OAK RIDGE NATIONAL LABORATORY

operated by

UNION CARBIDE CORPORATION

for the

U.S. ATOMIC ENERGY COMMISSION

UNION CARBIDE

ORNL - TM-37

COPY NO. - 45

DATE - October 6, 1961

MODIFICATION OF ALLIED ENGINEERING CORPORATION MANIPULATOR TONG

F. L. Peishel

E. L. Hutto

ABSTRACT

A manipulator tong manufactured by the Allied Engineering and Production Corporation of Alameda, California was modified to include an alpha seal at the slave end.

This arrangment is used in conjunction with Castle manipulators in a lead-shielded glove box to obtain protection from both gamma and alpha radiation.

A manipulator tong, Model 3650, manufactured by Allied Engineering and Production Corporation of Alameda, California, was supplied as a component of an alpha-gamma shielded glove box.

The existing O-ring seal shown on "Assembly Type B" of Drawing D-47110 is replaced by a rubber bellows and O-ring combination as shown on this same drawing. This new sealing arrangement will not transfer activity along the axis of the tube.

The internal motions of the manipulator are a reciprocating and a rotating movement of the central shaft and cable. The bellows was installed to prevent transfer of activity to the housing tube by the reciprocating motion. The O-ring, subject to rotation only, seals the contaminated end from the uncontaminated tube interior.

The bellows portion of the seal is made from a section of corrugated breathing tube, Mine Safety Appliance Company part number CS-10650. The remainder of the parts are as listed on Drawing D-47110 and detailed on Drawing D-44974.

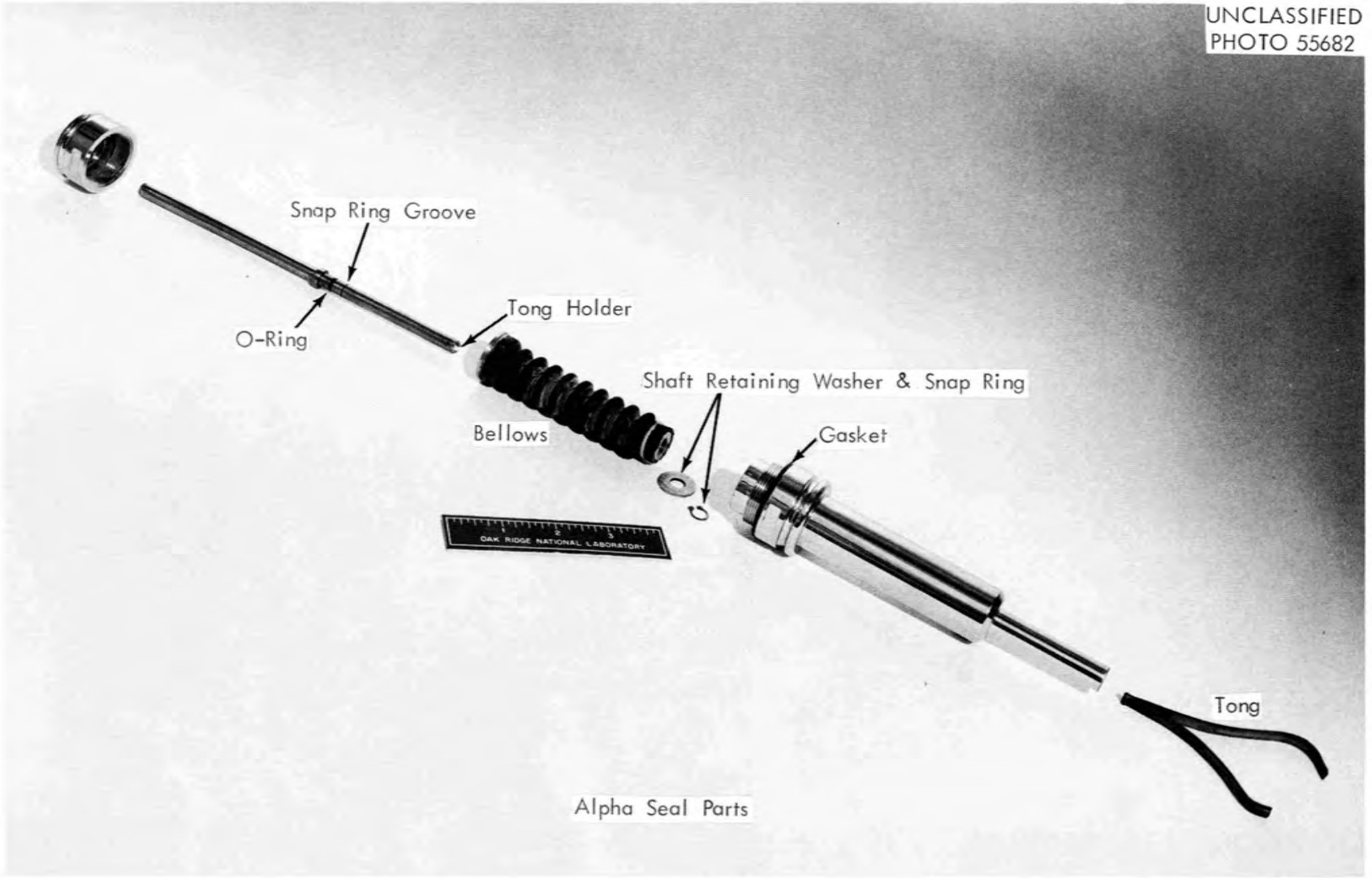
A test conducted on this unit by applying 5 psig of air pressure to the slave end of the tube produced no detectable leakage with the outlet end of the tube submerged in 1/2-in. of water. The unit is normally operated at 0.35 in. of water with a possible surge to 3 in. of water.

