A TEST STAND FOR APPLE CIRCUIT DEVELOPMENT WORK

ESB-117

April 27, 1955

INTRODUCTION

Most television receiver engineers accustomed to dealing with monochrome or shadow-mask design problems will find the circuits of the Apple receiver somewhat unconventional. This is especially true of the sweep circuits and the writing signal producing circuits, including the sideband loop.

To make it easier to work on such circuits, the Philco Laboratories have developed a somewhat standardized test stand. Engineering groups which are involved in Apple circuit development will find that the use of this type of test stand will greatly facilitate their work.

TEST STAND COMPONENTS

The several chassis and other physical units, equipped for a convenient test arrangement, are shown in figure 1. The test stand includes the following items:

Item	Name of Item
1	Sideband amplifier combined with pilot carrier oscillator and width discriminator
2	Seven-megacycle drive
3	Focus regulator and high-voltage drive
4	Meter panel
5	Line-voltage variac, used with focus supply*
6	Low-voltage power supply (for all low voltage except sweep)
	NOTE: For some work a separately controllable supply for CRT screen-grid voltage is desirable.
7	Low-voltage power supply (for sweep supply only, but not including sweep filaments)
8	Focus current power supply
9	Sweep chassis being tested
10	Main power switch and distribution outlets
	Line-voltage variac, control #1, used with item 7 above (sweep low-voltage power supply)*

* Variacs are used as expedients to obtain other than normal range of output variation.

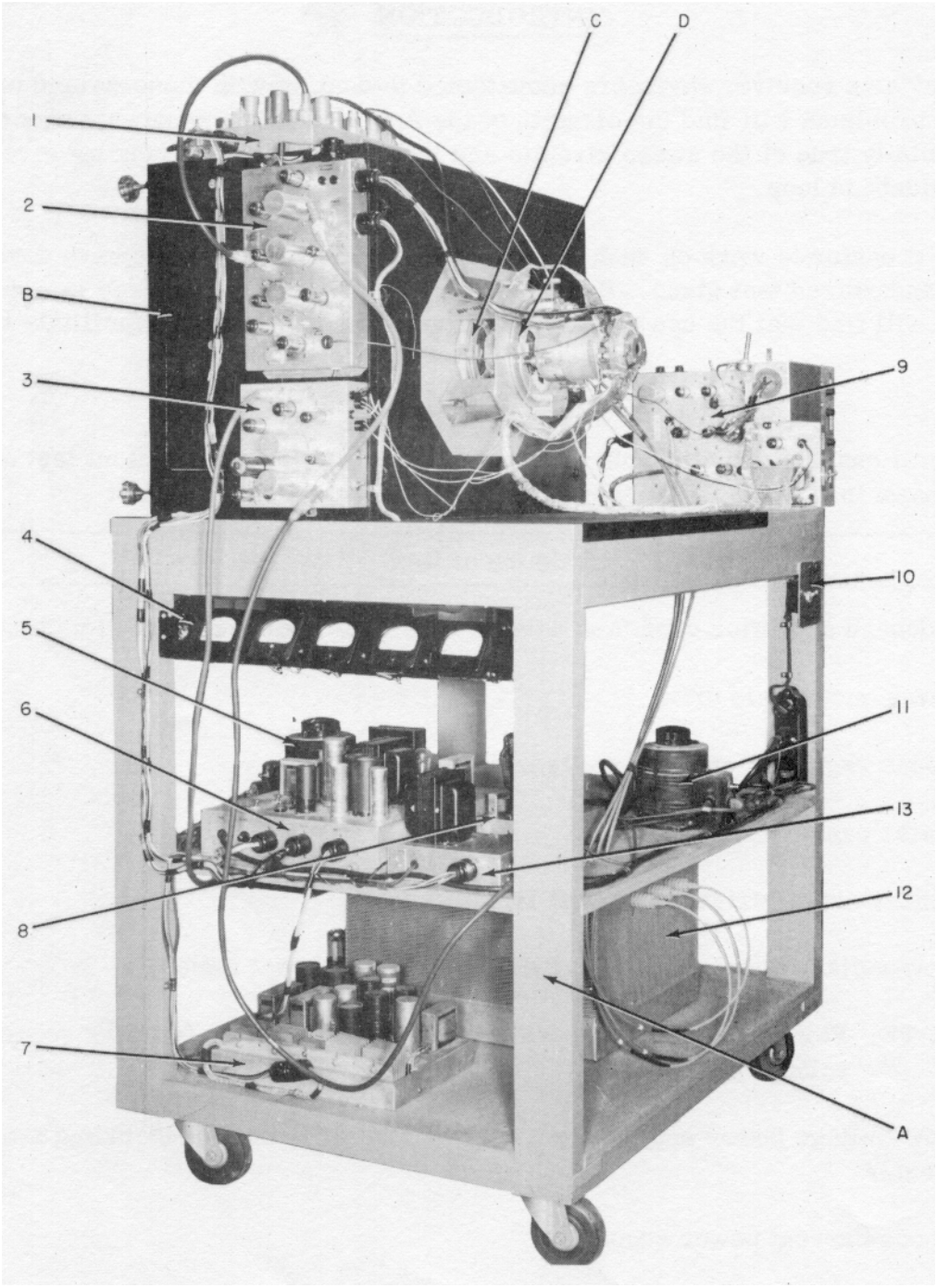


Figure 1. Test Stand and Equipment

Item	Name of Item
12	High-voltage power supply
13	Auxiliary filament supply
The following physical items are also included:	
A	Test stand frame
B	Tube housing
C	Yoke coil mounting
D	Focus coil mounting

TEST STAND CIRCUITRY

The several chassis included on the test stand incorporate Apple circuitry generally similar to that used in any of the test receivers. The block diagram (figure 2) shows the interconnection of all test stand units except the conventional low-voltage supplies.

To provide maximum versatility in the test stand, it is advisable to incorporate certain refinements not found in the test receiver circuits. For example, the usual high-voltage supply is triggered from the horizontal sweep output through a discharge diode. This arrangement removes high voltage in the event of sweep failure. For receivers this protection of the color tube is a necessity, and for some test stand applications is highly desirable. For other development work, such as on sweep circuits, this arrangement is not desirable. Accordingly, the high-voltage supply can be designed with alternate inputs. The first, for sweep circuit work, receives the sync pulses only, and develops its own driving signal for the output tube. The second couples a signal from the horizontal output transformer of the sweep chassis, through a discharge diode, to the high-voltage output tube. A switch allows the use of either drive.

Another approach to the use of this test stand for sweep study is presently being developed. In this approach a single chassis develops the vertical and horizontal drive waveforms and the vertical output. The horizontal output chassis, which includes linearity and width servo, can then be greatly simplified. This renders the fabrication of test horizontal-out-put chassis less time-consuming, and makes the experimental work on the simplified chassis much easier.

The circuits used as examples in this bulletin were designed for operation at the 7.0-mc. writing frequency. Anyone constructing a test stand along the lines herein outlined should carefully consider this operating frequency in view of the latest Apple circuitry at the time

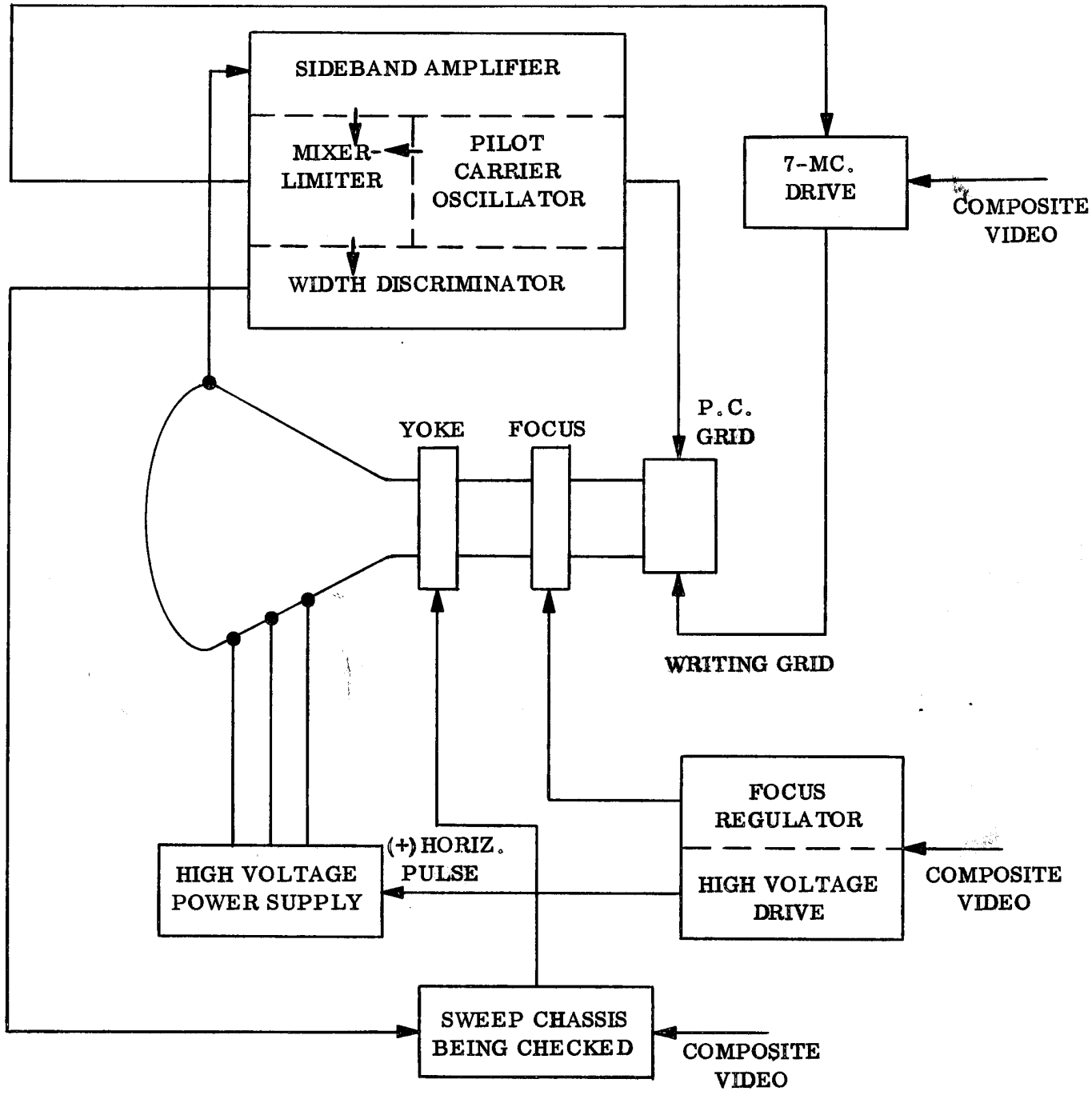


Figure 2. Block Diagram of Test Stand Equipment

the test stand is planned. The design of the test stand circuits might then be altered accordingly, if the purposes of the builder would be better served by so doing.

