

Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: THE CONSTRUCTION OF MEMORY PLANES FOR THE MTC MEMORY

To: N. H. Taylor

From: E. A. Guditz

Date: June 10, 1953

ABSTRACT: Seventeen memory planes were built for MTC. Each has 1024 cores, 128 coordinate driving lines, a digit-plane winding, and a sensing winding. Four days were required to wire each plane with additional time for frame construction, inspection and testing.

The memory planes which make up the magnetic-core memory in the Memory Test Computer are made of ferrite cores supplied by the General Ceramics and Steatite Corporation. The cores are type 1326-B F-291 and have an O.D. of 0.092 inches, an I.D. of 0.062 inches, and a thickness of 0.032 inches. They were carefully selected at this laboratory for uniformity of pulsed magnetic properties. The selection specifications are recorded in a Digital Computer Laboratory memorandum which will be issued in the near future.

The ferrite cores are mounted in an aluminum frame constructed in the laboratory shops. The details of the frame construction are given in drawing SC-53439 (attached). The cores are mounted in the frame by stringing them on the coordinate driving lines which are fastened to lugs in the phenolic strips around the outer edge of the frame. The wire used for all windings of General Electric Quadruple Formex insulated magnet wire #32 gauge with a diameter of 0.008 inches. Some interesting physical and electrical properties of this wire are given in the Digital Computer Laboratory memorandum M-1827, "Magnet Wire Tests" by B.B. Paine, February 5, 1953.

In preparation for mounting the ferrite cores, the memory frame is fastened in a jig as shown in Fig. 1. The constructional details of the jig are shown in the attached drawings SA-54537 and SC-54538. The opening in the base is necessary in order to see the reverse side of the cores without removing the plane from the jig.

The first wires to be installed are the coordinate driving lines. These wires are prepared in accordance with instructions given in the Digital Computer Laboratory memorandum M-1957, Procedure for Preparing and Stripping Wires for MTC Memory Planes, by E.A. Guditz, April 6, 1953. One end of a prepared wire is soldered to a lug on one side of the frame. Thirty-two cores are strung on the wire and the other end of the wire soldered to the lug on the opposite side of the frame; it is necessary that a wire from a top lug on one side join a bottom lug on the opposite side. This is done for all thirty-two coordinate lines. Next, another prepared wire is strung through each line of cores and the ends soldered to the unused lugs. The wires are not put in tension; it is sufficient to take up the slack. This procedure is repeated for the thirty-two pairs of wires of the other coordinate, noting that the cores must be oriented as shown in Fig. 2.

At this point a pulse test is made to ascertain that no bad cores have been accidentally installed, that no cores have been damaged, and that core orientations and wiring are thus far correct. Core selection during this test is done manually as described in detail by A.D. Hughes in Digital Computer Laboratory memorandum M-2219, "Testing of Individual Cores in MTC Memory Planes", June 8, 1953.

The plane is now ready for installation of the digit-plane winding which consists of a twenty-four-foot length of wire threaded through the cores as shown in Fig. 2.

Finally, the sensing winding is inserted. For convenience in handling it is made in two sections, each requiring twenty-two feet of wire. It passes through the cores as shown in Fig. 3 and Fig. 4.

When the sensing winding is installed the memory plane is complete except for inspection. The inspection includes thorough checking of all of the soldered joints and tracing each winding through the plane as a check on path geometry and core linkages. Resistance checks are made on all windings and between windings. A visual check of the cores for splitting or cracking completes the inspection.

Fig. 5 is a drawing of the memory plane complete with all windings, and Fig. 6 is a photograph of a finished plane.

Fig. 7 shows two memory planes under construction. Each

Memorandum M-2225

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plane required four man-days to wire.

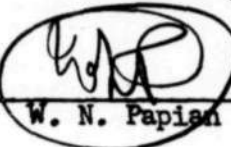
Seventeen of these planes were wired together and installed in the Memory Test Computer on May 6, 1953.