The detailed design of this unit was performed by E. L. Hutto of the Engineering and Mechanical Division of Oak Ridge National Laboratory, with assistance from Chemical Technology Division personnel.

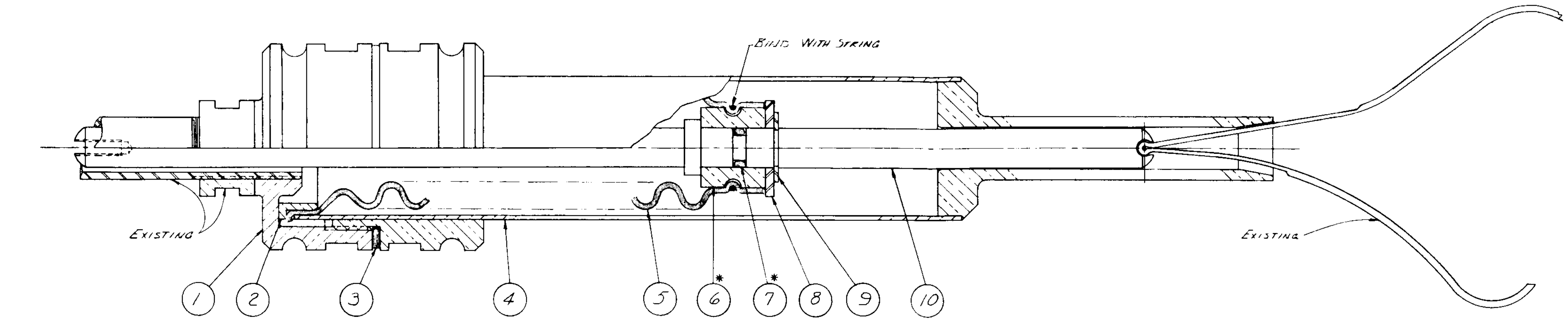
Frank L. Peishel

F. L. Peishel
Process Design Section
Chemical Technology Division

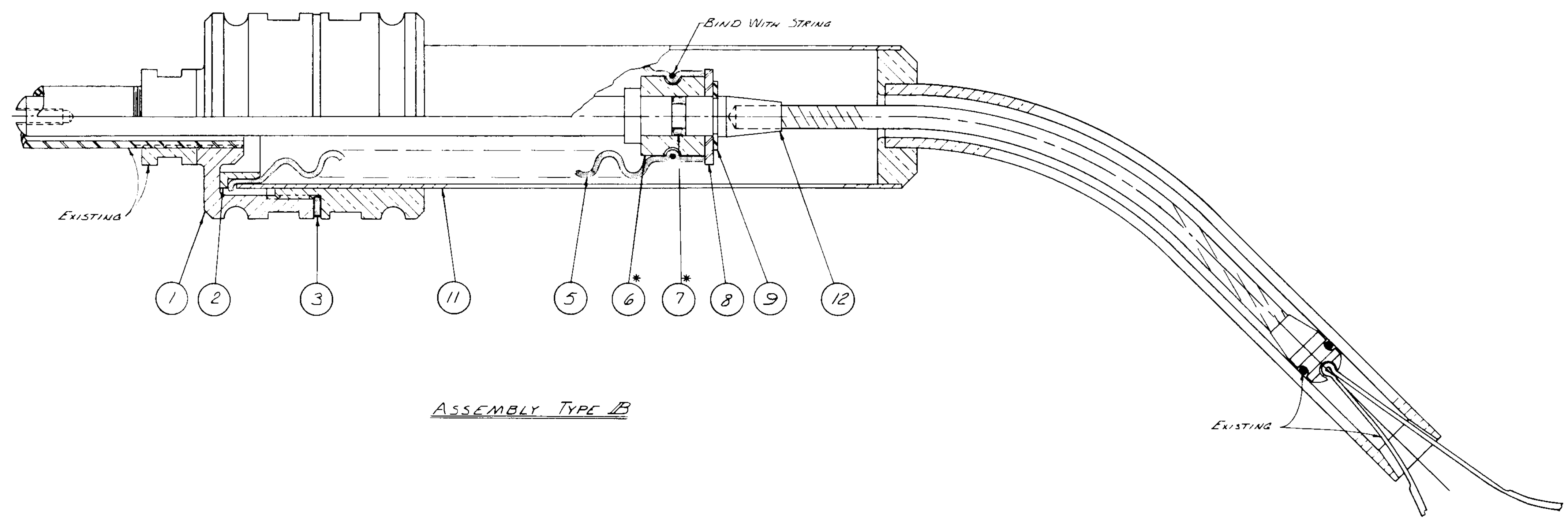
FLP:ELH/nr



Alpha Seal Parts



ASSEMBLY TYPE A



ASSEMBLY TYPE B

PARTS LIST

PART NO.	DWG. NO.	NO. REQD	DESCRIPTION (NAME, SIZE, ETC.)	MATERIAL
			TYPE A	
1	D-44974	1	NUT	BRASS
2	D-44974	1	BAND	BRASS
3	STOCK	1	GASKET 1 5/8 OD x 1 1/4 ID x 1/16 THK	NEOPRENE
4	D-44974	1	HOUSING	BRASS
5	D-44974	1	BOOT	NEOPRENE
6	D-44974	1	RING	BRASS
7	STOCK	1	O RING PARKER No. 5427-3	NEOPRENE
8	D-44974	1	WASHER	STL
9	STOCK	1	RETAINING RING TRUARC No. 5100-31	STL
10	D-44974	1	SHAFT	STL
			TYPE B	
1	D-44974	1	NUT	BRASS
2	D-44974	1	BAND	BRASS
3	STOCK	1	GASKET 1 5/8 OD x 1 1/4 ID x 1/16 THK	NEOPRENE
5	D-44974	1	BOOT	NEOPRENE
6	D-44974	1	RING	BRASS
7	STOCK	1	O RING PARKER No. 5427-3	NEOPRENE
8	D-44974	1	WASHER	STL
