Hi-Temp IR® Series
Infrared Heaters

Model 5090 High Temperature Infrared Heater

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CONTENTS

1.0 GENERAL INTRODUCTION

The 5090-10-X is a new design of a four inch wide water cooled modular radiant heating unit and is shown on Figures 1 and 2, drawing TD07125. It can be considered as a general purpose, major component for constructing high performance radiant heating systems. That is, the 5090-10-X may or may not be complete enough to satisfy all applications. In any case, it should provide easy and cost effective ways to design and build flat, and curved radiant arrays.

2.0 SIZES

The width of the unit is a convenient modular size of four inches so that radiant array design can be made easy. The four inch width is divided to support five equally spaced T3 lamps, .80 inches on center. This lamp spacing can continue beyond the adjacent units; thus, yielding most uniform heat flux in a direction perpendicular to the lamp axis.

The unit is divided into up to six equal modular sections, each 12.40 inches long as shown on Figure 1, drawing TD079125-XXX sheet 1. The modular units composed of these sections can be mounted end to end such that the 12.40 inch length remains an unbroken sequence; thus, giving a repetitive heat flux distribution along the length of an array. In this case, the modular section length is minimized in order to reduce the non lighted length of end to end units. The repetitive lighted length of 10.00 inches followed by non lighted length of 2.40 inches is the standard length of one modular 12.40 inch long section.

When choosing 5090-10-X's there may be an advantage of selecting the longer size because fewer mounting and cooling water connections would be needed.

3.0 STRUCTURE

The rugged construction, together with integrated water cooling passages of the 5090, renders it somewhat indestructible. The extruded reflector body serves as a stiff 2 x 4 inch cross section structural beam, capable of spanning the entire length of the longest unit (Model 5090-10-6; 74.40 inches long). The high strength of this beam is maintained in a high heat flux and temperature environment because its entire length is water cooled.

The extrusion serves as a backbone to which all else attaches to its rear side. The rear side has provision for:

a. unit mounting via 1/4-20 NC threaded holes into the reflector body
b. cooling water inlet at one end and outlet at the other end via 1/4-18 NPT ports
c. power input connections on the five lamp bus bar via #10-32 screws
d. access to the lamp lead connection to the bus bar, #8-32 screws
e. an optional port G for distributing lamp end seal cooling gasses, 1/4-18 NPT

attention should be given to component survival, especially in a high heat flux and temperature environment.

The reflector body is water cooled via a multitude of water passages running between the lamps, the entire length of the unit.

The quartz lamp envelopes are somewhat radiant cooled via some radiation to the comparatively cold grooved reflector.

The recommended cooling water flow is show on Table I.

The lamp endseals can be cooled by slightly pressurizing the rear side of the reflector of an array, such that low pressure cooling air passes through the half inch diameter ceramic lamp support tubes, past the lamp endseal or by providing a localized jet of cooling gas (air or perhaps nitrogen) via an individual gas line in each lamp support tube, connected to port G of the unit. Also, for very high heat flux density and temperature applications, large quantities of cooling gas (air, nitrogen, etc) may be forced through the ceramic lamp support tubes from a positive pressure supply plenum at the rear side of the unit to cool the lamp endseals, as well as the quartz lamp envelopes located behind a clear quartz window.

It should be noted that other components in a high heat flux and temperature radiant heating system may also require cooling. They are the peripheral edge and end reflectors used to contain radiant cavity radiation.

7.0 CONNECTIONS

See Figure 1 and 2, drawings TD079125 sheets 1 and sheet 2 showing connection locations. Notice that all connections are at the rear of the unit.

7.1 Mounting:

A set of three #1/4-20NF x 1/2 deep holes space .80 on center are provided at the center rear side of many modular sections. The weight of each 5090-10-X is given on Figure 1, drawing TD079125.

7.2 Water

There is a #1/4-18 NPT female water port labeled W near each end of the unit. Adequate water must be provided into one of these ports, through the unit, and out of the other end of the unit.

Minimum water flow requirement for 5090-10-X sizes is give in Table I.