YOKE MOUNTING

An assembly drawing of the yoke coil mounting is shown in figure 3. This illustration is followed by the detail drawings which are item-numbered to the assembly. See figures 4 and 5. The dimensions given are for the Mark III Yoke.

Item	Name of Item	Quantity
1	Plate #3 (MKIII)	1
2	Plate #2 (MKIII)	1
3	Plate #1 (MKIII)	1
4	Clamp, right (MKIII)	1
5	Clamp, left (MKIII)	1
11	*Bearing block	1
12	*Bearing pin	1
13	*Bearing block	1
14	*Bearing block	1
15	*Bearing block	1
16	*Bearing pin	1
17	*Bearing block	1
18	*Plate adjusting screw	2
19	Roller	3
20	Stand-off	2
21	Slide block	1

* Parts used in both yoke and focus mounting

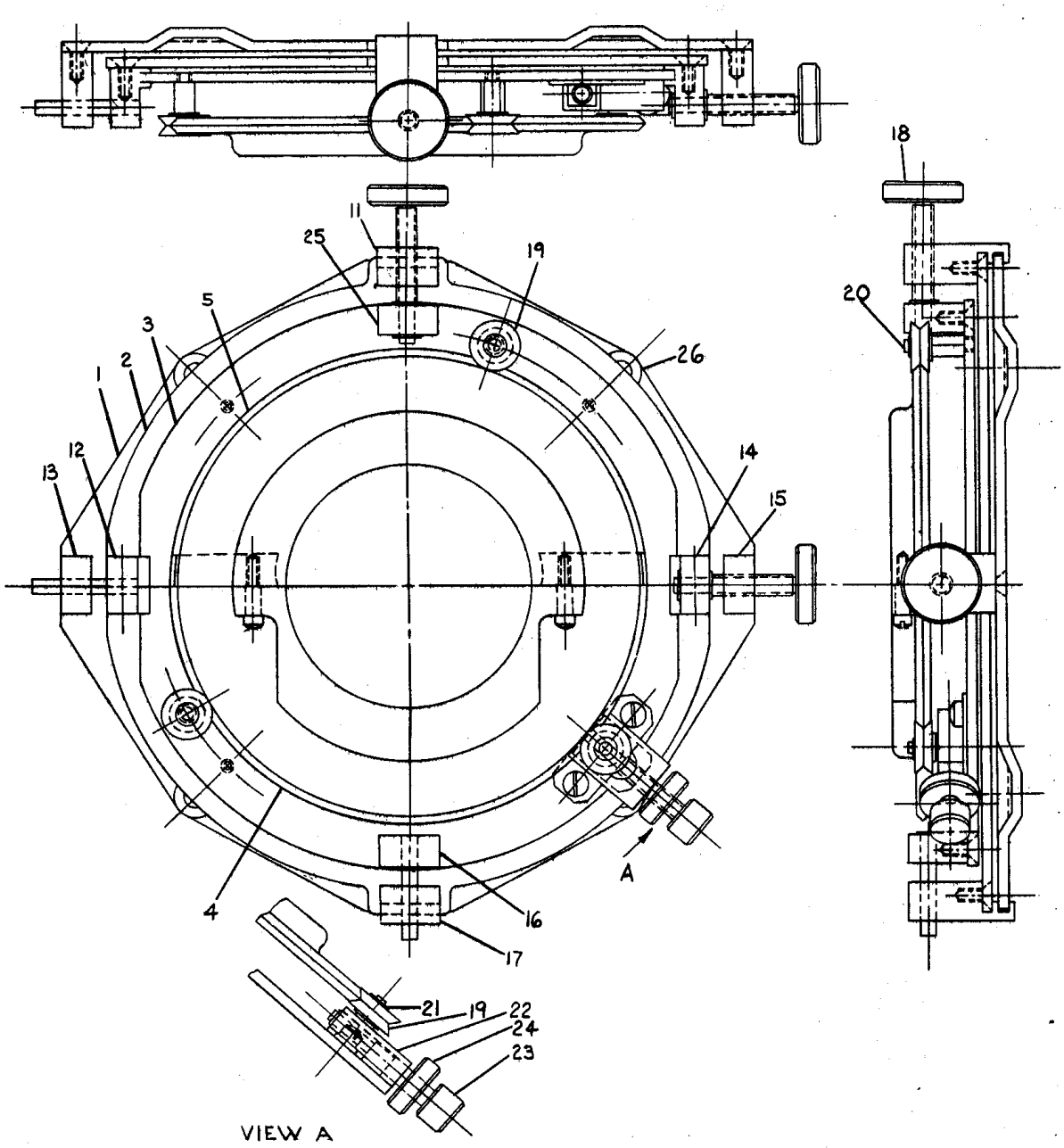


Figure 3. Yoke Mounting Assembly

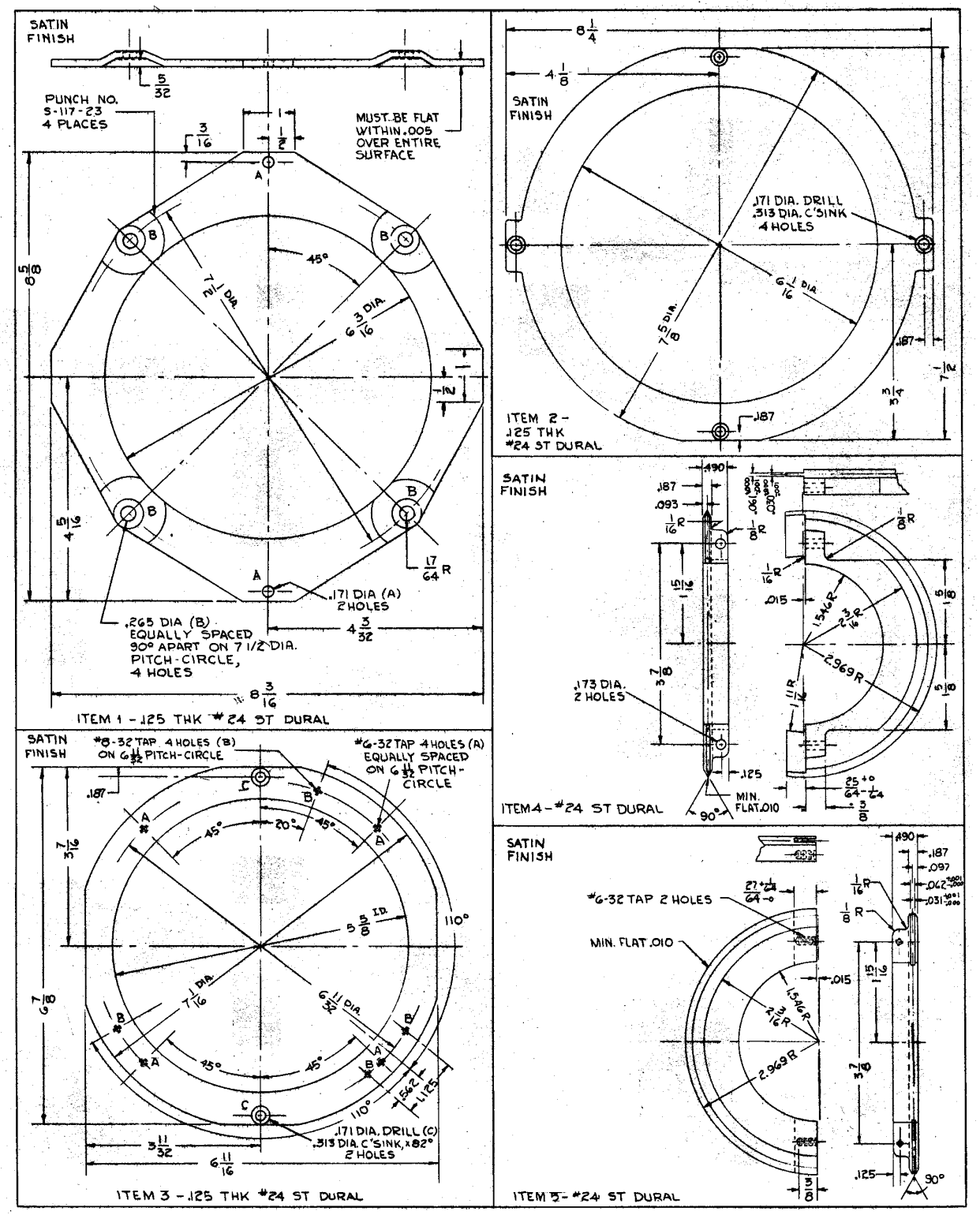
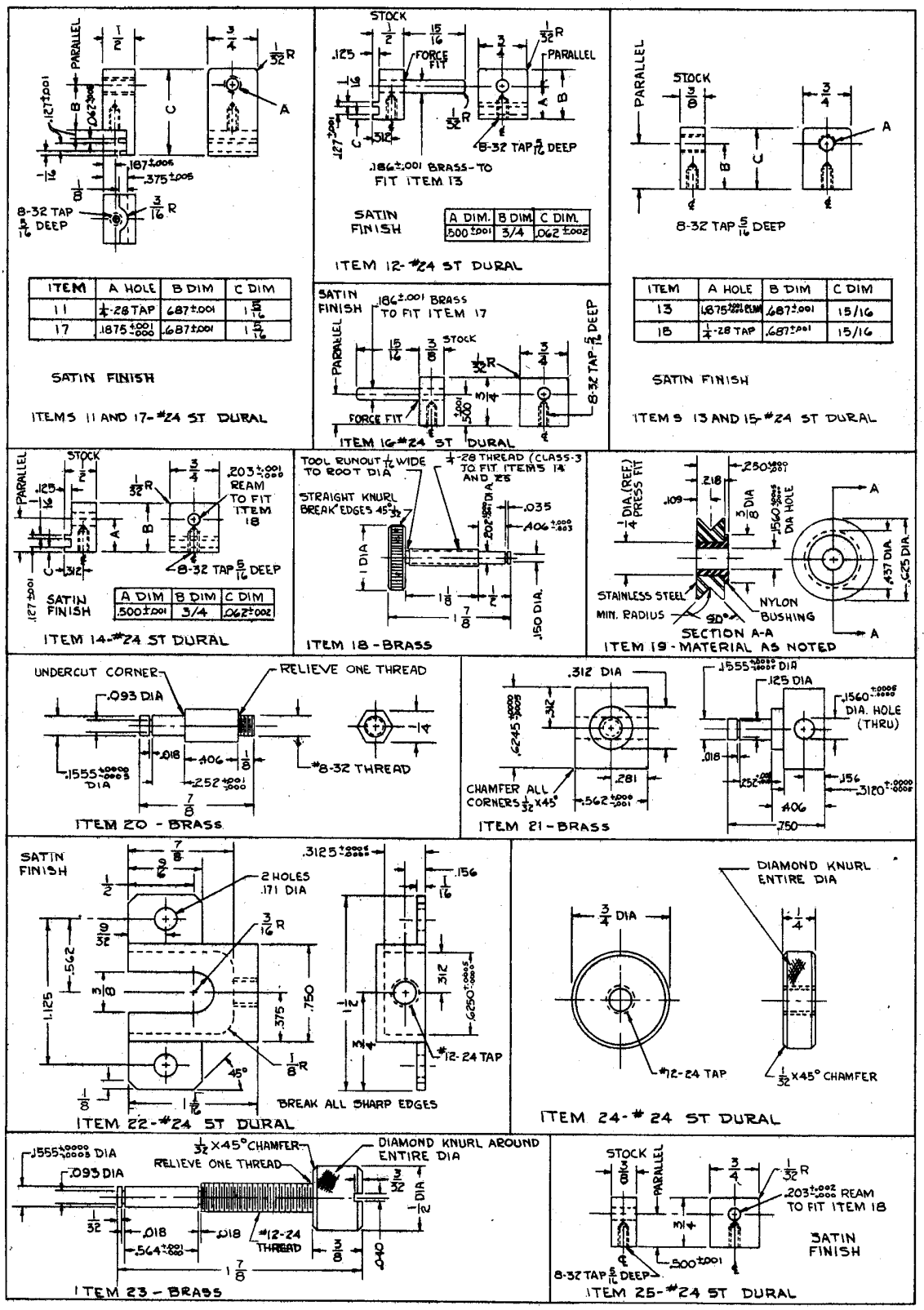


