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ONE ARTICLE FROM OER'S ECONOMIC INTELLIGENCE WEEKLY REVIEW  
ENDING 23 MARCH 1978

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ONE ARTICLE FROM DER'S ECONOMIC INTELLIGENCE WEEKLY REVIEW

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SOVIET COMPUTERS: A NEW GENERATION EMERGES.

1. THE USSR, WHILE ON THE THRESHOLD OF A MAJOR NEW ADVANCE IN COMPUTER TECHNOLOGY, WILL FIND IT EXTREMELY DIFFICULT TO REAP SHORT-TERM ECONOMIC GAINS FROM THE BREAKTHROUGH.

2. THE RYAD-II, A NEW FAMILY OF DATA PROCESSING COMPUTER SYSTEMS PATTERNED AFTER THE IBM 370, IS NOW GOING INTO PRODUCTION. RYAD-II COMPUTERS WILL BE FASTER AND MUCH MORE VERSATILE THAN THE MODELS BEING REPLACED AND WILL BE ABLE TO USE IBM 370 SOFTWARE. THE USSR, HOWEVER, CANNOT ACHIEVE THE FULL CAPABILITIES OF THE RYAD-II WITHOUT ADVANCED INTEGRATED CIRCUITS FROM THE WEST. THESE COULD BECOME AVAILABLE LATER THIS YEAR IF CURRENT PROPOSALS FOR THE RELAXATION OF EMBARGO RESTRICTIONS ARE ADOPTED. THE NEED FOR HIGH-GRADE ASSOCIATED SOFTWARE AND TECHNICAL MANPOWER, AS WELL AS THE INEFFECTIVE EMPLOYMENT OF ADVANCED COMPUTERS AT THE ENTERPRISE LEVEL, WILL LIMIT THE USEFULNESS OF THE RYAD-II FOR A LONG TIME.

THE SETTING.

3. THE CEMA-WIDE PROGRAM TO BUILD THE RYAD SERIES COMPUTERS--THE FIRST MODERN SOVIET COMPUTERS DESIGNED SPECIFICALLY FOR DATA PROCESSING--WAS BESET THROUGHOUT THE NINTH FIVE-YEAR PLAN PERIOD (1971-75) WITH DESIGN AND PRODUCTION

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DIFFICULTIES. PRODUCTION GREW FROM A FEW PROTOTYPES IN 1971 TO AN ESTIMATED 900 UNITS IN 1975; TOTAL OUTPUT WAS ONLY 10 TO 15 PERCENT OF WHAT HAD BEEN ANTICIPATED, HOWEVER, AND INCLUDED ONLY THE SMALLER, LESS POWERFUL ES-1020 AND ES-1030 MODELS--BOTH MARKEDLY INFERIOR TO THEIR WESTERN COUNTERPARTS IN RELIABILITY AND PERFORMANCE.

4. BY 1976, MAINLY BECAUSE OF INCREASED DOMESTIC PRODUCTION OF IMPROVED SEMICONDUCTOR COMPONENTS, THESE BASIC RYAD MODELS HAD BEEN MODIFIED, UPGRADED, AND REDESIGNATED AS THE ES-1022 AND ES-1033. THE NEW RYAD-IS ARE NONETHELESS STILL LIMITED IN THEIR PERFORMANCE CHARACTERISTICS AND ARE SOON TO BE SUPERSEDED BY RYAD-II.

