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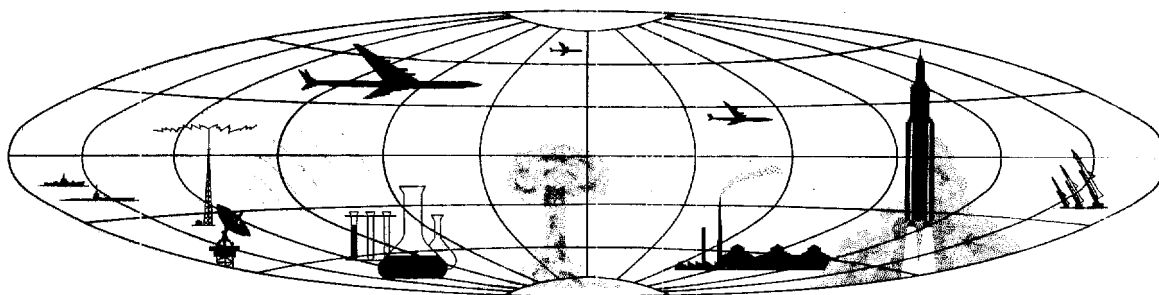
March 1961

PHOTOGRAPHIC INTELLIGENCE REPORT

**LINEAR ACCELERATOR  
UNDER CONSTRUCTION  
KHARKOV, USSR**



Published and Disseminated by  
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INTRODUCTION

A nuclear physics research installation featuring a large 2- to 4-BEV linear accelerator under construction is located approximately 7 nautical miles (nm) north of Kharkov, USSR (Figure 1). Coordinates for this installation are 50-05N 36-16E. Good-quality, oblique photography of the site was obtained in [REDACTED]

The installation covers an irregularly-shaped area of nearly 160 acres (Figures 2 and 3). It is served by the hard-surface, all-weather road connecting Kharkov and Belgorod. The nearest rail facility is found in Kharkov. Security facilities, consisting primarily of fences and walls, surround various sections of the installation. Guard towers are located throughout in a random pattern.

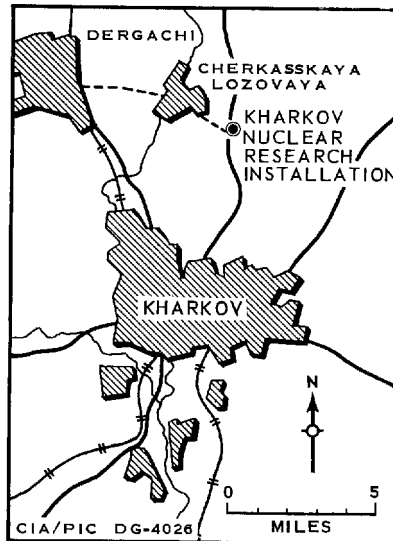


FIGURE 1. LOCAL ORIENTATION MAP.

The installation is self-contained in regard to housing, administrative, and related support facilities. Since construction is not yet complete, an abundance of temporary roads and sheds are in evidence.

Electric power to the installation is provided by a single-circuit power line, probably 110 kilovolt (kv) running in from a substation in north Kharkov.

This report examines the installation in general and the linear accelerator (Linac) building in detail.

GENERAL DESCRIPTION

The nuclear physics research installation can be readily divided into five areas (Figure 3) for purposes of study and description. The five areas delineated are (1) the Linac (Linear Accelerator) Area, (2) the Laboratory



FIGURE 2. KHARKOV NUCLEAR RESEARCH INSTALLATION.

and Shop Area, (3) the Electric Substation, (4) the Housing and Administrative Area, and (5) the Construction and Support Area.

The most important of these areas is the Linac Area. This area contains the largest facility to be found within the installation and certainly the most interesting with respect to potential contributions to Soviet nuclear physics.

Each of the areas within the installation are described below, with remarks limited to essential features.

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### Linac Area

The intended function of the Linac Area is believed to be advanced research in the field of high-energy physics.

Dominating the area is a long, narrow building under construction. It is enclosed within a perimeter fence (Figure 3, No 1). This Linac building when completed will house a linear accelerator and its attendant equipment. The latter part of this report discusses the Linac building in detail.

