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SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION, ALEXANDRIA, VIRGINIA

ARMY CONCEPT TEAM IN VIETNAM
APO 143, San Francisco, California

ACTIV-GM

SUBJECT: Additional Armament for the M113 APC in Vietnam (C)

TO: See Distribution

1. A requirement exists for added firepower for the M113 when it is used in a counterinsurgency role. This requirement is presently being satisfied by mounting an M1919A4 Caliber .30 machine gun on the left and/or right side of the vehicle's cargo hatch. A standard ground mount is tied with web straps or wire to the vehicle footman loops and antenna guards (See Incl 1, Figures 1 & 2).

2. In an attempt to develop a satisfactory vehicle mount, a comparative evaluation of 3 test mounts was conducted. Their respective elevation, depression, traverse capabilities, and resultant dead space were compared. A listing of all equipment used during the evaluation follows:

a. M1919A4 Machine Gun.

b. M60 Machine Gun.

c. Three-position Pedestal Mount Base - This item was fabricated by the US Army Arsenal, Rock Island, Ill (See Incl 1, Figure 3).

d. Slotted Adapter - This item was developed for the test by the US Army Concept Team in Vietnam (See Incl 1, Figure 4).

e. Support Assembly, OPN 10909992 - Standard (See Incl 1, Figure 5).

f. Modified Support Assembly - Same as para e but reduced 1 inch in height to compensate for height of items c & d above (See Incl 1, Figure 5).

g. Gunner's Platform - A wooden box, 7 inches in height, to allow a gunner of average height to man the machine gun comfortably.

h. M1 Aiming Circle - Used for measuring traverse.

i. M1 Gunner's Quadrant - Used for measuring elevation and depression.

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j. Tape Measure - Used for measuring dead space between bullet impact and vehicle hull.

3. Each of the 3 test mounts was evaluated while positioned on the right side of the top deck centered on the cargo hatch. Test results follow:

a. Three-position Pedestal Mount Base: The machine guns (M1919A4 & M60) were mounted on the modified support assembly (See para 2b above). The M1919A4 used a standard pintle, cradle, and ammunition tray assembly (See Incl 1, Figure 6). The M60 used a locally fabricated pintle assembly (See Incl 1, Figures 7 & 8) with a standard M60 platform assembly. Measurements were taken with the machine gun in the inboard position (closest to the cargo hatch), outboard position (closest to outer edge of vehicle), and center position (point between outboard & inboard position). The results are as follows:

		Inboard	Center	Outboard
(1) M1919A4:				
(a)	Depression	-463M	-463M	-463M
(b)	Elevation	+943M	+926M	+890M
(c)	Traverse	2723M	2634M	2492M
(d)	Dead Space	13' 5"	13' 10"	14'
(2) M60:				
(a)	Depression	-427M	-605M	-890M
(b)	Elevation	+837M	+605M	+463M
(c)	Traverse	3000M	2818M	2500M
(d)	Dead Space	9' 3"	7' 4"	6' 3"

(For a graphic portrayal of test results, See Incl 1, Figures 9, 10, 11 and 12).

b. Slotted Adapter: This mount features 14 possible positions within its channel for positioning the machine gun. Both the M1919A4 and the M60 were used with the same equipment mentioned in para 3a. Measurements were taken in the inboard, center, and outboard positions. The results are as follows:

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		Inboard	Center	Outboard
(1) M1919A4:				
	(a) Depression	-463M	-463M	-463M
	(b) Elevation	+1371M	+1282M	+1032M
	(c) Traverse	2723M	2634M	2492M
	(d) Dead Space	13'11"	13' 7"	13' 3"
(2) M60:				
	(a) Depression	-641M	-837M	-890M
	(b) Elevation	+748M	+712M	+587M
	(c) Traverse	2759M	2688M	2207M
	(d) Dead Space	9' 3"	7' 4"	6' 3"

(For a graphic portrayal of test results, See Incl 1, Figures 13, 14, 15, and 16.)

c. Standard Support Assembly, OPN 10909992: The M1919A4 and M60 were mounted and tested individually on a standard support assembly. The support assembly was centered on the cargo hatch, midway between the cargo hatch opening and side of the vehicle. This position approximates the center position of the other 2 test mounts. Results were as follows:

	M1919A4	M60
(1) Depression	-463M	-712M
(2) Elevation	+837M	+659M
(3) Traverse	2528M	2723M
(4) Dead Space	13' 8"	8' 11"

(For a graphic portrayal of these measurements, See Incl 1, Figures 17 and 18).

4. The advantages and disadvantages of each test mount follow:

a. Pedestal Mount Base:

(1) Advantages:

(a) Can be welded to top deck.

(b) Offers 3 positions.

(c) Relatively inexpensive.

(d) No repair parts and special tools required.

(e) Slight advantage in depression, elevation, traverse, and dead space over the standard support assembly.

(2) Disadvantages:

(a) Aluminum mounting plate may require inserts for holes to accept steel bolts.

(b) Lacks flexibility because 4 mounting bolts must be removed and reinserted to change the position of the gun.

(c) Mounting holes would be difficult to keep clean for quick-change feature.

(d) Test results indicate that this mount is slightly inferior in elevation and dead space measurements to the slotted adapter.

b. Slotted Adapter:

(1) Advantages:

(a) Offers flexibility because of the several locking positions within its channel.

(b) Is equal to the pedestal mount base and has minor advantages in all measurements over the standard pintle assembly when mounting the M1919A4 (See Test Results, para 3).

(c) Offers slight advantage to other tested mounts when mounting the M1919A4 (See Test Results, para 4).

(2) Disadvantages:

(a) Will be more expensive than the other tested items because of the extensive machining required.

(b) Would require maintenance and lubrication.

(c) Would be difficult to keep the channel and locking holes clean for smooth operation.

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c. Standard Support Assembly:

(1) Advantages:

(a) Uses standard assembly readily available in the supply system.

(b) Can be bolted to the top deck without an adapter.

(c) Least expensive of 3 mounts tested.

(d) Simplicity and ruggedness assure little maintenance or supply support.

(2) Disadvantages:

(a) Least flexible of 3 mounts tested.

