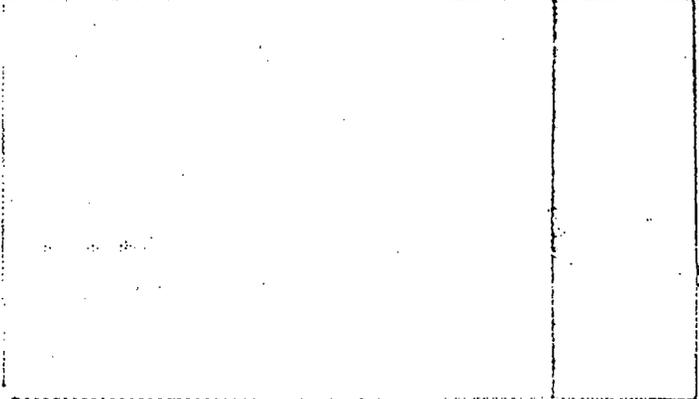


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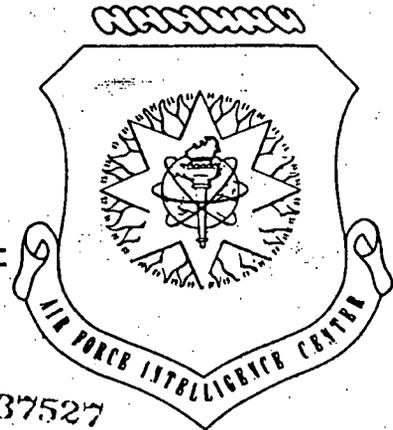
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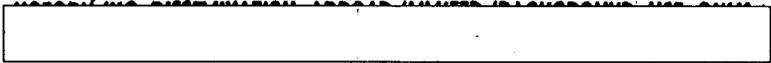
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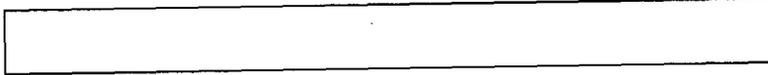
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ADDENDUM 1, 23 AUGUST 1962

TO

(U) REVIEW OF "CSDB REPORTS"

S-24-62

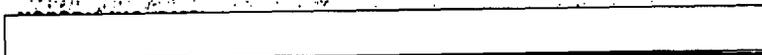
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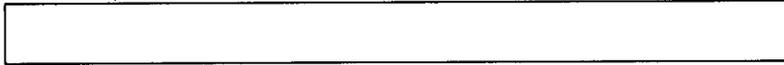
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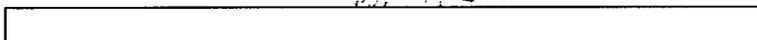
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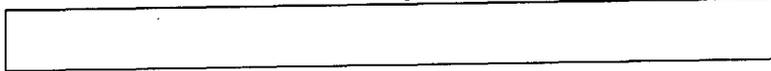
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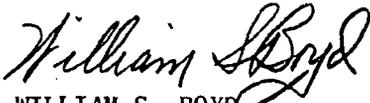


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FOREWORD

This is the first Addendum to AFIC Study No. S-24-62, 16 March 1962, "(U) Review of CSDB Reports" and is designed for summary treatment of IRONBARK reports received since the cut-off date of the above document. As was noted in S-24-62, the same classification and "need-to-know" criteria apply to this study as to the original IRONBARK reports. Also, the same reference system is used.

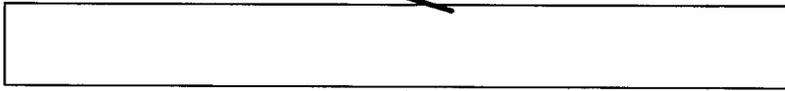


WILLIAM S. BOYD
Colonel, USAF
Commander
Air Force Intelligence Center

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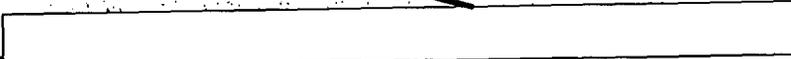
NOTICE

The codeword IRONBARK has been assigned to these TOP SECRET CSDB reports containing documentary Soviet material. The word IRONBARK is classified CONFIDENTIAL and is to be used only among persons authorized to read and handle this material.

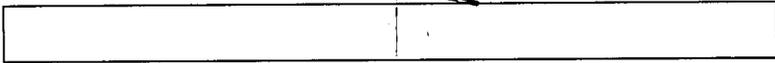
In the interests of protecting the source, all IRONBARK material should be handled on a need-to-know basis.

All portions of this study are classified TOP SECRET/NOFORN/NO DISSEM ABROAD/LIMITED/BACKGROUND USE ONLY.

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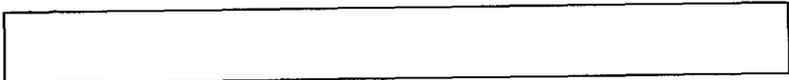
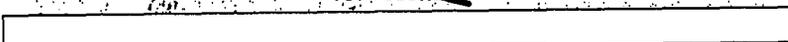
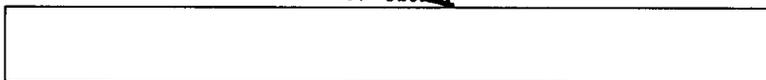


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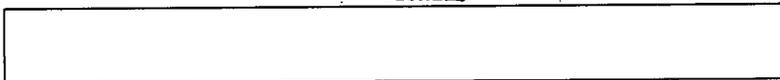
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PART I INTRODUCTION

A. Purpose

The purpose of this study is to summarize meaningful items of information contained in IRONBARK reports received since the cut-off date for AFIC Study No. S-24-62 and to synthesize them with information already covered in S-24-62.

B. Scope

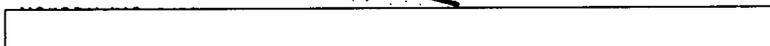
The scope of this study is limited primarily to an objective summary of actual expressions of the authors of the various articles contained in the "CSDB Reports." Conflicts in personal opinions between authors and between author and official positions of the Soviet Government, if they can be identified, are noted and where possible are evaluated. However, no attempt is made herein to extrapolate identified doctrinal or operational concepts beyond the pale of factual knowledge of Soviet practices.

C. Utility

IRONBARK reports already have been used extensively in preparing intelligence material on a variety of subjects. It is envisaged that this Addendum, together with AFIC S-24-62 and subsequent reviews of future IRONBARK articles, will be useful as précis of what this series of reports contain.

The Bibliography, as in S-24-62, contains a table showing selected subjects covered in each report which serves as a ready reference for readers.

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PART II CONCLUSIONS

IRONBARK reports listed in the Bibliography of this Addendum contain no new military concepts or developments beyond those discussed in AFIC S-24-62. In the main, these later reports provide additional material and wider participation by more Soviet high-ranking military personnel on the dynamism and conduct of modern warfare. Also, certain of the later articles indicate that a synthesis of thinking and a crystalization of doctrinal concepts have been accomplished or are taking place. These particular articles convey a measure of authenticity that connotes a stamp of official or semi-official approval. In particular, articles from the Strategic Missile Bulletin* appear to represent authoritative statements, including objective critiques on the results of exercises prepared by staff offices and other units of the Strategic Missile Troops, as opposed to the "think pieces" typical of many IRONBARK articles.

*61/, 64/, 78/, 94/, 101/, 102/, 104/, 105/, 110/, 115/, 121/, 125/.

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PART III SUMMARY

A. General

The IRONBARK reports reviewed and summarized in this Addendum reveal no new military concepts; however, they do provide additional material for study and analysis.

In the nuclear weapons and logistics fields an attempt was made to review all the extant CSDB documents, because it was found impractical to isolate analysis to those more recently received. Consequently, the sections on nuclear weapons and logistics are to be construed as a more or less complete exploitation of the CSDB reports in AFIC's possession.

In the organization of the nuclear weapons and logistics sections, material on nuclear weapon handling for various missile systems was included in the logistics discussion for the appropriate missile. A good deal of emphasis was placed on the logistics for ground force missiles because, in practice, it was found that logistics for strategic missiles bore much resemblance to and probably evolved from, earlier systems set up for shorter range missiles.

B. Aerospace Forces

1. Strategic

a. Strategic Missile Forces

(1) Missile "large units" and units of the High Command may be called in to combat the enemy's nuclear means on behalf of a 124/ Front.

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(2) A regiment equipped to launch R-12 missiles (MRBMs) is used mainly for the performance of strategic tasks. 64/

(3) A regiment is the operational entity responsible for carrying out missile strikes. 64/

(4) Between the CINC of Strategic Rocket Troops and the regiment is the division whose commander is designated as a "large unit commander." 64/

(5) Reaction time after attainment of Readiness Condition #1 is less than 30 minutes; after Readiness Condition #2, less than 1 hour; after #3, 2-2 1/2 hrs; after #4, 8 to 22 1/2 hrs. 64/, 124/, 141/, 131/

(6) Maximum use is to be made of the camouflage features of terrain and of natural camouflage conditions. 86/

b. Manned Bombers

(1) The value of flexibility afforded by aviation is emphasized. 129/

(2) A typical feature of modern bombers is their rapid obsolescence. Thought should be given to converting obsolete bombers to VTA transports. 129/

(3) Aerial reconnaissance means are not adequate. 89/, 63/

(4) The main problem of aerial reconnaissance is the creation of improved piloted and pilotless "flying machines" with high performance characteristics. 145/

2. Tactical

a. Methods of control of tactical forces (missiles, aviation, ground) are the important thing, and the improvement of communications should receive high priority attention. 90/, 138/

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b. The staff of the air army in a front offensive operation allocates nuclear warheads to the various delivery units and coordinates their employment. 67/, 85/

c. The main task of the frontal offensive, and hence its grouping, strength, and disposition, is the simultaneous destruction of the enemy to the entire depth of his operational formation. 68/

3. Air Defense

a. A consensus of opinion indicates a need for improved command and control of defense forces in a frontal situation. 75/, 88/, 90/, 138/, 148/, 120/

b. Deployment of SAM's on a front links zones of destruction and results in the beginning of an effective zonal air defense system. 128/, 142/

4. Naval Aviation

(Nothing new.)

C. Ground Forces

1. Authors disagree on the point that all troops of the front must shift to the offensive regardless of their condition at the beginning of combat operations. 77/, 80/

2. There also is a divergence of opinion on whether or not the present army control organizations for missile and nuclear weapons deployment are adequate. 88/, 90/, 147/, 35/

3. Missile troops have "emerged" in the form of front and army missile brigades as well as missile battalions of motorized rifle and tank divisions. Tactical missile "batteries" were employed in a divisional exercise in 1960. 75/, 69/, 111/

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4. The Soviets have "short-and medium-range front cruise missiles." ^{136/}
 5. In conducting an offensive operation, more air than surface nuclear bursts are usually planned, and in the conduct of a defensive operation this is reversed. ^{85/}
 6. The greatest effect from nuclear/missile strikes can be achieved if they are delivered simultaneously or in a strictly limited time. ^{85/, 141/}

D. Naval Forces

The advent of the missile launching submarine has added responsibilities to the Soviet Navy. Although basically the same antisubmarine operations are conducted against missile submarines as against torpedo submarines, the use of missiles against strategic targets and the comparatively long range of missiles has vastly increased the area to be covered by antisubmarine forces and the importance of detecting and destroying the submarines. ^{126/}

Rear Admiral O. Zhukovskiy indicates an appreciation of the problem and his views may represent the aims of the Soviet Navy. The capabilities of the Soviet Navy at present are believed to fall far short of the requirements for conducting antisubmarine warfare as outlined by Admiral Zhukovskiy. ^{126/}

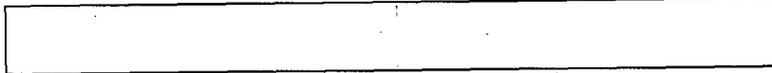
E. Special Weapons

1. Nuclear

The general tenor of the later IRONBARK reports continue to suggest that the Soviets have large quantities of nuclear weapons on hand. In general, they merely add more discussion to the same material contained in AFIC S-24-62.

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2. Chemical

a. Chemical weapons are considered to be an integral part of the armament of Soviet tactical forces. ^{96/}

b. The plan for employing CW missiles dictates that they will be employed as a normal weapon during an all-out conflict. ^{96/}

3. Radiological

(Nothing new.)

4. Nuclear Targeting

a. Nuclear yields required to destroy certain targets are discussed. ^{103/}

b. Procedures and ideas on the use of nuclear warheads are discussed. ^{128/}

F. Logistics

1. General

The combat readiness of the rear services must correspond to the level of combat readiness of the troops being supported. ^{69/}

2. Military Transport Aviation (VTA)

a. Development and strengthening of VTA is an absolute necessity in the furtherance of nuclear warfare.*

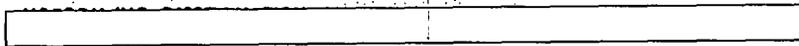
b. Helicopters may be used for radiation reconnaissance, troop control, refueling tanks, and general purposes. ^{10/, 39/, 74/}

3. Missile Troops of Ground Forces

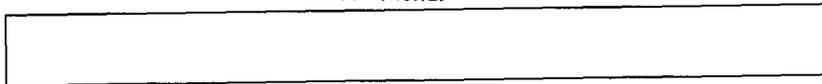
a. Success of operations depends on the uninterrupted and timely delivery of fuel, nose cones, and nuclear charges. ^{53/}

*Reference Bibliography Nos. 4, 8, 10, 27, 29, 38, 39, 40, 53, 58, 67, 68, 69, 77, 91, 119, 127, 130, 133, 134.

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b. Exercises have indicated that the logistic system is cumbersome and vulnerable. ^{69/} ^{53/}

4. Aerospace Forces

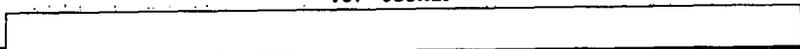
a. The R-12 (MRBM) regiment usually operates in an area of up to 20 square kilometers. ^{81/}

b. Readiness conditions are discussed. ^{64/}

c. Training equipment is prepared and supplied to units by the Chief Directorate of Missile Troop Equipment (GURVO). ^{94/}

d. In many cases, missile units are reinforced with officers who have no previous training in missile specialties. ^{94/}

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PART IV. APPENDICES

A. Aerospace Forces

1. Strategic

a. Organization and Mission of Strategic Missile Troops --

Articles in later issues of the IRONBARK series dealing with the organization and mission of strategic missile troops are in agreement with the statements and evaluations presented in S-24-62. The role of strategic missile troops in support of a front, however, has been dealt with by several authors who re-emphasize the subordination of this force to the Supreme High Command (VGK). For example, Chief Marshal of Artillery S. Varentsov in an article dated August 1961 has written that:

"In case of need, missile large units and units of the missile troops of the High Command may also be called in to combat the enemy's nuclear means on behalf of a front. They will be used for the destruction of the main enemy nuclear objectives, which are unattainable for the missile troops of the front or for the front's aviation. To such objectives belong the assembly bases and depots, the launch sites of long-range ballistic missiles, communications centers, airfields, ports, loading and unloading stations and the sites of cruise missiles..." 124/

Another writer, Lt. General V. Baskalov, states explicitly that:

"...destruction of the operational and strategic nuclear/ missile weapons and the following echelons of ground troops, located beyond the depth of the front operation, must be accomplished with weapons of the General Headquarters of the Supreme High Command..." 91/

Further information on the organization of the strategic missile troops is contained in a report 64/ not fully exploited in S-24-62. This report reveals some of the functions of the Main Staff of the Missile

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Troops, probably the most important and largest organization in rocket troops headquarters:

"...a regiment is put on combat duty on the basis of a combat order from the Main Staff of the Missile Troops." 64/

"Five missions for the destruction of objectives (targets), the coordinates of aiming points, the expenditure of missiles for each objective, the order on the sequence of destruction of targets are determined by the Main Staff of the Missile Troops." 64/

"...a combat alert signal [is] prearranged by the Main Staff of the Missile Troops which is received by the regiment." 64/

This same report 64/ also clearly indicates in a number of references that in the Strategic Rocket Troops the regiment is the operational entity responsible for the carrying out of missile strikes. As such, the regiment has direct communications with, and is operationally subordinate to Headquarters Strategic Rocket Troops.

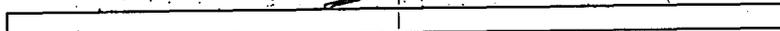
"...direct communications are organized between the Commander-in-Chief and each missile regiment." 64/

The subordination of the regiment to higher echelons and regimental sub-units is treated in paragraph l. g.

b. Targeting and Intelligence -- Later IRONBARK publications continue to reflect the concern of a number of military authors with the problems of targeting and intelligence and, in particular, with Soviet reconnaissance capabilities. Some of the suggestions advanced for improving Soviet reconnaissance, as such, are discussed more fully below in paragraph f.

Determining the location of allied missiles and nuclear weapons is confirmed as a primary intelligence requirement by several articles.

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For example, Chief Marshal of Artillery S. Varentsov, writing on the problems facing his ground force missile troops, lists the following as key intelligence objectives:

- "-the launch sites of missile batteries
- the firing positions of artillery batteries which use nuclear ammunition.
- the base airfields of bomber and fighter - bomber aircraft
- the assembly bases and depots for nuclear ammunition." 124/

Similarly, it is evident that in "front operations," at least, the missile troops have become the main consumers of intelligence data provided by reconnaissance. A December 1961 article in Military Thought by a Colonel G. Yeletskikh summarizes, by consumer, the reconnaissance flights made during one exercise:

- "-on behalf of the missile troops - 65-70%
- of the ground troops - 20-22%
- of aviation - 8-10%" 139/

In discussing the threat posed by U.S. missile-carrying submarines, one author seemingly envisions an intelligence, and possibly a combat role, for artificial earth satellites. Admiral V. Kasatonov writes:

"Apparently, the new possibilities in accomplishing this important task [detection and destruction of enemy submarines] may take into account orbital means of combat which are based on the use of artificial earth satellites."

"In our opinion, the essence of the problem is to create effective means for the distant detection of submarines from the air which will make it possible to employ for their destruction--missiles with nuclear charges launched from submarines and aircraft and possibly also from shore launching positions." 118/

While most of the Soviet military writers who discuss targeting and intelligence subjects make recommendations for improving Soviet capabilities in these fields, at least one writer expresses concern about the

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success of enemy intelligence and the state of Soviet security. Writing about the measures the Soviets should take to lessen the success of a possible surprise attack on the USSR, he recommends measures:

"...to stop providing the enemy with important intelligence information. In the central papers it is frequently possible to see diagrams showing new industrial installations which have appeared during the last five-year plans; for instance a map of Kazakhstan with an exact indication of the location of new industrial centers and their production capacities; a great deal of varied information characterizing our economy may be obtained from republic and oblast papers; and some responsible individuals--deputies of the Supreme Soviet of the USSR, speaking at sessions in the presence of foreign correspondent--spies provide precise information concerning the types and volume of production output and the location of installations." 59/

c. Dummy Sites and Camouflage -- Earlier IRONBARK

articles previously evaluated in S-24-62 suggested that deception, including camouflage and dummy sites, might be an important principle for maintaining the security of the strategic missile forces. Several articles from the Strategic Missile Bulletin received since publication of S-24-62 confirm this estimate.

One such article 86/ is completely devoted to the subject of camouflaging the primary siting areas of medium range missiles. This article indicates that major emphasis is placed on concealment through siting in terrain offering natural camouflage:

"As the basis for camouflage of the installations of missile troops, the principle must be laid down that maximum use is to be made of the camouflage features of terrain and of natural camouflage conditions." 86/

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Artificial camouflage, including tree branches, painted canvas, and nets, is also recommended:

"Artificial cover--horizontal, vertical, and overhead camouflage--cover--is the most effective means of concealing equipment and structures as well as sites and installations as a whole from aerial reconnaissance and visual observation. Using these camouflage covers in combination with dummy treetops and with vegetation camouflage, good concealment can be attained of launch pads, sectors of roads with hard surfaces, large structures, equipment, etc., which are most difficult to camouflage." 86/

Without specifying the type of missile involved, although written in general about medium range strategic missiles, the article refers to the problem of camouflaging the launch pad itself:

"The most complicated problem is the camouflaging of a launch pad with a missile on the launching platform. One method proposed is the construction of a horizontal sliding camouflage cover at a height of 6 to 8 m. This cover will conceal both the pad and all the special equipment on it. When raising the missile to the firing position, the cover slides apart 5 to 6 m from the center. The part of the missile protruding above the cover is camouflaged to resemble a group of trees with the aid of camouflage garlands made from polyvinyl chloride sheet. In this instance, the hoisting--transporting trailer and the erector boom are used for attaching the camouflage devices." 86/

The use of dummy or decoy sites is also envisioned:

"Camouflage comprises a series of measures for concealing structures in the siting area, for setting up dummy targets, and for changing the pattern of landmarks around the siting area." 61/

"To create the necessary camouflage effect, along with the erection of dummies, the activities typical of the installation represented by the dummy must also be carried out." 86/

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Measures are also recommended for "radio, illumination, and sound camouflage" and for "concealed control of troops." 86/

As part of the camouflage problem, the possibilities of radar deception are also discussed:

"Radar deception is done with the purpose of confusing the enemy's radar reconnaissance and his air operations against the missile regiment's siting area. It can be achieved by using vegetation (woods and other vegetation) and by setting up corner reflectors, metal nets, and anti-radar coverings both at places which stand out around the siting area (inhabited points, railway bridges, ponds, lakes, distinctive bends in rivers, etc.) as well as in the siting area itself. The more complicated antiradar deception tasks, which are beyond the capabilities of the regiment's personnel, will be carried out by special engineer troops within the general camouflage plan for the territory." 61/

d. Role of Manned Aircraft -- Earlier IRONBARK documents reviewed in S-24-62 indicated a debate in Soviet military circles relative to the importance of manned aviation in a nuclear/missile war. Although there were some dissenting voices, most writers seemed to hold the view that manned "aviation will keep its significance for some time yet." 41/ Even those authors who believed that the dominant position of the manned bomber in strategic aerospace operations has already been taken over by the missile troops saw other important roles for manned aviation, including support for the ground troops and fleet, and reconnaissance.

