Traversing Incore Probe System (TIP)

304B Chapter 5.6

Objectives

1. Identify the purpose of the TIP system.
2. Recognize the purpose, function and operation of major system components:
   a) TIP detectors
   b) storage locations
   c) drive mechanisms
   d) ball and shear valves
   e) indexing mechanisms
   f) TIP purge system

Objectives (continued)

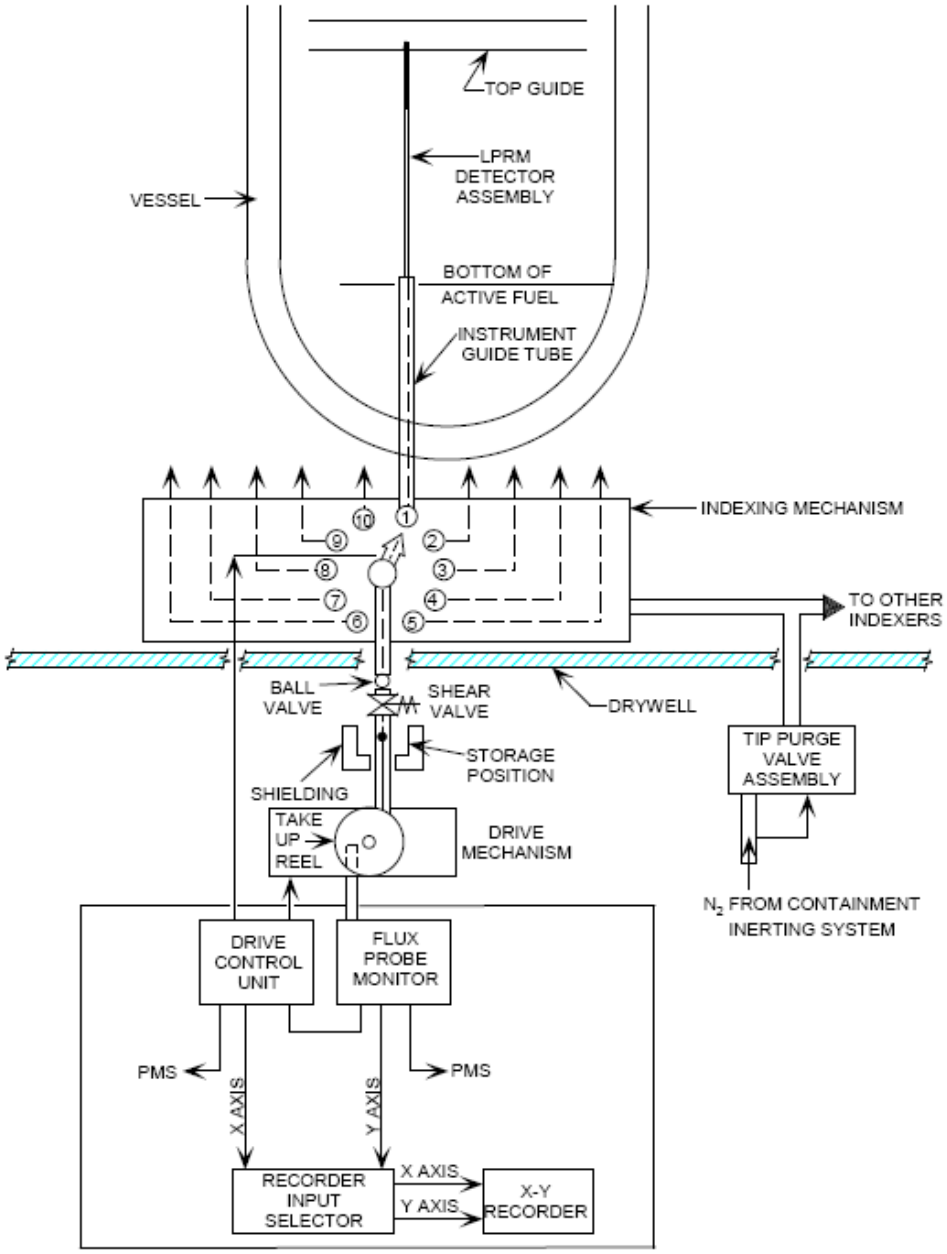
3. Explain the system's interfaces with:
   a) Local Power Range Monitoring (LPRM) System
   b) Process Computer System
   c) Service and Instrument Air System
   d) Nuclear Steam Supply Shutoff System (NSSSS)
   e) Containment Inerting System

Purpose

The purpose of the TIP system is:

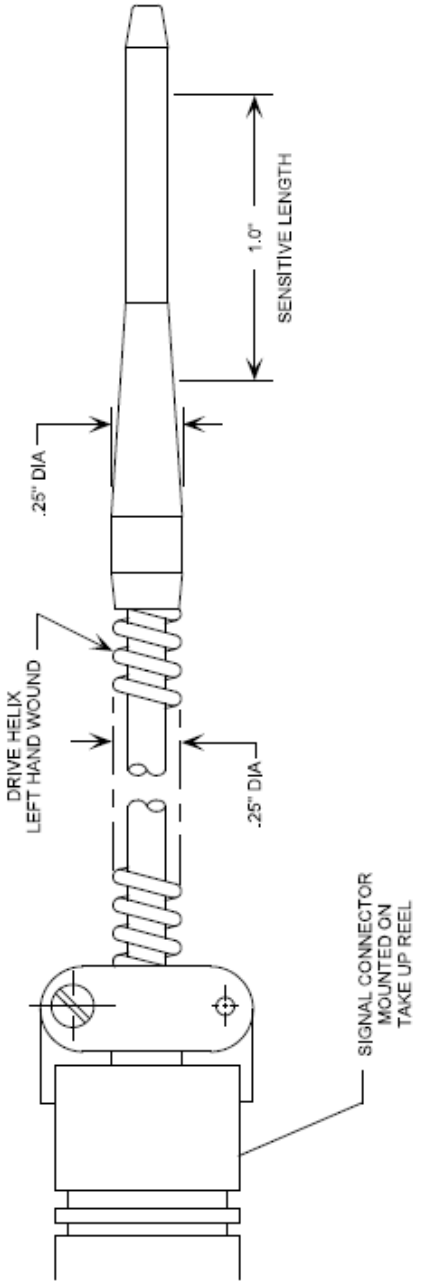
- To provide a means of obtaining the axial and radial neutron flux distribution within the reactor core.