#### TECHNOLOGY GAP.

5. THE RYAD-II PROGRAM HAS MOVED ALONG RAPIDLY SINCE IT WAS FIRST ANNOUNCED IN LATE 1974. DEVELOPMENT CYCLE TIME--MEASURED FROM THE FIRST ANNOUNCEMENT OF PLANNED DEVELOPMENT TO THE DATE OF THE FIRST PRODUCTION PROTOTYPE--TOOK ABOUT THREE YEARS FOR THE RYAD-II, COMPARED WITH ABOUT FIVE YEARS FOR THE RYAD-I. NEVERTHELESS, THE TECHNOLOGICAL GAP WITH THE UNITED STATES, AS REPRESENTED BY IBM, HAS STAYED AT ABOUT SEVEN YEARS. IN FACT, THE GAP IS MUCH GREATER WHEN THE FULL RANGE OF EQUIPMENT BEING PRODUCED BY BOTH SIDES IS CONSIDERED. IBM IN ITS 360- AND 370-SERIES MACHINES OFFERS A COMPLETE LINE OF COMPUTER SIZES, INCLUDING SOME VERY LARGE, FAST MODELS. RYAD-I PRODUCTION, IN CONTRAST, CONSISTED OF ONLY THE SMALLER SIZES, WITH THE LARGER MODELS ONLY NOW ENTERING SERIES PRODUCTION.

#### NEW MODELS ADVANCE...

6. THE SOVIETS CLAIM THAT TWO RYAD-II MODELS ARE NOW GOING INTO PRODUCTION, THE SMALL ES-1035 AND THE MUCH MORE POWERFUL ES-1060. THE LATTER COMPUTER, HOWEVER, WAS UNDER DEVELOPMENT FOR THE ORIGINAL RYAD-I PROGRAM AND IS NOT A COMPLETE NEW DESIGN. THE ONLY OTHER RYAD-II MODEL THAT IS LIKELY TO GO INTO PRODUCTION DURING THE CURRENT PLAN PERIOD (1976-80) IS THE ES-1055, BEING DEVELOPED BY EAST GERMANY.

7. THE ES-1035 IS IN THE VERY EARLY STAGES OF PRODUCTION IN THE USSR. A FEW PROTOTYPE MACHINES HAVE BEEN MADE, TESTED, AND ACCEPTED BY THE CEMA EVALUATION COMMITTEE. THE MINSK COMPUTER PLANT, THE LARGEST PRODUCER OF COMPUTERS IN THE USSR, IS NOW MAKING PREPARATIONS FOR SERIES PRODUCTION. DURING THE TRANSITION PHASE AT MINSK, WHICH COULD LAST UNTIL 1979,

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RYAD-IS (ES-1022S) WILL CONTINUE TO BE PRODUCED ALONG WITH THE RYAD-IIS (ES-1035), THEREBY AVOIDING A SHARP DROP OFF IN TOTAL SOVIET AND EAST EUROPEAN PRODUCTION OF RYADS. BY 1980, RYAD-IIS SHOULD CONSTITUTE ABOUT ONE-HALF OF TOTAL RYAD PRODUCTION.

8. RYAD-II PRODUCTION IS GOING AHEAD EVEN THOUGH THE CRITICAL SEMICONDUCTOR MEMORY COMPONENTS ARE NOT YET AVAILABLE FROM THE DOMESTIC ELECTRONICS INDUSTRY. SEMICONDUCTOR MEMORY--A MEMORY BUILT OUT OF HIGH-DENSITY INTEGRATED CIRCUITS (IC) WITH AN INFORMATION STORAGE CAPACITY OF ABOUT ONE THOUSAND BITS OF INFORMATION ON EACH IC--IS A KEY FEATURE THAT DISTINGUISHES THE TECHNOLOGY OF RYAD-II FROM RYAD-I. ALTHOUGH BY CURRENT WESTERN STANDARDS THIS LEVEL OF DENSITY IS LOW (OFF-THE-SHELF MEMORY COMPONENTS IN THE WEST HAVE 16 TIMES AS MUCH CAPACITY), IT NONETHELESS REPRESENTS A GIANT ADVANCE FOR THE RYAD PROGRAM. SEMICONDUCTOR MEMORY WILL PERMIT THE USSR TO DOUBLE THE MEMORY SIZE OF THE RYAD-I IN ONE-FOURTH OF THE SPACE, WHILE SUBSTANTIALLY INCREASING THE SPEED OF MEMORY OPERATIONS. GREATLY INCREASED MEMORY SIZE MAKES IT POSSIBLE TO (A) HANDLE MUCH LARGER PROGRAMS AND MORE THAN ONE PROGRAM AT A TIME AND (B) ATTACH REMOTE TERMINALS FOR TIME SHARING. THESE CHARACTERISTICS WOULD PROVIDE THE USSR WITH ITS FIRST TRUE CAPABILITY FOR COMPUTER-TO-COMPUTER COMMUNICATIONS.

