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PRESENTATION

OPTIMUM FAMILY OF ARMY SSM's

The purpose of this briefing is to present the results of a CofS directed study on future SSM requirements for the Army.

This was presented to the Chief of Staff on 9 March 1957, who approved the recommendations with certain modifications. The presentation this morning reflects those modifications.

The problem is shown here:

(CHART 1)

It should be emphasized that the time frame for this study is 1965-1970.

This problem was studied by an Ad Hoc Committee under monitorship of DCSOPS. In addition to the Army Staff, CONARC was represented on this committee. The results of the study were subsequently circulated to CONARC and interested staff agencies for comment.

(CHART OFF)

The scope of the study did not include special purpose anti-tank missiles.

The general approach to the problem is shown on this chart.

(CHART 2)

Using ARDP-68 as a point of departure strategic objectives and tactical and organization concepts were evaluated in order to describe the nature and scope of land warfare during this time frame.

Next, the pure requirements for fire support means necessary to support land warfare were determined.

An appraisal of technological trends and capabilities was made.

The pure fire support requirements were then evaluated in the light of technical capabilities to arrive at an optimum missile family.

Finally, a proposed plan of transition to the optimum family was established.

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The Army's future fire support requirements can be derived from an analysis of considerations which fall into two general categories:

(CHART 3)

Regrading data cannot be predetermined

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First, those considerations based on targets, determined from an analysis of Soviet tactical doctrine and organizational trends. And second, those based on the method and level of employment, derived from analysis of our own tactical and organizational concepts for future war.

These considerations lead to the establishment of pure requirements for range, lethality, accuracy and mobility of our fire support systems.

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A summary of these requirements is shown on this next chart:

(CHART 4)

First, it was found that the probable enemy dispositions and targets of interest to the ground commander in the war of 1965 will generally fall in five zones:

a. The contact zone is that area extending from our own foremost elements to a distance of approximately 3000 yards toward enemy-held territory. The area will include the interval between major units of each side, enemy outposts and screening units.

b. The direct support zone, extending about 20 miles, includes the enemy's forward elements, his artillery firing in support of these forward elements and his regimental and division reserves.

c. The general support zone extends to a depth of approximately 50 miles from the zone of contact. The major combat reserves will be located in this zone.

d. The extent of the logistics zone would vary considerably, but it is improbable that this zone would extend beyond approximately 300 miles forward of the zone of contact. The enemy's main logistic complexes, his principle tactical air bases, and his longer range SSM's for support of ground operations would be positioned throughout this zone.

e. The communications and reserve zone extends out to the limit of the ground commander's area of interest - or about 1000 miles. The enemy's strategic reserves and large communications and transportation complexes are the principle targets of interest to the ground commander in this zone.

(Place 1st overlay on CHART 4)

This next overlay shows the area of primary interest for each of our echelons of command, or that portion of the battlefield occupied by the enemy which each of our echelons should have the capability to control or influence by fire, in order to carry out its mission. For instance, the Division should have the capability to control by fire the entire direct support zone out to a distance of about 20 miles; the Corps, out to a distance of about 50 miles; and so forth. Note that there is a considerable overlap between each echelon.

The capability to reach the deepest targets in its zone of primary interest is the principle consideration in determining the maximum range requirement for each echelon. However, the positioning of the weapons for the attack of these targets is also an important consideration. All echelons require the capability of positioning its weapons in considerable depth in order to avoid frequent displacement, to minimize enemy detection, to permit coverage of the width of the front and to provide mutual support of adjacent and more forward units. It was found that this degree of flexibility could be obtained if, in general, each echelon had the capability of emplacing its longest range weapon to the rear a distance equivalent to the forward extent of its primary zone of interest. Accordingly, the total weapon range capability of each echelon should be approximately twice the depth of the primary zone of interest. For instance, the Corps should have a total range capability of approximately 100 miles, the Division, 40 miles, and so forth.

The requirements for lethality and accuracy must be considered together since the more accurately a warhead or projectile can be delivered, the less lethal it need be to obtain any given effect. Based on the targets to be attacked at the weapon ranges established, and considering probable target location capabilities and limitations, it was determined that the following represented the order of magnitude of our future atomic requirements.

(Place 2nd overlay on CHART 4)

The yields required for the various echelons are shown in Black; the delivery accuracy is in Green. These are the yield distributions, with associated maximum allowable circular probable errors in meters, necessary to obtain a high assurance of effectively destroying or neutralizing the type targets to be found in these zones. Troop safety governed to a large degree the selection of yields for close support.

In a non-atomic war the ground commander will still require the responsive means to isolate the battlefield and to attack all military targets which have a direct influence on the land battle. The advent of new ground delivery systems, primarily free rockets and guided missiles with optimum fragmentation warheads, gives the ground commander an organic capability to extend the depth of ground combat. However, the accuracy of even these new delivery systems deteriorates considerably with range. Also, the lethality of optimum fragmentation warheads do not begin to approach the proportions of atomic warheads.