(b) Offers least elevation, depression, and traverse, and creates the greatest dead space of the 3 mounts tested.

5. Conclusions: The angles of depression, elevation and traverse and the amount of dead space realized, differ slightly with each of the mounts tested. However, all mounts tested presented characteristics that adequately satisfy the stated requirement. A review of the comparative measurements versus cost, simplicity, ease of operation, ease of maintenance, and repair parts support, indicates that the use of the standard support assembly bolted to the top deck is the most practical solution to this requirement.

6. Recommendation: That the standard support assembly, unmodified, be used as the mount to satisfy the requirement.

Thomas O. Blakeney

1 Incl
a/s

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Colonel, Armor
Chief

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Figure 1
M1919A4 machine gun mounted with web straps to top deck of M113. The antenna guard and footman loops (small aluminum tiedown brackets) are used for tiedown. The same tiedown arrangement is used for mounting the gun on the right side of the cargo hatch.

Figure 2
M1919A4 machine gun strapped to the top deck of the M113. The antenna guard is missing in this vehicle. The vehicle's footman loops and web straps were used to effect the tiedown.

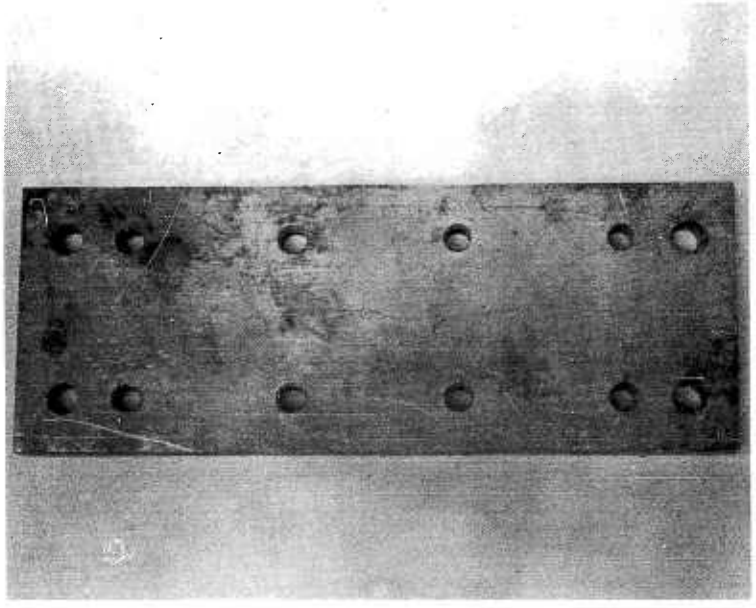


Figure 3
Three-position pedestal mount base.

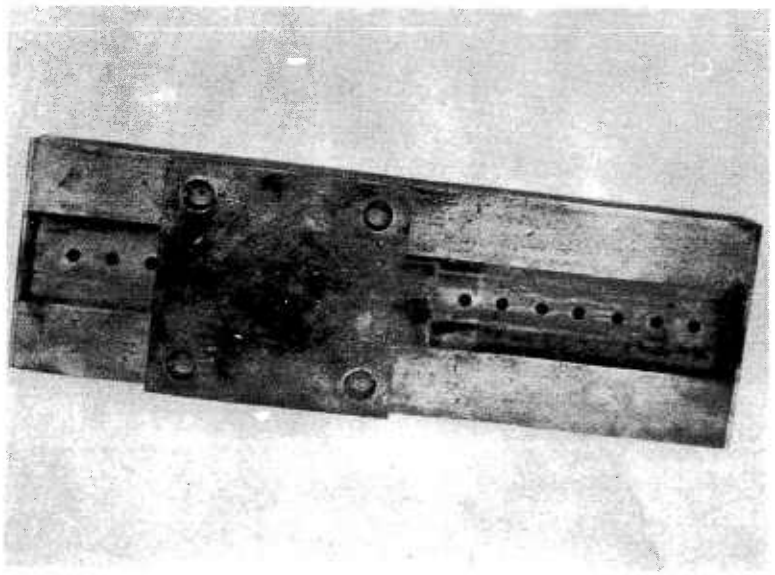


Figure 4
Slotted adapter.

Figure 5
Standard support assembly - Arrow A.
Modified support assembly - Arrow B.

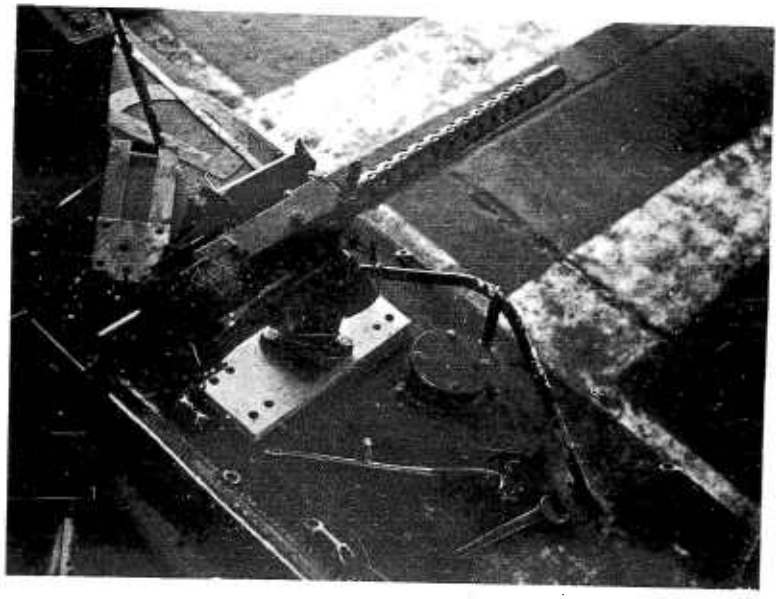


Figure 6
M1919A4 mounted on position pedestal mount base. A support assembly reduced one inch in height is used (See B in Figure 5).

Figure 7
Fabricated pintle assembly used to adapt the M60 machine gun to a support assembly.