Overview



Schematic for one TIP machine (typical of 4 total machines)

TIP Detectors



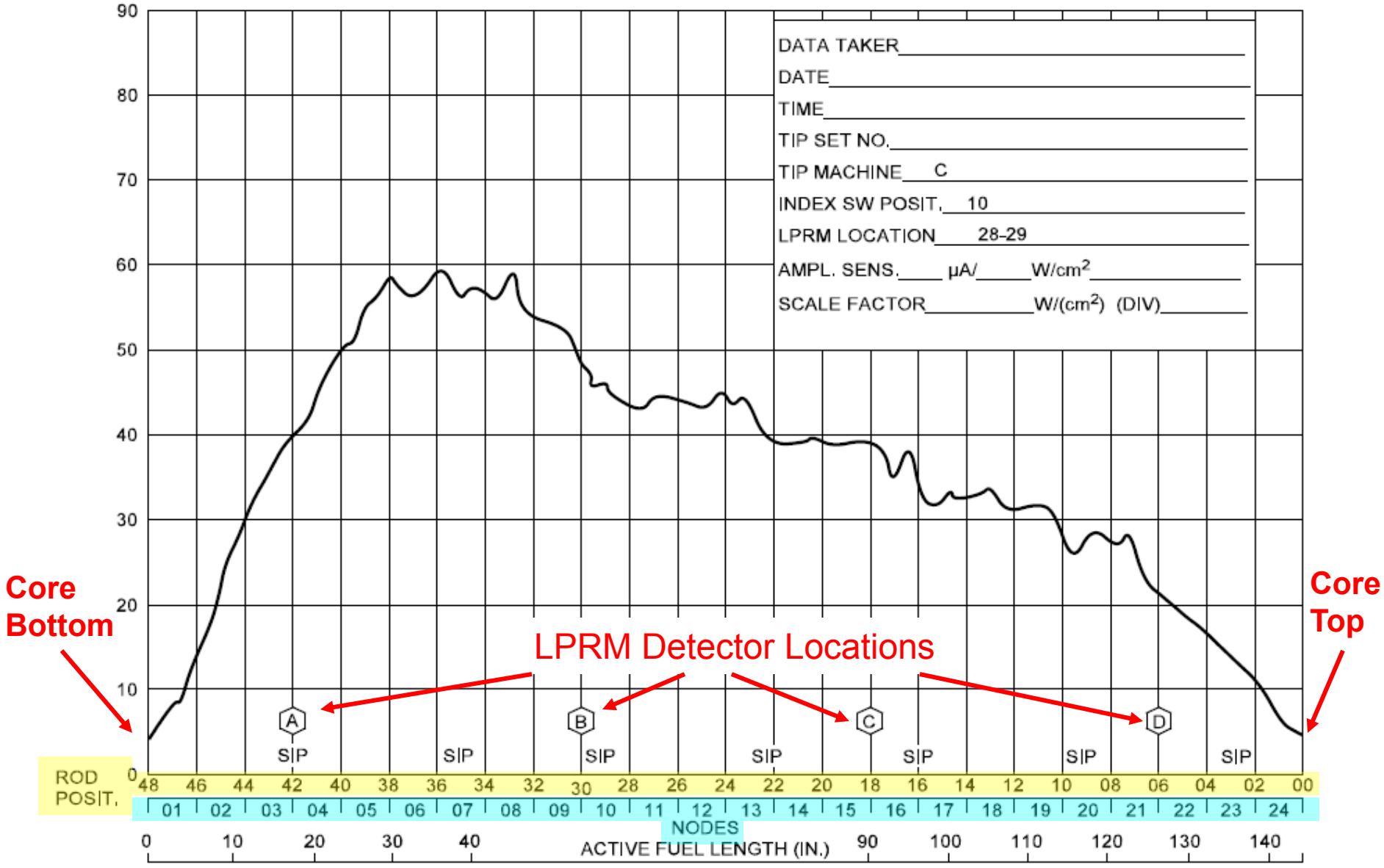
Each of the four TIP detectors consists of a fission chamber with characteristics similar to an LPRM detector connected to a triaxial cable about 140' long.

A TIP detector is driven to the top (core top) of a dry guide tube containing an LPRM string of 4 detectors. During its withdrawal, the TIP detector provides axial neutron flux level information to the process computer and/or chart recorder.

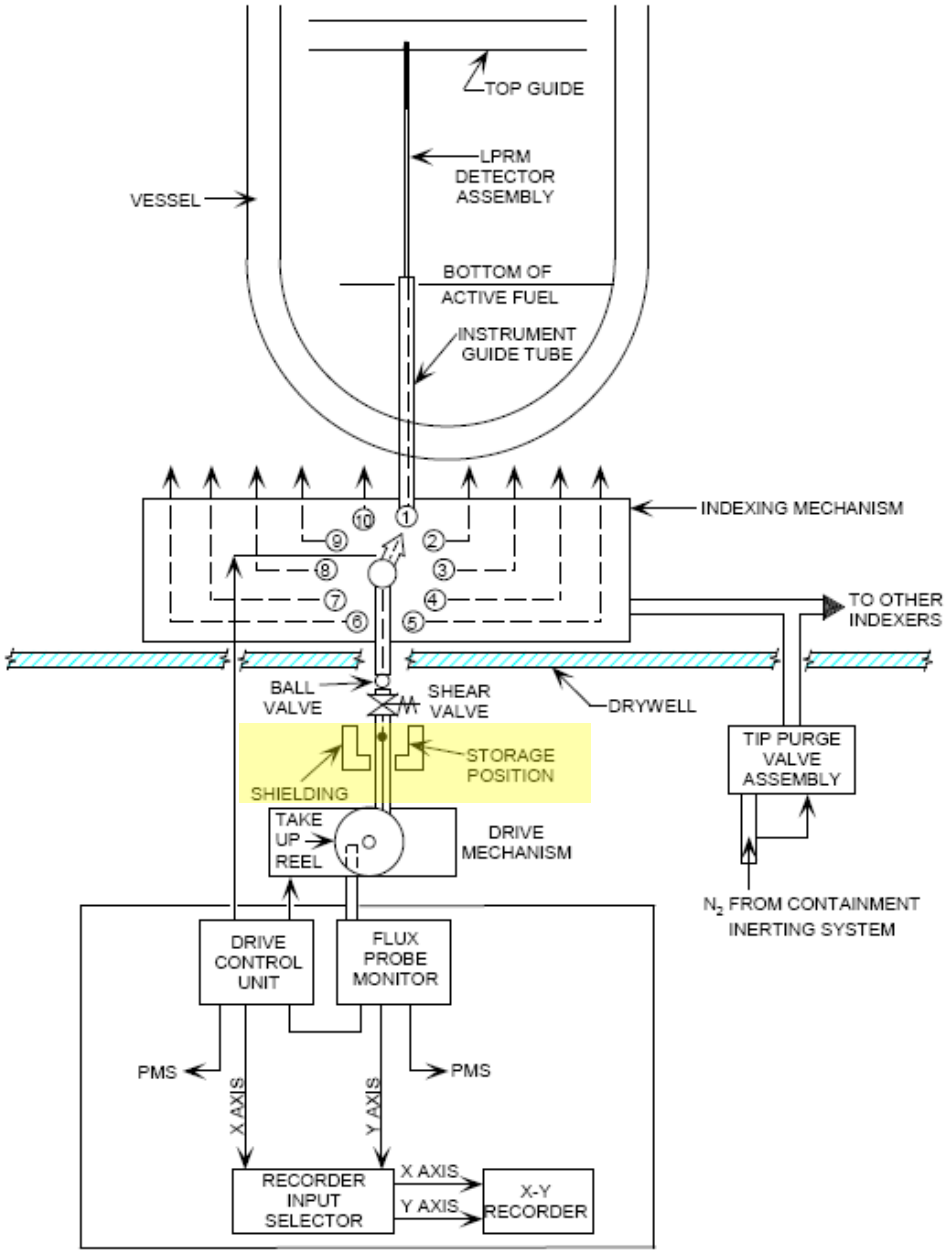
All four TIP detectors can scan the central LPRM string (28-29) along with one quadrant of other LPRM strings.