Later IRONBARK sources do not change this picture. The value of the flexibility afforded by aviation is emphasized in a number of the later articles. The use of manned aircraft to provide nuclear strikes while missile units were not in launching condition was suggested by a Major General N. Stashek, who wrote:

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"The most important thing... is to increase at this time the capabilities of the combined arms and tank armies to use nuclear weapons by increasing the number of their missile troops, and also by assigning for the support of each advancing army a larger amount of bomber and fighter-bomber aircraft which will deliver nuclear strikes during the change of launch sites and while missile troops prepare for subsequent launchings." 129/

Another author, writing about the need for additional air transport capability, foresees the continuing use of obsolescent bomber types in a transport role. He writes:

"A typical feature of modern bombers is their rapid obsolescence. This peculiarity urgently demands that very serious thought be given to using them not only according to their specific responsibility, but, after appropriate minor re-equipping, as a reserve of the VTA, to fulfill the needs of air transport and parachute landings of personnel and material." 133/

e. Atomic-Powered and Rocket Aircraft -- Later IRONBARK documents add very little on this subject not already contained in S-24-62.

f. Reconnaissance -- Reconnaissance continues to be treated in the IRONBARK series as a critical element in the Soviet military posture and one which needs considerable improvement. Two aviation officers, Colonel General S. Mironov and Major General M. Muskin, for example, point out:

"On the basis of a study of experience from the combat training of troops and the state of the means of reconnaissance, it can be said that the troop demands levied on the organs and means of reconnaissance significantly exceed the capabilities of the latter. This pertains mainly to aerial reconnaissance, the status of which causes us particular alarm." 89/

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They add that existing reconnaissance aircraft are "mainly of obsolete construction (TU-16R, IL-28R, MIG-15R bis), with low performance characteristics and extremely limited capabilities for overcoming an enemy PVO system." 89/

By way of recommending improvements, another author points out that:

"For the successful conduct of aerial reconnaissance, special reconnaissance aircraft are needed, capable of conducting observations from various altitudes (from 100 meters up to 25 to 30 km) and having a great range of speeds (up to 2000 to 2500 km/hr) and sufficient range and direction of flight. It is perfectly obvious that such aircraft must have improved flight and ground technical equipment, enabling them to conduct reconnaissance and photography by day and night from any altitude, to conduct television and radio technical reconnaissance, and to rapidly transmit data on the enemy with the use of automatic coding and secure transmission apparatus." 63/

In addition to recommending improved facilities and equipment, Colonel General Mirony and Major General Muskin argue that a number of organizational and administrative changes are necessary. Specifically, they recommend that "the direction of strategic, operational and tactical aerial reconnaissance...should...be concentrated in appropriate intelligence centers." Under this concept:

"The forces and means of strategic aerial reconnaissance of the armed forces, including satellite reconnaissance, should be concentrated in a special center of the air force, which would be responsible for providing intelligence data both to the Supreme High Command and to all types of armed forces. The forces and means of operational and tactical aerial reconnaissance should be concentrated in the intelligence centers of air armies (air forces of fleets or groups of troops) which would be responsible for furnishing intelligence data to the troops of the district (front or fleet)." 89/

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Recommendations for removing operational control of the reconnaissance force to non-operational commands do not go unchallenged in the IRONBARK series. In arguing against such views, one author points out that:

"Inasmuch as the air army staff knows the tasks for reconnaissance and inasmuch as it is better informed than the front intelligence directorate concerning the capabilities of reconnaissance aircraft crews and the actual conditions of enemy PVO forces and means, the air army staff is able to cope independently with the organization of prompt, reliable and stable aerial reconnaissance." 145/

He cites as another advantage of retaining the existing organizational structure, that the air army commander can entrust some reconnaissance tasks to regular combat units while they carry out their basic tasks. He points out that "in a number of cases, the air army staff entrusts [non-reconnaissance combat crews] with up to 40 percent of the task of aerial reconnaissance." 145/

However, divergent may be their views on the organization of reconnaissance forces, the writers seem to be in general agreement that:

"The main problem of aerial reconnaissance is the creation of improved piloted and pilotless flying machines with high performance characteristics, and also the creation of appropriate electronic reconnaissance equipment and automatic devices for processing and transmitting reconnaissance data." 145/

g. Missile Sites and Organization at the Launcher Level -- IRONBARK reports have added to our knowledge of missile sites and have provided considerable information on the missile force organization at launcher level and above. Most of the writing deals with deployment

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of MRBM missiles, although ICBM's are occasionally mentioned. (Since this subject was not covered in S-24-62, references are made to reports preceding No. 66 of the IRONBARK series).

An article in the first issue of the Strategic Missile Bulletin, in particular, has provided a great deal of information on MRBM sites and organization. According to the article a regiment is the operational entity responsible for carrying out of missile strikes. "...a regiment equipped to launch R-12 missiles [probably the 1100 nautical mile MRBM] is used mainly for the performance of strategic tasks." Each MRBM regiment is composed of missile battalions, probably two: "The command post of a regiment is located in the siting area of one of the battalions." 64/

A statement regarding data preparation for battalions suggests that each battalion has four launch pads:

"...the calculation of initial data for a mean point in a battalion siting area, instead of analogous calculations for each launching point, allows a four-fold reduction in the number of calculations." 73/

The number of batteries in a battalion has not yet been indicated in the series, but it has been estimated from other information that there are two launch batteries to a battalion of two launchers each. Other supporting elements in a battalion consist of a "technical battery" 68/, "data preparation section" 64/, "fuel and transport section" 64/, and a "geodetic support section" 64/.

An indication that ICBM's are deployed from fixed sites, while MRBM's are at least transportable, is contained in such statements as:

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"As distinct from the other types of armed forces, units and sub-units of intercontinental missiles at present lack the capacity to move freely on the terrain and they carry out their battle tasks from the primary siting areas. Only units equipped with intermediate range missiles can change their primary siting areas for alternate areas. However, even these units will also carry out their tasks for the initial phase of war mainly from the primary siting areas which were constructed in peacetime". 86/

The dimensions and characteristics of a primary siting area are described as follows:

"Launch pads are dispersed at an insignificant distance from one another in the siting area. As a rule, this distance does not exceed 150 to 200 meters. The launching points may be deployed in a line or in a checkerboard pattern." 78/

"...The primary siting area is equipped in advance with launching mounts, with storage shelters for missiles, nosecones and missile fuel with shelters for personnel, for command posts and combat equipment, and with other stationary structures and hard-surface roads." 64/

In addition to the fixed primary launch site area assigned to the regiment, "one or more alternate areas are prepared for the regiment equipped with field-type engineer structures." 64/ The alternate areas may be located within 10 miles of the regiment's primary siting area and, like the primary sites, are prepared in advance. A regiment may be moved from its primary siting area to an alternate siting area for the following reasons:

(1) "...the prolonged presence of a regiment in one siting area greatly increases the probability of discovery of its elements of combat formation by reconnaissance, which makes it possible for the enemy to deliver nuclear/missile strikes at the beginning of combat operations."

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(2) "When the actual threat of an enemy nuclear attack arises it is essential to take measures to move the regiment from the primary siting area and to relocate it in an alternate siting area or in another area which provides for an opportunity for the further performance of combat tasks."

(3) "In the event that it is impossible to fulfill combat tasks, for example, because of enemy fire."

(4) "On the reception of new and unscheduled fire missions which cannot be fulfilled from a particular siting area."

(5) "When it is impossible for personnel to remain in a particular area for a prolonged period because of high radioactive contamination."

(6) "In the event that several launchings have been carried out from the primary launch sites, which increases the likelihood of their being located by interception by the enemy, and in other cases." 64/

Communications within a primary siting area and with higher headquarters, both division and CINC of Missile Troops, are described below:

"The control of the regiment in one of the exercises was carried out from the central command post by the Commander-in-Chief of Missile Troops, by means of commands (signals) transmitted to the command post of the regiment through the communications center of the division command post. The signals were transmitted over permanent wire communications with the help of a secrecy device (ZAS) and were duplicated over high frequency communications. The control of the sub-units of the regiment and RTB was carried out from the command post of the regiment located in the primary siting area of one of the battalions. This location of the command post allowed the commander of the regiment to carry out the direction of the sub-units not only by technical means of communications but also by personal contact with the commander of the missile battalion, of the transportation and fueling battalion, and with the chief of the RTB." 64/

The above statement, as well as other IRONBARK sources, clearly establish the existence of a division (frequently referred to as "the large unit") between the CINC Strategic Rocket Troops and the regiment.

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h. Missile Operations -- IRONBARK Series Report No. 64 on the preparation for combat of an MRBM regiment has contributed significant information on the readiness conditions of MRBM forces and the various operations performed and times required for each stage of readiness. The document contains the statement that "depending on the situation and on the nature and importance of the tasks being performed, the personnel and combat equipment of a regiment and of an RTB may be found in various degrees of combat readiness (Nos. 1, 2, 3 or 4)." The operational procedures associated with each stage appear to be as follows:

(1) Readiness No. 4 -- The exact disposition of materiel and personnel in Readiness No. 4 can vary considerably. Regimental and Technical Repair Base (RTB) personnel may be fully or partially deployed in the primary siting area, or they may be in their permanent location which is indicated to be some 10 to 30 miles distant:

"...To ensure combat Readiness 4, the personnel of a regiment and RTB may be situated (completely or partially) in the primary siting area or in their permanent location [also known as disposition site]."^{64/}

"When Readiness Nos. 3, 2 or 1 is announced the missile regiment and RTB are moved to the siting area at full strength."^{64/}

Normally specially detailed combat duty crews, at least, will man the regimental and battalion command posts in the primary siting area at all times:

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"In order to ensure firm and constant control of regiment and RTB on combat duty...round-the-clock duty is organized for specially detailed combat crews at the command posts of the regiment and of battalions. The duty shift of a combat crew at a Regimental Command Post usually includes a Regimental Duty Officer, an RTB Duty Officer, a Communications Duty Officer, radio telegraph operators, telegraph operators, communications center telegraph operators and radio relay technicians."

In the event that the regiment has been activated prior to the completion of construction in its primary siting area, personnel will, as a rule, be located in the permanent disposition area:

"...when the construction of storage facilities and structures in the primary siting area is not yet completed, ...regimental sub-units will, as a rule, be located in the permanent disposition area..." 64/

The regiment's stocks of "missiles, component parts, nosecones, ground equipment, missile fuel and...the other material supplies" are normally stored "in the regiment's primary siting area," except when necessary storage facilities have not been completed, in which case they will "be located in the permanent disposition area." 64/

(2) Readiness No. 3 -- In Readiness No. 3 the full strength of the regiment and RTB are deployed in the primary siting area. If the regiment's sub-units had been located in the primary siting area while at Readiness No. 4, personnel merely proceed to their combat duty stations. Ground equipment is deployed and procedures for bringing the missiles and nosecones to prescribed states of readiness are commenced. Steps are taken "to transport the nosecones to the launching areas [pre-launch storage point] and to mate them with the missiles." 64/ At the same time tank trucks are filled with fuel and

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oxidizer at the siting area storage facility.

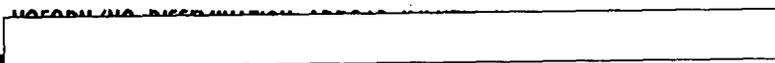
As indicated above, however, some or all of the regimental and RTB personnel may be located at the permanent disposition area when the signal to proceed to Readiness No. 3 is received. In such circumstances, personnel must first be brought to "assembly areas" and then transported to the primary siting area. If the storage facilities in the primary siting area have not been completed and, as a consequence, the missiles, nosecones, fuel and other supplies have been stored elsewhere, additional measures are required to bring the regiment to Readiness No. 3. "Transport and fueling sub-units of the battalion" must be directed to "missile and nosecone unloading points and to Ministry of Defense fuel supply dumps" ^{64/} to pick up missiles, nosecones and fuel and deliver these items to the siting area. One-way distances of up to 60 miles may be involved in these operations:

"...the execution of a march of up to 100 k.m. by the transport and fueling sub-units of the battalion..." ^{64/}

"...the missile fuel components are stored at the closest USG MO dumps (at a distance of up to 100 k.m.)." ^{64/}

Regimental and RTB personnel will in the meantime have moved to the siting area, as indicated above, and will have prepared to receive these deliveries. Subsequent actions are the same as indicated above for a situation in which personnel and materiel are already in the siting area when the alert is received. Variations of these operations will take place depending on the exact disposition of men and materiel at

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the time Readiness No. 3 is called for. For example, missiles and nosecones might be situated in the siting area while the fuel is stored at the closest Ministry of Defense fuel dump (up to 60 miles distant). Thus, depending on the exact conditions, the time required to reach Readiness No. 3 will vary considerably. According to IRONBARK document #64, this time may vary "between 6 to 20 hours." The document, however does not clearly define any situation that would require as little as 6 hours. The minimum time requirement clearly identified in the document is 10½ to 11 hours, when both personnel and materiel were located in advance in the primary siting area:

"Thus, if the regimental sub-units are located in the primary siting area, the regiment's transition from Readiness No. 4 to Readiness No. 3 can be carried out in 10½ to 11 hours..." 64/

It is believed that this constitutes a more normal minimum requirement. The 6-hour time is probably dependent upon improving the capabilities of the RTB assembly units responsible for readying the nosecones, as there is an indication that this is presently the most time consuming operation and should be improved:

"...the time necessary to convert the missile regiment to Readiness No. 3 can be almost halved if the productivity of the RTB's assembly brigades bringing nosecones to SG-5 [an undefined readiness condition applicable to nosecones] corresponds to the productivity of the missile battalions of the regiment in the technical preparation of missiles for launching." 64/

The author of IRONBARK document #64 adds that:

"After transition to Readiness No. 3, the missile regiment may remain at this state of readiness for some time, or, upon a signal from the Central Command Post, it may pass to a higher degree of readiness or may prepare missiles directly for launching." 64/

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(3) Readiness No. 2 -- On receipt of the signal to pass from Readiness No. 3 to Readiness No. 2, the missiles (now mated with nosecones) are moved from pre-launch storage to the launching platforms. Prescribed operations to bring the missile to Readiness No. 2 are carried out. Accelerometers are set and the missiles are "aimed at first volley targets." 64/ This apparently involves precise alignment of the missiles with reference to a theodolite. Fuel and oxidizer are "delivered to the launching platforms and readied for the fueling of the missiles." 64/

From Readiness No. 2 the missiles may be brought to Readiness No. 1, or they may be prepared directly for launching. "The launching of missiles from Readiness No. 2 must be carried out not more than an hour after the regimental commander receives the command to launch." 64/

(4) Readiness No. 1 -- On receipt of the signal to pass from Readiness No. 2 to Readiness No. 1 missiles are fueled and the aiming is checked. The missiles are apparently fueled directly from tank trucks.

The need for re-checking the "aiming" after fueling may be explained by another IRONBARK document which refers to "the distortion of the missile elements during its fueling." 115/ "The launching of missiles from Readiness No. 1 must be accomplished not more than 30 minutes after the moment when the regimental commander receives the signal to launch." 64/

For reference convenience, the readiness conditions and operations associated with each, as spelled out in IRONBARK document #64, are summarized in Table I, Page 28.

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Based on the operations described in this important document, reaction times for the various conditions of readiness can be summarized as follows:

Reaction after attainment of readiness condition:

- #1 Less than 30 minutes
- #2 Less than 1 hour
- #3 2-2½ hours *
- #4 8** to 22½ hours

As indicated in the paragraphs above, this document provides a substantial amount of evidence concerning the readiness conditions of strategic missile units. Other recent IRONBARK articles suggest, however, that a portion of the missile force, referred to as "duty sub-units" may be maintained in a higher state of readiness than designated for a regiment as a whole.

An article written by Chief Marshal of Artillery S. Varentsov, for example, contains the statement:

* This assumes that the missiles will be prepared for launching directly from Readiness No. 3. The process is somewhat slower--up to 4 hours--if the missiles are brought first to Readiness No. 2 and then to Readiness No. 1, prior to launching. Also, this figure pertains only to the first missile launched from a given battery. Apparently because of guidance equipment limitations, the second missile of the first salvo will be launched approximately 6 minutes after the first: "The launching of missiles...was carried out in 2 hours and 6 minutes and in 2 hours and 12 minutes." ^{64/}

** This assumes that measures have been taken to improve the capabilities of the warhead checking crew, as recommended by the author of IRONBARK document #64. If not, this figure would read 12½ hours.

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"...duty missile sub-units of army and front missile brigades can be ready to launch a missile within 15 to 20 minutes of the receipt of the coordinates of a target and sub-units of tactical missiles within 8 to 10 minutes." 124/

Another writer makes reference to "the commanding officer of the battalion from which was assigned the duty launch battery." 141/

Some idea of the proportion of missile units in a "duty" status is provided by another IRONBARK source:

"...of those missile battalions which are ready for firing not less than one-third of the launching mounts will be on a duty basis with nuclear missiles." 131/

The above-quoted writers are speaking of ground force missiles, probably of 30 to 300 k.m. range. It must be considered likely, however, that a similar concept of "duty" missiles is also found in the strategic missile force. This idea is definitely suggested in another article which is known to be speaking of strategic missiles:

"It is necessary to make use of the time spent by sub-units at the complex (when doing combat duty), mainly to conduct special training and comprehensive exercises. This may be achieved by curtailing the training time of sub-units located in the main camp and detailing them in turn to do guard duties on the sites for a period of 5 to 7 days. In this case, an opportunity will be presented to the duty sub-units to carry out to the full their combat duty and to engage profitably in combat training." 110/

This quotation also suggests a possible correlation between the training cycle of strategic missile units and their assumption of "duty" status.

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TABLE I

MRBM READINESS CONDITIONS AND ASSOCIATED OPERATIONS
(As Evidenced by IRONBARK Document #64)

READINESS #4	ITEM	TO ACHIEVE READINESS #3	TO ACHIEVE READINESS #2	TO ACHIEVE READINESS #1
<p>In Readiness #4 regimental and RTB personnel may be in the primary siting area or in their permanent disposition area. Materiel will normally be stored in the primary siting area except in cases where construction of storage facilities and other structures has not been finished, in which case it will be stored at the nearest depot. Operations in parentheses () in columns to right indicate those required when personnel and equipment are not in the primary siting area.</p>	Regimental personnel	<ul style="list-style-type: none"> -(Move to primary siting area) -Take duty stations 	-Remain at duty stations	-Remain at duty stations
	RTB personnel	<ul style="list-style-type: none"> -(Move to primary siting area) -Take duty stations 	-Remain at duty stations	-Remain at duty stations
	Missiles	<ul style="list-style-type: none"> -(Transported from depots to siting area) -Checked and brought to readiness #3 -Transported to pre-launch storage; mated with warheads 	<ul style="list-style-type: none"> -Placed on launchers -Brought to Readiness #2 -Aimed--with reference to guidance theodolite -Accelerometers set for flight time. -Fuel requirements determined by weight and volume 	<ul style="list-style-type: none"> -Fueled with fuel and oxidizer -Aim checked
	Warheads	<ul style="list-style-type: none"> -(Transported from depots to siting area) -Preparation of warhead for mating -Transported to pre-launch storage -Mated with missile 		
	Fuel	<ul style="list-style-type: none"> -(Transported from fuel depots to siting area) -Fueling and tank trucks filled 	<ul style="list-style-type: none"> -Delivered to launching platforms and readied for fueling of missiles 	-Missiles fueled

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2. Tactical

The current IRONBARK documents add some details on subjects involving tactical air forces which were treated in a broader and briefer manner in the first 66 documents analyzed in S-24-62.

a. Control of Forces of a Front-- Major General of Artillery V. Ilinykh 90/disputes the view of Major General M. Ivanov (not further identified) that there should be control of means of mass destruction (missile troops, aviation, chemical troops) from a single center. General Ilinykh says that control of aviation has its own characteristics, and is the prerogative of the air army commander. In the same paper, Lt. General of Communications Troops P. Kurochkin 90/ says that methods of control are the important thing, and that improvement of communications should receive high priority attention.

Major General N. Reut 138/ argues the advisability of assigning the control of all the means designated for the destruction of the air enemy to the commander who controls the means of air attack. This commander can organize the combat with the air enemy more easily, on the ground, as well as in the air. Also, he can coordinate more promptly the operations of fighter aviation and antiaircraft missile units with the operations of his own means of air attack. It would thus be beneficial to combine the means of PVO and aviation under the unified leadership of the commander of the air army. (The air defense aspect of this proposal is discussed under paragraph 4. Defense.)

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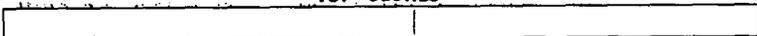
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b. Staff Functions of the Air Army-- The specific problems of nuclear preparation and nuclear support of the offensive are worked out by the operational directorate of the staff of the front, with the participation of the staff of the air army, and other staffs. The air army commander then effects transmission of fire missions assigned to his forces to those who will execute them, and also organizes the entire work of fulfilling them. This basic concept is described by Colonel General Y. Ivanov 67/. The following specific functions of the staff of the air army in a front offensive operation are listed by Colonel General V. Chizh 85/: the air army staff (1) allocates nuclear warheads among delivery aircraft and cruise missiles, designates specific objectives for destruction by them, and organizes the delivery of nuclear strikes in accordance with the plan of the front's offensive operation; (2) makes the necessary calculations (yield and height of nuclear bursts) to insure the prescribed degree of destruction of the objectives; (3) organizes and provides for continuous duty by delivery aircraft, and/or the timely delivery of nuclear warheads to the airfields on which the aircraft are based; (4) organizes direct control of the large units using nuclear warheads, and also their combat support and cover; and (5) clarifies problems of coordination by the aviation units and cruise missile units of a front in the joint delivery of nuclear strikes.

c. Grouping and Strength of a Front-- General of the Army V. Kurasov 68/ outlines the major demands placed on an air army by the needs of a front offensive:

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(1) The strength and composition of the aviation of a front are determined by the tasks assigned to it. Such missions in a front offensive operation may be: reconnaissance, destruction of mobile and small-sized objectives in the tactical and operational zones, and support of attacking troops of the front during the course of the operation. In General Kurasov's view it is particularly important, in the combat composition of the front, to have sufficient fighter aviation, along with AA missile troops and AAA, to provide reliable air cover for the launching areas of missile units, for airfields with delivery aircraft for nuclear weapons, for command posts, for basic troop groupings, especially in areas of concentration, and for the most important installations in the rear area of the front.

(2) The most important place in the modern grouping of a front is held by missile troops and delivery aircraft for nuclear weapons. Therefore, the creation of a front grouping must begin with the determination of the siting areas for missile large units and airfields of nuclear delivery aircraft, and only after this can the assembly and departure areas of other front troops be laid out. Nothing must reveal the siting areas of missile troops or the airfields of nuclear delivery aircraft.

(3) Finally, General Kurasov points out that, more than was true in the past, modern aviation in a frontal offensive ensures effective support and cover for troop combat operations to the entire depth of their offensive, and aids the main task of the frontal offensive, "the simultaneous destruction of the enemy

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to the entire depth of his operational formation."

3. Naval

There is no new material of importance on naval air in the current series of documents.

4. Defense

The present group of documents contains some additional material relating to air defense command and control and air defense weapons, but adds nothing significant on air defense doctrine in general.

a. Command and Control -- While several writers touch on air defense command and control, it is in the context of a frontal situation and a broader concern for streamlining and making more efficient the control of troops on the front. 75/, 88/, 90/, 138/, 148/

These writers are generally concerned with simplifying the internal organization of command posts, improving communications, improving the decision making and implementing process and decreasing the need for coordination. One writer 88/ believes that nuclear warfare means the end of forward command posts and emphasizes the need for control from a distance by various means including different types of displays. The other writers tend to emphasize the need for at least two highly mobile and essentially equivalent headquarters one of which would normally be the alternate but either of which could assume full command of the troops.

The most specific discussion of air defense on a front is by Major General Reut 138/ who believes that, taking everything into consideration, the means of PVO and aviation should be combined under

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the commander of the air army. This, he says, would do away with duplication between the chief of PVO troops of a front and the commander of the air army and with unnecessary coordination, and would free the combined arms commander from still another artificially created organ of control, the PVO command post.

b. Air Defense Weapons -- Surface-to-air missiles are the only air defense weapon on which significant additional comment appears. Major General of Artillery Dzhordzhadze considers that on a front the deployment of surface-to-air missiles results in numerous linked zones of destruction which result in the beginning of an effective zonal air defense system constantly defending all targets in an area as contrasted with defending individual targets only periodically with fighter aviation. ^{120/} He considers that surface-to-air missiles can do the full job of troop air defense within the area of their coverage and need to be supplemented by fighter aircraft only outside the missiles' zones of destruction. He says that computers have shown that limiting zones of operation in this manner more than doubles the effectiveness of the surface-to-air missiles and facilitates coordination.