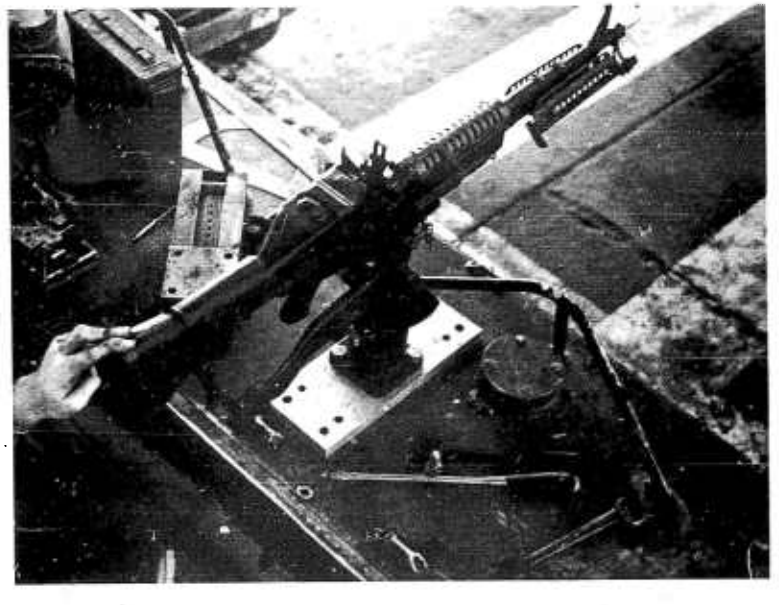


Figure 8
M60 machine gun and modified support assembly mounted on the