

**CONFIDENTIAL**

ISS	5	REV DATE	070580	BY	010955	INSTRUCTION MANUAL FOR	
FILE NO	033	REV	56	TYPE	30		
REV CLASS	M	REV	37	REV CLASS	C	THERMOELECTRIC GENERATOR	
ISS	22	NEXT REV	2010	AGENCY	NR 10-2		

ORIGINAL CL BY 235979  
 DECL  REVW ON 2010  
 EXT BYND 6 YRS BY SAME  
 REASON 3d(3)

DESCRIPTION OF THE GENERATOR

The  Thermoelectric Generator incorporates 99 pairs of elements arranged in layers radially about a central core containing the heat source.

25X1

The thermoelectric elements are cylindrical ingots of lead telluride material, doped to produce N and P type semiconductors. One N and one P type element constitute a couple, and the 99 couples are connected electrically in series.

Each couple is joined at the hot junction end by a metal shoe. The elements are individually spring loaded at the cold junction ends to insure low resistance electrical contact at the hot junctions and to insure good heat flow through the parallel paths from the heat source to the outside radiator.

Electrical insulation is provided at the hot and cold junctions to insulate the couples from each other and the container.

The container functions as the heat sink. Its metal fins enable the generator to operate more efficiently at room ambient temperature.

A propane burning, radiant-type burner is used as the heat source.

Sensing thermocouples are assembled into hot and cold junctions to provide a means of measuring the temperature drop along the elements.

AUXILIARY EQUIPMENT

Attached to the generator itself is a needle valve and small pressure gauge for adjusting the fuel flow input. There is also an indicating meter for the hot junction temperature. In addition the following accessories are provided:

1. A small self-contained propane bottle with regulator and a short hose.
2. A longer hose with regulator for direct attachment for a larger (100 pound) tank of propane.

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There are several more sensing thermocouples accessible by removing the cover on the output junction box. The location of these thermocouples are indicated in the attached drawings.

### STARTING INSTRUCTIONS

#### To Start:

1. Remove the stack cover by unscrewing the knurled nut at the top of the generator.
2. Connect the appropriate hose to the gas input and open tank valve.
3. Open regulator until approximately 16 psi is indicated.
4. Open the needle valve until a pressure of 14.5 is indicated on the small gauge mounted on the needle valve assembly.
5. Ignite the burner (preferably with a flint igniter). View down the stack will show a blue flame around the burner head.
6. After burning for approximately one to two minutes, the flame should "pop" into the combustion tube. Proper burning will be characterized by a "gurgling" sound. If the characteristic sound is not heard, re-ignite.  
CAUTION - Do not look down stack unless wearing glasses after initially lighting.
7. When proper burning has been established and the temperature indicating meter approaches to within 100°F of the desired hot junction running temperature, close down on the generator needle valve to adjust the hot junction temperature to the desired point. As a guide, 3.8 psig  $\approx$  1050°F operating with a matched load.  
CAUTION - Under no circumstances exceed 1100°F hot junction temperature.

### TO RUN

1. Hot junction temperature, and consequently the power output, is a variable function of the fuel input to the generator as shown by the gas pressure entering the burner. The electrical load attached to the output of the generator will also affect the hot junction temperature however,

-3-

so that whenever the generator is run open circuited or used with an electrical load, other than 12 volt batteries, it will be necessary to re-adjust the needle valve to keep the hot junction temperatures at the proper operating points. It is recommended that for a long term operational testing this generator should be run at a hot junction temperature of 1050°F, or less. The generator can be run for shorter periods up to 1100°F and momentarily at temperatures as high as 12 or 1300°F.

Under standby conditions the fuel input can be reduced to as little as  $\frac{1}{4}$  of the full input thereby operating the hot junction temperatures at around 400°F, with no adjustment to the burner other than cutting down the operating pressure by means of the needle valve. To switch back and forth between standby conditions and full power output, a dual set of needle valves could be installed in parallel such that one would merely adjust each needle valve for the proper flow rate and then switch back and forth between the two by means of either a manual switch or a automatic solenoid control.

The temperature indicating meter is connected to a small gauge thermocouple attached to one of the hot junction contacts within the generator. Since this thermocouple is a small gauge size, to prevent heat loss along the thermocouple leads from the hot junctions, there is the danger that this lead will become defective with long time operation. It is suggested that all of the thermocouple leads (enclosed in the terminal box) be hooked up to a tensiometer circuit upon initially receiving the generator, letting the generator run under normal conditions and take a complete set of temperature readings from all of the thermocouples. Thereafter, one can always recheck the relative temperatures of all of the thermocouples to make sure that no one thermocouple lead wire has become defective.

#### TO STOP

1. Close off the valve, the main fuel tank, and allow the remaining gas to bleed from the lines.
2. Close all valves.

WGK/lw

BATTERY CHARGING TEST

A  thermoelectric generator was used to charge a 12 volt storage battery. The following is an outline of the test and its results:

25X1

Generator used:  thermoelectric generator-propane fueled.

25X1

Battery used: 10 Sonotone, 5 ampere-hour nickel-cadmium cells connected in series.

Measured quantities: time, battery voltage, charging current, gas consumed.

Conditions of the test: The battery was completely discharged. The generator was started and run at 1050°F for about one hour to stabilize the generator. A resistance load which drew 0.6 amps was used during this warm-up period. The test was conducted in the laboratory, with an ambient temperature of about 75°F.

Measurement Techniques: The battery voltage was monitored continuously by means of a recorder. The charging current and gas consumed were measured hourly. To measure the gas consumed by the generator, the propane bottles used were weighed on a heavy duty platform balance. The graphs show the battery voltage, charging current, and gas consumed as a function of time.

Calculated Results: Gas consumption rate:

$$m = 183 \text{ g/hr}$$

Chemical power input to generator:

$$P_{in} = 255 \text{ watts}$$

(Based on a high heating value for propane of 13.5 w-hr/g)

Average charging current:

$$I_{av} = 0.57 \text{ a}$$

Average battery voltage:

$$E_{av} = 13.9 \text{ v}$$

Average power delivered by the generator:

$$P_{\text{out}} = 7.92 \text{ watts}$$

Efficiency:

$$\eta = 3.1\%$$

Ampere-hour input to battery during the 9-hour test:

$$I_t = 5.13 \text{ ah}$$

Gas consumed to charge batteries to 100% of nominal (5 ah) capacity:

$$M = 162 \text{ g}$$

Estimated gas consumption to charge batteries to 140% of nominal (5 ah) capacity:

$$M' = 230 \text{ g}$$

TO SERVICE BURNER



25X1

In the event excessive pressure is necessary to reach operating temperature, check the orifice. In the orifice spare parts envelope is a clean-out tool, along with two spare orifices.

To remove the burner assembly from the generator:

1. Remove stack cover by unscrewing knurled nut.
2. Loosen the weather cap by loosening the small Allen set screws at the bottom of the supporting legs.
3. Lift weather cap free and remove burner.
4. Remove burner mounting band and unscrew needle valve assembly from the mixing tube.
5. Orifice may now be removed for cleaning or replacement.

Flame screens may also be replaced by unscrewing the burner head from the feed-in tube. The flame screen is held in place by the feed-in tube.

**CONFIDENTIAL**PERFORMANCE SPECIFICATIONS

25X1

Voltage, open circuit	---	26.0	V.D.C.
Voltage, matched load	---	13.3	V.D.C.
Current, matched load	---	645	Ma.
Temperature, hot junction	---	1100	°F
" cold junction	---	160	°F
" stack gas	---	340	°F
Power output	---	8.56	watts
Fuel input	---	18.68	gm/hr.
Power to fuel ratio	---	208	watt-hr/#fuel
Thermal efficiency	---	5.8	%
Net efficiency	---	3.3	%

WEIGHTS

Generator assembly without burner	--	10# - 9 oz.
Burner assembly including gauge and valve	--	1# - 4 oz.
Generator case and terminal box	--	5#
Fuel supply unit	--	6# -12 oz.
Full bottle of propane	--	2#

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ISSUE ITEM	BM	DRWG. NO.	REQ'D	MAT'L	COM'L	NAME
2		C-TE-3A-10	1			COMBUSTION CHAMBER
2		B-TE-3A-35	1			COMBUSTION CHAMBER EXTENSION
5		C-TE-3A-7	102			PARALLEL HOT SHOE
5		A-TE-3A-1	204			ELEMENTS
1		A-TE-3A-9	102			"N" MICA SLEEVE
1		A-TE-3A-9	102			"P" MICA SLEEVE
3		A-TE-3A-4	204			ELEMENT CAP
2		B-TE-3A-18	---			THERMOCOUPLE ASS'Y.
2		B-TE-3A-6	204			COLD JUNCTION SOCKET
1		A-TE-3A-13	204			SPRING
1		B-TE-3A-14	204			ADJUSTMENT SCREW
1		A-TE-3A-15	204			ADJUSTMENT SCREW INSULATION
1		A-TE-3A-16	---			ADJUSTMENT SCREW ASS'Y.
3		B-TE-3A-8	1			COLD JUNCTION RING
2		A-TE-3A-19	1			LOWER INSULATION BLOCK
1		A-TE-3A-39	1			UPPER INSULATION BLOCK
1		B-TE-3A-40	1			COMBUSTION CHAMBER INSULATION
3		C-TE-3A-11	1			LOWER SHELL
1		B-TE-3A-36	1			UPPER SHELL (REVISION)
1		A-TE-3A-48	2			TUBULATION FITTING
1		A-TE-1E-50	2			TUBULATION (TOP & BOTTOM)
1		C-TE-3A-27	---			LOWER SHELL SUB ASS'Y.
1		B-TE-3A-37	1			COVER EXTENSION
1		B-TE-3A-49	---			UPPER SHELL SUB ASS'Y.
1		A-TE-3A-17	80			FIN DETAIL
1		C-TE-3A-30	---			GENERAL ASS'Y.
1		A-TE-3A-50	1			INSULATING SLEEVE
2		B-TE-1E-38	1			BURNER PREHEATER TUBE

