W	196 Y
197 V	198 Y	199 B	200 P	201 E	202 D	203 M	204 V	205 W	206 P	207 X	208 N	209 A	210 J
211 Q	212 S	213 L	214 K	215 A	216 U	217 M	218 V	219 A	220 Y	221 Z1	222 K	223 H	224 I
225 F	226 E	227 F	228 C	229 T	230 F	231 R	232 J	233 Y	234 W	235 G	236 M	237 E	238 J
239 B	240 C	241 J	242 Y	243 U	244 Q	245 E	246 Y	247 E	248 C	249 Z1	250 B	251 N	252 Y
253 F	254 M	D.H.W											

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TRANSLATOR IN YOUR POCKET

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Now that personal computers are a household item and hand-held calculators are being held by almost every hand, it has become inevitable that hand-held language "translators" should be vying for their share of the market. They claim to ease the problems of travel in foreign lands. But what can these electronic translators actually do, and are they worth the investment?

First let's note that the word "translator" is used rather loosely. The device won't replace a human being skilled in the languages of interest. For most purposes, it won't even replace a pocket dictionary. But it may be a useful tool for vocabulary drill, pronunciation, grammatical review, conversion, or checking the waiter's addition. (They also function as conventional arithmetic calculators.)

The general format is a hand-held, battery-powered, microprocessor-driven device into which one or more programmed modules may be inserted. A keyboard permits the entry of alphabetic and numeric characters, as well as a few special characters. A small selection of modules (usually containing one language or one language pair per module) is available with the introduction of the device; additional modules are introduced later, as they become available. Several modes of entry are possible:

- words may be spelled out, one letter at a time, and entered into temporary memory, to build a phrase or sentence
- high-frequency phrases or partial phrases may be keyed in
- sequences of words may be searched, to find a specific word, or as a vocabulary drill

Built-in phrases have the advantage of being grammatically correct, but, of course, their number is limited. The number of distinct words, although larger than the number of phrases, is also quite restricted, especially as compared to a pocket dictionary.

Furthermore, the meaning selection is restricted to a single word, and no attempt is made to achieve grammatical correctness as the words are used in a stream. This can best be illustrated by discussing the individual translator models.

There are three currently on the market—the Lexicon LK-3000 by Nixdorf, the Craig M100, and the Texas Instruments Language Translator. Sharp Co. has a model (with about five times the word capacity of the others) which may be introduced in the United States in the near future.

The Lexicon was the first on the market and is currently the one with the widest array of language modules. The keyboard contains 26 letters, a space key, and an "upper case" capability for ten digits, eight special characters, and nine special-purpose keys. There are six function keys:

- a function key [f], used predominantly with modules other than language modules
- a clear key [clr], used to halt one process and begin another
- a backspace key [bs], used to delete characters one at a time (when entering a word) or to reverse the direction of translation (after pressing the clear key)
- an "open dictionary" key [?], used to search alphabetically through the words in the dictionary
- a step key [stp], used to enter the words of a phrase into temporary memory (before a word is admitted to temporary memory, the dictionary is searched; if the word is not in the dictionary, the user may try to substitute a word that is in the dictionary). This key is also used in conjunction with the "open dictionary" key to step through the dictionary one word at a time. For example, to find the English words and phrases beginning with "I", press "I", then [?], then [stp]. The phrases "I am", "I am hungry:", "I am in a hurry", and so forth, will appear in sequence with each suc-

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cessive press of [stp]. To obtain the translation of one of these phrases, press [?].

- the definition key [def], used when the word, phrase or sentence is complete, to give the original and its translation.

A few idiosyncrasies can be illustrated with the English-Portuguese module. Suppose the following words are entered into the temporary memory by pressing the [stp] key following each word, which causes each word to be looked up individually:

YES [stp] I [stp] WANT [stp] DINNER [def]
The translator will deliver:

YES I WANT DINNER = SIM EU QUERER JANTAR.
progressively across its screen. But if the words "I WANT" are entered as a phrase:

YES [stp] I WANT [stp] DINNER [def]
the result is more grammatical:

YES I WANT DINNER = SIM EU QUERO JANTAR.
The practiced user will learn the phrases which are available, in order to take advantage of this feature.

