ORNL/BCTIC-1

**Directory
of Users
Computer in
Nuclear Medicine**

ASSEMBLED BY THE BIOMEDICAL COMPUTING TECHNOLOGY INFORMATION CENTER
IN COOPERATION WITH THE COUNCIL ON COMPUTERS
OF THE SOCIETY OF NUCLEAR MEDICINE

Randy L. Henne - Jan J. Erickson
William J. McClain - Dennis L. Kirch

NOTE
THIS WORK PARTIALLY SUPPORTED
BY THE BUREAU OF RADIOLOGICAL HEALTH
FOOD AND DRUG ADMINISTRATION

**BIOMEDICAL COMPUTING TECHNOLOGY
INFORMATION CENTER**

1-26-77
25042 11715

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Printed in the United States of America Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22161
Price: Printed Copy \$8.00; Microfiche \$3.00

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Contract No. W-7405-eng-25

DIRECTORY OF COMPUTER USERS
IN NUCLEAR MEDICINE

Assembled by the Biomedical Computing Technology Information Center
in Cooperation with the Council on Computers of the
Society of Nuclear Medicine

Randy L. Henne, Jon J. Erickson,
William J. McClain, and Dennis L. Kirch

NOTE:

This work partially supported by the
HEW/FDA Bureau of Radiological Health

Date Published: January 1977

Oak Ridge National Laboratory
Oak Ridge, Tennessee 37830
operated by
Union Carbide Corporation
for the
Energy Research and Development Administration

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DIRECTORY OF COMPUTER USERS IN NUCLEAR MEDICINE

Compiled and edited by:

Randy L. Henne¹

Jon J. Erickson²

William J. McClain¹

Dennis L. Kirch³

Under the auspices of the Biomedical Computing Technology Information Center (BCTIC), in cooperation with the Council on Computers of the Society of Nuclear Medicine (SNM) and the Bureau of Radiological Health (BRH) of the Food and Drug Administration (FDA)

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ACKNOWLEDGEMENTS

It would be impossible to acknowledge individually all the persons involved in the production of this Directory. However, the editors would like to express their appreciation to several individuals who had significant influence on the makeup of this document.

We are deeply indebted to A. B. Brill of Vanderbilt University, current president of the Council on Computers of the Society of Nuclear Medicine; Betty F. Maskevitz, SCTIC Director and secretary-treasurer of the Council; William J. MacIntyre, current president of the SNM; and A.B. McIntyre of the Bureau of Radiological Health (FDA/HEW/PHS).

Thanks go also to the chairmen of the various Task Groups of the Council on Computers: P. R. Bradley-Moore (Kidney); H. W. Strauss (Heart); R. S. Benua and Patrick Canill (Thyroid); E. M. Alpert (Brain); Paul Murphy (Lung); and T.A. Craddock (Lab Management). Thanks should also go to P. R. Bell of Oak Ridge National Laboratory for frequent advice, and of course to all those who provided survey data for the various sections of the Directory.

Finally, special thanks go to Mildred Landay and Diana Humphreys of the Radiation Shielding Information Center, ORNL, for typing, data entry, and editing; and to Ruth Slusher of the Computer Sciences Division, Union Carbide Nuclear Division, for preparation of the Users' Section output using the Oak Ridge Computerized Hierarchical Information System (ORCHIS).

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INTRODUCTION

The rapid expansion of computer applications in nuclear medicine has thrust persons with little or no formal instruction in computer science into computer-related positions. This has provided the field with a source of new ideas and fresh enthusiasm, uncontaminated by the opinions and prejudices acquired after being associated with a discipline for extended periods of time.

However, due to the inability of the published literature to maintain any semblance of currency in a field of such rapid growth, much of this fresh talent has been wasted on the redevelopment of procedures and algorithms already well-known and tested elsewhere. While this may constitute a good learning experience for the persons involved, it does little to further the state of knowledge or the quality of patient care.

The Directory has been designed to provide for both newcomers and seasoned users the ability to quickly identify and contact others with similar equipment and interests, thus hopefully reducing the need to devote precious resources to duplications of effort.

ORGANIZATION OF THE DIRECTORY

The Directory of Computer Users in Nuclear Medicine is physically organized into two major divisions: a Users' Section and a Vendors' Section.

The Users' Section consists primarily of detailed installation descriptions and indexes to these descriptions. A typical Installation Description contains the name, address, type, and size of the institution, plus the names of persons to contact within the responding department. If the department has access to a central computer facility for data analysis or timesharing, that fact is stated along with the type of equipment available. Complete descriptions are then given for each dedicated data processing unit operated by the responding department, whether the unit is commercially available or locally developed. Included are the attached peripherals, languages used, modes of data collection, and other pertinent information.

Following the hardware descriptions are listed the type of studies for which the computers are utilized, including the language(s) used, the method of output, and an estimate of how often the study is performed.