25X1

25X1

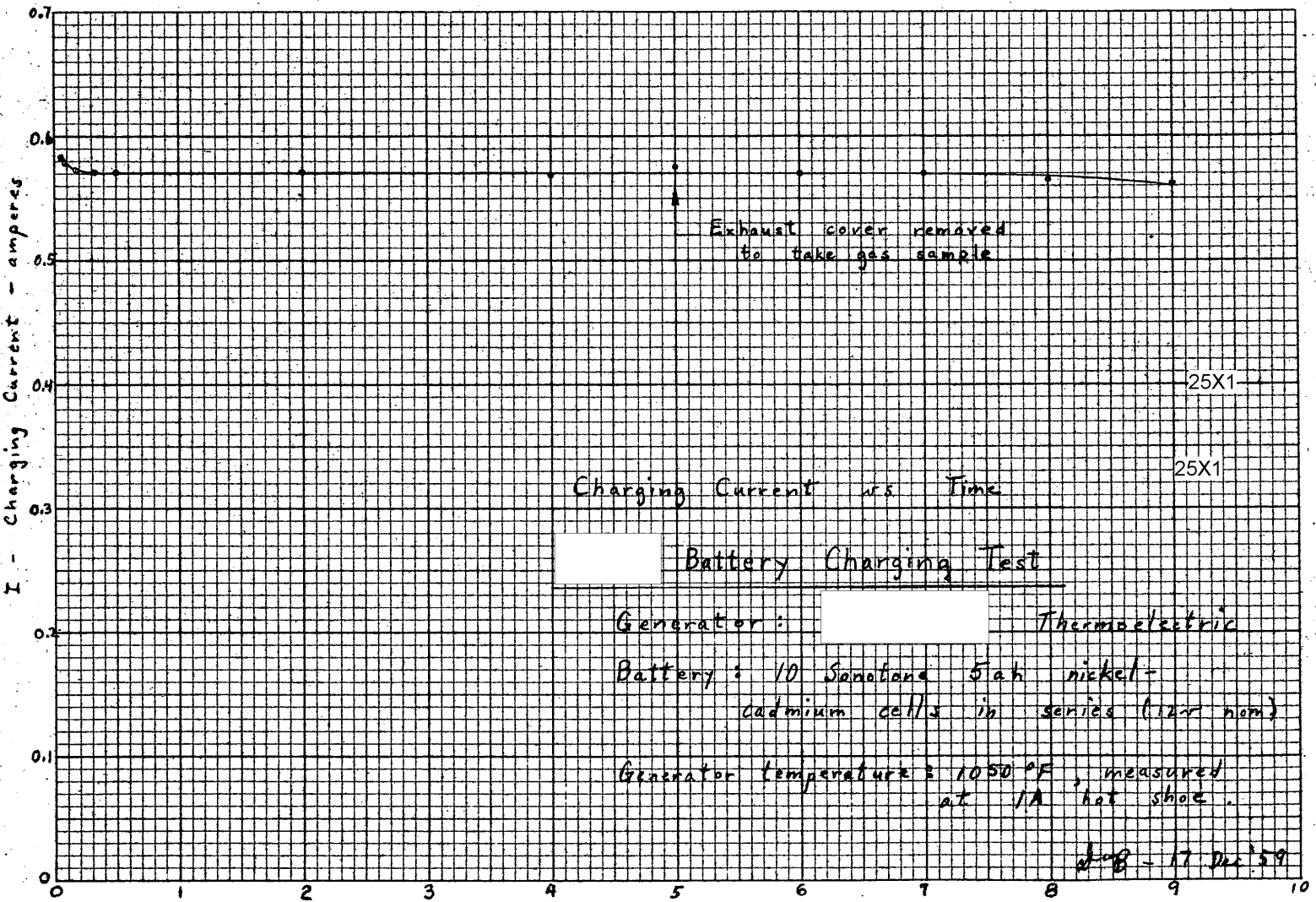
SHEET 1 OF 1 SHEETS

BM

PARTS LIST

TE-3A-31





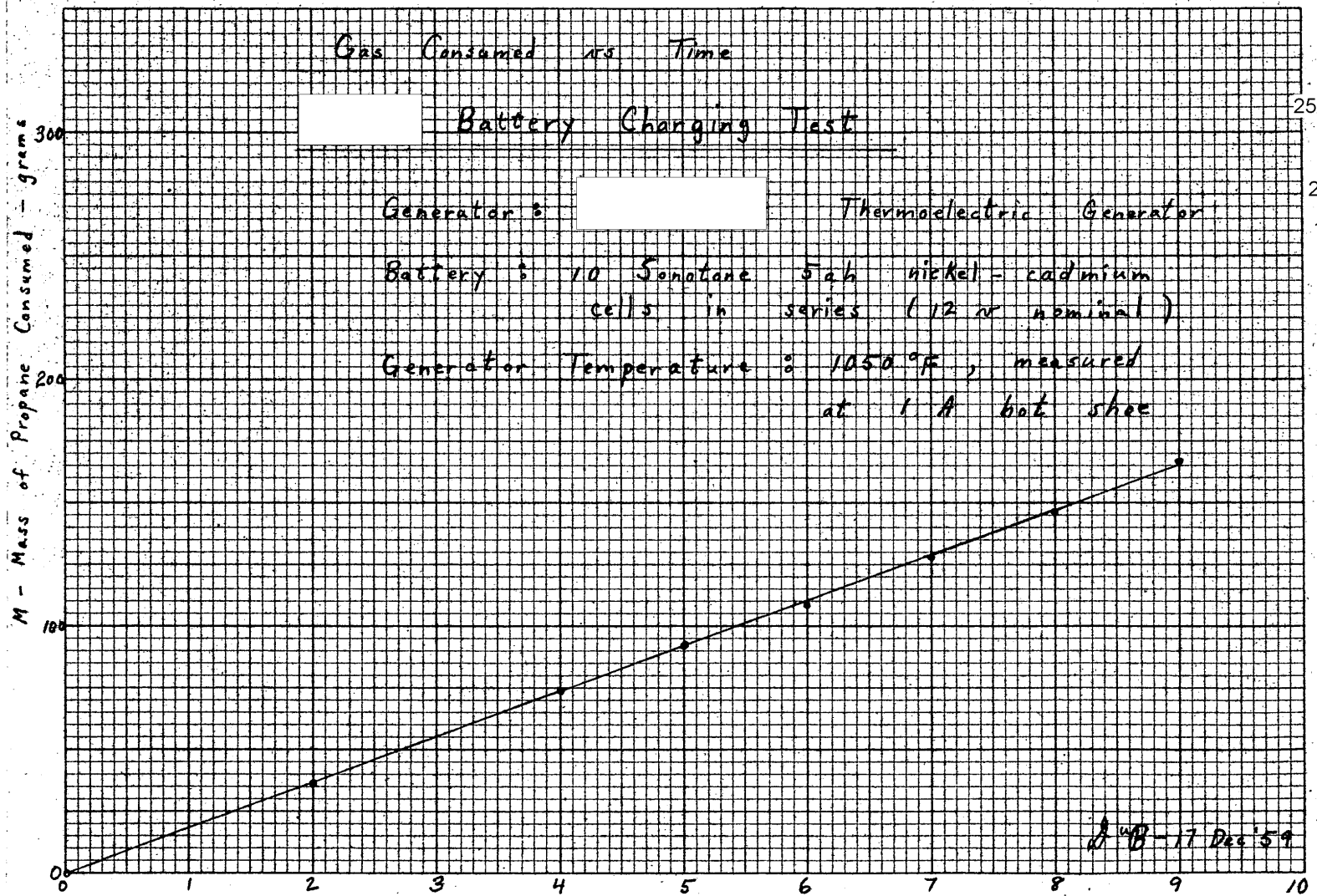
### Gas Consumed vs Time

### Battery Charging Test

Generator:  Thermoelectric Generator

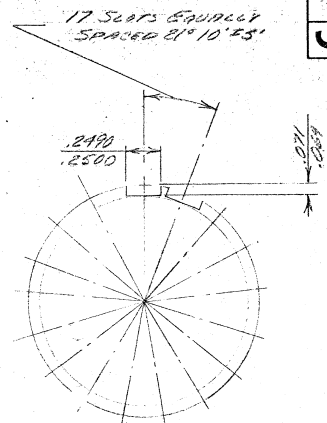
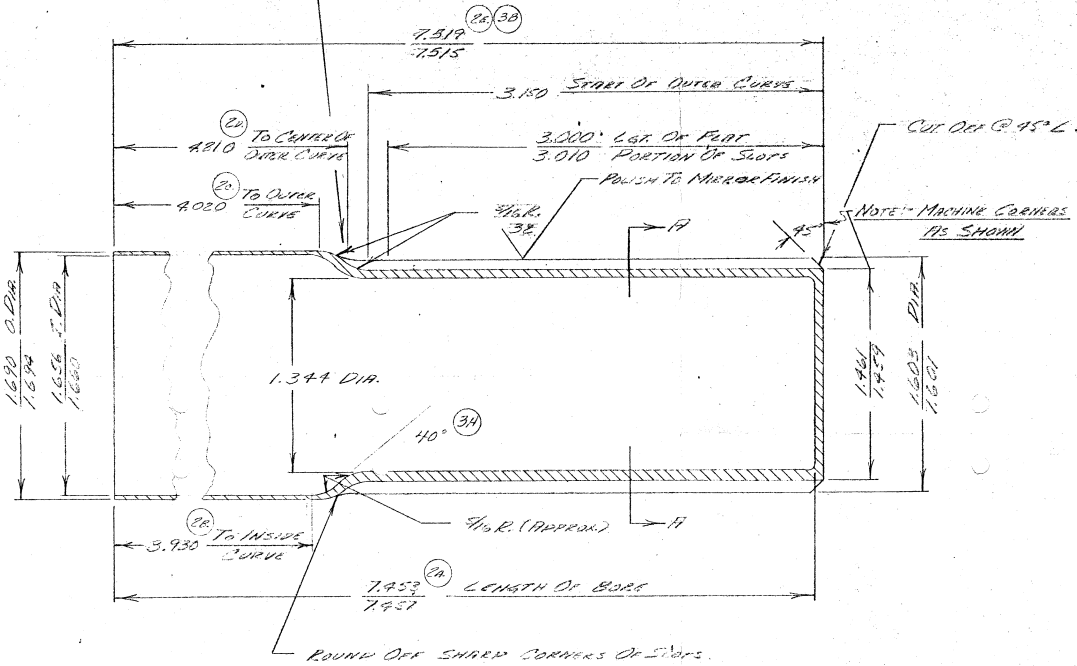
Battery: 10 Sonatane 5ah nickel-cadmium cells in series (12 v nominal)

Generator Temperature: 1050 °F, measured at 1 A hot shoe



A-4B-17 Dec '59

NOTE:  
Use  $\frac{3}{8}$ " Dia WOODRUFF CUTTER



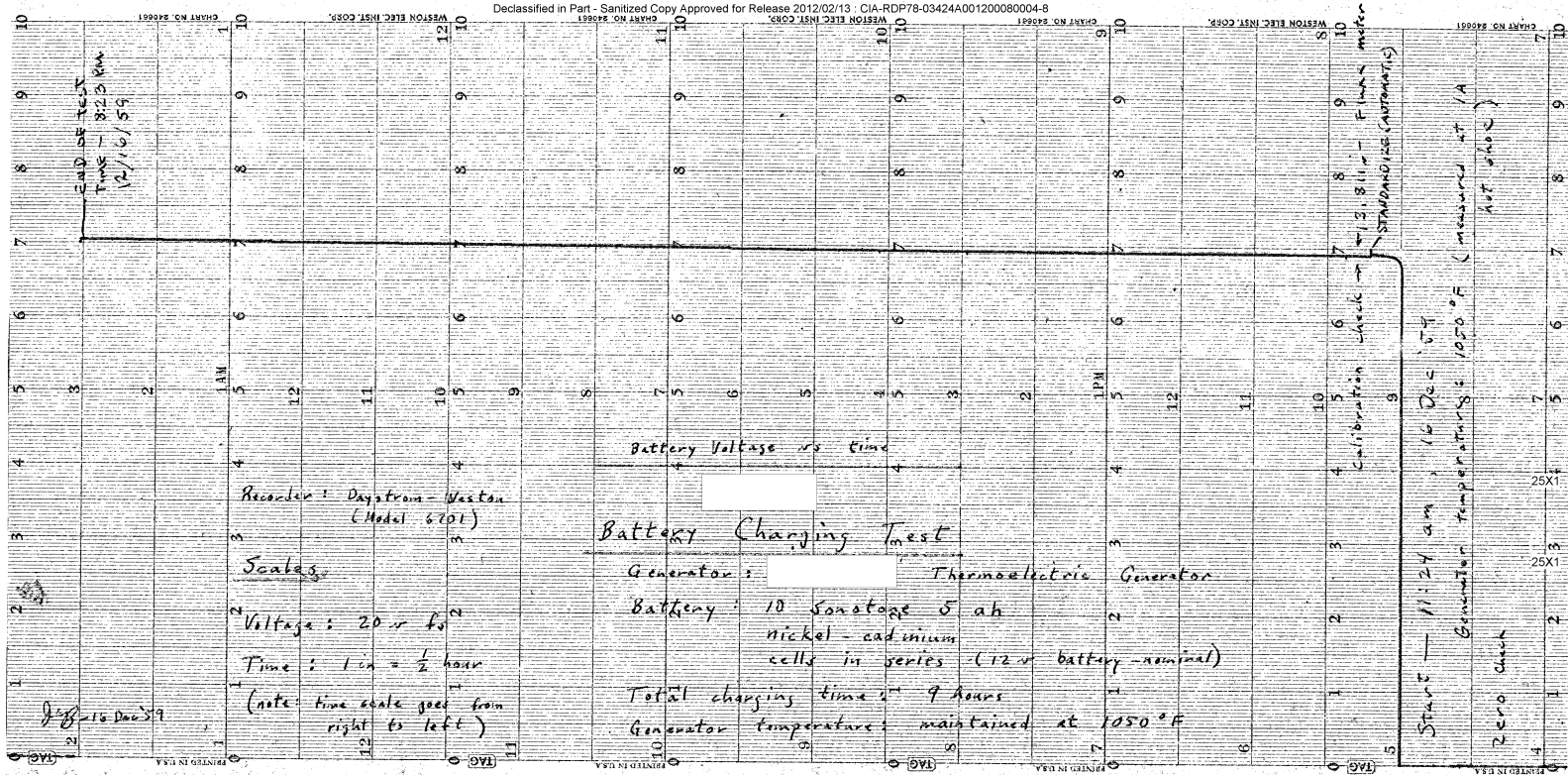
SECTION A-A

25X1  
25X1  
25X1

MATL - 304 STAINLESS STEEL - FULLY ANNEALED  
1300°-2000° F. AIR OR FURNACE COOLED  
PART NO. 319-38

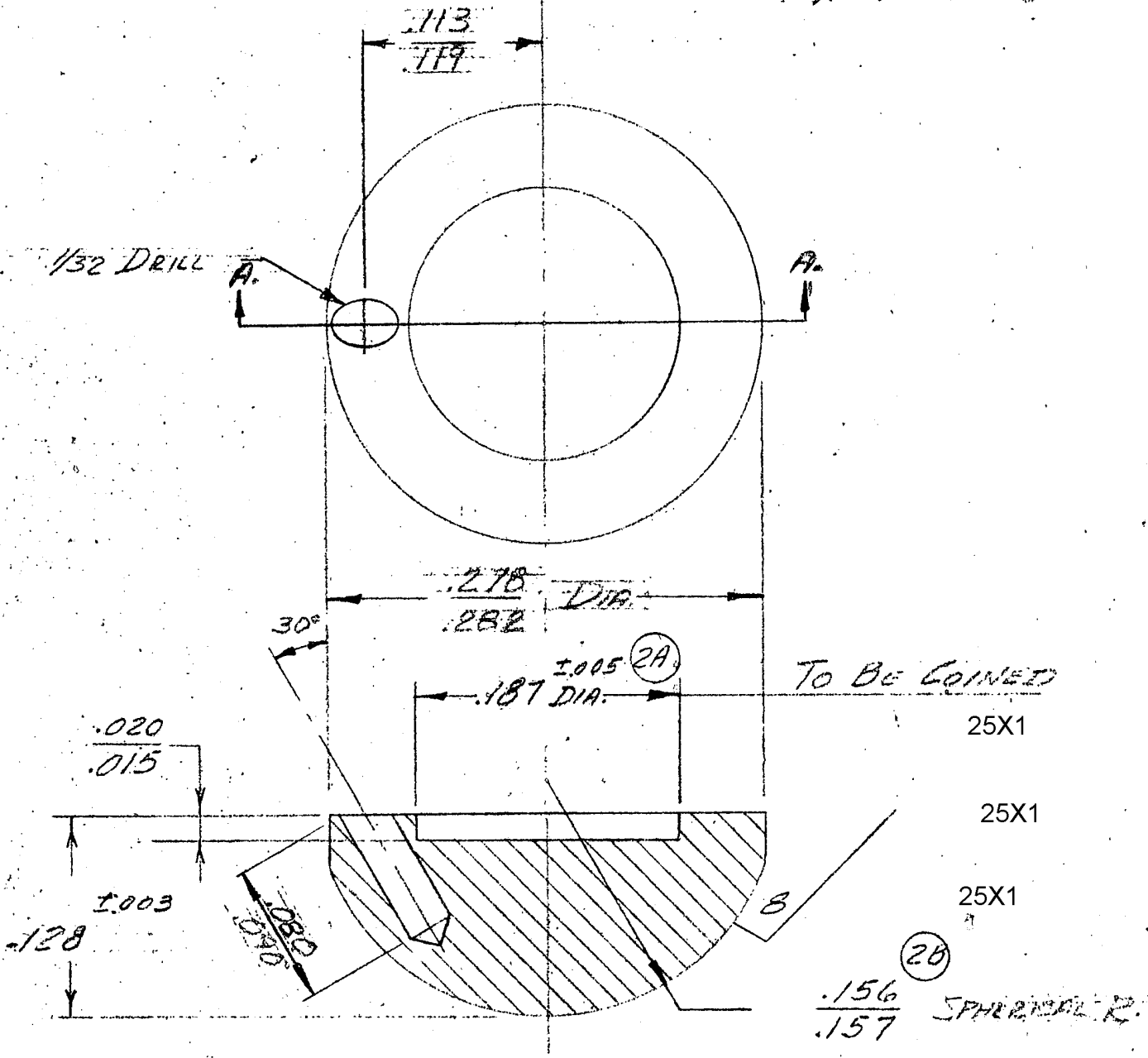
USED ON		ISSUE DATE AND CHANGE RECORD		REV.	CH.
EXCEPT AS NOTED, FINISH		1			
EXCEPT AS NOTED, TOLERANCES		2			
FRAC. DIM. ±		3			
WELD-GTNG DIM. ±		4			
DEC. DIM. ± .005		5			
ANGULAR DIM. ±		6			
DR.	SCALE	7			
CH.	APP.	8			
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		10			
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38  
76-38  
C