Sometimes words are available only in Portuguese. For example, when entering the phrase QUE HORAS SAO one word at a time, the user discovers that HORAS and SAO are not in the dictionary. But when entering it as a phrase, that is, without a [stp] after each word, the user reads

QUE HORAS SAO = WHAT TIME IS IT.

Its limited vocabulary will be one of the biggest frustrations for the user. There are about a thousand vocabulary items (each word and each phrase counting as one item). Travelers with children, for example, may well wonder why "pizza" and "beer" are included, but "milk" is not.

A cursory grammatical summary attempts to acquaint the user with the vagaries of the foreign language. It's probably better than nothing at all, but that's about the most that can be said for it.

The Lexicon's memory is arranged in English word order. Stepping through vocabulary words that begin with the same letter or letters is very prompt when in the English mode. In the foreign-language mode, however, there are frequent pauses, during which the device advises "SEARCHING."

Bilingual modules currently available are between English and Spanish, French, Italian, German, Polish, Portuguese and Greek, with Swedish, Russian and Japanese in preparation. Also available is a "Person to Person" module, which, according to the manufacturer, "con-

tains fun, social vocabulary in six languages. Introduce yourself, suggest a game of tennis, make a dinner date...in any combination of English, Spanish, French, German, Italian or phonetic Greek."

There is also a calculator module which "turns the LK-3000 into a sophisticated five-function calculator with memory, memory-plus and memory-recall functions. For the benefit of world travelers, this module also provides conversions for metric units and for foreign currencies.

Finally, the Lexicon can provide a filing system module and a personal program module. The latter permits the user to create his own small (1000-character) dictionary, and to retrieve stored data based on a search key.

The Craig M100 has similar features, with a few extra bells and whistles. Instead of bilingual modules, it offers single-language "capsules," three of which may be inserted and made accessible at any one time. Each capsule contains about 1200 words or phrases. Expanded memory capsules with over 2000 words apiece, including verb conjugations and case endings, are now being introduced. The keyboard allows for 26 letters, a space, ten digits, and ten special characters.

The bottom cover of the M100 has two lists—one of complete phrases and one of partial phrases, each identified by a single letter. When the PHR key is pressed once, followed by the appropriate letter, one of the complete phrases will be displayed. Depressing PHR twice, followed by one of the letters yields the corresponding partial phrase. The phrase will then be displayed in the language of interest by pressing one of the language selection keys.

Words may be entered one letter at a time, and may be used in conjunction with the phrase and partial phrase inventories. The capability to select from various meanings of a word is included. For example, WATCH (CLOCK) and WATCH (SEE) are both possible. The user chooses the one desired. In order to determine what the choices are, the user presses the SCH key after spelling the word WATCH. The same procedure can be used to find the correct spelling of a word. Words are held in memory until the user presses the Language Selection Key desired.

In addition to the capability to search the memory alphabetically, it is also possible to search it categorically, using the [LRN] key. For example, the sequence

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[CLR] FAMILY [LRN]

will yield

FAMILY
 PARENTS
 FATHER
 MOTHER
 HUSBAND
 ...

(U) Even with no capsule in place, the M100 can perform simple calculations and basic metric conversions. And fourteen common expressions can be evoked in four languages—English, French, Spanish and German.

(U) Capsules are currently available for English, French, German, Spanish, Italian and Japanese. There is a Phonetic Pronunciation Capsule, with which "the user can now pronounce words in any translated language." Other capsules in the works are Bar and Wine, Nutritional, Calorie Counter, Spelling, and various word games.

(U) The M100 has the following ten function keys:

- a clear key [CLR], which clears the entire entry when the device is in translate mode; when in calculator mode, it clears the entry and returns to translate mode.
- a clear entry key [C/E], which clears the entry in calculator mode, but acts as a backspace/delete key in the translate mode
- a shift key [SHFT], which must be used before each keystroke when a digit or special character is desired
- an external program key [EXT], which selects the calculator program, which is built in, or a special purpose program
- a phrase key [PHR], which starts or stops a vocabulary review by word category, such as car, train, hotel, sick, and so forth
- a fast/slow key [F/S], which is used to select the relative speed of automatic functions (speed of motion of text across

the screen, or speed of search and learn functions)

- a rotate key [ROT], which causes the display to move across the screen
- a search key [SCH], which starts or stops an alphabetical search of the file
- a hold key [HLD], which allows the user to enter a word on the screen even if it is not in memory. This is used for proper names and cognate words.