To the west of the Linac building are found some related facilities. These facilities include a coal-fired steam plant, a possible emergency power plant, a secured, earth-covered tank storage area, a possible demineralizer building, and several unidentified structures. Coal for the steam plant is probably trucked from Kharkov. The use of the five earth-covered tanks cannot be determined. Equipped individually with ventilators and served by a pump/control house, the tanks may possibly be used for storage of liquid nitrogen.

### Laboratory and Shop Area

Occupying the southern section of the installation is a laboratory and shop area. The activity within the area appears to be both scientific and technical. The presence of a large probable shop and several laboratories gives evidence of research efforts being conducted independently of the Linac Area. One of the laboratories (Figure 3, No 11) is believed to house a 400-MEV linear accelerator. 1/ The probable shop would provide engineering services to the various laboratories within its own area and also to the Linac Area.

The Laboratory and Shop Area is enclosed partly by wall and partly by fence, with an entrance gate at the northeast corner.

### Electric Substation

Located to the west of the Laboratory and Shop Area is an electric substation intended for servicing the entire research installation.

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KEY TO ANNOTATIONS, FIGURE 3		
Item	Description	Dimensions (ft)
1	Linear accelerator building u/c	1375 x 65 x 30
2	Building u/c	base 105 x 35 wings 50 x 30
3	Building u/c	90 x 30
4	Possible demineralizer building	90 x 35
5	Secured tank storage area	180 x 110
6	Steam plant	boiler house 130 x 75 control room 80 x 30
7	T-shaped building, u/c, possible emergency power plant	base 60 x 40 wing 50 x 20
8	Building u/c	60 x 30
9	Probable shop	190 x 80
10	L-shaped building, possible laboratory	base 150 x 45 wing 135 x 60
11	Monitor-roofed laboratory, flat-roofed extension	bldg. 240 x 110 ext. 110 x 40
12	Hip-roofed office building	100 x 60
13	Hip-roofed office building	165 x 45
14	Monitor-roofed building, probable laboratory	270 x 150
15	L-shaped building, probable laboratory	base 210 x 50 wing 135 x 55
16	L-shaped building, probable laboratory	base 210 x 50 wing 135 x 55
17	Low-voltage switching and control building	switching section 75 x 25 control section 65 x 50
18	Curved-roof vehicle/equipment maintenance shop	150 x 75

This small transformer substation is served by a single-circuit power line (probably 110 kv) carried from a substation in north Kharkov. This facility includes one 110-kv switching position, one 110/10- or 6-kv transformer (estimated capacity: 5.6, 10, or 15 megawatts), and a control and low-voltage switching building with an estimated 22 switching positions. At the west side of the enclosed substation area a tower has been erected which may indicate the future installation of a 220-kv circuit.

Power lines or poles from the Electric Substation to other areas of the research installation cannot be detected.

#### Housing and Administration Area

Partially secured by wall and fence this area contains a large administration building and a group of modern multistory apartments. The