REFERENCE DRAWING:  
#A-7E-5A-3



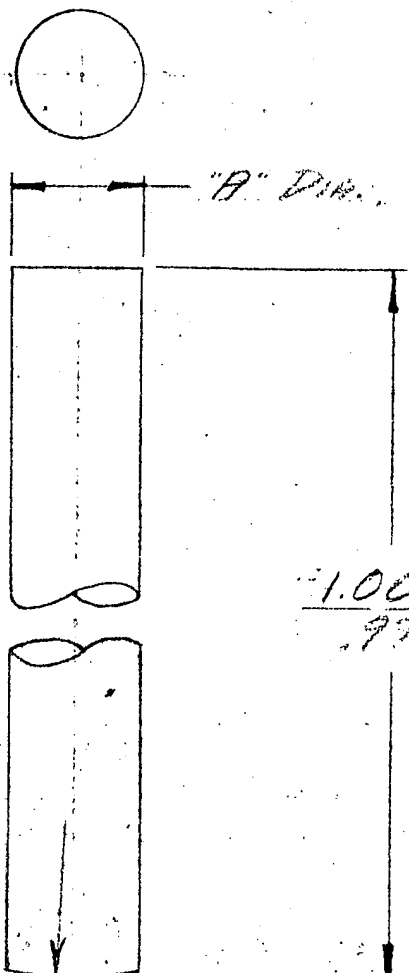
MATL - TELLURUM COPPER

PART NO. 3A-4

USED ON	
EXCEPT AS NOTED, FINISH	
EXCEPT AS NOTED, TOLERANCES	
FRAC. DIM. ±	WELD-CSTG DIM. ±
DEC. DIM. ±	ANGULAR DIM. ±
DR. M.S.	SCALE X10
CH.	APP.

3	ADDED DIMENSIONS (7-17-51)	A	
	WAS .129 (7-2-59)	B	
2	DIM. WERE .176 & .114 (7-2-59)	A	
1	6-22-57		
ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
DIVISION EMP		PROJ.	
TITLE			
ELEMENT CAP (FORGED)			
A		4	

25X1



25X1

25X1

$\frac{1.005}{.975}$  (2A) (4B)

<u>"A" DIA.</u>	
<u>P ELEMENT</u>	<u>N ELEMENT</u>
<u>.170</u>	<u>.133</u>
<u>.168</u>	<u>.136</u>

(3A)

(3B)

(2A)

(4A)

(5A) 3/8 RAD. ON  
HOT END ONLY  
FOR 3A-2

PART NO. 3A-1

5.	END WAS FLAT (9-24-59)	A	
	WAS $\frac{1.017}{1.007}$ (7-6-59)	B	
4.	END WAS CHAMFERED (7-6-59)	A	MS
	WAS $\frac{1.29}{.137}$ (6-30-59)	B	
3.	WAS $\frac{.171}{.167}$ (6-30-59)	A	MS
	WAS $\frac{1.005}{.975}$ (6-25-59)	B	
2.	END WAS FLAT (6-25-59)	A	MS
1.	5-25-59		

USED ON

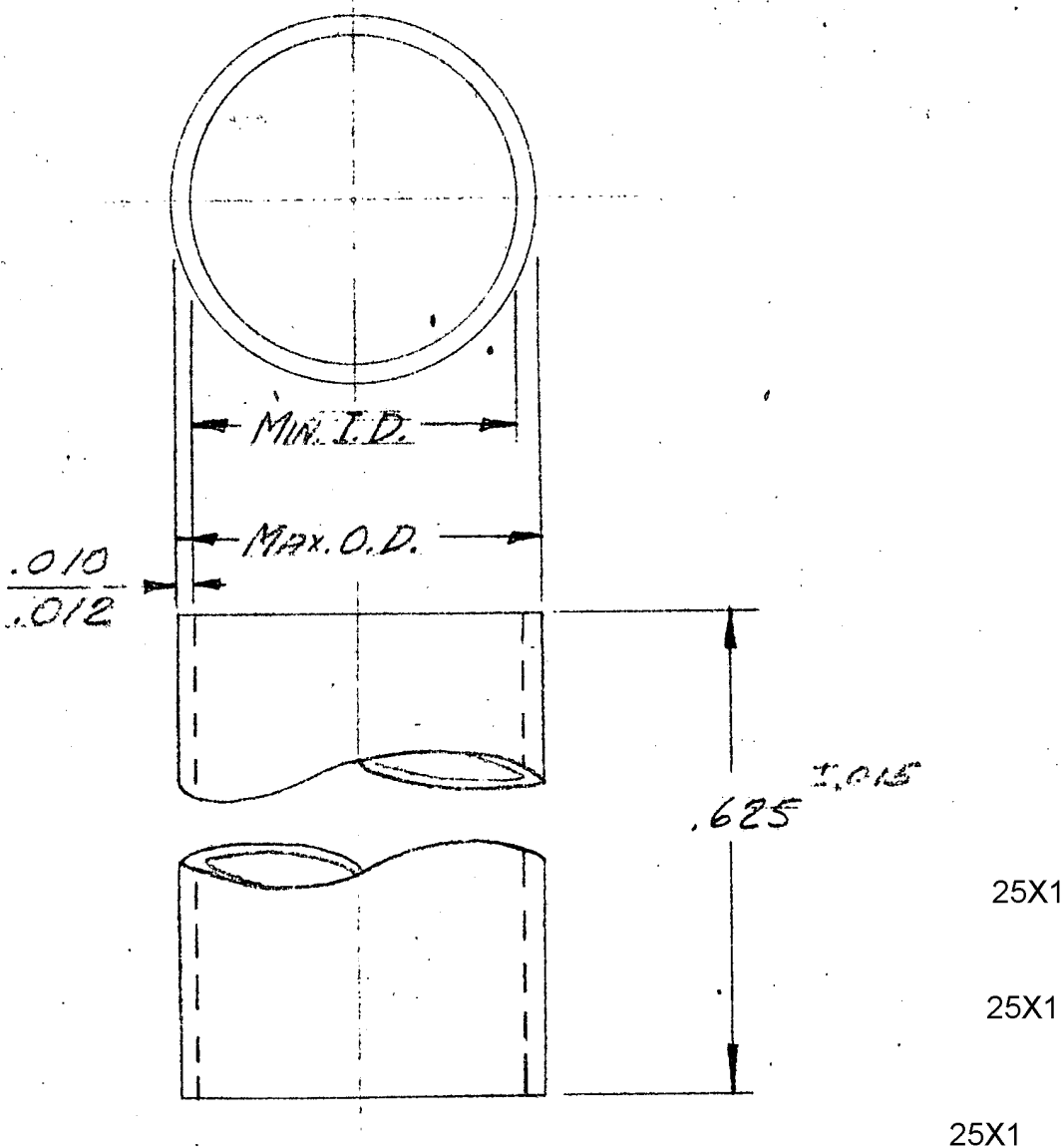
EXCEPT AS NOTED, FINISH

ISSUE ISSUE DATE AND CHANGE RECORD REV. CH.

EXCEPT AS NOTED, TOLERANCES	
FRAC. DIM. ±	WELD-CSTG DIM. ±
DEC. DIM. ±	ANGULAR DIM. ±
DR. M.S.	SCALE X 5
CH. J.H.B.	APP.

DIVISION	PROJ. 25X1
TITLE	
THERMO-ELECTRIC ELEMENT	
A-1	

<b>A</b>	72-34	1	25X1
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ELEMENT	MIN. I.D.	MAX. O.D.
"D"	.170	.194
"N"	.138	.162

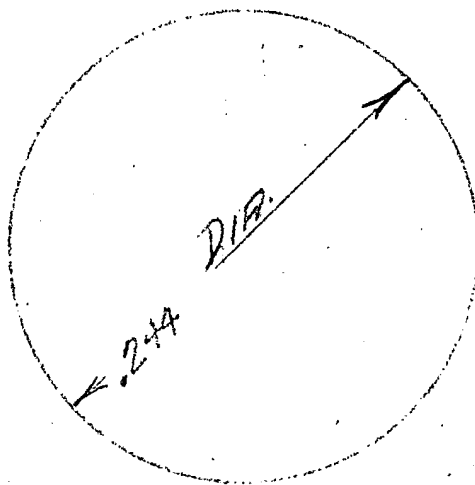
HEAT TREAT  
2 HRS. @ 250°F IN AIR

PART No. 3A-9

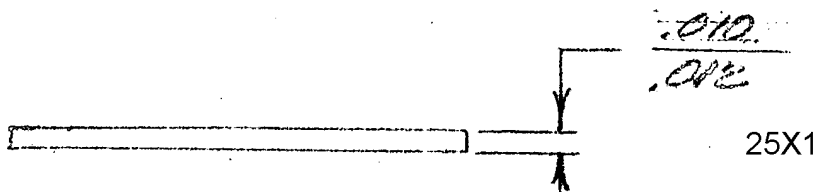
USED ON	1	6-30-57		
EXCEPT AS NOTED. FINISH	ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED. TOLERANCES FRAC. DIM. ± WELD-CSTG DIM. ± DEC. DIM. ± .005 ANGULAR DIM. ±	DIVISION	PROJ		
DR. M.S.	TITLE			
CH. J.H.B.	MICA SLEEVE			
SCALE x 10	A		TE-3A	7
APP.				

