SPECIAL NO. R702

(REVISION STATUS)

REV.	DATE	DESCRIPTION	PAGE NO.	ENGINEER
A	6-13-96	ORIGINAL RELEASE	ALL	V. LAKNER
B	7-25-97	UPDATED CAL INSTRUCTIONS ADDED OUTPUT	ALL	J. LAKNER
—	—	CURRENT PAGE	—	—

COMMENTS:

DATE: 07-25-1997
REVISION: B
CUSTOMER: IRCON INC.
LOCATION: NILES, IL

INFRARAIL SPECIAL NUMBER R702

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A INFRARAIL SIGNAL CONDITIONER TO BE MATED WITH A SPECIAL SENSING HEAD SIMILAR TO SPECIAL E724. THE SENSING HEAD IS TO MEASURE A SPOT OF 0.1" AT A DISTANCE OF 4.75" WITH A TEMPERATURE RANGE OF 900 TO 2500 DEGREES F.

MODEL: DN999-99F
RANGE: 900 - 2500 DEG. F
OPTICAL RESOLUTION: 0.1" AT 4.75"
WAVELENGTH: 1.49 - 1.6 um

GENERALITY OF APPLICATION AND RESTRICTIONS:

RESTRICTIONS:
1. EMISSIVITY RESTRICTED TO A MINIMUM VALUE OF 0.8 FROM 900° F TO 1000° F.
2. AVOID EXCESSIVE BENDING OR FLEXING OF THE SENSING HEAD CABLE WHILE TAKING TEMPERATURE MEASUREMENTS. DO NOT PLACE THE SENSING HEAD OR CABLE IN ENVIRONMENTS WITH LARGE VIBRATIONS.
3. ACCURACY REDUCED TO 1.0% OF FULL SCALE TEMPERATURE DUE TO THE WIDE SIGNAL SPAN FOR THIS SPECIAL.

UNRESTRICTED: SUITABLE FOR USE WITH ALL STANDARD OPTIONS.

WRITTEN BY: _____

APPROVED BY: _____ DATE: 7-25-97

INFRARAIL SPECIAL NUMBER R702

REVISION: B
DATE: 07-25-1997

PRODUCTION INSTRUCTIONS:

START WITH A MODEL DNE31-24F ELECTRONICS MODULE, AND INSTALL M1 MODULE AS PER BILL OF MATERIAL ON PAGE 3.
DELIVER THE CABLE TO ENGINEERING FOR MODIFICATION. NO CONNECTOR IS REQUIRED FOR THIS SPECIAL.
SECURE FROM ENGINEERING THE SPECIAL SENSING HEAD.

CALIBRATION INSTRUCTIONS:

ACCURACY FOR THIS SPECIAL IS 1.0%, 0.5% FOR THE LINERARIZER MODULE.

DUE TO THE CLOSE FOCUS AND SMALL SPOT, WHEN CALIBRATING THE SENSOR ON THE THERMOGAGE, CALIBRATE AT A DISTANCE OF APROXIMATELY 8" TO 10".
CALIBRATE AS PER STANDARD.

MANUAL INSTRUCTIONS:

GENERIC INFRARAIL SERIES MANUAL.

INFRARAIL SPECIAL NUMBER R702

REVISION: B
DATE: 07-25-1997

M1 MODULE ASSEMBLY BILL OF MATERIAL

SYMBOL	PART NO.	DESCRIPTION		
R1	101374011	RESISTOR	1.37 MOHM	METAL FILM 1/4W 1%
R44	101872011	RESISTOR	18.7K OHM	METAL FILM 1/4W 1%
R54	101273011	RESISTOR	127K OHM	METAL FILM 1/4W 1%
R45	101582011	RESISTOR	15.8K OHM	METAL FILM 1/4W 1%
R55	105902011	RESISTOR	59.0K OHM	METAL FILM 1/4W 1%
R46	101022011	RESISTOR	10.2K OHM	METAL FILM 1/4W 1%
R56	101003011	RESISTOR	100K OHM	METAL FILM 1/4W 1%
R47	106191011	RESISTOR	6.19K OHM	METAL FILM 1/4W 1%
R57	101743011	RESISTOR	174K OHM	METAL FILM 1/4W 1%
R48	103571011	RESISTOR	3.57K OHM	METAL FILM 1/4W 1%
R58	103163011	RESISTOR	316K OHM	METAL FILM 1/4W 1%
R49	101961011	RESISTOR	1.96K OHM	METAL FILM 1/4W 1%
R59	106193011	RESISTOR	619K OHM	METAL FILM 1/4W 1%
R50	101001011	RESISTOR	1.00K OHM	METAL FILM 1/4W 1%
R60	101274011	RESISTOR	1.27M OHM	METAL FILM 1/4W 1%
R51	104750011	RESISTOR	475 OHM	METAL FILM 1/4W 1%
R61	102674011	RESISTOR	2.67M OHM	METAL FILM 1/4W 1%
R52	102150011	RESISTOR	215 OHM	METAL FILM 1/4W 1%
R53	101470011	RESISTOR	147 OHM	METAL FILM 1/4W 1%
R62	106194011	RESISTOR	6.19M OHM	METAL FILM 1/4W 1%

TEMPERATURE RANGE: 900 TO 2500 DEGREES F
SPECTRUM: 1.49 TO 1.60 MICRONS
(current output is nonlinear with Planck)

TEMP.IN DEG. F	% SIGNAL	Iout IN uAMPS
900.0	0.128	0.0030
925.0	0.160	0.0037
950.0	0.198	0.0046
975.0	0.244	0.0057
1000.0	0.298	0.0070
1025.0	0.361	0.0085
1050.0	0.435	0.0102
1075.0	0.521	0.0122
1100.0	0.620	0.0145
1125.0	0.735	0.0172
1150.0	0.866	0.0203
1175.0	1.015	0.0238
1200.0	1.184	0.0277
1225.0	1.375	0.0322
1250.0	1.590	0.0373
1275.0	1.831	0.0429
1300.0	2.100	0.0492
1325.0	2.400	0.0562
1350.0	2.732	0.0640
1375.0	3.099	0.0726
1400.0	3.503	0.0821
1425.0	3.947	0.0925
1450.0	4.434	0.1039
1475.0	4.966	0.1164
1500.0	5.546	0.1299
1525.0	6.177	0.1447
1550.0	6.860	0.1607
1575.0	7.600	0.1781
1600.0	8.399	0.1968
1625.0	9.259	0.2169
1650.0	10.185	0.2386
1675.0	11.177	0.2619
1700.0	12.241	0.2868
1725.0	13.377	0.3134
1750.0	14.590	0.3418
1775.0	15.882	0.3721
1800.0	17.256	0.4043
1825.0	18.716	0.4385
1850.0	20.263	0.4748
1875.0	21.901	0.5131
1900.0	23.632	0.5537
1925.0	25.460	0.5965
1950.0	27.387	0.6417
1975.0	29.417	0.6892
2000.0	31.550	0.7392
2025.0	33.792	0.7917
2050.0	36.143	0.8468
2075.0	38.607	0.9046
2100.0	41.186	0.9650
2125.0	43.882	1.0282
2150.0	46.699	1.0942
2175.0	49.639	1.1630

2200.0	52.703	1.2348
2225.0	55.895	1.3096

TEMPERATURE RANGE: 900 TO 2500 DEGREES F
SPECTRUM: 1.49 TO 1.60 MICRONS
(current output is nonlinear with Planck)

TEMP.IN DEG. F	% SIGNAL	Iout IN uAMPS
2250.0	59.216	1.3874
2275.0	62.668	1.4683
2300.0	66.255	1.5524
2325.0	69.977	1.6396
2350.0	73.838	1.7300
2375.0	77.838	1.8237
2400.0	81.979	1.9208
2425.0	86.265	2.0212
2450.0	90.696	2.1250
2475.0	95.273	2.2323
2500.0	100.000	2.3430

1.5 SPECIAL MODIFICATIONS

IRCON InfraRail Model DN999-99F, Serial Nos. 001874 through 001877 have been modified upon customer request for sensing hesds with a smaller physical dimensions. The sensing heads must also provide a spot size of 0.1 in. (2.5 mm) at a distance of 4.75 in. (121 mm). The entire system is calibrated for a temperature range of 900 to 2500°F at a wavelength between 1.49 and 1.6 μm.

RESTRICTIONS:

1.) Emissivity is restricted to a minimum value of 0.8 form 900 - 1000°F.
2.) Avoid excessive bending or flexing of the sensing head cable while taking temperature measurements. Do not place the sensing head or cable in environments with large vibrations.
3.) Due to the wide temperature span, system accuracy is reduced to 1.0 %of Full Scale temperature.

INSTALLATION INSTRUCTIONS:

SENSING HEAD INSTALLATION

Physical dimensions of the Sensing Head are given in Figure 1.5.3. The Sensing Head may be mounted in a tapped hole by means of the 5/8–20 mounting thread on the front of the sensor. Tighten firmly but gently.

NOTE

Ground the mounting surface to a good earth ground. If the Sensing Head case is above ground potential, erratic operation may result.

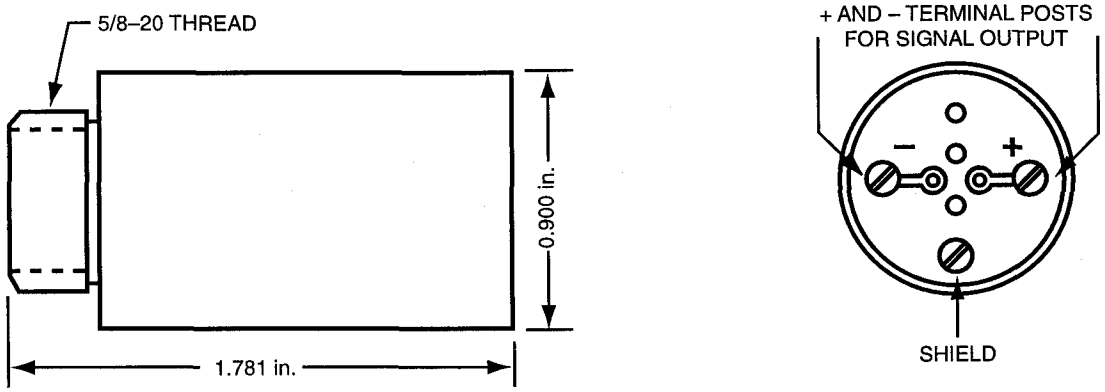


FIG. 1.5.1 – PHYSICAL DIMENSIONS AND CONNECTIONS FOR SPECIAL R702 SENSING HEAD

SIGNAL CABLE ASSEMBLY

SENSING HEAD END OF CABLE

1. Remove the outer insulation as necessary making sure not to cut the shield wire.

2. Insulate the end of the shield with electrical tape, shrink tubing, etc. to prevent accidental grounding to the shield.

3. Strip about 3/16 inch of insulation from the red, black, and shield conductors. Tin the wires. Wrap the red wire around the positive terminal post (+), the black wire around the negative post (–), and the shield wire around the unmarked post. Carefully tighten the screws.

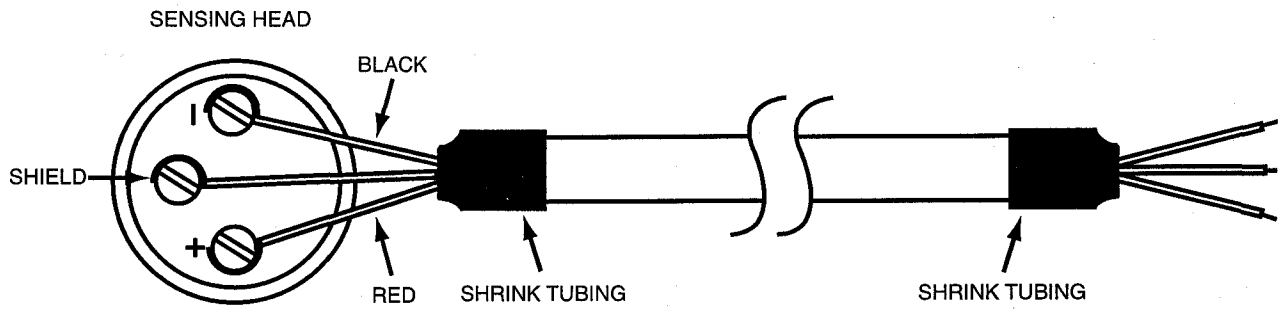


FIG. 1.5.3 – SIGNAL CABLE CONNECTIONS FOR SPECIAL R702 SENSING HEAD

OTHER END OF CABLE

1. Remove the outer insulation as necessary. Cut off the shield braid, BUT LEAVE THE SHIELD WIRE INTACT AT THIS END.

2. Strip about 3/16 inch of insulation from the red and black conductors. Cover the shield wire with insulation or shrink tubing, leaving about 3/16 inch end exposed. Secure the end of the cable with electrical tape, shrink tubing, etc.

3. Tin the wire ends (including shield wire). The cable is now ready to be connected to the signal processing module per Section 3 of this manual.

The modified instrument may be used with all standard InfraRail options and accessories.

Details of this modification are retained in IRCON Engineering Files as InfraRail Special No. R702.

NOTE: Ircon, Inc. is the sole owner in all respects of any product or software modification or design herein specified.