Discussing SAM deployment in air defense of the country as distinguished from air defense on a front, another writer, Lt. Col. Ryvkin, emphasizes that SAM's will have to be deployed for point defense even with the advent of stand-off weapons because deploying them only as a barrier would leave all targets behind the barrier open to attack when a hole is punched in the barrier, as could easily be done. ^{142/}

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In his view, long-range SAM's will be needed for barrier defense, not necessarily around the country's periphery but around existing or intended industrial zones. With both barrier and point SAM defenses, a low-level SAM system will be necessary. ^{142/}

One writer indicates that authority over SAM units has been so diffused that there is insufficient control or coordination over firing to prevent wasteful and ineffective use of SAM's by firing too many at the first intruders and having too few left for those that follow. ^{120/}

In evaluating the air defense aspects of an exercise, another writer, General of the Army Popov, Marshal of the Soviet Union and Commander-in-Chief of Ground Troops, emphasizes that camouflage units, front or army units, and engineer depots must possess manufactured dummy missile equipment with which to set up false disposition areas of missiles and missile technical units, both when preparing for an operation and during its course. ^{69/}

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B. Ground Forces

1. Initial Strike

Colonel General Babadzhanian discusses the Army's mission in the initial period of hostilities: 77/

...We emphasize that, immediately at the beginning of combat operations, all fronts, without exceptions, must shift to the offensive on the axes where the seizure of enemy territory is possible and necessary. A shift to the defensive on such axes is not permissible. The troops of the front must shift to the offensive regardless of their condition, even after undergoing enemy nuclear strikes.

Lt. General Igolkin and Major General Buryak take exception to this point of view: 80/

...under modern conditions, not even an economically powerful state can, in peacetime, maintain in readiness such armed forces, especially ground troops, as to permit it at the beginning of a war to initiate and conduct offensive operations in all possible theaters of military operations. Therefore, offensive operations will be conducted only in the most important theaters of military operations, while our troops can carry out defensive actions on an operational scale in other theaters.

2. Command Control

The papers indicate that considerable controversy has been generated concerning the inadequacy of the present army control organizations for missile and nuclear weapons employment, and a number of suggestions and recommendations have been made. Major General Ivanov 88/ suggests that "...our operational organs of control, from the organizational standpoint, still remain at the level of the staffs of the World War II period." He suggests that it is advisable to have within the composition of the field command of a front (army): a main command - planning center;

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a nuclear/missile center; an operations center; an intelligence center; and a PVO control center. General Ivanov also states that it is essential to have two independent control organizations in the field command of a front (army). One organization would consist of the staff of the front (army) including the basic complement of the field command and the above-mentioned centers and would constitute the primary control point. It would be controlled directly by the front (army) commander. The second control organization would be a special operations group having its own organic means of communications and transportation and would be capable of assuming complete control in the event that the command post were put out of action.

Major General of Artillery Ilinykh⁹⁹/disagrees with Gen. Ivanov's opinion that "...there must be a radical reorganization of control organs." He believes "this center plan is also unwieldy and still does not eliminate the division of duties, and requires coordination between centers," and, "fairly definite views have been worked out for the organization of the control of missile troops and atomic-bomb-carrying aircraft." He also indicates that the organization, which he describes, is satisfactory.

In the same article ⁹⁹/ Lt. General of Communications Troops P. Kurochkin agrees with Major General Ivanov's opinion concerning the necessity for stricter centralization of top control as a whole, but not his view on the composition of the field control of a front (army).⁹⁹

Major General N. Reut ¹³⁸/ states:

It is known that the existing organs of control are unwieldy, insufficiently flexible, and do not ensure the mobility necessary for control of troops during abrupt changes in the situations and in keeping with the highly maneuverable nature of combat operations.

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He suggests that the articles of Major General Ivanov and others "correctly uncovers the flaws in the existing organizational structure of control organs and the inability of the latter to ensure firm control of the troops." He notes, however, that their suggestions would "but slightly modernize structure rather than eradicate existing flaws," and suggest having "only one organ of troop control directly subordinate to the combined arms commander." He also suggests abolishing the brigade level in the missile troops and the division level in aviation "because there is no independent use for them during the course of combat operations."

Lt. General N. Volodin almost parrots the words of General Reut:^{147/} "...the front and army field commands in existence at the present time... are too unwieldy, insufficiently mobile, and inadequately supplied with means of control and movement." He proposes the organization for a command post and an alternate command post which are capable of independently executing their mission.

Criticism of the present control organizations similar to those of Generals Reut and Volodin were expressed in an earlier paper on command control ^{35/} by Major General Morozov and Lt. General Arkhipov. They also suggested that existing organs of control are "unwieldy," "too cumbersome," and "have little mobility."

3. Short-Range Missiles

a. Organization -- Information on the organization of tactical missiles within a front was provided in an article by Colonel General Koshevoy: ^{75/}

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At present, the front is usually made up of 4 to 5 armies, including one tank and one air army, one or two front missile brigades, as well as large units and units of special troops, ... A front of the above-mentioned complement contains 58 to 80 missile launching mounts, including 6 to 12 front, 18 to 24 army, and 33 to 34 organic to divisions, and also one or two regiments of front cruise missiles.

The General also stated that "...missile troops have emerged in the form of front and army missile brigades as well as missile battalions of motorized rifle and tank divisions."

Further data on missile organization within a front was provided by Army General Popov. 69/ General Popov discussed an exercise which took place in the Carpathian Military District in 1961. In this exercise, the front had two combined arms, one tank, and one air armies, an army corps; two front and three army missile brigades; two independent missile battalions; nine missile antiaircraft regiments of type "A" and "S"; and 24 independent missile battalions of type "M".

Of interest is the fact revealed in a paper by Lt. General A. Baksov 111/ in which he indicated that tactical missile batteries were employed for the first time in an exercise in February 1960. This was a divisional exercise held in the Moscow Military District and "commanders of divisions acquired a certain experience in employing them."

b. Employment -- A possible role of ground force missiles in the initial stages of a general war situation was described by Major General N. Stashek as follows: 129/

Front missile troops and aircraft, naturally, will participate in the initial strike jointly with nuclear weapons of strategic designation. ... The most important mission of army missile troops in delivering the initial nuclear/missile strikes is destruction of enemy operation-al-tactical and tactical nuclear means within the zone

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of the army advance. Together with this, the successful development of the offensive by army troops during the initial operation will be furthered to a large degree by the destruction of enemy combined arms large units (tank and infantry divisions).

General Stashek further stated:

It seems to me that missile troops of border military district armies (group of forces) assigned to cover the State border, and for operation in the first echelon of the front, must be kept in a degree of combat readiness which will allow them to participate in the delivery of the initial nuclear strikes. For this purpose, missions for army, as well as front, missile troops must be designated beforehand, even in peacetime.

Colonel General Khetagurov appears to disagree with General Stashek on the role of a front in general war. 123/

The strategic aspect of the initial period of a war will be determined above all by the nuclear/missile strikes delivered by both sides for strategic purposes. The elaboration of the theory and the implementation of such strikes, in practice, are not a function of operational preparation and a mission of the front.

c. Cruise Type -- According to Colonel P. Plyachenko 136/

the Soviets have "short-and medium-range front cruise missiles." These missiles have "great accuracy in hitting the target" even "higher than that of bombing by horizontal flying aircraft." The mean error at maximum range of this weapon is stated to be 0.1 km.

Further reference to front cruise missiles was made by General of the Army Popov, Chief of the Main Staff of the Ground Troops. In a discussion on an exercise in the Carpathian Military District in 1961 in which various units (including missile units) were employed, General Popov stated that among other equipment employed were "4 launchers for the front's cruise missiles."

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These are authoritative indications that tactical - type cruise missiles are in operational units.

4. Nuclear Weapons Employment

Massed Strikes -- Colonel General Chizh in discussing the use of nuclear weapons in a front operation 85/ reveals the following Soviet doctrine:

(1) In conducting an offensive operation, more air than surface bursts are usually planned and in the conduct of a defensive operation this is reversed.

(2) It is known that the greatest effect from nuclear/ missile strikes can be achieved if they are delivered simultaneously, or in a strictly limited time. Therefore, the troop commander of a front establishes the timing for a simultaneous nuclear strike against the target by all nuclear warhead delivery means.

Lt. Colonel Pavlov 141/, although agreeing that "massed nuclear strikes are the best way for guaranteeing the success of the struggle for fire superiority in operations and offer a strong psychological effect on the enemy," further states:

The experiences of exercises in 1959 to 1961 gives evidence that, although as a result of massed nuclear strikes, the combat and psychological capabilities of the enemy on a selected axis show a marked decrease, even after this strike his troops can show a high degree of activity and considerable efforts will still be needed to complete their destruction.

Target Priorities -- Chief Marshall of Artillery S. Varentsov states: 124/

In a modern operation the side which can win fire supremacy over the enemy, primarily in nuclear weapons will win.

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To achieve this supremacy, he indicates the following target

priorities:

First of all, in every case, the missile and artillery batteries using nuclear ammunition located at launch and firing sites must be destroyed. In this process, primary attention should be given to the Redstone, Corporal, Sergeant, and Pershing.

Further,

...Aviation may receive 60 to 70 percent of the total of the nuclear weapons allocated for an operation. Consequently the destruction of aircraft on the airfields where they are based, is one of the most important tasks in the combat with the nuclear means of the enemy.

5. Reconnaissance

The requirement for reconnaissance for both conventional and missile forces is appreciated by the Soviets. Lt. Colonel T. Goryachkin

writes: 1/5/

At the present time (and in the immediate future) aerial reconnaissance is one of the most effective forms of reconnaissance, having the capability, in a short time and at considerable depth in zone of front operations, of revealing the exact location and condition of the enemy's means of mass destruction. With its help it is possible to obtain the most accurate documentary data on the opposing enemy grouping, which is very essential in the preparation and launching of our nuclear/missile strikes.

Major General of Aviation Muklin discusses requirements for the improvement of reconnaissance: 89/

On the basis of a study of experience from the combat training of troops and the state of the means of reconnaissance, it can be said that the troop demands levied on the organs and means of reconnaissance significantly exceed the capabilities of the latter. This pertains mainly to aerial reconnaissance, the status of which causes us particular alarm.

General Muklin further adds that other types of reconnaissance devices including television, infrared, radar, magnetometric, radiometric,

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radiational, and meteorological "are not sufficiently developed" and that "individual models of such devices have not yet been perfected and are of little use in obtaining intelligence data." This statement on Soviet reconnaissance capabilities appears to confirm a similar evaluation by Marshal Chuykov. (See page 53, S-24-62.)

6. Movement of Troops and Materiel

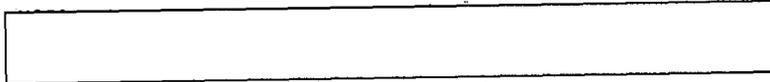
The Soviets appear to appreciate the possible extent of damage to their rail facilities during the initial period of hostilities and have taken steps to counter these effects. The documents indicate that plans have been made to move wheeled vehicles by road wherever possible and exercises utilizing road transport for long distances have been undertaken. However, because of the Soviet's normally great dependence on rail transportation, considerable reliance on such traffic continues to prevail. Colonel Nikolayev states:

Under modern combat conditions, and especially in the initial period of war, the traffic capacity of the railroads will apparently be strictly limited in a number of cases, and therefore troop regroupings will often have to be carried out by combined means. Equipment with a large cruising range (mainly wheeled) will proceed under its own power, but slower vehicles with a small cruising range (mainly tracked) will be transported by railroads. 106/

Major General Stepshin states that large units must be moved rapidly in the initial period of war from rear to front areas. A large percentage of these units must move under their own power and the remainder by rail, air, and water. 134/

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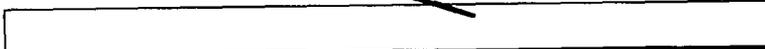
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C. Naval Forces

Rear Admiral O. Zhukovskiy sets forth doctrine for combat against missile submarines. 126/ He describes such combat generally as a combination of offensive and defensive operations in the entire depth of possible locations of missile submarines in a given theater of operations. Operations required are described by Admiral Zhukovskiy 126/ as: destruction of missile submarine bases and shipyards, and submarine at these points; destruction of missile submarines at exits from bases, during transit, and on approaches to launch positions; frustration and hampering of missile submarines in the use of their

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weapons; and destruction of missile submarine support forces.

Successful combat against missile submarines requires three major elements of a previously prepared and continuously operating antisubmarine defense: Stationary positions and maneuvering forces for observation and warning; mine and net barriers; and antisubmarine forces operating on defensive lines and in the open sea.

Basic principles of antisubmarine defense according to Admiral Zhukovskiy 126/ involve the following factors: (1) The depth of antisubmarine defense is equal to or greater than the estimated firing range of ballistic missiles from submarines to important operational and strategic objectives on the coast or inland; (2) defense is echeloned by the organization of successive zones of antisubmarine defense; (3) the density of antisubmarine forces corresponds to the degree of threat from various axes and the capabilities of the antisubmarine defense forces disposed along these axes, and (4) high combat stability and constant readiness to repel a surprise attack must be maintained at all times.

Admiral Zhukovskiy 126/ also believes that control of antisubmarine forces in a theater should be exercised at fleet level, since the means available and capability to resolve all problems of the theater as a whole require that level of direction.

Admiral Zhukovskiy 126/ would organize antisubmarine operations into two zones - the near and far zones: (1) The near zone is the coastal area. The mission of the antisubmarine forces in this area is to defend

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lines of communication, ships at bases and at points of dispersal, and coastal installations against submarine attack. The mission is carried out by fixed observation and warning stations, surface ships, helicopters, and other aircraft. (2) The far zone includes water area from the coastal zone to the maximum launching distance for ballistic missiles to the important targets on the coast. The mission of the antisubmarine forces in this area is to bar strikes against coastal installations. This mission is carried out by antisubmarine submarines, surface ships, helicopters, and other aircraft.

Prior to hostilities, Admiral Zhukovskiy 126/states that antisubmarine forces beyond the limits of territorial waters detect submarines, observe them, and transmit information to other forces in the path of movement. Upon the start of military operations attacks are carried out against all detected submarines. Antisubmarine barriers are established in areas where peacetime conditions prevented establishment. The exact sequence of operations of antisubmarine forces is determined by the operational organization designated by the fleet commander and depends on the area of initial detection and the means by which initial detection is made. In general, however, the sequence is as follows: (1) Antisubmarine submarines move to intercept missile submarines in accordance with information received from reconnaissance and stationary means of observation. Upon interception, an attack is executed. The antisubmarine submarines direct antisubmarine aviation and surface ships against any missile submarines that break through this line of defense. (2) Aviation

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and antisubmarine surface ships conduct a coordinated search for missile submarines and attack them when discovered. Forces are redeployed to strengthen efforts in detection zones. (3) In area of probable missile launching positions systematic searches are conducted and missile submarines are destroyed or their operations hampered.

Admiral Zhukovskiy 126/ describes conditions which hamper the control of submarines. These conditions are said to be achieved by destroying coastal control points and transmitting and receiving radio centers; destroying coastal systems of radio navigation and satellites to make position-finding difficult and reduce the accuracy of missile firings; and by radiocountermeasures against control of missiles, navigation systems, and communications.

Admiral Zhukovskiy 126/ believes that destruction of missile submarines in Arctic waters can be carried out by use of antisubmarine submarines under the ice; antisubmarine aviation to search and destroy submarines in open water areas; antisubmarine barriers at straits and narrows; ice hydroacoustic stations in zones of pack ice and radio hydroacoustic buoys near the ice edge; continuous reconnaissance; forward area ice airfields; and by remote control posts on Arctic islands and repeater centers for communication.

According to Admiral Zhukovskiy 126/ combat against missile submarines in fiord areas can be effected by laying antisubmarine mines, destroying the system of channels among fiords, and patrolling fiord entrances.

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D. Special weapons

1. Nuclear

The general tenor of the statements in these military papers continues to suggest that the Soviets now have large quantities of nuclear weapons on hand to be utilized in many forms by the various arms of the Soviet military forces, in contrast to a rather limited quantity for bomber aircraft only in the 1956-1957 period. The strategic rocket forces of the Supreme High Command contemplate the mass employment of high- and low-yield nuclear warheads on their missiles. It is mentioned that nuclear warheads will be employed to a limited extent by SAMs advancing with the troops of a Front. 13/ 16/ 39/ 51/ 58/ The Ground Forces plan to utilize them with atomic artillery, with short-range missiles, and with the main striking arm of Frontal aviation--the fighter-bomber. The Navy intends to use them as warheads for torpedoes, air-to-surface missiles, and guided and cruise missiles on surface ships and submarines.

This comparative abundance of nuclear and thermonuclear weapons has caused many of these Soviet military writers to reject as wrong and dangerous the use of massed formations of infantry, artillery, and tanks to achieve a breakthrough. 69/ 141/ 88/

Nuclear-powered submarines are accepted as an important part of the Soviet Navy for swift strikes against coastal regions and American carrier strike forces, as well as for interdicting

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57/ 118/ 126/
shipping routes. There is only a paucity of references
23/ 1/
to a nuclear-powered aircraft.

The available papers do not discuss in any detail the role of the
manned bomber in nuclear delivery, except that the fighter-bomber
appears to be the vehicle of choice among aircraft for nuclear
delivery in support of theater (Front) forces. 58/ 53/

With this rejection of past forms and means comes the advocacy
of massed nuclear and thermonuclear strikes on the North American
continent, the peripheral Allied bases, and the Western Theater to
destroy and paralyze the enemy's means of retaliation and resistance.
During the follow-through in the Western Theater certain writers
advocate the use of high-yield nuclear weapons to obliterate major
pockets of resistance and to cow whichever of the high-populated
states of Western Europe were still resisting. The role of the
ground forces would be altered to one of exploitation of these massed
strikes by means of self-sufficient, mobile, independent all-arms
units of about brigade strength with organic missiles. The limits
on the employment of high-yield nuclear weapons for all major
purposes would appear to be, to the Soviet way of thinking, (a) the
global radiation level lethal to humanity in general, (b) the desire
to seize and exploit the territory of the enemy as soon as possible,
and (c) the inherent dangers in the close support of Front units. 18/
31/ 69/ 38/ 141/

Parallel to this acceptance by the Soviets of nuclear weapons

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as the dominant means in warfare is the policy of strict central control of the storage, transport, and decision to employ these weapons. Tactical and operational missiles with nuclear warheads, for example, are prepared, transported and turned over to operational units of the Missile Troops and Artillery of a Front from the Front rear by a special organization, the Missile-Artillery Armament Service of the Front. This occurs only after the Supreme High Command has allocated a certain number of missiles and nuclear warheads to the Front and has provided for their transport to the Front rear from the regional storage depots of the Chief Artillery Directorate. Whether the warheads are stored with the missiles is not apparent from the documents. There is a distinct possibility that analogous procedures are used in the supply of medium-range strategic missile units. A special nose-cone crew, the RTB, operates in the primary siting area of the medium-range missile regiment. The RTB is in complete charge of the nose-cone preparations before mating, and possibly mates or helps the technical section of the launch battery to mate the nose-cone with nuclear charge to the missile body at the launch battery. 53/ 58/64/ 69/

2. Chemical

Some aspect of the Soviet chemical warfare program has been mentioned in better than a fourth of the available Soviet papers. These aspects have included the use of chemical troops for radiological reconnaissance 74/ 85/ 38/ 134/ 140/; the development of gas masks for

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use in tanks fording rivers in the winter ; details of the defensive
equipment supply program ^{81/} ; functions of chemical officers at
various echelons ^{74/ 10/} ; and of primary importance, the employ-
ment of chemical warfare munitions in combat. ^{68/ 69/ 47/ 9/}
33/ 45/ 96/ 131/ 124/ 136/ 138/

Three papers have provided

considerable detail on the employment of tactical missiles armed
with toxic chemical warheads. ^{96/ 69/ 131/}

Chemical weapons are considered to be an integral part of the
armament of Soviet tactical forces. They will be employed in
conjunction with conventional and nuclear weapons at the onset of
war, according to Front/Army plans. ^{69/} Troops and tactical
targets in the immediate path of advancing Soviet troops will be
attacked with non-persistent chemical agents (probably nerve
agents of the G-type) delivered by tube (conventional) and rocket
artillery. Deeper targets (20 to 300 miles back) such as atomic-
capable units and large troop concentrations, will be subjected to
persistent agents of the V-type delivered by tactical ballistic and
cruise missiles. Tactical aircraft are also indicated to have a
role in the delivery of toxic agents, but the nature of the type of
target which they would attack is not defined. Missile systems
for which CW warheads are specified are: (a) FKR-cruise missile
(300 mi. range), (b) R-30 (Soviet designation of rocket of 30 km.
range), and (c) R-170 (Soviet designation of missile of 170 km
range). ^{96/}

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The only toxic agent identified in these papers for delivery by Soviet tactical missiles is VR-55. It exerts the toxic effect through inhalation and by absorption of small droplets through the skin. Droplets from the warhead of one R-170 missile cause casualties in 80% of the personnel in a 200 hectare area (0.7 square mile). Fog and vapor from the same warhead will create a 15% casualty rate over an area three to five times the area of droplet effect or about 2 to 3.5 square miles. The effect of VR-55 is indicated to instantaneous. The agent persists on the terrain for 1 to 3 days. The description of VR-55 indicates that it is most probably one of the V-type nerve agents, which are known to exert their effect through the skin as well as by inhalation, to be extremely toxic, to cause death in extremely short periods of time, and to be highly persistent. ^{96/}

The plan for employing chemical warfare missiles dictates that they will be employed as a normal weapon during an all-out conflict. They will be employed in accordance with the Army/Front plan which is developed by the commander of the Army/Front. In some conditions the authority to employ these weapons will be delegated to the division commander. Aiming points for the CW missiles will be determined by the Chief of Missile Troops and Artillery of the Front/Army, by the Chief of Artillery of the division, or by their staffs. The primary purpose of these attacks will be to destroy large concentrations of troops in the open,

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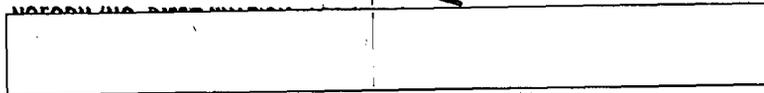
atomic-capable units and command centers.

The tactical doctrine for Soviet employment of toxic chemicals is sufficiently detailed to determine that the Soviets intend to create a toxic environment around key targets from the battle-front to 300 miles behind the primary zone of combat. Targets in the immediate path of the intended Soviet advance will be attacked with non-persistent CW agents (probably the G-type of nerve agent) delivered by tube and rocket artillery. Critical elements to the flanks of the advance will be subjected to persistent CW agents (probably mustard gas) from the same type of weapons. Fragmentation attacks by tactical aircraft and artillery will closely follow the CW attacks to hinder decontamination operations by the target personnel and increase the effectiveness of the CW onslaught. Targets beyond the range of artillery will be subjected to V-agent attacks from ballistic and cruise tactical missiles. These attacks will range in depth from 20 miles to 300 miles behind the Front. The CW missiles are to be programmed in conjunction with nuclear-armed missiles. The planning strikes with these types of missiles should strive to ensure simultaneous delivery of both types of warheads to the targets; however, the nuclear missiles will precede the CW missiles if it is not possible to achieve the desired time phasing. In order to eliminate the scattering of the CW agent clouds by the thermal and blast effects of the nuclear detonations, CW strikes will not

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be programmed closer than 5 to 10 kilometers to nuclear strikes.

Targets selected for attack with CW tactical missiles include all atomic-capable units, large troop concentrations in the open, and critical control centers. The atomic-capable units singled out for chemical attack included tactical missile units (Honest John, LaCrosse, Little John, Corporal, Redstone, Mace and Matador), SAM sites (Nike), tactical airfields and nuclear weapon stockpile sites. Critical control centers were indicated to include command posts and air defense headquarters.

