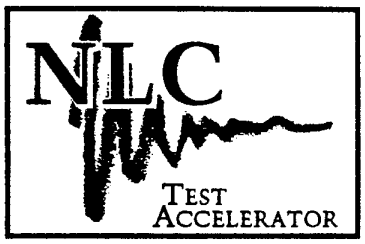

NLCTA-Note #40

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Subject: RF Cable Specifications

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1.0 Introduction

1.1 Purpose

This document describes the specification for the special-purpose RF HELIAX coaxial cable. The purpose of the RF cable is to transport the RF signal from the High Power Transmission Lines and accelerator structures to the Low-Level RF subsystem over a phase stabilized subsystem. The cables will be installed in a building that has ±15°F temperature fluctuation (60°F-90°F). To decrease the phase sensitivity to temperature, the cable assembly will be custom fabricated at Stanford Linear Accelerator Center (SLAC) with a temperature stabilized subsystem that is electronically controlled using a feedback subsystem. A typical cable assembly configuration is shown in Figure 1. This cable assembly is to be used in a very precise RF system in which phase measurements are extremely critical. There are no SLAC Control Program (SCP) demands for this system. A vendor will supply one continuous piece of HELIAX coaxial cable with the following electrical specifications.

2.0 RF Cable General specifications

Specification	Value
Cable type	3/8'" foam Dielectric 50 Ω HELIAX
Operating Frequency	11.424 ± 0.5 GHz
Operating Temperature	110±10°F
Phase/Temp. Coefficient over the temperature range	±20 ppm/°F (max.) †
phased stabilized cable	yes (Andrew's #35422-2)
Characteristic Impedance	50Ω
Operating Humidity	20% - 100%
Size	3/8'" dia.
Operating Power	120 W average (max.)
Attenuation @12 GHz	16 dB/100 ft (max.)
Vibration/shock	N/A
Length	10000 ft (one continuous piece)

3.0 Acceptance Tests

The vendor shall perform a phase measurement on a sample of the cable approximately fifty feet long over the specified operating temperature range to verify the phase/temp. specification listed in section 7.0 of the Andrew's catalog. The cable shall be placed in an enviromental chamber with connectors and using a network analyzer, the thru phase of the cable shall be measured over a temperature range of 60°F-120°F. The raw data and a summary graph shall be sent to SLAC for approval. The results of the acceptance test shall be reviewed by SLAC personnel and SLAC shall respond within 2 weeks after receiving the data.

† Note to calculate the phase change from the phase/temperature coefficient use the following equation

$$\Delta\Phi = \frac{3.66*10^{-7}*(ppm)*\Delta T*L(ft)*f(MHz)}{v}, ppm \equiv \pm 20, v \equiv 0.7-0.88, f \equiv 11424, L \equiv 50 ft,$$