INFRARAIL SPECIAL NUMBER R702
TEMPERATURE RANGE: 900 TO 2500 DEGREES F
SPECTRUM: 1.49 TO 1.60 MICRONS

TEMPERATURE DEGREES F	SENSOR OUTPUT IN uAMPS	INDICATOR OUTPUT mAMPS
900.0	0.0030	4.000
950.0	0.0046	4.500
1000.0	0.0070	5.000
1050.0	0.0102	5.500
1100.0	0.0145	6.000
1150.0	0.0203	6.500
1200.0	0.0277	7.000
1250.0	0.0373	7.500
1300.0	0.0492	8.000
1350.0	0.0640	8.500
1400.0	0.0821	9.000
1450.0	0.1039	9.500
1500.0	0.1299	10.000
1550.0	0.1607	10.500
1600.0	0.1968	11.000
1650.0	0.2386	11.500
1700.0	0.2868	12.000
1750.0	0.3418	12.500
1800.0	0.4043	13.000
1850.0	0.4748	13.500
1900.0	0.5537	14.000
1950.0	0.6417	14.500
2000.0	0.7392	15.000
2050.0	0.8468	15.500
2100.0	0.9650	16.000
2150.0	1.0942	16.500
2200.0	1.2348	17.000
2250.0	1.3874	17.500
2300.0	1.5524	18.000
2350.0	1.7300	18.500
2400.0	1.9208	19.000
2450.0	2.1250	19.500
2500.0	2.3430	20.000

R702

D (inches)	spot (inches)
3"	0.065
3.25	0.060
3,50	0.055"
3,75	0.050
4,00	0.055
4.25	0.060
4.50	0.070
4.75	0.090
5.0	0.100
5.25	0.110
5.5	0.120
6.0	0.135

USE Ex 4279 FIELD STOP

IRCON

Engineering Special or System Request

From: V. LAPPE

Date 2-2-96

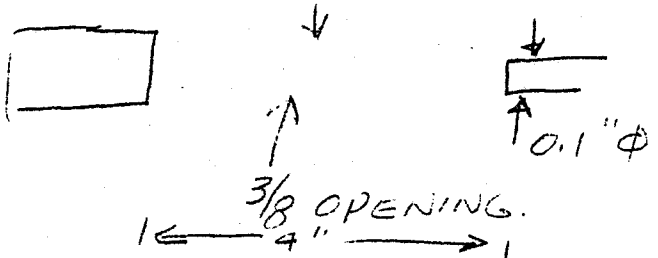
To: J. LARSEN

Customer: CORNING

Description of Request: EUREKIT HEAD

Base standard model or series:

NEED 50 UNITS - TEMPERATURE OXIDIZED STEEL PIN AT 2250°F (RANGE OF INST) COULD be 2000-2500°F.



FEED INTO INTERNAL Module —

Details of specific approval:

To get a 0.1" spot at 4", we could use our current Eureka (#724) head 0.7-1.0μ and move detector back approximately 0.1". Also we would have to decrease the f. Stop from 0.030" to 0.016". Our 1x cost for Qty 50 ... ≈$100 for THE SENSING head. We sell this head to Fluids for $1,600 each with no electronics.

Specific Exceptions: 2000°-2500°F ok. I_{sc} = 80 nA @ 2000°F

λ = 0.7 - 1.0

1 only 1,500 Adder

~~(BASED ON ONE SYSTEM)~~

Price: 250 Adder for All 50 (adder to standard)

Delivery: 6-8 wks purchasing (adder to standard)

Approved by: J. [illegible]

Date: 2-6-96

$375 Adder

Form No. O1006 Rev B

803

3" - 0.065"

3.5" 0.055

4 → 0.050" ← (3.25)

4.5" = 0.070

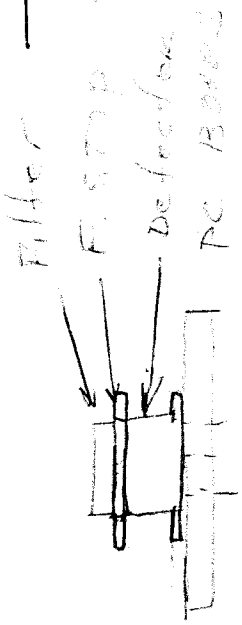
4.75 0.090"

5.0 - 0.100"

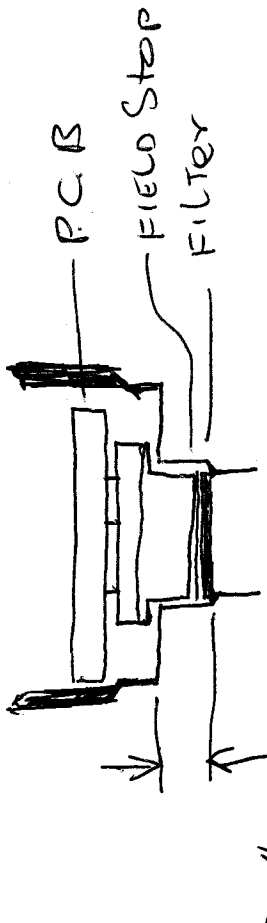
5.5 0.115

6" - 0.130

20 - 40



.02" THICK
.003" thick
.2" height
.223" Total



Engineering Instructions

OVER →

(1) Build S.H. the same as special 2724 but omit spacer. Short (solder) detector case lead to P.C.B. minus (-) terminal.

(2) Epoxy field stop onto detector using FIVE minute Hardman epoxy. F.S. must be centered on top of detector.

(3) Epoxy spectral filter onto field stop using Hardman 5 minute epoxy. Filter must be centered on top of field stop

(4) Epoxy detector assembly into sensing head case using 5 minute epoxy.

8-4-97
A.D.

Joe

Please See Recent Fax From
KAWASO About E-724.
WHAT ARE EXPECTED SPILLAGE
PLEASE GIVE ME THE COMMENTS
AND I WILL WRITE BACK

Vern

1-5-99

ANSWERS TO KAWASO
E724 SN 19219

1) Per W.O. 308486, Test documentation was Required. ~~I personally have not looked for test results.~~ Our calibration is performed ON the 1.0" Thermogage at approximately 9.11.00 ± 1". With this small test fixture we cannot check for spillage.
I Looked in the Folder for cal results and did not Find Anything!! I don't have proof the unit was calibrated.

2. We try to cut down on spillage with the use of glare stops, Field stops, and black anodizing of the sensing head. spillage should be at worst around 10.0%. We don't cal this sensor at the distances KAWASO has tested.

From the results of table 3, I can only Guess the unit was not calibrated properly or not calibrated at all. The other reason could be the difference in calibration distances. We only cal at 9". I have no test results at further distances due to the fact we don't have equipment to properly align this sensor.

1-7-57

FACSIMILE MESSAGE

KAWASO
ELECTRIC INDUTRIAL CO., LTD

7-10,Nishihommachi,1-Chome,
Nishi - ku, Osaka 550-0005 JAPAN
Tel No: +81-6-535-5936
Fax No: +81-6-541-2363
E-mail: yao-kws@mx1.alpha-web.ne.jp

TO:	Mr. Vern Lappe, Vice President Technical Customer Support Ircon, Inc.	FROM:	T. Shibata, Chief Engineer
CC:	Mr. Greg Sheahen International Sales Manager	PAGES:	3 pages including this page
FAX:	+1-847-967-5151	DATE:	December 26, 1998
RE:	Special Miniature Sensing Head E724-22999-019219	FAX SERIAL NO:	3868

Our order number: 98KI052 **Your order number: PD 308486/00**

Special Miniature Sensing Head E724
Model Number: 22999
Special Number: 019219

1. Kawaso examination result

(1) Considerable discrepancy in the output was observed perhaps because of spillage.
(2) Considerable discrepancy in the temperature was also noted.
(Kawaso standard 0.9 μm single color infrared thermometer was used for the examination. This thermometer is checked monthly. No error is found.)

Table 1.

Blackbody	0.9 μm single color infrared thermometer [°C]	E724-22999-019219			
		Distance from the bottom of the cavity [mm]	Output [mV] *	Calculated temperature [°C]	Discrepancy [°C]
LRC-1	1017.2	500	4.171	1093.9	+76.7
	1017.2	600	4.090	1091.7	+74.5
	1017.2	700	3.770	1082.2	+65.0
LRC-2	1190.0	500	18.067	1288.6	+98.6
	1190.0	600	17.870	1286.9	+96.9
	1190.0	700	17.700	1285.5	+95.5

* Load resistance 10KΩ

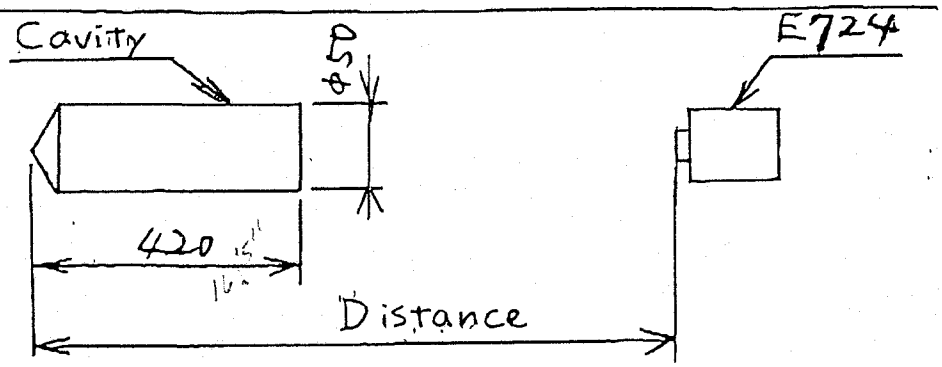
2. E724 Target size (Calculated on the basis of Ircon technical bulletin)

Table 2.

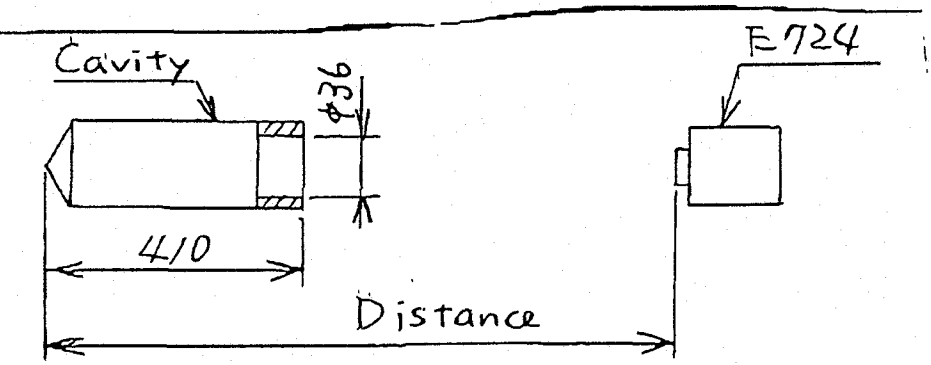
Distance [mm]	Target size [ϕ mm]
500 19.7"	18
600 23.62"	22
700 27.5"	26

3. Cavity size of LRC-1 and LRC-2

(1) LRC-1



(2) LRC-2



4. From the result shown in the table 2 above

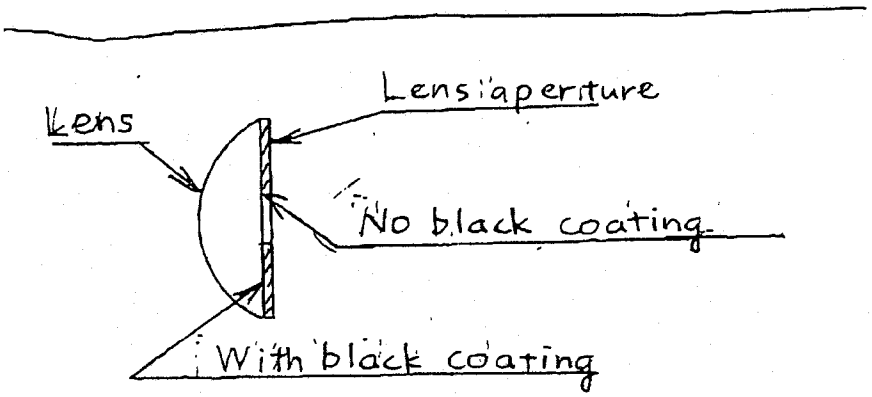
As per LRC-2, the proportion of the output at 500mm to the one at 700mm was 102 %. As for LRC-1, the proportion of the output at 500mm to the one at 700mm was 110 %, which is substantially large perhaps due to spillage. We are very surprised at the result. It is the first experience for us to observe such large output proportion, which is probably caused by spillage, using an infrared thermometer with a silicon detector.

5. Our questions to Ircon

(1) No test certificate was attached to the instrument. We would like to know whether you performed blackbody calibration with the instrument. CAL is done on T-gage!!

(2) Do you fit a baffle (glare stop) between a lens and a detector for the prevention of stray light? yes

(3)



2, yes done black anodi

No black coating is done for an opening in the lens aperture after drilling. We think it is not good for the prevention of stray light. What do you think about that?

6.

Since it is not possible to do something effective for the prevention of spillage, we adjusted the output at the distance of 700 mm between the bottom of the cavity and E724, and shipped the instrument to our customer. (Please refer to Table 3 below.)

Table 3.

Blackbody	E724-22999-019219			
	0.9 μm single color infrared thermometer [°C]	Output [mV] *	Calculated temperature [°C]	Discrepancy [°C]
LRC-1	1013.6	2.017	1013.7	+0.1
LRC-2	1499.7	61.18	1495.9	−3.8

* Load resistance 10KΩ

Best regards,

for M. Shibata

From:

FACSIMILE MESSAGE

KAWASO
ELECTRIC INDUTRIAL CO., LTD

7-10,Nishihommachi,1-Chome,
Nishi - ku, Osaka, 550-0005 JAPAN
Tel No. 06-535-5936
Fax No. 06-541-2363
E-mail yao-kws@mx1.alpha-web.ne.jp

Fax Serial No.: 3822 Date: November 27, 1998 Page: 1/1

Fax to: IRCON, INC.

Attn: Mr. Christopher Siskovic, Technical Sales Manager

Re: Our order #98KJ052 & your order #PD308486/00 – Mod II Sensing head for Sumitomo Sitix

Could you please advise us of the following information with regard to Mod II sensing head for Sumitomo Sitix supplied on our order #98KJ052 (Model: 22999, S/N 019219, Special: E724).

1. Blackbody Calibration Accuracy ——— .75% OF FULL SCALE
2. Repeatability @25°C ±.3% OF F. Scale
3. Ambient Temperature Range (without auxiliary cooling) — 0 – 200°F
4. Humidity —— 100% non-condensing

Best regards,

Y. Yao

TO

ABOVE ARE SPECIFICATIONS FOR THIS SPECIAL MODEL

DICK BRESEN

Purchase Quotation Request

IRCON, INC.
7301 N. Caldwell Ave.
Niles, IL 60714 USA

Phone 708-967-5151
Toll Free 800-323 7660
Fax 708-647-0948

ISO 9001 Quality System Certified

This is not an order – and implies no obligation on our part.
We reserve the right to accept or decline all or parts hereof.