8.4 Repolish

To repolish, simply remove all lamps and ceramic lamp support tubes from the demounted reflector body extrusion. The lamp support tubes are a part of a removeable bus bar assembly, fastened with only two screws, item 4 on drawing TD079125-XXX sheet 2 of 2 (Figure 2).

9.0 RECOMMENDED SPARE PARTS

The following spare parts are recommended for the 5090-10-X Modular Heater in order of anticipated need.

9.1 Lamps

The lamps must be considered as a totally expendable item. For this reason, a complete set of spares is recommended. This unit normally employs standard lamp number Q6MT3/CL/HT rated for 6000 watts at 480 volts.

9.2 Lamp Support Tubes

Lamp support tubes are of a ceramic material and are subject to breakage if this unit is mishandled. For this reason, at least on spare tube is recommended per five lamp section.

This item is shown as item 3 on the assembly drawing TD079125 sheet 2 (reference Figure 2). The Research, Inc. parts list number is 066329-001.

9.3 Others

Other spare parts for the 5090-10-X heater are shown associated parts list in Table II.

10.0 ACCESSORIES

10.1 Bench Bracket

The bench bracket shown on Figure 3 serves to support the individual unit off from its fragile ceramic lamp support tubes when servicing it on a work bench. Also, it may be provided attached to the unit, for unit protection in the shipping container.

Figure 3, drawing TB080469 shows the bench bracket and how it is attached via the three .28 diameter mounting holes to the rear of the 5090 heater. At least one bracket for the 5090-10-1 and two separate brackets are recommended for the 5090-10-2 through 6 sizes.

10.3 Lamp Endseal Cooling Comb

The lamp endseal cooling comb shown on Figure 2, drawing TD079125 sheet 2 is an optional extra accessory to provide auxiliary cooling gas to the lamp endseals. The "comb" assembly plumbs a cooling gas such as air, nitrogen, or argon, provided into the unit at port labeled G on each 5090 unit, from a 1/4-28 NF gas port near each bus bar assembly through small manifolded stainless steel tubes (ie: "comb") with an exit orifice at each lamp endseal. The comb assembly attaches to the two extra lamp lead connector screws on the bus bar. This accessory should be made available in the future.

TABLES AND FIGURES

Table I

Power Dissipation and Incident Heat Flux

(5090-10-X Heaters)

Model No.	No. of Sections	Overall Length inches	No. of lamps	Power Dissipation at Various Voltages with Lamp #Q6MT3/CL/HT, KW (1) 120V	240V	300V	360V	400V	440V	480V	Water, Minute GPM (2)
5090-10-1	1	12.40	5	3.5	10.3	14.5	19.3	22.6	27.1	30	.4
5090-10-2	2	24.80	10	7.0	20.6	29.0	38.6	45.2	54.3	60	.9
5090-10-3	3	37.20	15	10.5	30.9	43.5	57.9	67.8	81.3	90	1.3
5090-10-4	4	49.60	20	14.0	41.2	58.0	77.2	90.4	108.4	120	1.8
5090-10-5	5	62.00	25	17.5	51.5	72.5	96.5	113.0	135.5	150	2.2
5090-10-6	6	74.40	30	21.0	61.8	87.0	115.8	135.6	162.6	180	2.7
				Incident Heat Flux of Infinite Array at Various Voltages KW/FT^2 (3)							
				7.1	21.5	30.5	40.7	47.9	57.5	63.6	

(1.) Lamp #Q6MT3/CL/HT is rated for 6 KW at 480 volts.

(2.) Recommended minimum cooling water flow entering at 72°F or less and exiting at less than 210°F.

(3.) At a parallel target surface of an infinite array.