EAG/cs

Signed


E. A. Guditz

Approved


W. N. Papian

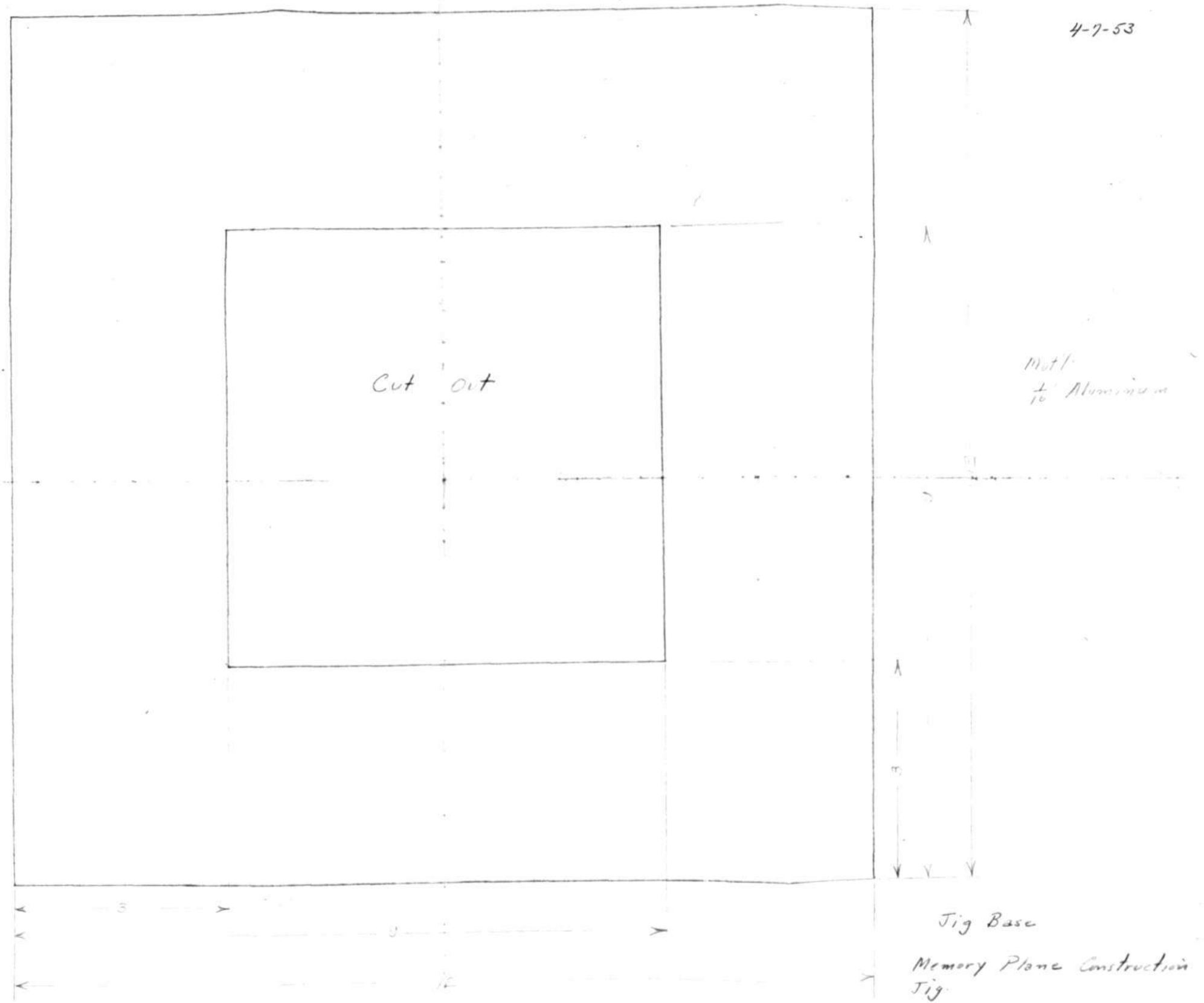
cc: Magnetic Memory Section
N. Edwards (IBM)
D.R. Brown
J. McCusker
MTC File.

Drawings Attached:

SC-53439	Attached
SC-54538	Attached
SA-54537	Attached
A-54602	Fig. 1
C-55273	Fig. 2
C-55271	Fig. 3
C-55274	Fig. 4
C-55272	Fig. 5
A-55381	Fig. 6
A-55382	Fig. 7