8-2-95

G & Z INDUSTRIES
541 CHADDICK DR.
WHEELING, IL 60090

G&Z QUOTE #598+599,600,601

Date: 8-2-95

Lead Time: 6-7 Weeks ARO

Qty	Part Number	Rev Level	Description and Specifications	Unit Price	Total Price
50	44728-2	C	SENSING HEAD	$28.59	$ 1429.50
50	44730-2	B	DETECTOR HOUSING	10.04	502.00
50	44729-2	A	GLARE STOP	5.76	288.00
50	44731-2	A	ASSEMBLY OF ITEMS 44728-2, 44729-2, 44730-2	10.73	536.50
					$ 2756.00
50	44731-2	A	COMPLETE INCLUDING COMPONENTS	49.84	2492.00
			NOTE: .069 DEPTH TO BE CHANGED TO .035 INCLUDE THREADS		
50	43224-2			3.01	171.00

[X] Drawings Attached

Grand Total _____

Comments: **NOTE:** G & Z QUOTED ON 3/15/95, UNDER EX P/N'S 3502, 3499, 3496 AND 3445.

Attention Bidder: Can you suggest a better value through:

- [ ] Substitution
- [ ] Quantity change
- [ ] Different design
- [ ] Packaging change

Buyer RONALD DEFOE Date 7/24/95

Signature R Defoe 7/24

Seller Signature _____

Title PRESIDENT/G&Z INDUSTRIES, INC. Date 8-2-95

Form No. P107 Rev B

SEE REV A:
J. L. 12-16-93

MODLINE II SPECIAL NUMBER E724

ENGINEER: J. LAKNER
REV:
W.O. NO.: 55166
CUSTOMER: FERROFLUIDICS
CITY: NASHUA
STATE: NH

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A SMALL CUSTOM SENSING HEAD TO VIEW AND MEASURE A GRAPHITE HEAT SHIELD. THE CUSTOMER ALSO REQUIRES A SPECIAL 0.7 TO 1.0 u FILTER TO PROVIDE TEMPERATURE COMPENSATION SIMULAR TO THE MODLINE PLUS 2000 SERIES (0.1 C INCREASE FOR EACH 1.0 DEG.C. RISE IN AMBIENT).

MODEL: 22999
RANGE: 1000 -1500 DEGREES C.
OPTICAL RESOLUTION: CUSTOM LENS TO PROJECT A 0.30" DIA. SPOT AT A WORKING DISTANCE OF 9.0".

GENERALITY OF APPLICATION AND RESTRICTIONS:

CUSTOMER WILL PROVIDE THEIR OWN ELECTRONICS FOR SIGNAL PROCESSING.

MODLINE II SPECIAL NUMBER E724

ENGINEER: J. LAKNER
REV:
W.O. NO.: 55166
CUSTOMER: FERROFLUDICS
CITY: NASHUA
STATE: NH

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A SMALL CUSTOM SENSING HEAD TO VIEW AND MEASURE A GRAPHITE HEAT SHIELD. THE CUSTOMER ALSO REQUIRES A SPECIAL 0.7 TO 1.0 u FILTER TO PROVIDE TEMPERATURE COMPENSATION SIMULAR TO THE MODLINE PLUS 2000 SERIES (0.1 C INCREASE FOR EACH 1.0 DEG.C. RISE IN AMBIENT).

MODEL: 22999
RANGE: 1000 -1500 DEGREES C.
OPTICAL RESOLUTION: CUSTOM LENS TO PROJECT A 0.30" DIA. SPOT AT A WORKING DISTANCE OF 9.0".

GENERALITY OF APPLICATION AND RESTRICTIONS:

CUSTOMER WILL PROVIDE THEIR OWN ELECTRONICS FOR SIGNAL PROCESSING.

MODLINE II SPECIAL NUMBER E724 CONTINUED

PRODUCTION INSTRUCTIONS:

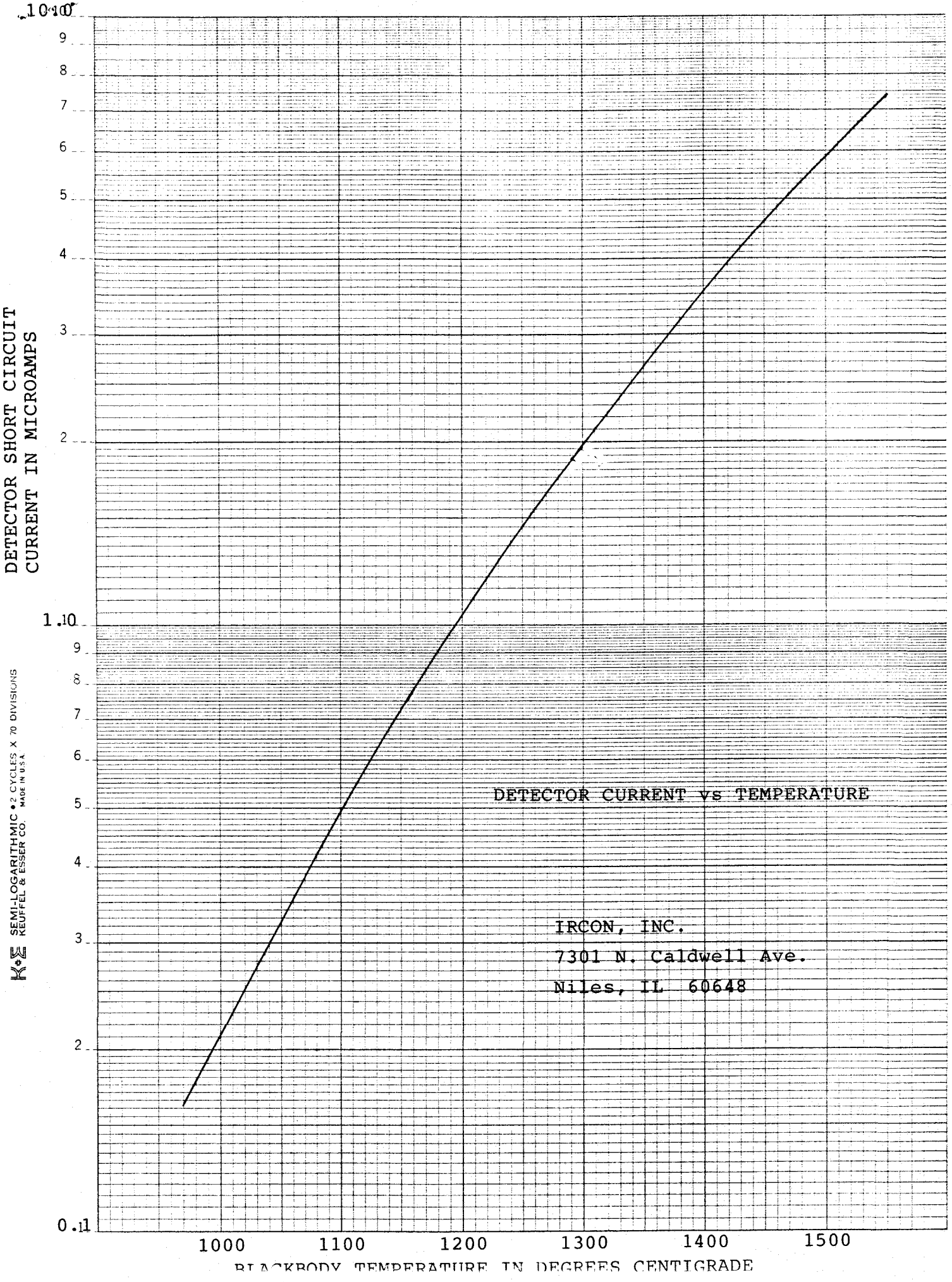
BUILD THE SPECIAL SENSING HEAD PER DRAWING NUMBER C11148 ATTACHED. SECURE EX NUMBERED PARTS (EX-3502 AND EX-3498) FROM ENGINEERING. THERE IS NO ELECTRONICS REQUIRED FOR THIS SPECIAL.

CALIBRATION INSTRUCTIONS:

1. FOCUS THE SENSING HEAD AT 9.33" ON THE TUBE FURNACE.
2. TRIM Isc TO 1.028 MICROAMPS AT Tbb = 1200 DEG. C. (2192 DEG.F.).
3. SPOT CHECK A FEW TEMPERATURES BELOW 1200 DEGREES C AND THE ZERO SCALE TEMPERATURE OF 1000 DEGREES C.

MANUAL INSTRUCTIONS:

USE THE SAME MANUAL INSTRUCTIONS AS PREVIOUSLY SUPPLIED. (REFER TO SPECIAL E717)


10.10
9
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0.11
DETECTOR SHORT CIRCUIT CURRENT IN MICROAMPS
1000
1100
1200
1300
1400
1500
BLACKBODY TEMPERATURE IN DEGREES CENTIGRADE
DETECTOR CURRENT vs TEMPERATURE
IRCON, INC.
7301 N. Caldwell Ave.
Niles, IL 60648
K&E SEMI-LOGARITHMIC • 2 CYCLES X 70 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

JPB IRCON PART NO. 41031-2

JUN 06 1994

COMPONENT SPECIFICATION

ORIGINAL PART DESCRIPTION: SCREW, PAN HEAD, MACH. BRASS, SIZE = 0-80 x 3/16" LG, Slotted

FIRST USE: MODEL _____, ASSEMBLY LSE713

Mat Al.

FIRST SOURCE: CENTURY FASTENERS (No Finish)
4155 N. Rockwell Chicago IL 60618
(312) 436-3900

SECOND SOURCE: (Exact Replacement) KOMAR TOOL

ALTERNATE SOURCE: *(Must contact Mfg. Engr. before purchasing) _____

CRITICAL PARAMETERS:

SEE DESCRIPTION

*If second source not available then alternate source should be provided.

ENGINEERING APPROVAL _____ DATE 12-10-64

QUALITY ASSURANCE APPROVAL _____ DATE 12-10-64 NA

GLOBE FASTENERS

JPB IRCON PART NO. 44517-2

JUN 06 1994

COMPONENT SPECIFICATION

ATTACHED

ORIGINAL PART DESCRIPTION: STANDOFF. 1/8 SWAGE PART Nº RB-080-105G36 (ROUND BRASS)

FIRST USE: MODEL _____, ASSEMBLY LSE713

FIRST SOURCE: GLOBE FASTENERS: REP. ELECTRA SALES (369-8240) 1224 Field Court NAPERVILLE IL

SECOND SOURCE: (Exact Replacement) RAF ELECTRONICS HARDWARE, INC. SEYMOUR, CT

ALTERNATE SOURCE: *(Must contact Mfg. Engr. before purchasing) _____

CRITICAL PARAMETERS:

SEE SPEC. SHEET ATTACHED.

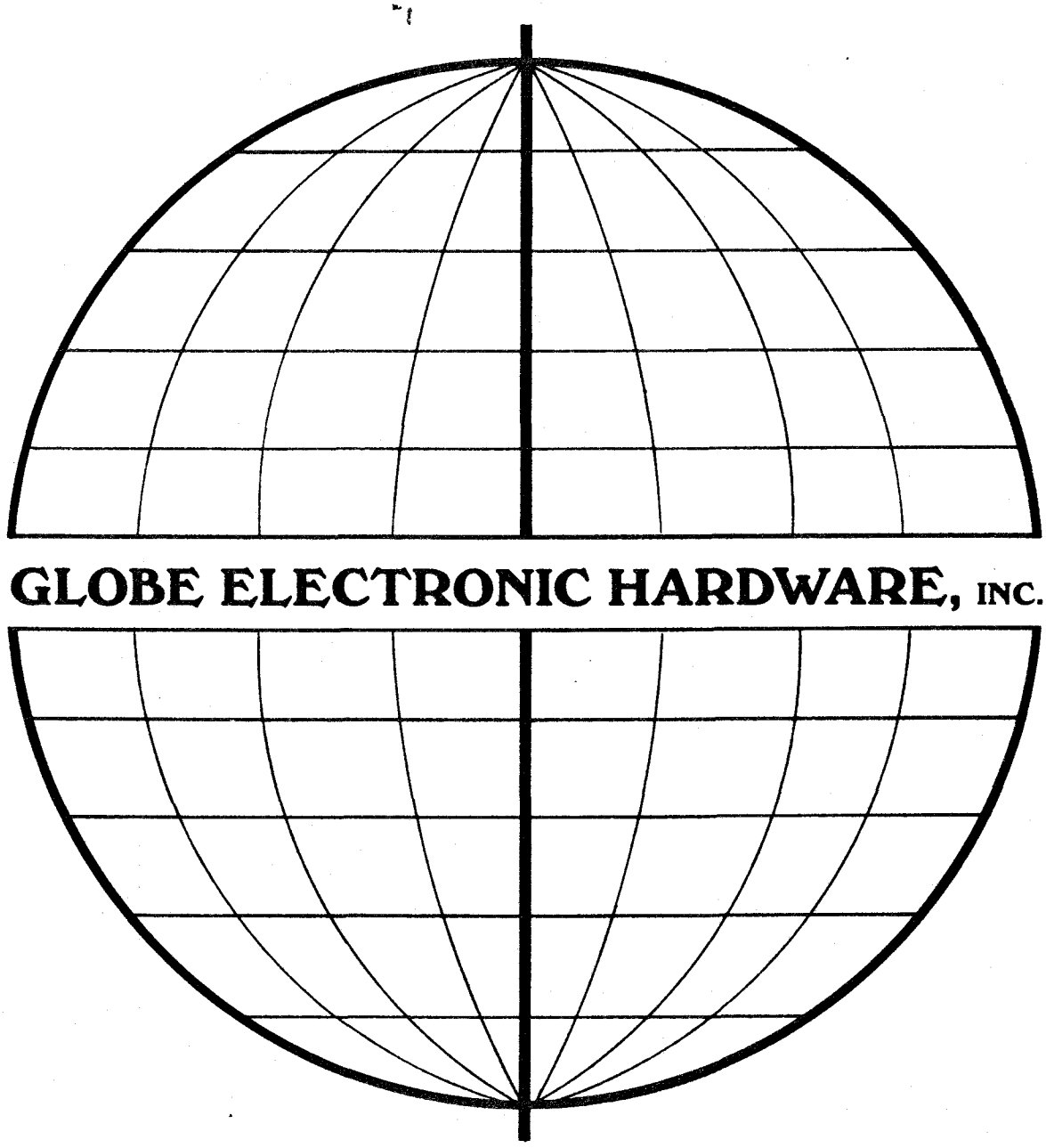
*If second source not available then alternate source should be provided.

