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ENGINEERING NOTE

CODE	SERIAL	PAGE
P40102	M5845	1 OF 5

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PROGRAM - PROJECT - JOB
PEP-4

INTERNAL SYSTEM INTEGRATION

TITLE
INSTALLATION OF COIL SUPPORTS AND ALIGNMENT

PURPOSE: The purpose of this Engineering Note is to provide general guide lines for the support and alignment of both the 'Conventional' Coil, SLAC Drawing 205-137-01-R2 and the Superconducting Magnet, LBL Drawing 19C2906 with the Hex Calorimeters in place. It does not cover the moving of the coils into position.

BACKGROUND: The conventional coil is presently (June 82) in place and is supported by 8 supports (Drawing Number 19C4176). The two lower Hex Calorimeters are in place but not coupled to the coil in anyway. The first phase will be to install the balance of the Hex Calorimeters with the conventional coil in place. At a latter date the superconducting magnet (Cryostat) will be installed. The mounting holes, etc. are, nominally at least, the same for both.

REFERENCE INFORMATION: Since this Engineering Note is not intended to cover everything much of the following should be utilized.

ENGINEERING NOTES:

Serial No.	Code	Titles
M5842	P40102	Mounting of the Magnetic Coils(s) in PEP-4.
M5853	P40601	Revised Module Insertion Procedure - Positions 4 & 5.
M5877	P40601	Module Insertion Procedure - Positions 1 & 2.
M5895	P40601	Module Insertion Effort Estimate.
M5644	P41001	Cryostat Installation & Alignment.

ENGINEERING NOTE

P40102

M5845

2 of 5

AUTHOR

DEPARTMENT

LOCATION

DATE

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BERKELEY

JUNE 15, 1982

A. INSTALLATION WITH THE CONVENTIONAL COIL IN PLACE:

This procedure must be coordinated with those for the calorimeters (M5833 and M5877). It is based upon the order of installation outlined in Engineering Note 5895. It is critical that the coil always be supported adequately. As an absolute minimum this should be by the supports at the bottom two positions (#4 & #5) at each end or by the two upper positions (#1 & #2) and one of the bottom positions.

STEP

1. Before the original supports (19C4176) are removed from positions 1 or 2 it is MANDATORY that the coil be supported at positions 4 & 5. Since these modules (Brenda & Abbey) are in place it will be necessary to install Items 2, 11, 12 & 13 per Detail A of 19Q9576.¹ (2 places each end). Torque the screws,³ Item 13, just enough so that the coil will not drop any when the upper supports are removed. Now the original supports (19C4176) can be removed from Positions 1 & 2. (This step is in effect Step 7.1 of Engineering note M5877).
2. After one or the other of the upper modules (Donna & Florence) are installed (after Step 26, Engineering Note M5877) install the spring loaded supports per detail B on 19Q9576.² Set the gap 'A', sec A-A, to $1.060 \pm .015$ inches. Check for longitudinal clearance per Note 7 on 19Q9576. Note that its permissible to first install both modules then the supports.
3. Now & ONLY NOW the adjusting screws, Item 13, 19Q9576 can be backed off on ONE of the lower modules (Brenda or Abbey) and the module removed. As soon as possible (ASAP) thereafter the original supports (19C4176) must be installed.¹ (Reference Engineering Note M5644, Code P41001 & 19Q3326). The only requirement at this time is that these supports keep the coil from sagging. (The spring loaded upper supports are NOT DESIGNED to take 100% of the Load). Repeat the process with the 2nd Tower module.

- 1 It is permissible, but not encouraged, to use temporary supports (blocks, jacks, etc.) IF approved by the cognizant Engineer in charge at the time.
- 2 It may be desirable, or even necessary, to install the coil supports (Items 1, 2, 15 or 16) on 19Q9576 before the calorimeters are in place.
- 3 It is important to torque the two screws equally. USE a torque wrench and tighten or loosen alternately. (One-fourth the total coil weight on one swivel is enough to start indenting the plate. Please avoid.)

ENGINEERING NOTE

P40102

M5845

3 of 5

AUTHOR

DEPARTMENT

LOCATION

DATE

DALE NESBITT

MECHANICAL

BERKELEY

JUNE 15, 1982

4. Per M5895 the two side modules, Positions 0 & 3 (Ellen & Christa) are to be installed. Since the new side supports will not support any weight anyway there are no special procedural requirements. Install the spring loaded supports, adjust and make checks as specified in Step 2.
5. The lower modules, Position 4 & 5 (Brenda or Abbey) must be re-installed one at a time. That is the coil must be supported at one lower position at all times. Install the first module and readjust the adjusting screw as specified in Step 1. Then the other module can be installed. This completes the initial installation. The alignment procedure follows.

B. ALIGNMENT OF THE CONVENTIONAL COIL:

Even though the conventional coil was previously lined up it must be rechecked. It is desirable to have the coil near its operating temperature (90 to 110°F average coil temperature). It should not be aligned if the ambient temperature is below 65°F unless the coil can be warmed up (possibly by running warm water through the cooling coils). The centerlines of the coil and the detector are to be co-axial within a radius of .015.

STEP

1. The first step is to establish the respective center lines. The prime responsibility for this will rest with the SLAC alignment crew. John Mark (SLAC) should be consulted if there are any questions about the procedure for the coil. Drawing 19Q3426 shows all the established locations for tooling balls on the frame. Drawing 19Q7496, TPC alignment procedure, might also be useful as it shows an expanded view of the 4 locations used on each end for the lineup of the TPC (see Section III).
2. The coils position is to be shifted as required to meet the lineup criteria by adjusting the various bolts within the limits, specified on curve I. The average load per upper support is 1400 lbs. (1.104 inches). The maximum load per support of 2800 lbs. (.996 inches) is specified to allow .070 additional travel for contraction. While there is no required minimum it is desirable to have enough tension to hold the tube assembly firmly up against the bulkhead.