Figure 4. Items 1 through 5 of Yoke Mounting Assembly



ITEM	A HOLE	B DIM	C DIM
11	1/4-28 TAP	.687±.001	15/16
17	.1875 +.001 -.000	.687±.001	15/16

A DIM.	B DIM.	C DIM.
.500±.001	3/4	.062±.002

ITEM	A HOLE	B DIM	C DIM
13	.1875 +.001 -.000	.687±.001	15/16
18	1/4-28 TAP	.687±.001	15/16

A DIM	B DIM	C DIM
.500±.001	3/4	.062±.002

Figure 5. Items 11 through 25 of Yoke Mounting Assembly

Item	Name of Item	Quantity
22	Ways	1
23	Adjusting screw	1
24	Locking nut	1
25	*Bearing block	1
26	Machine screws ¼ x 20 x 7/8 (brass)	4

* Parts used in both yoke and focus mounting

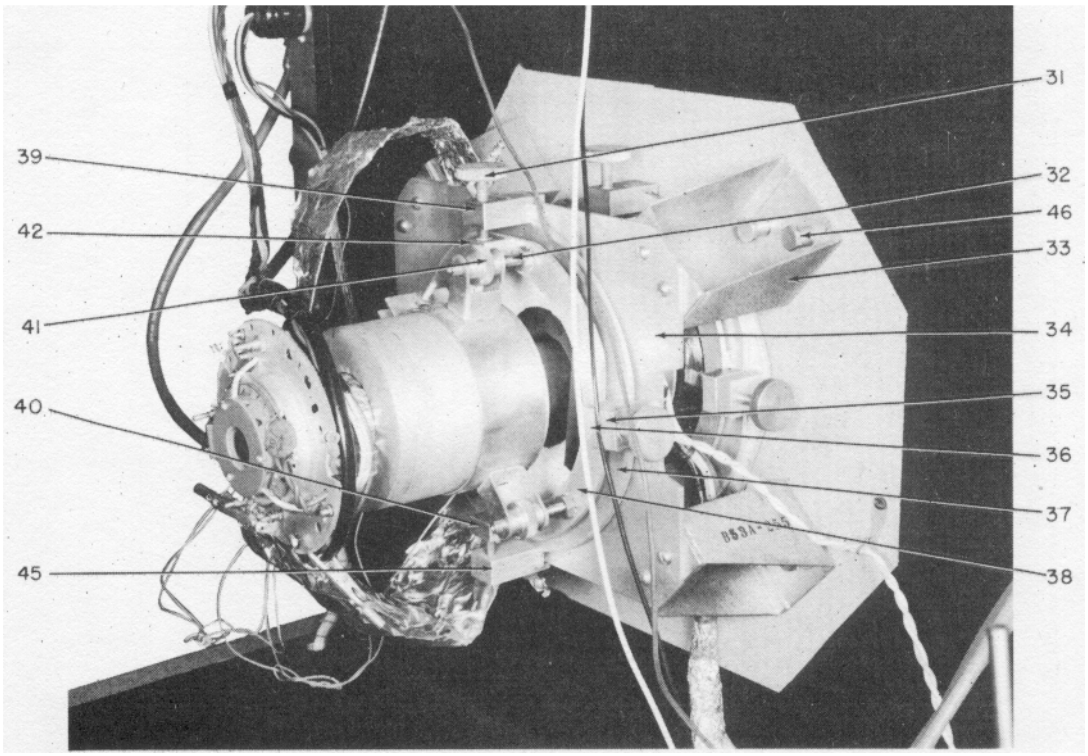


Figure 6. Focus Mounting

Figure 6 shows the principal focus mounting parts. This illustration is followed by detail drawings which are item-numbered to the illustration. See figures 7 and 8.