53-54535

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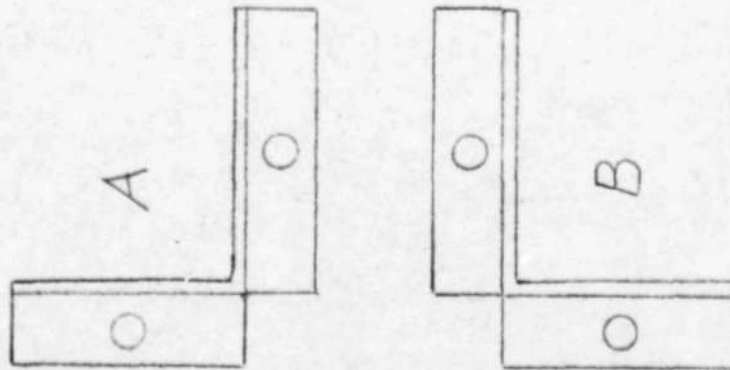
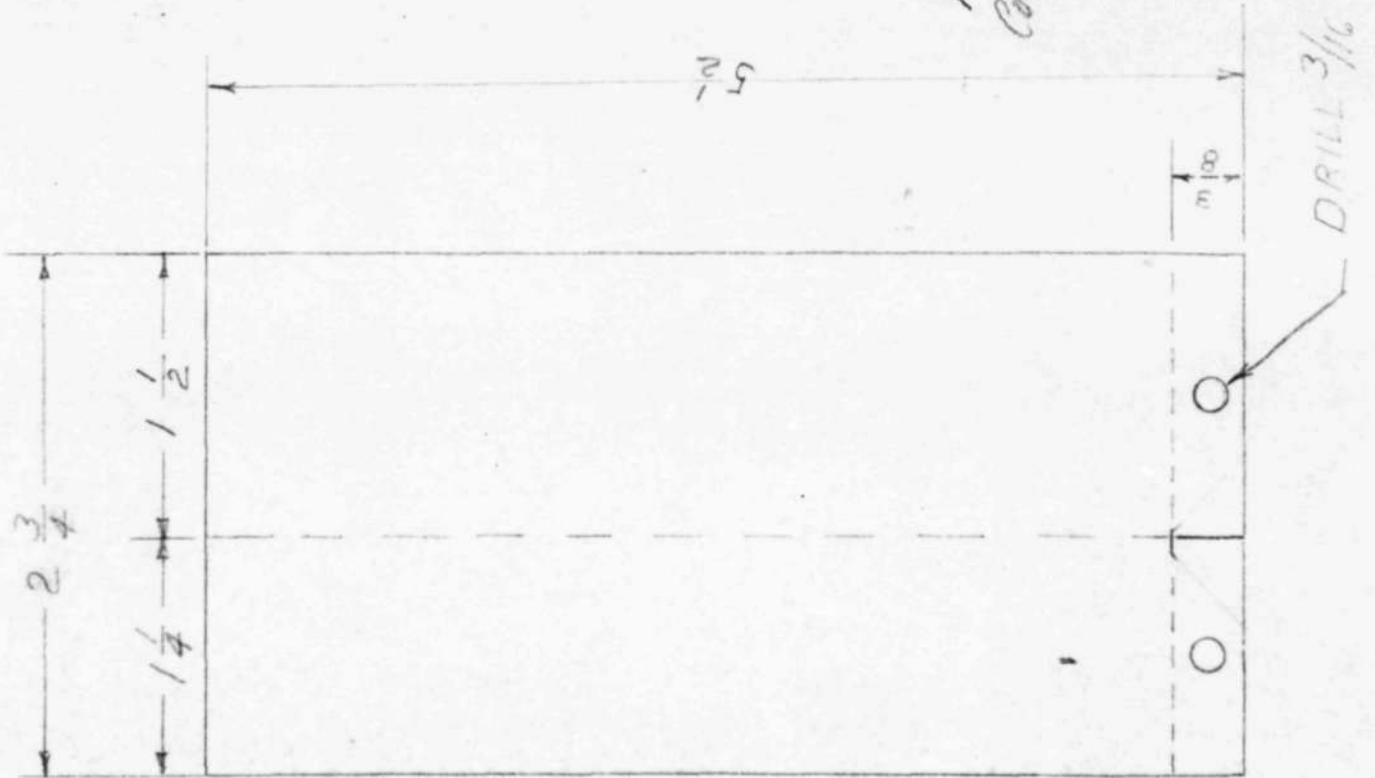
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4-7-53

SA-54537 ✓

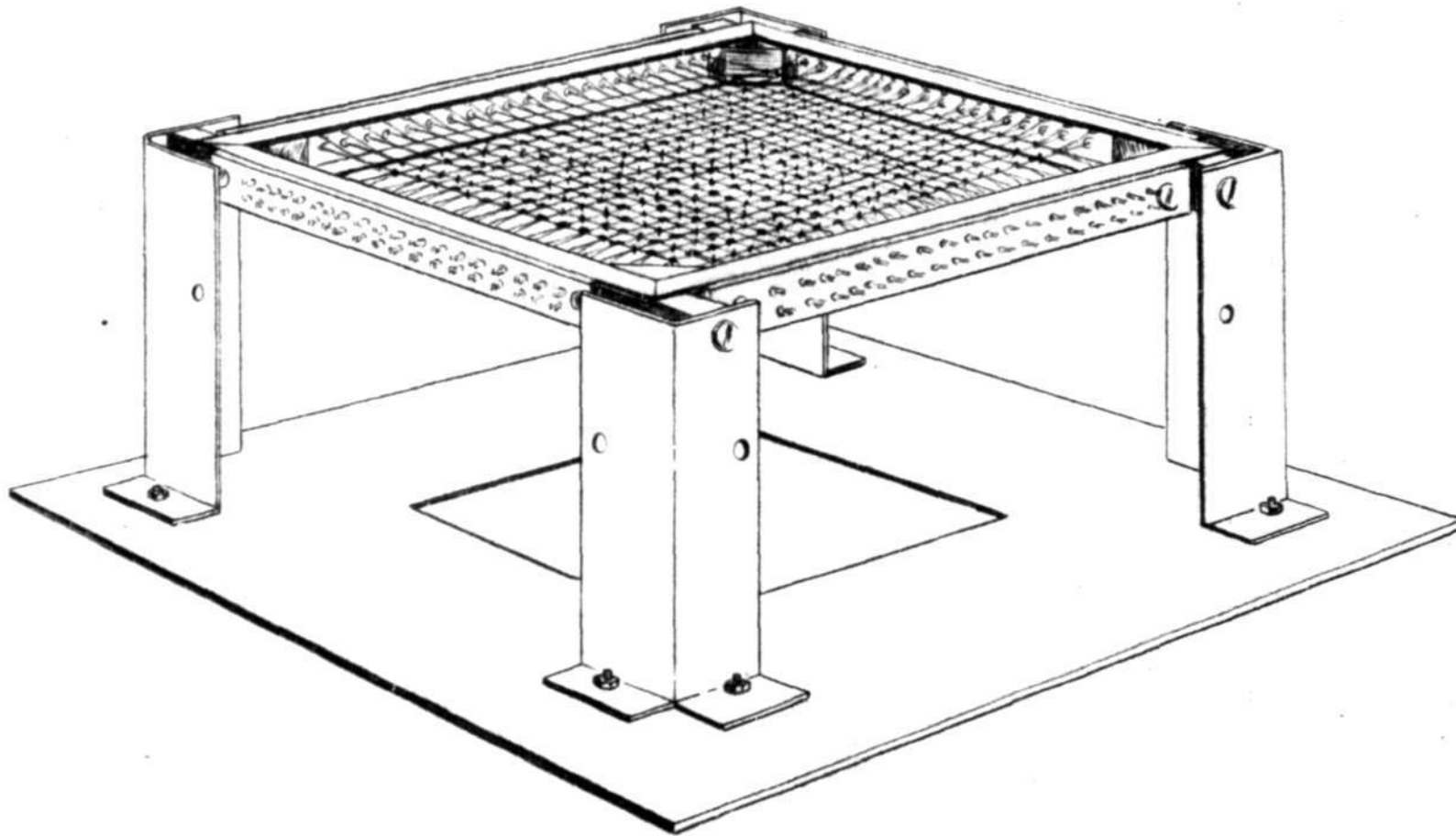
Tig Legs
Memory Plane
Construction Tig.