(Place 3rd overlay on CHART 4)

Shown in Green on this next overlay, are the relative maximum acceptable probable errors for non-atomic delivery: i.e. circular probable errors of the order of 5 meters for the attack of small fleeting point targets, which require direct hits for a kill, and which are located in the contact zone and the forward portion of the direct support zone; 30-50 meters CEP for the neutralization of relatively small enemy troop concentrations and supporting weapons in the contact and direct support zones by conventional HE munitions; and about

200 meters when delivering optimum fragmentation on large area targets. Now this maximum acceptable 200 meter probable error requirement assumes payloads at least of the order of 2-300# and recognizes that multiple or salvo attack will probably be required in many instances to achieve the effect desired. From a pure requirement standpoint, a non-atomic capability out to the full extent of the ground commander's area of interest is desirable. The question-mark indicates recognition of the fact that there is some range beyond which the over-all non-atomic effectiveness of ground delivered weapons becomes marginal and does not justify the cost, complexity, field handling and logistic support problems entailed in their employment.

(CHART OFF)

With regard to mobility, the requirements can only be stated in general terms. The fire support system must be as mobile as that echelon of command at which it will normally be employed. The ease with which road nets can be disrupted in an atomic war places a premium on cross-country mobility and the capability for rapid movement by air to and within the battle area.

Having established the pure fire support requirements in terms of range, accuracy, lethality, and mobility, the next step was to determine the probable technical limitations and capabilities in meeting these requirements. I will briefly summarize the principle results of this technical appraisal.

a. Sectionalized solid rocket motors are applicable to this time frame, which should greatly alleviate the field handling problem previously associated with large solid motors. Also improved chemical efficiency of solid rockets should result in considerable savings in missile gross weight per pound of payload. Improvements in liquid propulsion such as free radicals and prepackaged liquid propellants were considered. All in all, however, from an operational, logistical and field handling point of view, solids are favored based on the state of art as far as we can project it.

b. We can expect greater reliability in guided missiles, but high accuracy can still only be attained at high cost, increased complexity, and reduced responsiveness to fire requests. Where high rates of fire are needed, guided missiles are not the answer. Therefore, within the Division, we must look to other delivery means for high density non-atomic fires.

c. Some improvement in the lethality of optimum fragmentation warheads can be expected. This should decrease somewhat the accuracy requirement for efficient employment of this type munition and increase the range limit beyond which it is not economically feasible to deliver such warheads. This range is expected to be about 40 or 50 miles.

d. Large reductions in size and weight of atomic warheads [redacted] without an appreciable reduction in nuclear efficiency, are expected. Yields of about [redacted] are possible in a warhead weight of [redacted] pounds; [redacted] in a warhead of about [redacted] however, the prospects are not as favorable. Although atomic warheads [redacted] might be possible, considerable development effort would be required and the cost in nuclear inefficiency would be high.

e. Considerable improvements in the performance of manned aircraft are expected by this time frame but their over-all effectiveness will be marginal, primarily because of air defense capabilities of the opposing forces. It is believed that TAC Air will still be useful in many missions but more and more reliance will have to be placed on missiles, particularly for atomic delivery.

Based on the pure fire support requirements which I presented earlier and the technical forecast, a family of 5 missiles was selected to meet the Army's operational needs for the 1965-70 period.

(CHART 5)

The family is shown on this chart as a function of minimum and maximum range. The normal level of employment for Missile "A" would be the Combat Group, Missile "B" - the Division, "C" - Corps, "D" - Field Army and "E" - the Army Group. Note that the study was not inhibited by the recent administrative restriction placed on the range of Army missiles. This was a requirements study and long-range missiles are a valid Army requirement.

The range shown for Missile "A" is tentative. In accordance with guidance received from the CofS, this missile is being restudied with a view to decreasing its minimum range to as short as technically feasible. Depending on this minimum range, its maximum range may turnout to be somewhat longer or shorter than that shown on this chart.

I invite your attention to the range of Missile "D". Actually the range of this missile, when presented to the CofS and the General Staff Council early this year, was 600 miles - 600 miles being twice the depth of the Field Army Commander's area of interest. However, events overtook this range requirement when it was decided to press forward with the Army's proposal for a mid-range missile development this spring. At the time, a technical feasibility study of a 500 mile ballistic missile was well underway, while no specific study of a 600 mile missile had been made. It was therefore decided to drop 100 miles of the requirement in favor of a missile proposal which could be supported by a fairly detailed technical appraisal.

A comparison of the range spectrum of this family and the present family is shown here.

(CHART 6)

This is the range spectrum of the present family.

(Overlay to CHART 6)

This is the new family superimposed in red. Gaps in the range spectrum of the present family have been eliminated and with a reduction in the number of different type missiles.

(CHART OFF)

The next series of charts summarizes all the principle characteristics of these proposed missiles.