ENGINEERING APPROVAL R. Kenny DATE 12-10-84

QUALITY ASSURANCE APPROVAL [signature] DATE 12/10/84 (WA)

IN NYS
718-278-2400

OUTSIDE NYS
800-221-1505
TOLL FREE



GLOBE ELECTRONIC HARDWARE, INC.

FAX 1-718-726-1381

CORPORATE OFFICE • 32-02 57th St. • PO Box 727 • WOODSIDE, N.Y. 11377 • 718-278-2400

I_{SC} = 2.5 μA at T_{BB} = 1200 °F
SCREW FULL OUT
(0.7 - 1.0 μ)

2/07/94

MODLINE II SPECIAL NUMBER E724 CONTINUED

PRODUCTION INSTRUCTIONS:

SECURE THE PARTS SPECIFIED PER B.O.M B-11147 (ASSY LSE724), AND DELIVER TO ENGINEERING FOR THE ASSEMBLY OF THE SENSING HEADS.
THERE IS NO ELECTRONICS REQUIRED FOR THIS SPECIAL.

CALIBRATION INSTRUCTIONS:

1. FOCUS THE SENSING HEAD AT 9.33" ON THE TUBE FURNACE.
2. TRIM Isc TO 0.9703 MICROAMPS AT Tbb = 1200 DEG. C. (2192 DEG.F.).
3. SPOT CHECK A FEW TEMPERATURES BELOW 1200 DEGREES C AND THE ZERO SCALE TEMPERATURE OF 1000 DEGREES C.

MANUAL INSTRUCTIONS:

USE THE SAME MANUAL INSTRUCTIONS AS PREVIOUSLY SUPPLIED (REFER TO SPECIAL E717), BUT USE THE NEW NEW SPECTRUM (0.7 - 1.0) AND THE NEW SENSOR OUTPUT CURVE AND CURRENT TABLE.

SEE REV B

DATE: 12-16-93

MODLINE II SPECIAL NUMBER E724

ENGINEER: J. LAKNER
REV: A
W.O. NO.: 55166
CUSTOMER: FERROFLUIDICS
CITY: NASHUA
STATE: NH

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A SMALL CUSTOM SENSING HEAD TO VIEW AND MEASURE A GRAPHITE HEAT SHIELD. THE CUSTOMER ALSO REQUIRES A SPECIAL 0.7 TO 1.0 u FILTER TO PROVIDE TEMPERATURE COMPENSATION SIMULAR TO THE MODLINE PLUS 2000 SERIES (0.1 C INCREASE FOR EACH 1.0 DEG.C. RISE IN AMBIENT).

MODEL: 22999
RANGE: 1000 -1500 DEGREES C.
SPECTRUM: 0.7 - 1.0 microns
OPTICAL RESOLUTION: CUSTOM LENS TO PROJECT A 0.30" DIA. SPOT AT A WORKING DISTANCE OF 9.0".

GENERALITY OF APPLICATION AND RESTRICTIONS:

CUSTOMER WILL PROVIDE THEIR OWN ELECTRONICS FOR SIGNAL PROCESSING.

SQUARE D COMPANY
INFRARED MEASUREMENT DIVISION

PURCHASE REQUISITION

Date: March 9,1993

Supplier: Fox Tool Co.

P.O. #:

Requisitioner R.Vernon

Purpose/Reason: Special #E717

Attn:

Date needed: 4/12/93

Telephone ( )

Route to: Engineering,R.Vernon

Material Safety Data Information:
New chemical MSDS received on _____ ☐ for sample only ☐ routine use
Previously purchased chemical: Active Index No. _____

Qty	U/M	Description	Price Ea	Total	Acct or W.O.#
4		Sensing Head per Dwg.# EX-3499		advise	54674
4		Detector housing per Dwg.# EX-3496		advise	54674
4		Glare stop per Dwg.# EX-3445		advise	54674
4		Assemble above items per Dwg.#		advise	54674
		EX-3502			
4		Detector Dieldstop per Dwg.#EX-3500		advise	54674
		Ircon to supply part # 45119-3			
12		Detector spacer per Dwg.# 43224-2		advise	54674

Confirming to:

Total: $ advise

Approval: _____ (under $100 - Authorized Requisitioner)

_____ ($100 - $5000 - Department Manager)

_____ (over $5000 - General Manager)

Acknowledgment

IRCON

IRCON, INC.
7300 N. Natchez Ave.
Niles, IL 60714 USA

Phone 847-967-5151
Toll Free 800-323-7660
Fax 847-647-0948

SCHEDULED SHIPPING WEEK ENDING — MONTH/DAY/YEAR: 01/04/97

SOLD TO — CUSTOMER NO.: 005041

FERROFLUIDICS CORP.
40 SIMON ST

NASHUA NH 03061

OUR ORDER NO.: SA 062424/00 — ORDER DATE — MONTH/DAY/YEAR: 11/19/96

YOUR ORDER NO.: 96906-A

TERMS: X NET 30 / OTHER

F.O.B.: X NILES, ILLINOIS

SHIPPING ADDRESS — TAX CODE: NO TAX

CODE: 318 .00

VIA: UPS — PPD.: X — COLL.:

SPECIAL SHIPPING INSTRUCTIONS

FERROFLUIDICS CORP.
40 SIMON ST

NASHUA NH 03061

1/19/96 PAGE 1

LINE NO.	PART NO.	QTY.	DESCRIPTION	UNIT MEAS	DISCOUNT %	PRICE EACH U.S. DOLLAR	AMOUNT U.S. DOLLAR
01		4	MOD II SENSING HEAD W/O CABLE MODEL 22999 SERIAL NBR 019034 THRU 019037 ********** * SPECIAL Z999 * ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. **	EA		1440.00	5760.00
			SUB TOTALS				5760.00
			GRAND TOTAL				5760.00

Redo Special No E724
Special Sensor Temp range 1000 -1500C
MHB 11/20

THIS ORDER IS ACCEPTED SUBJECT TO TERMS AND CONDITIONS SHOWN ON THIS AND THE REVERSE SIDE

IF TAX EXEMPT, PLEASE PROVIDE COPY OF EXEMPTION OR DIRECT PAYMENT CERTIFICATE.

Ship To: IRCON, INC.
7300 N. NATCHEZ AVE.
NILES, IL 60714 USA

ORIGINAL

.028" THK

K-C11148	(A1) SH FINAL ASSY		1	.00	.00
447312-27	S H. MECH ASSY SPLICE734	EA	1	52.17	.00
20081267D	SCREW #8-32 X 3/8" SOCKET		1	.00	.00
611032 53	LENS PLANO CONVEX 12.5MM	EA	1	13.36	.00
B11147	DETECTOR ASSEMBLY		1	.00	.00
473752	LABEL REIMAGING 2 LENS	EA	1	.20	.00
990100002	EPOXY HARDMAN #4005 GEN PURP	EA	1	.00	.00
	TOTAL		7	65.73	.00

PARTS COST	65.73
PARTS LABOR	.00
ASSM LABOR	.00
TOTAL BOM	65.73

TC	OUTPUT(TC)
1700	15.981
1675	14.3564
1650	12.8625
1625	11.4921
1600	10.2382
1575	9.0937
1550	8.0521
1525	7.1067
1500	6.2511
1475	5.4793
1450	4.7852
1425	4.1631
1400	3.6075
1375	3.1131
1350	2.6747
1325	2.2877
1300	1.9474
1275	1.6495
1250	1.3899
1225	1.1648
1200	0.9706
1175	0.8039
1150	0.6616
1125	0.5409
1100	0.4391
1075	0.3539
1050	0.283
1025	0.2244
1000	0.1764

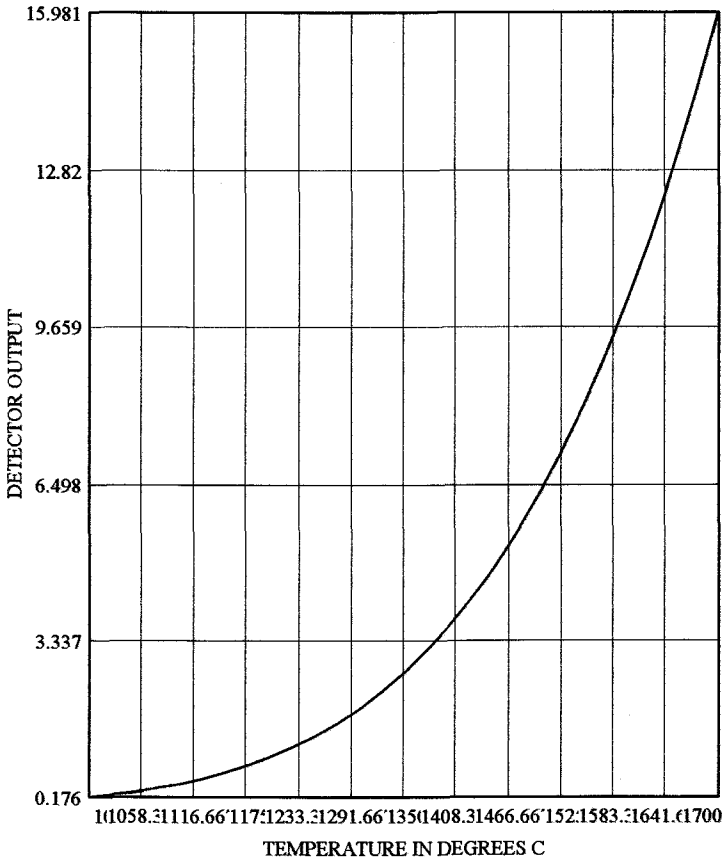


TABLE 1 - OUTPUT CURRENT VS. TEMPERATURE FOR SPECIAL E724 SENSING HEAD

TEMP.IN DEG. C	Iout (microamps)
1000.0	0.1764
1010.0	0.1944
1020.0	0.2140
1030.0	0.2351
1040.0	0.2581
1050.0	0.2829
1060.0	0.3096
1070.0	0.3385
1080.0	0.3696
1090.0	0.4030
1100.0	0.4390
1110.0	0.4776
1120.0	0.5189
1130.0	0.5633
1140.0	0.6107
1150.0	0.6614
1160.0	0.7156
1170.0	0.7733
1180.0	0.8349
1190.0	0.9005
1200.0	0.9703
1210.0	1.0445
1220.0	1.1233
1230.0	1.2069
1240.0	1.2956
1250.0	1.3895
1260.0	1.4890
1270.0	1.5942
1280.0	1.7055
1290.0	1.8229
1300.0	1.9469
1310.0	2.0777
1320.0	2.2155
1330.0	2.3606
1340.0	2.5134
1350.0	2.6741
1360.0	2.8430
1370.0	3.0203
1380.0	3.2065
1390.0	3.4019
1400.0	3.6067
1410.0	3.8213
1420.0	4.0460
1430.0	4.2811
1440.0	4.5271
1450.0	4.7842
1460.0	5.0529
1470.0	5.3334
1480.0	5.6262
1490.0	5.9316
1500.0	6.2500
1510.0	6.5818
1520.0	6.9274
1530.0	7.2872

TABLE 1 - OUTPUT CURRENT VS. TEMPERATURE FOR SPECIAL E724 SENSING HEAD

TEMP. IN DEG. C	Iout (microamps)
1540.0	7.6616
1550.0	8.0509
1560.0	8.4557
1570.0	8.8763
1580.0	9.3131
1590.0	9.7665
1600.0	10.2371
1610.0	10.7252
1620.0	11.2313
1630.0	11.7558
1640.0	12.2991
1650.0	12.8618
1660.0	13.4443
1670.0	14.0469
1680.0	14.6703
1690.0	15.3148
1700.0	15.9810

~~E-724~~ -

E-724

If they Get 6 ½ amp up to 9 ½ amp
What is Temp reading -

Can We give them a table

MA V.S Temp @ 5 ½ Amps.

TEMPERATURE RANGE: 1000 TO 1600 DEGREES C
SPECTRUM: 0.70 TO 1.00 MICRONS

OUTPUT IN uAMPS

DEG. C	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1000]	0.176	0.178	0.180	0.182	0.183	0.185	0.187	0.189	0.191	0.193
[1010]	0.194	0.196	0.198	0.200	0.202	0.204	0.206	0.208	0.210	0.212
[1020]	0.214	0.216	0.218	0.220	0.222	0.224	0.226	0.229	0.231	0.233
[1030]	0.235	0.237	0.240	0.242	0.244	0.246	0.249	0.251	0.253	0.256
[1040]	0.258	0.260	0.263	0.265	0.268	0.270	0.273	0.275	0.278	0.280
[1050]	0.283	0.285	0.288	0.291	0.293	0.296	0.299	0.301	0.304	0.307
[1060]	0.310	0.312	0.315	0.318	0.321	0.324	0.327	0.330	0.333	0.336
[1070]	0.339	0.342	0.345	0.348	0.351	0.354	0.357	0.360	0.363	0.366
[1080]	0.370	0.373	0.376	0.379	0.383	0.386	0.389	0.393	0.396	0.400
[1090]	0.403	0.407	0.410	0.414	0.417	0.421	0.424	0.428	0.432	0.435
[1100]	0.439	0.443	0.447	0.450	0.454	0.458	0.462	0.466	0.470	0.474
[1110]	0.478	0.482	0.486	0.490	0.494	0.498	0.502	0.506	0.510	0.515
[1120]	0.519	0.523	0.528	0.532	0.536	0.541	0.545	0.550	0.554	0.559
[1130]	0.563	0.568	0.573	0.577	0.582	0.587	0.591	0.596	0.601	0.606
[1140]	0.611	0.616	0.621	0.626	0.631	0.636	0.641	0.646	0.651	0.656
[1150]	0.661	0.667	0.672	0.677	0.683	0.688	0.693	0.699	0.704	0.710
[1160]	0.716	0.721	0.727	0.733	0.738	0.744	0.750	0.756	0.761	0.767
[1170]	0.773	0.779	0.785	0.791	0.798	0.804	0.810	0.816	0.822	0.829
[1180]	0.835	0.841	0.848	0.854	0.861	0.867	0.874	0.880	0.887	0.894
[1190]	0.901	0.907	0.914	0.921	0.928	0.935	0.942	0.949	0.956	0.963
[1200]	0.970	0.978	0.985	0.992	0.999	1.007	1.014	1.022	1.029	1.037
[1210]	1.045	1.052	1.060	1.068	1.075	1.083	1.091	1.099	1.107	1.115
[1220]	1.123	1.131	1.140	1.148	1.156	1.165	1.173	1.181	1.190	1.198
[1230]	1.207	1.216	1.224	1.233	1.242	1.251	1.260	1.268	1.277	1.287
[1240]	1.296	1.305	1.314	1.323	1.333	1.342	1.351	1.361	1.370	1.380
[1250]	1.390	1.399	1.409	1.419	1.429	1.439	1.449	1.459	1.469	1.479
[1260]	1.489	1.499	1.510	1.520	1.530	1.541	1.552	1.562	1.573	1.584
[1270]	1.594	1.605	1.616	1.627	1.638	1.649	1.660	1.672	1.683	1.694
[1280]	1.706	1.717	1.729	1.740	1.752	1.763	1.775	1.787	1.799	1.811
[1290]	1.823	1.835	1.847	1.860	1.872	1.884	1.897	1.909	1.922	1.934
[1300]	1.947	1.960	1.973	1.986	1.998	2.012	2.025	2.038	2.051	2.064
[1310]	2.078	2.091	2.105	2.118	2.132	2.146	2.160	2.174	2.187	2.202
[1320]	2.216	2.230	2.244	2.258	2.273	2.287	2.302	2.316	2.331	2.346
[1330]	2.361	2.376	2.391	2.406	2.421	2.436	2.452	2.467	2.482	2.498
[1340]	2.514	2.529	2.545	2.561	2.577	2.593	2.609	2.625	2.641	2.658
[1350]	2.674	2.691	2.707	2.724	2.741	2.758	2.775	2.792	2.809	2.826
[1360]	2.843	2.860	2.878	2.895	2.913	2.931	2.949	2.966	2.984	3.002
[1370]	3.021	3.039	3.057	3.075	3.094	3.112	3.131	3.150	3.169	3.188
[1380]	3.207	3.226	3.245	3.264	3.284	3.303	3.323	3.342	3.362	3.382
[1390]	3.402	3.422	3.442	3.463	3.483	3.503	3.524	3.544	3.565	3.586

