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DEVICE NAMES FOR THE AGS COMPLEX

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Technical Note

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It is now appropriate for another iteration of specifications for device naming conventions. This is the third pass[1,2] at setting standards for this process and comes at a point of significant change at the AGS facility. First, more of the devices presently controlled via the DEC-10 computer are being transferred to the AGS Distributed Control System (AGSDCS). This of itself is sufficient justification for a thorough review of device names. Also, however, the addition of new systems to the existing accelerator facility (RFQ, VHF dilution cavity, etc.) as well as the AGS Booster synchrotron underscore the need.

The following outline has been reviewed and accepted by the Operational Aspects Committee (OAC). Members of the OAC are K. Reece, B. Culwick, W. Glenn, W. Van Asselt and R. Witkover. Members of the EP&S Division have also reviewed the proposal so it may be adopted for use by the entire AGS facility. Many definitions have been borrowed from previous naming conventions and some new standards have been suggested. Also, it is hoped that this outline will be viewed as general enough to be applicable to any future accelerator(s), beam line(s), etc., associated with the existing AGS Complex.

It is assumed that the particle polarity for all definitions is positive (+). Certain considerations are implied by this statement to be understood by the user(s). At present,

1. The Linac accelerates negatively charged particles.
2. The AGS Booster and AGS accelerate positively charged particles, (H+, partially/fully stripped heavy ions).
3. The primary external beam lines of the AGS transport positively charged particles.
4. The secondary beam lines of the AGS may transport either positively or negatively charged particles.

The direction of the beam (particle) bend shall always be relative to an observer traveling with the beam and facing downstream.

It is convenient to adopt a standard convention (e.g., a right-handed coordinate system) as in TRANSPORT, (unit x↑ to the left, unit y↑ is up, unit z↑ in the beam direction. Therefore,

1. A horizontal dipole is defined such that a positive beam is bent to the right.
2. A vertical dipole bends a positive beam up.
3. A quadrupole magnet would be defined as horizontal if for positive particles, it focuses the beam in the horizontal plane and vertical if for positive particles, it focuses the beam in the vertical plane.
4. A normal sextupole is defined as one that bends a positive beam to the right.

Note: In a previous note on device names,[1] the particle bend direction was referenced to the AGS ring (e.g., toward or away from the ring). It is clear that this convention should no longer be maintained as the AGS facility grows in scope and physical dimensions. However, it is also quite important to try to provide a straightforward translation for the old definitions of "A" and "B" polarities where possible. In areas where a large number of infrequent system users exist (such as the experimenters' workstations), the most efficient solution is to provide "A" and "B" assignments by device so as to minimize confusion with the new workstation system (it would be transparent to the users in these areas). Keeping a familiar format with respect to polarities of devices is an important consideration. A brief list showing "proposed" and "old EP&S" definitions for dipole and quadrupole magnets follows:

Magnet	Proposed Convention	Previous Convention
dipole(H)+	bend right	
dipole(V)+	bend up	
dipole(A)		bend left
dipole(B)		bend right

pitcher(A)		bend up
pitcher(B)		bend down
quad (H)	horizontal focus	
quad (V)	vertical focus	
quad (A)		horizontal focus
quad (B)		vertical focus

From this table, it is obvious that there only need be an assignment of "dipole(H)=dipole(B)" and "dipole(V)=pitcher(A)" to translate to the proposed convention. Similarly, the appropriate translation for quadrupoles would be "quad(H)=quad(A)" and "quad(V)=quad(B)".

The Secondary Beam Areas present a unique situation in that an individual beam line may transport positively charged particles one day and negatively charged particles the next. A solution here would be to simply define the beam line assuming one polarity (positive) in the Database device names. Then the user would be required to enter particle polarity and the displayed beam line elements would have the appropriate magnet plane (H or V, + or -, A or B) associated with that device. Details of this method will have to be defined when the need arises.

Plane identifiers such as H & V may have different meanings depending upon element usage. They may refer to plane of action or as in the AGS and Booster rings, the device location with respect to the β-function, (e.g., QH in the AGS ring refers to a quadrupole located at a horizontal β(max) in the machine lattice).