Objective 2a

TIP Trace


DATA TAKER
DATE
TIME
TIP SET NO.
TIP MACHINE C
INDEX SW POSIT. 10
LPRM LOCATION 28-29
AMPL. SENS. ____ μA/____ W/cm²
SCALE FACTOR ____ W/(cm²) (DIV) ____
90
80
70
60
50
40
30
20
10
0
Core Bottom
Core Top
LPRM Detector Locations
A
B
C
D
SIP
ROD POSIT.
48 46 44 42 40 38 36 34 32 30 28 26 24 22 20 18 16 14 12 10 08 06 04 02 00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
NODES
0 10 20 30 40 ACTIVE FUEL LENGTH (IN.) 90 100 110 120 130 140

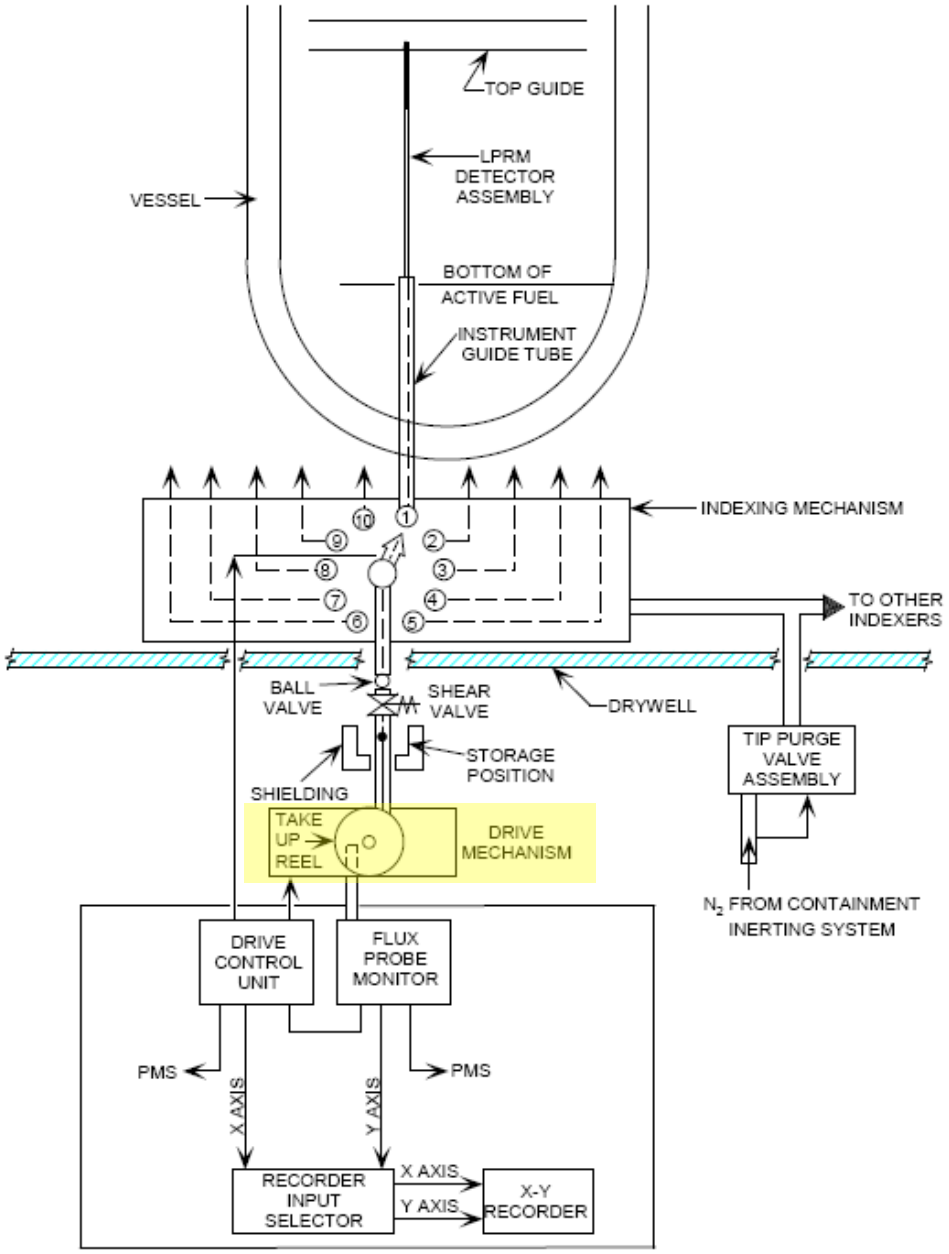
Storage Locations



Schematic for one TIP machine (typical of 4 total machines)