TEMPERATURE RANGE: 1000 TO 1600 DEGREES C
SPECTRUM: 0.70 TO 1.00 MICRONS

OUTPUT IN uAMPS

DEG. C	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1400]	3.607	3.628	3.649	3.670	3.692	3.713	3.734	3.756	3.778	3.800
[1410]	3.821	3.844	3.866	3.888	3.910	3.933	3.955	3.978	4.000	4.023
[1420]	4.046	4.069	4.092	4.116	4.139	4.162	4.186	4.210	4.234	4.257
[1430]	4.281	4.306	4.330	4.354	4.378	4.403	4.428	4.452	4.477	4.502
[1440]	4.527	4.553	4.578	4.603	4.629	4.655	4.680	4.706	4.732	4.758
[1450]	4.785	4.811	4.837	4.864	4.891	4.917	4.944	4.971	4.999	5.026
[1460]	5.053	5.081	5.108	5.136	5.164	5.192	5.220	5.248	5.277	5.305
[1470]	5.334	5.362	5.391	5.420	5.449	5.479	5.508	5.537	5.567	5.597
[1480]	5.627	5.657	5.687	5.717	5.747	5.778	5.808	5.839	5.870	5.901
[1490]	5.932	5.963	5.995	6.026	6.058	6.090	6.121	6.154	6.186	6.218
[1500]	6.250	6.283	6.316	6.349	6.382	6.415	6.448	6.481	6.515	6.549
[1510]	6.582	6.616	6.650	6.685	6.719	6.753	6.788	6.823	6.858	6.893
[1520]	6.928	6.963	6.999	7.034	7.070	7.106	7.142	7.178	7.215	7.251
[1530]	7.288	7.325	7.361	7.399	7.436	7.473	7.511	7.548	7.586	7.624
[1540]	7.662	7.700	7.739	7.777	7.816	7.855	7.894	7.933	7.972	8.012
[1550]	8.052	8.091	8.131	8.171	8.212	8.252	8.293	8.333	8.374	8.415
[1560]	8.456	8.498	8.539	8.581	8.623	8.665	8.707	8.749	8.791	8.834
[1570]	8.877	8.920	8.963	9.006	9.050	9.093	9.137	9.181	9.225	9.269
[1580]	9.314	9.358	9.403	9.448	9.493	9.538	9.584	9.629	9.675	9.721
[1590]	9.767	9.814	9.860	9.907	9.953	10.000	10.048	10.095	10.142	10.190
[1600]	10.237									

TEMPERATURE RANGE: 1000 TO 1600 DEGREES C
SPECTRUM: 0.70 TO 1.00 MICRONS
UNLINEARIZED 4 TO 20 mAMPS

OUTPUT IN uAMPS

DEG. C	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
[1000]	0.176	0.178	0.180	0.182	0.183	0.185	0.187	0.189	0.191	0.193
[1010]	0.194	0.196	0.198	0.200	0.202	0.204	0.206	0.208	0.210	0.212
[1020]	0.214	0.216	0.218	0.220	0.222	0.224	0.226	0.229	0.231	0.233
[1030]	0.235	0.237	0.240	0.242	0.244	0.246	0.249	0.251	0.253	0.256
[1040]	0.258	0.260	0.263	0.265	0.268	0.270	0.273	0.275	0.278	0.280
[1050]	0.283	0.285	0.288	0.291	0.293	0.296	0.299	0.301	0.304	0.307
[1060]	0.310	0.312	0.315	0.318	0.321	0.324	0.327	0.330	0.333	0.336
[1070]	0.339	0.342	0.345	0.348	0.351	0.354	0.357	0.360	0.363	0.366
[1080]	0.370	0.373	0.376	0.379	0.383	0.386	0.389	0.393	0.396	0.400
[1090]	0.403	0.407	0.410	0.414	0.417	0.421	0.424	0.428	0.432	0.435
[1100]	0.439	0.443	0.447	0.450	0.454	0.458	0.462	0.466	0.470	0.474
[1110]	0.478	0.482	0.486	0.490	0.494	0.498	0.502	0.506	0.510	0.515
[1120]	0.519	0.523	0.528	0.532	0.536	0.541	0.545	0.550	0.554	0.559
[1130]	0.563	0.568	0.573	0.577	0.582	0.587	0.591	0.596	0.601	0.606
[1140]	0.611	0.616	0.621	0.626	0.631	0.636	0.641	0.646	0.651	0.656
[1150]	0.661	0.667	0.672	0.677	0.683	0.688	0.693	0.699	0.704	0.710
[1160]	0.716	0.721	0.727	0.733	0.738	0.744	0.750	0.756	0.761	0.767
[1170]	0.773	0.779	0.785	0.791	0.798	0.804	0.810	0.816	0.822	0.829
[1180]	0.835	0.841	0.848	0.854	0.861	0.867	0.874	0.880	0.887	0.894
[1190]	0.901	0.907	0.914	0.921	0.928	0.935	0.942	0.949	0.956	0.963
[1200]	0.970	0.978	0.985	0.992	0.999	1.007	1.014	1.022	1.029	1.037
[1210]	1.045	1.052	1.060	1.068	1.075	1.083	1.091	1.099	1.107	1.115
[1220]	1.123	1.131	1.140	1.148	1.156	1.165	1.173	1.181	1.190	1.198
[1230]	1.207	1.216	1.224	1.233	1.242	1.251	1.260	1.268	1.277	1.287
[1240]	1.296	1.305	1.314	1.323	1.333	1.342	1.351	1.361	1.370	1.380
[1250]	1.390	1.399	1.409	1.419	1.429	1.439	1.449	1.459	1.469	1.479
[1260]	1.489	1.499	1.510	1.520	1.530	1.541	1.552	1.562	1.573	1.584
[1270]	1.594	1.605	1.616	1.627	1.638	1.649	1.660	1.672	1.683	1.694
[1280]	1.706	1.717	1.729	1.740	1.752	1.763	1.775	1.787	1.799	1.811
[1290]	1.823	1.835	1.847	1.860	1.872	1.884	1.897	1.909	1.922	1.934
[1300]	1.947	1.960	1.973	1.986	1.998	2.012	2.025	2.038	2.051	2.064
[1310]	2.078	2.091	2.105	2.118	2.132	2.146	2.160	2.174	2.187	2.202
[1320]	2.216	2.230	2.244	2.258	2.273	2.287	2.302	2.316	2.331	2.346
[1330]	2.361	2.376	2.391	2.406	2.421	2.436	2.452	2.467	2.482	2.498
[1340]	2.514	2.529	2.545	2.561	2.577	2.593	2.609	2.625	2.641	2.658
[1350]	2.674	2.691	2.707	2.724	2.741	2.758	2.775	2.792	2.809	2.826
[1360]	2.843	2.860	2.878	2.895	2.913	2.931	2.949	2.966	2.984	3.002
[1370]	3.021	3.039	3.057	3.075	3.094	3.112	3.131	3.150	3.169	3.188
[1380]	3.207	3.226	3.245	3.264	3.284	3.303	3.323	3.342	3.362	3.382
[1390]	3.402	3.422	3.442	3.463	3.483	3.503	3.524	3.544	3.565	3.586

TEMPERATURE RANGE: 1000 TO 1600 DEGREES C
SPECTRUM: 0.70 TO 1.00 MICRONS
UNLINEARIZED 4 TO 20 mAMPS

DEG. C	[0]	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
					OUTPUT IN uAMPS					
[1400]	3.607	3.628	3.649	3.670	3.692	3.713	3.734	3.756	3.778	3.800
[1410]	3.821	3.844	3.866	3.888	3.910	3.933	3.955	3.978	4.000	4.023
[1420]	4.046	4.069	4.092	4.116	4.139	4.162	4.186	4.210	4.234	4.257
[1430]	4.281	4.306	4.330	4.354	4.378	4.403	4.428	4.452	4.477	4.502
[1440]	4.527	4.553	4.578	4.603	4.629	4.655	4.680	4.706	4.732	4.758
[1450]	4.785	4.811	4.837	4.864	4.891	4.917	4.944	4.971	4.999	5.026
[1460]	5.053	5.081	5.108	5.136	5.164	5.192	5.220	5.248	5.277	5.305
[1470]	5.334	5.362	5.391	5.420	5.449	5.479	5.508	5.537	5.567	5.597
[1480]	5.627	5.657	5.687	5.717	5.747	5.778	5.808	5.839	5.870	5.901
[1490]	5.932	5.963	5.995	6.026	6.058	6.090	6.121	6.154	6.186	6.218
[1500]	6.250	6.283	6.316	6.349	6.382	6.415	6.448	6.481	6.515	6.549
[1510]	6.582	6.616	6.650	6.685	6.719	6.753	6.788	6.823	6.858	6.893
[1520]	6.928	6.963	6.999	7.034	7.070	7.106	7.142	7.178	7.215	7.251
[1530]	7.288	7.325	7.361	7.399	7.436	7.473	7.511	7.548	7.586	7.624
[1540]	7.662	7.700	7.739	7.777	7.816	7.855	7.894	7.933	7.972	8.012
[1550]	8.052	8.091	8.131	8.171	8.212	8.252	8.293	8.333	8.374	8.415
[1560]	8.456	8.498	8.539	8.581	8.623	8.665	8.707	8.749	8.791	8.834
[1570]	8.877	8.920	8.963	9.006	9.050	9.093	9.137	9.181	9.225	9.269
[1580]	9.314	9.358	9.403	9.448	9.493	9.538	9.584	9.629	9.675	9.721
[1590]	9.767	9.814	9.860	9.907	9.953	10.000	10.048	10.095	10.142	10.190
[1600]	10.237									

IRCON

Engineering Special or System Request

Page ___ of ___

From: R Frutchey

Date 3/31/00

To: Joe Lahner -

Customer: Unique Electronics

Description of Request: E724

Base standard model or series:

Price & Delivery - Quantity (1)

KAWASO PAID 4G.'S 11/14/98

Details of specific approval:

1 only $2000. IF CUSTOMER BALKS GO TO $1,750. IF HE BALKS AGAIN, GO TO $1500, ~~IF~~ HE BALK AGAIN GO TO....

.....

$200 is IRCON cost. IF HE BALKS AGAIN GO TO ----.