three-position pedestal mount base.

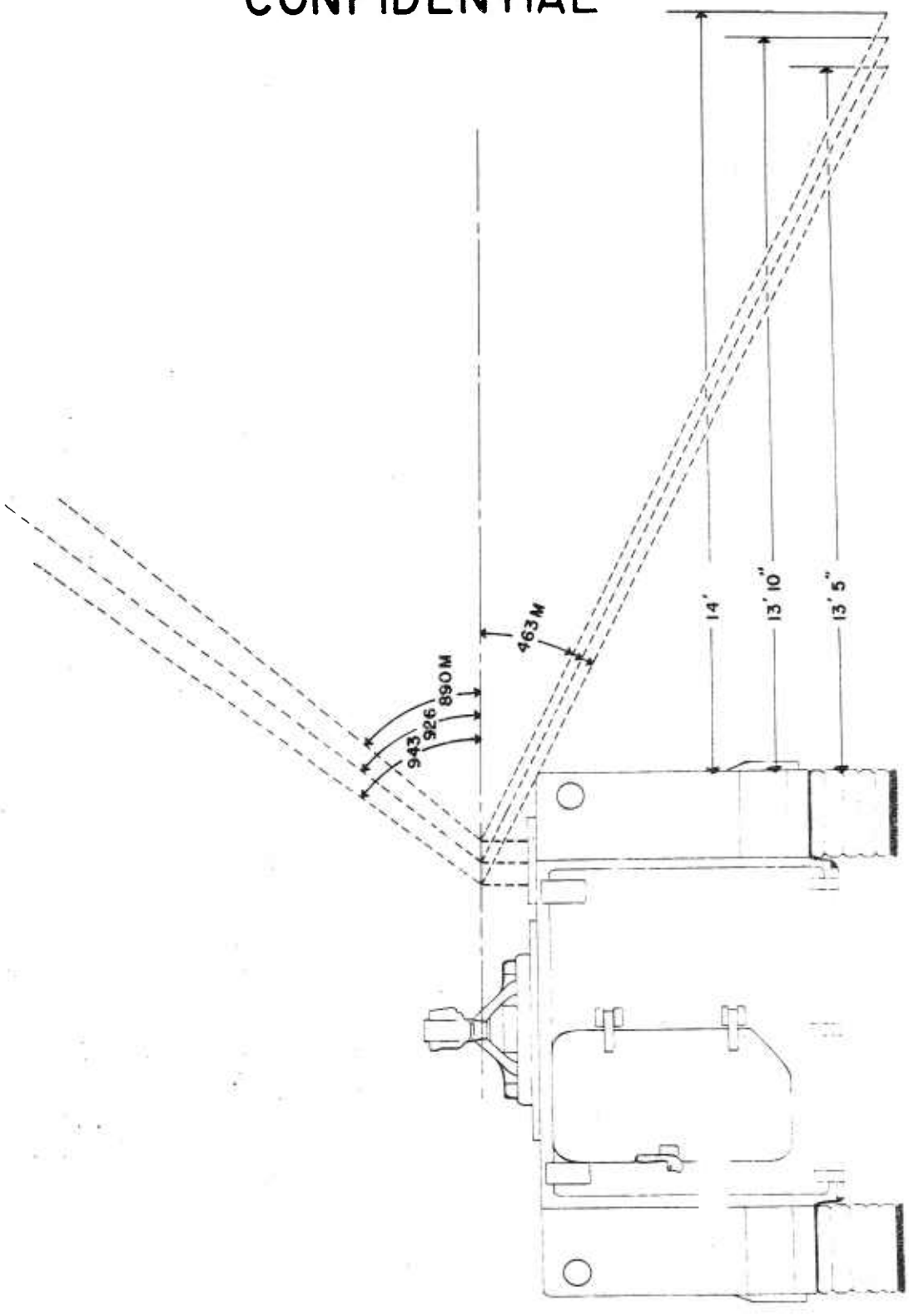
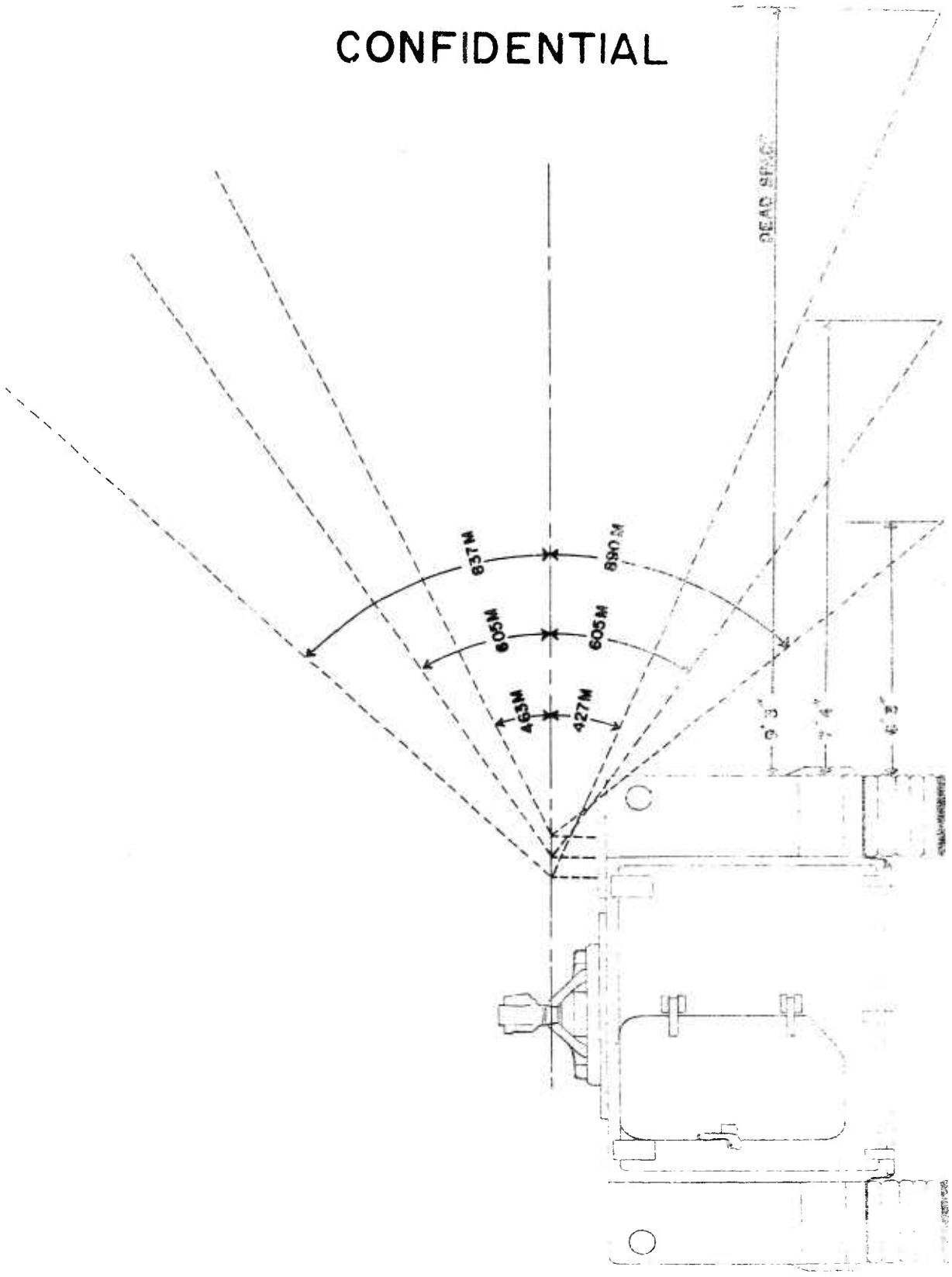


