THE CO-OP GUIDE

TO

DØ

J. Michael

August 16, 1991

DØ ENGINEERING NOTE #000

LOCATION

You are at DØ, the newest and most advanced experiment at Fermilab. Its goal is to find the "top quark", nicknamed "truth", theoretically one of the six fundamental building blocks of matter. Combinations of the six quarks are said to make up electrons, protons and neutrons. Your group at DØ is the cryogenic division. Its goal is to provide and maintain a cryogenic system which ultimately supplies and controls the liquid argon used in the giant cryostats for the experiment. The high purity liquid argon is needed to keep the detector modules inside the cryostats cold, so that they will operate properly. Your job at DØ is to be a co-op for the research and development group of the cryogenics division. Your goals are dependent on the needs of the cryo group.

DØ is where you will spend most of your time. The co-op office is located on what is known as the 3rd floor, but is actually on the ground floor. The floor directly above the 3rd floor is the 5th floor, which contains your immediate superiors and the DØ secretary. The 6th and top floor is above that, and contains the DØ secretary for official and important business. On the other side of the DØ assembly building is the cryo control room. This is where the cryogenic piping system is remotely monitored and controlled. Other important sites at DØ include the trailer city on the north parking lot, which has the DØ secretary who handles all the payroll matters (among other duties), and the portakamp in the south parking lot.

Besides DØ, which is named for its location on the particle accelerator ring, the most important place is Wilson Hall. That is the large building shaped like a big Atari symbol. It contains various important people such as the safety group, the personnel department (which you have already encountered, being hired), the minor stock room, the cafeteria, the Fermi library, Ramsey Auditorium, etc. Behind Wilson Hall is the Booster Ring, which accelerates particles before they are injected into the main ring. Inside the booster ring are the East and West Booster towers, which contain cryogenic support groups. The DØ cryo group offices used to be in the West Booster Portakamps.

Away from Wilson Hall, there are various buildings strewn about the

Fermilab property that have important functional uses to DØ. One such example is Lab A. This is where the now unused bubble chamber resides, which was used to take pictures of particle motion. Many of our group is from the bubble chamber, and occasionally stories from the 'bubble chamber days' can be heard as someone waxes nostalgic. Lab A has a machine shop and many technicians. All three of the cryostats used in the DØ experiment went through Lab A for preparation and installation work. Lab A is located directly up the road from the front of Wilson Hall (north-east). Its unmistakable dark geodesic dome makes it easy to find.

The Feynman Computer building, located east and just a little bit north of Wilson Hall, houses the computer repair people. If any of the computers used in our group crash and burn, we must take them to the third floor of Feynman to be fixed or exchanged. On one side is the Prep department, which handles the VAX mainframe computers, and on the other is personal computer repair, which handles Fermi Macs and IBMs.

Directly north of Wilson Hall is Site 38. This site is the location of many important Fermilab facilities, such as the Fermi fire department, the carpenter's shop, the Fermi gas pumps, the main stock room, and shipping and receiving.

Lastly, but perhaps most significantly, is the Fermilab Village. In addition to the machine shops, the cut shop, welding facilities, and the garishly painted physicist dorms, there are such things as a gym, a pool and other facilities to take the edge off a weary mind. The village is located just north off Batavia road on the east side of Fermilab. The village barn is the first and most notable building as one approaches.

FORMS

Now that you are situated, there are a certain number of items that you are required to have to become a safe and effective employee. These include safety shoes, a radiation film badge, keys to DØ, and a government drivers license. All of the forms for these can be found near either of the secretaries in the main building.

Safety shoes have a special steel toe guard that will decrease the effect of a heavy weight landing on them. The rating is in the thousands of pounds, so it is very unlikely that you will encounter a force that would be strong enough to dent it. However, there are plenty of very heavy objects at DØ, so remember to be careful, and never walk under a crane with a load. The steel toe safety shoe man is only at Fermi on Tuesdays, and he will only be helpful if you have a filled out a form. He parks behind the five building industrial area, a map of which is noted on the back of the safety shoe form. Fermilab will only pay for \$60 worth of shoes, but most of them will not cost that much.