25X1





MATL: ISOMICA

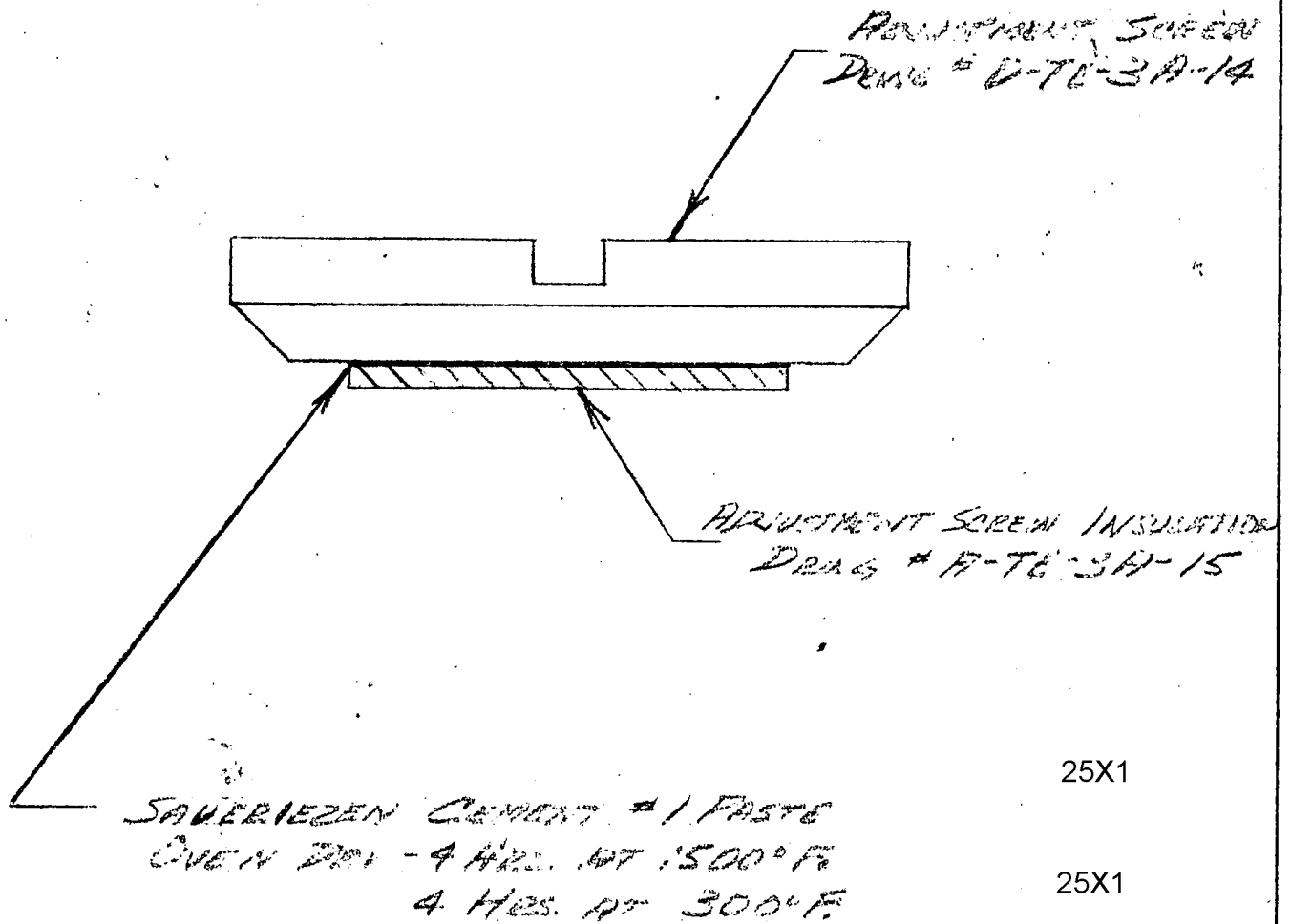


25X1

PART NO. 3A-15

USED ON		1		7-15-57		REV.	CH.
EXCEPT AS NOTED, FINISH		ISSUE		ISSUE DATE AND CHANGE RECORD		REV.	CH.
EXCEPT AS NOTED, TOLERANCES		DIVISION		PROJ.			
FRAC. DIM. ±		WELD-CSTG DIM. ±		TITLE			
DEC. DIM. ±		ANGULAR DIM. ±		ADJUSTMENT SCREEN			
DR. M.S.		SCALE X10		INSULATION			
CH. J.H.B.		APP.		A		TE-3A	
						75	

25X1

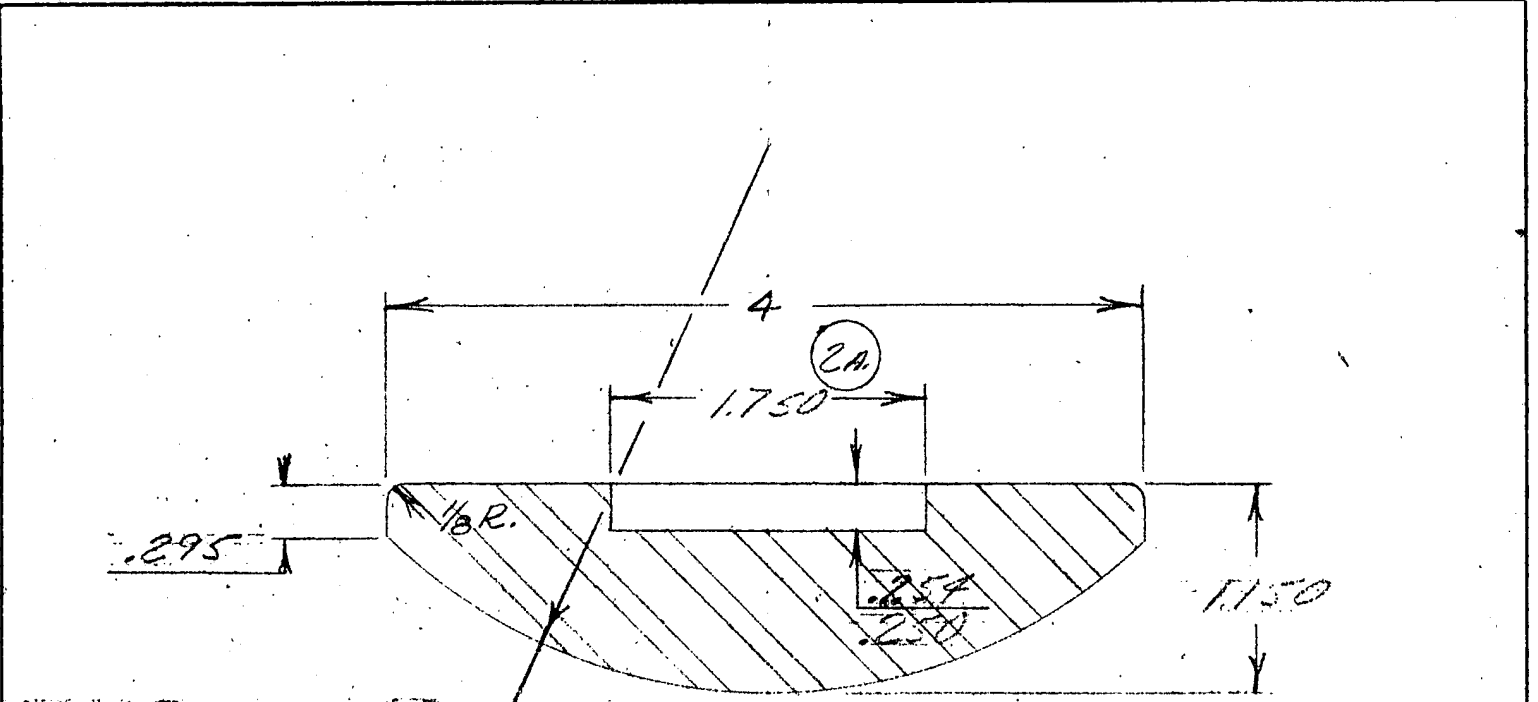


25X1

25X1

25X1

USED ON		1	7-15-59		
EXCEPT AS NOTED, FINISH		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES		DIVISION		PROJ.	
FRAC. DIM. ±	WELD-CSTG DIM. ±	E.M.P.			
DEC. DIM. ±	ANGULAR DIM. ±	TITLE			
DR. M.S.	SCALE X10	ADJUSTMENT SCREEN ASS'Y.			
CH. J.H.B.	APP.				
		<b>A</b>	76-3A-	16	25X1



2-75 SPHERICAL B.

BOTTOM BLOCK

25X1

25X1

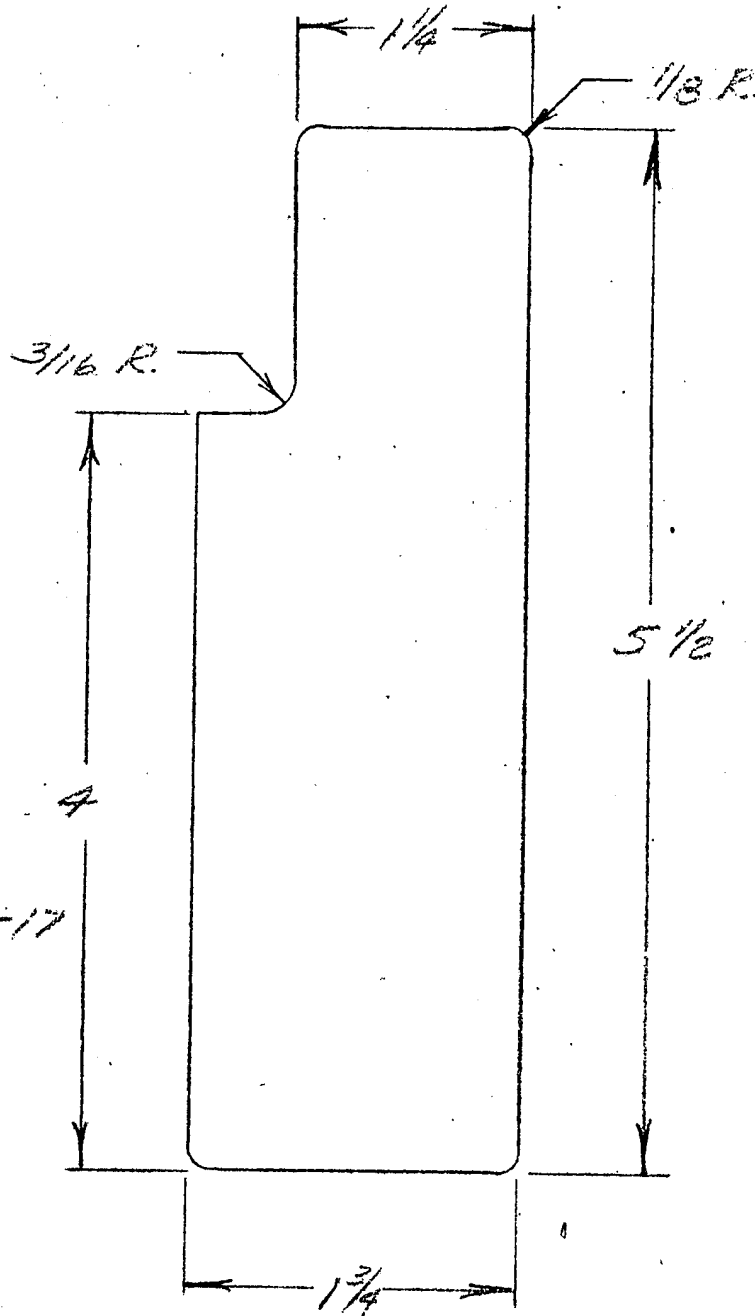
MATERIAL - 1/4" IN

25X1

DRAWING NO. 39-19

USED ON		2. Wgt: 1650 2-24-59		A.	
EXCEPT AS NOTED, FINISH		1 2-21-59			
EXCEPT AS NOTED, TOLERANCES		ISSUE		ISSUE DATE AND CHANGE RECORD	
FRAC. DIM. ±		DIVISION		PROJ.	
DEC. DIM. ±		TITLE		INSULATION BLOCK (Bottom)	
WELD-CSTG DIM. ±		DR. M.S.		SCALE	
ANGULAR DIM. ±		CH:		APP.	
		A		7-5-39 19	

25X1



PART NO. 3A-17

25X1

25X1

25X1

MATL. - .025 THICK COPPER

USED ON		1		7-16-59			
EXCEPT AS NOTED, FINISH				ISSUE		ISSUE DATE AND CHANGE RECORD	
EXCEPT AS NOTED, TOLERANCES				DIVISION		PROJ.	
FRAC. DIM. ±		WELD-CSTG DIM. ±		EMR			
DEC. DIM. ±		ANGULAR DIM. ±		TITLE			
DR. A.S.		SCALE FULL		FIN DETAIL			
CH. J.H.B.		APP.					
				A		TE-3A 17	

MANDATORY SPECIFICATIONS				SUGGESTED SPECIFICATIONS	
TO SUPPORT	2	LBS. 2	1/2 LBS. IN	WIRE SIZE	228
TO SUPPORT		LBS. 2	LBS.	OUTSIDE DIAMETER	298
TO WORK IN			INCHES	INSIDE DIAMETER	19.8 TYPE 302
TO WORK OVER			DIA. HOLE	FREE LENGTH	1752.010
RATE PER INCH	40	LBS.	DIA. SHAFT	TOTAL NUMBER OF COILS	4
DIRECTION OF COIL (R.H. OR L.H.)			MAX. SOLID HEIGHT		
			TYPE OF ENDS		
			MATERIAL	ANNEALED	
			HEAT TREAT TO ROCKWELL	SPRING TEMPER	