Objective 2b

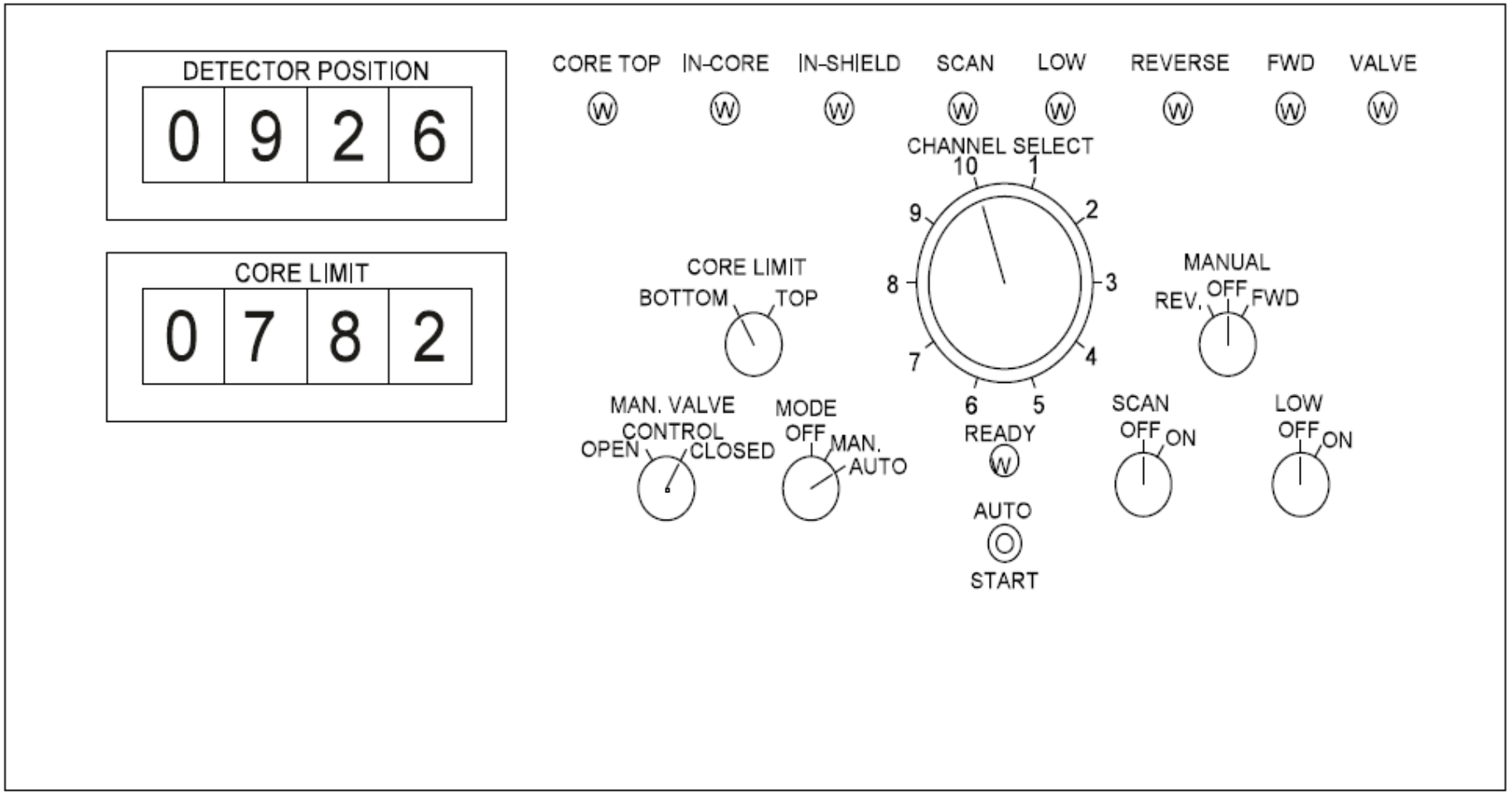
Drive Mechanisms



Schematic for one TIP machine (typical of 4 total machines)