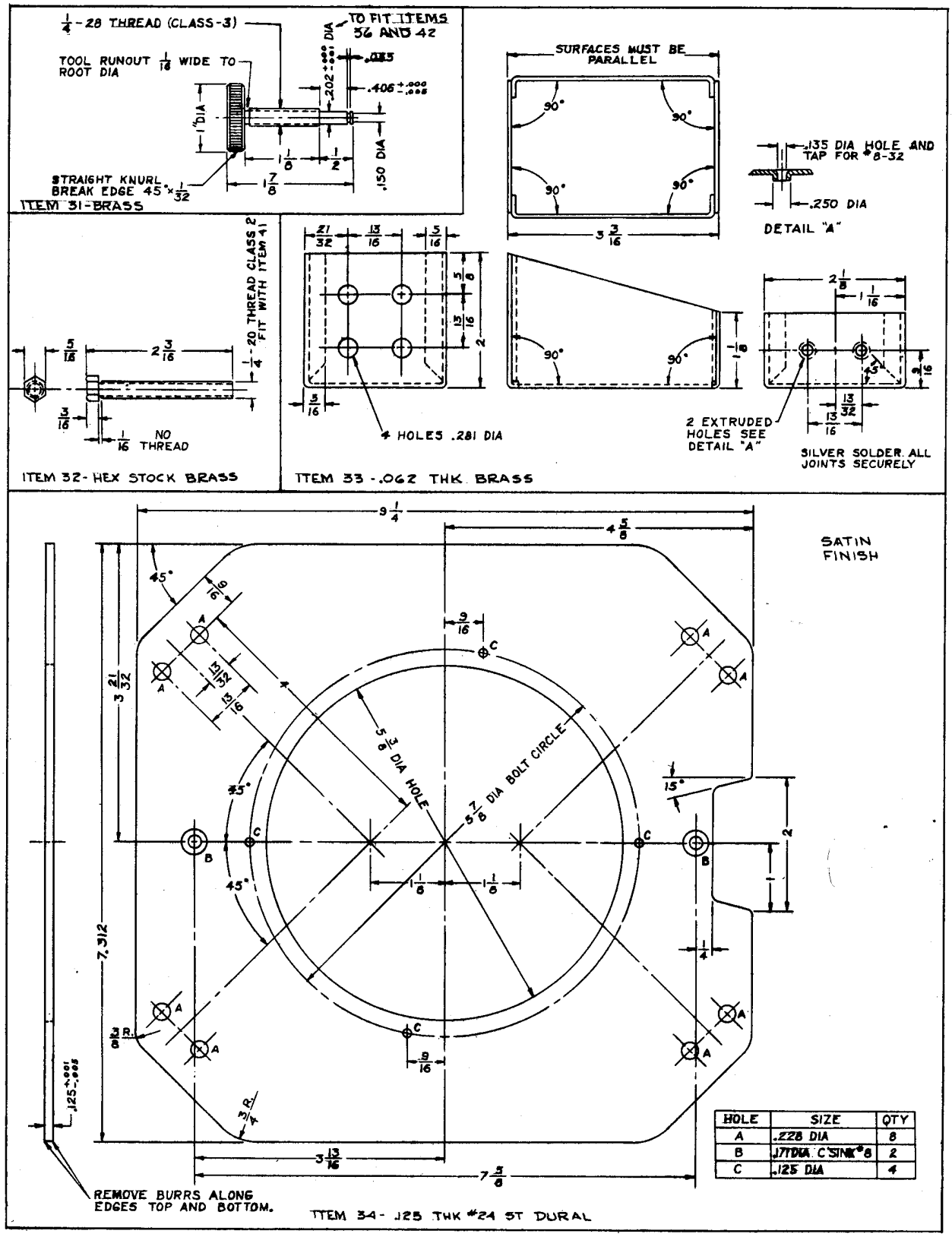


Figure 7. Items 31 through 34 of Focus Mounting Assembly

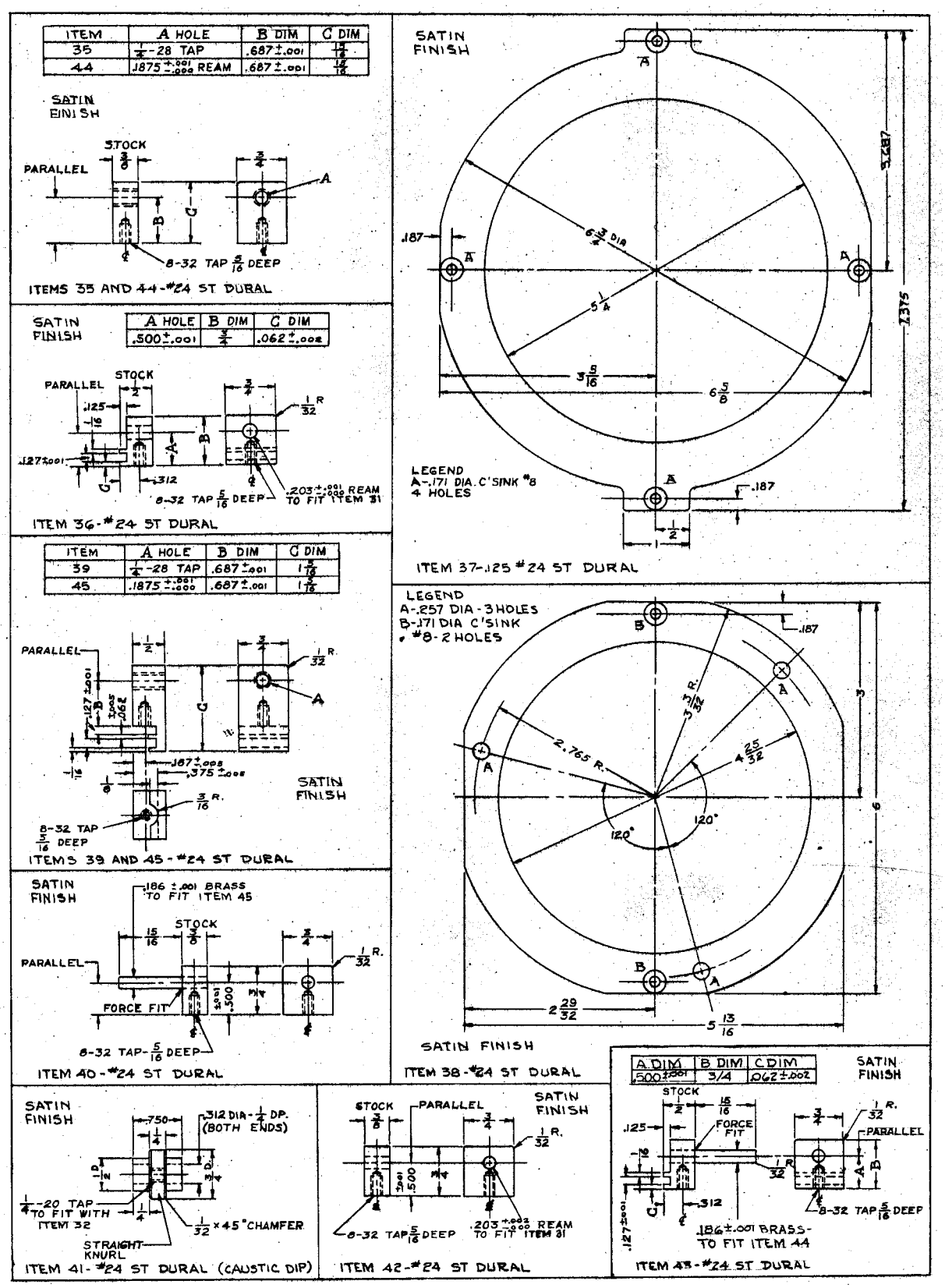


Figure 8. Items 35 through 43 of Focus Mounting Assembly

Item	Name of Item	Quantity
31	*Plate adjusting screw	2
32	Focus coil support	3
33	Bracket	2
34	Plate #3	1
35	*Bearing block	1
36	*Bearing block	1
37	Plate #2	1
38	Plate #1	1
39	*Bearing block	1
40	*Bearing pin	2
41	Focus adjusting nut	3
42	*Bearing block	2
43	*Bearing pin	2
44	*Bearing block	1
45	*Bearing block	1
46	Machine screw, ¼ x 20 x 7/8” Brass (with spacer as required)	8

*Parts used in both yoke and focus mounting

The structural members and dimensions of the test stand frame are shown in figure 9.

The tube housing assembly drawings (figures 10A and 10B) are followed by detail drawings of the front plate assembly, which are shown in figures 11 and 12. A list of these items is given below.

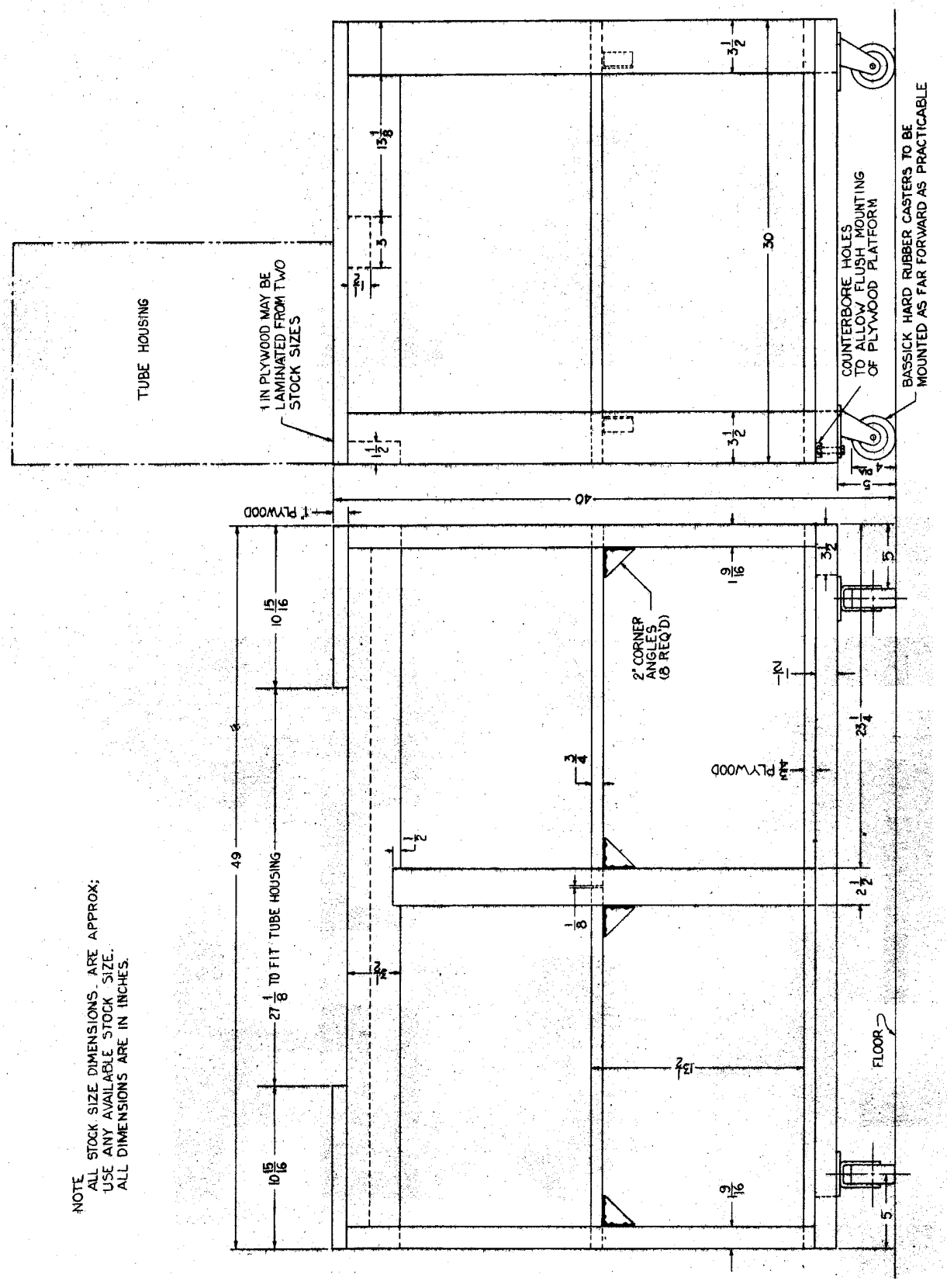
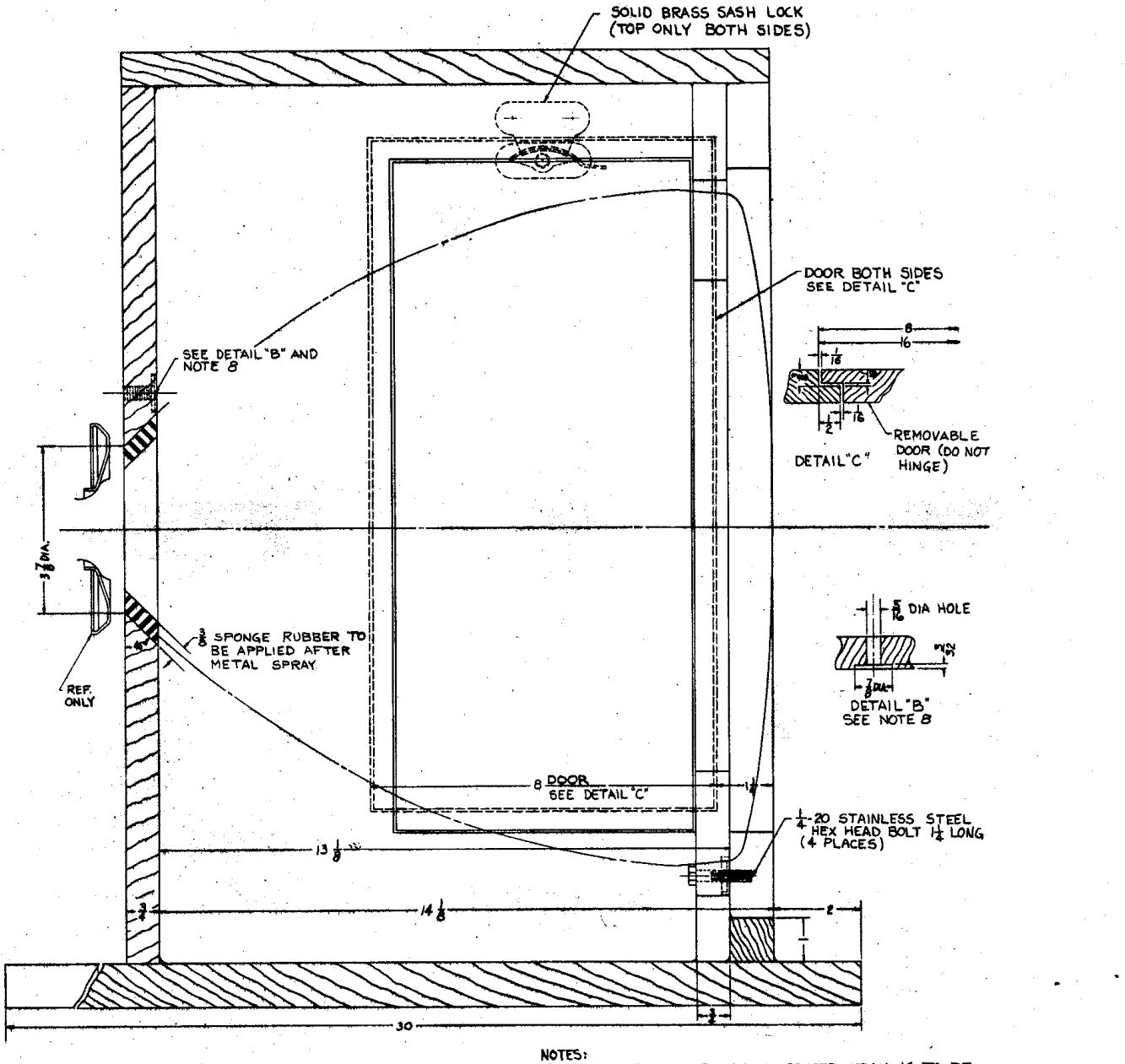


Figure 9. Test Stand Frame



HALF SECTION

NOTES:
1- UNLESS OTHERWISE SPECIFIED CONSTRUCTION IS TO BE OF 3/4" PLYWOOD.
2- NO FINISH IS TO BE APPLIED UNTIL METAL SPRAYING IS COMPLETED.
3- ALL JOINTS ARE TO BE FILLETED (1/4 FLAT MIN.) WITH SAVOGRAN CRACK FILLER OR EQUIVALENT.
4- ALL EXCESS GLUE TO BE REMOVED.
5- ALL SURFACES TO BE SANDBLASTED, PRIOR TO METAL SPRAY, TO REMOVE ALL GLUE AND GREASE.
6- METAL SPRAYING - A MIN. OF .006 ZINC FOLLOWED BY .010 COPPER, WITH NO SHADOW SPOTS. ALL JOINTS ARE TO BE COMPLETELY BRIDGED.
7- AFTER METAL SPRAY, ALL EXPOSED WOOD SHOULD BE COATED WITH SEALER.
8- 12 PLACES FOR CAPTIVE NUTS 1/4 x 20 - 5/8 LONG, NAILED IN A MIN. OF 2 PLACES.