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TABLE II
PARTS LIST FOR 5090-10-X

MODEL 5090-10-1

079125-001 OPCODE: 3 REV: ASSY-EXTR 4"HTR MOD 5090-10-1
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

REQ: N=PART OPTI(
Y=PART REQU
PF: N=PART DOES
Y=PART PRIN
P=PART PRIN

PART NUMBER	DESCRIPTION	O P	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	R EP QF	DEFAULT QUANTITY	DAYS OFF SET	SEQ
079126-001	FAB-REFLECTOR,BODY,12.4"L	3		1	1.000	1.000	EA	MD	YN	1.000	0	0
079128-001	ASSY-BUS BAR 5090 IR HEATER	3		2	2.000	1.000	EA	MC	YN	2.000	0	0
066329-001	LAMP SUPPORT TUBE	3	B	3	10.000	1.000	EA	BB	YN	10.000	0	0
054979-108	SCRW-PH 10-32X1/2 SST PH	3	R	4	4.000	1.000	EA	BA	YN	4.000	0	0
079132-001	FAB-END BRACKET	3		5	2.000	1.000	EA	MC	YN	2.000	0	0

MODEL 5090-10-2

079125-002 OPCODE: 3 REV: ASSY-EXTR 4"HTR MOD 5090-10-2
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

REQ: N=PART OPTI(
Y=PART REQU
PF: N=PART DOES
Y=PART PRIN
P=PART PRIN

PART NUMBER	DESCRIPTION	O P	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	R EP QF	DEFAULT QUANTITY	DAYS OFF SET	SEQ
079126-002	FAB-REFLECTOR,BODY,24.8"L	3		1	1.000	1.000	EA	MD	YN	1.000	0	0
079128-001	ASSY-BUS BAR 5090 IR HEATER	3		2	4.000	1.000	EA	MC	YN	4.000	0	0
066329-001	LAMP SUPPORT TUBE	3	B	3	20.000	1.000	EA	BB	YN	20.000	0	0
054979-108	SCRW-PH 10-32X1/2 SST PH	3	R	4	8.000	1.000	EA	BA	YN	8.000	0	0
079132-001	FAB-END BRACKET	3		5	2.000	1.000	EA	MC	YN	2.000	0	0

MODEL 5090-10-3

079125-003 OPCODE: 3 REV: ASSY-EXTR 4"HTR MOD 5090-10-3
MODEL:
ECO NO:
DATE OF LAST ECO: 00/00/00

REQ: N=PART OPTI
Y=PART REQU
PF: N=PART DOES
Y=PART PRIN
P=PART PRIN

PART NUMBER	DESCRIPTION	O P	RV	ITEM NO.	QTY PER ASSEMBLY	YIELD FACTR	UM	SC	R EP QF	DEFAULT QUANTITY	DAYS OFF SET	SEQ
079126-003	FAB-REFLECTOR,BODY,37.2"L	3		1	1.000	1.000	EA	MD	YN	1.000	0	0
079128-001	ASSY-BUS BAR 5090 IR HEATER	3		2	6.000	1.000	EA	MC	YN	6.000	0	0
066329-001	LAMP SUPPORT TUBE	3	B	3	30.000	1.000	EA	BB	YN	30.000	0	0
054979-108	SCRW-PH 10-32X1/2 SST PH	3	R	4	12.000	1.000	EA	BA	YN	12.000	0	0
079132-001	FAB-END BRACKET	3		5	2.000	1.000	EA	MC	YN	2.000	0	0