Specific Exceptions:

Price: See Above (adder to standard)

Delivery: 3-4wks (adder to standard)

Approved by: J. Lahner

Date: 3-31-2000

Form No. O1006 Rev B

Acknowledgment

IRCON

IRCON, INC.
7300 N. Natchez Ave.
Niles, IL 60714 USA

Phone 847-967-5151
Toll Free 800-323-7660
Fax 847-647-0948

SCHEDULED SHIPPING WEEK ENDING: 11/14/98

SOLD TO — CUSTOMER NO.: 004702

KAWASO ELEC. INDUSTRIAL
NANKYOKU BLDG 2F, 7-51 6-CHOME
ITACHIBORI, NISHIKU
OSAKA JAPAN

OUR ORDER NO.: PD 308486/00 — ORDER DATE: 10/22/98

YOUR ORDER NO.: 98KI052

TERMS: X NET 30 / OTHER

F.O.B.: X NILES, ILLINOIS

SHIPPING ADDRESS — TAX CODE: NO TAX

KAWASO ELECTRIC INDUSTRIAL CO.
NANKYOKU BLDG 2F, 7-51 6-CHOME
ITACHIBORI, NISHIKU
OSAKA JAPAN

CODE: 751 .00

VIA: KINTETSU EXPRES — PPD. — COLL.: X

SPECIAL SHIPPING INSTRUCTIONS

TEST DOCUMENTATION REQUIRED

0/22/98 PAGE 1

LINE NO.	PART NO.	QTY.	DESCRIPTION	UNIT MEAS	DISCOUNT %	PRICE EACH U.S. DOLLAR	AMOUNT U.S. DOLLAR
01		1	MOD II SENSING HEAD W/O CABLE MODEL 22999 SERIAL NBR 019219 ********** * * * SPECIAL Z999 * * * ********** !!!!!!!!!!WARNING!!!!!!!!!! ** SPL # TO BE DETERMINED ** ** SEE ENGINEERING DEPT. **	EA		2000.00	2000.00
			SUB TOTALS				2000.00
			GRAND TOTAL				2000.00

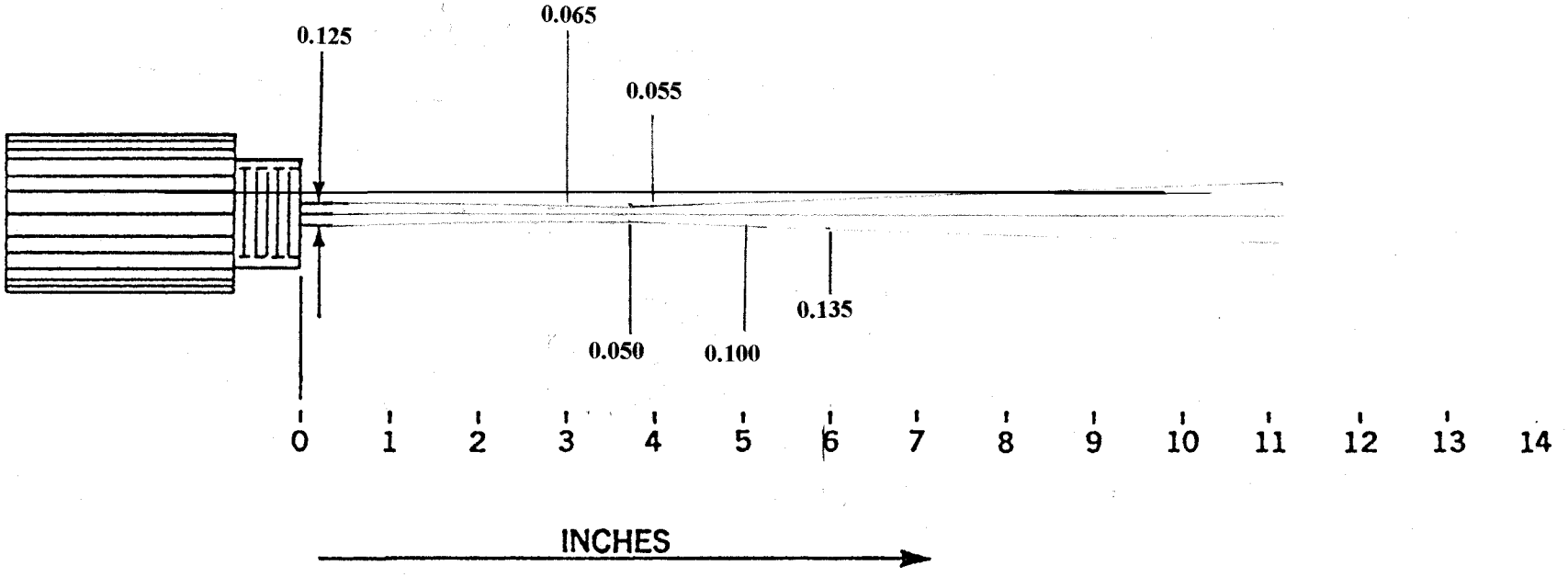
Redo Special No E724
Special Mod II
Sensor only
RAB 10/23

THIS ORDER IS ACCEPTED SUBJECT TO TERMS AND CONDITIONS SHOWN ON THIS AND THE REVERSE SIDE

IF TAX EXEMPT, PLEASE PROVIDE COPY OF EXEMPTION OR DIRECT PAYMENT CERTIFICATE.

Ship To: IRCON, INC.
7300 N. NATCHEZ AVE.
NILES, IL 60714 USA

ORIGINAL


0.125
0.065
0.055
0.050
0.100
0.135
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1
2
3
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7
8
9
10
11
12
13
14
INCHES

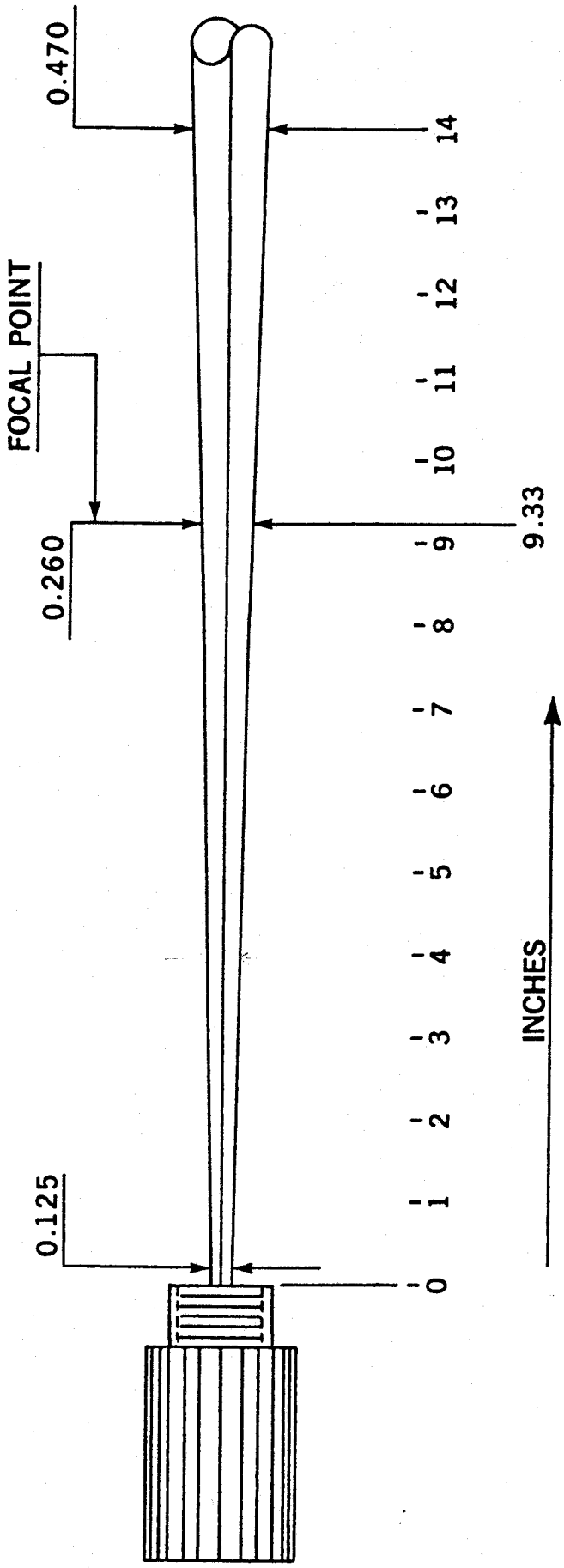
move Detector Back 0.2" 11

Use 0.014

F. STOP = 0.03"

I_{se} 2000°F

.4365 μH



Need 0.1" spool at 4"

MODLINE PLUS SPECIAL NUMBER CONTINUED,

$I_{SC}^{F.S.} = 2.343\mu A$
$I_{SC}^{3.3} = 3mA$!!
1.49 - 1.6 μ

BILL OF MATERIAL

MODEL: 2-99F05

MODULE M1 REFERENCE: DWG.NO.C-10864

SYMBOL	PART NO.	DESCRIPTION		
R45	101582011	RESISTOR	15.8 Kohm	METAL FILM 1/4W 1%
R55	105902011	RESISTOR	59.0 Kohm	METAL FILM 1/4W 1%
R46	101022011	RESISTOR	10.2 Kohm	METAL FILM 1/4W 1%
R56	101003011	RESISTOR	100 Kohm	METAL FILM 1/4W 1%
R47	106191011	RESISTOR	6.19 Kohm	METAL FILM 1/4W 1%
R57	101743011	RESISTOR	174 Kohm	METAL FILM 1/4W 1%
R48	103571011	RESISTOR	3.57 Kohm	METAL FILM 1/4W 1%
R58	103163011	RESISTOR	316 Kohm	METAL FILM 1/4W 1%
R49	101961011	RESISTOR	1.96 Kohm	METAL FILM 1/4W 1%
R59	106193011	RESISTOR	619 Kohm	METAL FILM 1/4W 1%
R50	101001011	RESISTOR	1.00 Kohm	METAL FILM 1/4W 1%
R60	101274011	RESISTOR	1.27 Mohm	METAL FILM 1/4W 1%
R51	104750011	RESISTOR	475 ohm	METAL FILM 1/4W 1%
R61	102674011	RESISTOR	2.67 Mohm	METAL FILM 1/4W 1%
R52	102150011	RESISTOR	215 ohm	METAL FILM 1/4W 1%
R53	101470011	RESISTOR	147 ohm	METAL FILM 1/4W 1%
R62	106194011	RESISTOR	6.19 Mohm	METAL FILM 1/4W 1%
R1	101374011	RESISTOR	1.37 Mohm	METAL FILM 1/4W 1%

MODULE M2 REFERENCE: DWG.NO.C-10865

SYMBOL	PART NO.	DESCRIPTION		
R44	101871011	RESISTOR	18.7 Kohm	METAL FILM 1/4W 1%
R54	101273011	RESISTOR	127 Kohm	METAL FILM 1/4W 1%
R25	101001011	RESISTOR	1.00 Kohm	METAL FILM 1/4W 1%
J2	100000990	JUMPER, DUMMY RESISTOR		
J1	100000990	JUMPER, DUMMY RESISTOR		
C07	52102-2	CAPACITOR	33pF	CERAMIC
R36	101374011	RESISTOR	1.37 Mohm	METAL FILM 1/4W 1%
R38	102672011	RESISTOR	26.7 Kohm	METAL FILM 1/4W 1%
R39	101621011	RESISTOR	1.62 Kohm	METAL FILM 1/4W 1%
R40	101331011	RESISTOR	1.33 Kohm	METAL FILM 1/4W 1%

TEMPERATURE RANGE: 900 TO 2500 DEGREES F
SPECTRUM: 1.49 TO 1.60 MICRONS
(current output is nonlinear with Planck)

TEMP.IN DEG. F	% SIGNAL	Iout IN uAMPS
900.0	0.128	0.0009
950.0	0.198	0.0014
1000.0	0.298	0.0021
1050.0	0.435	0.0030
1100.0	0.620	0.0043
1150.0	0.866	0.0060
1200.0	1.184	0.0082
1250.0	1.590	0.0111
1300.0	2.100	0.0146
1350.0	2.732	0.0190
1400.0	3.503	0.0244
1450.0	4.434	0.0309
1500.0	5.546	0.0386
1550.0	6.860	0.0477
1600.0	8.399	0.0585
1650.0	10.185	0.0709
1700.0	12.241	0.0852
1750.0	14.590	0.1015
1800.0	17.256	0.1201
1850.0	20.263	0.1410
1900.0	23.632	0.1645
1950.0	27.387	0.1906
2000.0	31.550	0.2196
2050.0	36.143	0.2516
2100.0	41.186	0.2867
2150.0	46.699	0.3250
2200.0	52.703	0.3668
2250.0	59.216	0.4121
2300.0	66.255	0.4611
2350.0	73.838	0.5139
2400.0	81.979	0.5706
2450.0	90.696	0.6312
2500.0	100.000	0.6960

3 mA

SPAN

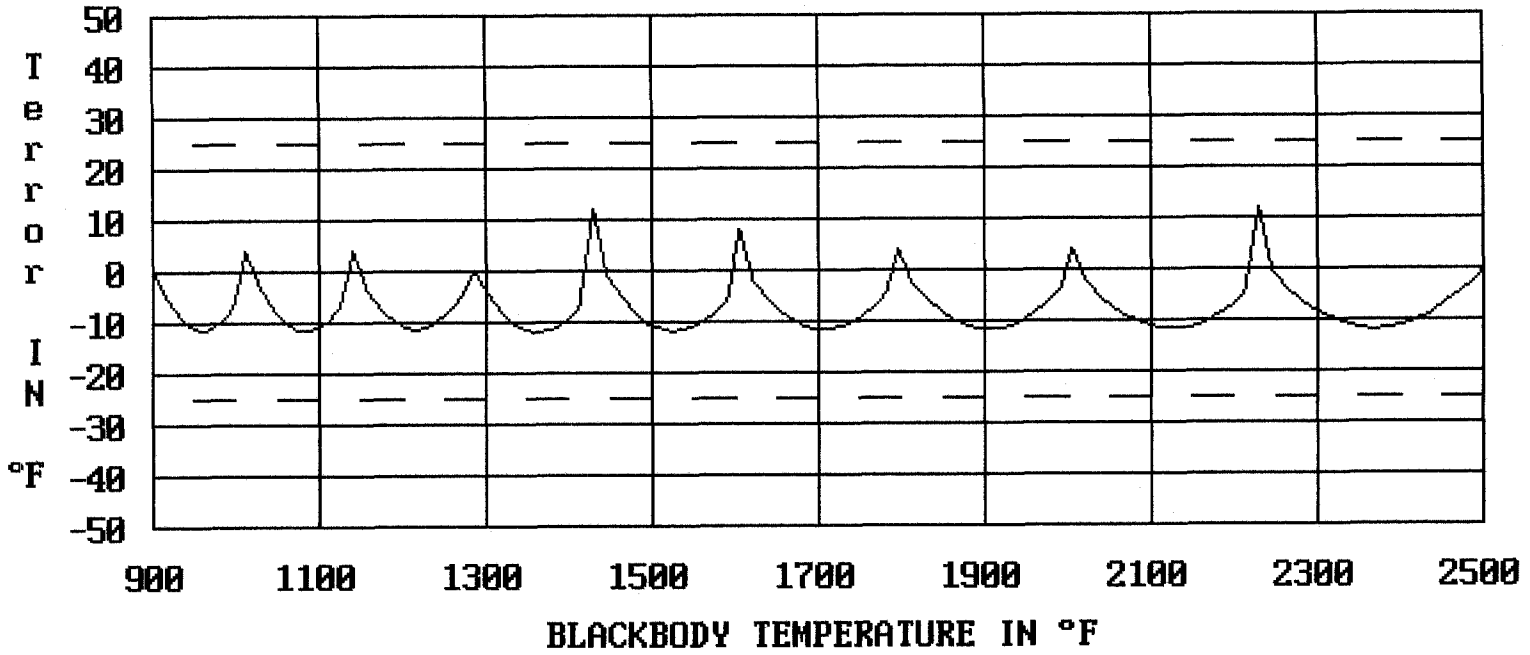
780/1

2,393 μA

1" @ 4.75"