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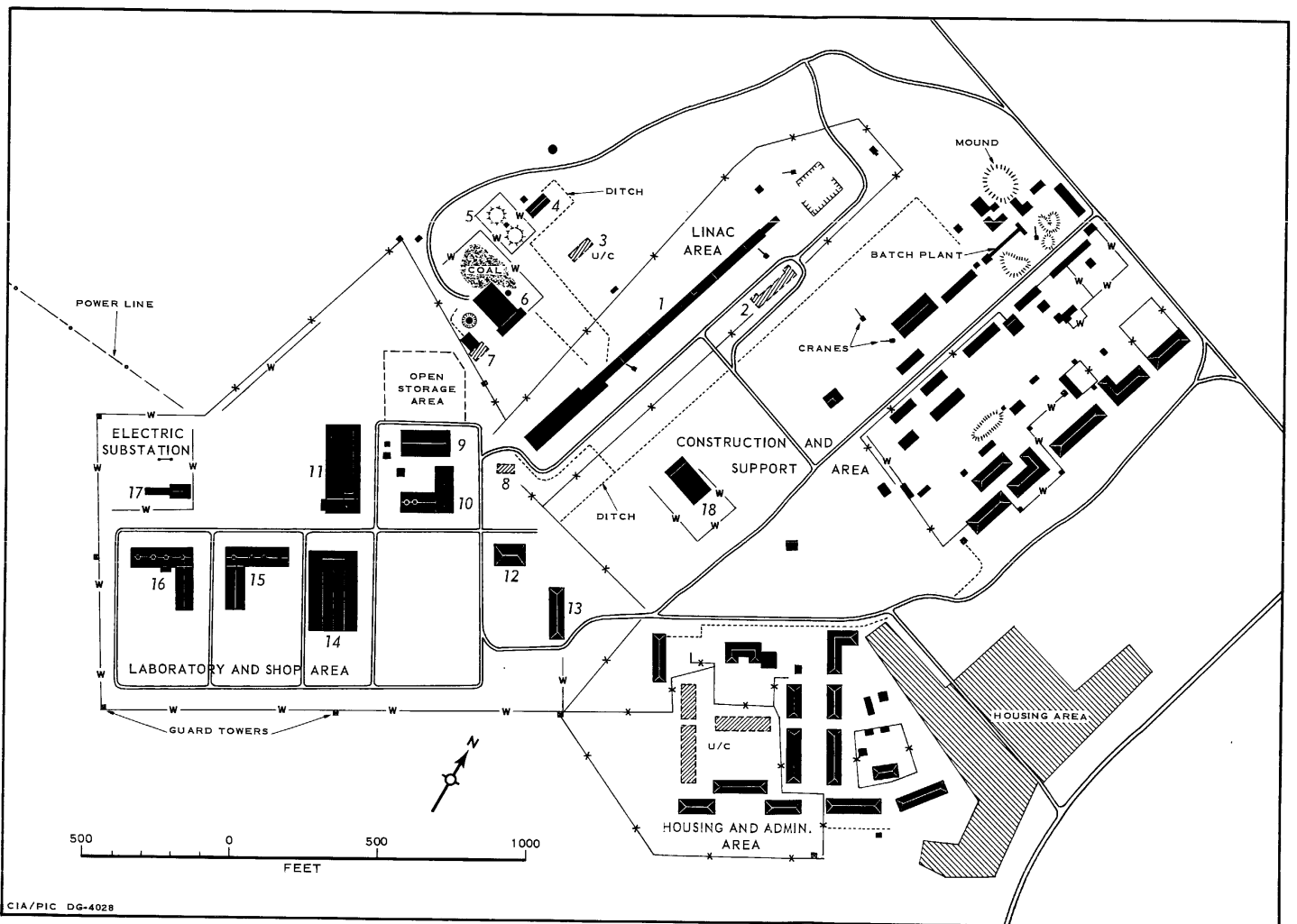


FIGURE 3. NUCLEAR RESEARCH INSTALLATION.

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apartments in the area are for the scientific-technical personnel employed at the installation. Three of the 14 apartment buildings are still under construction. When completed, an estimated 370 family units would be available for housing. This estimate is based on 720 square feet for each family unit. Located nearby is a small service area for the housing.

### Construction and Support Area

For the construction of the research installation a moderate size construction camp was established north of the Housing and Administration Area. This camp area includes shops, storage-buildings, housing, a probable vehicle/equipment maintenance shop and a concrete batch plant. It is apparent that a portion of this area, especially the housing units, will become a permanent part of the installation when construction is completed. At present it appears that the apartment-type housing is used only by the construction workers. The area is surrounded by a fence and wall with guard towers.

### LINAC BUILDING

The largest building within the research installation is a linear accelerator building measuring [REDACTED] in length. Since construction of the facility is still in progress, a complete description is impracticable. However, an analysis and comparison of the photography with some Soviet references 1/ does produce an interesting picture of the probable functions and characteristics of the facility when completed.

Apparently the building will consist of three sections; namely the administrative/maintenance section, the klystron/accelerator section, and the experimental section. These three sections are shown in a perspective drawing of the Linac building (Figure 4). The several building cranes also shown indicate areas where construction is not yet complete.

The marked similarity between an earlier Soviet design for this Linac facility, 1/ and the facility as it has actually taken form during con-