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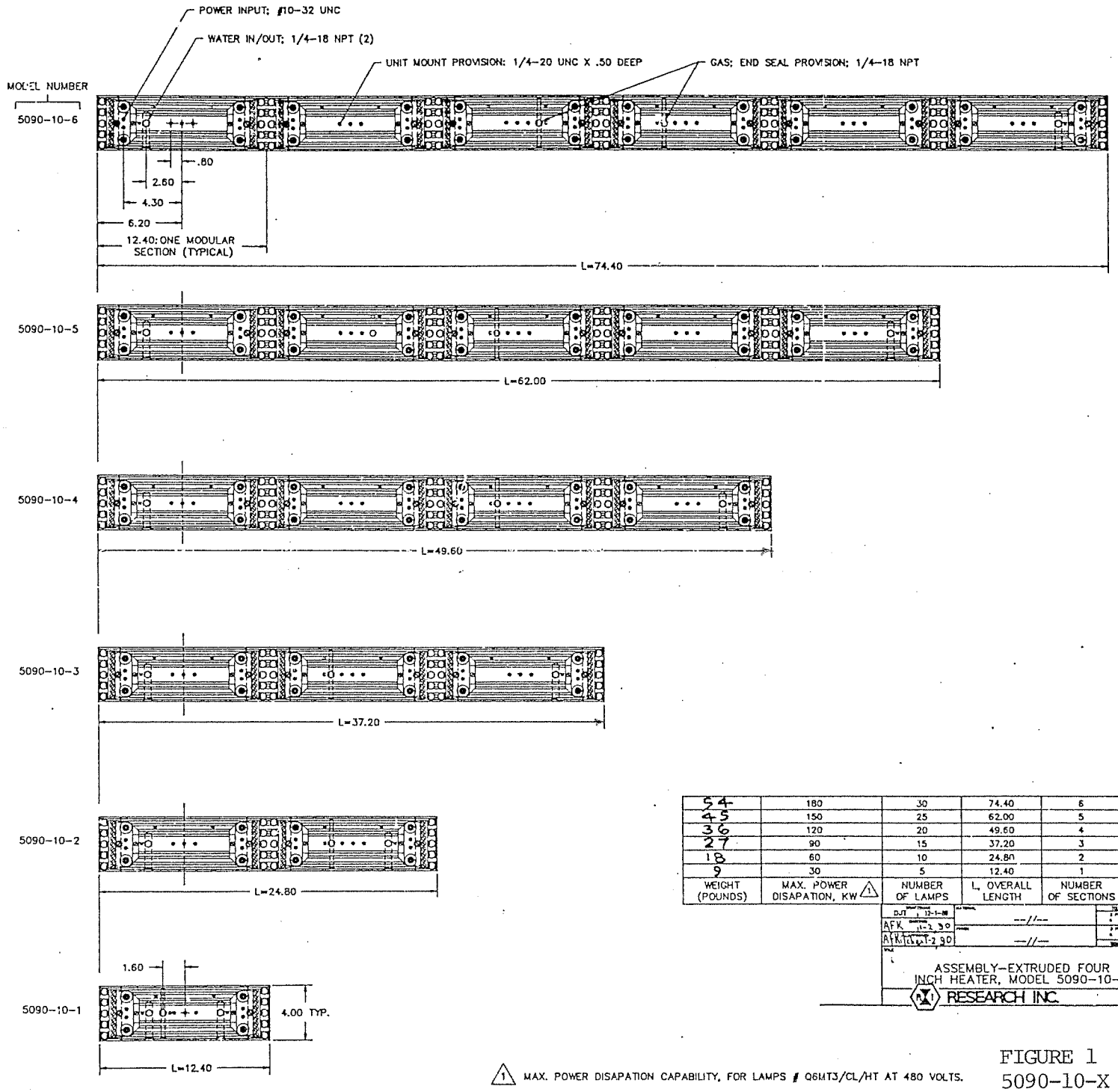

WEIGHT (POUNDS)	MAX. POWER DISAPATION, KW ⚠1	NUMBER OF LAMPS	L, OVERALL LENGTH	NUMBER OF SECTIONS	MODEL	DASH #	REV #
54	180	30	74.40	6	5090-10-6	-006	
45	150	25	62.00	5	5090-10-5	-005	
36	120	20	49.60	4	5090-10-4	-004	
27	90	15	37.20	3	5090-10-3	-003	
18	60	10	24.80	2	5090-10-2	-002	
9	30	5	12.40	1	5090-10-1	-001	

D.J.T. 12-1-98
AFK 11-2-98
AFK 11-27-98
--//--
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1/4
ASSEMBLY-EXTRUDED FOUR INCH HEATER, MODEL 5090-10-X
TD079125-
SEE TAB
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⚠1 MAX. POWER DISAPATION CAPABILITY, FOR LAMPS # Q6MT3/CL/HT AT 480 VOLTS.