Radiation film badges are required in order to access many areas at DØ. That does not mean that radiation is present in those areas, it just means that there is a chance, however remote, that there may be radiation present at a given moment. The purpose of the badges is to keep track of any incidental radiation exposure you may encounter by way of the sensitive film inside. Badges are rotated every month. Every year you work at Fermilab you will be mailed a report of how much radiation exposure you have received. In my three years of work at Fermilab, I have not gotten any exposure over negligible/background. Since the film badge form takes a while to be processed, and it will probably take a month or two for your badge to appear on the badge rack (which, incidentally, is just inside the main entrance of DØ, by the water jugs), you should get a temporary monthly film badge for the interim. There is a box near the regular film badges that contains a bunch of yellow film badges clipped to forms. Take a badge, fill out a form and put the form back in the box. Put the badge back in the box at the end of the month and get a new one if necessary, filling out another form for the new temporary badge. That should do until your regular badge

appears on the badge racks.

You need two different keys to get around at DØ without getting locked out of important areas. The first is key #25, which will get you through most of the general access doors. The other is #29, which is for both of the doors leading into the cryo control room. #29 also opens doors to restricted cryogenic areas, such as the liquid argon dewar room and the pipe chase. The key request form needs to be filled in and mailed to the appropriate mail station, and you will also need signatures of approval. You will be sent a reply when the keys are ready, requesting you to pick them up at Wilson Hall.

You can get a government drivers license provided you have a regular drivers license already. Just fill and mail the form. You need one to drive the government vehicles located on site, which are used for stock room runs and other material transportation. Speaking of vehicles, you can get a Fermilab vehicle sticker to put on the inside of your car windshield. That will allow you to enter Fermilab at night without having to display your Fermilab ID.

COMMUNICATION

Communication between you and anyone else at Fermi can be varied in form and content. Besides talking to someone personally, there are phones, mail, and electronic mail. The phone can be used to call or page, mail is either inter-departmental or off-site, and e-mail is handled on the VAX system (more about the VAX system later).

The most common use of the phones around Fermi is to call to another on-site phone. Since all phone nos. at Fermi begin with 840, you only need to dial the last four numbers to make a call. That number is commonly known as an extension, and is symbolized like this: x4447. To call that number from a non-Fermi phone, you would have to dial 840-4447 (Fermi is in the 708 area code). (It would be a good idea at this point to remember that the Fermi emergency extension number is 3131, and that their motto is "when in doubt, call emergency".) Since the phone system assumes that you are making an on-site call when you pick up the phone, you will have to dial a "9" first to get an outside line. At that point, you can use the phone normally, which includes local, long distance, information (411), etc. just like the phone at home. Most employees at Fermi are listed in the Fermi phone book, which not only has useful information such as extension numbers, addresses and VAX user names, but also maps, Fermi 'yellow pages', postal references and is quite a useful document overall.

Another use of the phone is to use the paging system. Most everyone in the cryo group has a pager, and there are two co-op pagers (965 and 342). These are normally employed when the person you are trying to reach is not at the phone and the need to reach him is somewhat urgent.

The method for doing this is as follows:

At the dial tone, dial "72".

Listen for a high pitched buzz.

Dial the pager number (e.g. 965).

Listen for three or four beeps.

Leave a short message.

The message is usually along the lines of "so'n'so, please call me at 4-4-4-4-7, so'n'so call 4-4-4-7". It is a good idea to repeat yourself because the transmission is not always clear. There are also such things as long distance pagers, but it is unlikely that you will ever need to call one. They usually operate by having a dedicated phone number.

The last topic about the phone system is about the fancy six button phones. The buttons usually consist of a hold button, three multi-phone group lines, an individual number just for that phone, and a building page button. Only a call to the phone's individual line will make it ring. A depressed button indicates which line is currently being used by the phone, and a lighted button indicates that the line in question is being used somewhere. It is important to note which button is pressed and which lines are being used before picking up the phone. If you pick up the phone when there is a lighted, depressed button, you are interrupting somebody's conversation (this can only happen with the three group lines, of course). If you pick up the phone when the page button is down, anything you say into the phone will be broadcast to the whole building. This is useful when you suspect somebody that you need to get a hold of is in the building but doesn't have a pager, since you can ask for so'n'so to call the phone you are at (much like using the pager system). Be careful that someone hasn't left the page button down when the phone rings, or you will end up saying "hello?" to the entire building, and the phone still will not have been answered. Lastly, if you ever for some particular reason want to put somebody on hold so you can talk to another line, you must hit the hold button FIRST (which disengages the line on your phone), then press the button for the other line. If you simply switch lines you will disconnect the other line.