COMPRESSION SPRING

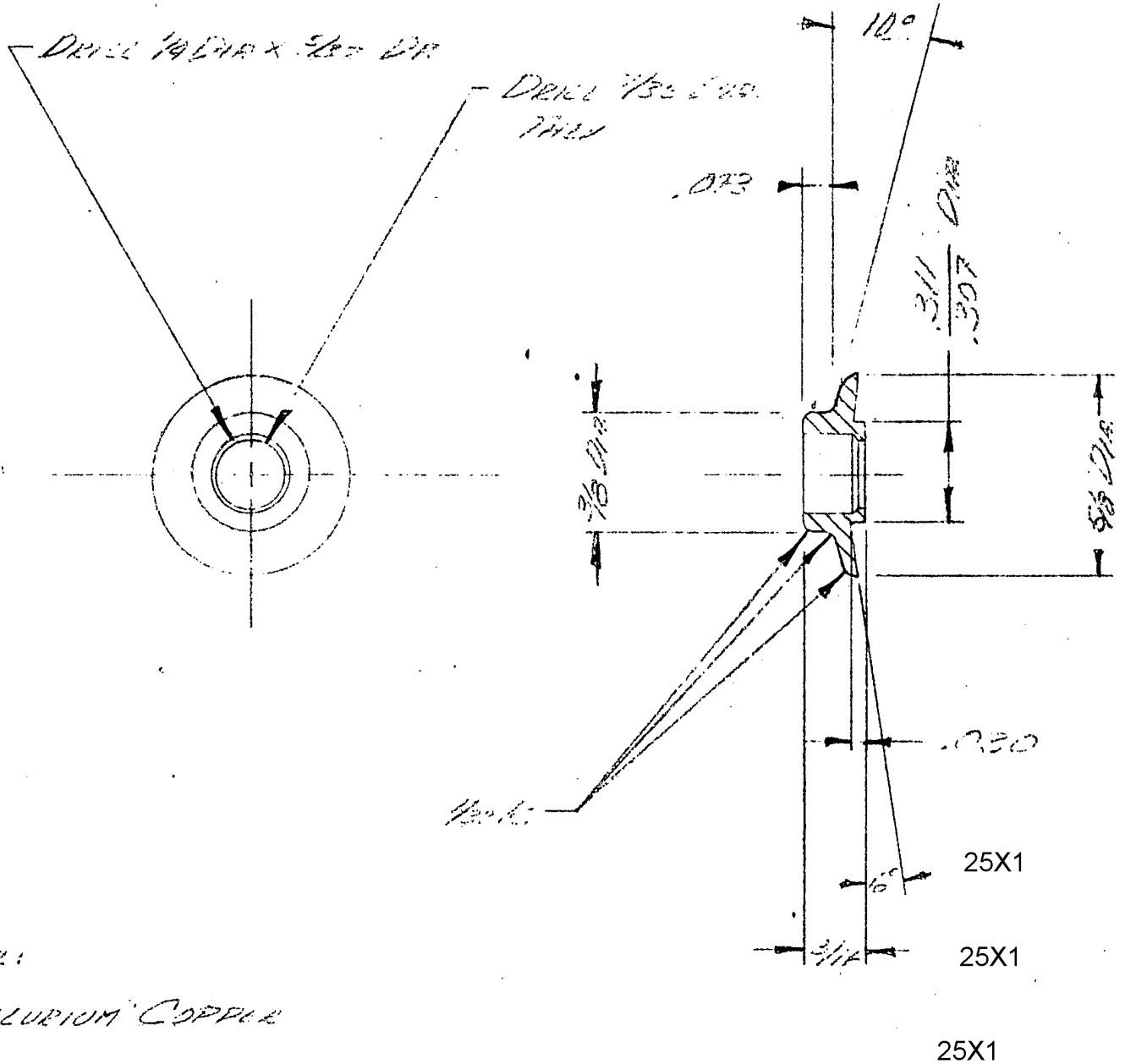
25X1

25X1

*Part No. 3A-12*

USED ON		1	7-15-59		
EXCEPT AS NOTED, FINISH		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES		DIVISION	EMM	PROJ.	
FRAC. DIM. ±		WELD-CSTG DIM. ±		TITLE	
DEC. DIM. ±		ANGULAR DIM. ±			
DR. M.S.		SCALE	1/8" = 1"		
CH. J.H.B.		APP.			
		<b>A</b>	7-15-59		

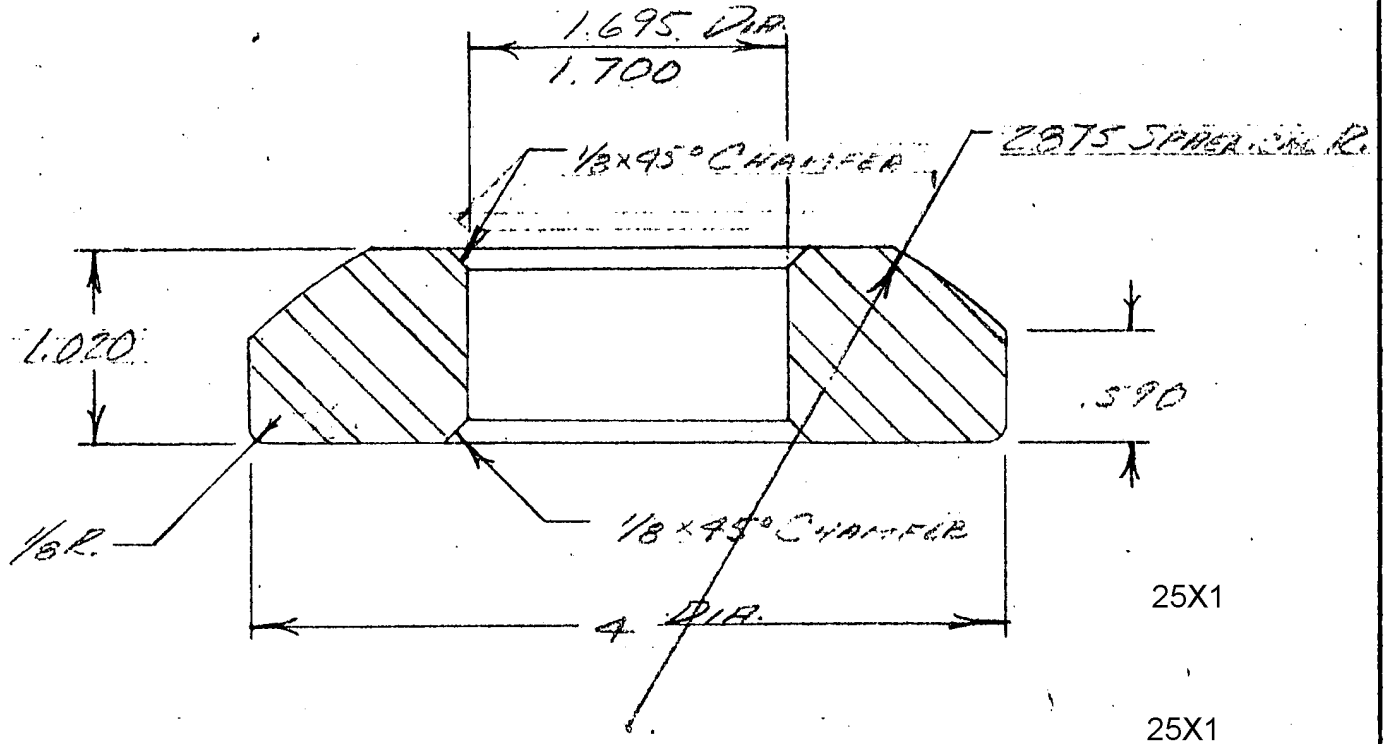
25X1



MATERIAL:  
 "TELLURIUM" COPPER  
 PART NO. 3A-48

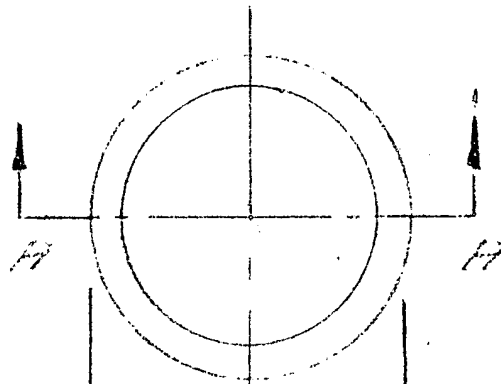
USED ON		1		1-5-50		REV.	CH.
EXCEPT AS NOTED, FINISH		ISSUE		ISSUE DATE AND CHANGE RECORD		REV.	CH.
EXCEPT AS NOTED, TOLERANCES		DIVISION		EIRP		PROJ	
FRAC. DIM. ±		TITLE		TELLURIUM COPPER			
DEC. DIM. ±		SCALE		X2			
DR. M.S.		APP.					
CH.		A		TE-3A		48	

25X1

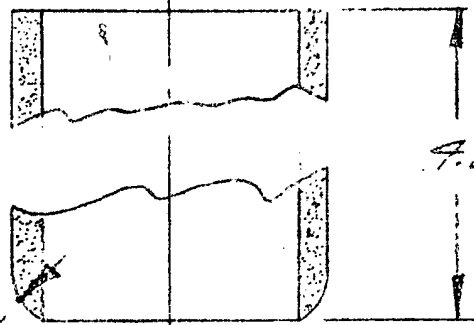
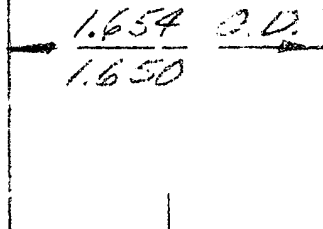


MATL - MIN. K. - HEAT TREATED PRIOR TO MACHINING  
 8 HRS. @ 1000 °F AND ALLOW TO  
 COOL SLOWLY TO ROOM TEMP. FOR 12 HRS.  
 PART NO. 3A-39

USED ON		1	9-11-59		
EXCEPT AS NOTED, FINISH		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES		DIVISION 6712		PROJ.	
FRAC. DIM. ±		TITLE			
WELD-CSTG DIM. ±		INSULATION BRACKET FOR			
DEC. DIM. ±					
ANGULAR DIM. ±					
DR. M.S.	SCALE 1/2" = 1"				
CH. J.H.B.	APP.				
		<b>A</b>	TE-3A	39	



Part No. 3A.50



25X1

SECTION A-A

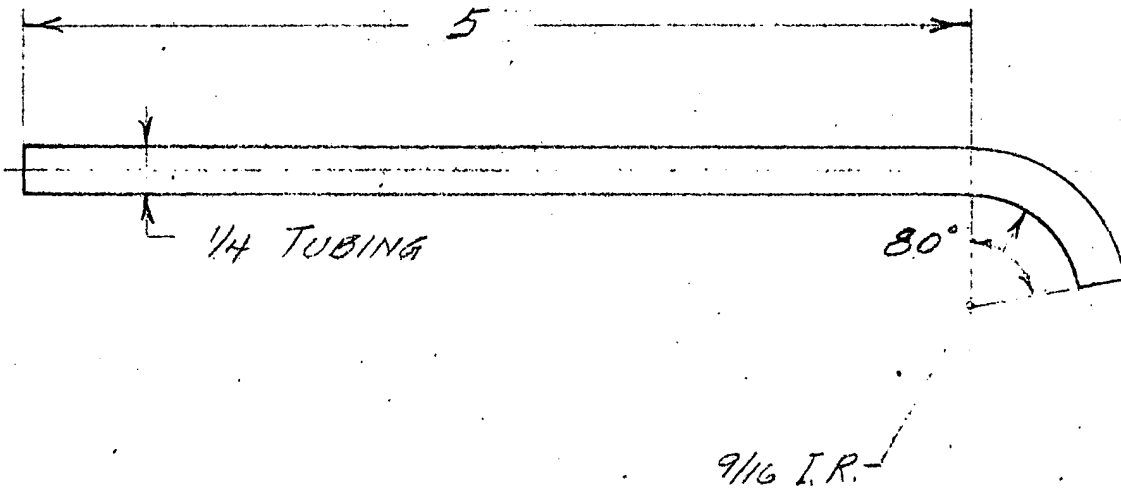
25X1

MATERIAL - NITRAL C-1000

USED ON		1	9-27-59		
EXCEPT AS NOTED, FINISH		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES FRAC. DIM. ± WELD-CSTG DIM. ±		DIVISION <i>EPH</i>		PROJ.	
DEC. DIM. ± .005 ANGULAR DIM. ±		TITLE <i>INSULATING SLEEVE 3A.2</i>			
DR. <i>J.S.</i>	SCALE <i>1:1</i>				
CH.	APP.				
		<b>A</b>	<i>TE-3A</i>	<i>50</i>	

25X1





MATERIAL:- 1/4" DIA. COPPER TUBING

25X1

25X1

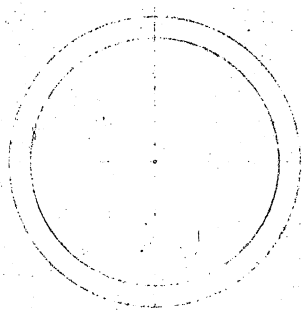
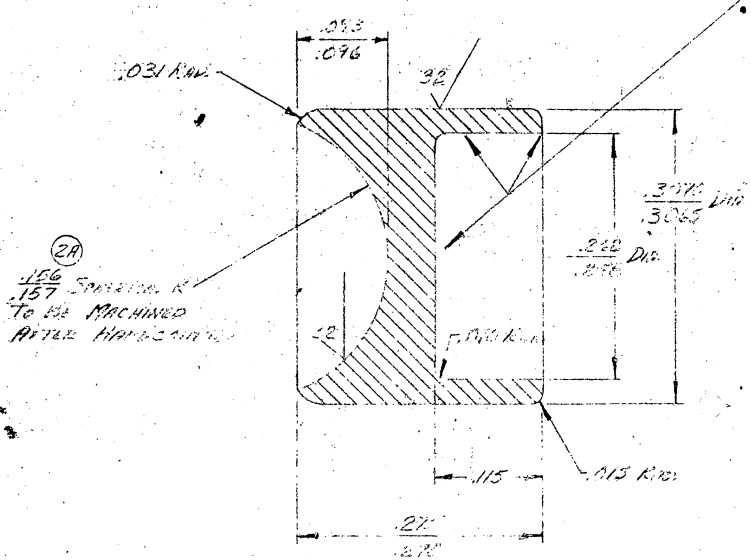
PART No. 1E-50

USED ON		1	9-1-59		
EXCEPT AS NOTED, FINISH		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES FRAC. DIM. ± 1/32 WELD-CSTG DIM. ± DEC. DIM. ± .005 ANGULAR DIM. ±		DIVISION E.M.P.		PROJ.	
DR. J. H. B	SCALE FULL	TITLE TOP & BOTTOM TUBULATION (1E-4 & 1E-5)			
CH.	APP.				
		A	TE - 1E	50	