FIGURE 1
5090-10-X SIZES

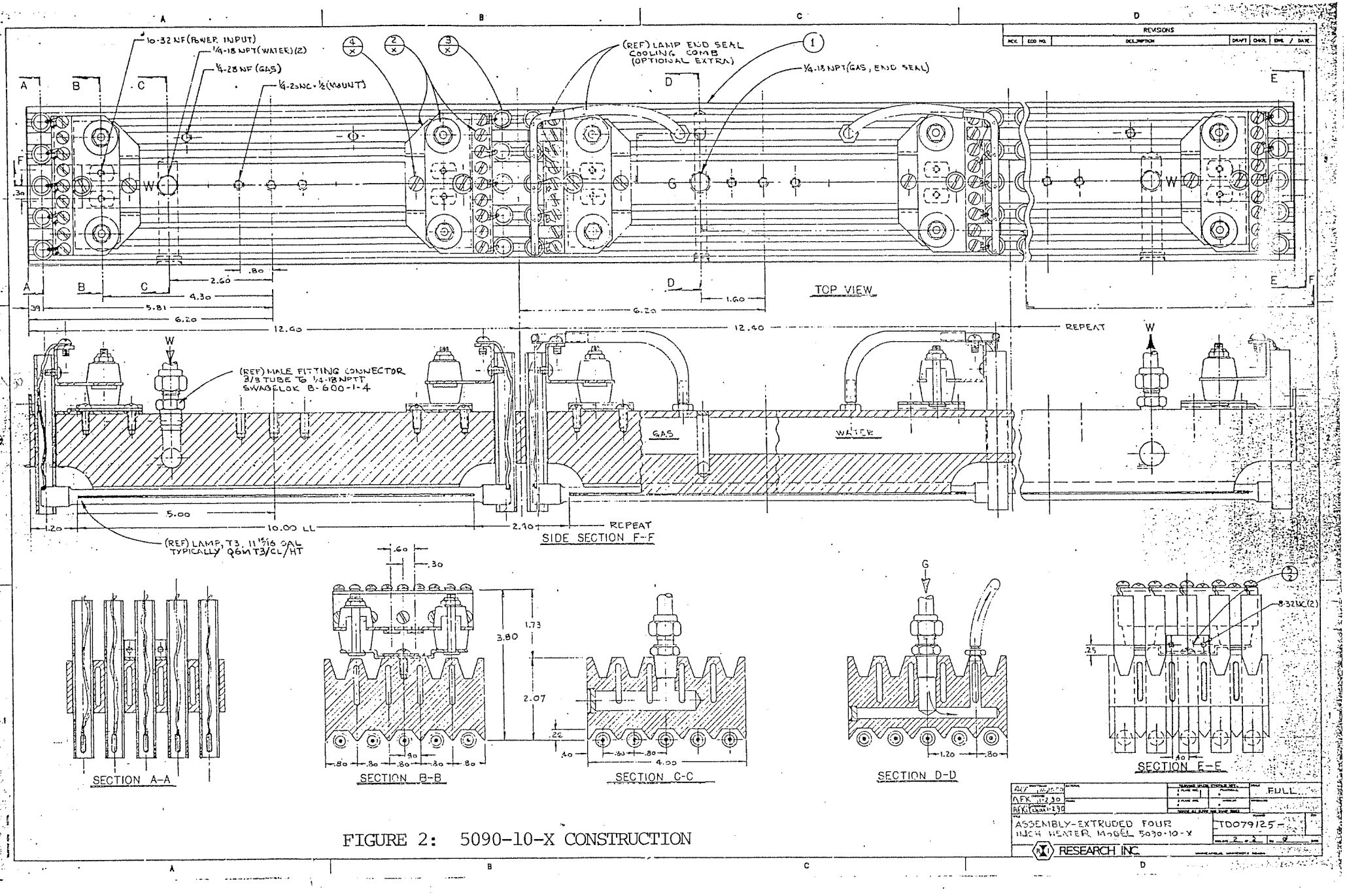

FIGURE 2: 5090-10-X CONSTRUCTION