(U) In addition there are three keys which are used to select among the three capsules, and another to select the built-in information.

(U) Texas Instruments has recently introduced its "Language Translator," which apparently has similar capabilities to those of the other two, but with one added capability: it will pronounce the words or phrases for you. It is currently available with English, French, German, and Spanish modules.

(U) The translators list for between \$120 (Lexicon) and \$300 Texas Instruments), but discounts are available. Extra modules are \$25 for the Craig and \$60 for the other two.

(U) The question remains—are they worth the money? Probably not, if you expect to forego the standard ways of getting around in a foreign country, such as dictionaries, language courses, and the like. But if you're gadget-happy, if you like the idea of being the focus of attention while the natives "ooh" and "ah" over your electronic translator, if you want to own an expensive calculator that does more than just calculate, or if you have an eye on some of the special-purpose modules now being developed, then perhaps you will decide to get a translator of your very own.

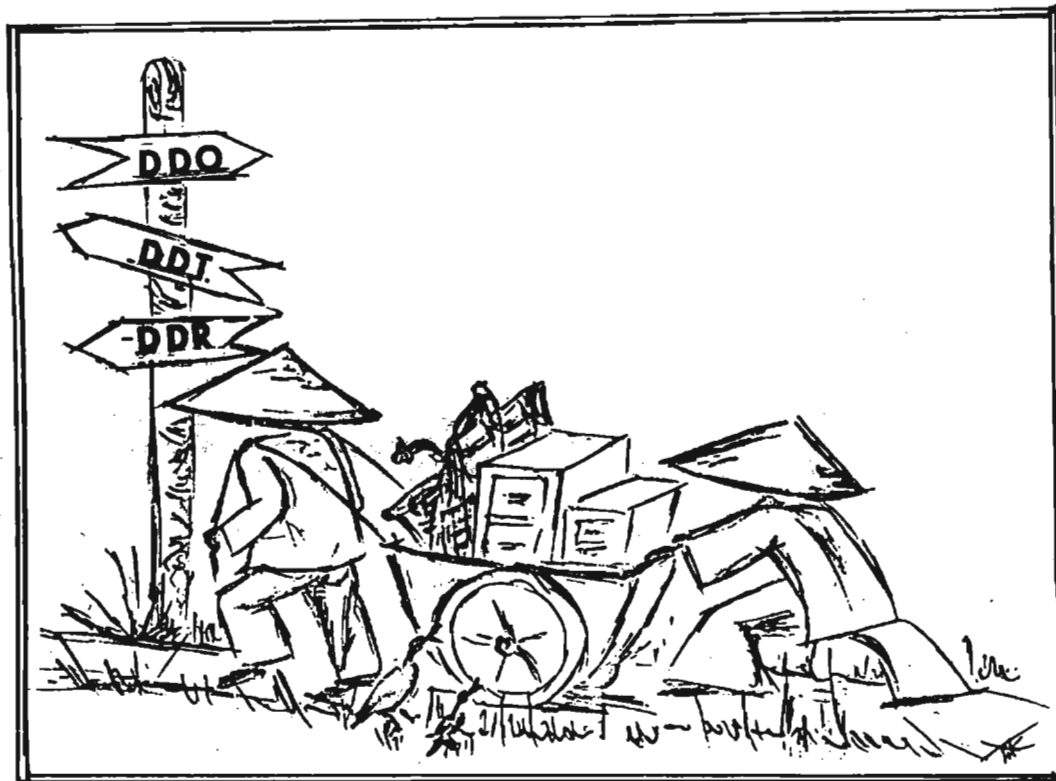
(U) And if you can't decide, perhaps you would like to try the Craig or the Lexicon which PI has available for loan. If so, call the author on 1103s.