The supports maybe used to help correct for an out of round condition as long as the above limits are observed.

ENGINEERING NOTE

CODE

P40102

SERIAL

M5845

PAGE

4 OF 5

AUTHOR

DALE NESBITT

DEPARTMENT

MECHANICAL

LOCATION

BERKELEY

DATE

JUNE 15, 1982

C. REALIGNMENT OF THE TPC:

It will be necessary to recheck the alignment of the TPC even if it appears there was no shifting of the coil.

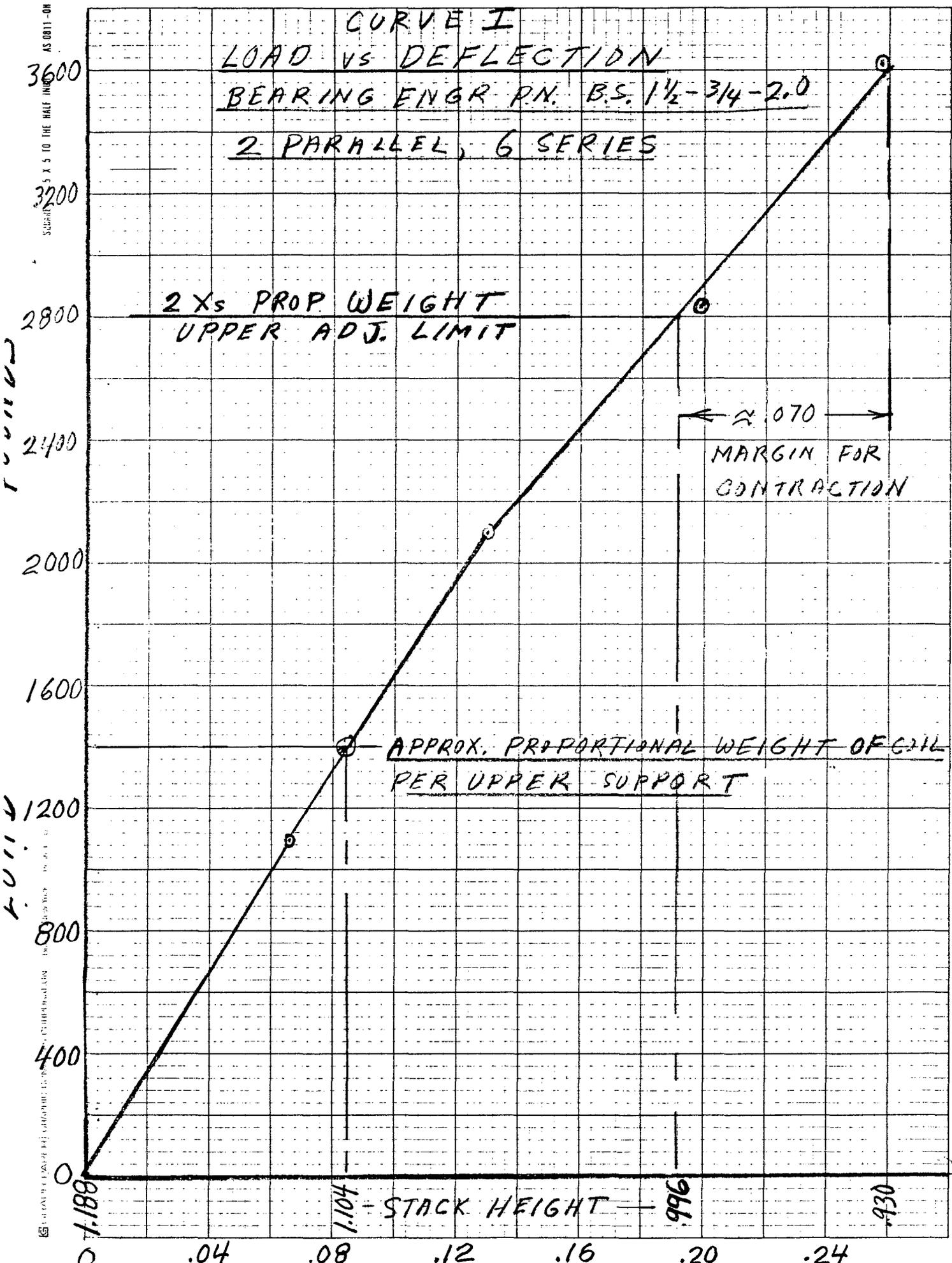
1. Drawing 19Q7496 outlines the procedure used the first time. It does not need to be followed precisely as the setup of the optical instruments, etc. may be different. It is important, however, to use the bore targets 19Q4026 (stored in cabinet in TR-2) and to use and/or confer with people with experience i.e. Dale Nesbitt, Jack Borde, Kevin Medlock, Hal VanSlyke or Wayne Lee. The criteria is to line up the TPC and detector center line as well as practical. Certainly the cross hairs should all be in line within .005. (Adjusting for small changes is easy.) Refer to Drawings 19Q2706, 19Q2716, 19Q2726, etc. as required.

D. LIMITATION OF AXIAL TRAVEL

The maximum axial travel of the conventional coil is to be limited to $.060 + .015$ in either direction. This is to be accomplished by installing 'stops' on the pole tip. Gene Miner is to provide details.

E. SUPPORT SYSTEM FOR THE SUPERCONDUCTING MAGNET

The support system is to be different in that the north end is to be anchored rigidly. This is to be detailed on 19Q9566 which is not complete as of 6/15/82.



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