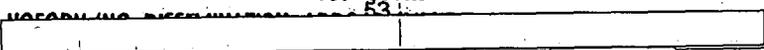
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A detailed description of an exercise in the Carpathian Military District revealed that 277 CW missiles were allocated for this particular operation. This information is of considerable interest, when it is considered in light of the fact that only 277 nuclear missiles were allocated. In order to maintain a combat level of CW munitions for all of the delivery systems mentioned, as well as to fill the requisite pipeline and to replace normally deteriorating munition stocks, a chemical warfare agent stockpile of sizable proportions would certainly be required.

69/

One paper by Colonel G. Yefimov entitled "Coordination of Adjacent Units During the Use of Nuclear/Missile Weapons in Operations" clearly demonstrates that the Soviets are aware of the limitations of chemical weapons as well as their advantages. Colonel Yefimov points out that in exercises many chemical missiles often were not actually committed during the operation. He

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attributes this to the fact that in the past chemical weapons were in many instances not employed in sufficient strength to achieve the desired effect. This deficiency is indicated to be the result of the time required to position the missiles and the fact that any single Army or Front may have insufficient CW missiles available for firing to achieve the desired result. The answer to this problem, according to Colonel Yefimov, is increased coordination between adjacent Fronts/Armies, so that the combined force of CW missiles can be utilized to maximize the effects of such attacks.

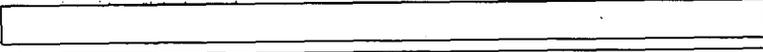
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The function of the chemical troops, is mainly chemical, biological and radiological defense. This includes the identification, marking, monitoring and decontaminating areas attacked with chemical and biological agents. In addition to the above the chemical troops are also charged with similar responsibilities with regard to the effects of fallout from nuclear weapons. This function in itself will require considerable manpower. Missile troops, artillerymen and aircrews will be the Soviet troops employing chemical warfare agents in combat, while the chemical troops will be engaged primarily in defensive activities.

74/ 85/ 38/ 134/ 140/

3. Radiological Warfare

Combat radioactive substances are mentioned as one of the weapons presently employed by the Western forces. Since the latter have no such weapons, it is possible that the Soviets themselves envisage a role for RW weapons as distinct from the RW hazards of



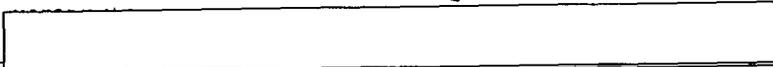


^{14/}
nuclear detonations.

4. Soviet Special Weapons Targeting Procedures

The article, "The Methodology of Determining the Yield of Nuclear Charges and the Expenditure of Missiles for the Destruction of Targets,"^{103/} contains: (a) Three sample problems which demonstrate the use of three tables for selecting nuclear yields required to destroy certain targets with one round. These tables are not included in the article but are included apparently in a referenced publication entitled Manual for Firing and Fire Control. (b) A rather sophisticated chart with which one may easily obtain, for 17 listed tactical targets and two specific USSR missiles, such information as the required yield for the "destruction" of each target listed, the expected fractional damage to an area target, the maximum possible damage, the probability of damage to a point target, the safe radius of burst (that which precludes the destruction of personnel in the open), and the height of burst. The chart is rather limited in one respect in that it applies only to the USSR R-170 and R-30 missiles. (c) Six sample problems which demonstrate simple procedures for using the chart.

The chart is easy to use and requires no mathematical calculations of any kind. It should prove to be very convenient for obtaining rough answers to many missile application problems. However, it is rather limited in the application in that it applies only to the Soviet R-170 and R-30 missiles. On the other hand, similar charts for other missiles and warheads could easily be prepared and probably have been. One interesting feature of this chart is the method used



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for including the aiming error. Apparently the aiming error or CEP for these two missiles is dependent on the range at which they are fired. The charts are so constructed that range and not CEP is an input. For this reason the user does not need to estimate the CEP for each range at which he may be firing the missiles. This is already done for him by the planners who designed the chart.

Since the CEPs used for the various ranges are not given in the paper, no direct comparison can be made with the system set forth in AFM 200-8. However, by studying the arrangement of the target curves on the chart it can be observed that targets are classified according to relative hardness in a manner having a general similarity to that in AFM 200-8.

Further detailed study of this document may yield additional information on Soviet targeting and weapon employment concepts. However, for this purpose, the original chart included in the document, as well as the referenced publication (Manual for Firing and Fire Control) are needed. The reproduced chart does not lend itself to detailed study.

The article, "Some Problems in Destroying Targets with Nuclear Warheads," by Chief Marshal of Artillery S. Varentsov, ^{128/} contains:

(a) Some very general policy guidance on types of tactical targets to be attacked with nuclear warheads. (b) A limited background discussion on procedures used in formulating the two charts contained therein along with some generalities on effects of aiming errors and target characteristics on yield requirements. (c) A chart for selecting the required

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nuclear yield to "destroy" or "annihilate" each of 29 types of tactical targets for any aiming error up to 2000 meters. Yields up to 1 MT are included. (d) A chart for obtaining the "degree of target destruction" for each of the same 29 tactical targets for any aiming error up to 2000 meters and for one yield (40 KT). (e) Sample problems which demonstrate procedures for using charts referred to above.

The procedures and ideas given in this article are very similar to early methods used by the USAF. A type of "cookie cutter" concept of weapons effects is used and each target in a target category is assumed to be the same size and hardness. As the types of targets considered are all tactical, their hardness could be approximately the same, but there is certain to be a significant variation in their sizes. It is of interest to note that the damage requirement stipulated (.90 probability on point targets) is the same as that used by US forces. The damage requirement for area-type tactical targets (90 percent assurance of damaging 40% of the target) is practically the same as US Army policy (90% assurance of damaging 35 to 50% of the target). The article is well written, should be readily understood by any artilleryman and be very useful to the staffs of missile troops and artillery in selecting an optimum weapon from a stockpile to accomplish the mission.

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E. Logistics

1. General

The Soviet writers believe that a future war will be a nuclear/missile war and that great havoc would be wrought on the deep rear of the country as well as on the operational rear services of the army fronts. Thus, at a time when the operating troops would demand the delivery of nuclear/missile weapons, fuel, munitions, and foodstuffs and the evacuation of casualties, the functioning of the transport systems would probably be greatly disrupted. Various proposals have been made to improve their transport capability in anticipation of this eventuality including (a) the stockpiling of supplies and materiel in forward areas (b) increasing the capacity and number of transport facilities and equipment, and (c) contingency planning for the utilization of a combination of rail, road, water, and air transport instead of the traditional preponderant reliance on rail. 58/ 53/

Marshal V.I. Chuykov noted that the new means and methods of combat have brought substantial changes in the volume and content of the tasks performed by the operational rear services. An enormous increase in the expenditure of materiel supplies in combat and in operations as compared to the consumption of supplies in World War II is to be expected (this is particularly true for the Soviets since their armed forces were only provided with the absolute minimum essentials and were not fully motorized in the World War II period). Marshal Chuykov further noted that the

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assortment (variety) of materiel required by the troops as well as the quantity has increased considerably with the result that supplying troops in a future war would far exceed in complexity the task of supplying them in past wars. The rear services would also have to assume the whole burden of repair and restoration in a rapid and efficient manner of the massive amount of combat and special equipment which can be expected to be put out of commission during the initial period of a war. 69/

The operational exercises that the Soviets have held clearly indicate that their rear services could not satisfactorily accomplish the increased volume of more complicated tasks that would be levied on them in a future war. These exercises have shown that serious deficiencies exist in the control structure of the operational rear services of the Soviet ground forces. Among these the most significant are (a) the inadequacy of existing secure communications systems to handle logistics traffic expeditiously, (b) the lack of coordination and close cooperation of all elements and lack of organizational unity of the rear, (c) a low level of operational rear training and (d) a weak knowledge of the modern rear conditions and requirements on the part of many of the senior Soviet officers. Marshal Chuykov expresses the importance he attaches to improvement of the Soviet rear services and particularly stresses the need for supplying the missile troops in the following words:

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"The combat readiness of the rear services must correspond to the level of combat readiness of the troops being supported. This primarily concerns the missile — technical large units and units which are supporting the combat operations of the missile troops." 69/

2. Role of Air Transport

Soviet military authorities seem in agreement on the need for further development and strengthening of military transport aviation (VTA). It is seen as an absolute necessity in the furtherance of nuclear warfare whether used to transport men or materiel.*

Under Soviet Field Service Regulations, VTA is considered one of the three basic arms of the Soviet Air Force and is charged with the mission of dropping troops in the enemy rear during airborne operations and/or transporting troops and cargo. 8/ It is designed to supplement surface transportation, retaining a mobility that enables it to traverse barriers both natural or man-made. It is and will be the most mobile means of transporting troops and cargo. (29)

*References: Bibliography Nos. 4, 8, 10, 27, 29, 38
39, 40, 53, 58, 67, 68, 69, 77, 91, 119,
127, 130, 133, 134.

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VTA is the transport pool of all the Soviet armed forces and units are allocated to Front Commanders for specific missions or operations. While allocated to the Front Commander, they operate under the direct control of the Deputy Commander of Troops of the Front for Rear Services who is responsible for all rail and air transport. They may in turn be allocated to the Chief of the Front or Army/Missile-Artillery Armament for the transportation of missiles and special charges. On the other hand, they may be used in airborne landing operations or the maintenance through air landing or paradropping of normal supplies and materiel. (58, 69, 134)

It is advocated that each Front or Army should have a transport pool to provide the basic means of supply and evacuation in a fast-moving fluid situation. Estimates of as much as 3 to 4 divisions of transport aircraft (a typical division consists of 125-150 aircraft), as well as supporting units of light and heavy helicopters (HOUND and HOOK) are desired for each front commander. (27, 39, 130)

Of increasing significance in Soviet tactical strategy is the use of airborne troops to supplement the advance of tank and combined-arms armies in a nuclear war. (4, 40, 68, 67, 69, 119, 39, 127) Seemingly, airborne operations are divided into two groups, tactical and operational. (68) A tactical lift is of about battalion size and is used to surmount zones of radiation, deny routes to the enemy, secure strong points or enemy atomic stocks or

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missiles, or for bridgehead crossings. (39, 68, 40, 119, 127, 134). This lift will be performed primarily by helicopters. (39, 53, 68, 119). An operational lift is a mass lift of a large airborne force deep into enemy territory to seize and secure such targets as the largest politico-military-industrial centers, strategic ports, strategic transportation routes or junctions or similar targets. Such a lift would be in conjunction with swift-moving tank armies and would be for the purposes of denial and confusion. This lift would require the use of transport aircraft, primarily at present, of the An-8 and An-12 variety. It is estimated that it would require four divisions of these aircraft (about 580 aircraft) to move one light motorized division in two successive lifts in two days. (39, 40, 68, 91, 134)

In conjunction with the airborne landings, VTA is envisioned in the support role of transporting men and materiel from the rear to the front or in lateral movements from one area to another. VTA will often, under the exigencies of a nuclear war, be the only means of transport available immediately. (27, 28, 39, 53, 58, 67). During the North Caucasus exercise of 1959, an entire light motorized division, less tanks, was actually airlifted over a flooded area which was impassable by other means. (134). Under certain conditions, VTA will be the only method of transporting fuels or special charges (58, 69). During the rear services exercise of July 1961 in the Carpathian Military District, An-8 and An-12 aircraft were actually used to transport missiles, missile fuels,

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rations, and other materiel when other forms of transportation were disrupted. During this exercise, a mixed helicopter regiment was allocated to the Chief of Missiles and Artillery Armament of the Front. All of the helicopters were equipped to carry nuclear/missile weapons and were used for forward supply purposes. In 40 flights in one day, they were indicated as actually transporting 32 missiles and 11 special charges. (69)

The rapid evacuation of wounded on aircraft returning from the Front is a primary mission of VTA. Soviet doctrine calls for the most rapid means of evacuation possible of wounded and transport aircraft are peculiarly suited to this type of operation. At present, the basic problems involved are the lack of air conditioning and the slowness of loading, although an An-12 can be converted from cargo purposes to an ambulance in 90 minutes. (8, 29, 133).

Of special interest is the Soviet use of helicopters. It has been suggested that they be used for radiation reconnaissance, troop control, engineer reconnaissance, refuelling vehicles for tank columns, tactical vehicles for division commanders, and for all general purposes. (10, 74, 39). Each division is presently assigned a flight of helicopters although it has been proposed that this be increased to a regiment of HOUND and HOOK for the support of the combat operations of the division. (39) Of further interest is the possible existence of two operational regiments of HOOK helicopters. (134)

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VTA is being equipped with new heavy freight type aircraft and helicopters (the An-8, An-10, An-12, and Mi-6). However, because of the limited numbers of aircraft and their load-carrying capacity, VTA is indicated as unable to cope with the large numbers of major combat tasks assigned to it. Its reserve is the Civil Air Fleet (GUGVF) and long range aviation. Unfortunately the civil fleet can not be used immediately in the combat area because they are configured for passenger traffic and not cargo and the conversion to military transport types can only be accomplished at stationary repair bases or fabricating plants. Some of the aircraft of long range aviation can be used for paradrop activities. Although the An-8, An-10, and An-12 are relatively modern aircraft they have many deficiencies that seriously limit their usefulness. The aerodynamics of the wings are poor, they lack reverse thrust, they are not equipped with take-off boosters or jet flaps, and the operating time of the engines and their dependability are not satisfactory. Aircraft builders have not standardized their cargo hold-down equipment so that it is interchangeable. Finally, door and hatch sizes on such aircraft as the Tu-104, Il-18, An-10, and the Tu-114 severely limit the size of packages and cargo. (134)

The Soviet military is cognizant of the present shortcomings of VTA and many proposals for its expansion have been put forth. A need is expressed for a long range increase in heavy freight

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capacity with aircraft capable of carrying loads of 30 to 50 tons at 800 KPH to a distance of 5-8,000 kms. with limited dirt strip landing capabilities. (27, 133, 134). It is believed necessary to have a powerful central military transport aviation for the transfer of troops and equipment up to an army in size not only within the limits of one front and one theater of operations but between theaters of operations. (27, 29, 130, 133, 134). A greatly expanded VTA seems to be indicated for the future.

3. Missile Troops of the Ground Forces

A Front in the Soviet Army has units armed with a variety of short-range (tactical and operational-tactical) missiles and with antiaircraft missiles. The commander of the Front exercises operational control over the units equipped with short-range SSM through the Chief of Missile Troops and Artillery and over the antiaircraft units through the Chief of the PVO. ^{69/}

The Soviet concept of Front missile operations involves the frequent movement of missile units (including PVO) during the course of an operation. In addition to dispersal to the large number of pre-selected primary and alternate siting areas assigned to the missile units, new siting areas may be designated if combat conditions dictate changes in plans. The dispersed disposition of these missile units and their frequent movements to other siting areas makes their logistic support extremely difficult and complex to plan and carry out. The Soviets well recognize, however, that the success of their operations depends upon the

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uninterrupted and timely delivery to the troops of missile fuel, nose cones and special (nuclear) charges, and missiles in an assembled condition ready for firing. 53/

The Soviets consider missiles to be substantially different from other types of weapons because of their design and construction and the unique problems raised by the dispersal and frequent movement of the missile forces. Moreover, difficulties in logistically supporting troops have been compounded by restrictions put on the release of nuclear weapons to launching troops prior to the start of a war and also the requirements for non-storable, highly toxic, and/or liquid missile fuels which present enormous handling problems.

To solve such problems the Soviets have developed cumbersome, complex, and vulnerable supply procedures which the experience of military exercises shows frequently fail when put under test. For example, in one exercise the supply of missile troops with missiles and missile fuels was planned separately by the Directorates of Artillery Armament and by the front rear services jointly with the Directorate of Fuel Supply. The inefficiency of the rear services work and errors in supplying the missile troops resulted from the complexity of coordinating these plans on short notice when operational conditions were changed. Lieutenant-General M. Novikov suggested that the planning of missile troop supply be worked out by one group of officers comprised of personnel from the rear services staff, the artillery armament service, the fuel

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supply and other interested services in close coordination with the operational section of the front staff. This plan would be signed by the Deputy Commander of the Rear and the Chief of Missile Troops and Artillery and approved by the Commander of the Front. It would then remain for the Directorates of Artillery Armament and Fuel Supply to work out more detailed plans for supplying troops with missiles, warheads, and missile fuel. 58/

The Soviets charge the Chief of Missile and Artillery Armament of the Front with the responsibility for organizing the delivery of missiles to the troops. Missiles are delivered from the ZI as missiles (airframes), component parts, and nose sections by rail and by air. The principal organizers of the loading and dispatch of these missiles is the Chief Artillery Directorate and the 12th Chief Directorate of the Ministry of Defense, presumably in charge of the nuclear warheads.

The Chief of Missile and Artillery Armament of the Front must serve two masters - the Chief of Missile Troops and Artillery with short range SSM and the Chief of the PVO with antiaircraft missiles. To accomplish these tasks two missile technical bases were established 200 to 250 kilometers from the front line: one designated the front missile technical base (FRTB) for the preparation of SSM and the other the front technical base of antiaircraft missiles (FTB ZUR). The front missile technical base (FRTB) includes one transport battalion, one technical battalion, and several mobile technical repair bases. The front

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technical ZUR base prepares antiaircraft missiles and may be composed of one or two transport battalions and 3 or 4 technical battalions.

Missiles arriving at the front rear are forwarded to the mobile technical repair bases where the missiles are assembled, the nose section crews attach the warhead, and the missiles are fueled.

The missiles are then placed on special "cross-country" transporters and delivered to the missile troops. However, a serious problem arises in that during operations all missile troops of a front must depend on either the nose section crew of the FRTB or the nose section crew of the FTB ZUR. During an operation ready missiles sometimes must be transported distances of 150-200 km or more which adversely affects their reliability.

The responsibility for supplying the missile troops with missile fuel is vested in the Deputy Commander of the Rear for the Front. His tasks include establishing the necessary front depots and dumps of missile fuel to assure that the missile-technical units can be supplied in good time. He must always be alert to changes in operational plans affecting the requirements for missile fuels and relocation of the missile-technical units and coordinate these new situations with the fuel supply service and the engineer troops.

The Soviet system of supplying the missile troops of the ground forces has several serious weaknesses. One of the most

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significant of these is that the Chief of Missile and Artillery Armament is responsible for the transport of missiles and special charges while the Deputy Commander of the Rear is responsible for the transport of missile fuels. This division of responsibility makes difficult the delivery of missiles, special charges, and missile fuel and coordinated operation of the various types of transport (railroad, motor vehicle, and air transport). A second weakness noted in Soviet exercises is that the stocks of missiles, special charges, and missile fuels at the front were inadequate to support the proposed operations of the missile troops, and it was therefore necessary to bring up additional stocks from the front rear under very difficult conditions. The Soviets have also indicated a desire to have the storage of missiles and missile fuels completely mobile, i.e. missiles on special carriers and missile fuel on fuelling vehicles and special tank truck semi-trailers. Other weaknesses observed in the Soviet system of supplying their missile troops are:

- 1) poor coordination in the correct placement and relocation of support installations; and 2) the narrow specialization of the rear area missile-technical bases which makes them highly vulnerable to enemy action and necessitates transporting ready missiles great distances. 69/ 53/

It is quite evident, therefore, that the Soviet concept of missile operations involving a very high degree of dispersal and frequent movement of their missile troops has been implemented

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only with the accompaniment of very formidable logistic support problems.

4. Aerospace Forces

a. Strategic Missile Forces -- Strategic missiles are defined as those which have a range of more than 1000 kilometers and include the ICEM and earth satellites which are launched for military purposes. ^{155/} These missiles are under the operational control of the Soviet Rocket Forces (SRF). Available documents pertaining to these missiles deal mostly with operations; however, certain logistic data were revealed on the MREM system, e.g., there is a missile depot system where airframes are stored. There are central fuel/propellant depots; nose cones and warheads may be stored separately from the missile and are handled by special technical troops; re-fire of more than two missiles per pad is the operational concept; maneuver to alternate launch sites is definitely planned; and the real estate occupied by the lowest operational element (the regiment) consists of primary siting area (launch area) and one or more alternate siting areas.

(1) The MREM System:

An R-12 missile (MRBM) regiment usually operates in an area of up to 20 square kilometers. A missile battalion usually operates in an area of one to two square kilometers. ^{81/} Outside the MRBM regimental primary siting area are one or more alternate siting areas equipped with field-type engineer structures. Primary siting areas include storage. ^{61/}

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The operations of the MRBM Regiment when on combat duty are governed by a set of alert conditions running from No. 4 to No. 1, established by the SRF Commander-in-Chief. Although not spelled out, there may be a "no alert" status when the regiment is located in its "permanent" headquarters, or "permanent disposition area." 64/*

To go on Alert No. 4, the required stocks of missiles, component parts, nose cones, ground support equipment, missile fuel and other materiel supplies needed to ensure the specified degree of readiness and the successful conduct of combat operations are set up "in good time." The size of the stocks established in the regiment is determined by a decision of the Commander-in-Chief of Missile Troops. Included in the alert notice is the transport schedule for missiles and fuel components from the supply station (depot), the schedule for issuing and receiving missiles, nose cones, missile fuel, technical supplies, and other materiel. For Alert No. 3, the subunits of the regiment deploy the ground equipment, carry out the transition of the missiles from readiness No. 4 to readiness No. 3, the nose cones from readiness SG-4 to readiness SG-5, transport the nose cones to the launching areas and mate them with the missiles, and fill the fuelling trucks and tank trucks with missile fuel components simultaneously with the preparation of the missiles and nose cones. 64/

*See also para. IV A.1.h.

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When the construction of storage facilities and structures in the primary siting area is not complete, the regimental subunits will, as a rule, be located in the permanent disposition area, and the regimental stocks of missiles, nose cones and missile fuel may be stored at the closest depots. In order to bring the regiment to readiness No. 3 in these conditions, it is necessary

- (a) to move the missile battalions, the servicing and supporting subunits of the regiment and the RTB into the assembly areas;
- (b) to organize and carry out the march of these subunits to the primary siting area;
- (c) to deploy the regiment and RTB subunits in combat formation and to prepare them for the receipt and checking of missiles and nose cones, and also for the receipt of missile fuel;
- (d) to direct the transport (including RTB transport) and fueling subunits of the battalion to missile and nose-cone unloading points and to the Directorate of Fuel Supply Dumps of the Ministry of Defense;
- (e) to receive the missiles, nose cones and missile fuel from the depots and to deliver them to the siting area;
- (f) to check the missiles and nose cones and to bring them to readiness No. 3.

After transition to readiness No. 3, the missile regiment may remain at this state of readiness for some time. On receiving the signal to pass to readiness No. 2, the missiles and nose cones are transported to the launching platform from prelaunch storage; are mounted on the launch pads and brought to readiness No. 2. The necessary fuel is delivered to launching

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platforms and readied for the fueling of the missiles. On receipt of the signal for transition from readiness No. 2 to readiness No. 1, the missiles are fueled and there begins the transport of additional missile fuel components by the regiment's surface transport resources, which are free after fueling the initial round of missiles. ^{64/}

The scheme of preparation of the R-12 thus seems to envision:

- (a) Central or regional depots for missiles, nose cones (warheads) and missile fuel.
- (b) Regimental storage for the above. Missiles designated for the first launchings are moved immediately to the pre-launch storage at the launch sites. Missiles for subsequent firings are stored elsewhere in the regimental primary siting area. When these stocks are accumulated by the regiment depends on a decision by the Commander-in-Chief Missile Forces.
- (c) The RTB prepares nose cones at a technical position in the regimental primary siting area and transports them to the pre-launch storage where they are mated to the missiles.