9	STOCK	1	RETAINING RING TRUARC No. 5100-31	STL
11	D-44974	1	HOUSING	BRASS
12	D-44974	1	SHAFT	STL

* NOTE
LUBRICATE PART No. 7 AND I.D. OF PART No. 6 WITH PETROLEUM JELLY AT ASSEMBLY

REFERENCE DRAWINGS	DWG. NO.
TYPE A AND TYPE B DETAILS	D-44974

MANIPULATOR ALPHA SEAL P&U PROGRAM — BLDG. NO. 3508

SEALED MANIPULATOR TONG
ASSEMBLY TYPE A AND TYPE B

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE NUCLEAR COMPANY
DIVISION OF UNION CARBIDE CORPORATION
OAK RIDGE, TENNESSEE

SUBMITTED: K. E. Jameson | ACCEPTED: V. A. Vaughan, F. S. Paul | APPROVED: [signature]
RCO: C. E. Guthrie | J.D.F. 10-23-61 | D- 47110 | REV

GENERAL SPECIFICATIONS:
1. Break all sharp edges 1/64 max., unless otherwise specified.
2. The fabricator may choose the type, grade or finish of material unless otherwise specified.

MACHINE FINISH SPECIFICATIONS:
1. Finish symbols are in accordance with ASA Standard B46.1-1955.
2. Roughness height values are the maximum arithmetical average deviation from the mean surface, expressed in microinches.
3. For surfaces not otherwise indicated, roughness height shall not exceed √.