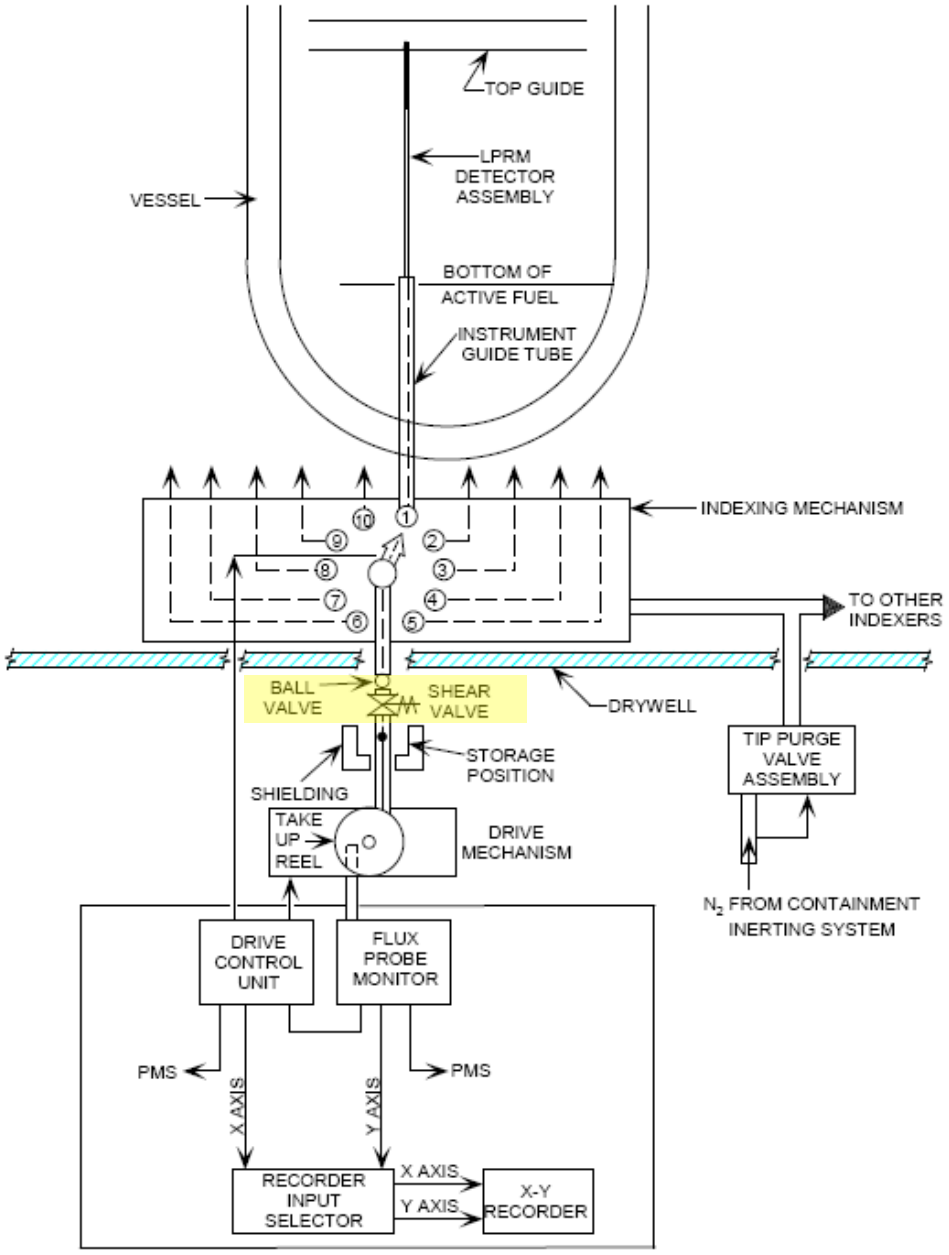
Objective 2c

Drive Control Units



Schematic for one TIP machine (typical of 4 total machines)

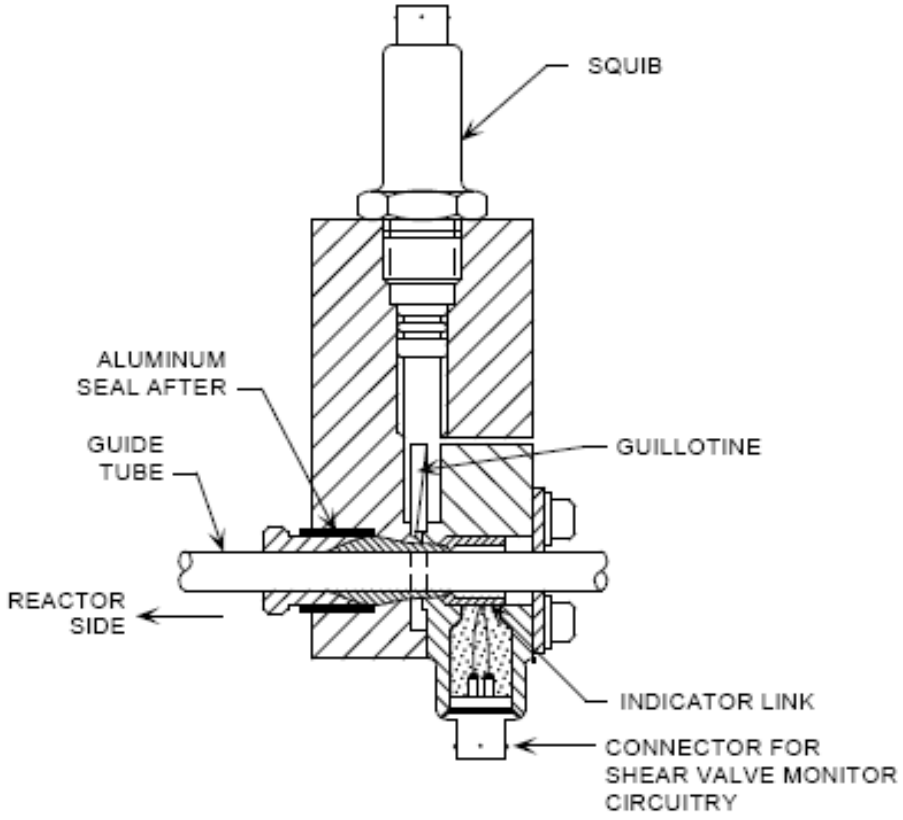
Ball and Shear Valves

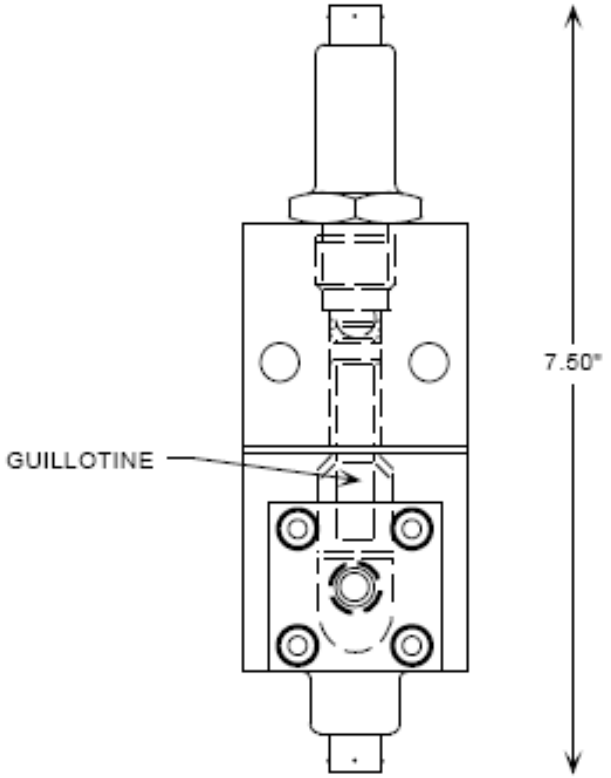


Schematic for one TIP machine (typical of 4 total machines)