Now onto using the mail system. To send page sized material to anywhere on site you can use an inter-departmental manila envelope. You simply need a name and appropriate Mail Station (abbr. MS, and are listed in the Fermi phone book). Mail that is being sent outside of Fermilab needs to be in regular postal envelopes, although if they are Fermilab business they need not have a stamp (the postage will be applied at the Fermi post office). Both of these kinds of mail can be put in the outgoing mail box of a Mail Station. For rush items, you can go directly to the post office in the ground floor of Wilson Hall. They handle mail much the same as a regular post office, and they have stamps and envelopes and all sorts of postal amenities.

COMPUTERS

VAX

Fermi uses the VAX system as their mainframe computer system. VAX stations can be found most anywhere computers are. You need an account to use it, however; there is a form you can fill out to get one. You need to decide on a user name and a password—the password can easily be changed later, but your user name will be relatively permanent. Once your account is set up, this is how you log onto it, from any normal terminal:

DØ= vc	(for Vax Cluster)
local> c	(c for connect)
USERNAME: COOP	(use your username)
PASSWORD:	(your password, does not appear on screen)

Welcome to VAX vms, you have logged onto your account. If you have any e-mail, you will be notified at this point, and your login.com will be loaded (more about that later). If you ever want to change your password, simply type the following at the command prompt:

\$ SET PASSWORD	
OLD PASSWORD:	(your password, does not appear on screen)
NEW PASSWORD:	(desired password)
VERIFICATION:	(retype to verify)

E-mail is one of the main uses for the VAX system. Most everyone in the cryo group and anywhere else on Fermi has an account, and can be sent e-mail. To get into mail, simply type "mail" at the dollar sign prompt. Here you can read and send mail. All you have to do to read new mail is to hit <return>, VAX will automatically call up the first unread message. You can read all your mail by hitting <return>. To send mail, type SEND at the mail prompt. It will ask to whom you want it sent, and then what the subject of the message is. If you do not type in a valid username, then message will be aborted. If everything is all clear, it will let you type in a message. This method of sending does not have screen editing commands, so whatever mistakes you have on previous lines cannot be corrected save by aborting

and retyping the whole thing. Once you're finished, you can hit CONTROL-Z to send or CONTROL-C to abort. This will take you back to the mail prompt.

A fancier way of sending messages is SEND/EDIT. The "TO:" and "SUBJECT:" lines will appear as normal, but this time an * will appear. This is a screen editor's command line. Type "C" to Connect to the screen. A full page display will pop up, and you can type in your message using the arrow keys and the backspace to edit (the number pad offers fancier editing capabilities if you are interested in learning more). When you are satisfied with the message, type CONTROL-Z to exit the screen. You will get another * prompt. Type EX to exit and send the message, QUIT to abort the message completely, or C if you want to go back and edit the message again.

One good idea is to send a copy of every message you send to yourself, so that if the transmission fails in any way you have proof of the message, and also you can keep track of the e-mail you have sent. This can be done automatically by typing the following at the mail prompt:

```
MAIL> SET COPY_SELF SEND,REPLY,FORWARD
```

You can send the last mail message viewed to a printer by using a PRINT/Q= command. Queues include DAB5_LN03R on the 5th floor, ADESD_PRINT for short jobs on the 6th floor, and DAB6_PRINT for long jobs on the 6th floor. E.g.:

```
MAIL> PRINT/Q=ADESD_PRINT
```

VAX has a fairly extensive help system if you should ever get stuck. Just type HELP at any prompt, a topic listing will appear. Type the topic you are interested in, or type ? to refresh the topic listing. There are many subtopics to help, so you may end up many layers deep in help. To back up to a main topic, hit return at the help prompt. Hitting return can take you all the way out of help.