FIGURE 9


DEAD SPACE
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890M
605M
605M
463M
427M

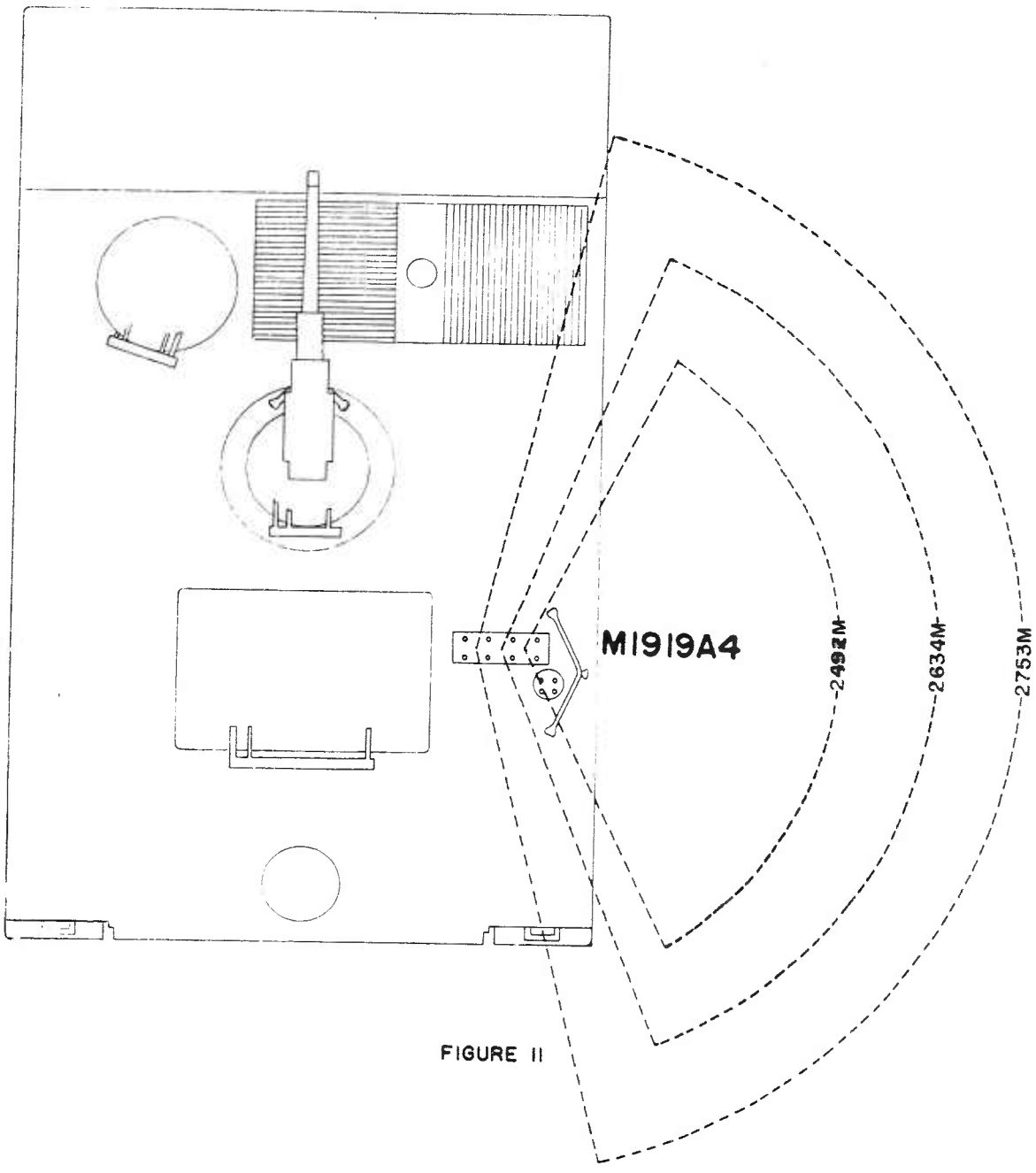