A skew element is simply any device whose action on the beam is not orthogonal (couples the horizontal and vertical plane).

In the present standard for the device name field on the AGSDCS system there are 18 characters allowed. Within this field, the first plus next two characters define the major machine and major system respectively. Immediately following is a delimiter (period), that is counted in the total of 18 characters.

- <u>First character</u> (major machine)
  - L = Linac
  - T = Tandem Van de Graaff
  - A = AGS
  - B = AGS Booster
  - S = Slow External Beam
  - F = Fast External Beam
  - C = Controls

- <u>Second and third characters</u> (major system)
  - RF = RF acceleration system
  - LF = Low field magnetic elements
  - HF = High field magnetic elements
  - PI = Preinjector
  - TL = Transfer line
  - LI = Linac injection
  - BI = Booster injection
  - TI = Tandem injection
  - IJ = Injection
  - XT = Extraction
  - GN = General
  - MD = Measurement device
  - VA = Vacuum
  - SF = Safety
  - MX = Multiplex
  - A,B,C,D,U,W...(0,1,2,...) = Beam line (beam line number) e.g., SC0 = present switchyard.

- <u>Remaining 14 characters</u> (device type). Included in this field are any necessary device specific identifier(s) such as location or function of device etc.
  <u>Note</u>: H, V and S refer to horizontal, vertical and skew respectively.

  - DH,DV,DS = Dipole
  - QH,QV,QS = Quadrupole
  - SX,SS = Sextupole
  - SP = Separator
  - LF = Low frequency
  - HF = High frequency
  - VHF= Very high frequency
  - LL = Low level
  - HL = High level
  - PM = Position monitor (STIC, etc.)

F = Flag
C = Collimator (H & V)
FC = Faraday cup
MW = Multiwire (SWIC, etc.)
XF = Transformer
LM = Loss monitor
LTA= Linac to AGS
LTB= Linac to Booster
TTA= Tandem to AGS
TTB= Tandem to Booster
BTA= Booster to AGS
GTC= Thermocouple gauge
GCC= Cold cathode gauge
GI = Ionization gauge
PR = Roughing pump
PS = Sublimation pump
PG = Non-evaporable getter pump
PC = Cryogenic pump
PI = Ion pump
VF = Fast valve
VI = In-line valve
VM = Manual valve
VR = Roughing valve
VS = Sector valve
VV = Vent valve
Z = Beam stop

Note: With respect to quadrupole magnets, in beam lines where the assignment of focusing plane identifiers (H or V) is unambiguous then these labels in the device name are appropriate. However, in other instances, the quadrupole focusing plane may change as a function of other conditions in the beam line. Then the H or V identifiers should not be assigned to the name, and the set-point polarity of that quadrupole would be a sufficient identifier to the user as to the focusing plane.

- Included in the 14 characters is the allowance for a suffix (suggested to be ≤ two characters) to indicate any additional attribute of a device.

TM = Timer (autodet)
FN = Function
DG = Digital
V = Voltage
I = Current
TP = Temperature
P = Pressure

Beam transport line elements should continue to be identified using two conventions:

- Major elements are numbered sequentially from a unique origin of the beam line.

- Auxiliary elements are tagged by the distance from a unique origin of the beam line.

There are certainly many other standard abbreviations that should be used in the body (14 character field) of the device name. In many instances, however, there may well be sufficient space available to spell a name completely. Some examples of abbreviations are;

SEC	=	Secondary emission chamber
TGT	=	Target
FOIL	=	Stripping foil
BLP	=	Brookhaven Linac Isotope Production (BLIP)
REF	=	Radiation Effects Facility
ORBMP	=	Ring orbit bump
PUE	=	Pick up electrode
STN	=	Station
DCTL	=	Device controller
CB	=	Combox
ST	=	Start
SP	=	Stop
CLK	=	Clock
DLY	=	Delay
GN	=	Gain
OFST	=	Offset
SRVO	=	Servo
SPTM	=	Septum
TRN	=	Transition
.	=	.
.	=	.
.	=	.

