22572

23 February 1978

MEMORANDUM FOR:

                                              OSI

SUBJECT        :   Information on Communist
                   Computer Capabilities

REFERENCE      :   DIA Memo, Request for Computer
                   Information, dated 28 Dec 1977


        Attached, as requested by J        of your staff,

are answers to questions a), b), and d) of the referenced

DIA memo.  Please use these answers as you see fit in

formulating your response to DIA.

of this Branch, who prepared the Attachment, will provide

whatever additional assistance you may desire on this issue.
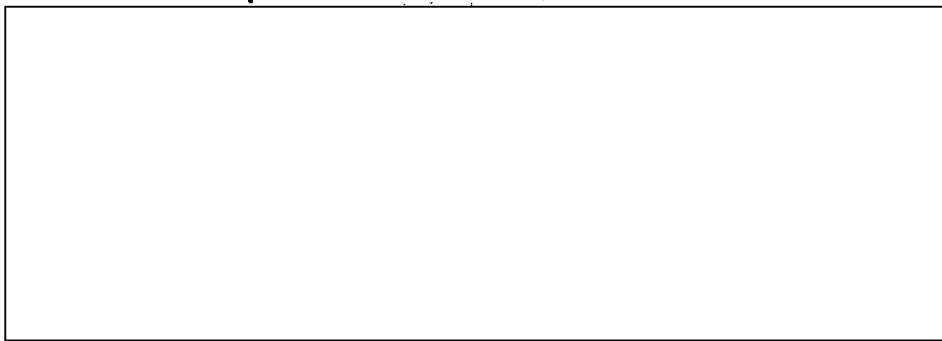
                        Office of Economic Research


Attachment:
 as stated


                                Copy No. _5_

                                ER M 78-10125

IMPDET CL BY

ATTACHMENT

## Information on Communist Computer Capabilities

a) **What are the expectations of the RYAD 1055, e.g., production run per year? When will production start (1979, 1980, etc.)? Is semiconductor memory feasible (any problems)? Will core be used in an interchangeable mode?**

The East Germans hope to begin production of the ES-1055 at the Robotron Plant in 1979. Currently, this plant is producing about 50 ES-1050 computers per year, although it probably has the capacity to produce 80 to 100 units per year. We expect that output of ES-1055 in 1979 will be about 10 units and that output of ES-1050's will fall to about 40 units. In 1980, production probably will be split between the 1050 and 1055, and after 1980, the plant is likely to be devoted exclusively to the 1055, at the rate of about 50 units per year.

In 1977 the East Germans exhibited at the Leipzig Spring Fair, an 8-bit microprocessor designated the ZE-1. The basic RAM circuit for the ZE-1 is a 1K PMOS circuit which appears to be a direct copy of the Intel 1103. The German part, number U253D, meets the specifications given for the ES-1055 semiconductor memory. Hence, if the East Germans can produce the ZE-1 microprocessor, they have the capability to supply 1K RAMs for the ES-1055.

Copy No. 2

We feel the East Germans are having difficulty
with the ZE-1.*

The East Germans have refused all purchase orders
and have refused further to specify even when these cir-
cuits will be available.

Since the East Germans are known to have used
Western ICs (sense amplifiers) in their ES-1040, they may
plan to use the Intel 1103 in the ES-1055. It is not known
if the ES-1055 will use ferrite core in an interchangeable
mode with integrated circuit memory. This is a possibility
since the Soviets specifically stated that another RYAD-II
computer, the ES-1060, would have this capability.

b)  In general, what is the status of semiconductor memory
    research and production in the USSR?

The USSR has an active program for the development
of semiconductor memory devices. Partly, the USSR is
developing its own devices; and partly, it is attempting to
copy US devices. Native Soviet devices carried in catalogs
are listed in Table 1. US devices that the Soviets are
copying, together with the Soviet models developed by copying,
are given in Table 2.

The only Soviet semiconductor memory ICs that
are known to be in use in series production computers are
the K155RU1, and K155RU2.  The RU1 is a relatively low
density device (TTL 16 bit RAM) that we think is being used
in the RYAD computer system, Model ES-1022.  It is used in
local storage, rather than main memory; the RU2 is a much
higher density device (TTL 64 bit RAM) being used with the
ES-1033.  In mid-1976, shortages of the RU2 were holding up
production of the ES-1033.  Possibly the Soviets were having
trouble with the quality or reliability of these devices.
It is not know if these shortages are continuing.

indicates that one other device,
the 527RU1, a 256 bit CMOS static RAM, may also be in
production.  No further information on its production or use
is available.  Our best judgement is that few, if any, Soviet
RAMs of 1K bits or higher have progressed any further than
pilot scale production.  For ROMs, we doubt that the Soviets
have progressed further than pilot scale production of 2K,
or higher density devices.