The MRBM is conceived as a maneuverable (not mobile) system which can refire and which can be deployed to alternate siting areas. In one example the alternate area was 15 km distant. It took the fuel unit 10 hours to get additional fuel from the Ministry of Defense fuel dump traveling a total of 99 km there and back. The Soviets believe that the weight of the R-12 missile in transport which requires heavy duty roads and its dependence on

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Liquid propellants are its main drawbacks. ^{64/}

(2) ICBM System

ICBM units launch missiles only from primary siting areas, there being no alternate siting areas envisioned. The regiment, as in the MRBM system, is the basic ICBM unit. ^{61/} There appears to be a strong similarity between the basic concept for ICBM and MRBM logistics. In training classes for ICBM personnel, there is reference to "the transport, storage and transshipment of missiles." ^{94/} The sequence would imply a pipeline system of supply similar to that for the MRBM regiments. Likewise, in reference to ICBM training equipment, the author says that a similar list of equipment, with some changes, is quite suitable for intermediate range missile units. ^{94/} It appears therefore that missile fuel, nose cones (warheads) and technical materiel may be obtained from central storage depots, but whether ICBM airframe depots exist cannot be affirmed or denied from available documents. ^{61/}

Training equipment is prepared and supplied to units by the Chief Directorate of Missile Troop Equipment (GURVO). Training equipment in short supply is furnished by the Chief Engineering Directorate of the Missile Troops on application by units (regiments). ^{94/}

Training officers in a Technical Repair Base (RTB) is a comparatively long process (in certain cases, not less than a year).

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This problem acquired special significance during 1961 when RTB personnel were assigned to work with missiles still undergoing flight tests. In this instance, neither the troop units nor even the training centers had at their disposal for any length of time the necessary documentation on the equipment or the technological and ground equipment. The missiles under test were not specified, but imply a strategic classification. RTB units receive their documents on the operation of equipment from the Ministry of Medium Machine Building. 105/

In many cases, missile units are reinforced with officers who have no previous training in missile specialities. In the organic structure of subunits, it is sometimes necessary to replace engineers by technicians and technicians by other ranks. Therefore, missile units must become a school for the special training of personnel. 94/

b. Air Forces -- Marshal V. I. Chuykov, Commander-in-Chief of the Ground Troops, in his critique of a Soviet Rear Services Exercise held in July 1961, expressed the requirement for the rear services of an air army to be capable of rebuilding and restoring airfields to permit the redeployment of aircraft to accompany the rapid advance of present-day ground troops. He also noted the need for aviation-technical units to increase their mobility so that they could be rebased on the new airfields at the same time as the air regiments and immediately begin their maintenance and supply functions. Marshal Chuykov

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critized the failure of the Deputy Commander of the Air Army, Rear, to ensure that supplies, particularly aviation ammunition, were dispersed to prevent their destruction by the enemy's nuclear/missile strikes. He also observed that as a consequence of enemy action against airfields and the large expenditure of aviation fuel the air army had almost completely exhausted its supplies toward the end of the third day of simulated combat activities. This observation would indicate that even with allowance for theoretical losses of aviation fuel due to enemy action, the Soviets have less aviation fuel stocks on their air bases than the 10 days supply generally estimated. ^{69/}

In an article discussing ways of increasing the combat readiness of troops, Major General G. Semenov advocated that only one air regiment should be on an airfield and that there be one or two reserve airfields, on which the necessary supplies were established in advance, where aircraft could be dispersed. He warned, however, that when effecting the dispersal of air units care must be taken to maintain the capability to create at the right time the required air groupings needed to maintain their air defense and air offensive capabilities. Semenov also suggested that a network of decoy airfields be constructed and that a change of bases by air units be carried out periodically. ^{llh/}

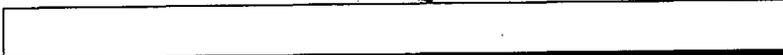
The Soviet Air Force is equipped with and launches cruise missiles (against fairly short-range - up to 300 mi. targets). These missiles are referred to as front cruise missiles (FKR)

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and are directly under the operational control of the air army or the aviation representatives of the Front. The preparation, supply, and delivery of the cruise missiles, nose sections (nose cones and warheads), and of the special missile fuel is handled in the same way and by the same FRTB organization as the tactical ballistic missiles weapon armament of the missile troops of the ground forces previously discussed. (See E. 2 Missile Troops of Ground Forces.) 69/ 136/

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F. Nature of Modern War

A review of the later IRONBARK documents reveals that the debate on the nature of modern war as related to military doctrine and strategy is by no means over. Articles treating such concepts as the initial period of the war, the period of threat, and the value of combined forces reveal about the same content and divergencies of opinion, in about the same degree, as the earlier articles covered in S-24-62.

Discussions on the subjects of "mass" and "annihilation," in particular, continue in the later documents. Because of the significance of Soviet thinking in these areas with respect to the development of large yield weapons vs. smaller weapons, additional comments on this subject, as considered in the more recent IRONBARK material, are presented below.

Arguments favoring large yield weapons appear in a number of writings. For example:

"Figures show that even if the army missile troops are employed, the total number of launching mounts may be insufficient to perform the tasks when delivering the initial nuclear strikes. Therefore, in the initial strikes it is advisable to employ nuclear charges with the greatest yield as this would lessen the need for launching mounts." ^{129/}

Major General of the Engineering Technical Service, M. Goryainov, in a 1960 IRONBARK article not, however, fully exploited in S-24-62, pointed out that:

"Our own military thought has... lingered more than was necessary on the analysis of the potentialities of low-yield nuclear bombs and, in fact, has not afforded the study of the potentialities of powerful, multi-megaton nuclear bombs." ^{31/}

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General Goryainov's article contains a number of other statements supporting his belief in a relatively small strategic missile force armed with large yield weapons:

"Mass quantity should be understood not just as any large quantity, but as that quantity which satisfies the requirement or need for it to a definite degree. As regards nuclear/missile armaments the concept 'mass quantity' will mean that quantity which permits the quality of individual means of armament to be manifested in a decisive manner." 31/

"It follows that 100-120 20 megaton bombs can incapacitate no less than 3/4 of the industry and more than 50% of the population of the USA." 31/

"Therefore, 100-120 20 megaton or 100-150 2-megaton bombs (for Europe) are the quantity which, if used correctly, will decide the outcome of the war. To use this quantity of power bombs we evidently need a small number of strategic missile units." 31/

"Bombs of large yield are more advantageous than low-yield bombs, both from a combat and from an economic point of view."

Foreshadowing developments in Soviet nuclear technology, Goryainov points out that:

"...a bomb of 20 MT is not maximal. If it is found to be advisable, 50 and 100 MT bombs may be employed." 31/

Goryainov, nevertheless, does recognize a continued need for lower yield weapons:

"If bombs of megaton yield, correctly used, are capable of deciding the fate of nations and the overall outcome of the war, then kiloton bombs will be completely effective for the destruction and elimination of individual targets, for the most part the delivery vehicles of nuclear/missile weapons, individual bases, and launching pads. Kiloton bombs will also be needed in operation with strategic goals, particularly when it is necessary to avoid unnecessary victims." 31/

Goryainov also relates the yield of nuclear weapons to the duration of a future war, pointing out that:

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"...the time span from the moment of the beginning of a nuclear world war to the moment of the poisoning of the atmosphere of the globe (or a given zone of it) with a concentration of radiation substances dangerous to human life on earth can be called the time limits of a war." 31/

Therefore, Goryainov, argues:

"The main decisive phase of the war, defined as the complete paralization of the enemy's nuclear strength, must be achieved in the shortest possible time; this must be much shorter than the time necessary to create a dangerous radioactive concentration." 31/

He concludes that:

"...the nuclear/missile weapon is a mass type of weapon, is relatively economical, and, from the combat point of view, it is the most effective."

"...a nuclear/missile war must be short-lived; its active phase can be measured in days or weeks."

"...the time limits of a war must be determined by...the intensity and number of bursts which will not cause a dangerous saturation of the atmosphere..." 31/

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G. BIBLIOGRAPHY OF CSDB REPORTS

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(See (U) Review of "CSDB Reports"

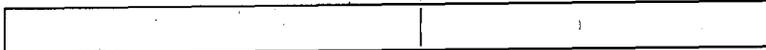
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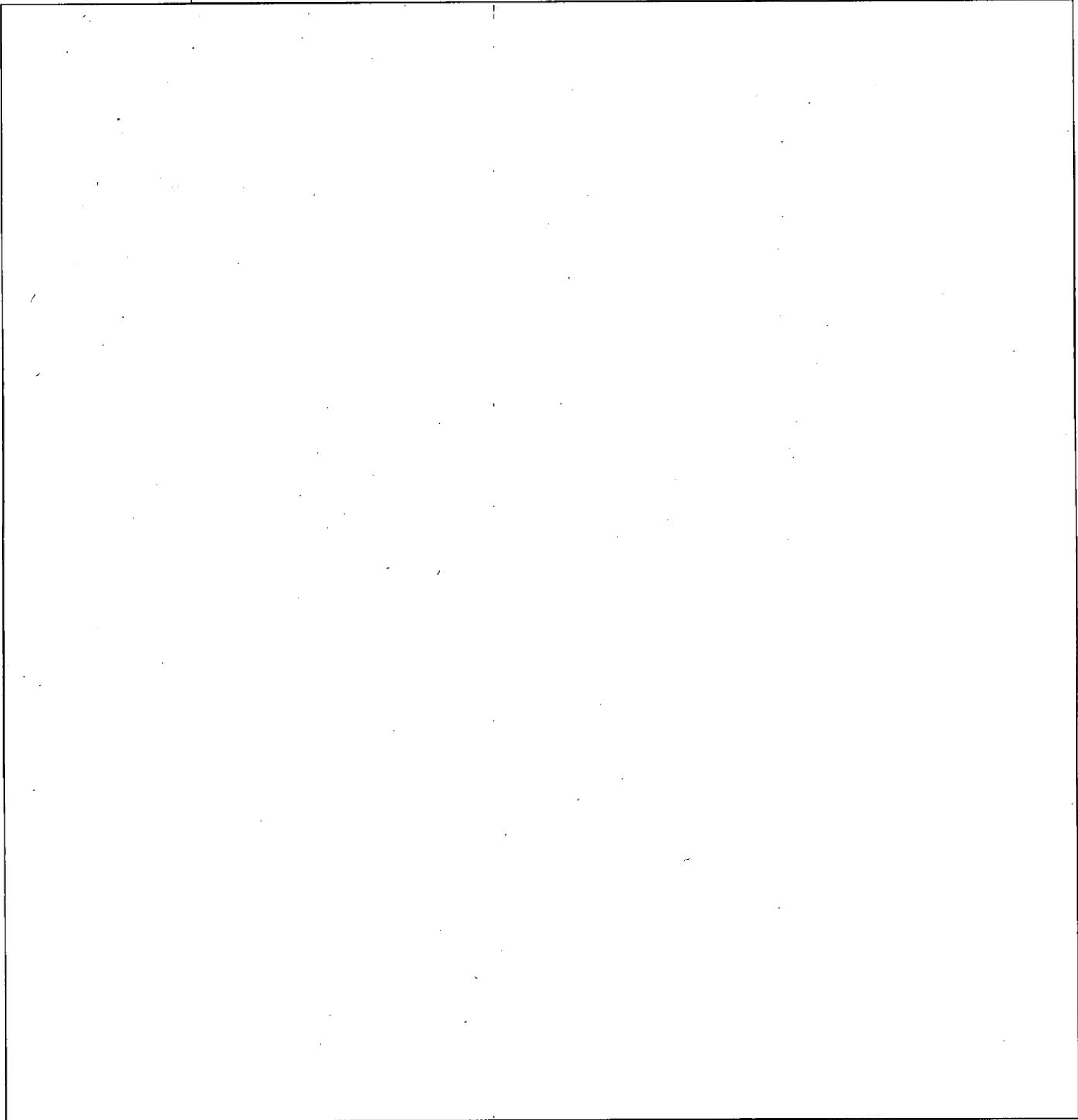
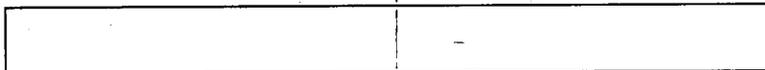
NOTE

For ready reference this Bibliography includes 29 of the latest CSDB Documents (151 thru 180) which are not quoted or reviewed in Parts I, II, III, and IV.

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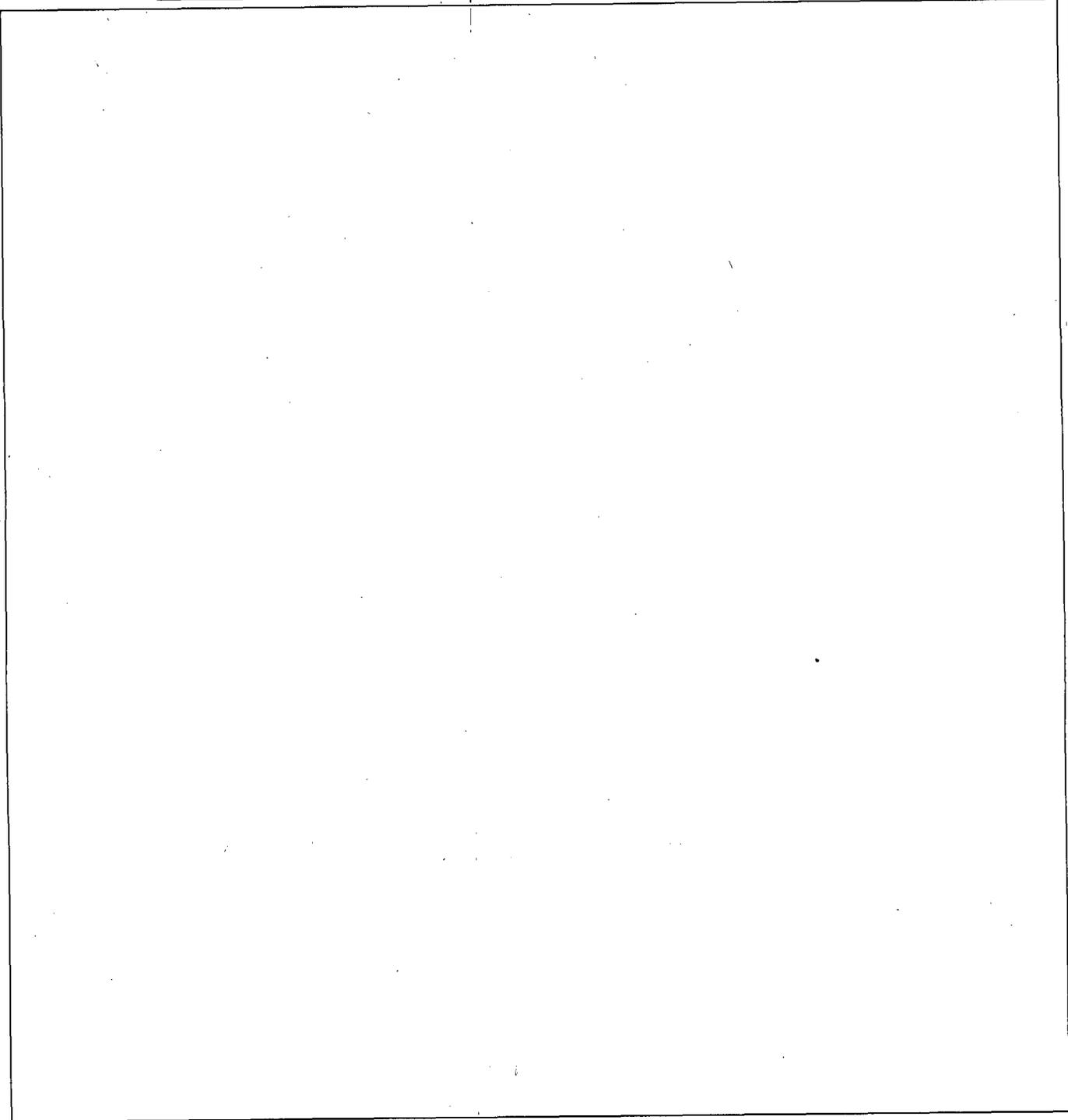