(CHART 7)

This is Missile "A" or the Battle Group Missile. In addition to the range requirements just discussed, accuracy, lethality and general physical characteristics are shown. We will permit some relaxation in that 50 meter accuracy requirement near maximum range. Weighing only about [redacted] which is less than half the weight of LITTLE JOHN, this missile would deliver both optimum fragmentation warheads and atomic warheads with [redacted] Because it will be the highest density weapon in the system, we consider it highly important that this missile be unguided or, at most, employ the simplest, most rudimentary, type of guidance in order to reduce to the absolute minimum its cost, logistic complications and requirements for tactical personnel.

(CHART OFF)

(CHART 8)

The division missile, or Missile "B", shown here, will also be a solid propellant rocket. It will deliver [redacted] atomic and non-atomic warheads and weigh approximately 1,000 to 1,200 pounds. In other words, with a range better than half that of CORPORAL, it will weigh only one-tenth as much. It would have a [redacted] It too will be highly mobile, helicopter transportable, and employ minimum guidance.

(CHART OFF)

(CHART 9)

The corps missile, Missile "C", will weigh approximately [redacted] pounds and deliver a [redacted] pound atomic warhead. Again, for the sake of comparison, this missile is only about two-thirds the weight of HONEST JOHN but yet has almost seven times the range. An optimum fragmentation warhead requirement for this missile was seriously considered. But if a non-atomic capability were incorporated, it is estimated that about a 100% improvement in accuracy would be required. This degree of accuracy would probably entail technological advances in missile guidance an order of magnitude better than we can realistically predict today. It should also have a solid propellant motor, but will employ an all-inertial guidance system immune to hostile electronic countermeasures in order to provide the required accuracy.

(CHART OFF)

(CHART 10)

This next chart shows the characteristics of Missile "D" or the Field Army Missile. The characteristics shown reflect the refinements over the basic study as a result of the technical feasibility study mentioned earlier. It would [redacted] Note the weight -- [redacted] This is less than our present 75 mile CORPORAL. It too would be solid rocket propelled and use inertial type guidance

(CHART OFF)

(CHART 11)

This next chart is the optimum land-based IRBM, or Missile "E". The physical characteristics of this missile closely approximate those of the Navy's POLARIS.

(CHART OFF)

Next, consider the schedule for developing this new family and phasing it into the active Army. Such a schedule must be technically and budgetarily feasible, must be based on realistic R&D lead times, and must provide for a realistic life span for our present missiles.

Shown on this chart is a schedule which should meet these requirements.

(CHART 12)

The dashed lines indicate the time scale for development, and the solid lines, the period of operational use.

Note this schedule indicates that development of Missile "A", the future Combat Group missile, does not begin until FY 61. There is a good possibility that this time scale can be improved, and the CofS has directed earlier development if the state of the art and budgetary considerations permit. Funds for initiating a detailed technical feasibility study of Missile "A" are included in the FY 58 budget.

The time phasing for Missile "E" is obviously conditional and should be considered as a separate problem. Even if present administrative restrictions are removed, the development of this missile should not be undertaken unless additional funds are made available to the Army, in recognition of the Army's need for such a weapon.

Based on this phase-in schedule and considering operational need during the interim period, the following schedule for phasing the present family out of the active Army was recommended for planning purposes:

(Overlay to CHART 12)

The first missile to be phased-out would be HONEST JOHN in about FY 63 or 64, when an adequate stockpile of atomic and optimum fragmentation warheads for LACROSSE and LITTLE JOHN has been established.

Next, CORPORAL, in about FY 65, after SERGEANT is available in sufficient quantity.

REDSTONE, about FY 66, when Missile "D" is in the hands of troops.

The phase-out of LACROSSE and LITTLE JOHN would be phased to the operational availability of both Missiles "A" and "B".

The period of usefulness of SERGEANT would probably extend throughout the entire period and be phased-out when Missile "C" becomes available in quantity.

Finally, JUPITER, if continued would be replaced by the cheaper and more versatile Missile "E". This portion of the phasing schedule is of course purely academic considering the present DOD policy on employment of the IRBM.

(CHART OFF)

The funding requirements for this program have been analyzed and an estimate of these requirements is shown on the next two charts. First, R&D funds.

(CHART 13)

The funding requirements for the present family are shown in blue and the new family, less Missile "E", in red, plotted in $ million by fiscal year. Beyond 1960 these yearly estimates should be considered order of magnitude figures only. The planned FY 58 level for SSM's is shown in green.

(CHART 13 OFF - CHART 14 ON)

This next chart shows the requirements for production and procurement funds. The same legend applies. The present family requirements, the blue levels, reflect the ASOP quantitative requirements; the funding requirements for the latest force structure (8 Aug Army) are about 15% less than these ASOP levels.

The following recommendations were approved by the CofS:

(CHART 15)

First, that this family of SSM's, shown on the chart, be approved as R&D objectives and as guidance for operational planning.

Second, that the phasing schedule for the introduction of Missiles "A", "B", "C", and "D" into the Army's weapons family be approved for planning purposes, to include the formulation of budgetary requirements.

Sir, this completes the briefing. Are there any questions?