Figure 10A. Tube Housing Assembly

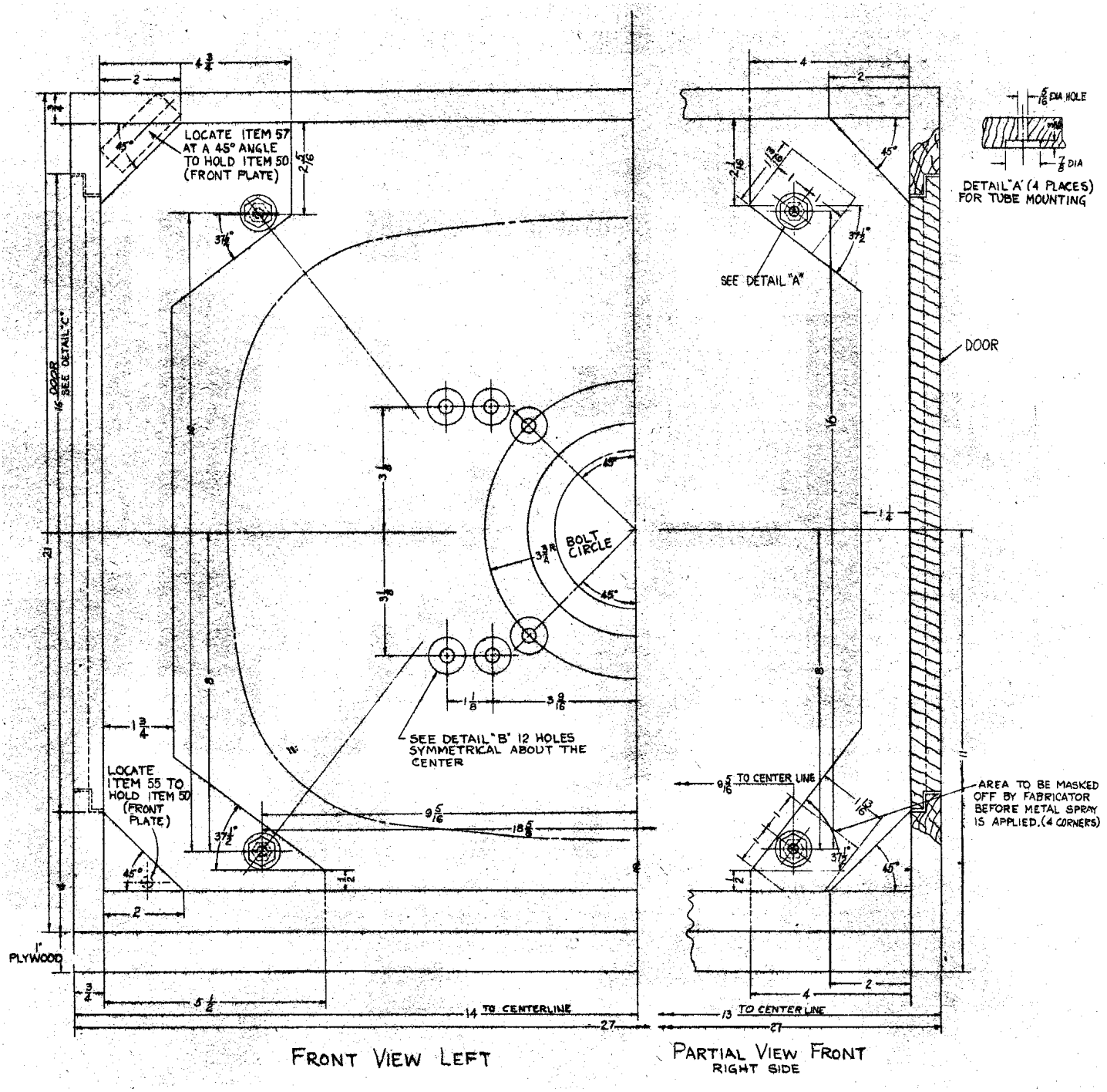


Figure 10B. Tube Housing Assembly (Continued)

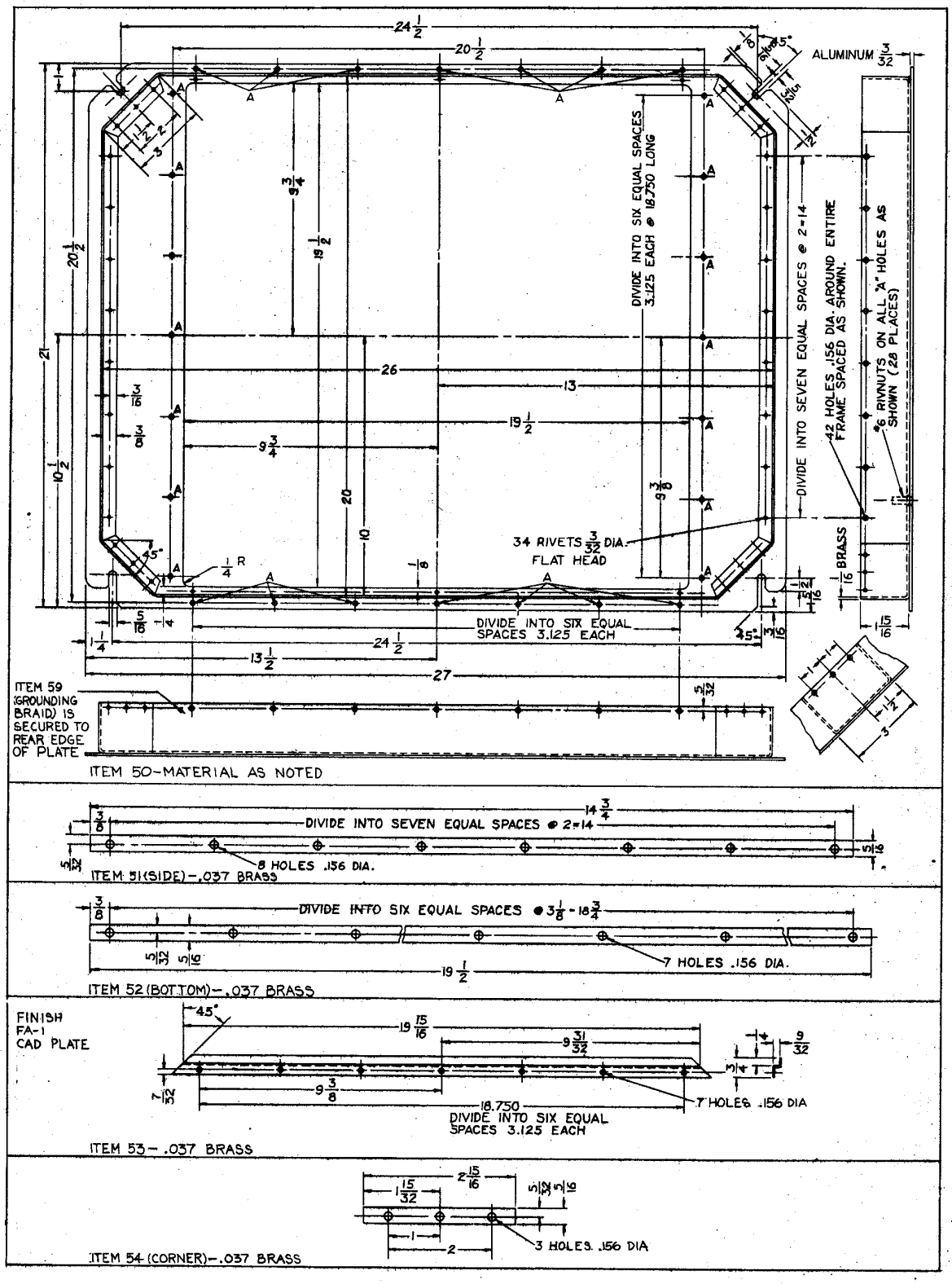


Figure 11. Items 50 through 54 of Front Plate Assembly

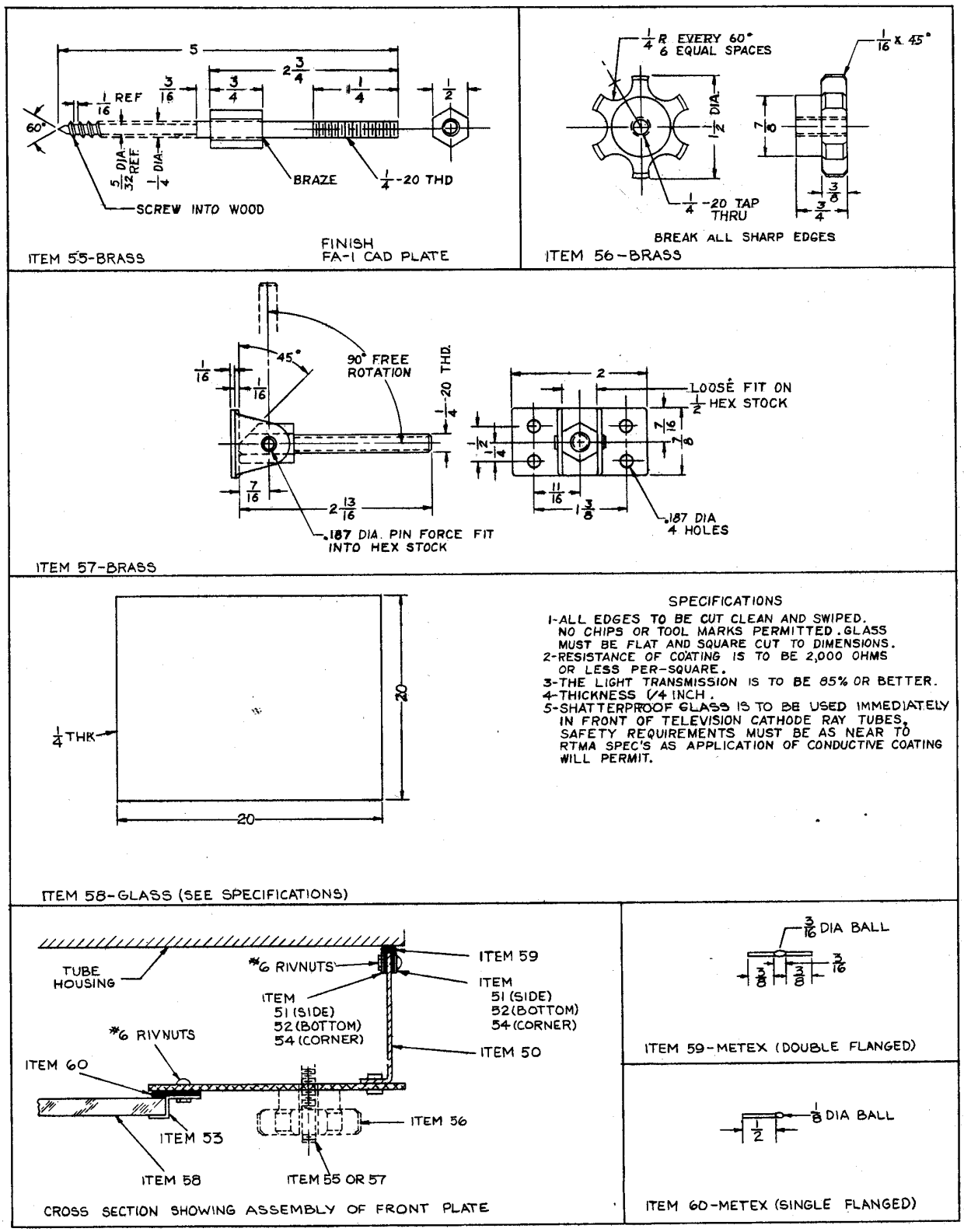


Figure 12. Items 55 through 60 of Front Plate Assembly

Item	Name of Item	Quantity
50	Front plate	1
51	Strip (side)	4
52	Strip (bottom)	4
53	Strip (retaining)	4
54	Strip (corner)	8
55	Support stud	2
56	Knob	4
57	Hold-down stud	2
58	Glass	1
59	Grounding braid METEX, (METAL TEXTILE CORP.,	
60	Grounding braid ROSELLE, N.J., or equivalent)	

The Appendix contains schematic diagrams of the focus regulator and high-voltage drive, the seven-megacycle drive, and the sideband amplifier combined with pilot carrier oscillator and width discriminator. See figures A-1, A-2, and A-3.