9. NEITHER THE USSR NOR ANY OF THE OTHER EAST EUROPEAN PARTICIPANTS IN THE RYAD PROGRAM HAS YET DEMONSTRATED A CAPABILITY TO PRODUCE ICS OF THE REQUIRED DENSITY. THE HIGHEST DENSITY IC IN PRODUCTION IN THE USSR IS A 64-BIT DEVICE; EVEN THESE ARE SCARCE, AND SHORTAGES HAVE CAUSED DELAYS IN THE PRODUCTION OF RYAD-IS. TO COMPRESS DEVELOPMENT TIME, THE SOVIETS ARE ATTEMPTING TO COPY SEVERAL HIGH-DENSITY DEVICES MANUFACTURED BY US FIRMS.

10. SOVIET DESIGNERS, APPARENTLY UNCERTAIN ABOUT WHEN THE NEW COMPONENT TECHNOLOGY WILL BECOME AVAILABLE, HAVE DESIGNED RYAD-II MEMORIES TO EMPLOY THE TRADITIONAL MAGNETIC CORE TECHNOLOGY. USE OF THIS TECHNOLOGY, HOWEVER, WILL CURTAIL THE NUMBER OF NEW FEATURES OF THE RYAD-II AND GREATLY REDUCE OVERALL SYSTEM PERFORMANCE. IN PARTICULAR, IT WOULD BE DIFFICULT TO USE THE RYAD-IIS TO ESTABLISH LARGE COMPUTER NETWORKS.

...BUT QUESTIONABLE IMPACT.

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11. RYAD-IIS WILL HAVE LITTLE SHORT-RUN ECONOMIC IMPACT. FIRST, THE INCREASED SPEED AND CAPACITY OF RYAD-IIS RAISES THE PERFORMANCE REQUIREMENTS OF ASSOCIATED HARDWARE TO LEVELS THAT, IN SOME CASES, ARE BEYOND THE REACH OF CURRENT SOVIET TECHNOLOGY. THE SMALLER RYAD-IIS WILL REQUIRE DISC DRIVES WITH A CAPACITY (30 MEGABYTES) FOUR TIMES GREATER THAN THOSE NOW BEING PRODUCED IN THE USSR. IT IS NOT CLEAR IF BULGARIA, WHICH HAS MASTERED PRODUCTION OF SUCH DRIVES, WILL BE ABLE TO SUPPLY LARGE-SCALE SOVIET NEEDS. THE LARGER RYAD-II MODELS WILL REQUIRE DISC DRIVES OF A CAPACITY (100 MEGABYTES) FAR BEYOND THE CURRENT MANUFACTURING CAPABILITY OF ANY COMMUNIST PRODUCER.

12. SECOND, RYAD-IIS WILL REQUIRE HIGHER PROFESSIONAL SKILLS FROM SYSTEMS ANALYSTS, PROGRAMERS, AND SERVICE PERSONNEL. PROGRAMS TO MEET THESE MANPOWER NEEDS ARE PROCEEDING WITH FAR LESSER PRIORITY THAN PRODUCTION.