There is little restriction on the above list of abbreviations for the main body of the device name except for some combination of "common usage" for that abbreviation and following BNL "Quality Assurance Classifications". There must also be considered the inclusion of non-device names such as "ALF.NU_H" for example to change the horizontal tune of a machine by controlling both the horizontal and vertical tune shifting quads in an orthogonal manner and therefore not affect the vertical tune. Also important are naming standards for non-operations parameters such as database information pertaining to magnet effective length, coil number, etc.

The maintenance and assignment of device names will be managed by the Main Control Room Supervisor, Ray Zaharatos. Also, any suggestions for additional naming conventions should be forwarded to Ray.

References

1. L. N. Chimienti, et al., EP&S Division Technical Note No. 81, BNL, 1976.
2. D. Barton, K. Reece, Private Communication, 1985.

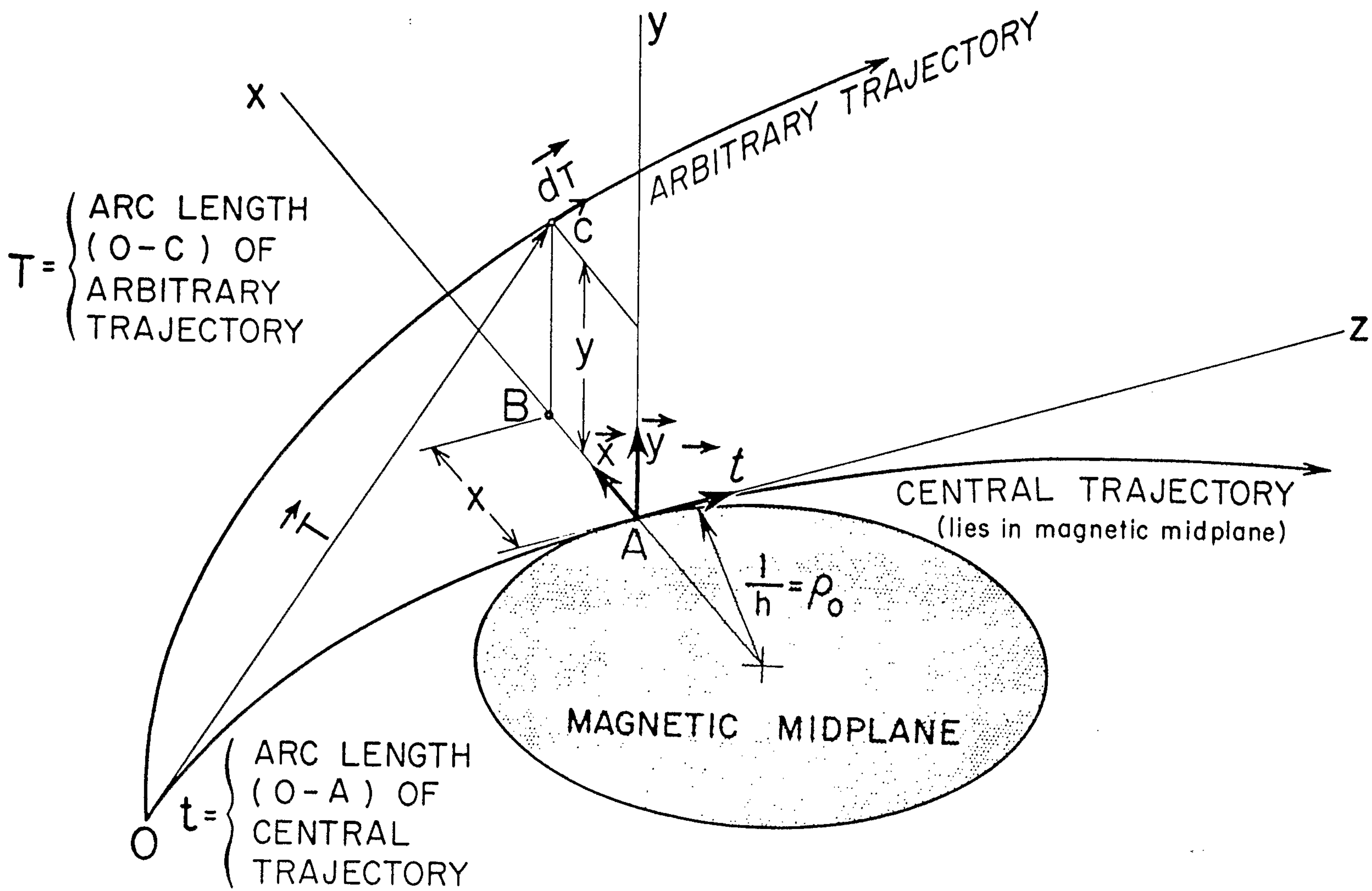
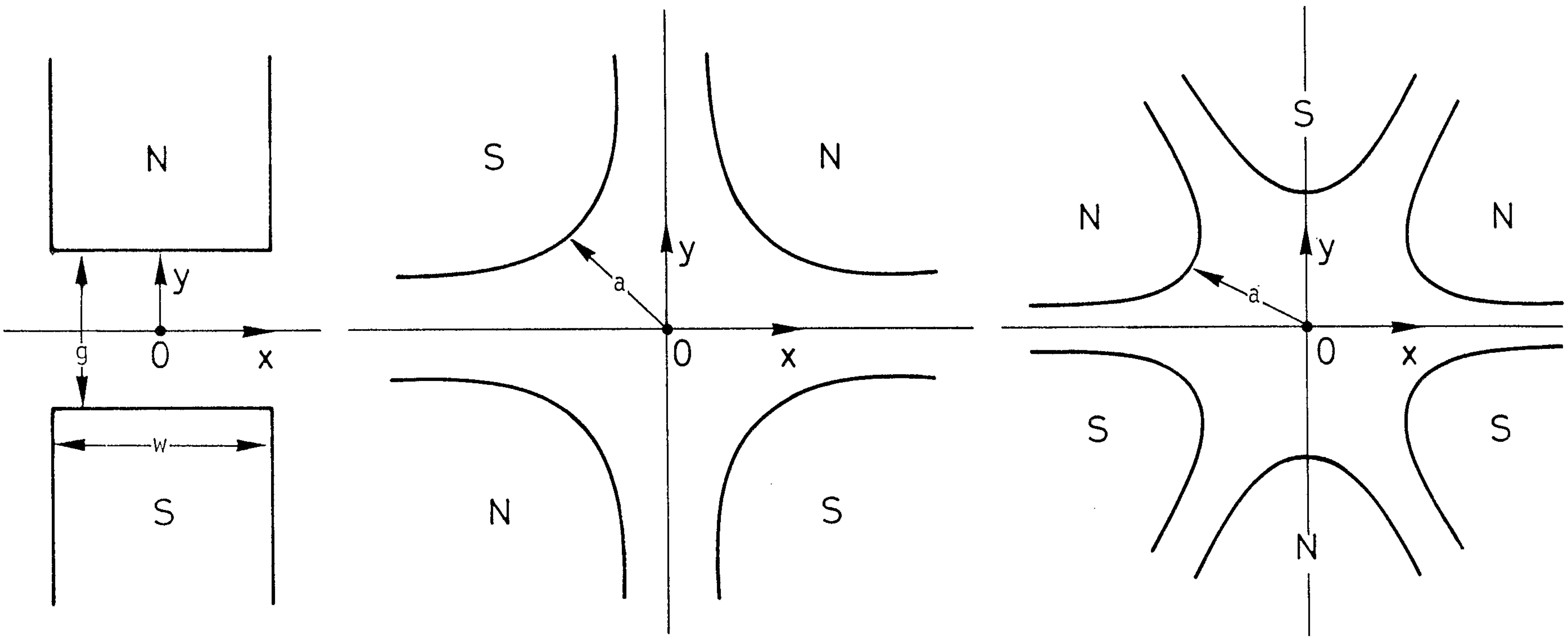


FIG. 1--CURVILINEAR COORDINATE SYSTEM USED IN DERIVATION OF EQUATIONS OF MOTION.



DIPOLE   QUADRUPOLE   SEXTUPOLE

ILLUSTRATION OF THE MAGNETIC MIDPLANE (x AXIS) FOR DIPOLE, QUADRUPOLE AND SEXTUPOLE ELEMENTS. THE MAGNET POLARITIES INDICATE MULTIPOLE ELEMENTS THAT ARE POSITIVE WITH RESPECT TO EACH OTHER.