25X1

Reference Drawing:  
#B-TE-3A-5

NOTE - RATCHING MARKS TO  
APPEAR ON INSIDE OF BORE

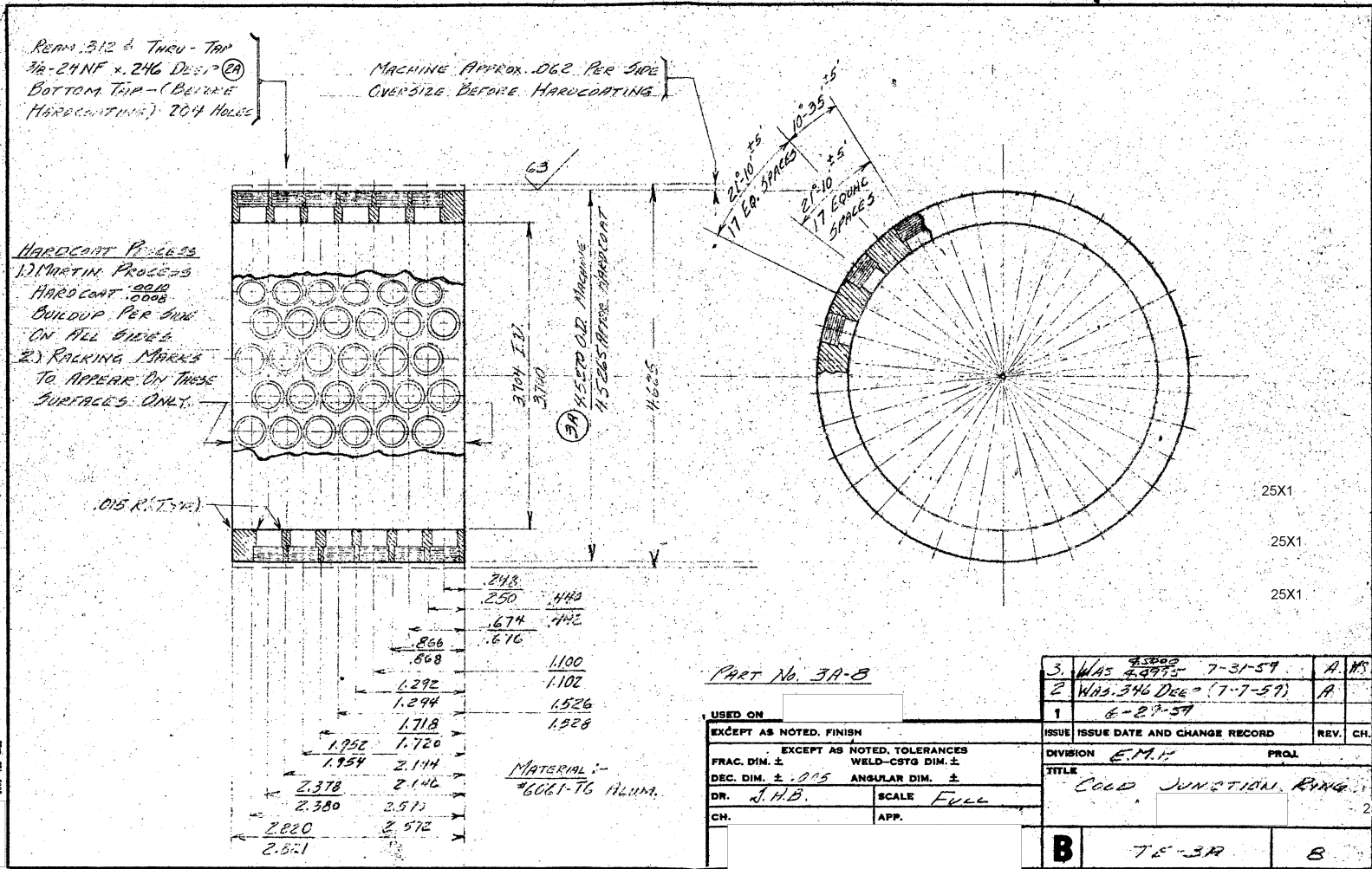


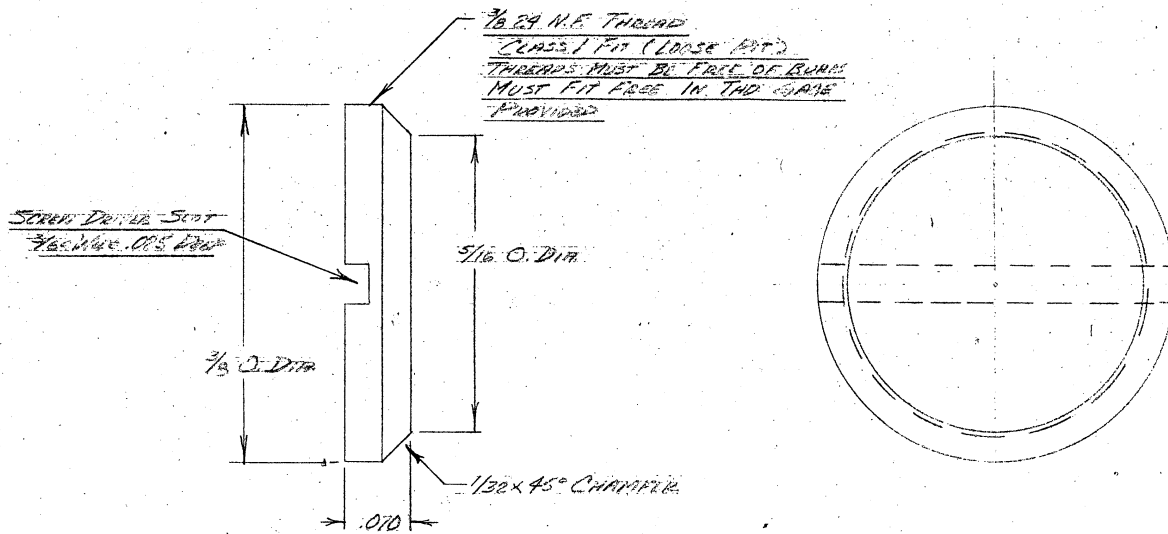
25X1  
25X1  
25X1

Part No. 3A-6

MATL: 6061-T6 ALUMINUM  
NOTE: BORE TO BE MACHINED (MACHINING REQUIRED)  
BONDING FOR JOE ON ALL SURFACES  
LET THE SPHERICAL END IS MACHINED

USED ON		ISSUE		ISSUE DATE AND CHANGE RECORD		REV.	CH.
EXCEPT AS NOTED, FINISH		2	SPHERICAL R. WID 152 (7-25T A)				
EXCEPT AS NOTED, TOLERANCES		1	6-23-59				
FRAC. DIM. ±		DIVISION		EM.P		PROL	
DEC. DIM. ±		TITLE		COP JUNCTION SOCKET (MACHIN)		25X1	
ANGULAR DIM. ±		DR.		M.E.		SCALE X10	
APP.		CH.		APP.			
		<b>B</b>		TE-3A		5	





25X1  
25X1

NOTE: 2024579 OR T6 ALUMINUM  
7/8 RED STOCK

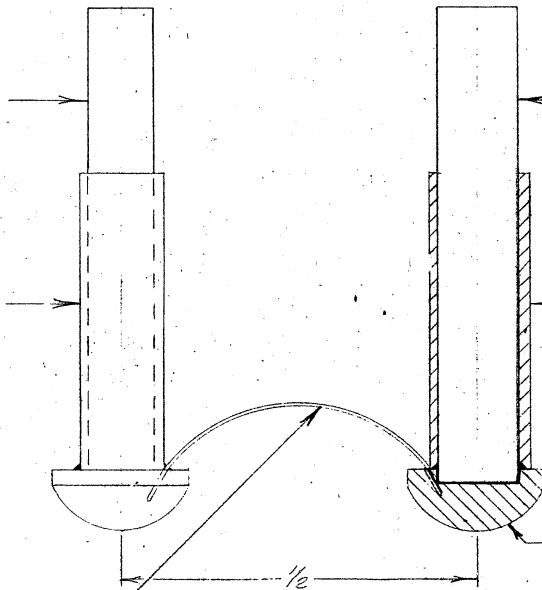
Part No. 2014

USED ON	1	7-15-53	
EXCEPT AS NOTED, FINISH	ISSUE	ISSUE DATE AND CHANGE RECORD	REV. CH.
EXCEPT AS NOTED, TOLERANCES FRAC. DIM. ± .015 WELD-CSTG DIM. ± DEC. DIM. ± .005 ANGULAR DIM. ±	DIVISION	ETAP	PROJ.
DR. M.S.	SCALE	10X	TITLE
CH. J.H.B.	APP.		UNCLASSIFIED DRAWING
	<b>B</b>	7-15-53	15

25X1

"N" ELEMENT  
 DRAW # A-TE-3A-1

1.00 INCH SLEEVE  
 DRAW # A-TE-3A-9



"D" ELEMENT  
 DRAW # A-TE-3A-1

1.00 INCH SLEEVE  
 DRAW # A-TE-3A-9

ELEMENT CAP (REMOVED)  
 DRAW # A-TE-3A-9

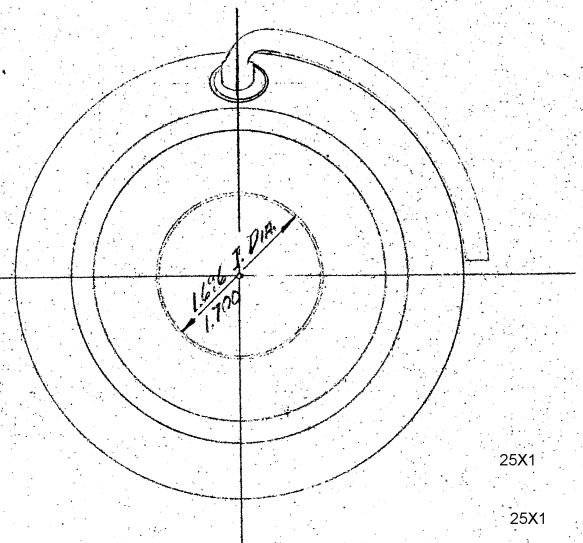
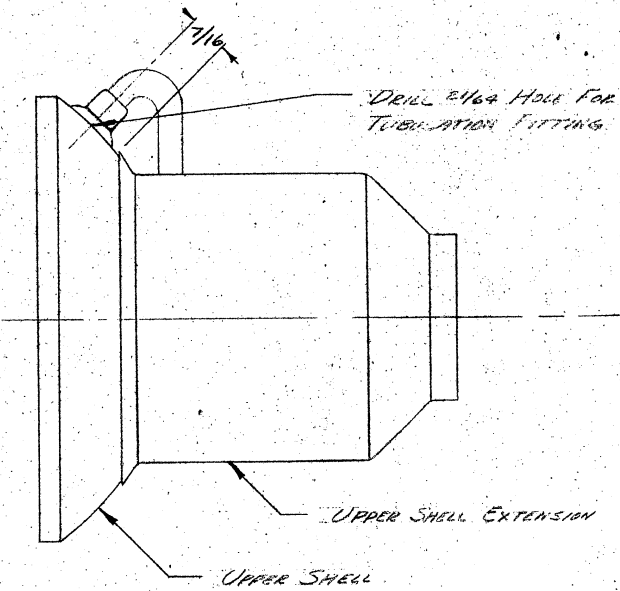
2A  
 #2264 SOLID TIN PLATE  
 COMES WITH 1/8 INCH  
 STAINLESS TO PREVENT  
 AND BRINE SOLUTIONS

25X1  
 25X1  
 25X1

USED ON		2. 11/24/59		7/16/59		A. 1.5	
EXCEPT AS NOTED, FINISH		1		7-16-59		REV. CH.	
EXCEPT AS NOTED, TOLERANCES		DIVISION		EMP		PROJ.	
FRAC. DIM. ±	WELD-CSTG DIM. ±	TITLE		THUNDERBOLT H-10			
DEC. DIM. ±	ANGULAR DIM. ±	SCALE		x 5			
DR. M.S.	APP.	CH.		B			
		7-16-59		13			

SILVER SOLDER TUBULATION & TUBULATION FITTING & UPPER SHELL EXTENSION. USING EPOXYIC 1501 OR EQUIVALENT. PART  $\frac{7}{8}$  INSIDE OF TUBULATION TO BE FREE OF FLOW RESIDUES AND OXIDE FILMS.