MAC

The Macintosh is widely used in our group. It is the machine of choice for writing engineering notes, making presentations, drawing schematics,

and most things that require output. It is a very powerful computer with a simple interface. If you are unfamiliar with Macintoshes, it would be a good idea to read an introductory manual on one at this point.

Some MAC tips:

1) On most applications, you can select an area of the document by holding down the mouse button and dragging it to another part of the screen. This can also be done by clicking the mouse at one spot, and then holding the shift button down while clicking at another spot. This is known as 'shift-clicking', and is one of the single-most useful shortcuts that the Mac offers.

2) The option button is also extremely useful. When pressed, it makes regular keys type in different characters. For example, μ is option-m, π is option-p, and to type DØ you use option-shift-o or option-O. Not all fonts offer the same alternatives, but you can find out what they are by using the desk accessory "key caps." Key caps shows you whatever font you select and what the alternative characters are when you hold down shift and option.

About specific applications:

MacWrite II

Most of the documents, such as engineering notes, written in our group are MacWrite II documents. MacWrite II is fairly easy to use, and has simple but effective tools. Some basics:

1) The ruler bar:

This shows how your document will lay out. The dotted line shows the maximum width of your page, which can only be changed by adjusting your margins under the **Format/Page** menu. The black sideways triangles on the left and right show your current margins, which can be adjusted to anywhere inside the dotted line. The inverted tee on the right is the automatic indentation setting. Wherever it is, your paragraphs will automatically be indented there. The four boxed and striped triangles on the lower left are tab settings, standing for left,

center, right and period tabs, respectively. The boxes with lines in them in the lower center section are line spacings: single, 1-1/2, double spacing, bigger/smaller adjust, and current spacing display. The boxes on the lower right are for justification: left, center, right and to both margins.

2) Spelling:

Be sure to spell check you document before you finish, that's one of the easiest fixes you have available. Use **Check All. Spelling Options** is also useful because you can have the program check your spelling as you type.

MacWrite II is reasonably intuitive, so the basics should be easy to pick up. Always remember, though, that text must be selected for changes to affect it, otherwise you will only affect the next character you type. For fancier word processing, check the manual and the quick reference.

Excel

This is the spreadsheet program, useful for number crunching. It is very powerful, but can be cryptic at times and is not as intuitive as MacWrite II. Yet it is still one of the best spreadsheet programs available.

1) The basic layout:

Click on a box to make it active. To add text, just start typing. A box at the top of the screen shows you what you're typing, which is used to edit what you type. Click the check box to have the text entered, or hit the x box to have the typed text ignored. To input an Excel formula, there must be an = as the first character. Be careful though, if you click another box while editing the formula that box will be added to the formula instead of the box being selected. The columns and rows size can be changed just by holding the mouse on the line in between the rows/columns. A special mouse icon will appear, then you can click and drag the edge anywhere on screen. (There is a way to do that through the menus, also.)

2) Format

Format in Excel means how things look on the screen. You can change the font characteristics of a cell, the border, the way a number looks, etc. This menu is used fairly often when you are trying to make a spreadsheet look nice. However, since you have to go through two menus to get something useful done, you may be driven to learn how to make a macro do it for you. You'll have to read a manual to learn about macros.

3) Command-option

This is a useful if obscure combination. With it, you can select non-contiguous areas. When you hold down command-option while you click, other selected areas are not deselected. Command-option-shift lets you select an area between the last selected box and where you click without affecting other areas. You can also change the borders of selected cells with command-option by holding them down while striking an arrow key. The border in the direction of the arrow is toggled on or off.

4) Printing

You will need to set a print area before you print, just select all the boxes that you want to have printed and go to the **Set print area** option. The print area will be shown as a dashed outline on your screen. **Page setup** is used to tell the computer how you want the document to be printed. There you can scale the printing size and set headers and footers for each page, as well as the orientation of the document. You may need to OK a page setup before page dividers will appear on the screen. If you want to see what your output will really look like before you print it, click the preview button in the PRINT dialog box. You will then see a simulation of you output, which you can zoom in or out to.

Excel can be a frustrating program before you master it (though not nearly as frustrating as anything on IBM), but it has a lot of capabilities. If

you need to use this program for anything fancy, you will need to spend some time with the owner's manual.