FIGURE II

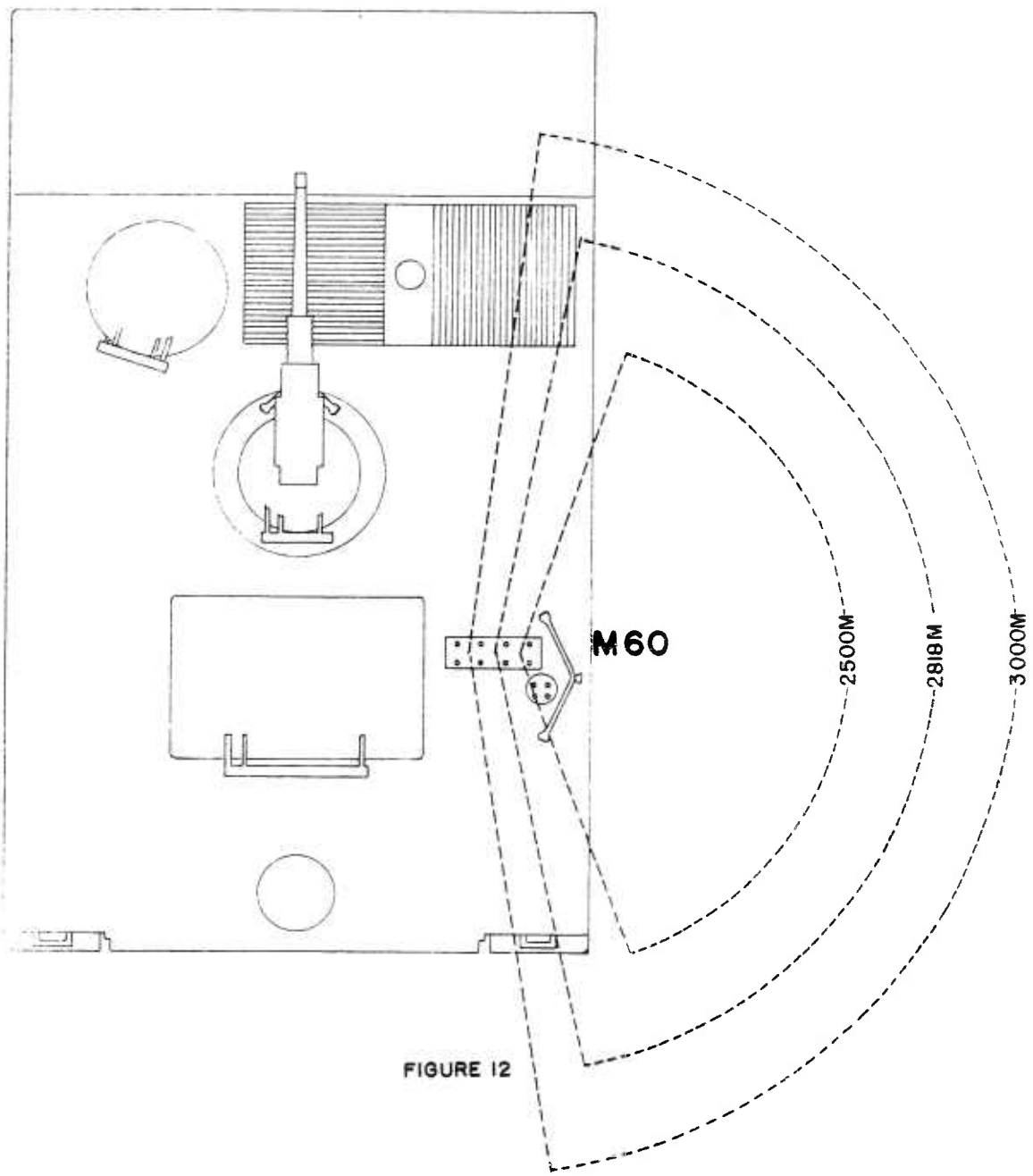

FIGURE 12

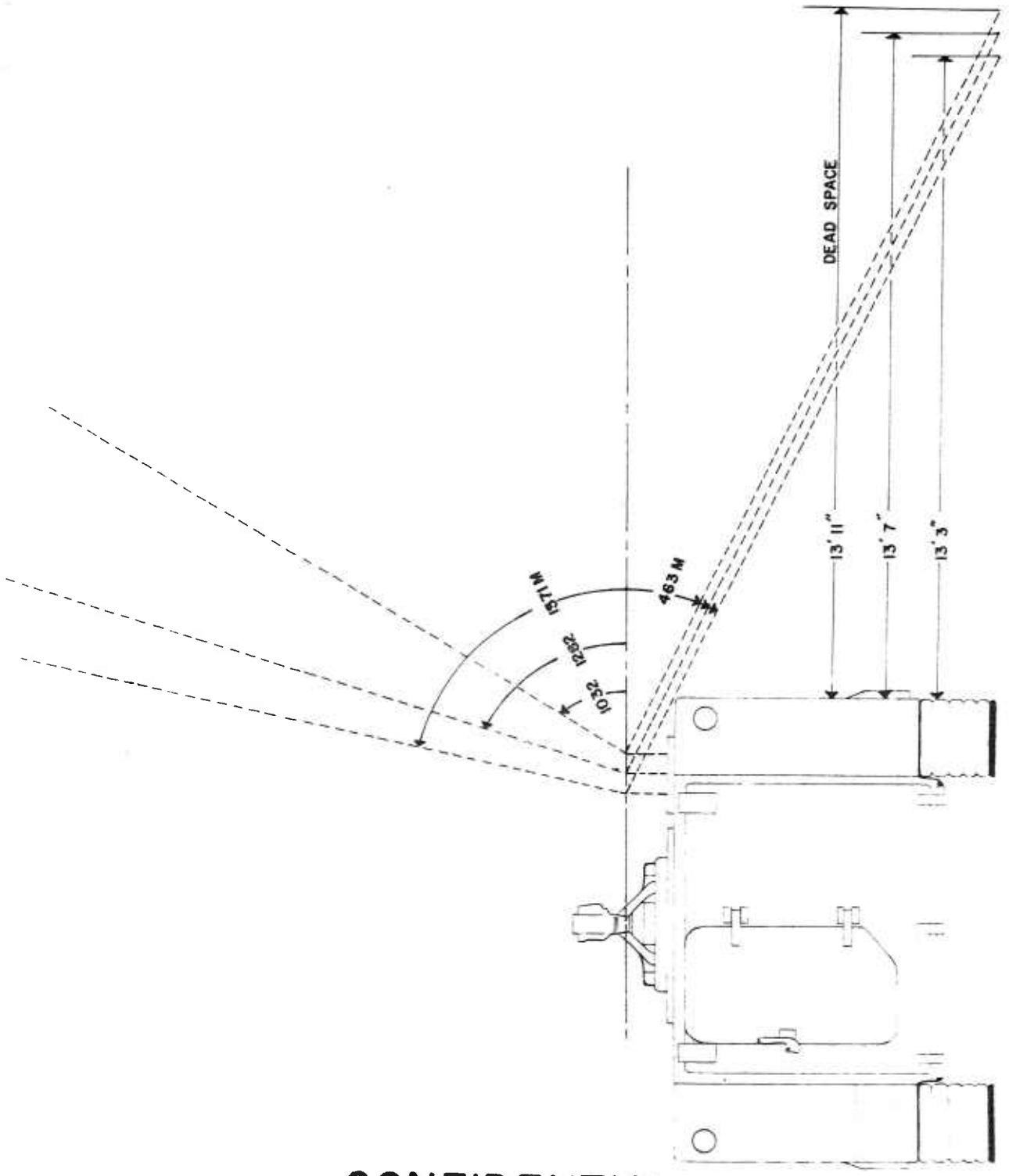

FIGURE 13