Objective 2d

Shear Valves

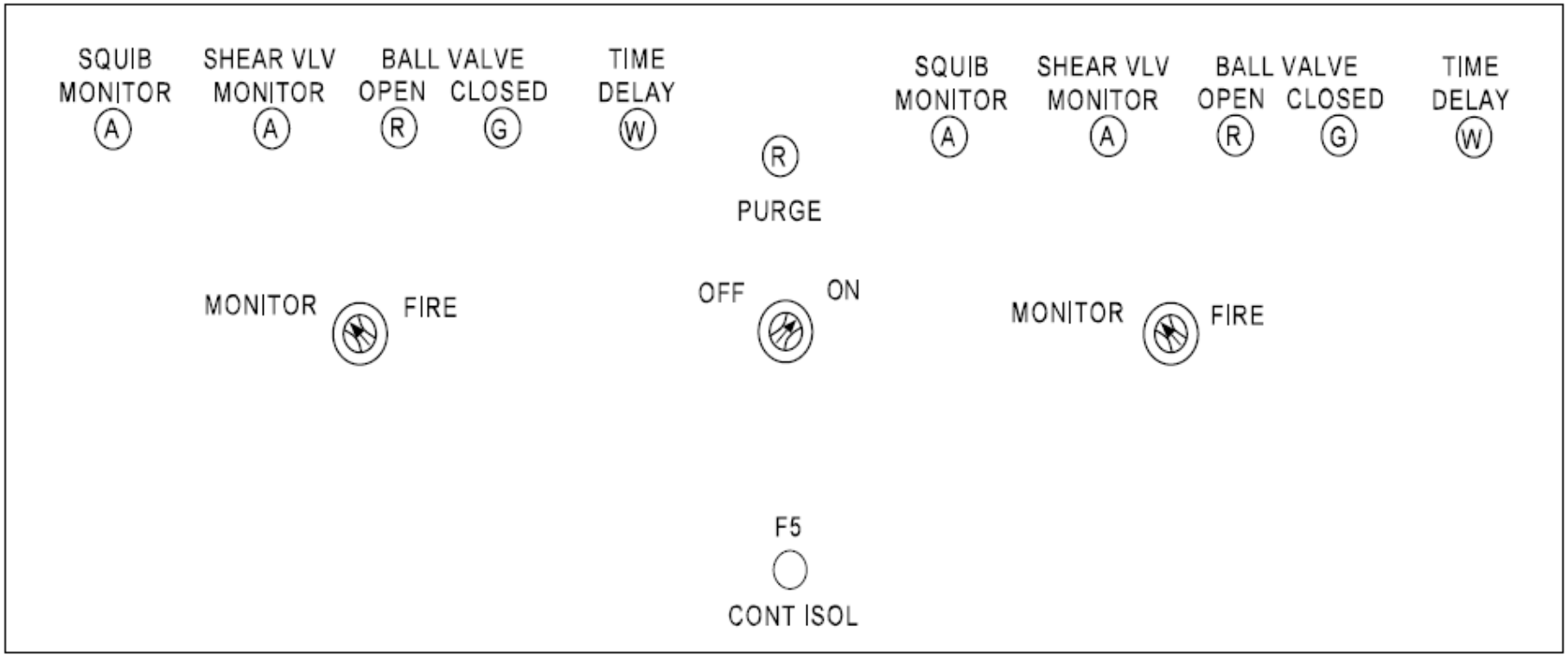




Schematic for one TIP machine (typical of 4 total machines)

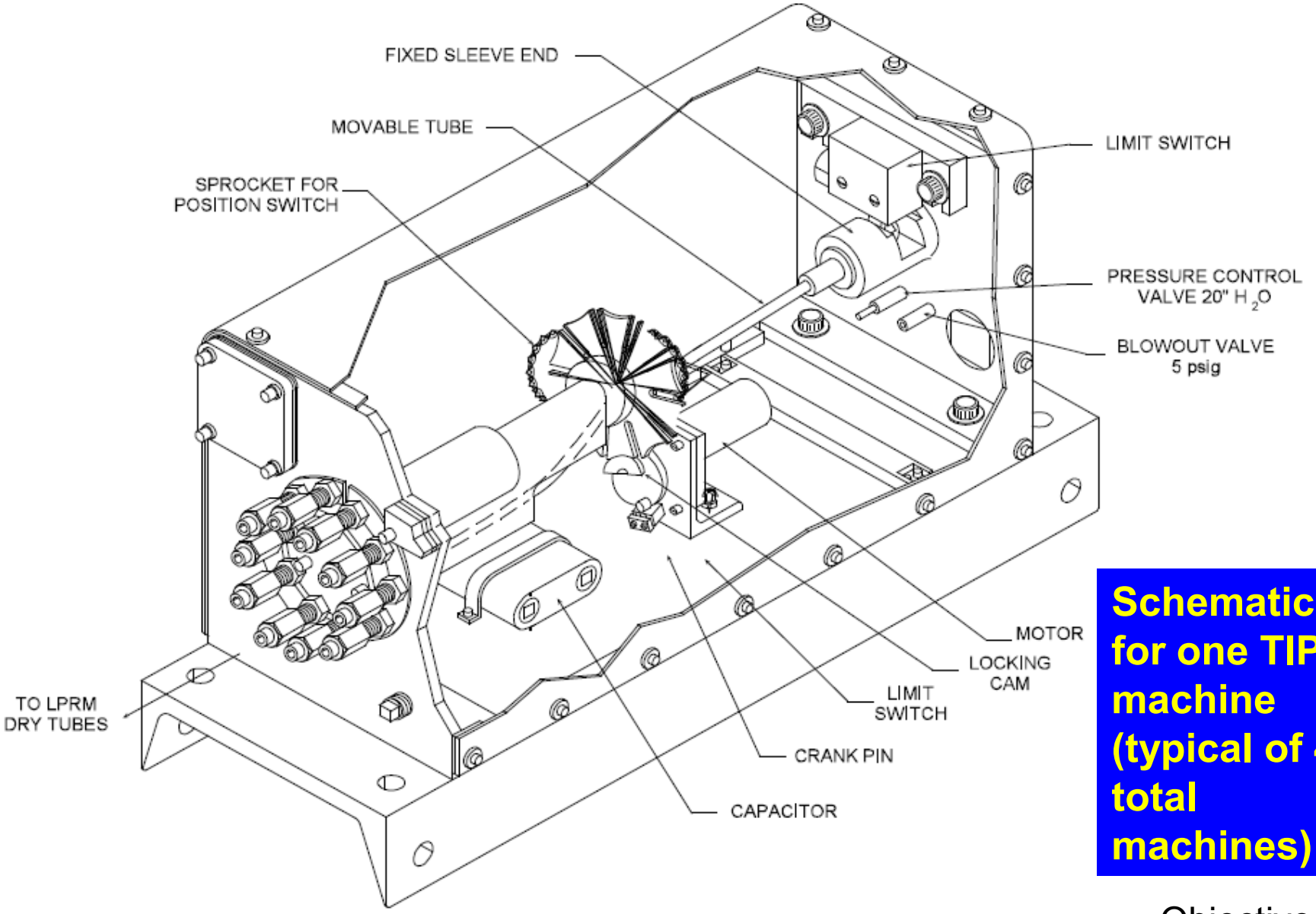
Objective 2d

Valve Control Monitor



Schematic for one valve control monitor panel (typical of 2 panels)