1/16" Aluminum

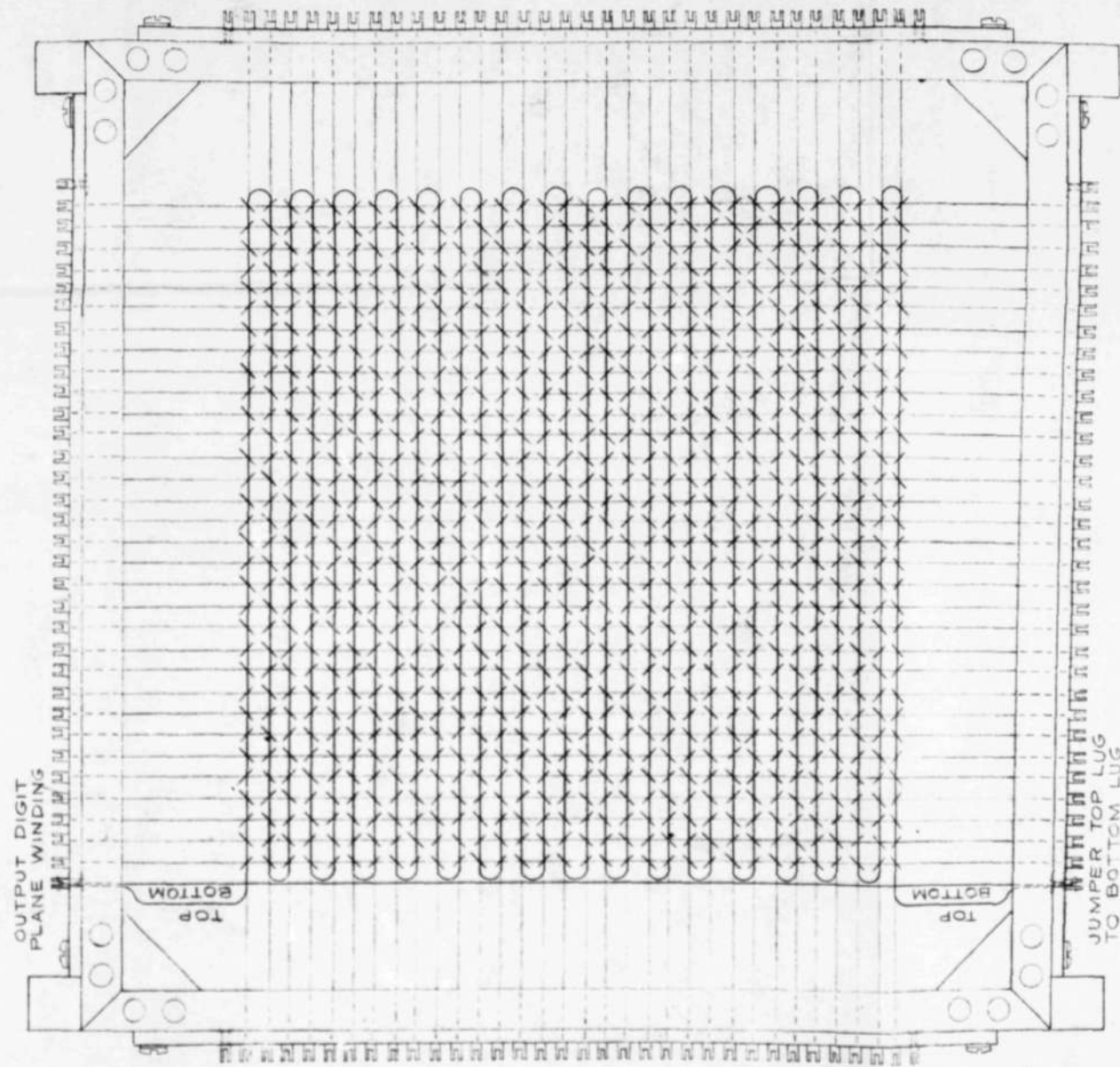


NOTE:
FOLD AS SHOWN
ABOVE - MAKE TWO
OF EACH

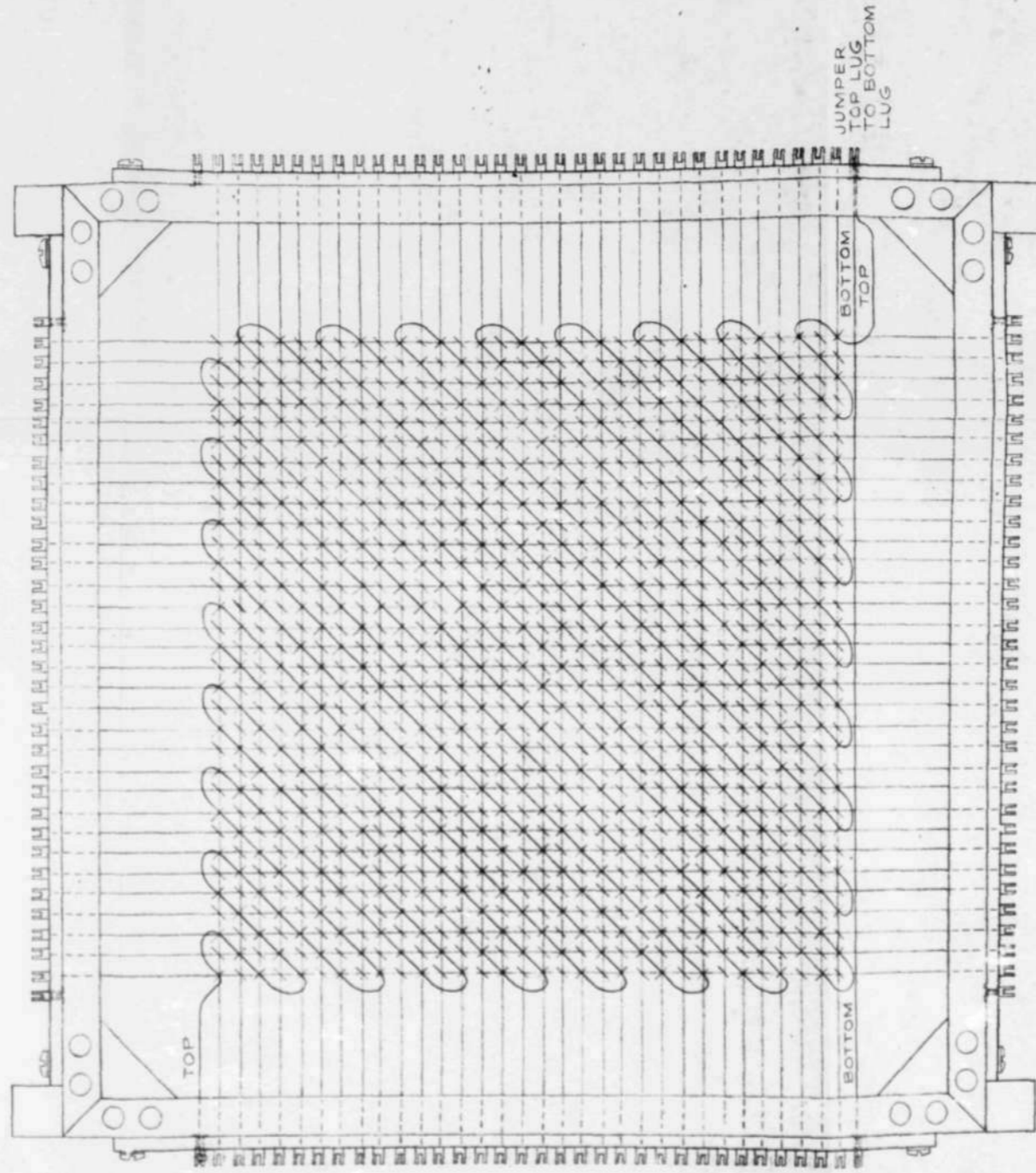
