



NATIONAL RADIO ASTRONOMY OBSERVATORY

ELECTRONICS DIVISION TECHNICAL NOTE NO. 104

TITLE: Cryogenic Wire Description

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Cryogenic Wire Description

S. Weinreb, January 1982

Description - The wire is #32 (.2 mm or .008" diameter) soft brass (type 260) which gives lower thermal conductivity and higher strength than copper at a sacrifice of 2.3 times greater resistance at 300K. It is coated with polyurethane insulation which can be burned off with a soldering iron and is bonded into a red/green pair of wires (bifilar) with polyvinyl butyral bonder. The bonder can be dissolved with alcohol.

Source - Part number B2322111-001 from MWS Precision Wire, 20731 Marilla Street, Chatsworth, California, (213) 882-7620. Price in 1981 was \$0.63 per foot for a 1,000' roll.

Calculated Heat Flow:

For a single wire the heat flow for a 30 cm = 1' length of the brass wire and, for comparison, copper wire is as follows:

<u>Temperature Range</u>	<u>Heat Flow in mW for 1' Length</u>	
	<u>#32 Brass</u>	<u>#32 ETP Copper</u>
300 to 77K	2.0	10
300 to 20K	2.16	16.7
300 to 4K	2.18	22
77 to 20K	0.19	5.9
77 to 4K	0.21	7.9
20 to 4K	.014	1.8
4 to 2K	.0003	.09

DC Resistance:

At 300K the DC resistance is 0.6 ohms per foot.

At 20K the DC resistance is 0.35 ohms per foot.