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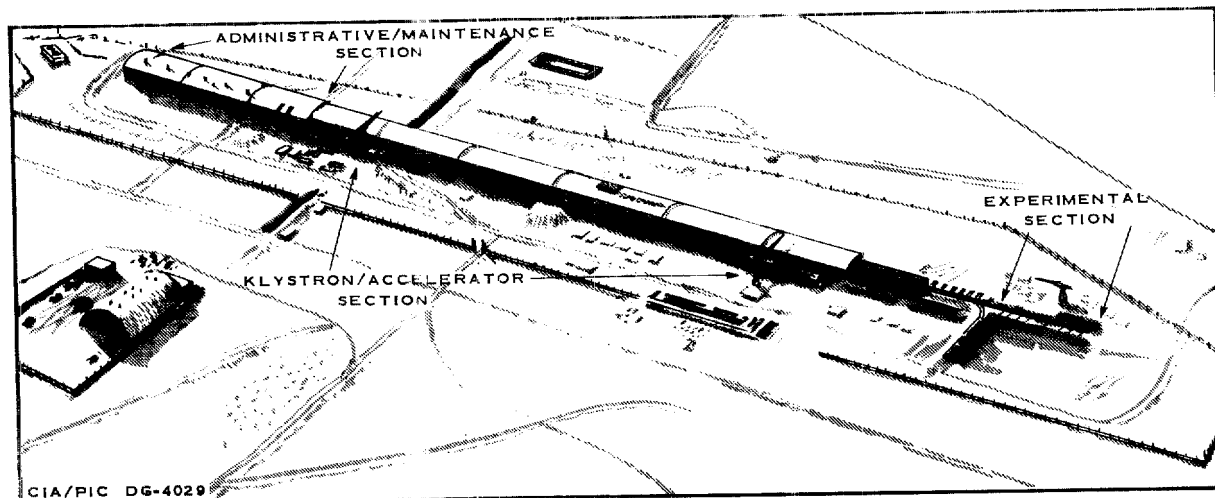


FIGURE 4. CONCEPT OF LINAC BUILDING AS SEEN FROM THE EAST.

struction is illustrated in Figure 5. Figure 5A represents a general schematic giving the earlier intended functions of the building and 5B shows the dimensions and functions of the different sections as interpreted from the photography. The breakdown of the functional sections as shown in Figure 5B would not be considered atypical for a linear accelerator of this size.

The purpose of each section, the administrative/maintenance section, the klystron/accelerator section, and the experimental section is implied in the name of the section. The administrative/maintenance section will probably contain several laboratories and storerooms, a mechanical workshop, and miscellaneous offices. The klystron/accelerator section appears to be constructed on two levels: the higher level to contain the klystron chamber and the lower level to contain the accelerator tube. In Figure 5B the representation of the accelerator gallery (lower level) is only approximate because the obliquity of the photography involved makes this section barely discernible.

The electron beam from the accelerator will be diverted possibly to one or more target installations to be found in the experimental section. A large excavation of about 15,000 square feet reveals the probable location of the experimental section. Some considerations governing the size