APPENDIX

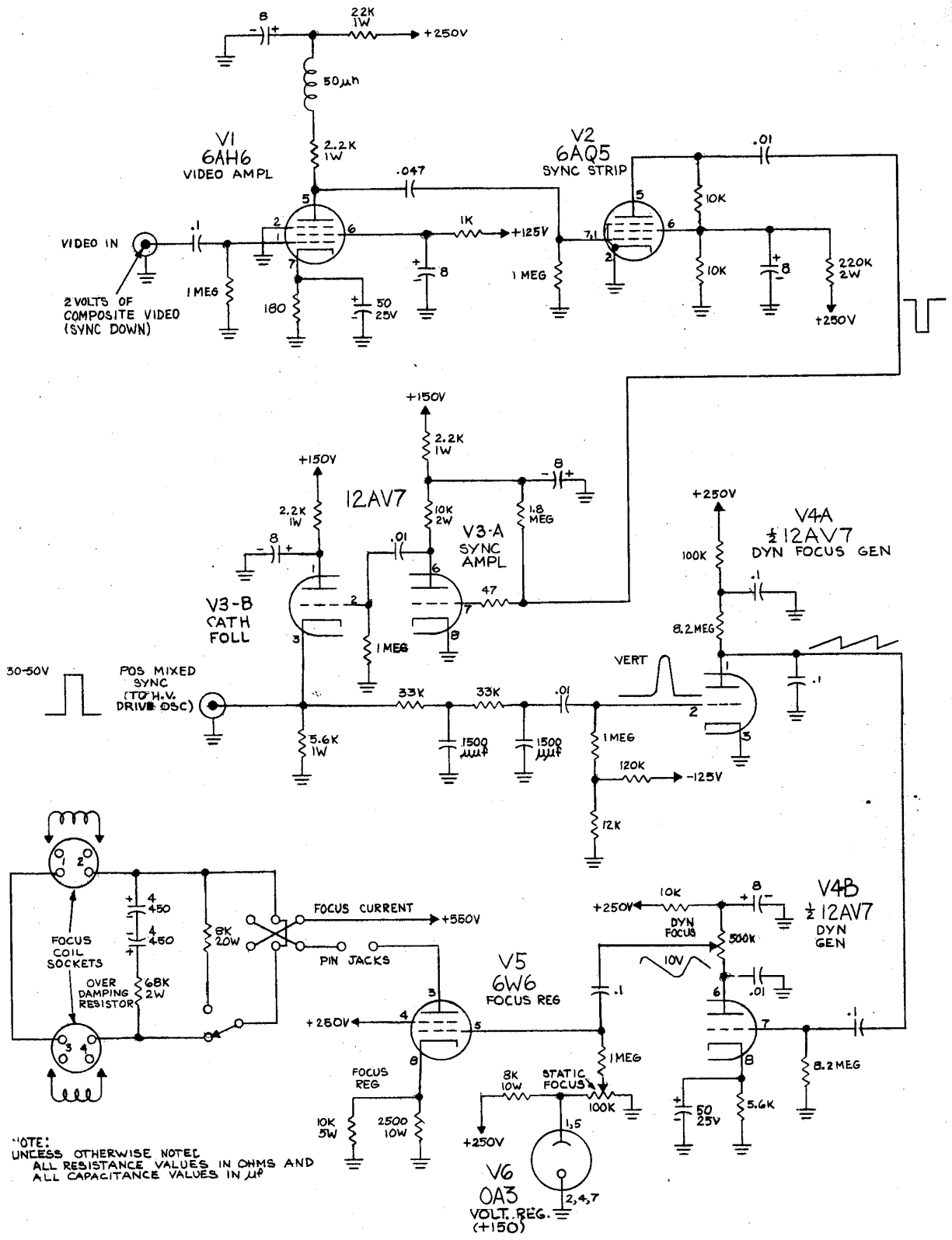


Figure A-1. Schematic Diagram, Focus Regulator and High Voltage Drive

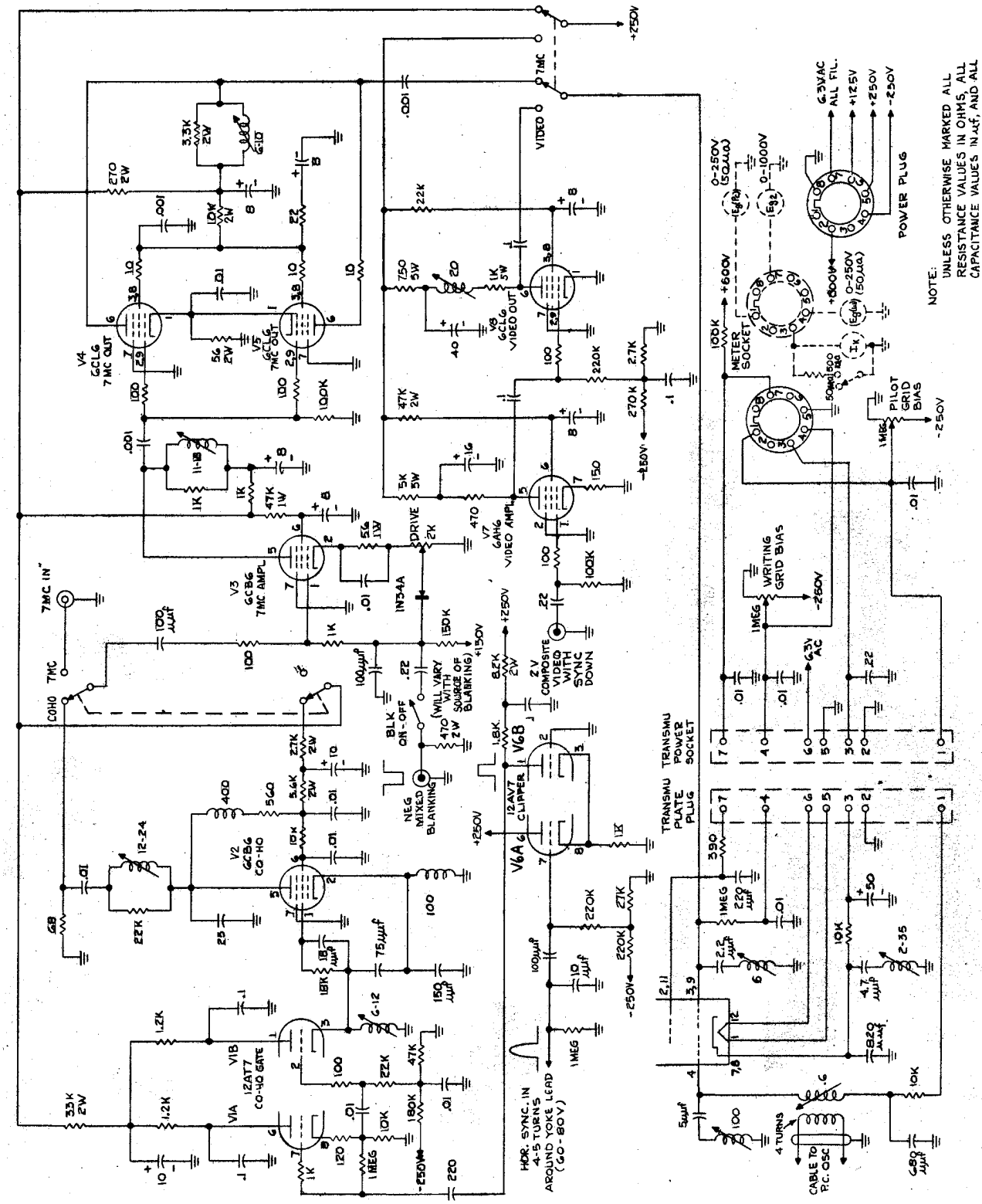


Figure A-2. Schematic Diagram, Seven-Megacycle Drive

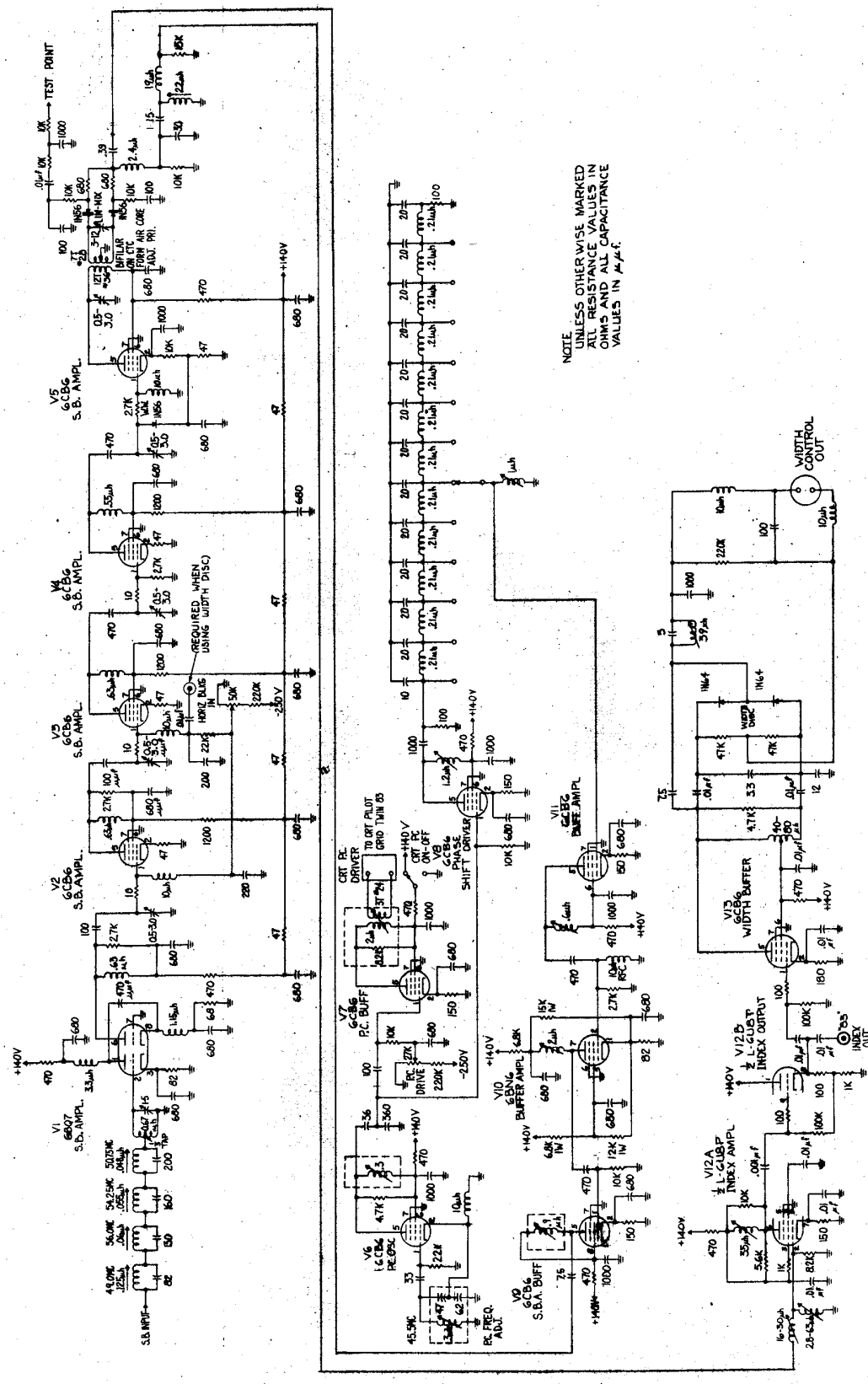


Figure A-3. Schematic Diagram, Sideband Amplifier Combined with Pilot Carrier Oscillator and Width Discriminator

A TEST STAND FOR APPLE CIRCUIT DEVELOPMENT WORK

Since the publication of ESB-117, a number of improvements have been incorporated in the test stand which was used as an example in that bulletin. A newer test stand has been built, incorporating these improvements. This addendum presents general information about these improvements, for the benefit of those groups engaged in Apple research and development. Detailed information about any of the improvements can be obtained by addressing an inquiry to the Engineering Services Division.

MOUNTING ARRANGEMENT FOR A YOKE AND FOCUSER

A modification of the tube shield box has been made to make it possible to use the test stand to test a complete tube assembly, such as would be prepared for installation in one of the developmental receivers. This modification consists of enlarging the opening in the back of the box to approximately 13-1/2" x 13-1/2". This, in turn, makes an adapter plate necessary to attach the yoke and focuser assembly to the tube shield box. One form of such an adapter is illustrated in the photographs.

CONTROL PANEL

A control and metering panel has been added to consolidate the various controls and meters. In addition, provision has been added for centering currents, to enable the raster to be offset on the face of the Apple tube. This is a particularly useful feature when certain sweep studies are being carried out.

HIGH-VOLTAGE CURRENT METERING

Current metering can be added in the leads to the screen, the band, and the anode. This provision facilitates monitoring of these currents, thereby enabling monitoring of certain secondary emission phenomena. A reversing switch in the screen and band metering provides for conditions of high or low secondary emission.