SA-54537



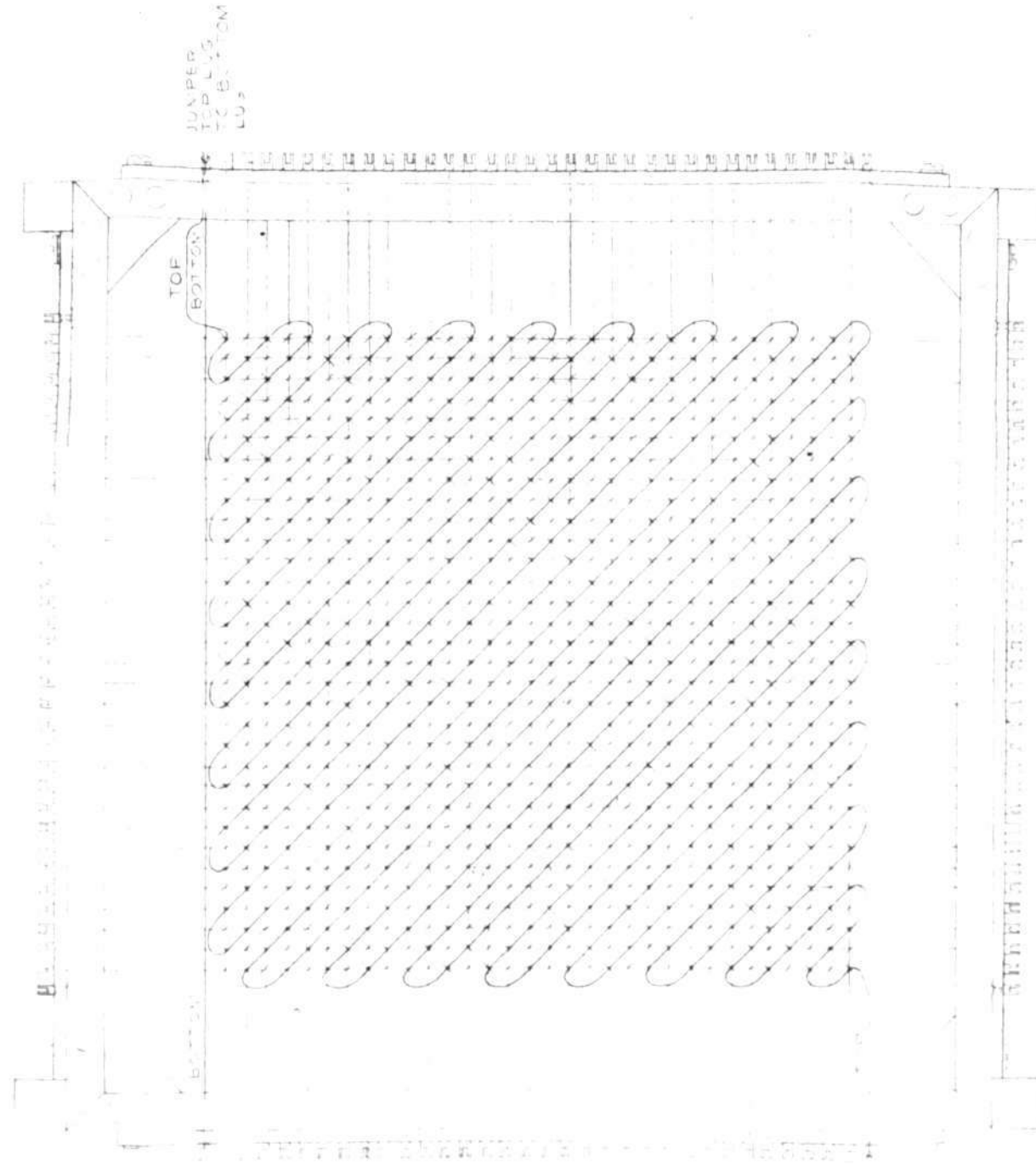
MEMORY PLANE MOUNTED IN ASSEMBLY JIG



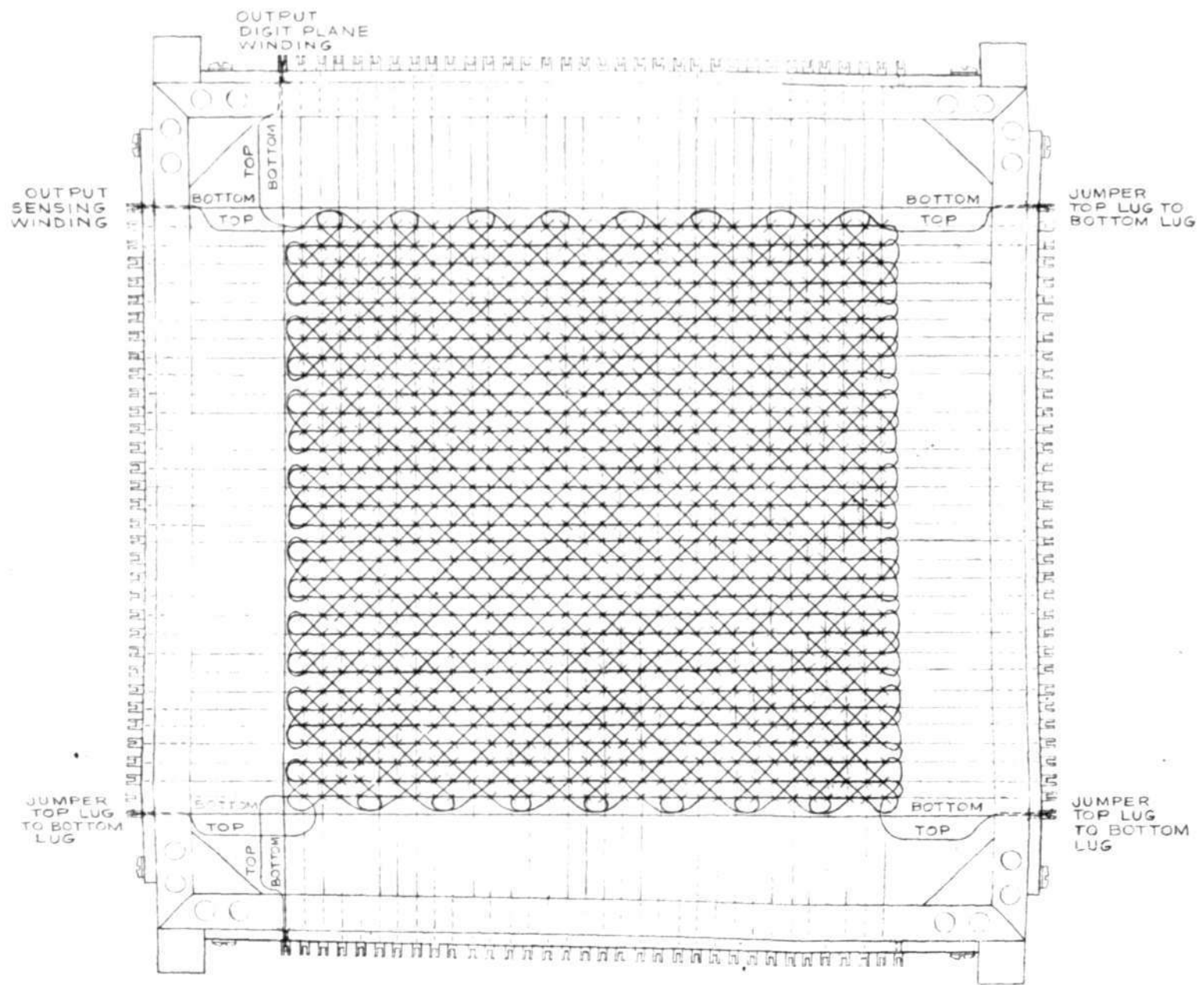