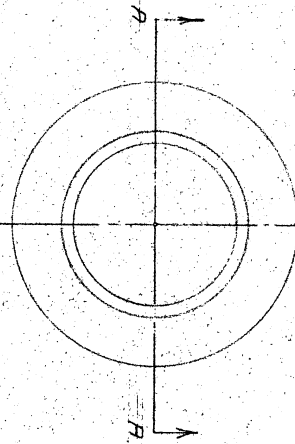
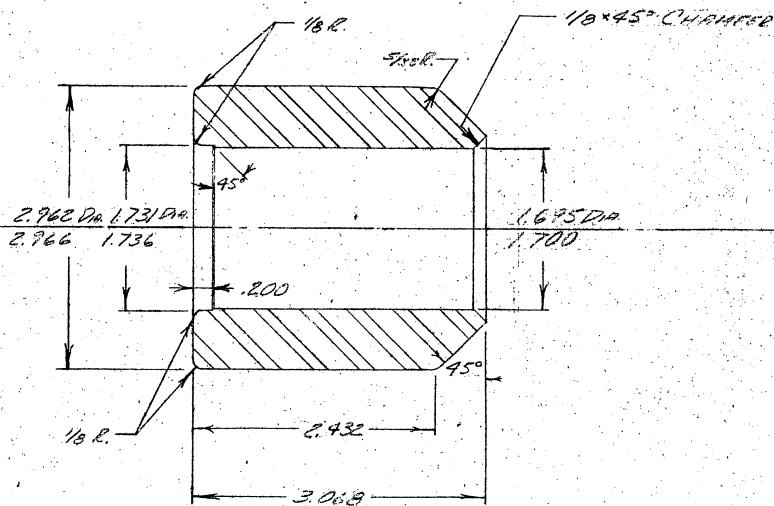
COMPLETED PART TO HAVE 11 MIN. OF 3D DIMENSIONS OF DIMENSION AS DETERMINED ON HEAVY MESH SUPERFINE DECISION



25X1  
25X1  
25X1

USED ON		1	9-23-59		
EXCEPT AS NOTED, FINISH			ISSUE		ISSUE DATE AND CHANGE RECORD
EXCEPT AS NOTED, TOLERANCES			DIVISION		PROJ.
FRAC. DIM. $\pm$	WELD-CSTG DIM. $\pm$		TITLE		
DEC. DIM. $\pm$	ANGULAR DIM. $\pm$		UPPER SHELL EXTENSION		
DR. <i>M.S.</i>	SCALE <i>Free</i>				
CH.	APP.				
			<b>B</b>		

25X1

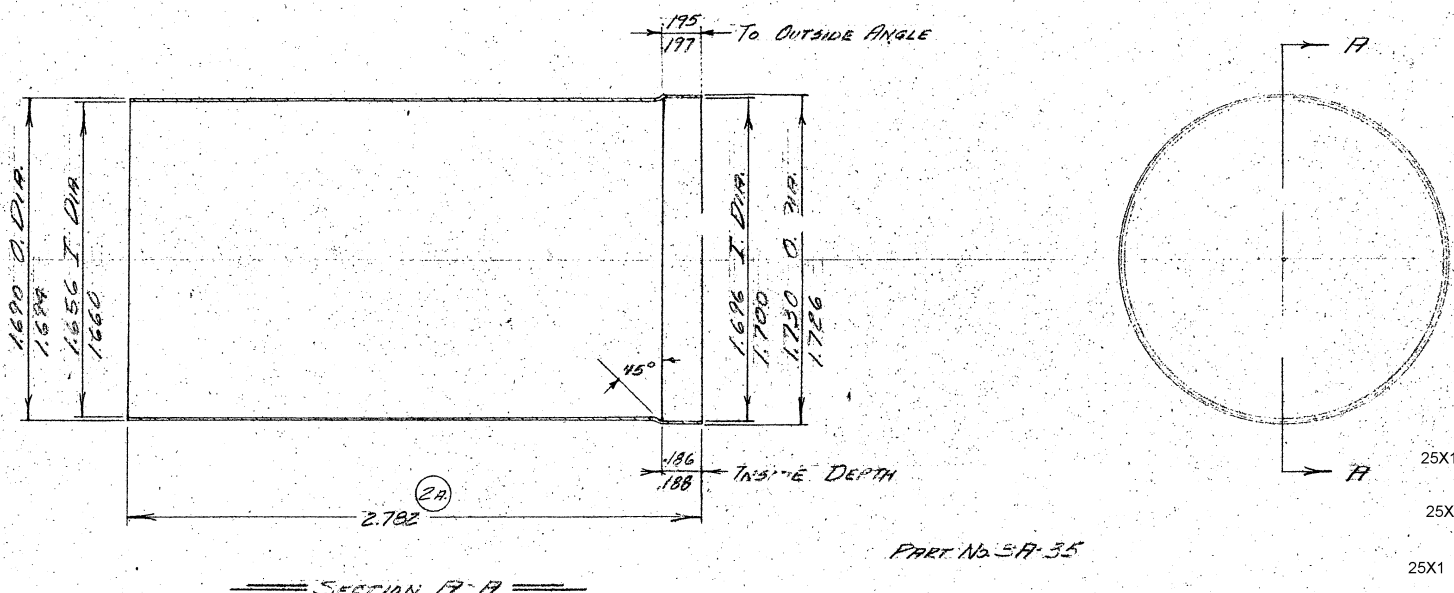


25X1  
25X1  
25X1

PART No. 34-40

MAT'L - MIN K - HEAT TREATED & HRS. @ 1000°F.  
 COOL SLOWLY FOR 12 HRS. TO RM. TEMP.  
 PRIOR TO MACHINING

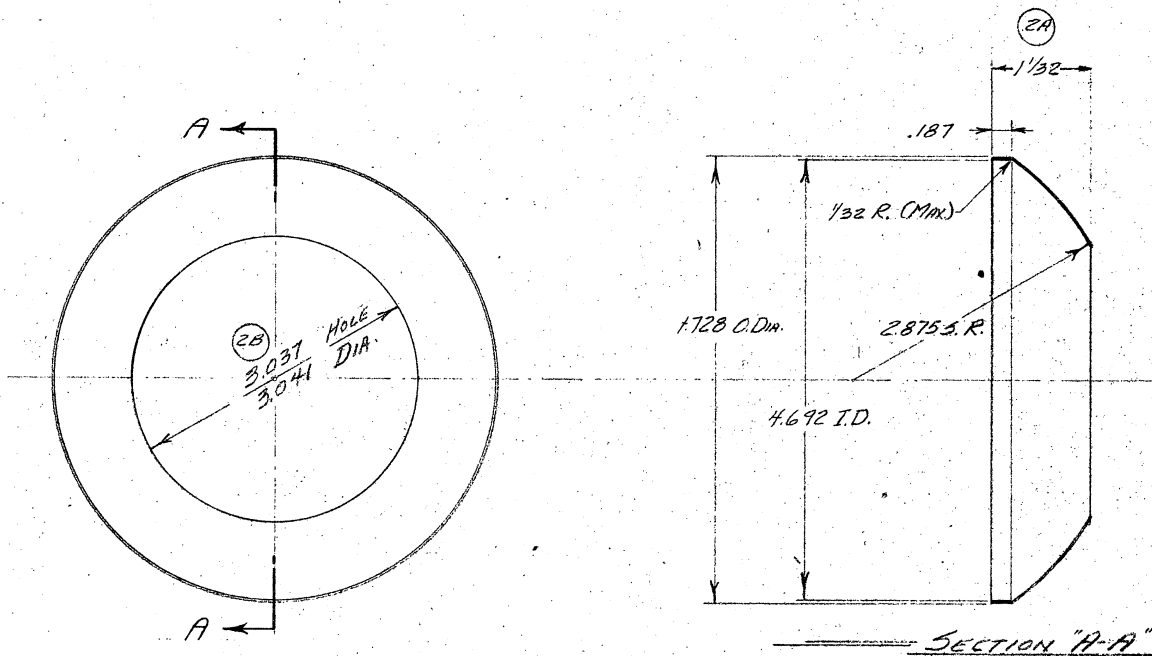
USED ON		1	9-11-59		
EXCEPT AS NOTED, FINISH		ISSUE		ISSUE DATE AND CHANGE RECORD	
EXCEPT AS NOTED, TOLERANCES		DIVISION		PROJ.	
FRAC. DIM. ± 1/32		E.M.P.			
WELD-CSTG DIM. ±		TITLE			
DEC. DIM. ± .005		CHANGES			
ANGULAR DIM. ±		APP.			
DR. M.S.		SCALE Full			
CH. J.H.B.		APP.			
		<b>B</b>		40	



MAT'L. ~ #307 STAINLESS STEEL

USED ON		2. Was 3.500 7/12-59	A. 11.5
EXCEPT AS NOTED, FINISH	1	9-10-59	REV. CH.
FRAC. DIM. ± 1/64	EXCEPT AS NOTED, TOLERANCES WELD-CSTG DIM. ±		DIVISION EMP PROJ.
DEC. DIM. ± .005	ANGULAR DIM. ±		TITLE
DR. M.S.	SCALE 2/3	COMBUSTION CHAMBER EXTENSION	
CH. J.H.B.	APP.	25X1	
		B	TE-3A 35



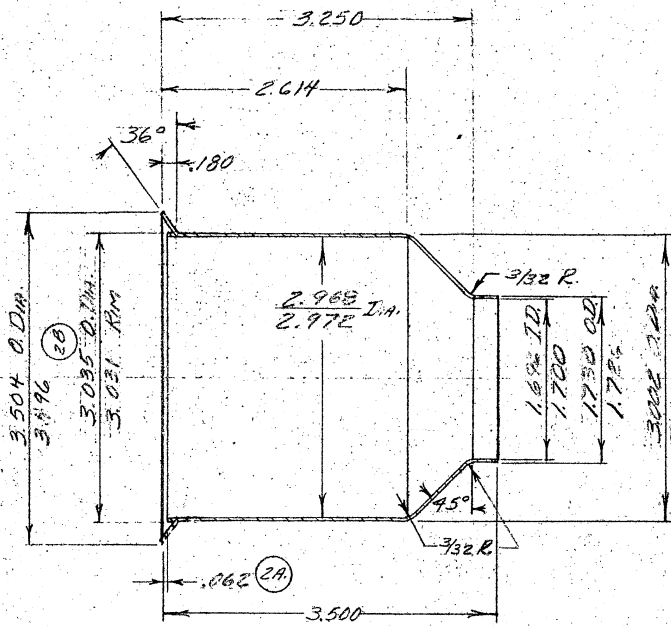


25X1  
25X1  
25X1

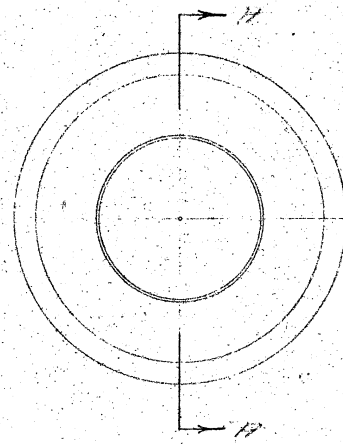
NOTE: - REVISION OF PART #3A-12

PART #3A-36

USED ON		ISSUE	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, FINISH		1	9-10-59		
EXCEPT AS NOTED, TOLERANCES		DIVISION E.M.P.		PROJ.	
FRAC. DIM. $\pm$ $\frac{1}{64}$	WELD-CSTG DIM. $\pm$	TITLE			
DEC. DIM. $\pm$ .005	ANGULAR DIM. $\pm$	REVISION TO			
DR. J.H.B.	SCALE Full	TOP HOUSING SHELL			
CH.	APP.	25X1			
		<b>B</b>	TE-3A	36	



SECTION A-A



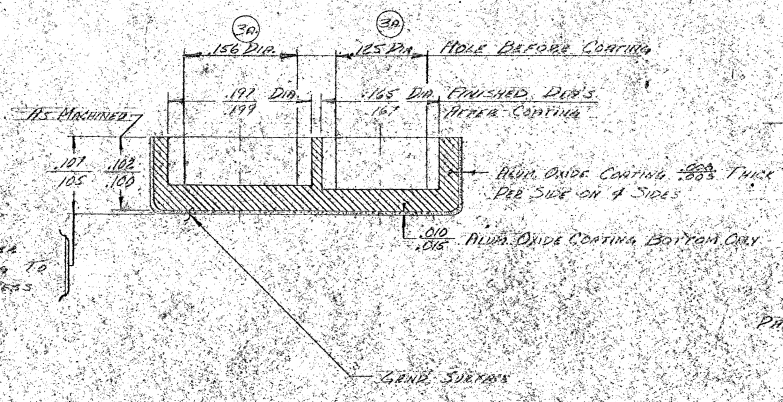
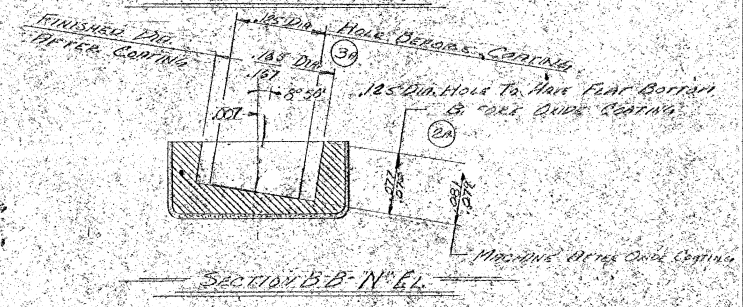
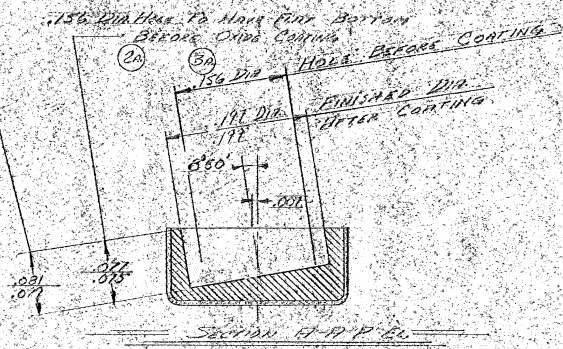
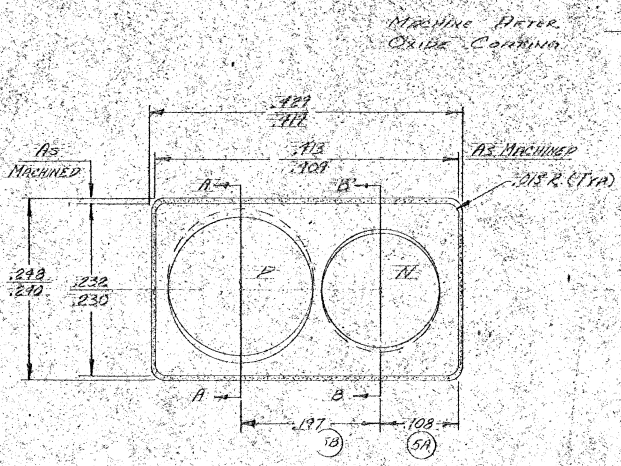
25X1  
25X1  
25X1