Other

There are a few other extremely useful programs for the Mac. One is Expressionist, which helps you write mathematical formulas in a nice graphic style, which can be imported to other documents as a graphic element. Another is KaleidaGraph, which can transmute raw data into really sharp looking graphs. There is also Versa-Term, which is the program that interfaces a Macintosh with the VAX system. You can log on normally through this program, but now you have some added benefits. You can copy or paste text to Versa-term or to MacWrite II, giving you access to superior editing capabilities. Text on your screen can be selected and send to a printer with the **Print selection** command. It even has a buffer that will hold quite a bit of information, so you don't have to worry about stuff scrolling off your screen. However, Versa-Term only supports ASCII text, so you can't get any fancy font effects as with MacWrite II.

BLUEPRINTS

In the good old days, any large document had to be made into blueprints because that was the only economic way to mass produce them. Document sizes are referred to with letters instead of inches, since the sizes are so large. Size "A" is the smallest, being 8-1/2" x 11". Each size thereafter is twice as big, the largest being "E" sized. Large photocopiers are a lot cheaper now-a-days, so instead of making blueprints you need only make a large photocopy in a special machine. But if you ever find yourself with a need to make a blueprint, this is how its done:

1) Most blueprint machines turn on automatically when you stick a document in it, and you needn't turn it off when you are finished. Check to make sure the speed is around 20, which is usually the proper exposure rate.

2) You need to have a vellum copy of the drawing in order to make a blueprint. Vellum is a waxy, translucent paper. You also need blueprint paper, which should be available in drawers near the machine. Blueprint paper is think, having one side of yellow and one of white. Put the vellum paper directly on top of the yellow side.

3) Feed the two sheets face up through the ultraviolet slot. This exposes the yellow side.

4) Once the sheets have gone through, you can set the vellum aside. You now need to run the blueprint face-up through the developing slot, which is usually on the top of the machine. This will turn the remaining yellow to blue. One time through will not completely develop the blueprint, so you may want to run it through a few more times or the copy will have a short shelf life, eventually fading away. Alternatively, you can turn the speed all the way down to 0 when you run it through, but just remember to set it back where it was when you finish.

Folding a blueprint

The object of folding a blueprint is to leave the lower right corner exposed, which has the drawing name, number, and other information, and leaving it the size of an "A" drawing. Size "A" drawings need not be folded, "B" size can just be folded in half. "C" size can be folded in half (the long side first), and then in half again. At "D" size the folding gets tricky. First fold the long side so that the the drawing is not exposed. Then fold the sides back, so that you have an accordion shaped fold. Fold that in half.

Looking at a random cross-section of "E" sized drawings, there would not seem to be a specific standard of folding, perhaps because of the number of folds required. No one really bothers remembering. But here is a suggested way of folding one that is one of the standard ways: fold it accordion style, just like a D-sized drawing. Fold the remainder in half, then in half again, leaving the info box showing.

PERSONNEL

This is a list of the people that make up the DØ R&D cryo group, and people we generally deal with, at this printing:

<u>NAME</u>	<u>EXTENSION</u>	<u>PAGER</u>	<u>USERNAME</u>
Kurt Krempetz	x4657	p509	KREMPETZ
Dan Markley	x2849	p992	DMARKLEY
Russ Rucinski	x2888	p527	RUCINSKI
Gary Trotter (Drafting)	x2027		TROTTER
Jack Mateski (Drafting)	x2812		MATESKI
John Kowalski (Drafting)	x3444		KOWALSKI
Bob Pucci (Gas Group)	x4394		PUCCI
Bob Kubinski (Gas Group)	x2817		
Del Miller (Mech. Group)	x2152	p804	
Jim Harder (E. Booster)	x3254	p720	
Fred Walters (E. Booster)	x3445	p180	
Sonya Wright (5th sec.)	x4591		SONYA
Barbara Edmonson (6th)	x3695		BKE
Becky Knol (Trailer City)	x2039		MCKINESS

DØ ASSEMBLY BUILDING

Accelerator Ring

In road

BOOSTER RING

CROSS GALLERY

Drafting

WILSON HALL

East Side

West Side

NORTH FACING, MAIN ENTRANCE