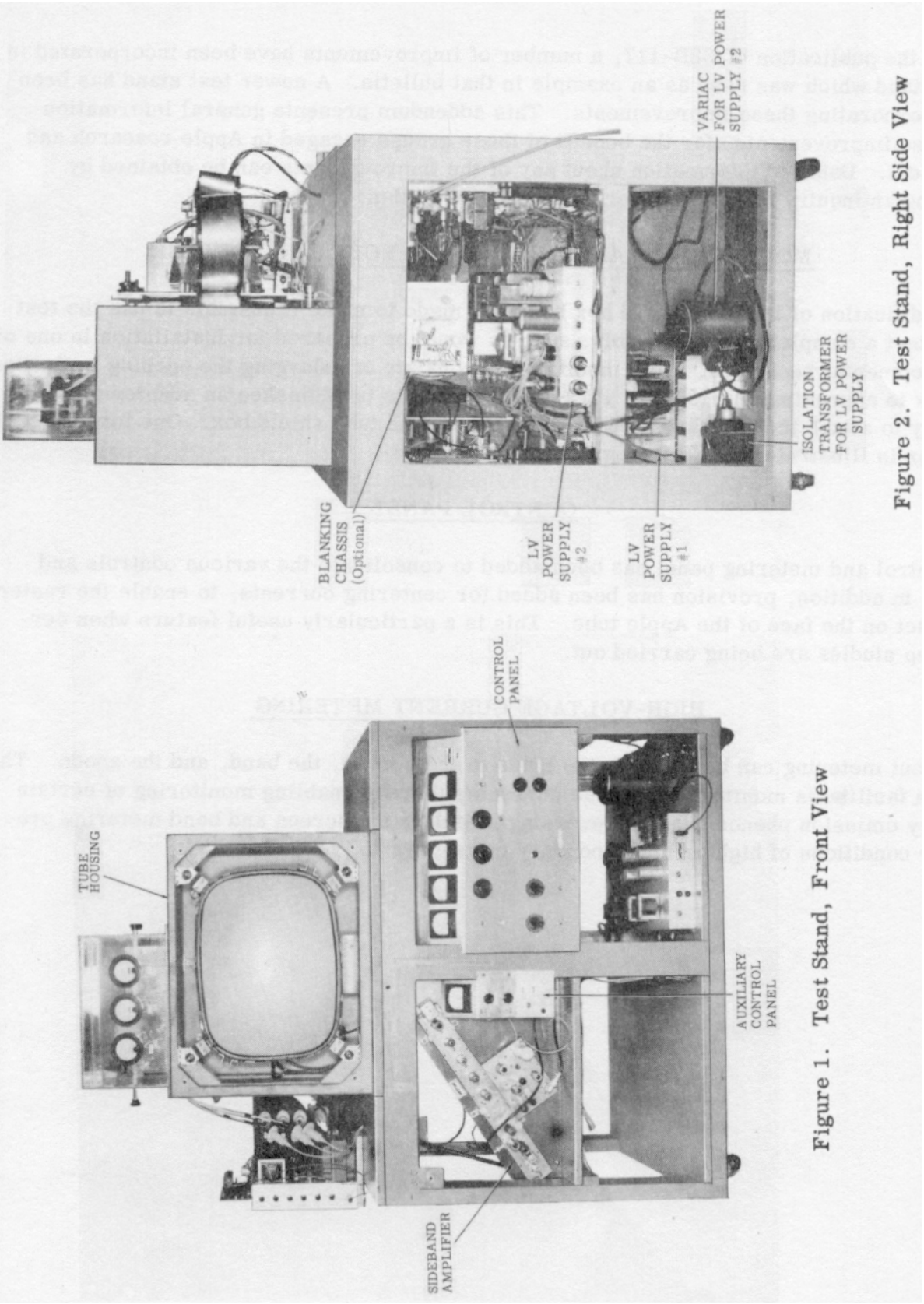


Figure 2. Test Stand, Right Side View

Figure 1. Test Stand, Front View

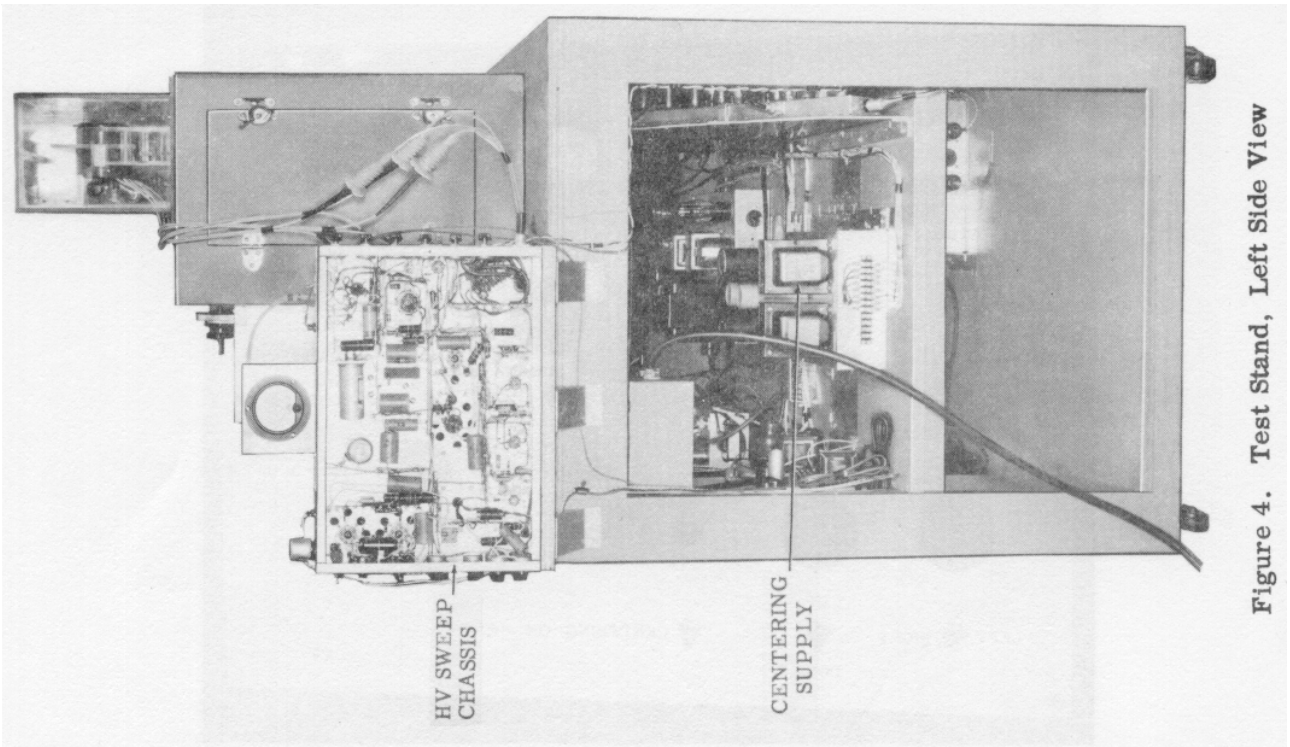


Figure 4. Test Stand, Left Side View

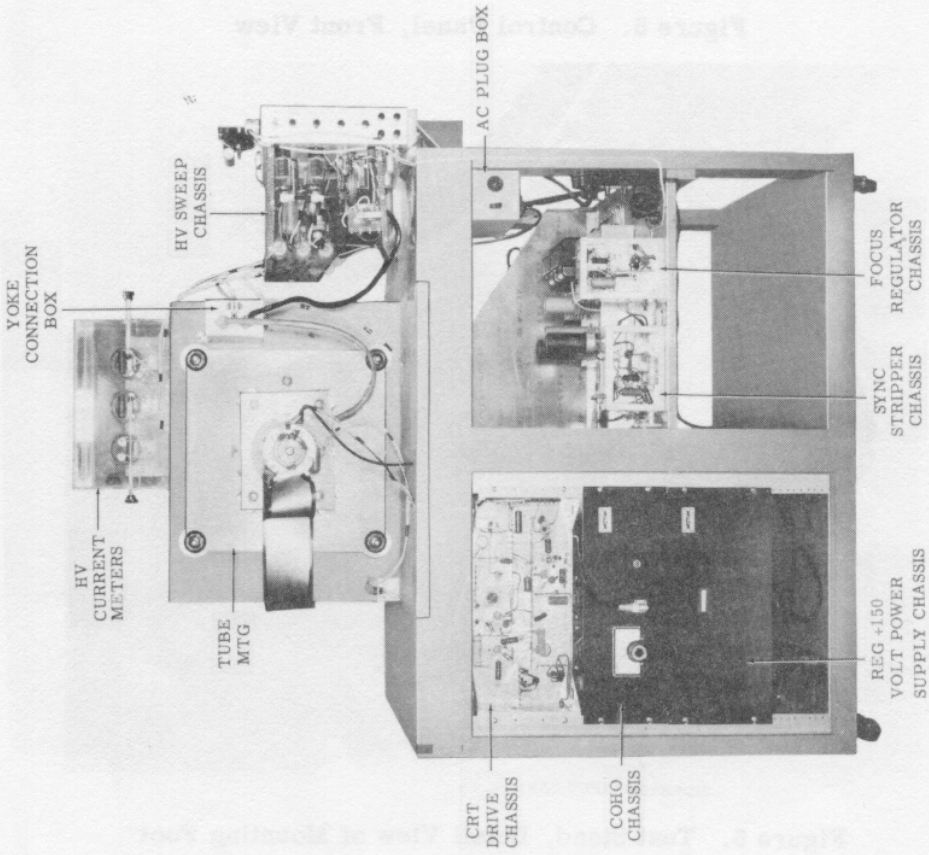


Figure 3. Test Stand, Rear View