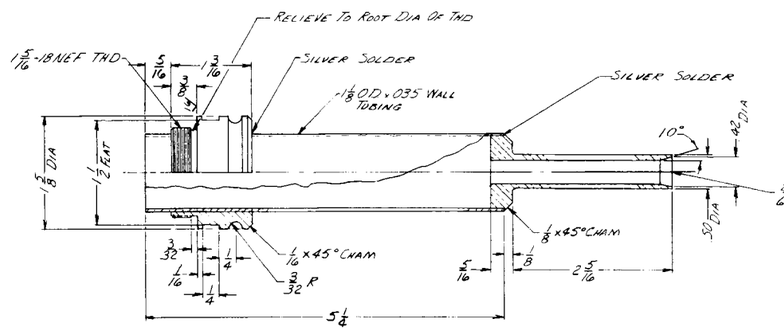
CLASSIFICATION

LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
FRACTIONS: ± —
DECIMALS: ± —
ANGLES: ± —
SCALE: 2" = 1"

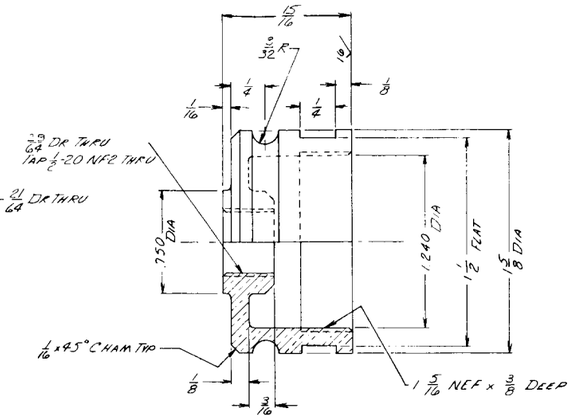
LTR	REVISIONS	DATE	APPD	APPD

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
E. G. GIBSON	9-20-61	Hutto	10-6-61		
DESIGNED	DATE	SUBMITTED	DATE	APPROVED	DATE
Hutto	10-6-61	PATE	10-4-61	H. Duggan	10-13-61

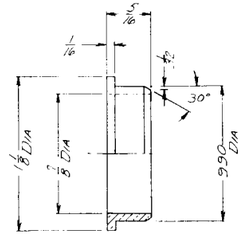
PARTS LIST				
PART NO.	DWG. NO.	NO. REQD	DESCRIPTION (NAME, SIZE, ETC.)	MATERIAL



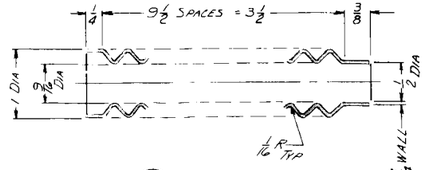
(4) HOUSING
MATL - BRASS (CHROME PLATE)
SCALE - 1:1



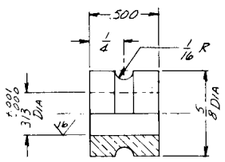
(1) NUT
MATL - BRASS (CHROME PLATE)
SCALE - 2:1