~~(C-CCO)~~ POSTSCRIPT: With regard to potential applications within the Agency for electronic translators, [] offers the following observations: Although there might not be a groundswell of interest in language translators *qua* language translators, the ability to enter one's own data into them makes them very interesting indeed. If they contained a small code book, they could be used for quick look-up of terms, or maybe call signs, or abbreviations, or you-name-it. R17 is currently in the process of modifying one of these translators to perform various COMSEC and other user-defined functions. This research may open broad new vistas for analytic, COMSEC or training potential. Watch for more information about experimentation, and don't hesitate to call with any ideas you have that you might want to try.

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Some Things Never Change...



" We trained hard.....but it seemed that every time we were beginning to form up into teams we would be reorganized. I was to learn later in life that we tend to meet any new situation by reorganizing; and a wonderful method it can be for creating the illusion of progress....."

Petronius Arbiter, 210 B.C.

NCS-CLA Symposium

The National Cryptologic School and the Crypto-Linguistic Association are co-sponsoring a Language Training Symposium in May and June of this year. At the opening session on 5 May, following introductory remarks by Lieutenant General Lincoln D. Faurer, Director, NSA, the keynote address will be given by Mrs. Minnie Kenny, Deputy Assistant Director for Training.

The symposium will present a broad spectrum of language training programs and perspectives, featuring speakers not only from NSA and the Service Cryptologic Elements, but also from the Defense Language Institute, the Foreign Service Institute, CIA, the Maryland State Department of Education, the Montgomery County (MD) Public Schools, and the Congress of the United States. Appropriately, the final session on 12 June will focus on the methodology and techniques of evaluation of language training.

The Special Group for Linguistics (SIGLING), whose chairman is [redacted] has invited a distinguished group of outside speakers for the symposium, which will be the first of its kind ever held at the Agency. All sessions will be held in the Friedman Auditorium. Those in May will be open to everyone; those in June will be for fully cleared personnel only.

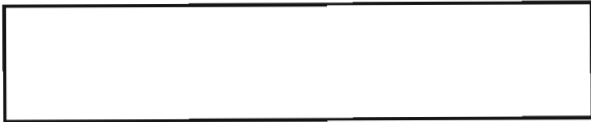
The schedule is as follows:

Tuesday, 5 May, 1300-1500	Welcome — [redacted] President, CLA Introductory Remarks— Lt. Gen Lincoln D. Faurer, USAF, Director, National Security Agency Keynote Address—Mrs. Minnie Kenny, Deputy Assistant Director for Training, NSA
Wednesday, 6 May, 1300-1500	The Russian Linguist Acquisition Program and the Romanian Instruction Program— [redacted] P16, NSA
Wednesday, 13 May, 0900-1100	A Congressional Perspective on the Language Problem—Hon. C. W. "Bill" Young (R-Florida)
Thursday, 14 May, 0900-1100	CIA Language Training Programs and Oral Interview Testing— [redacted]
Tuesday, 19 May, 1300-1500	FSI Language Training Program and Novel Approaches to Language Learning— Dr. Earl Stevick, Foreign Service Institute, Department of State
Thursday, 21 May, 1300-1500	Two Perspectives on Language Training: Academia—Mrs. Marie S. Rentz, University of Maryland Maryland State Public Education—Miss Ann Beusch

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Tuesday, 26 May, 0900-1100	Defense Language Institute Training Program—Lt Col Roland W. Fleming, Jr.
Thursday, 28 May, 0900-1100	Total Immersion Language Study Spanish—Miss Louise Rosenberg, Rock Creek Forest Elementary School, Chevy Chase, MD French—Dr. Gabriel Jacobs, Four Corners Elementary School, Silver Spring, MD
Thursday, 11 June, 0900-1100	Language Training: A, B and G Group Perspectives—Speakers to be announced later
1300-1500	Language Training: The Service Cryptologic Element Perspectives—Speakers to be announced later
Friday, 12 June, 0900-1000	National Cryptologic School Language Training—Speakers to be announced later
1000-1100	Language Training Evaluation—Speakers to be announced later

Why Do They Leave?