MODLINE PLUS LINEARIZER ERROR CURVE

DATE: 06-12-1996
REV.
SPECIAL NO.
MODEL NO.2-99F05
TEMP.SPAN: 900 - 2500 DEG.F
SPECTRUM: 1.49 - 1.6 MICRONS



I short circuit
(R702 SENSING HEAD)

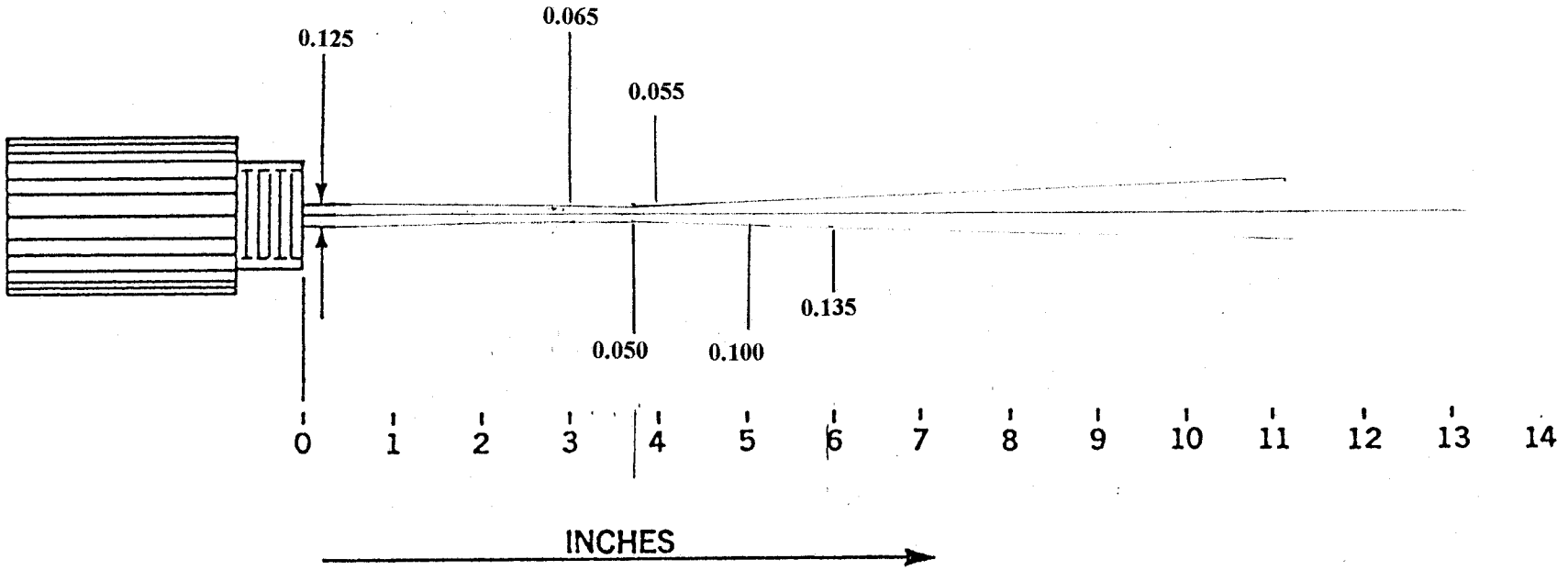
6-18-96
A.D.

2500°F	2.343 μA (ADJUSTED)
2400	1.923
2300	1.551
2200	1.236
2100	.965
2000	.738
1900	.551
1800	.402
1700	.285
1600	.195
1500	.128
1000°F	.007
900	.003

SPECIAL R702
SYSTEM OUTPUT

6-19-96
AD

2500°F	20.00 mA (ADJUSTED)
2400	18.93
2300	17.96
2200	16.96
2100	15.94
2000	14.99
1900	13.94
1800	13.03
1700	11.92
1600	10.97
1500	9.90
900°F	4.00 (ADJUSTED)


0.125
0.065
0.055
0.050
0.100
0.135
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
INCHES

DATE: 06-13-1996
REVISION: A
CUSTOMER: IRCON INC.
LOCATION: NILES, IL

INFRARAIL SPECIAL NUMBER R702

PURPOSE AND DESCRIPTION:

CUSTOMER REQUIRES A INFRARAIL SIGNAL CONDITIONER TO BE MATED WITH A SPECIAL SENSING HEAD SIMILAR TO SPECIAL E724. THE SENSING HEAD IS TO MEASURE A SPOT OF 0.1" AT A DISTANCE OF 4.75" WITH A TEMPERATURE RANGE OF 900 TO 2500 DEGREES F.

MODEL: DN999-99F
RANGE: 900 - 2500 DEG. F
OPTICAL RESOLUTION: 0.1" AT 4.75"
WAVELENGTH: 1.49 - 1.6 um

GENERALITY OF APPLICATION AND RESTRICTIONS:

RESTRICTIONS:
1. EMISSIVITY RESTRICTED TO A MINIMUM VALUE OF 0.8 FROM 900° F TO 1000° F.
2. AVOID EXCESSIVE BENDING OR FLEXING OF THE SENSING HEAD CABLE WHILE TAKING TEMPERATURE MEASUREMENTS. DO NOT PLACE THE SENSING HEAD OR CABLE IN ENVIRONMENTS WITH LARGE VIBRATIONS.

UNRESTRICTED: SUITABLE FOR USE WITH ALL STANDARD OPTIONS.

WRITTEN BY: J. Tak

APPROVED BY: J. Tak DATE: 6/13/96

INFRARAIL SPECIAL NUMBER R702

REVISION: A
DATE: 06-13-1996

PRODUCTION INSTRUCTIONS:

START WITH A MODEL DNE31-24F ELECTRONICS MODULE, AND INSTALL M1 MODULE
AS PER BILL OF MATERIAL ON PAGE 3.
DELIVER THE CABLE TO ENGINEERING FOR MODIFICATION. NO CONNECTOR IS REQUIRED
FOR THIS SPECIAL.
SECURE FROM ENGINEERING THE SPECIAL SENSING HEAD.

CALIBRATION INSTRUCTIONS:

ENGINEERING WILL PROVIDE ASSISTANCE WITH INITIAL CALIBRATION AND TESTING OF THIS
UNIT. UPON COMPLETION DELIVER THE UNIT TO ENGINEERING FOR CE TESTING!!
CALIBRATE AS PER STANDARD.

MANUAL INSTRUCTIONS:

GENERIC INFRARAIL SERIES MANUAL.

INFRARAIL SPECIAL NUMBER R702

REVISION: A
DATE: 06-13-1996

M1 MODULE ASSEMBLY BILL OF MATERIAL

SYMBOL	PART NO.	DESCRIPTION		
R1	101374011	RESISTOR	1.37 MOHM	METAL FILM 1/4W 1%
R44	101872011	RESISTOR	18.7K OHM	METAL FILM 1/4W 1%
R54	101273011	RESISTOR	127K OHM	METAL FILM 1/4W 1%
R45	101582011	RESISTOR	15.8K OHM	METAL FILM 1/4W 1%
R55	105902011	RESISTOR	59.0K OHM	METAL FILM 1/4W 1%
R46	101022011	RESISTOR	10.2K OHM	METAL FILM 1/4W 1%
R56	101003011	RESISTOR	100K OHM	METAL FILM 1/4W 1%
R47	106191011	RESISTOR	6.19K OHM	METAL FILM 1/4W 1%
R57	101743011	RESISTOR	174K OHM	METAL FILM 1/4W 1%
R48	103571011	RESISTOR	3.57K OHM	METAL FILM 1/4W 1%
R58	103163011	RESISTOR	316K OHM	METAL FILM 1/4W 1%
R49	101961011	RESISTOR	1.96K OHM	METAL FILM 1/4W 1%
R59	106193011	RESISTOR	619K OHM	METAL FILM 1/4W 1%
R50	101001011	RESISTOR	1.00K OHM	METAL FILM 1/4W 1%
R60	101274011	RESISTOR	1.27M OHM	METAL FILM 1/4W 1%
R51	104750011	RESISTOR	475 OHM	METAL FILM 1/4W 1%
R61	102674011	RESISTOR	2.67M OHM	METAL FILM 1/4W 1%
R52	102150011	RESISTOR	215 OHM	METAL FILM 1/4W 1%
R53	101470011	RESISTOR	147 OHM	METAL FILM 1/4W 1%
R62	106194011	RESISTOR	6.19M OHM	METAL FILM 1/4W 1%

FOX TOOL CO., INC.

1665 N. Milwaukee Avenue
Chicago, Illinois 60647
Phone: (312) 235-5283
Fax #: (312) 235-5075

==========QUOTE ACKNOWLEDGEMENT==========

QUOTE DATE	REQUEST FOR QUOTE ID	CUST. ID	QUOTE ID	TERMS
04/30/96	QUOTES	100001	000311	

TO: IRCON, INC.
7300 N. NATCHEZ AVENUE

NILES IL
60714

ATTENTION: RON DEFOE
847-967-5151

FREIGHT:

DATE DUE: 04/30/96 SALESMAN: ESTIMATOR: 01

PART NUMBER / DESCRIPTION	REV	QUANTITY	UNIT PRICE
45438-2 PLATE ADJUSTMENT (DIRTY WINDOW TESTER) cc. Pete P. 5/2		2	60.00
44748-2 SPACER .460 I.D (PARTS QUOTED BLACK ANODIZE PER JOE LACKNER)	A	20	12.00

cc 5/2

THANK YOU FOR THE INQUIRY.

JOSEPH W. LIS

4/12

07/25/97 03:14 PM

IRCON

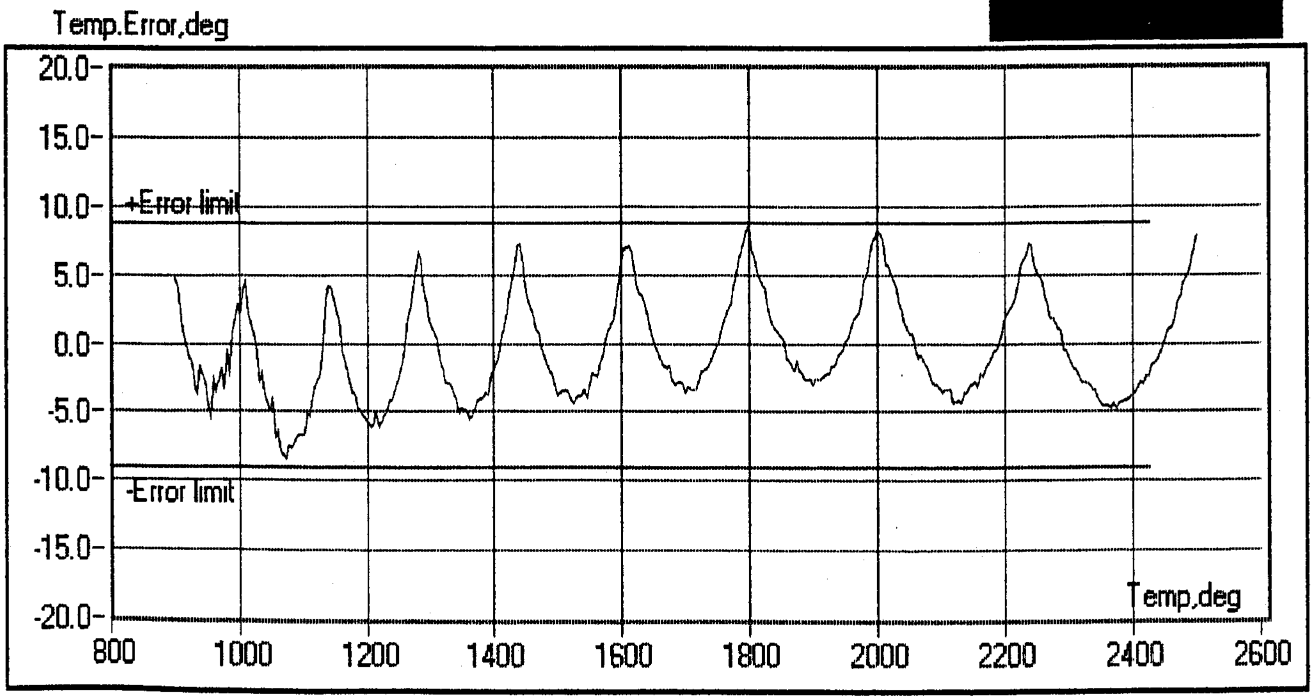
INFRARAIL CALIBRATION TEST REPORT

TECHNICIAN# 595 SERIAL# 1876

MODEL# DN 999-99F SPECIAL# R702

FULL SCALE	2500F	FS CURRENT=	2.343	uA	λmax=	1.60
ZERO SCALE	900F	ZS CURRENT=	0.003	uA	λmin=	1.49

TEST NAME	SPEC.	TEST RESULT	EVAL
1. REFERENCE 3.2 V	3.2 ±0.005 V	3.200	P
2. CURRENT OUTPUT	4 ±0.05 mA	4.00	P
	20 ±0.05 mA	20.02	
3. LINEARIZER TEST			P
4. EMISSIVITY CONTROL			P
5. RESPONSE TIME	10 ±2 S	10.4	P
	10 ±2 mS	10.0	
6. P-P DECAY RATE	< 0.05%	0.041	P
	5 - 6.5 %	6.3	[redacted]