Critical to the use of the indexes is the four-digit number appearing in angle brackets in the upper right-hand corner of each installation description. This is the Key Number, which will be used in the Indexes to locate individual installations.

The Installation Descriptions are arranged physically in alphabetical order by state (within states by city, etc. All non-U.S. installations appear following the U.S. installations, arranged alphabetically by nation). This arrangement permits a user to easily locate any installations in his proximity, or within a given state.

The Installation Index, which appears immediately following this text, lists the name of each responding institution in alphabetical order, regardless of its location. With each name is given the Key Number by which the respective Installation Description may be located.

Following the descriptions are the three hardware indexes. The Central Computer Index lists those processors referred to by the respondents as "Central Computing Facilities". The Commercial System Index lists the commercially available nuclear medicine data acquisition and processing systems cited, and the User-System Index lists general purpose minicomputers around which users have developed their own nuclear medicine systems. In each case, a given computer or system is followed by the list of key numbers for those installations using that equipment.

Following the hardware indexes is the Studies Index. This index lists the different types of studies performed with the computer by the responding departments, again with lists of the key numbers for each type of study. The studies are arranged alphabetically within the index. In general, they appear as an organ followed by a letter abbreviation. The letter "S" indicates "Static", "F" indicates "Function" or "Flow", "P" is "Perfusion", "V" is "Ventilation". Also used with heart studies are "E" for "Effusion", "O" for "Output", and "G" for "Gated", and for thyroid Studies, "I" for "Image" and "U" for "Uptake."

For an example of the use of the indexes, let us suppose that a user has a DEC PDP-9 computer and wishes to develop procedures for determining cardiac output. From the User-System Index, he ascertains that three of the responding installations operate PDP-9's: Key numbers 1500, 2300, and 5200. He then looks in the Studies Index for "Heart-O", and finds that only 5200 appears. Turning to index 5200 and finding the list of studies performed, he finds that Vanderbilt University indeed uses their PDP-9 for cardiac output studies. He may at this point wish to make contact with Vanderbilt to see if that installation has existing programs which could fill his need directly or be readily adaptable.

After the Users' Section is the Vendors' Section, short descriptions of current commercially available nuclear medicine systems as supplied by the vendors themselves. The descriptions are organized identically in order to facilitate comparisons, with comments appearing at the end. This section is intended to be used as a preliminary source of information regarding the various systems. As such, it is not intended to be (nor could it be) a fully complete and definitive description of the systems.

All the information included in this directory was obtained for the users and manufacturers by means of questionnaires which were distributed by BCTIC. The very thing which makes a directory of this sort desirable, i.e., the rapid growth of the discipline, also makes it difficult to compile such a collection of information without including some obsolete data. In an attempt to reduce the amount of obsolete data and to include new institutions in future updates of the directory, a user questionnaire is included. New and old computer users are invited and urged to submit this form to BCTIC any time they feel that the data from their institution should be updated.

INSTALLATIONS INDEX

Aberdeen University 7400	Kaiser Hospital 300
Academic Hospital 7000	Kansas University Medical Center 1000
Addington Hospital 7700	Kent & Canterbury Hospital 6600
Aerofat Nuclear Co. 1500	Maisonrouve - Rosemont Hospital 6300
Albany Veterans Administration Hospital 3000	Manchester Royal Infirmary 7100
Baylor College of Medicine 5600	Massachusetts General Hospital 2300, 2400
Bross-Lebanon Hospital 3500	Mayo Clinic 3000
Brooke Army Medical Center 5000	Medical College of Pennsylvania 4800
Cancer Foundation of Santa Barbara 700	Mercy Catholic Medical Center 4900
Charing Cross Hospital 6000	Mt. Sinai Hospital (Cleveland) 4600
Cleveland Clinic Foundation 4500	Mt. Sinai Hospital (W.C.) 3700
Clinica Puerta De Hierro 7800	Mt. Sinai Medical Center (Miami) 1300
Denver VA Hospital 900	N.I.H.S. 7500
Duke University Medical Center 4400	National Institutes of Health Clinical Center 2000
Edward Rines VA Hospital 1700	National Naval Medical Center 2100
Eisenhower Medical Center 460	North Middleton Hospital 6900
Fairfax Hospital 6000	Nuclear Medicine Associates 100
Gainesville VA Hospital 1200	Oak Ridge Nat'l Laboratory 5300
General Infirmary 6700	Omaha Veterans Administration Hospital 3200
Georgetown University Hospital 1100	Presbyterian Hospital 3800
Heckley Hospital 2700	Presbyterian-University Hospital 5000
Houston Veterans Administration Hospital 5700	Providence Veterans Administration Hospital 5100
Institute of Medical and Veterinary Sciences 6200	Queens Hospital Center 3600
John F. Kennedy Medical Center 3300	
Johns Hopkins University 2200	