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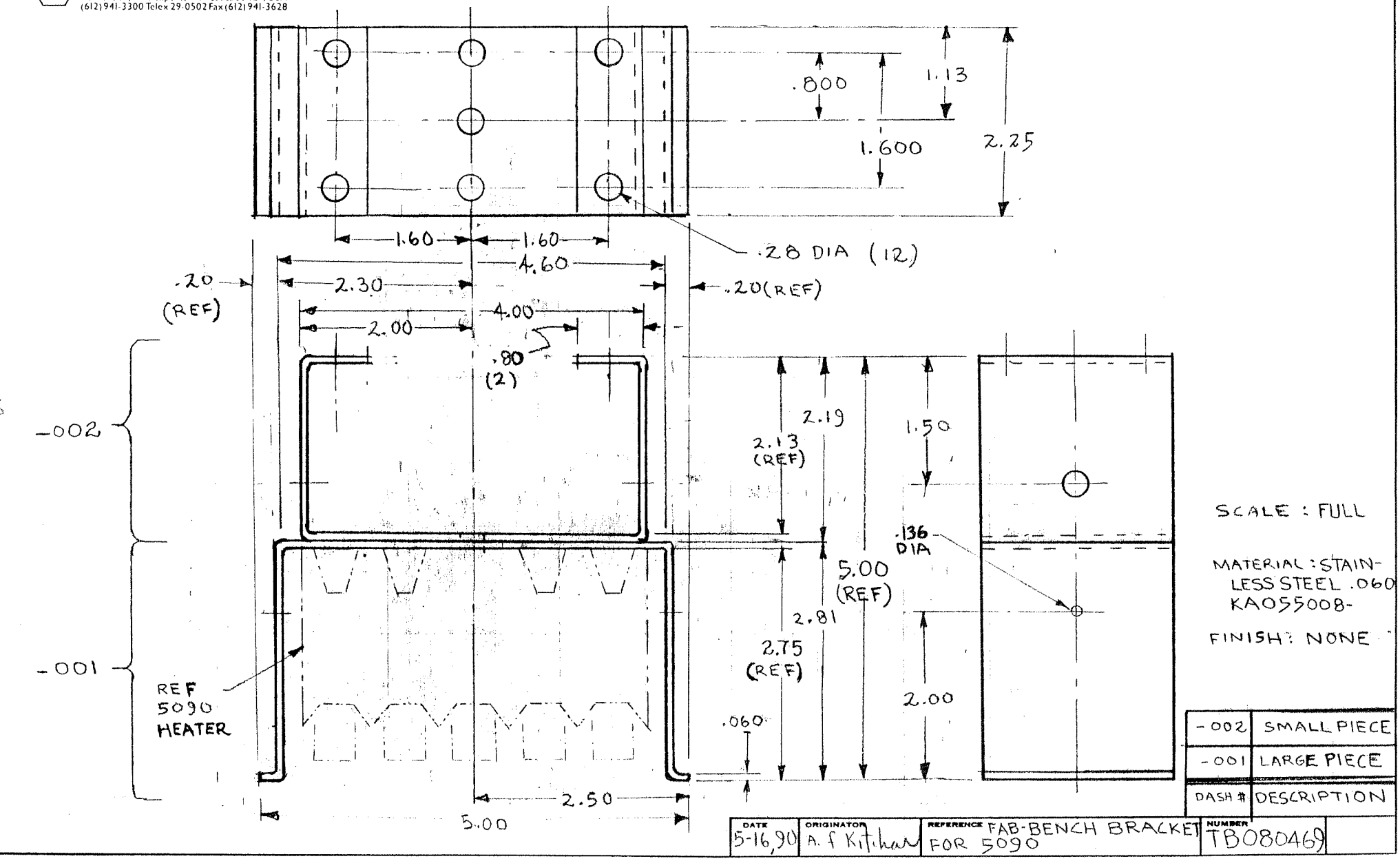

