



2/13/67

Reduction of Thermal Barrier
Heat Leak

The following tables have been updated to more accurately define the characteristics of the conductors crossing the thermal barrier. Significant reductions have been made since ATM-561 was issued 11/2/66. The ALSEP antenna (RG-141) interfaces with a UT-141SS (stainless steel tube) at the thermal barrier (thermal bag) but since the advantage cannot be calculated easily, figures in the tables treat the RG-141 cable as if it were connected to the diplexer filter.

Prepared by: F. Snedeker
F. Snedeker

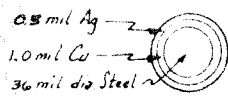
Approved by: L. R. Lewis
L. R. Lewis

ARRAY A

From	To	Total No. of Conductors	No. Copper	AWG	Total X-Section (Circular Mils)	No. Manganin	AWG	Total X-Section (Circular Mils)	Remarks
330	P. S. Elec.	19 shields (288)	4	28	639.2	15 6 x 48 = 288	28 38	2397.0 4527.	Passive Seismic
335	P. S. Elec.	19 shields (288)	4	28	639.2	15 6 x 48 = 288	28 38	2397.0 4527.	Passive Seismic
360	Term. Board	9	-	--	----	9	24	3636.0	Solar Wind
380	Term. Board	18	-	--	----	18	24	7272.0	SIDE
340	Term. Board	15	-	--	----	15	24	6060.0	Magnetometer
322	PCU	12	12	24	4848.0	--	--	-----	RTG
	PDU	13	--	--	----	13	24	5252	
	Timer	4	--	--	----	4	24	1616	
324	Term. Board	8	--	--	----	8	24	3232.0	Power Dissipation Module
323	Term. Board	12	--	--	----	12	24	4848.0	Prim. Structure Thermistor
325	Term. Board	17	--	--	----	17	24	6868.0	Sunshield Thermistors and Dust Detector
326	Term. Board	4	--	--	----	4	24	1616.0	Thermal Bag Thermistors
Astro Switches	PDU	10	--	--	----	10	24	4040.0	Backup switches
	PCU	2	--	--	----	2	24	808.0	
321	P16	Outer braid (112)	112	36	2800				ALSEP Antenna (RG 141)
		Center conductor	See Note 1	--	270				
Total		850	132		9196	718		59096	

TOTAL

NOTE 1: Inner conductor is steel with copper and silver coating. 59096 MANGANIN CIR. MILS 3476 equiv. copper cir. mils
17 Relative thermal conductivity of Manganin to Copper



0.5 mil Ag
 1.0 mil Cu
 36 mil dia Steel
 $Cu + Ag = 225 \text{ cir mils}$
 $Steel = 1295 \text{ cir mils}$
 $Equiv Cu = 225 + \frac{1295}{29} = 270 \text{ cir mils}$

9196 copper cir. mils
3476 equiv. copper cir. mils
12672 Total equiv. copper cir. mils

ARRAY B

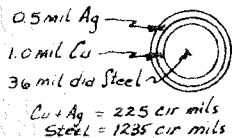
From	To	Conductors	Copper	AWG	Total X-Section (Circular Mils)	No. Manganin	AWG	Total X-Section (Circular Mils)	Remarks
J30	P. S. Elec.	19 Shields (288)	4	28	639.2	15 6 x 48 = 288	28 28	2397.0 4527	Passive Seismic
J35	P. S. Elec.	19 Shields (288)	4	28	639.2	15 6 x 48 = 288	28 38	2397.0 4527	Passive Seismic
J80	Term. Board	18	--	--	-----	18	24	7272.0	SIDE
J65	Term. Board	24	--	--	-----	24	24	9696.0	CPLEE
J70	Term. Board	28	--	--	-----	28	24	11312.0	Heat Flow
J22	PCU	12	12	24	4848.0	--	--	-----	RTG
	PDU	13	--	--	-----	13	24	5252	
	Timer	4	--	--	-----	4	24	1616	
J24	Term. Board	8	--	--	-----	8	24	3232.0	Power Dissipation Module
J23	Term. Board	12	--	--	-----	12	24	4848.0	Prim. Structure Thermistors
J25	Term. Board	13	--	--	-----	13	24	5252.0	Sunshield Thermistors
J26	Term. Board	4	--	--	-----	4	24	1616.0	Thermal Bag Thermistors
Astro Switches	PDU	14	--	--	-----	14	24	5656.0	Backup Switches
	PCU	2	--	--	-----	2	24	808.0	
J50	P10	8	8	28	1278.4				ASE Geophones
		4	4	30	402.0				
J51	Term. Board	4	--	--	-----	4	24	1616.0	ASE Thumper
J52	Term. Board	18	--	--	-----	18	24	7272.0	ASE Mortar
J54	P53	Outer Braid (80)	80	38	1258				ASE Antenna (RG 188)
		Center Conductor	See Note 2	38	19				
J21	P16	Outer Braid (112)	112	36	2800				ALSEP Antenna (RG 141)
		Center Conductor	See Note 1		270				
TOTALS		992	224		12153.8	768		79296.0	

Note 1: Inner conductor is steel with copper and silver coating.

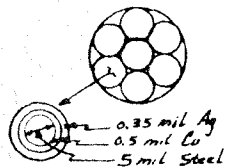
Note 2: Inner conductors are steel with copper and silver coating.

TOTALS

79296 MANGANIN CIR. MILS = 4664 equiv. copper
17 Relative thermal conductivity of Manganin to Copper cir. mils



$Cu + Ag = 225$ cir mils
 $Steel = 1235$ cir mils
 $Equiv. Cu = 225 + \frac{1235}{29} = 270$ cir mils



7 Conductors
 $Cu + Ag = 12.5$ cir mils
 $Steel = 175$ cir mils
 $Equiv. Cu = 12.5 + \frac{175}{29} = 18.53$ cir mils

12154 copper cir. mils
4664 equiv. copper cir. mils
16818 Total equiv. copper cir. mils