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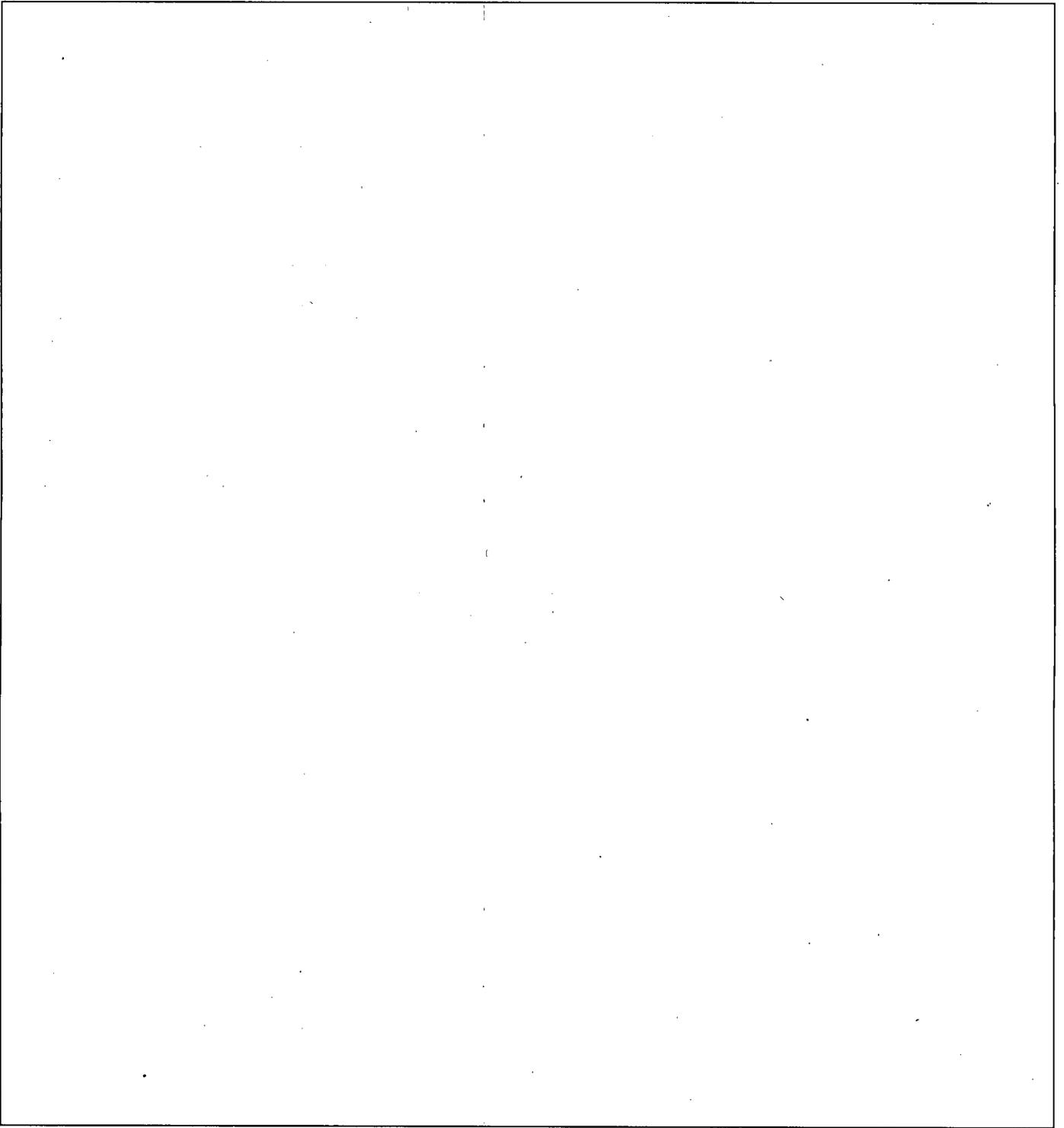
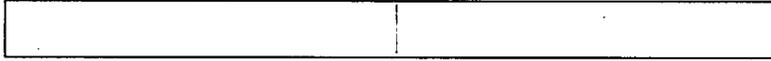
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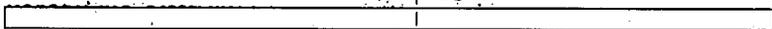
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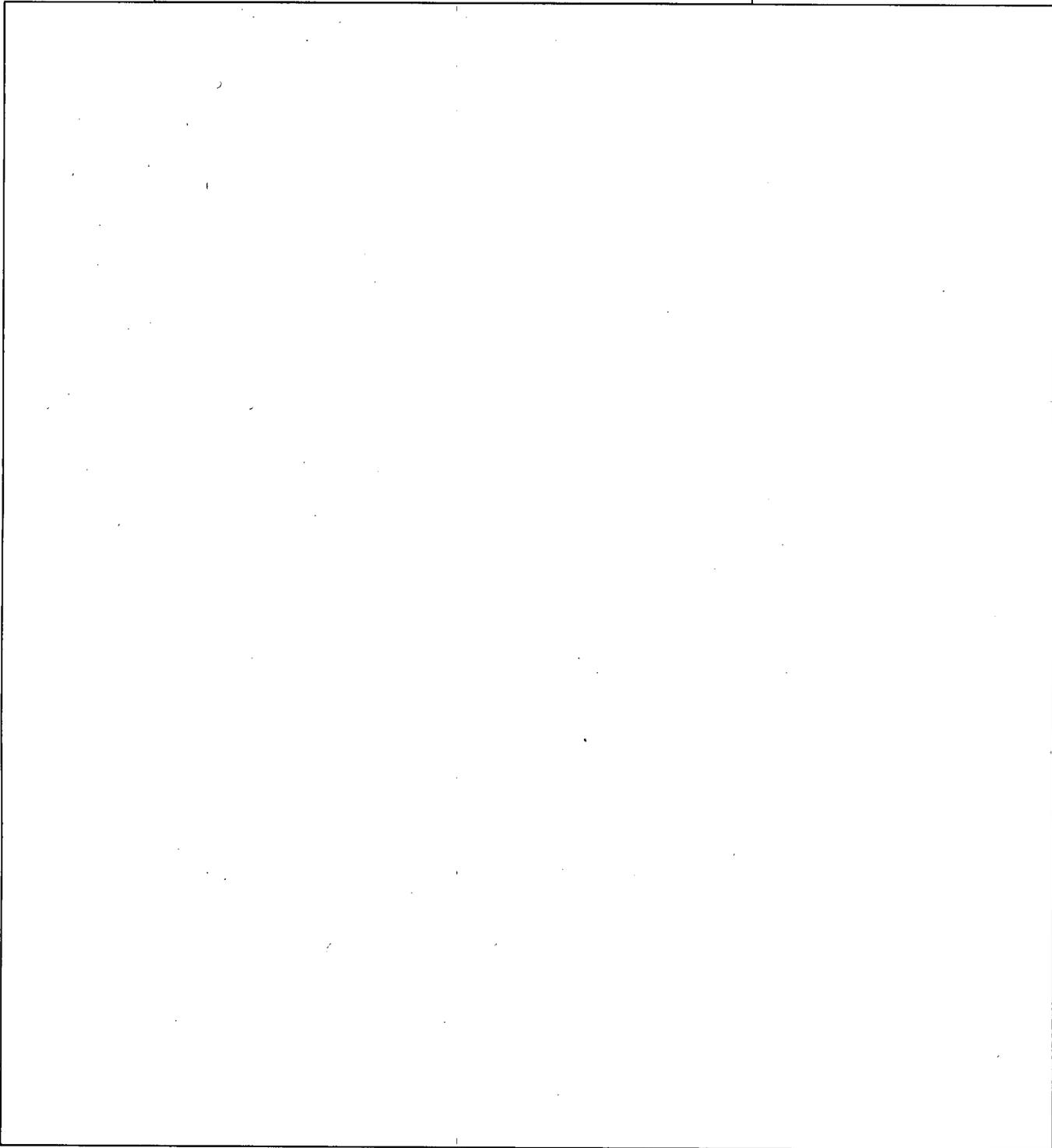
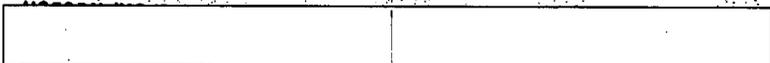
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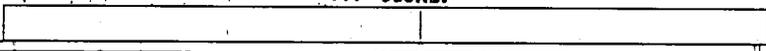
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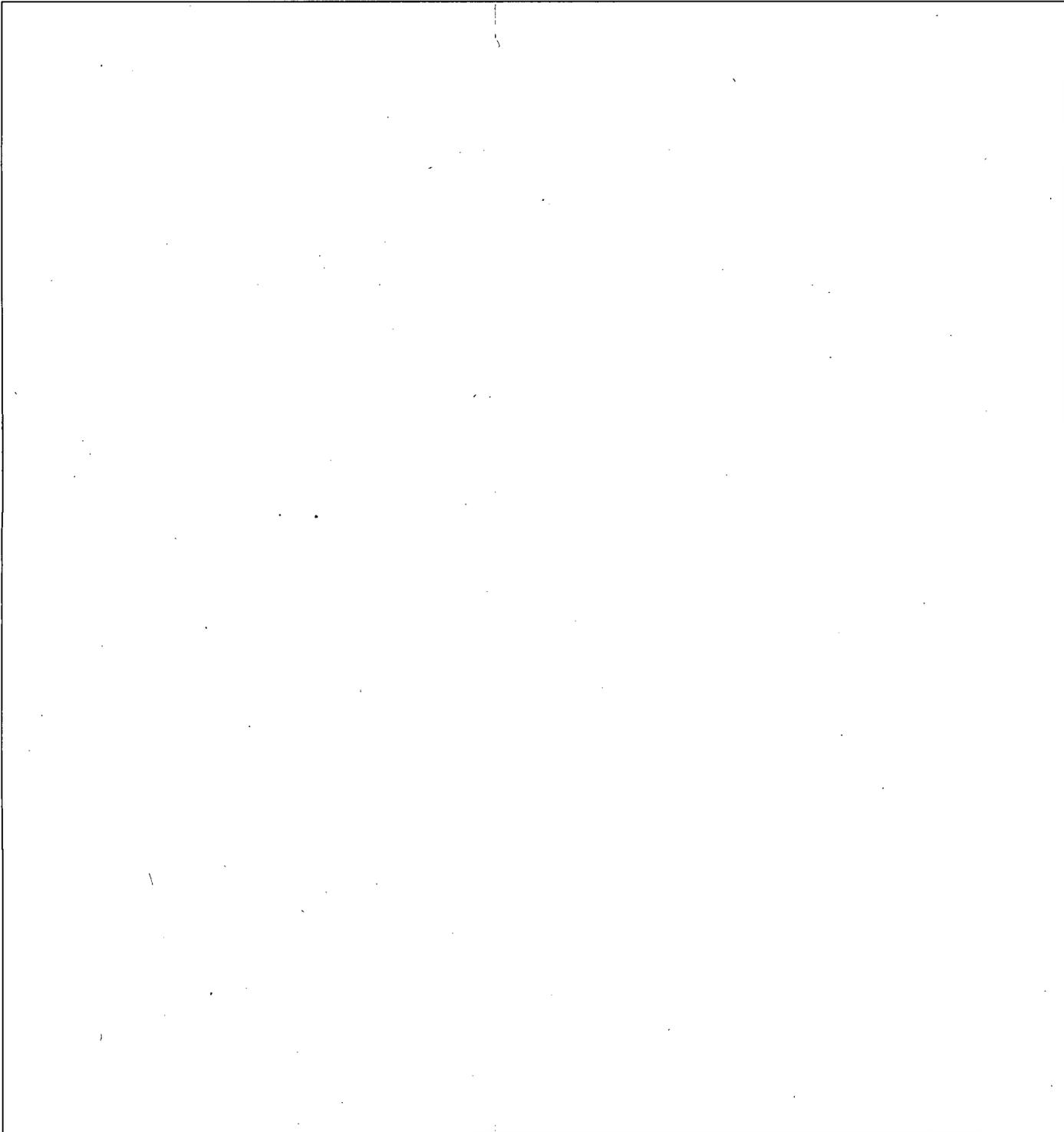
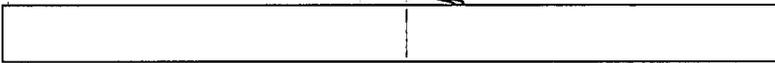
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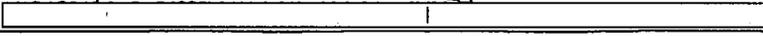
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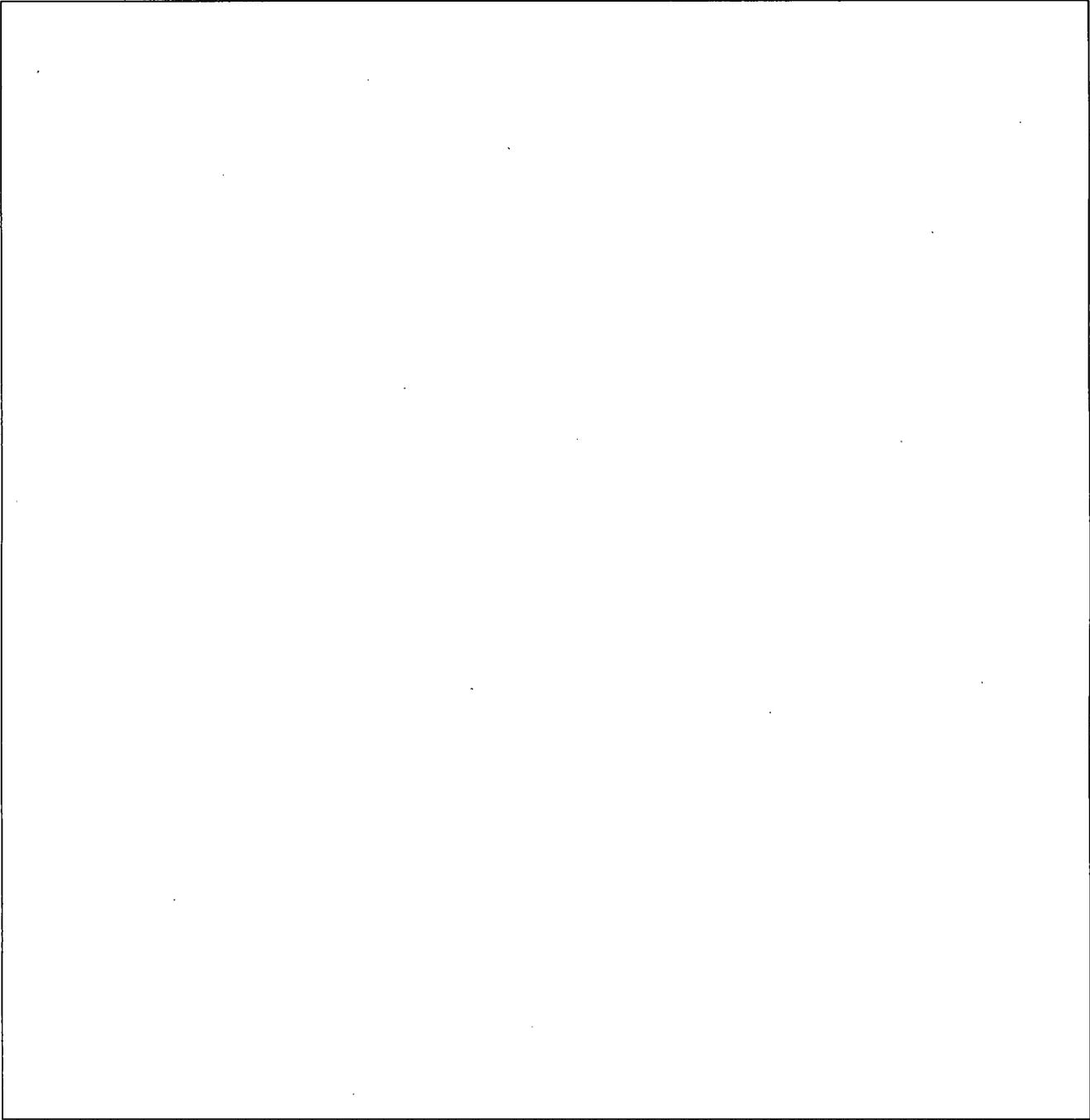
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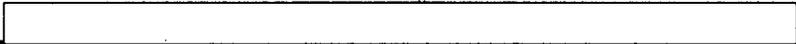
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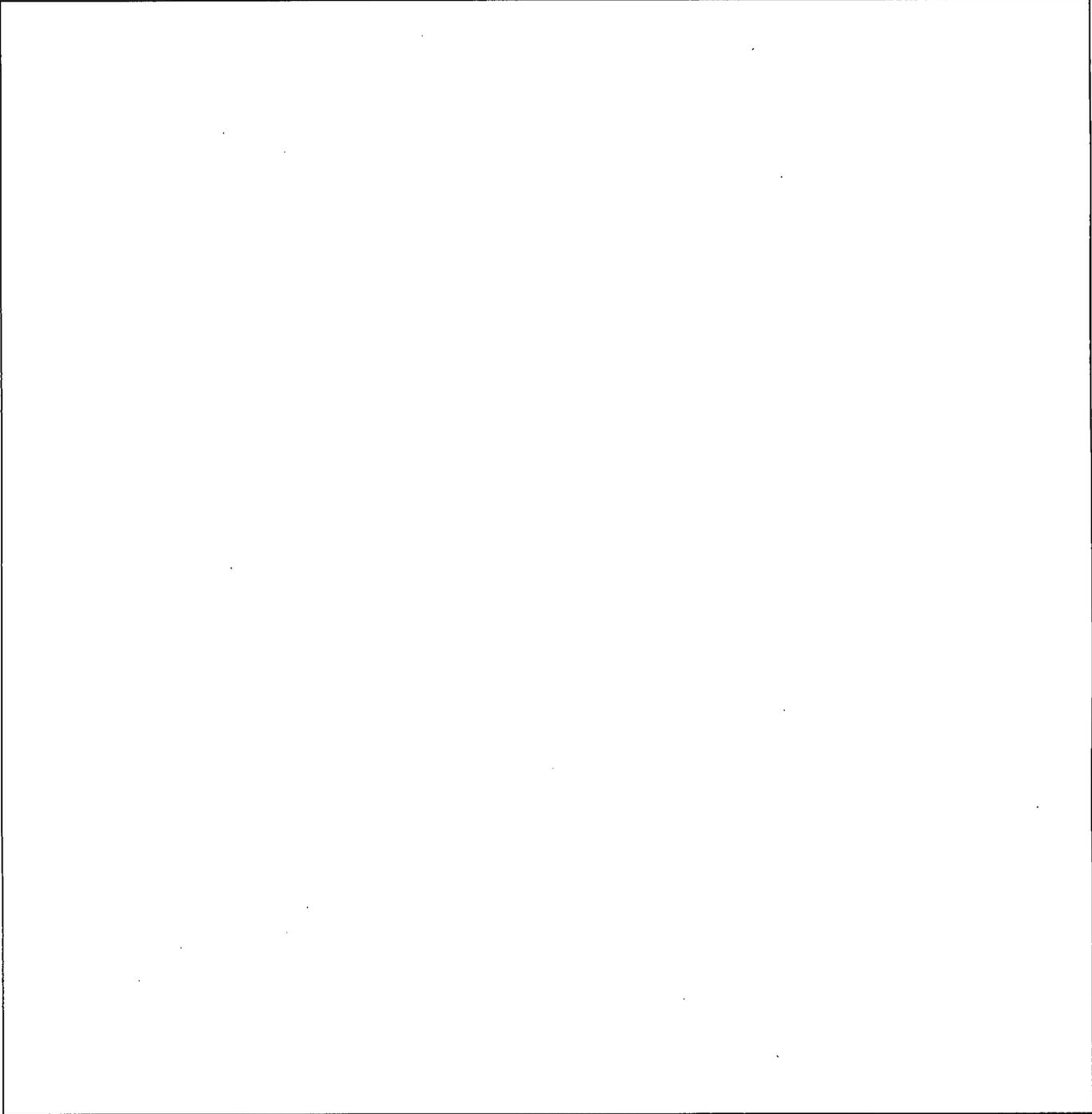
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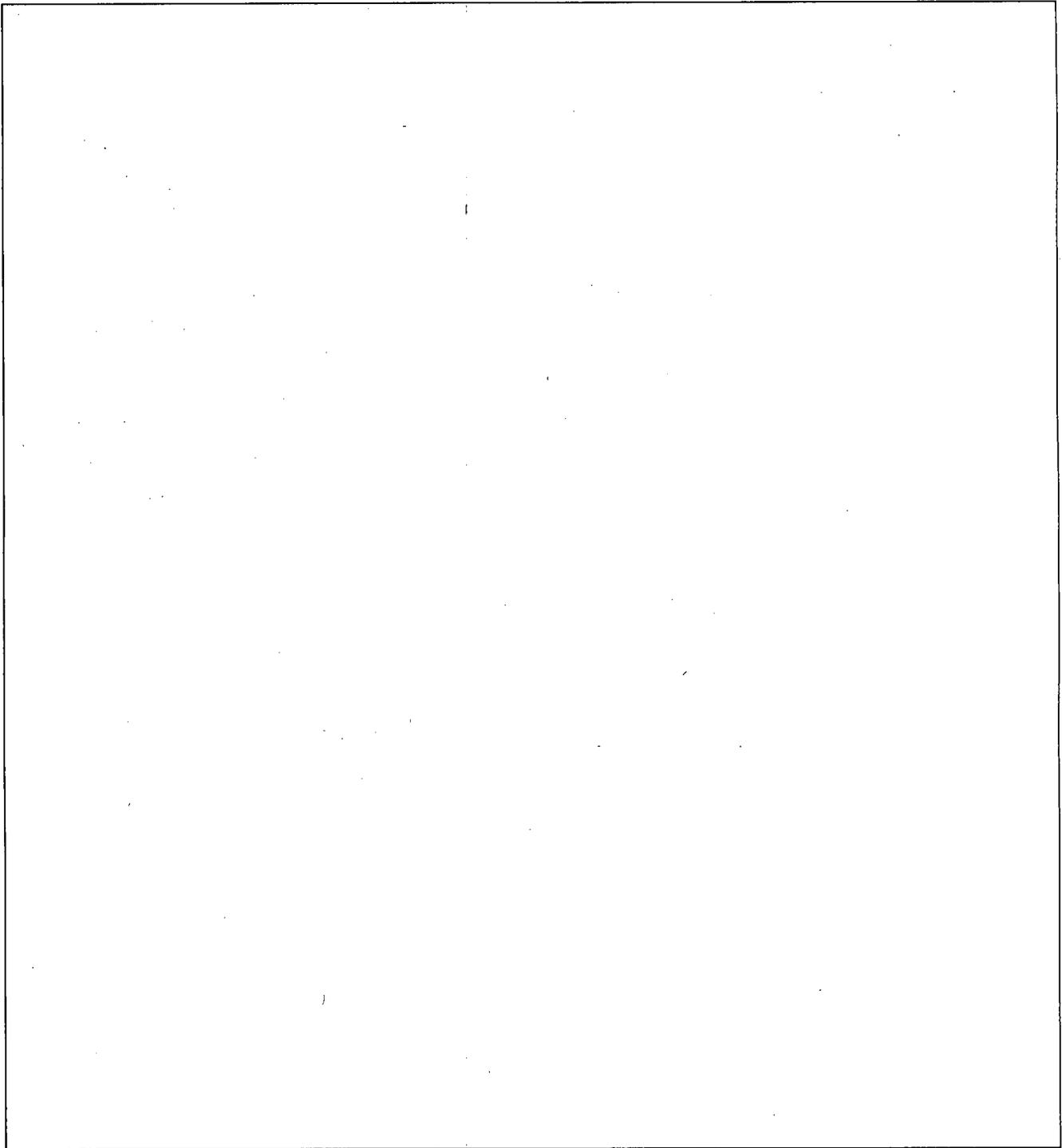
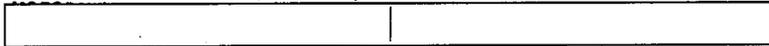