M60 SLOTTED ADAPTER

FIGURE 14

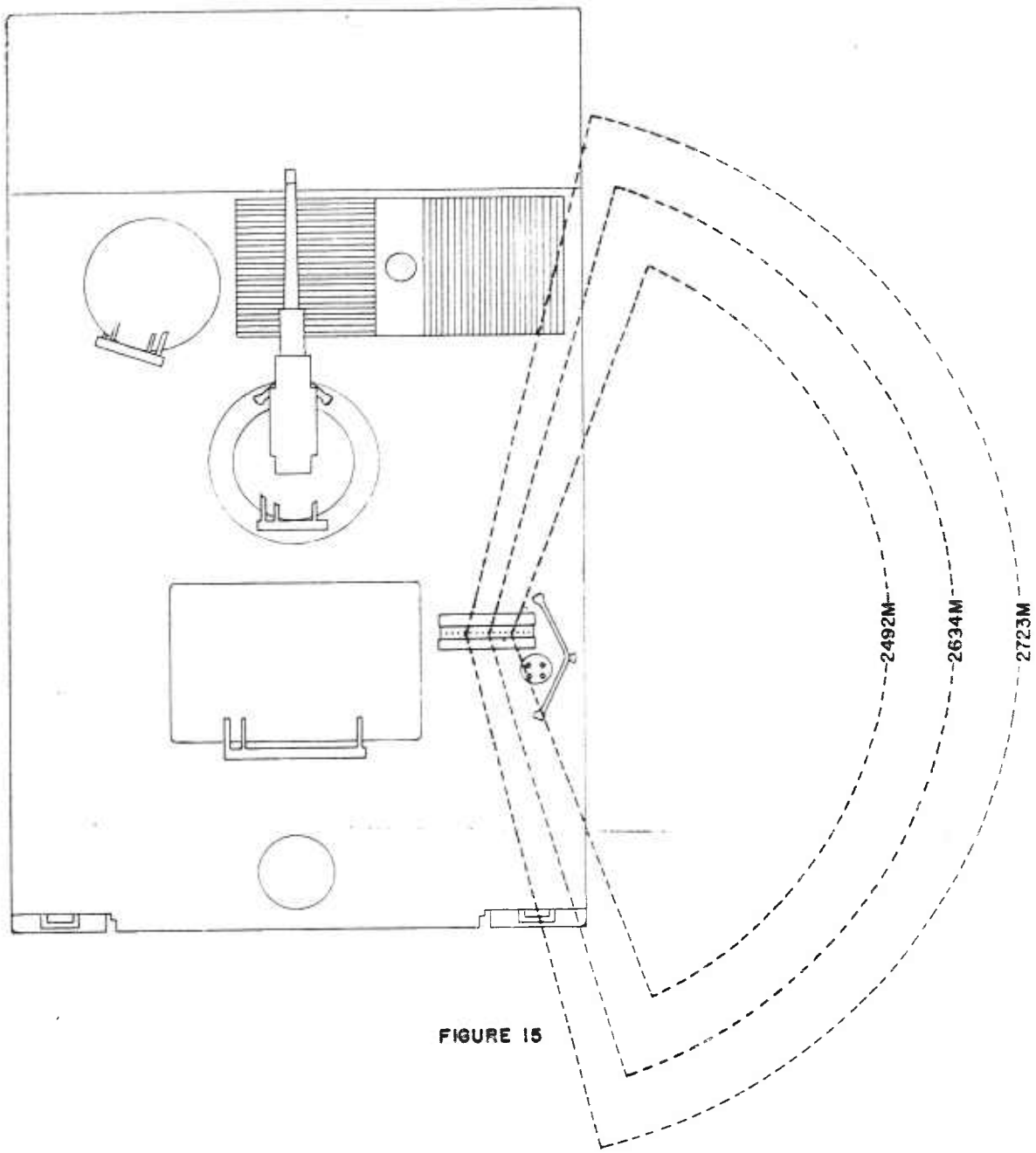

FIGURE 15

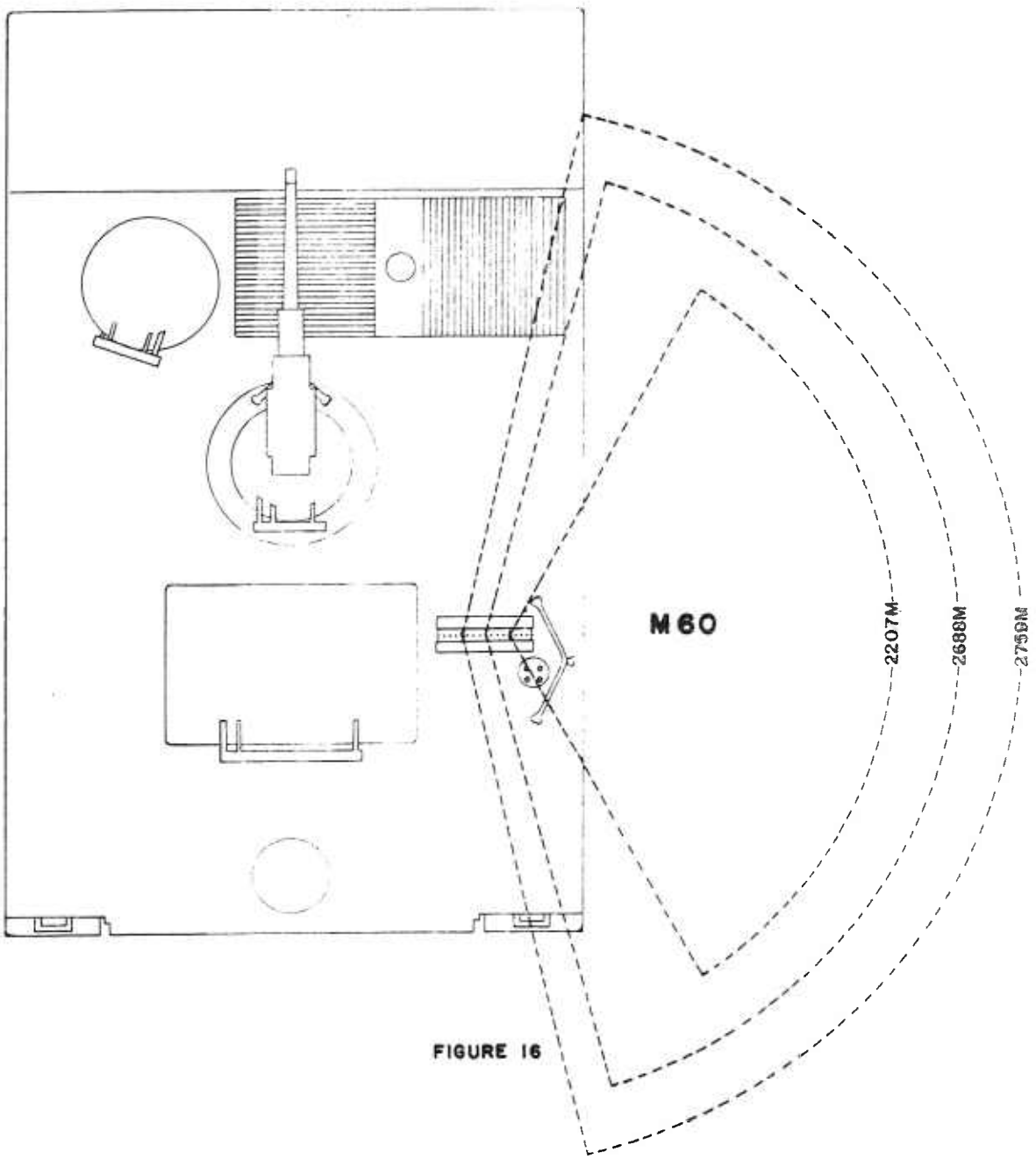

FIGURE 16