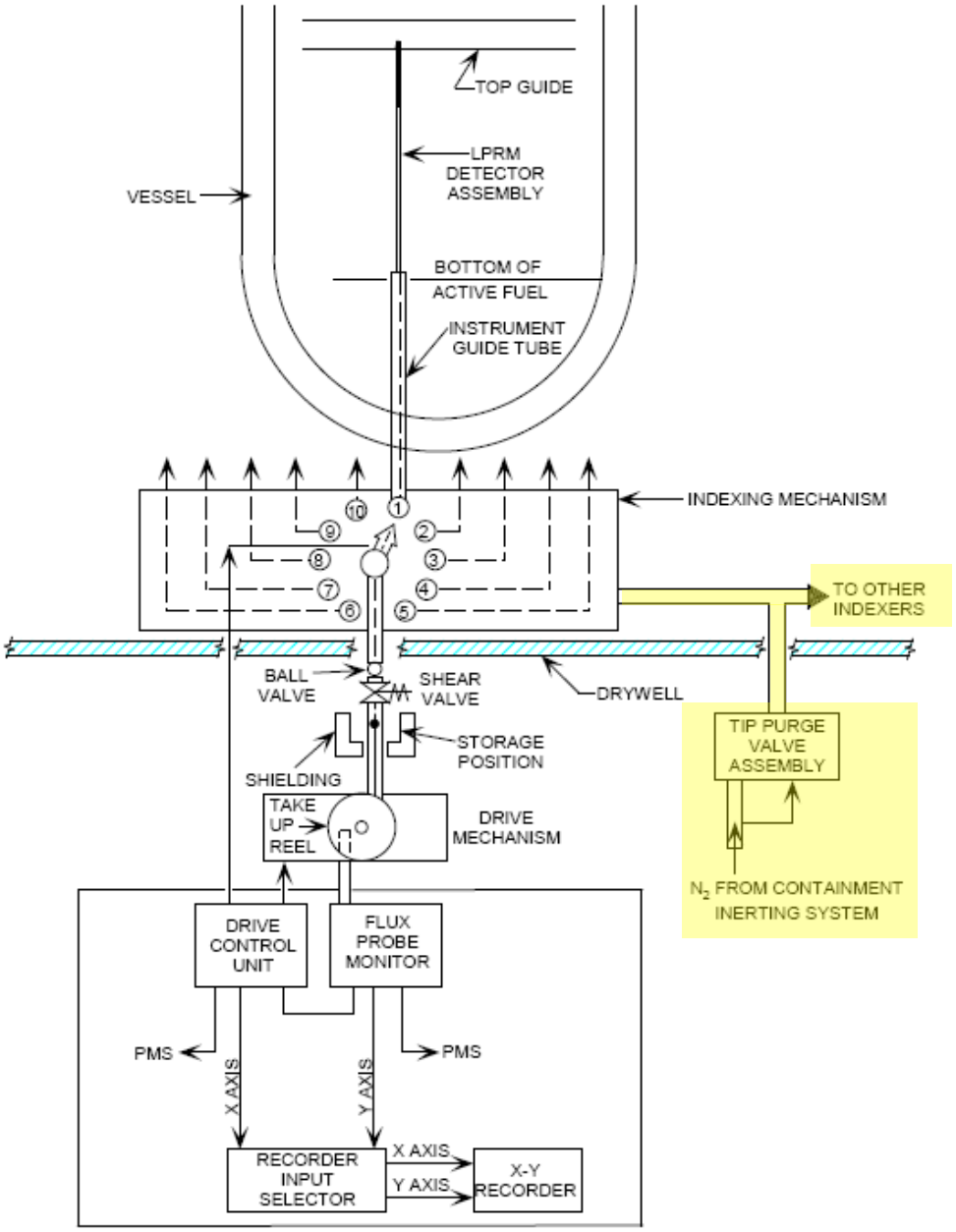
Indexing Mechanisms



Schematic for one TIP machine (typical of 4 total machines)