FIGURE 3: BENCH BRACKET

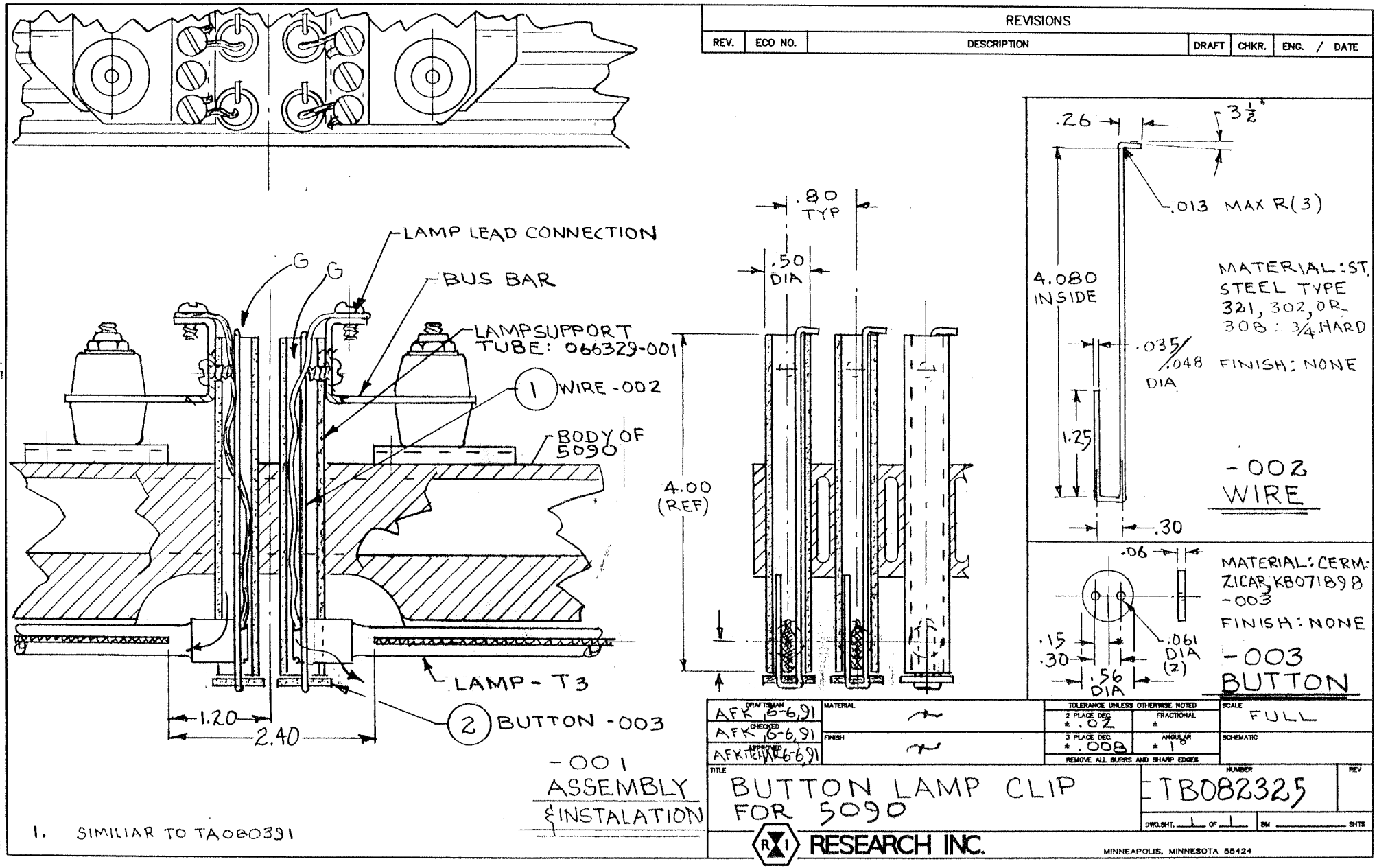

FIGURE 4: BUTTON LAMP CLIP