13. THIRD, RYAD-IIS ARE LIKELY TO ENCOUNTER THE SAME PROBLEMS IN ALLOCATION AND USE THAT HAVE CURTAILED THE EFFECTIVENESS OF RYAD-IS. MANY ENTERPRISES HAVE OVERORDERED RYADS, FAILED TO TRAIN PERSONNEL IN THEIR USE, AND HAVE SHOWN MONUMENTAL INDIFFERENCE TO THEIR CARE AND MAINTENANCE. M. YA. RAKOVSKIY, DEPUTY CHAIRMAN OF GOSPLAN, RECENTLY COMPLAINED OF 'FREQUENT CASES WHERE THE MACHINES ARE KEPT IN A STOREHOUSE, AND SOMETIMES UNDER THE OPEN SKY, STILL IN A CRATE, FOR 4 TO 6 MONTHS AND EVEN LONGER.'

14. FINALLY, RYAD-IIS OFFER THE TYPICAL INDUSTRIAL FACILITY FEW ADVANTAGES OVER RYAD-I AND SEEM BETTER SUITED FOR DATA PROCESSING AT HIGHER LEVELS--THE PRODUCTION ASSOCIATION, THE MINISTRY, AND REGIONAL AND NATIONAL PLANNING BODIES. EVEN IN THE LATTER USES, POTENTIAL EFFECTIVENESS AWAITS THE DEVELOPMENT OF APPROPRIATE SOFTWARE AND COMPLEX DATA TRANSMISSION SYSTEMS.

#### POLICY IMPLICATIONS.

15. TO REALIZE THE FULL CAPABILITIES OF RYAD-II COMPUTERS, ESPECIALLY THE TIME-SHARING FEATURE, THE COMMUNIST COUNTRIES WILL HAVE TO TURN TO THE WEST FOR THE REQUIRED INTEGRATED CIRCUITS. AS PRECEDENT, THE EAST GERMANS USED WESTERN ICS ENTIRELY IN THE FIRST FEW UNITS OF THEIR RYAD-I MODEL AND CONTINUE TO USE SOME WESTERN ICS.

16. THE ICS NEEDED FOR THE SEMICONDUCTOR MEMORY IN

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RYAD-IIS ARE CONTROLLED BY COCOM. EVEN SO, SUBSTANTIAL QUANTITIES OF THESE COMPONENTS HAVE BEEN ACQUIRED BY THE USSR AND EAST EUROPEAN COUNTRIES. THESE ACQUISITIONS HAVE ALLOWED RYAD PRODUCERS TO DESIGN EXACT PHYSICAL AND PERFORMANCE COPIES OF THE WESTERN PARTS AND, PROBABLY, TO USE THEM IN PROTOTYPE RYAD-IIS.

17. THE SUPPLY OF WESTERN MEMORY ICS THROUGH ILLEGAL CHANNELS IS NEITHER ADEQUATE NOR SUFFICIENTLY DEPENDABLE FOR USE IN SERIES-PRODUCED RYAD-IIS. LATER THIS YEAR, HOWEVER, COCOM WILL CONSIDER RELAXING CONTROLS ON ICS TO A LEVEL THAT WOULD PERMIT FREE EXPORT OF THE NEEDED WESTERN MEMORY COMPONENTS TO COMMUNIST COUNTRIES. THE USSR AND EAST EUROPEAN COUNTRIES WOULD BECOME LARGE PURCHASERS UNTIL HIGH-VOLUME DOMESTIC PRODUCTION IS ACHIEVED.

18. SOVIET MILITARY AUTHORITIES HAVE BEEN DIRECTLY INVOLVED IN THE RYAD PRODUCTION PROGRAM AND ARE IMPORTANT USERS. RYAD-IS ARE EMPLOYED IN MILITARY-SPACE RESEARCH INSTITUTES AND IN PLANTS PRODUCING MILITARY HARDWARE. THE MORE VERSATILE AND LARGER-CAPACITY RYAD-IIS WOULD STRENGTHEN THESE MILITARY APPLICATIONS. ALSO, THE NETWORKING AND TIME-SHARING FEATURES OF RYAD-II WILL PERMIT MORE SOPHISTICATED MILITARY COMMAND AND CONTROL, AUTOMATED AIR TRAFFIC CONTROL, AND STRATEGIC PLANNING AND TARGETING.  
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