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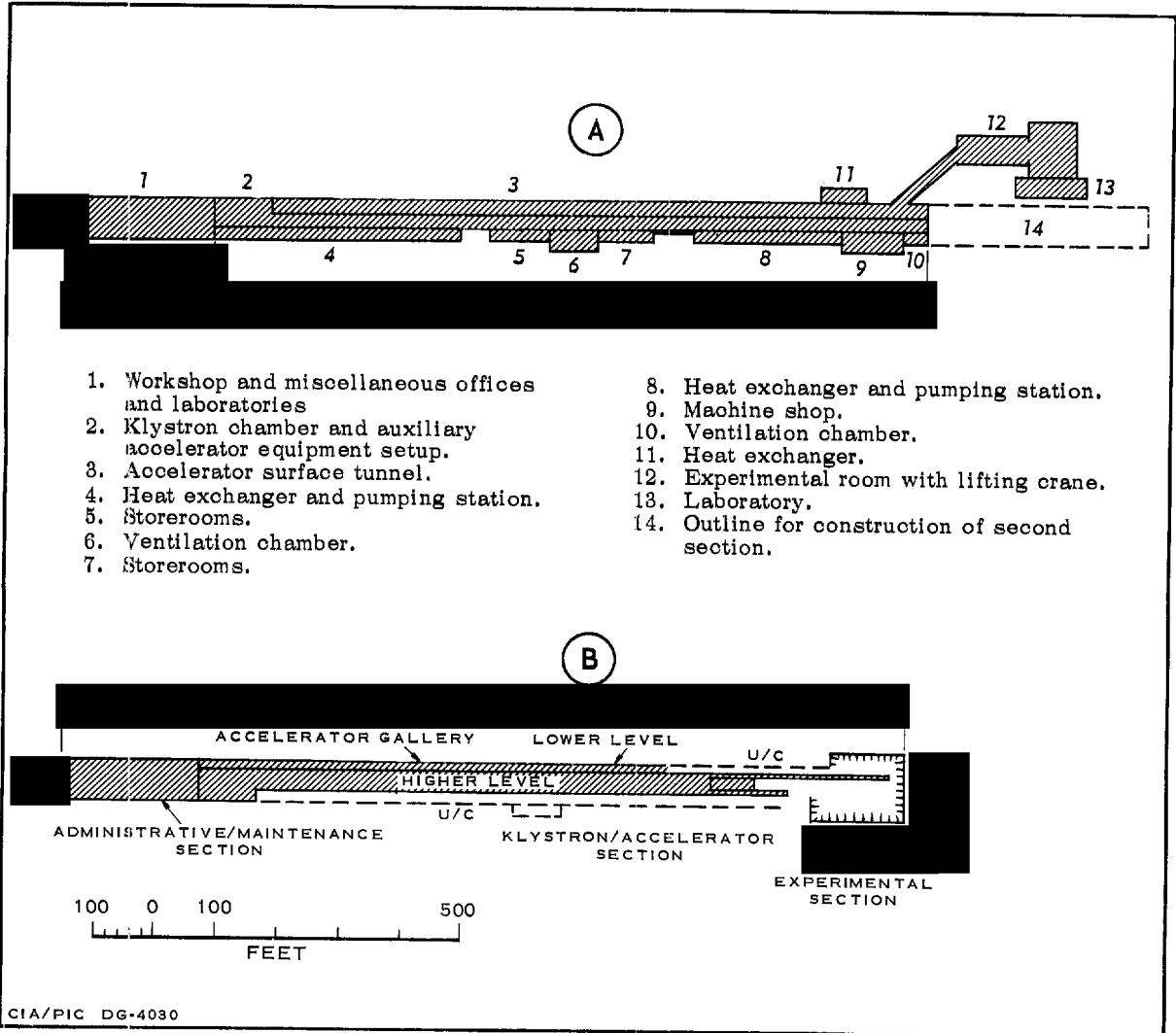


FIGURE 5. LINEAR ACCELERATOR BUILDING. This gives a comparison of earlier Soviet design, A, with facility as imaged on photography, B. Differences in dimensions may be attributed to measurement problems inherent in photography.

and shape this section may take are the necessity for adequate shielding around the targets and the probable requirement for an overhead crane to permit handling of the shielding and magnets.

There are no indications that the length of the Linac building will be extended beyond the presently planned experimental section. However, future extension of the electron beam with additional experimental facilities would appear rather easy to accomplish.

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### CONCLUSIONS

The nuclear physics research installation found outside Kharkov appears to be a facility of the Physico-Technical Institute, Ukrainian SSR Academy of Sciences, located within that city.

Because of the number of laboratory facilities within the installation it is evident that a major center of nuclear energy research is being developed here.

The major facility within the installation is a linear accelerator building under construction. When completed, this 2- to 4-BEV machine will not only demonstrate the technical competence of the Soviet Union in this field but will also greatly broaden their nuclear research program by providing laboratory-controlled particles in the BEV energy range.

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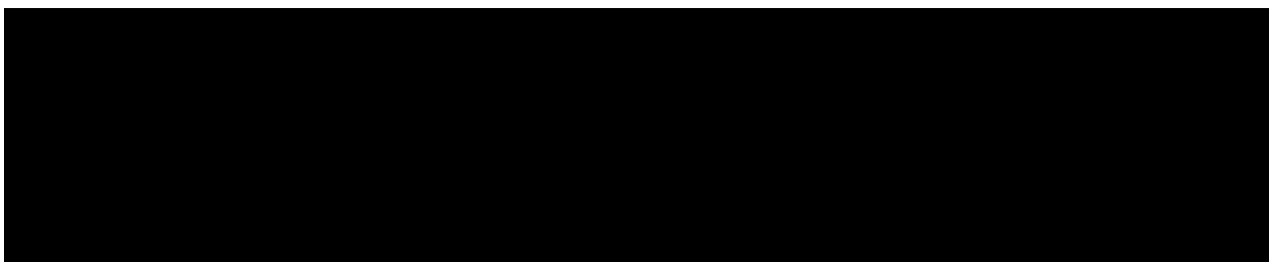
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REQUIREMENT: Prepared in answer to a request for a thorough check of all dimensions on the accelerator, comparing and contrasting the dimensions obtained with those given in the Soviet book referenced above.

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