Part No. 37-37

MATERIAL: 304 STAINLESS STEEL

USED ON		1		ADDED DETAIL (7-23-59) B	
EXCEPT AS NOTED, FINISH		2		ADDED DETAIL (7-23-59) A	
EXCEPT AS NOTED, TOLERANCES		1		9-10-59	
FRAC. DIM. ± 1/32 WELD-CSTG DIM. ±		ISSUE		ISSUE DATE AND CHANGE RECORD	
DEC. DIM. ± .005 ANGULAR DIM. ±		DIVISION		E.M.P.	
DR. M.S.		SCALE		FULL	
CH. J.H.B.		APP.		TITLE	
				COVER EXTENSION	
		B		70-3A	
				37	

25X1



(20)  
Machine After Oxide Coating to .001 Thickness

MATERIAL - C. S. STEEL A. I. S. I. 1020  
MACHINE - ALL MILL SCALE REMOVED  
GRIND SURFACE

PART NO. 3A-7

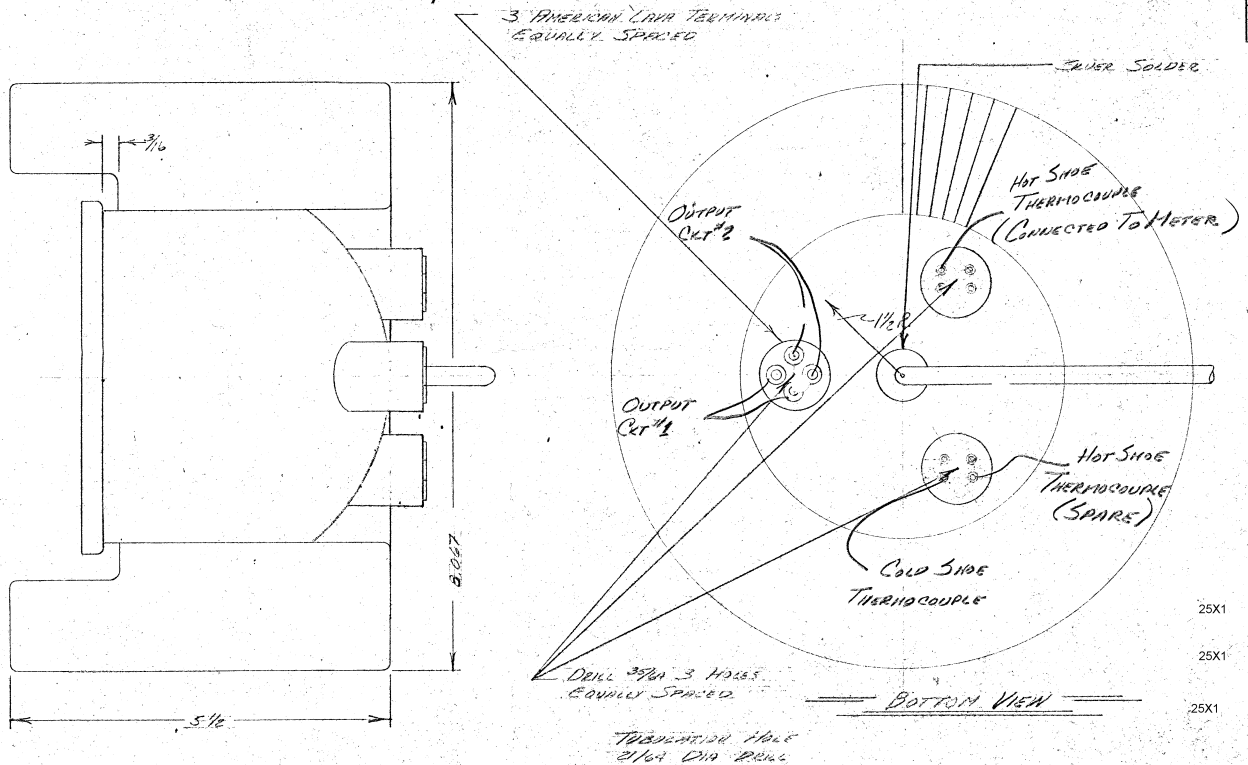
USED ON		ISSUE	DATE	AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, FINISH:		1				
EXCEPT AS NOTED, TOLERANCES:		8-26-52				
FRACTIONAL DIM. ±		DIVISION 67112				
DEC. DIM. ±		PROJ.				
ANGULAR DIM. ±		TITLE				
SCALE x10		PAPER NO. 109-3400				
APP.		C				
APP.		7				

REV.	CH.	DATE	DESCRIPTION
1		8-26-52	
2		8-26-52	
3		8-26-52	
4		8-26-52	
5		8-26-52	

SILVER SOLDER TERMINALS, TUBULATION & TUBULATION FITTING USING CONECTOR 1801 IS EQUIVALENT PART AND INSIDE OF TUBULATION TO BE FREE OF FLUX RESIDUES AND OXIDE FILMS.

COMPLETED PART TO HAVE A MAX. OF 30 DIVISIONS OF DEFLECTION AS DETERMINED ON HELIUM MASS SPECTROMETER DETECTOR.

SOFT SOLDER TERMINAL CHARGES TO COVER SHELL.

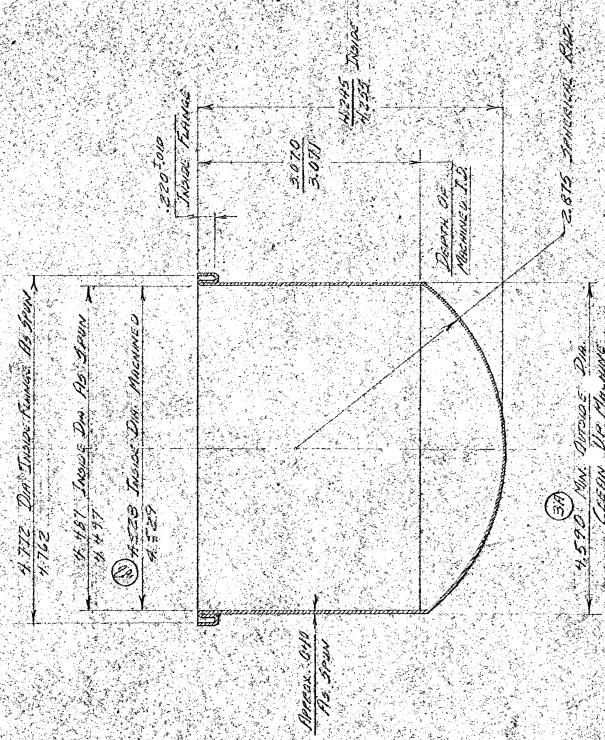
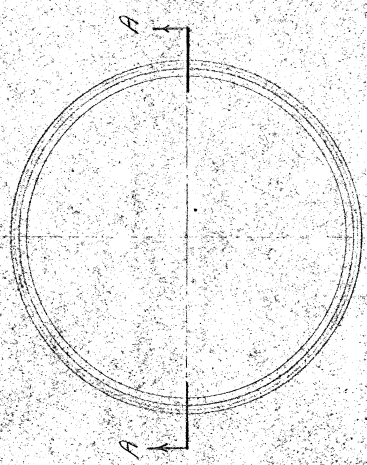


NOTE:  
80 PMS EQUALLY SPACED  
USE HELIUM 560°F WALT SOLDER  
USE 3 AMERICAN LEAD TERMINALS

NOTE:  
USE 1 ALLOY OUTPUT TERMINAL  
DISK BORE # 10-15-39-27  
USE 2 ALLOY THERMOCOUPLE TERMINALS  
DISK BORE # 10-15-39-23

USED ON	1	8-25-59	
EXCEPT AS NOTED, FINISH	ISSUE DATE AND CHANGE RECORD		REV. CH.
EXCEPT AS NOTED, TOLERANCES	DIVISION <b>ENR</b>		PROJ.
FRAC. DIM. ±	WELD-CSTS DIM. ±	TITLE	
DEC. DIM. ±	ANGULAR DIM. ±	COMMON SHELL SUB ASSEMBLY	
	SCALE <i>Free</i>	3 R 2	
CH.	APP.	C TR 3A 87	

11  
TE-3A  
C



SECTION "A-A"

MATERIAL - C. R. ANNEALED COMMERCIAL COPPER  
SANDING OR DRUMMING QUALITY No. 14 GR. (B, & S) (0.644)

FINISH - OUTSIDE - ROUGH POLISH - #30-60 GRIT PAPER  
INSIDE - 114 SPUN

PART No. 31A-11

EXCEPT AS NOTED, FINISH	ISSUE DATE AND CHANGE RECORD	REV.	CH.
EXCEPT AS NOTED, TOLERANCES			
FRAC. DIM. ±	WELD-CSTG DIM. ±		
DEC. DIM. ±	ANGULAR DIM. ±		
DR. 1/16	SCALE 1/2" = 1"		
CH.	APP.		

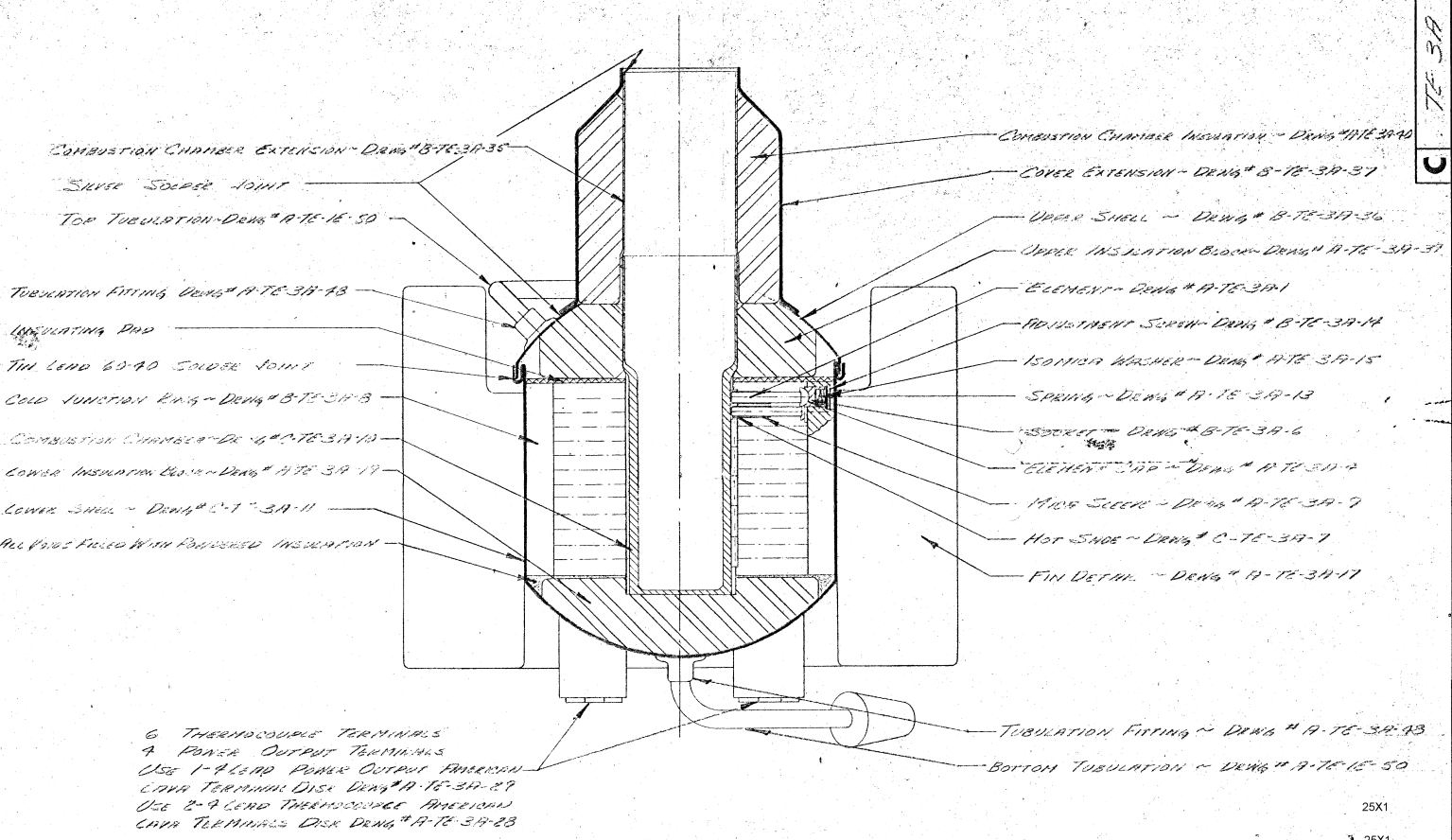
3	1/11/54	1823-57	A	20
2	1/11/54	7-7-54	A	10
1	7-1-51			
DIVISION: EMP		PROJ.		
TITLE: LOWER HOUSING 31216				
C	TE-3A	11		

25X1

25X1

25X1

TE-3A 30



6 THERMOCOUPLE TERMINALS  
 4 POWER OUTPUT TERMINALS  
 Use 1-4 LEAD POWER OUTPUT AMERICAN  
 CANN TERMINAL DISK - Draw # A-TE-3A-29  
 Use 2-2 LEAD THERMOCOUPLE AMERICAN  
 CANN TERMINAL DISK - Draw # A-TE-3A-28

GENERAL ASSEMBLY

25X1  
 25X1

USED ON	1	2-24-59	
EXCEPT AS NOTED, FINISH	ISSUE	ISSUE DATE AND CHANGE RECORD	REV. CH.
FRAC. DIM. ±	EXCEPT AS NOTED, TOLERANCES		
DEC. DIM. ±	WELD-CSTG DIM. ±	DIVISION	PROJ.
DR. M.S.	SCALE Full	TITLE	
CH.	APP.	GENERAL ASSEMBLY 3A-2	
		C	TE-3A 30