Objective 2e

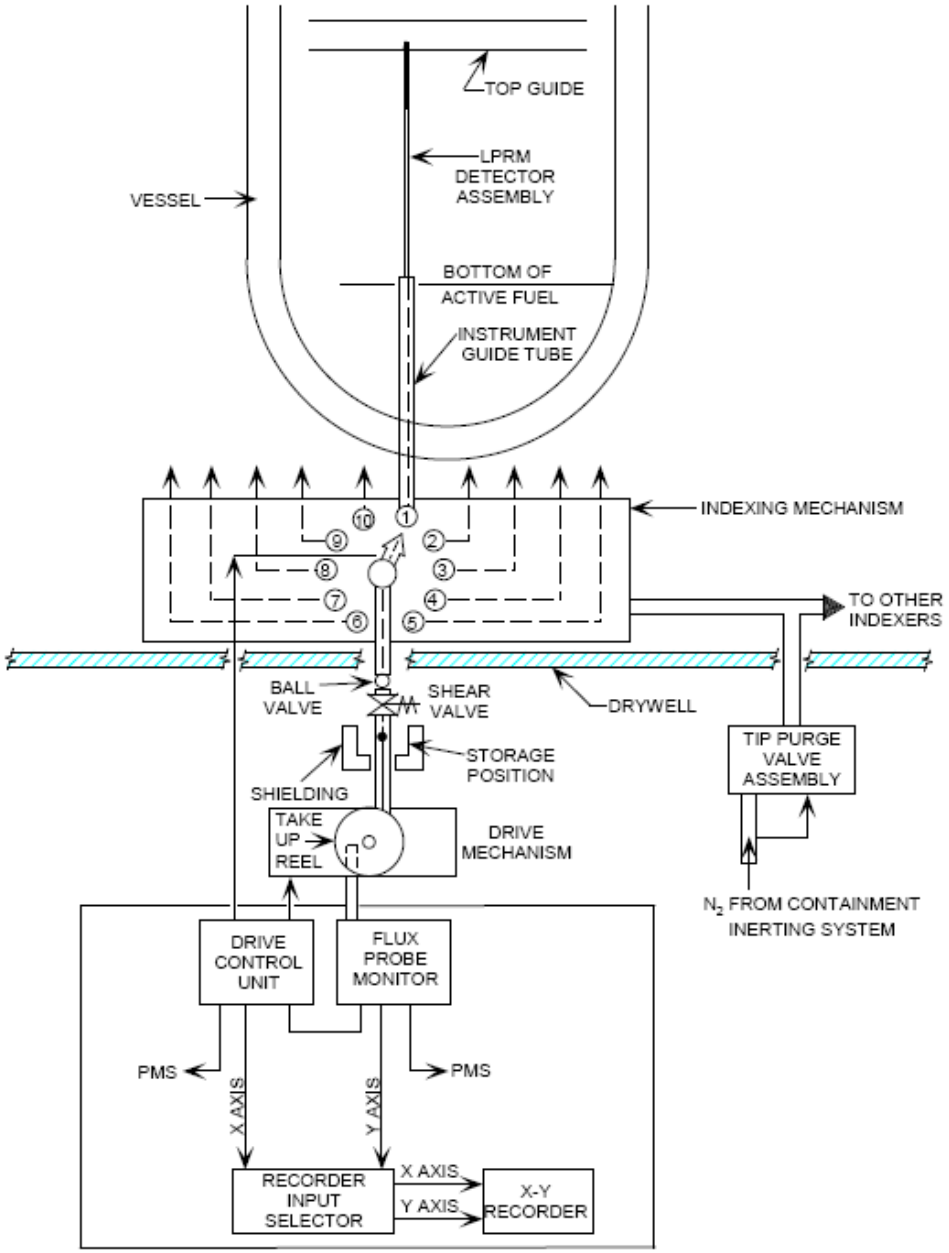
TIP Purge System



Schematic for one TIP machine (typical of 4 total machines)

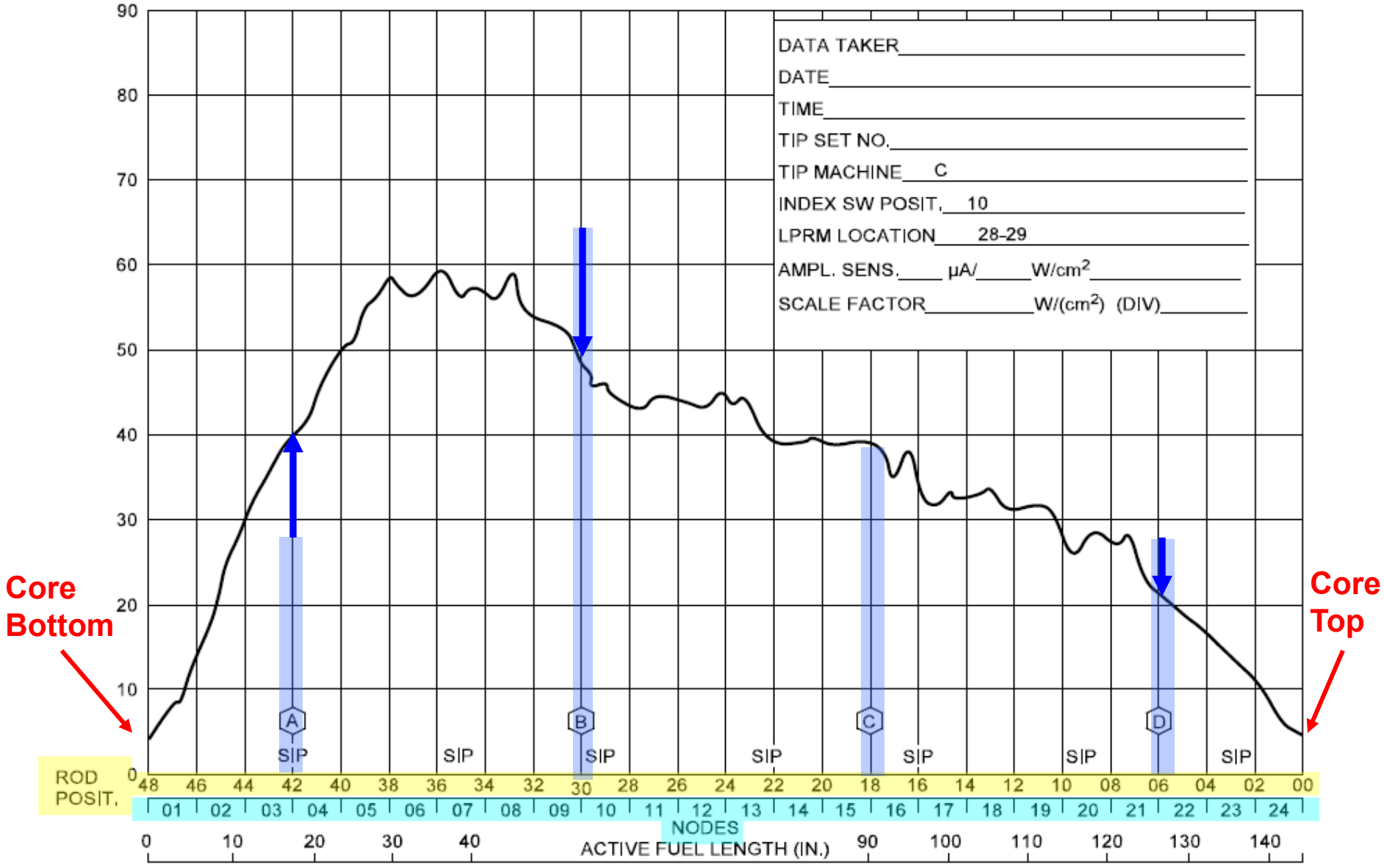
Objective 2f

System Interfaces



Objective 3

LPRM Calibration



Review Objectives

1. Identify the system's purpose.
2. Recognize the purpose, function and operation of major system components:
   a) TIP detectors
   b) storage locations
   c) drive mechanisms
   d) ball and shear valves
   e) indexing mechanisms
   f) TIP purge system

Review Objectives (continued)

3. Explain the system's interfaces with:
   a) local power range monitoring system
   b) process computer system
   c) Service and instrument air system
   d) nuclear steam supply shutoff system
   e) containment inerting system

Are there any questions?