E7

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In recent years the language career field has commanded a great deal of attention by Agency managers and planners; a great deal of folk wisdom has been generated to describe the various aspects of what is generally referred to as "the language problem." The folk wisdom holds that linguists are fleeing the language career field at alarming rates for employment in other career fields within the Agency, and that this exodus occurs about the time the linguist reaches Grade 11 or 12, that is, the professional level.

A recent survey of 63 linguists who have abandoned their language careers for other jobs within the Agency has provided some useful information on their views of language work in the Agency, and also provides management with a more complete picture of the segment of the linguist population that is being lost.

The survey findings, augmented by work force data supplied by M331, show that the exodus from the language career field may be more imaginary than real when compared to other career fields, but nevertheless they do cast new light on the problem from two

standpoints—the seriousness of the loss and the reasons for the loss.

The seriousness of the loss, of course, lies in the fact that the vast majority of the linguists who do leave are the experienced ones, the cadre, so to speak. They are not easily replaced, and the loss of their expertise is felt in at least two vital areas: the quality of the product issued, and guidance to junior linguists. The survey found that the linguist departing the field has an average grade of GG10.4, with five or more years experience, and that a full 48 percent has achieved the professional level, that is, has passed the Professional Qualification Examination, in one or more languages.

Nearly one-half of the linguists leaving the career field identified the lack of upward mobility within the field as the primary reason for leaving. Even where this is not the primary reason, it is the secondary reason for another 19 percent. This would indicate that job dissatisfaction is not a major factor in their decision. This view is reinforced by the statistic that

41 percent of the linguists responding to the survey stated that they would be willing to return to language work if the career advancement opportunities were improved, while another 11 percent were undecided. It is conceivable that if the conditions the linguists viewed as unsatisfactory were improved, fully one-half of those currently departing the field would remain as productive, experienced workers. This view is further borne out by the responses of the linguists when asked how much longer they would have remained in the field if the conditions they viewed as untenable had been different. Thirty-eight percent said they would have stayed two or more years (the longest option offered on the survey form. Only 13 percent reported that they would have left about the same time regardless of conditions. Another 40 percent were undecided. This should be contrasted to the number of linguists who said that, under current conditions within the language field, they felt that they had made a wise choice in leaving. Four-fifths of those responding said they felt they had made a wise choice, and only one linguist felt that the decision was unwise. The remaining respondents were ambivalent.

(U) The folk wisdom view that attrition among linguists is greater at Grades 11 and 12 is substantiated by the survey, which goes on to indicate that the problem begins even earlier than Grade 11. It appears from the data gathered through the questionnaire that the problem begins in earnest around Grade 9 and remains constant throughout Grades 9, 11, 12 and 13. The linguists in these grades noted "lack of advancement," "no promotions," and "dead-end field" as primary reasons for their leaving. Linguists in the lower grades were more apt to mention working conditions, job dissatisfaction, academic or professionalization problems, and lessening enthusiasm for language work as primary reasons for leaving. Nevertheless, lack of promotions remains a concern even for linguists at Grade 7.

(U) If any picture emerges from the foregoing, it is one of frustrated employees. On one hand, the linguists enjoy the work and would like to continue in the field as a career. On the other hand, just when the linguists have been in the field long enough to have had the training and gain the experience that enables them to do the work in a professional manner and to pass their knowledge on to newer linguists, they feel pressures forcing them out of the field if they are to continue to move upward in the organization. Whether the pressures are real or imagi-

nary, and whether the linguists' positions in the organization are improved or not by their actions (nearly 80 percent feel their position *is* improved), the result is the same: the linguists' expertise is lost to the Agency. And this loss is a costly one. Years of training time and thousands of training dollars have been wasted, and the replacement linguists will require the same investment of time and money.

(U) The "language problem" is less a language problem than it is a management problem. Until a language career field is developed that offers, or appears to offer, equal advantages with the other career fields, the Agency will have to suffer the loss of experienced linguists and recruit and train replacements for those who seek greener pastures elsewhere. The management question, which begs for an answer is

Which is more costly: paying the experienced linguist to perform, or continually training newer—and less experienced—linguists to replace them when they look ahead and see no future in their career field?