Tech#________ DATE__________ QA#__________ 1472 to 165

Resistor on Module was changed from R53: 1472 to 165 oh

07/25/97 03:36 PM

IRCON

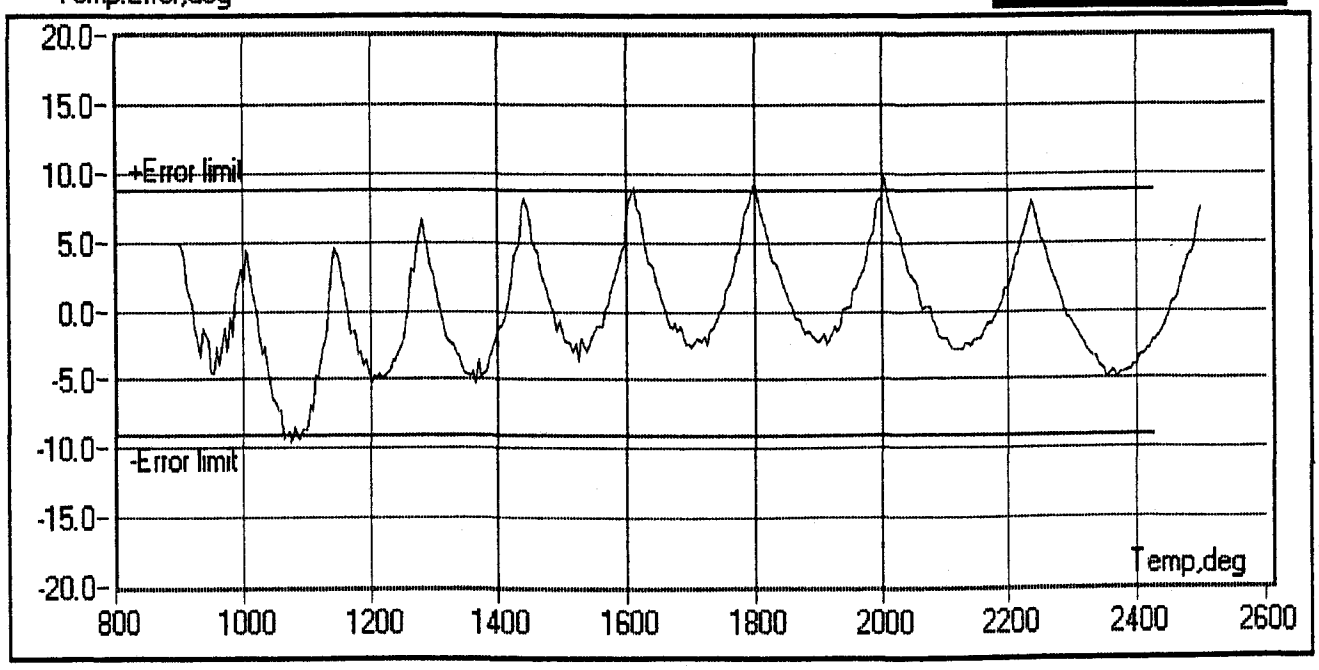
INFRARAIL CALIBRATION TEST REPORT

TECHNICIAN# 273 SERIAL# 1877

MODEL# DN 999-99F SPECIAL# R702

FULL SCALE	2500F	FS CURRENT=	2.343	uA	λmax= 1.60
ZERO SCALE	900F	ZS CURRENT=	0.003	uA	λmin= 1.49

TEST NAME	SPEC.	TEST RESULT	EVAL
1. REFERENCE 3.2 V	3.2 ±0.005 V	3.200	P
2. CURRENT OUTPUT	4 ±0.05 mA	4.00	P
	20 ±0.05 mA	20.00	
3. LINEARIZER TEST			F
4. EMISSIVITY CONTROL			P
5. RESPONSE TIME	10 ±2 S	11.3	P
	10 ±2 mS	11.0	
6. P-P DECAY RATE	< 0.05%	0.048	P
	5 - 6.5 %	6.4	



Tech#_____ DATE_____ QA#_____

without changing resistor value on Module.

07/25/97 03:48 PM

IRCON

INFRARAIL CALIBRATION TEST REPORT

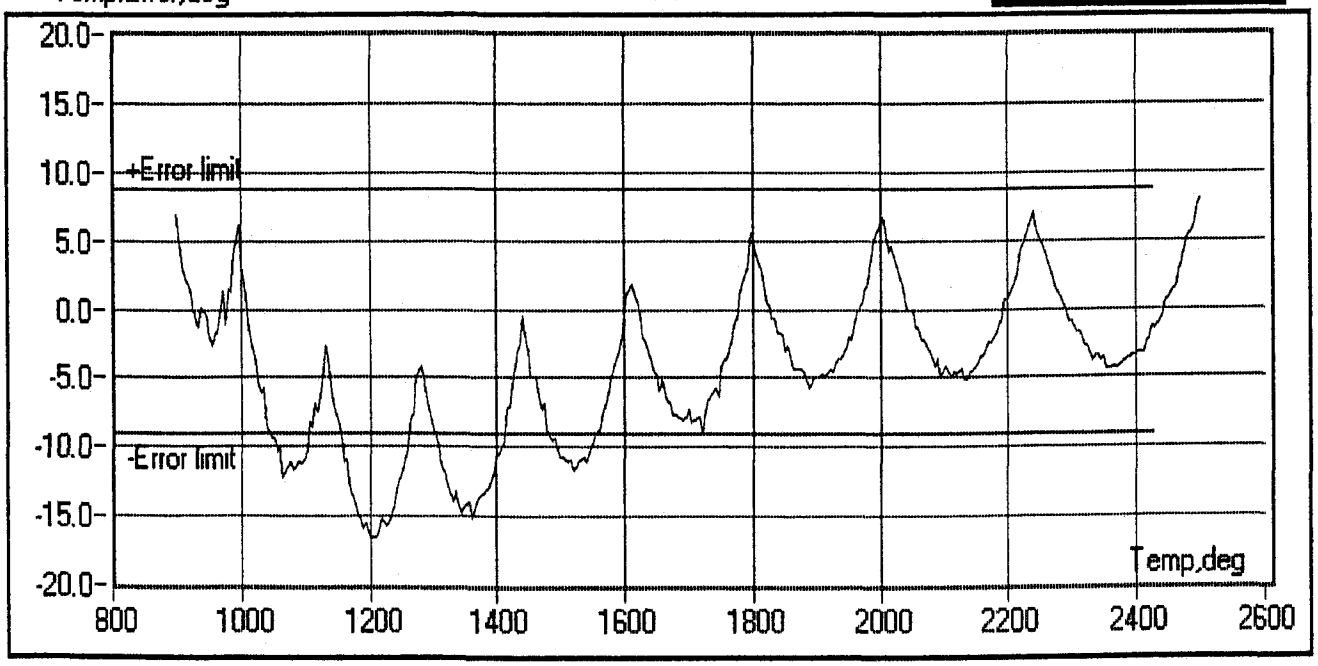
TECHNICIAN# 273 SERIAL# 1874

MODEL# DN 999-99F SPECIAL# R702

FULL SCALE	2500F	FS CURRENT=	2.343	uA	λmax=	1.60
ZERO SCALE	900F	ZS CURRENT=	0.003	uA	λmin=	1.49

TEST NAME	SPEC.	TEST RESULT	EVAL
1. REFERENCE 3.2 V	3.2 ±0.005 V	3.200	P
2. CURRENT OUTPUT	4 ±0.05 mA	4.01	P
	20 ±0.05 mA	20.01	
3. LINEARIZER TEST			F
4. EMISSIVITY CONTROL			P
5. RESPONSE TIME	10 ±2 S	10.1	P
	10 ±2 mS	11.0	
6. P-P DECAY RATE	< 0.05%	0.054	P
	5 - 6.5 %	6.5	

[redacted]



Tech#_____ DATE_____ QA#_____

Without changing Resistor Value on Module

DWG. NO. 56005-2

THIS PRINT SUPERSEDES ANY PRINT PRIOR TO 5/12/95

DWG. NO. -56005-2

REVISIONS

A	ECO# 3425 CHG LENGTH 1000' ±2% TO ±5%, ECHO 2500 5/12/95 BE JR

CONSTRUCTION DETAILS FOR IRCON CABLE
IRCON PART NO. 56005-2

ITEM NO.1:

ITEM NO.1 SHALL CONSIST OF 2 CONDUCTORS OF NO.22 AWG (16X34 TINNED COPPER) CABLED WITH A NO.22 AWG (16X34 TINNED COPPER) DRAIN WIRE. INSULATION OF THE ABOVE 2 CONDUCTORS SHALL BE PVC INSULATION RATED AT 105°C OPERATING TEMPERATURE. (MIN. WALL THICKNESS 0.014") THE COLORS OF THE ABOVE 2 CONDUCTORS SHALL BE RED AND BLACK.

ITEM NO.2:

ITEM NO.2 SHALL BE A NO.36 AWG TINNED COPPER BRAIDED SHIELD WITH 92% COVERAGE. THE SHIELD SHALL BE CABLED AROUND ITEM NO.1.

ITEM NO.3:

PAPER TAPE WRAP

ITEM NO.4:

CABLE JACKET
THE OVERALL CABLE JACKET SHALL BE BLACK PVC RATED AT 105°C OPERATING TEMPERATURE. NOMINAL WALL THICKNESS TO BE 0.035 INCHES. THE OUTER CABLE DIAMETER SHALL BE MAINTAINED AT 0.212 INCHES ± 0.005 INCHES. IRCON PART NO. (AS SHOWN) SHALL BE PRINTED ON THE CABLE APPROXIMATELY EVERY 12 INCHES. THE PART NO. SHALL BE PRINTED ON THE CABLE USING WHITE INK THAT IS RESISTANT TO COMMON "CABLE PULL" LUBRICANTS.

NEXT HIGHER ASS'Y

NEXT LOWER ASS'Y

USED ON

ESS OTHERWISE SPECIFIED DO NOT SCALE PRINT

E SPECIFIED)
D HOLES
PARTS
RNAL
NAL

DRAWN BY	DATE
KAM	4-5-78

APPROVED BY

M.E.	E.E.
	WJK

SCALE ~

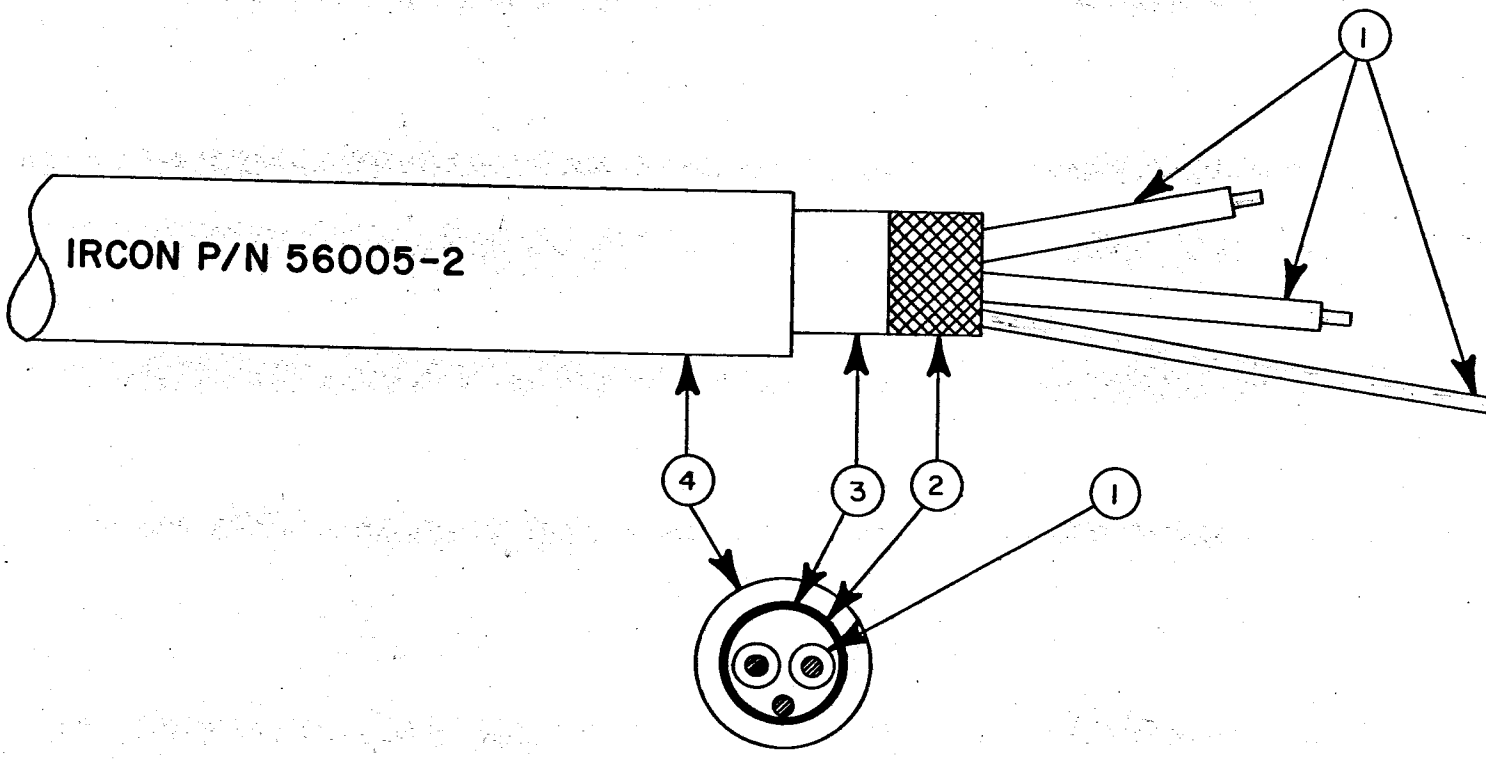
IRCON.

IRCON, INC.
7555 N. LINDER AVENUE, SKOKIE, ILLINOIS 60076
(312) 967-5151 TELEX 72-4412

TITLE
1100/2000 SERIES CABLE

DRAWING NO. -56005-2

REV. A



NOTES:

1. USE HIGH-STRENGTH FILLERS.
2. SPOOL 1000 FT. ±5% MINIMUM LENGTH 1000 FT. ±5% FOR 90% OF ORDER. 10% OF ORDER MAY BE LENGTHS OF 100 FT TO 1000 FT PROVIDED THAT EACH LENGTH IS SEPARATELY SPOOLED OR IN INDIVIDUAL "HANKS" AND IS MARKED WITH THE ACTUAL LENGTH ON EACH PIECE.
3. BOTH ENDS OF EACH CABLE LENGTH TO BE EXPOSED 6" TO 8" FOR INCOMING ELECTRICAL TESTS.

ALL DIMENSIONS ARE IN INCHES UN

TOLERANCES (UNLESS OTHERW
± .010 ALL DIMENSIONS EXCEPT ROU
± .002 ALL ROUND HOLES AND ROU
± ½° ALL ANGLES
± .010 T.I.R. CONCENTRICITY
ALL THREADS TO BE CLASS -2A EXT
CLASS -2B INT

DRAWING (S) TOO LARGE TO SCAN.
TO VIEW THE ORIGINAL DESIGN,
A REQUEST TO VIEW PHYSICAL FILE
IS YOUR NEXT OPTION.