MEMORY PLANE SHOWING DIGIT PLANE WINDING



MEMORY PLANE SHOWING FIRST HALF OF SENSING WINDING



MEMORY PLANE SHOWING SECOND HALF OF SENSING WINDING



MEMORY PLANE SHOWING ALL WINDINGS

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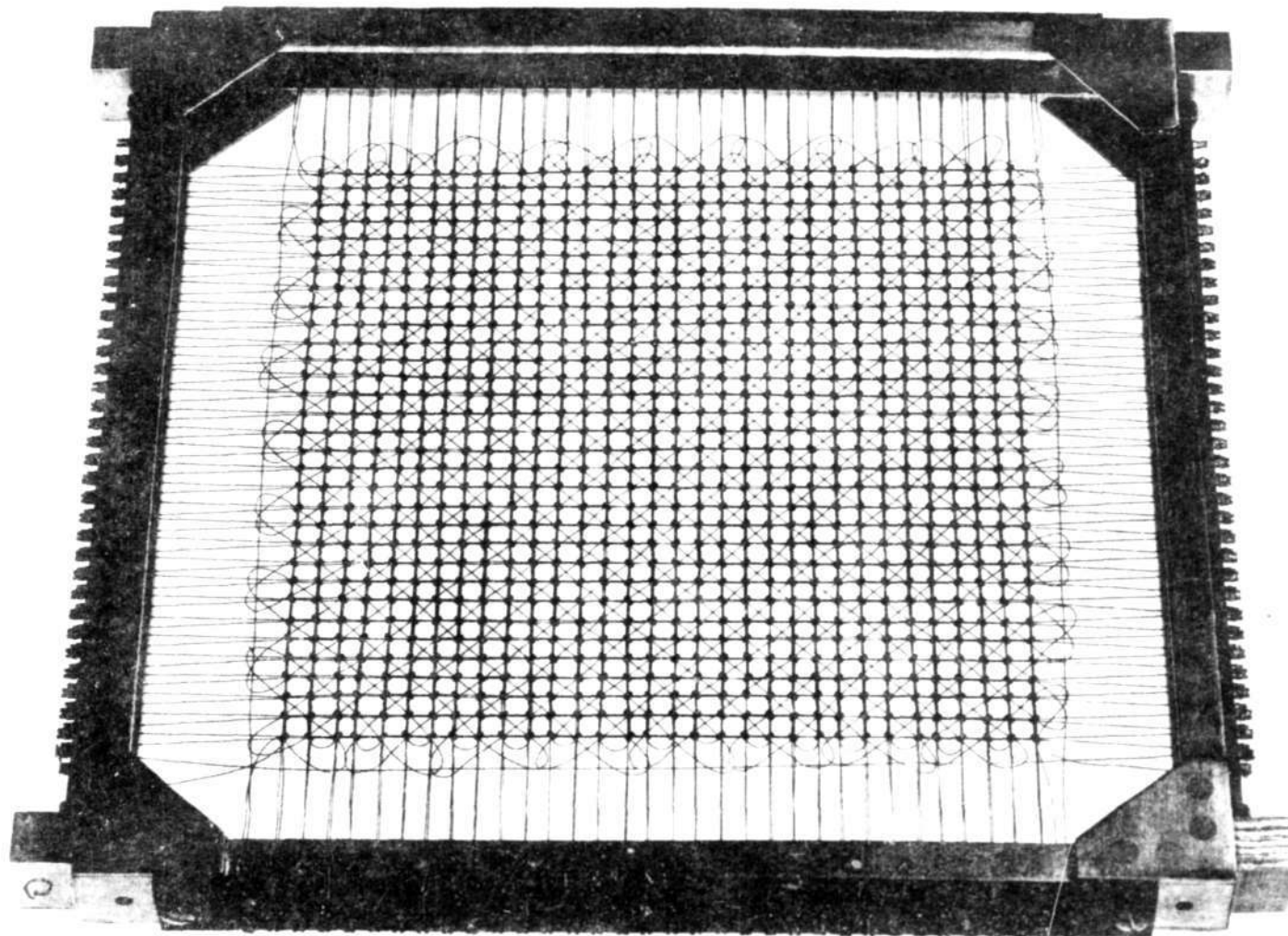