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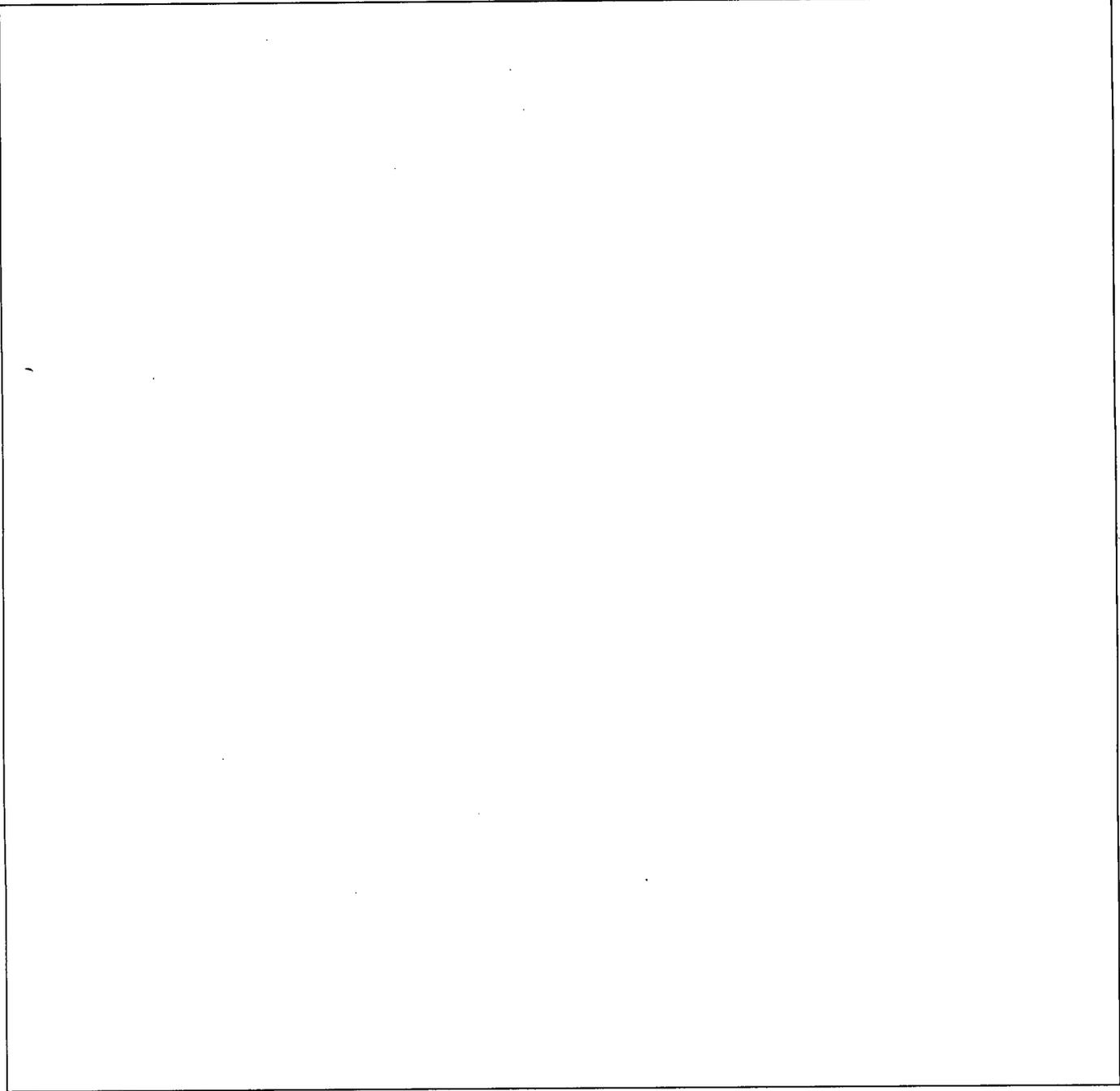
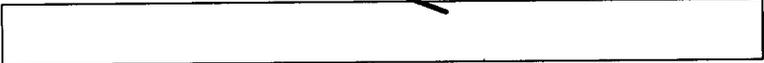
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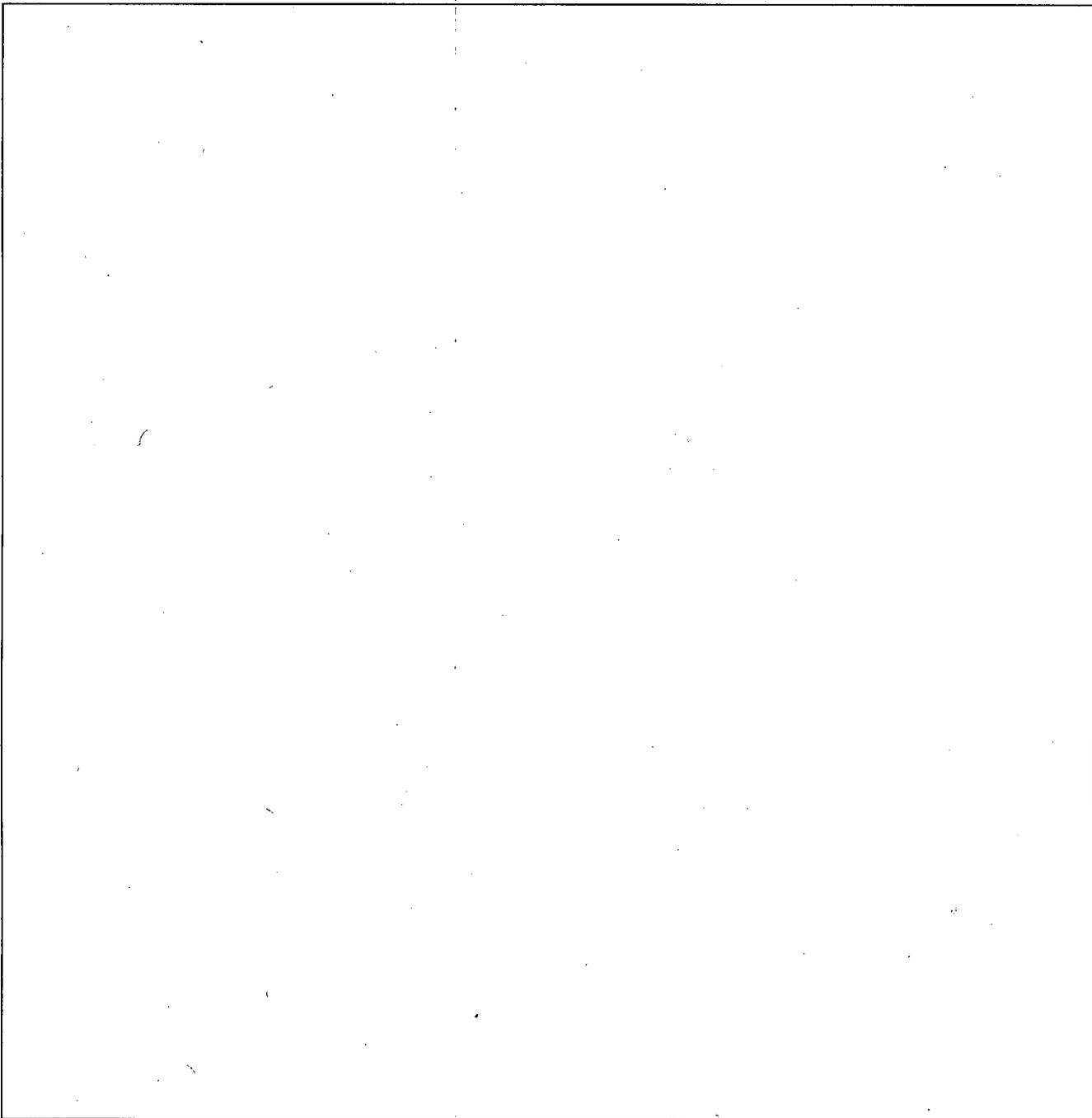
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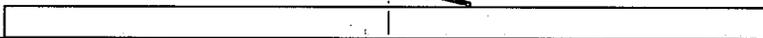
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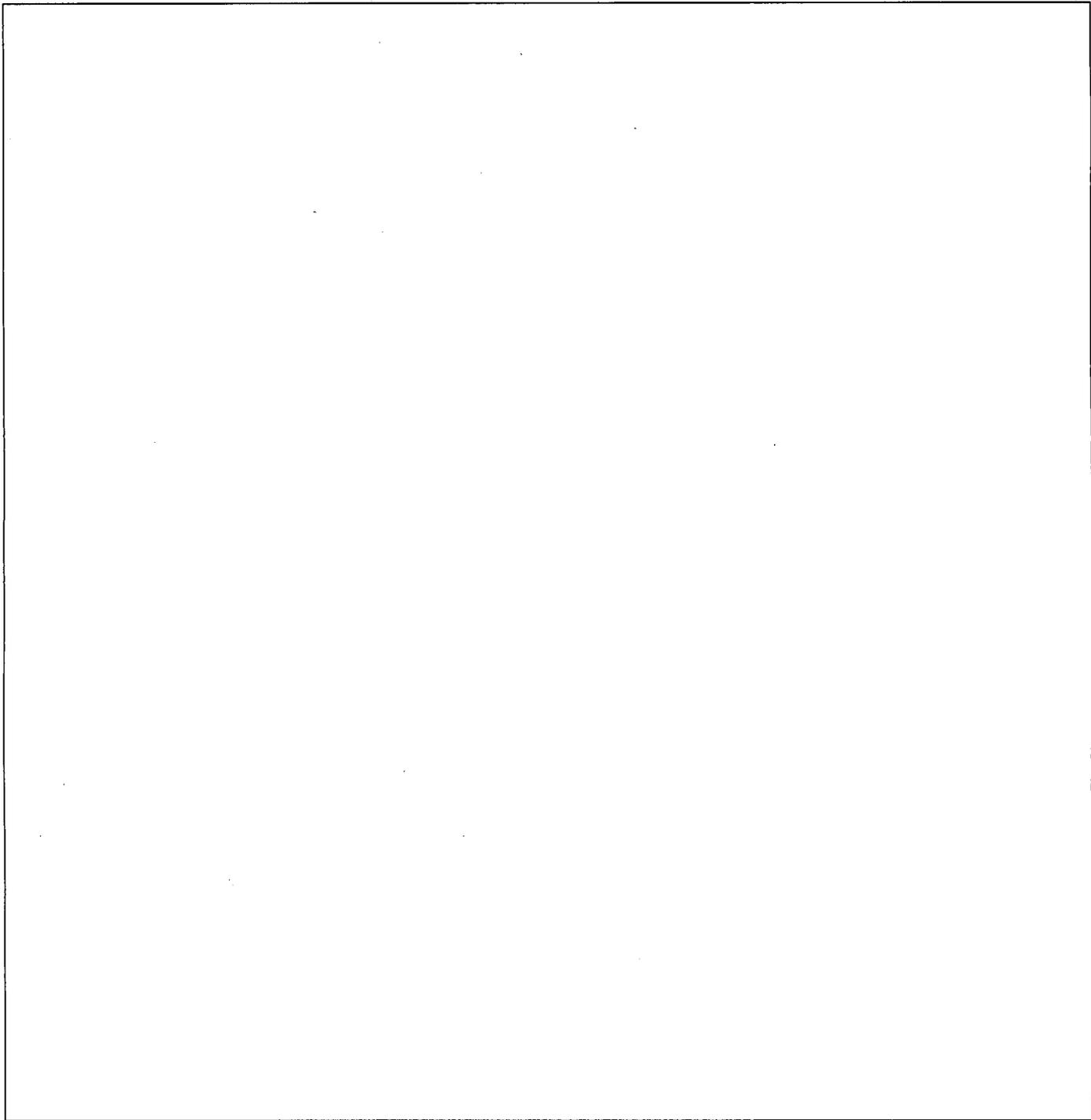
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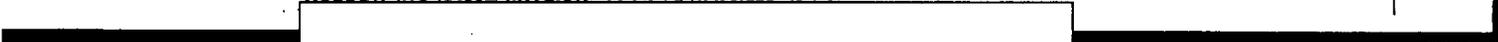
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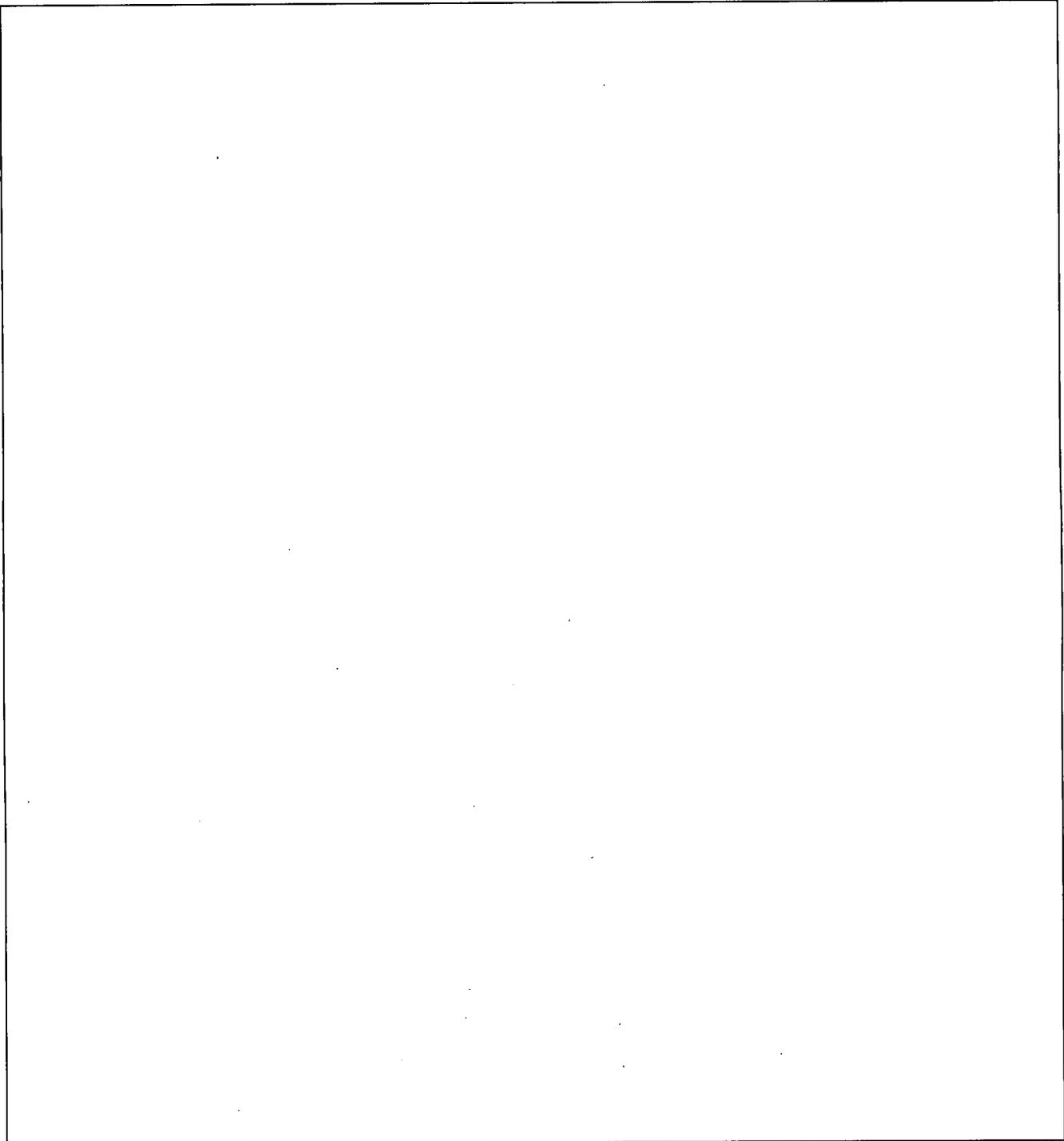
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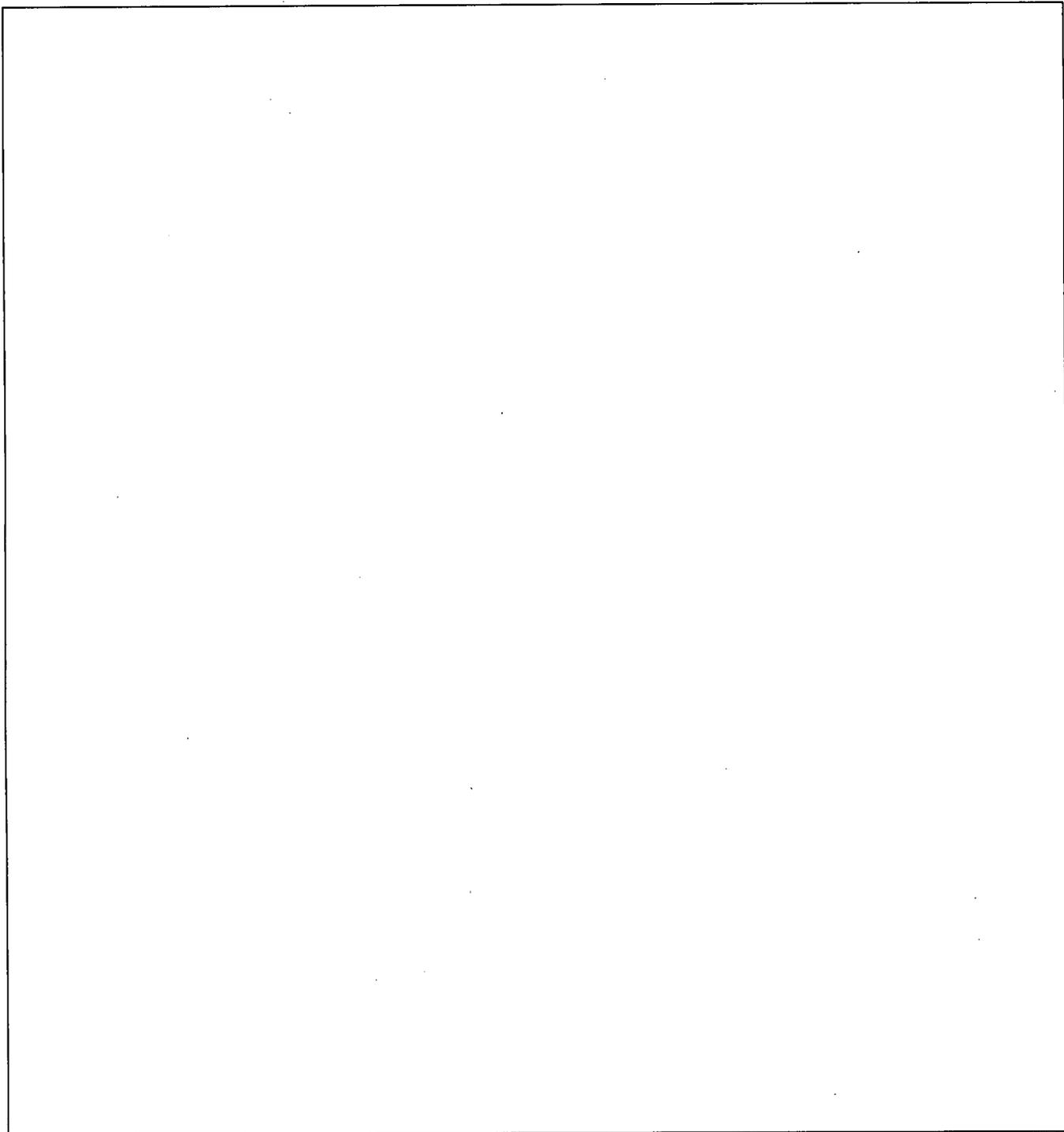
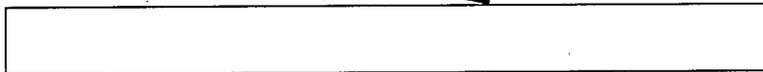
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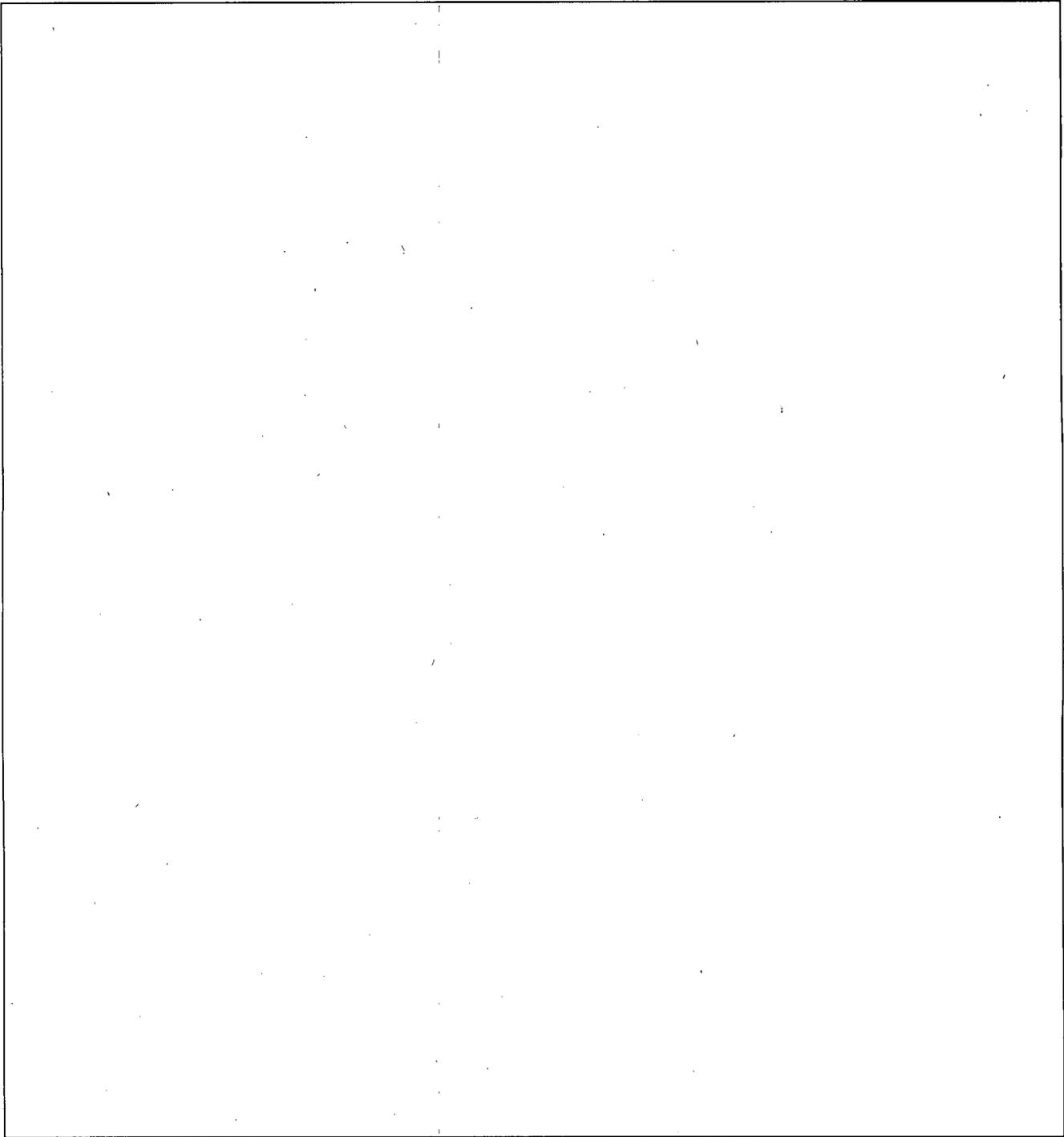
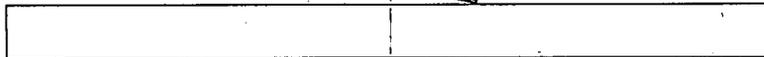
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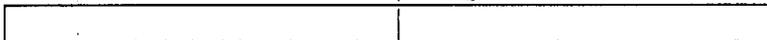
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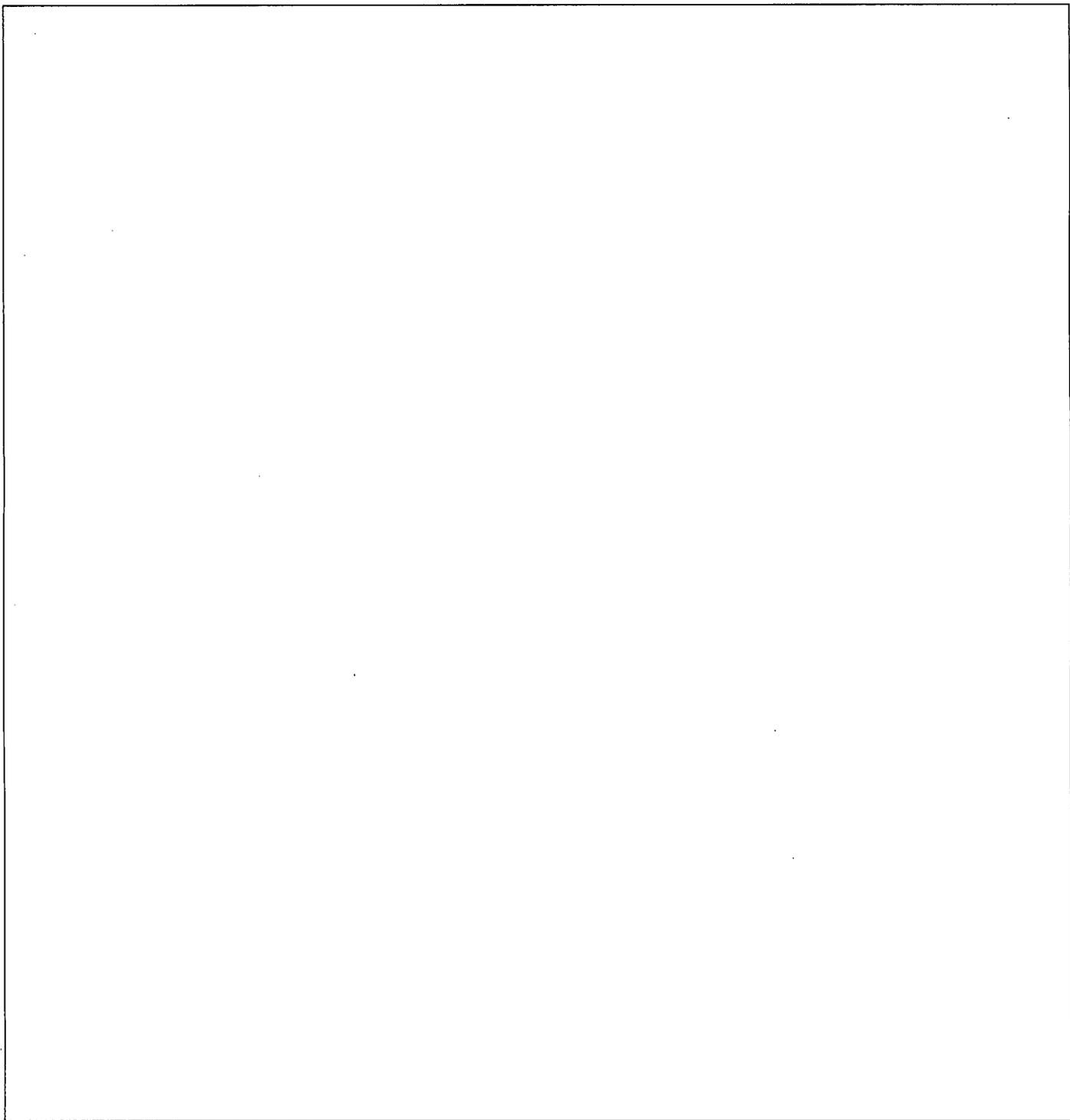
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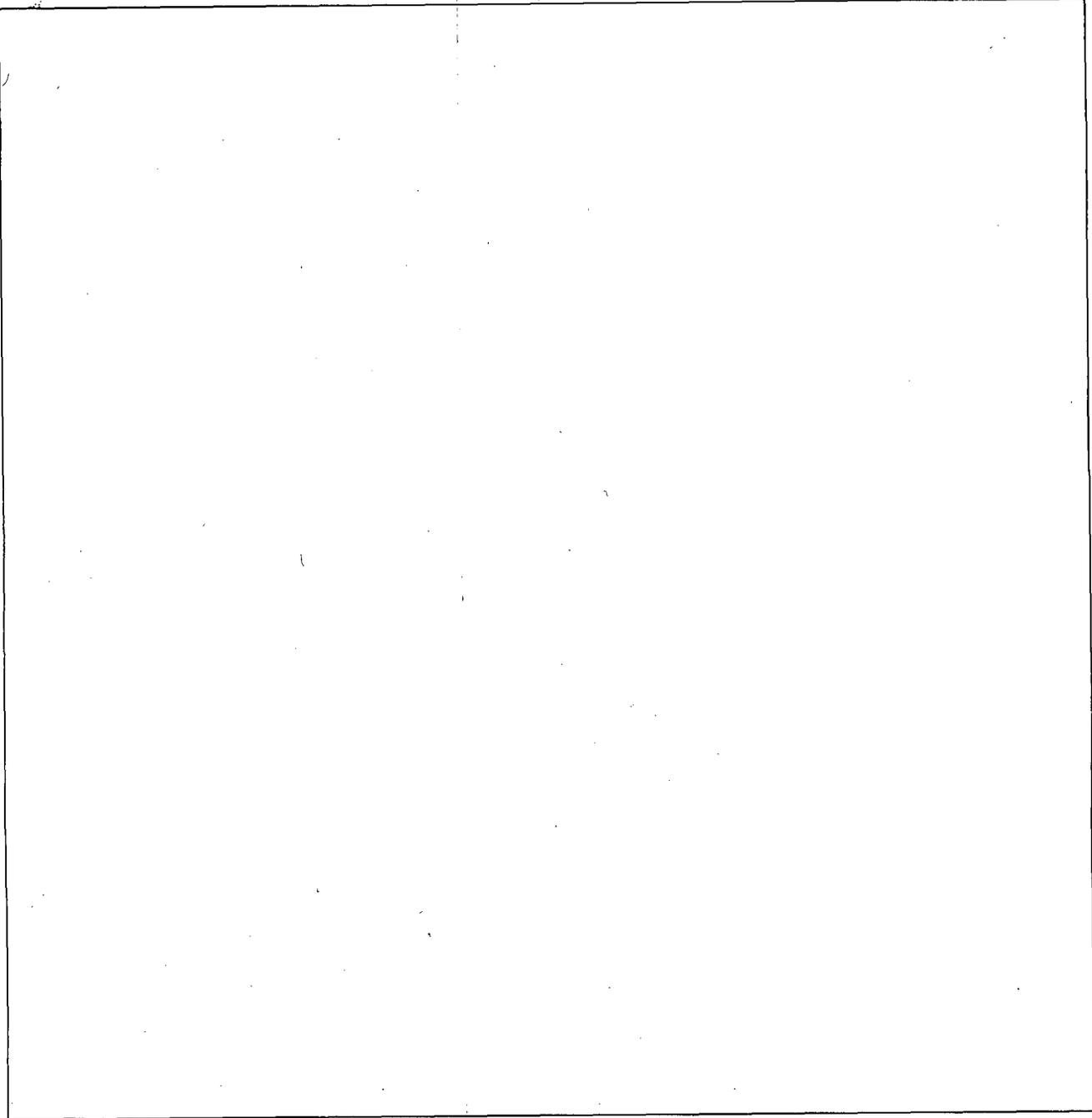
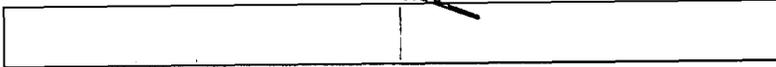
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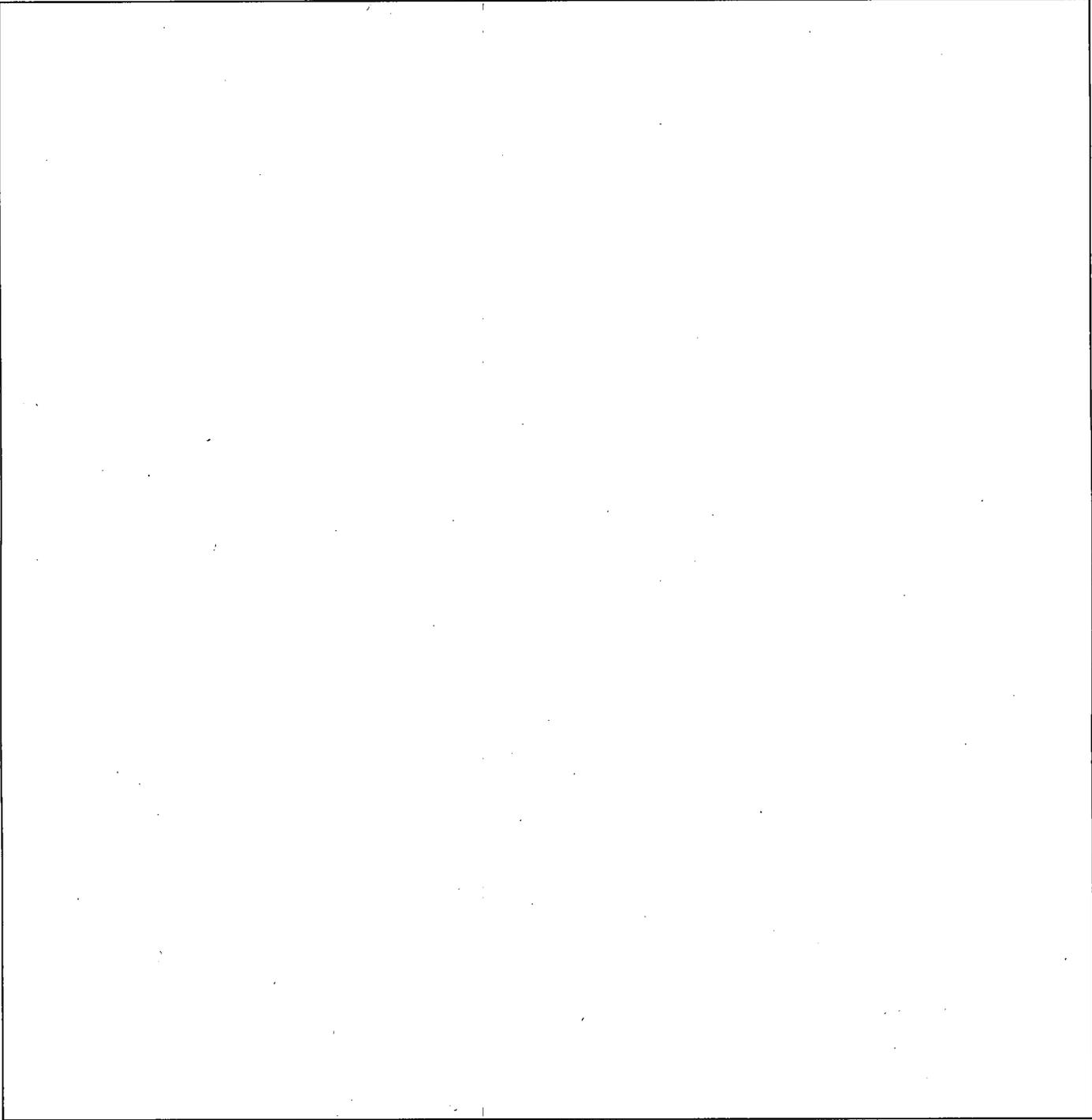
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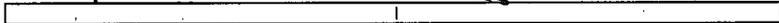
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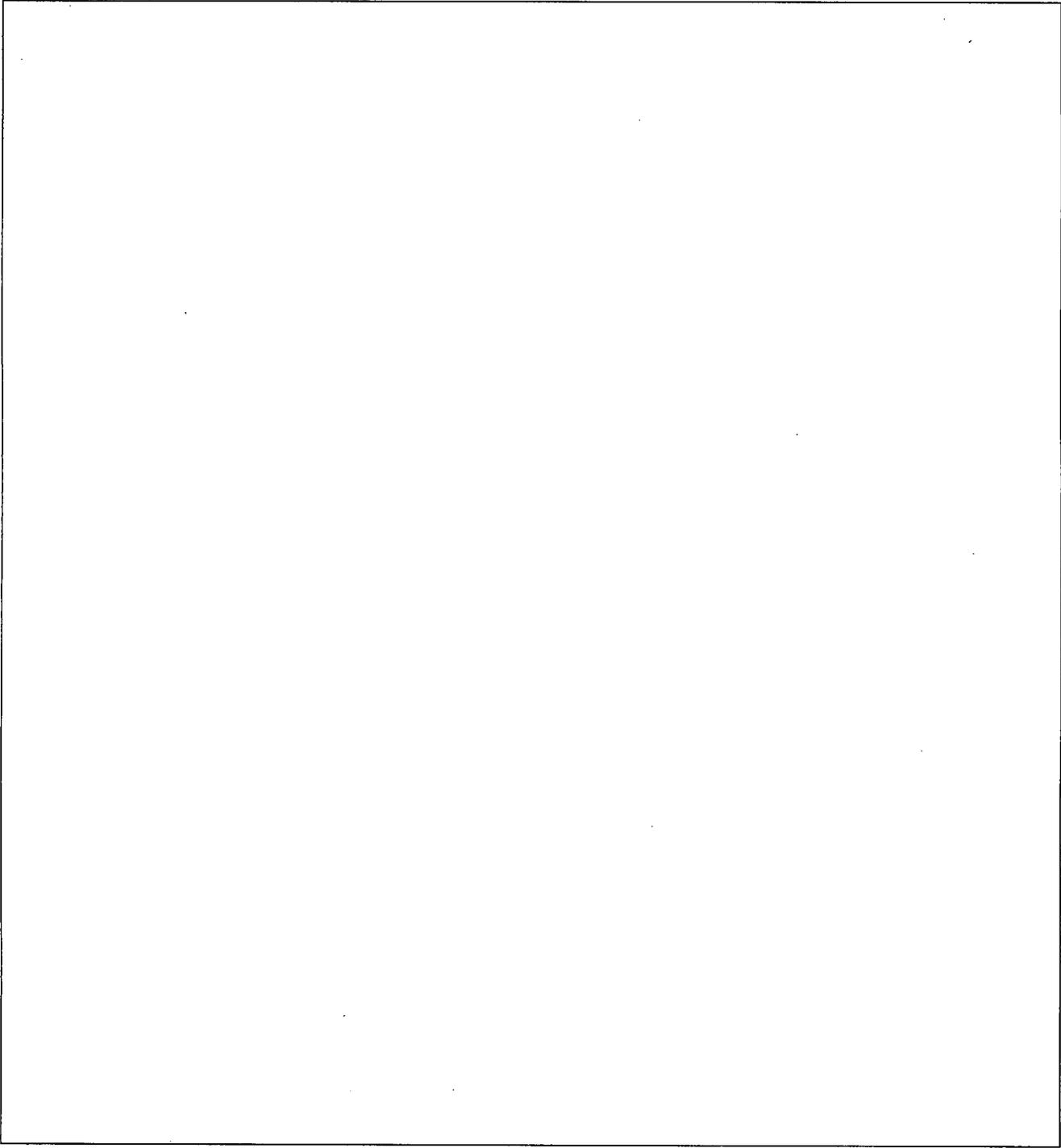
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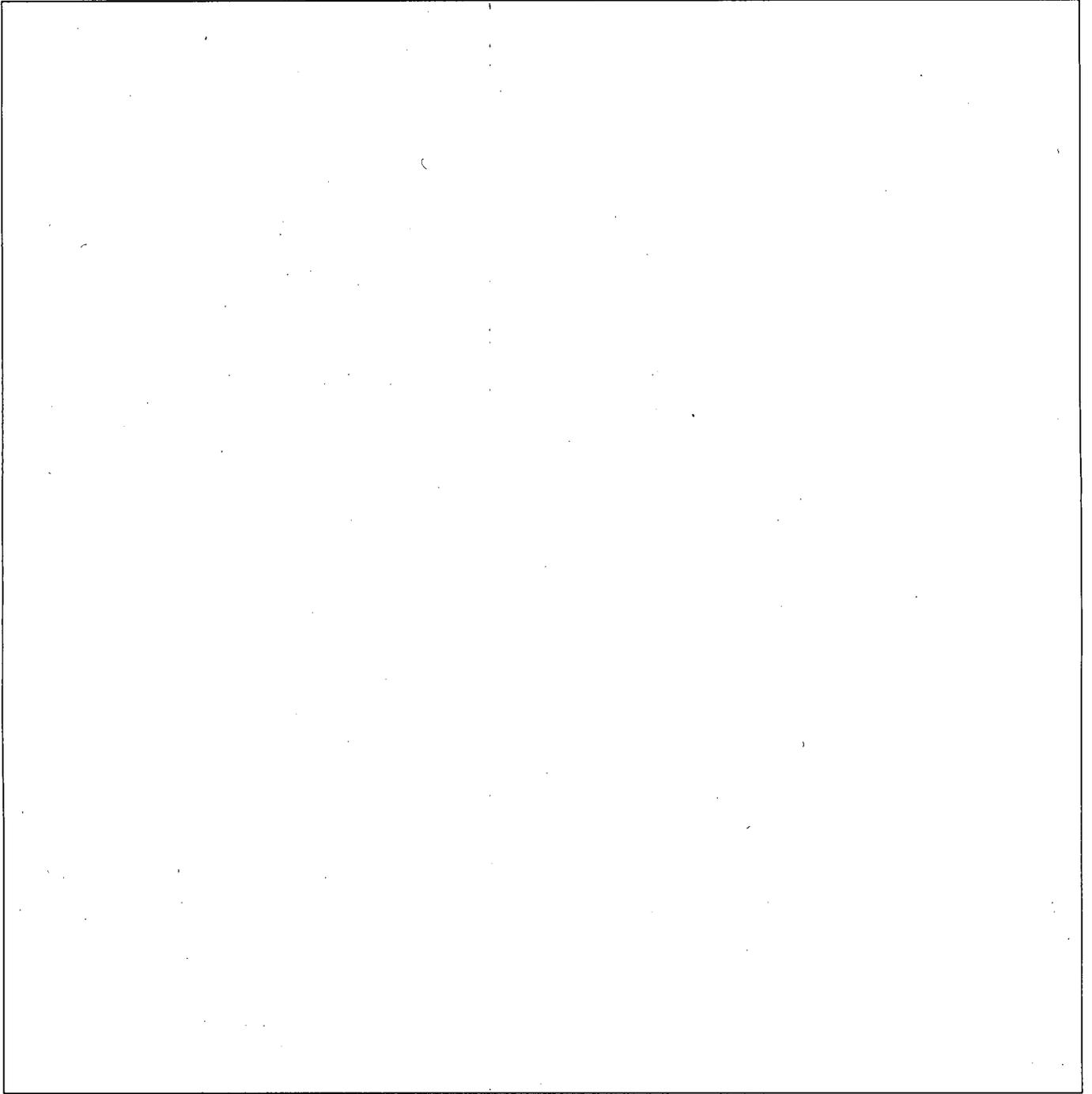
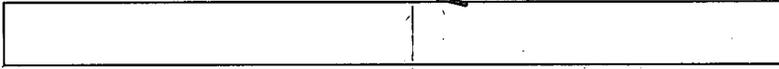
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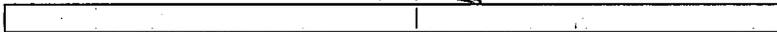