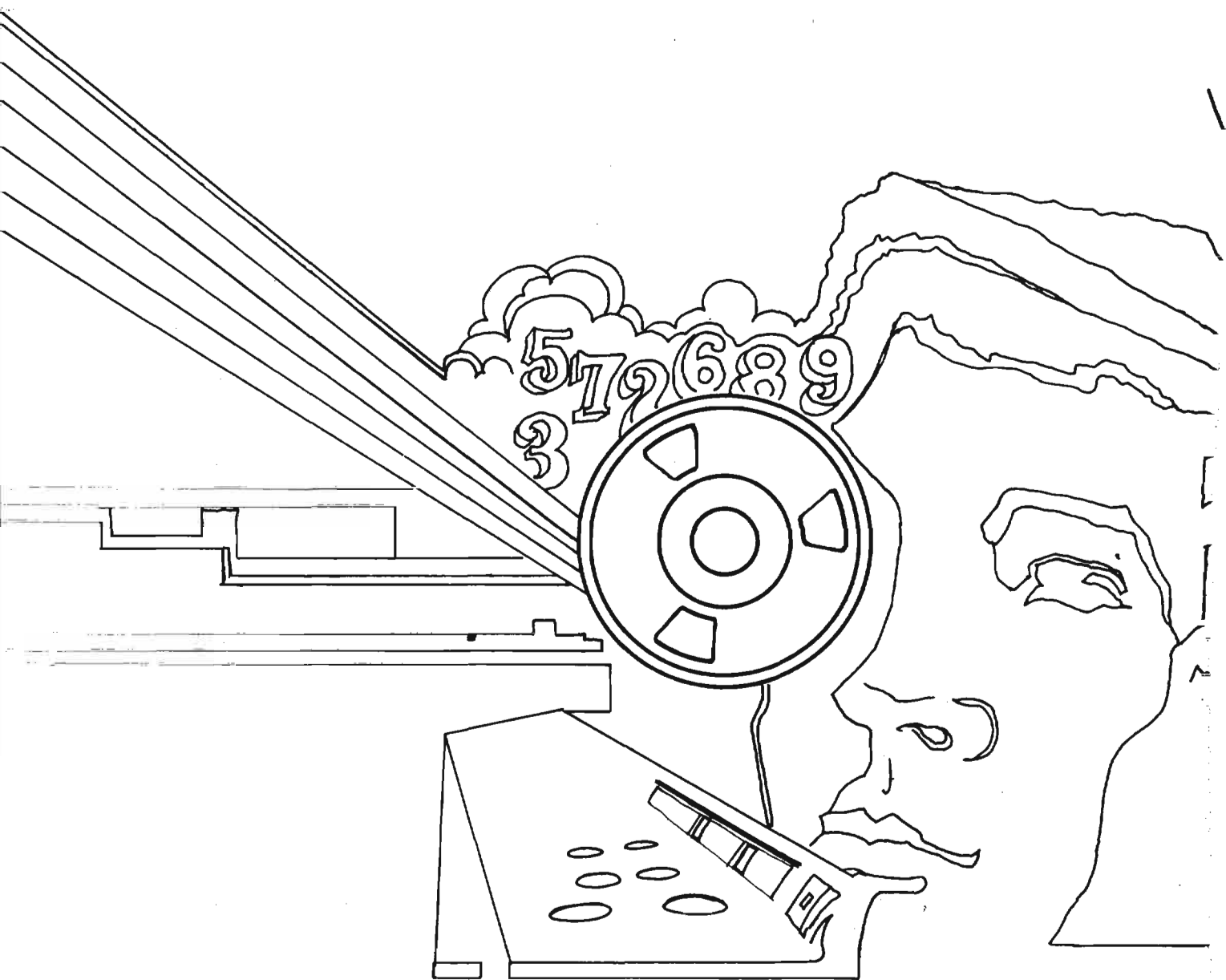
The latter option is an illusory one. The recently trained linguist is a replacement only in quantitative terms. The loss of an experienced linguist represents a geometric loss, not an arithmetic one. Linguists are not interchangeable. Experience is a vital attribute that should not be treated capriciously.

~~(S-CCO)~~

KITTIWAKE

(Continued from Page 9)

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