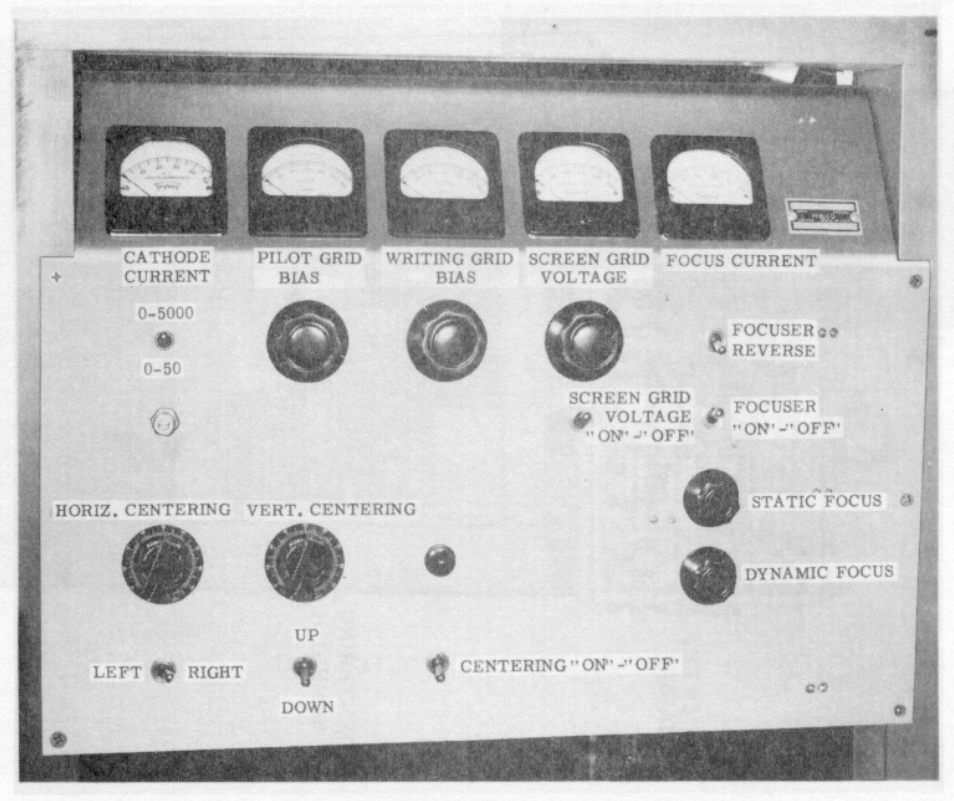


Figure 5. Control Panel, Front View

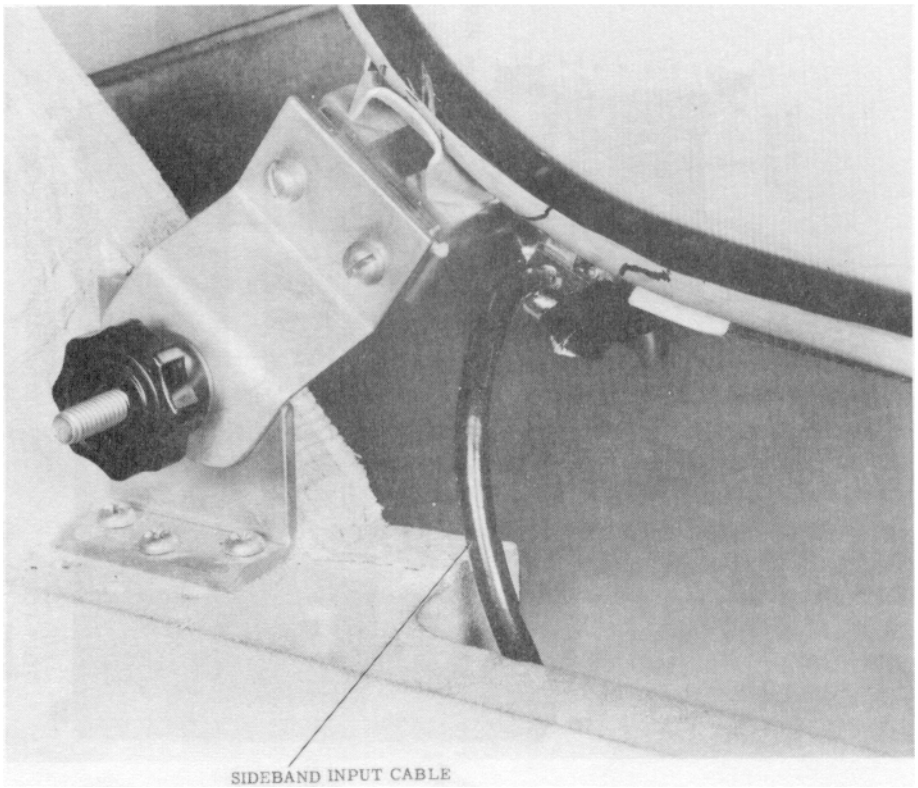


Figure 6. Test Stand, Detail View of Mounting Foot

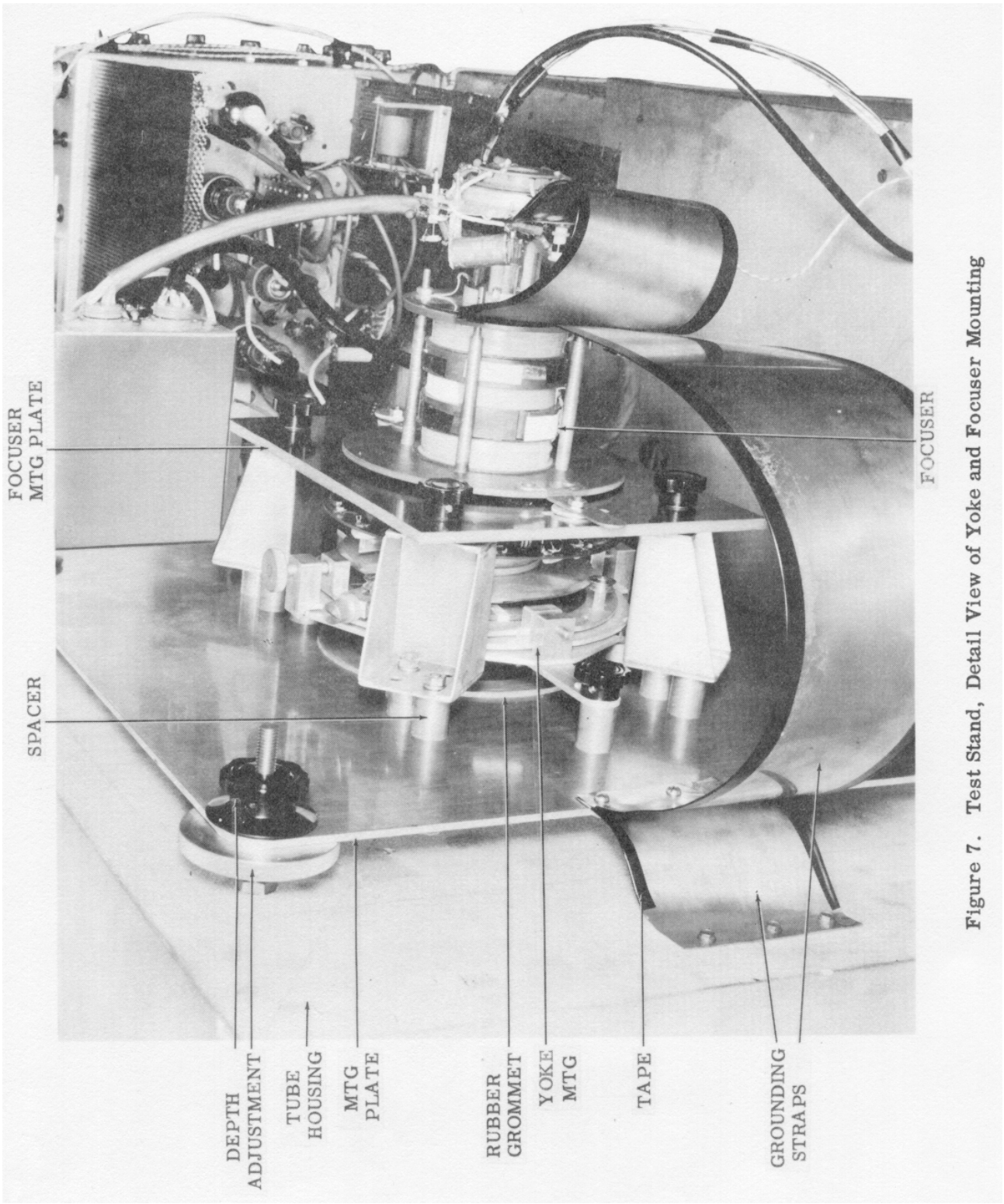


Figure 7. Test Stand, Detail View of Yoke and Focuser Mounting