The fact that several native devices are listed in
Soviet catalogs should not be taken as an indication that
they are readily available, or indeed, available at all.  We
know that some integrated circuits listed in earlier catalogs

-3-

have never entered production, and that it is not uncommon

for the USSR to list devices a year or more before they are

actually put into production. Also, it is known that the

USSR produces integrated circuits which have never appeared

in catalogs -- including some that are used in commercial

equipment.

c) <u>Does the PRC have 18 MIL core capability?</u>

See OSI Comments on question c.

d) <u>How many 1022's and 1033's have been produced and what</u>
   <u>is the production rate now and expected?</u>

The ES-1022 has been in regular series production

at the Minsk Computer Plant since early 1976 although some

1022's were produced in 1975 for test and evaluation. In

late 1976, the Soviets announced that the Brest Computer

Plant also had commenced production of the ES-1022.

-4-

probably at Minsk since Brest did not begin production until very late in the year. Some of this 1022 production may represent only modifications to 1020's previously produced. We note that significant numbers of dissatisfied 1020 users had shipped their computers back to the factory for conversion into 1022's.

The capacity of the Minsk Plant has been estimated at about 500 systems per year. The capacity of the Brest Plant would be substantially below that figure. If both plants were producing at capacity in 1977, 700 to 750 1022's could have been produced.

Production in 1978 is more difficult to assess. This is again a transition year, as the Minsk Plant (and, possibly Brest also) is converting to production of the higher capacity ES-1035 and ES-1060. We feel that production of the ES-1022 may have already ceased, or soon will cease, and that output of this model for 1978 will be small.

The ES-1033 has been in production at the Kazan Computer Plant since early 1976. However, we believe output to date has been small for two reasons: first, the nuber of observed installations of 1033's is small in relation to 1022 installations. Secondly, production at the Kazan Plant has been delayed by a lack of required integrated circuits (see question (b),

-5-

above). In several instances, the production of the computer has had to be halted to await delivery of parts. In 1975 the Kazan plant produced an estimated 300 ES-1030 computers, approximating the plant's capacity. Output of the ES-1033 during 1976-77 was substantially below plant capacity, probably less than 100 computers. If IC supply problems have been solved, Kazan could produce about 300 ES-1033's in 1978 and thereafter. We have no indication that Kazan is converting to production of a RYAD-II model, but this is a strong possibility.

e) Do we have a good handle on BESM-6 installations? What is the production rate now? Will the production run end?

We can account for about 40 BESM-6 installations in the USSR and Eastern Europe (and India). The BESM-6 has been in series production at the Moscow Computer Plant since 1967 at the rate of about one per month or 12 per year. Several models were produced prior to 1967 for test and evaluation. Thus, through 1977 we estimate 140 to 150 BESM-6's have been produced. Probably the BESM-6 will stay in production until some of the newer scientific computers (VS-1, VS-2, IS-8) come on-stream, perhaps by the end of this decade.

## Table 1

### Semiconductor Memory Devices Listed in Catalogs

| Model Device | Type | Technology |
|---|---|---|
| | **MOS** | |
| K176RM1 | 16 bit Static RAM | CMOS |
| K185RU1 | 16 bit RAM 1/ | MOS 1/ |
| K176RU1 | 256 bit Static RAM | CMOS |
| 527RU1 | 256 bit Static RAM | CMOS |
| | | |
| K519RE1 | 128 bit ROM 2/ | MOS 1/ |
| K519RE2 | 256 bit ROM 2/ | MOS 1/ |
| K5YAP011 | 2048 bit ROM 1/ | MOS 1/ |
| | **Bipolar** | |
| K500RU401 | 16 bit RAM 1/ | ECL |
| K500RU40 | 64 bit RAM 1/ | ECL |
| K155RU1 | 16 bit RAM 1/ | TTL |
| K155RU2 | 64 bit RAM 1/ | TTL |

---

1/ Not further identified.
2/ Electrically reprogrammable and partial decoding.

---

## Table 2

### US Semiconductor Memory Devices Being Copied by the USSR

| US Part | Manufacturer | Type | Technology | No. of Bits | Soviet Copy |
|---|---|---|---|---|---|
| 1101 | Intel | RAM | PMOS | 256 | K507RM1 |
| 2107 | Intel | RAM | NMOS | 4096 | |
| 2102 | Intel | RAM | PMOS | 1024 | |
| AMS 700 | Adv. Dev. | RAM | PMOS | 1024 | K507RU1 1/ |
| MK 4006 | Mostek | RAM | PMOS | 1024 | K507RU2 1/ |
| MK 5260 | Mostek | RAM | PMOS | 1024 | |
| S8223 | Signetics | PROM | Bipolar | 256 | |
| 1702 | Intel | REPROM | Bipolar | 2048 | |
| 93410 | Fairchild | RAM | Bipolar | 256 | |
| 93415 | Fairchild | RAM | Bipolar | 1024 | |

---

1/ Soviet model copied from one of the indicated group;