



BPM Upgrade Cable Specification

Bob Forster

Introduction

We are soliciting pricing and delivery information regarding the items in Table 1. Also optional pricing information regarding labeling both ends of the cables of items 2, 3 & 4 according to the details given below.

Requirements

Table 1: BPM Project Interconnect Cables:

Item #	Quantity (Each)	Cable Type	Connector A	Overall Physical Cable Length	Connector B	Cable Name, for reference	Delivery Requirements
1	1,104	RG 316U 50-Ohm Coax	SMB Plug	4 Inch $\pm\frac{1}{4}$ Inch	SMB Plug	In-Crate Slot Jumpers	Delivered Packed in Sets of 8 each
2	300	RG 400/U 50-Ohm Double Shielded Coax	SMB Plug	2 Foot $\pm\frac{1}{4}$ Inch	SMB Plug	In-Crate Timing Distribution	Delivered Packed in Sets of 10 each
3	90	RG 400/U 50-Ohm Double Shielded Coax	SMB Plug	36 Foot ± 1 Inch	Lemo Straight Plug LEMO Connector FFS.00.250.CTCE56 or approved equivalent	Accelerator Timing Inputs	Delivered Packed in Sets of 3 each
4	1,104	RG 400/U 50-Ohm Double Shielded Coax	N Female	6 Foot $\pm\frac{1}{4}$ Inch	SMB Plug	BPM Analog Inputs	Delivered Packed in Sets of 8 each

Overall Physical Cable Length

The “Overall Physical Cable Length” column specified in Table 1 above includes the completed connectors.

Delivery Schedule

A proposed delivery schedule must be specified in the reply to this bid package.

Early delivery of these cables will be a consideration in our choice of vendor. We look for delivery as early as possible, or by September 1, 2004. Once the Purchase Order is awarded, partial deliveries will be welcomed.

Delivery Requirements

The cables are to be delivered packed in sets as tabulated in Table 1, above, using Tie Wraps™ or Zip Ties™ or the equivalent.

Acceptance Criteria

Incoming acceptance testing will be performed at Fermilab, using TDR and/or Network Analyzer equipment. Each cable listed in Table 1 above is subject to rejection at our discretion if any of the following are true:

- a) If incoming testing shows it to have a physical length deviating from that specified in Table 1 by more than the bounds specified in Table 1.
- b) If incoming testing shows it to have an electrical length deviating from the mean length of the first 50% of the cables (of the same nominal physical length) tested by more than $\pm 1^\circ$ at 53 MHz.
- c) If incoming testing shows it to have a nominal cable impedance deviating by more than ± 1 Ohm from 50 Ohms.
- d) If incoming testing shows it to have a Return Loss greater than -40 db @ 53 MHz while resistively terminated in 50 Ohms.
- e) If incoming testing shows it to have an electrical attenuation that varies by more than 0.1 db @ 53 MHz from the mean value of the first 50% of the cables (of the same nominal physical length). At any other frequency up to 100 MHz the electrical attenuation shall vary less than 0.5 db at the same frequency from the mean value of the first 50% of the cables (of the same nominal physical length).
- f) If incoming testing shows it to have a less than acceptable connector quality or cable-to-connector mechanical integrity as shown during a flexure test described in more detail below.

Flexure Test Notes

During any of the other incoming acceptance tests a controlled amount of flexure may be applied to the cable under test, spot-checking connector quality and cable-to-connector mechanical integrity. The cable flexing applied will be limited to that representative of normal usage - less than 5 lbs side loading force and less than 45° from a straight angle. The cable must continue to meet all of the above acceptance specs during and after the application of this flexure. Any cable failing to pass any of the above acceptance criteria during or after a flexure test is considered to have failed the incoming acceptance testing.

Consequences of Incoming Acceptance Test Failures

Those cables failing to meet *any* of the above initial acceptance criteria can be rejected at our discretion and returned to the vendor for replacement.

Request for Optional Cable Labeling Pricing

Both ends of each RG400/U cable in only items 2, 3 and 4 in Table 1 above will be labeled. Please provide optional contract information based on the following:

- i) Up to 19 characters of text in each of up to three lines of text per label.
- ii) Fermilab will supply label text which will be numerically sequential within the packaged sets specified in Table 1.
- iii) Labeled cables will be inside unoccupied service buildings where room temperatures range between 110°F and 40°F.
- iv) 20 year lifetime labels.
- v) Clear shrink tubing over the labels for protection is acceptable.
- vi) Minimum font size is 10 point.
- vii) All labels are to be positioned entirely within 6 inches of the cable end.
- viii) Each label shall extend no more than 2 inches along the length of the cable.
- ix) Printing can be light text on a dark background or vice versa.

We request separate pricing information for the labeling option.

Change Log

Version	Issue Date	Concurrence	Description of Change
1.0	July 15, 2004	RGF	Original
2.0	July 21, 2004	RGF	Heavily revised the Acceptance Criteria section reflecting feedback, and turned the Labeling section into an outline.

Concurrence

The following persons concur with this document.

Steve Wolbers, Project Manager (date)

Bob Webber, Deputy Project Manager (date)

Jim Steimel, Technical Coordinator (date)