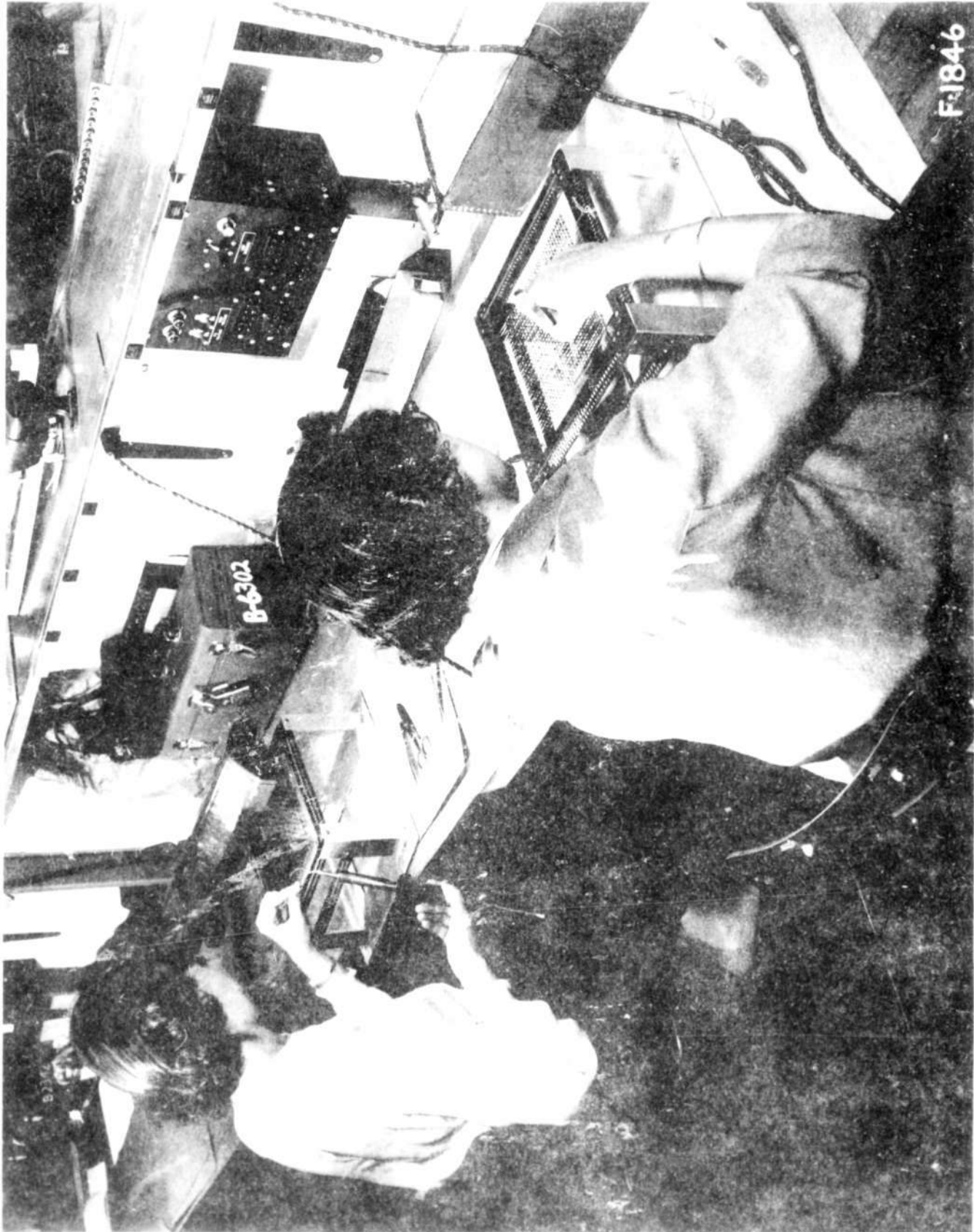


FIG. 6 32 X 32 MEMORY PLANE

F-1811

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F-1846

A-55382