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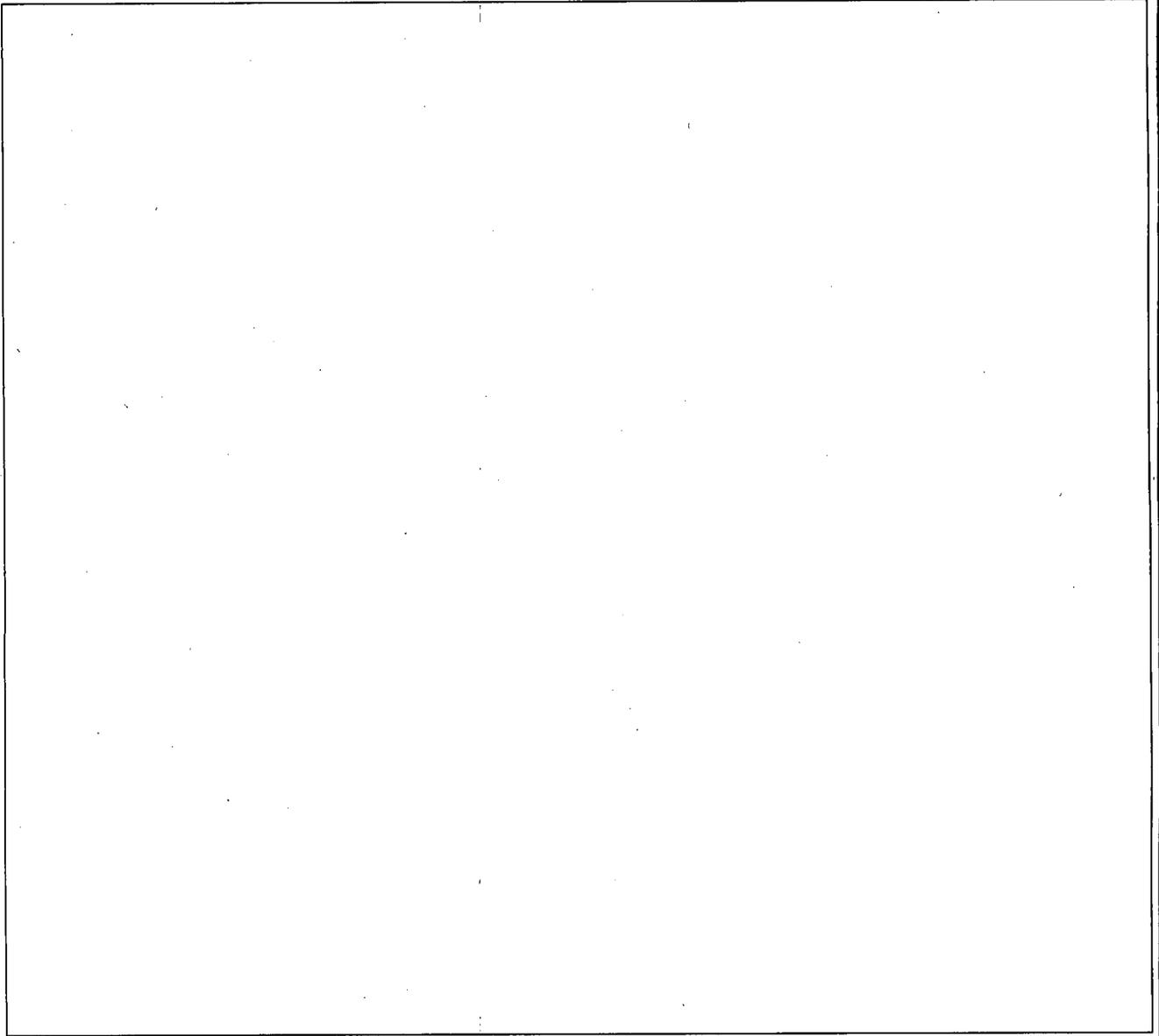
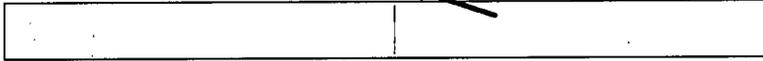


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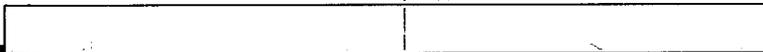
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G. Bibliography of Reports (Cont.)

NOTES:

*CIA - CSDB Document No.

**When indicated by the respective numbers in parentheses, the subject matter includes direct or indirect references to the following:

- | | |
|------------------------|--------------------------------------|
| 1. Doctrine | 12. Missile Troops |
| 2. Strategy | 13. Naval Forces |
| 3. Tactics | 14. Ground Forces |
| 4. Strategic Aerospace | 15. Intelligence |
| 5. Defense Aerospace | 16. Organization |
| 6. Tactical Aerospace | 17. Equipment/Materiel |
| 7. Naval Aerospace | 18. Logistical |
| 8. SSM | 19. Special Weapons |
| 9. SAM/AAA | 20. Radar/ECM/or Communications |
| 10. AAM | 21. Missile Sites/ or Air Facilities |
| 11. ASM | 22. Misc. information |

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G. Bibliography of Reports, Summary

Subject matter of the respective documents indicated by the Bibliography Number and (x) includes direct or indirect references to the following:

BIBLIOGRAPHY NO.	Doctrine	Strategy	Tactics	Strat. Aerospace	Der. Aerospace	Tac. Aerospace	Naval Aerospace	SSM	SAM/AA	AAM	ASN	Missile Troops	Naval Forces	Ground Forces	Intelligence	Organization	Equip/Materiel	Logistical	Special Weapons	Radar/ECM/Comm.	Mts.Site/Air Pac	Misc. Information		
79	X	X	X			X		X				X	X	X		X		X			X			
68	X	X	X			X		X				X	X	X		X		X				X		
69	X	X	X			X		X				X	X	X		X		X						
70	X	X	X			X		X				X	X	X		X		X						
71			X										X	X										X
72		X	X										X	X										
73		X	X										X	X										
74		X	X										X	X										
75		X	X	X	X	X		X				X	X	X		X		X						X
76		X	X	X	X	X		X				X	X	X		X		X						X
77		X	X	X	X	X		X				X	X	X		X		X						X
78		X	X	X	X	X		X				X	X	X		X		X						X
79		X	X	X	X	X		X				X	X	X		X		X						X
80		X	X	X	X	X		X				X	X	X		X		X						X
81		X	X					X				X	X	X		X		X						X
82		X	X					X				X	X	X		X		X						X
83		X	X					X				X	X	X		X		X						X
84		X	X					X				X	X	X		X		X						X
85		X	X			X		X				X	X	X		X		X						X
86		X	X			X		X				X	X	X		X		X						X
87		X	X			X		X				X	X	X		X		X						X
88		X	X			X		X				X	X	X		X		X						X
89		X	X			X		X				X	X	X		X		X						X
90		X	X			X		X				X	X	X		X		X						X
91		X	X			X		X				X	X	X		X		X						X
92		X	X			X		X				X	X	X		X		X						X
93		X	X			X		X				X	X	X		X		X						X
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95		X	X			X		X				X	X	X		X		X						X
96		X	X			X		X				X	X	X		X		X						X
97		X	X			X		X				X	X	X		X		X						X
98		X	X			X		X				X	X	X		X		X						X
99		X	X			X		X				X	X	X		X		X						X

G. Bibliography of Reports, Summary (cont'd)

Subject matter of the respective documents indicated by the Bibliography Number and (x) includes direct or indirect references to the following:

BIBLIOGRAPHY NO.	Doctrine	Strategy	Tactics	Strat. Aerospace	Def. Aerospace	Tac. Aerospace	Naval Aerospace	SSM	SAM/AAA	AAM	ASM	Missile Troops	Naval Forces	Ground Forces	Intelligence	Organization	Equip/Materiel	Logistical	Special Weapons	Radar/ECM/Comm.	Mis.Site/Air Fac.	Misc. Information	
100																							
101																							
102																							
103			X					X															
104																							
105																							
106			X																				
107			X																				
108			X																				
109			X																				
110			X																				
111			X																				
112			X				X																
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114			X																				
115			X																				
116			X																				
117																							
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119			X																				
120			X		X	X	X																
121			X																				
122			X																				
123			X		X	X																	
124			X			X																	
125																							
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128			X																				
129			X																				
130			X																				

6. Bibliography of Reports, Summary (cont'd)

Subject matter of the respective documents indicated by the Bibliography Number and (x) includes direct or indirect references to the following:

BIBLIOGRAPHY NO.	Doctrine	Strategy	Tactics	Strat. Aerospace	Det. Aerospace	Tac. Aerospace	Naval Aerospace	SSM	SAM/AA	AAM	ASN	Missile Troops	Naval Forces	Ground Forces	Intelligence	Organization	Equip/Material	Logistical	Special Weapons	Radar/ECM/Comm.	Mis. Site/Air Fac.	Misc. Information	
131			X			X		X				X		X									
132						X		X					X	X									
133			X			X							X	X									
134		X	X			X							X	X									
135		X	X			X							X	X									
136			X			X							X	X									X
137			X			X							X	X									
138		X	X		X	X			X				X	X									
139		X	X			X									X								
140			X			X																	
141			X			X							X	X									
142			X		X				X														
143			X											X									
144			X																				
145		X	X			X							X	X									
146		X	X			X							X	X									X
147			X										X	X									
148			X		X				X				X	X									
149													X	X									X
150			X						X				X	X									
151			X										X	X									X
152			X										X	X									X
153			X			X							X	X									X
154		X	X			X						X	X	X									X
155			X			X							X	X									X
156															X								X
157			X		X								X	X									X
158			X										X	X							X		
159		X	X			X							X	X									X
160															X								X
161		X	X			X							X	X									X
162			X																				X

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G. Bibliography of Reports, Summary (cont'd)

Subject matter of the respective documents indicated by the Bibliography Number and (x). Includes direct or indirect references to the following:

BIBLIOGRAPHY NO.	Doctrine	Strategy	Tactics	Strat. Aerospace	Def. Aerospace	Tac. Aerospace	Naval Aerospace	SSM	SAM/AAA	AAM	ASM	Missile Troops	Naval Forces	Ground Forces	Intelligence	Organization	Equip/Material	Logistical	Special Weapons	Radar/ECM/Comm.	Mis.Site/Air Fac.	Misc. Information
163			x																			
164			x																			
165			x						x													
166			x																			
167			x																			
168			x																			
169			x																			
170			x																			
171			x																			
172			x																			
173			x																			
174																						
175			x																			
176			x																			
177																						
178																						
179																						
180			x																			

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