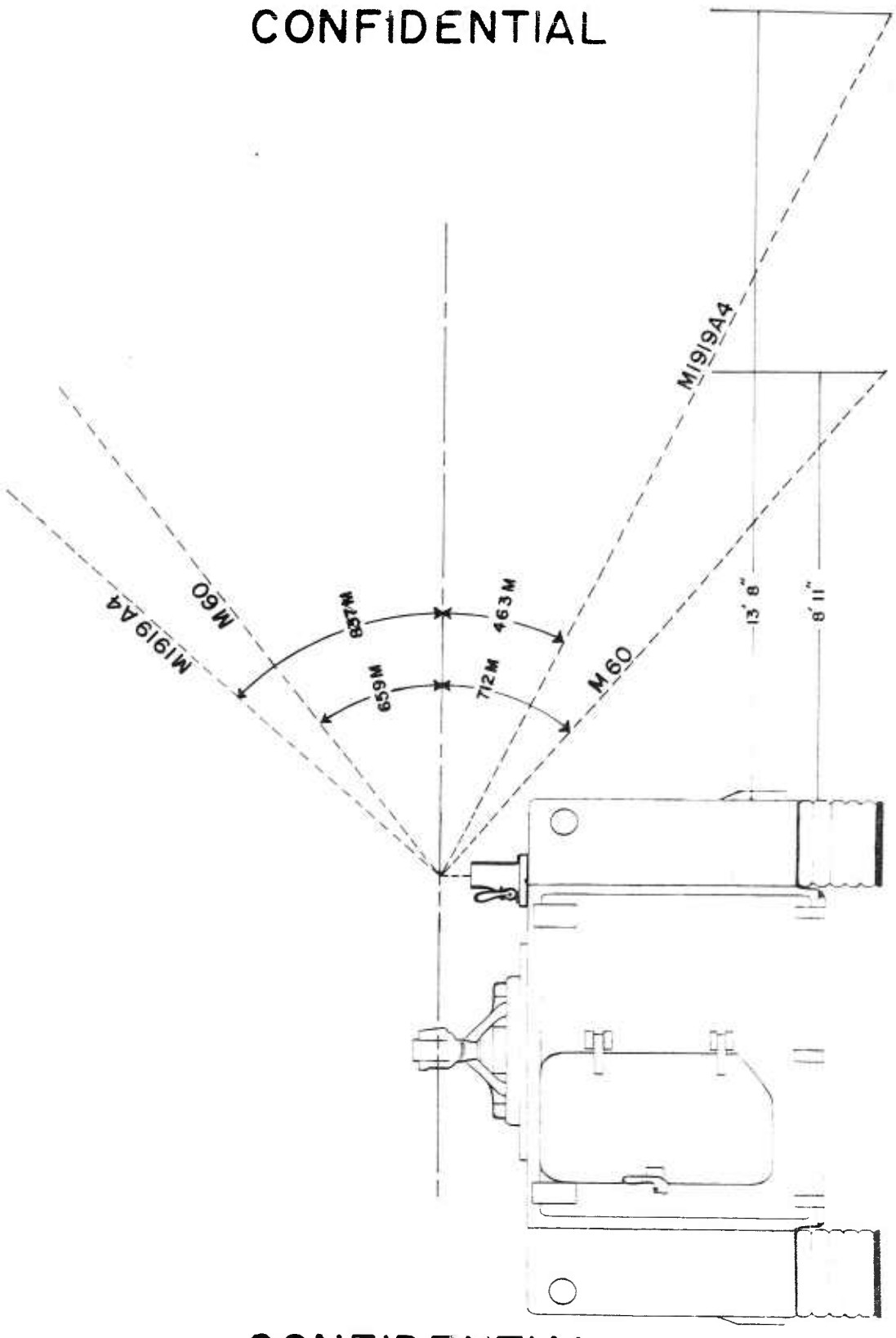

FIGURE 17

STD SUPPORT ASSEMBLY

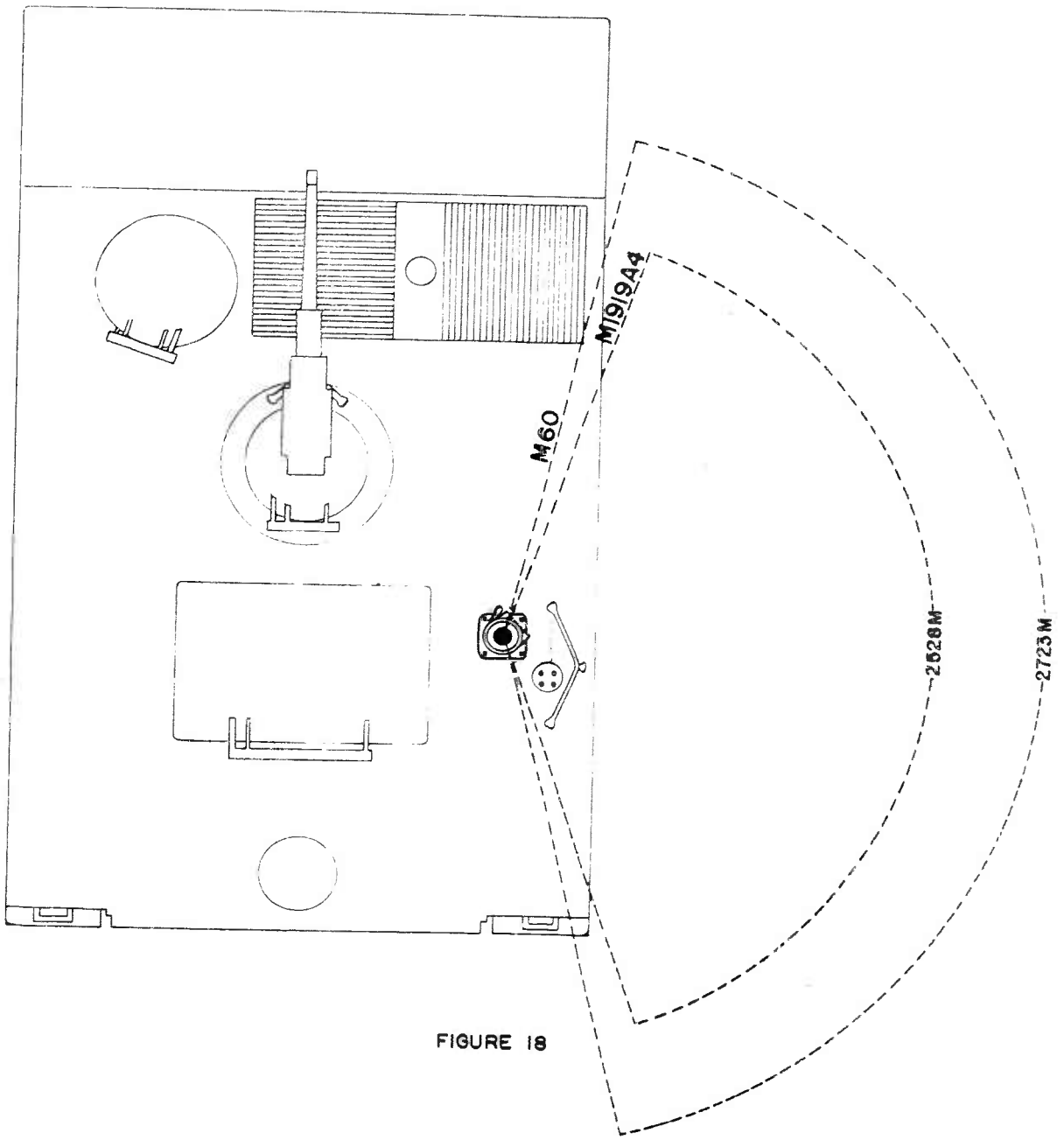

FIGURE 18