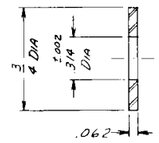
(2) BAND
MATL - BRASS
SCALE - 2:1



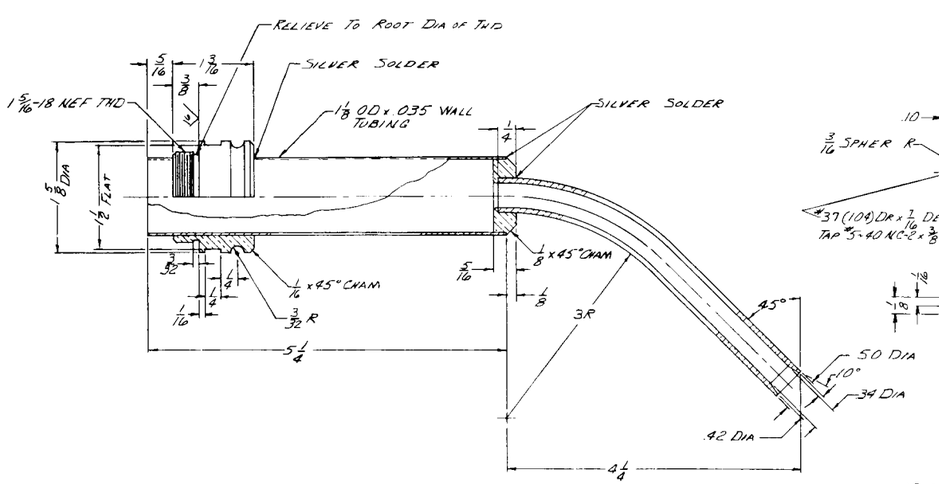
(5) BOOT
MATL - NEOPRENE
SCALE - 1:1



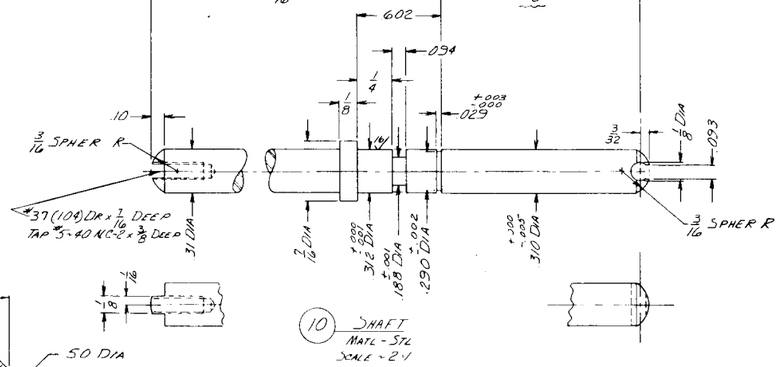
(6) RING
MATL - BRASS
SCALE - 2:1



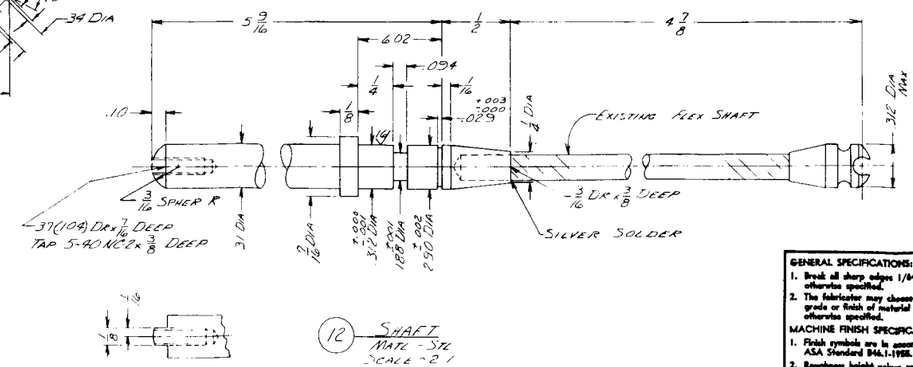
(8) WASHER
MATL - STL
SCALE 2:1



(11) HOUSING
MATL - BRASS (CHROME PLATE)
SCALE 1:1



(10) SHAFT
MATL - STL
SCALE - 2:1



(12) SHAFT
MATL - STL
SCALE - 2:1

W. E. Duggan

LTR	REVISIONS			DATE	APPD	APPD
DRAWN	DATE	CHECKED	DATE	APPROVED		DATE
B.B. GIBSON	9-11-61	Hutto	10-4-61			
DESIGNED	DATE	SUBMITTED	DATE	APPROVED		DATE
Hutto	10-6-61	Pate	10-4-61	W. Duggan		10-13-61

TYPE A AND TYPE B ASSEMBLY	D-47110
REFERENCE DRAWINGS	DWG. NO.
MANIPULATOR ALPHA SEAL P&U PROGRAM	ELDG. NO. 3508

GENERAL SPECIFICATIONS:
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3. For surfaces not otherwise indicated, roughness height shall not exceed 500.

CLASSIFICATION

LIMITS ON DIMENSIONS UNLESS OTHERWISE SPECIFIED
FRACTIONS ± 1/64
DECIMALS: ± .01
ANGLES: ± 1°
SCALE: AS NOTED

SEALED MANIPULATOR TONG
TYPE A AND TYPE B DETAILS

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE NUCLEAR COMPANY
DIVISION OF UNION CARBIDE CORPORATION
OAK RIDGE, TENNESSEE

SUBMITTED	ASST. SUPERVISOR	APPROVED
R.C.O.	J.D.F. 10-23-61	D-44974

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