Radiologische Universitätsklinik
7300

Rigshospitalet 6500

Santa Clara Valley Medical Center
600

Sloan-Kettering Memorial Cancer
Center 8000

St. Joseph Mercy Hospital 2500

St. Luke's Hospital Center of
Columbia University 3900

Stanford University School of
Medicine 800

Strong Memorial Hosp., U. of
Rochester 4100

Sutter Memorial Hospital 500

Toronto General Hospital 6400

Touro Infirmary 1900

U. S. Veterans Administration
Center (Wood) 6100

Univ. of New Mexico School of
Medicine 4200

Univ. of North Carolina Memorial
Hospital 4300

University College Hospital 7000

University of Chicago 1600

University of Manchester 7200

University of Miami School of
Medicine 1400

University of Michigan Hospital
2600

University of Minnesota 2900

University of Mississippi Med.
Center 3100

University of Oklahoma 4700

University of Texas 5400

University of Virginia 5500

Vanderbilt University Hospital
5200

Walsworth VA Hospital 200

William Beaumont Army Medical
Center 5500

William Beaumont Hospital 2800

Yale-New Haven Hospital 1000

<100>

Installation: Nuclear Medicine Associates
Address: 500 West 10th Place
Mesa, Arizona 85201

Nuclear Medicine Associates is a Clinical institution which
has 300 beds.

For further information, contact:
Giddings, Bland (software)

Comments: No systems at present; 3 scintillation cameras, 4
rectilinear scanners

Installation: Wadsworth VA Hospital
Address: Veterans Administration Center
Los Angeles, California 90073

Wadsworth VA Hospital is a Research; Clinical; Teaching
Hospital institution which has 800 beds.

For further information, contact:

Bland, W. H. (clinical)

Bland, W. H. (hardware)

Bland, W. H. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): NDS Basic System

System descriptions:

System 1: NDS Basic System; fixed disk; removable pack
disk; interfaced to 1 scintillation camera; camera
collection in frame mode (64x64)

<360>

Installation: Kaiser Hospital
 Department: Dept. of Nuclear Medicine
 Address: 280 W. MacArthur Blvd.
 Oakland, California 94610

Kaiser Hospital is a Clinical institution which has 340 beds.

For further information, contact:

Weber, P. (clinical)
 Schurr, Dave (hardware)
 Schurr, Dave (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data NED2 System
 User-designed system(s): DEC PDP-8/E

System descriptions:

System 1: Nuclear Data NED2 System with 16K 12-bit words; 800 bpi 45 ips incremental magnetic tape; 2-meg Wangco fixed disk; 2-meg Wangco removable pack disk; Tektronix 602 CRT display with 11 grey scales; interfaced to 1 scintillation camera; camera collection in frame mode (32x32 40/sec) (64x64 10/sec) 738 max frames, list mode with position, time signals

System 2: DEC PDP-8/E with 8k 12-bit words; 300 cps PTP; 300 cps PTR; 1.6-meg DEC RK05 removable pack disk

On the computers described above, the following studies are performed:

1. Brain (FLOW) on system 1; language(s) NUTRAN; Experimental
2. Renal on system 1; language(s) NUTRAN; list, graph output; ERPF, split function; 4/week
3. Lung (V/Q) on system 1; language(s) NUTRAN; list, graph output; V/Q ratios; less than 1/week
4. Heart (FLOW) on system 1; language(s) NUTRAN; list, graph output; EF, CO, EDV, ESV; 1/week
5. Heart (DIFFUSION) on system 1; language(s) NUTRAN; list, graph output; PTT, aneurysms; 1/week
6. Heart (OUTPUT) on system 1; language(s) NUTRAN; list, graph output; 1/week
7. In-Vitro on system 2

Installation: Eisenhower Medical Center
Address: 39000 Bob Hope Drive
Palm Desert, California 92260

Eisenhower Medical Center is a Clinical institution which has 130 beds.

For further information, contact:
Oxley, Dwight K. (software)

The responding department operates the following data acquisition and processing equipment:
Commercial system(s): NDS Simultaneity System

System descriptions:
System 1: NDS Simultaneity System

On the computers described above, the following studies are performed:

- 1. Brain (STATIC); 30/week**
- 2. Brain (FLOW); 30/week**
- 3. Heart (PERFUSION); intra-coronary myocardial perfusion study; 2/week**
- 4. Pancreas; 2/week**

Installation: Sutter Memorial Hospital
Address: Sacramento, California 95819

Sutter Memorial Hospital is a Clinical institution which has 550 beds.

For further information, contact:

Brown, Donald W. (clinical)

Brannon, Troy (hardware)

Brannon, Troy (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): NDS Trinary System

System descriptions:

System 1: NDS Trinary System (Data General Nova 2 CPU) with 32K 16-bit words; 3-meg Diablo HD-12 fixed disk; 3-meg Diablo HD-12 removable pack disk; Tektronix 604 CRT display with 16 grey scales; simultaneous collection and processing; language(s) FORTRAN IV, BASIC, ALGOL; interfaced to 2 scintillation cameras; camera collection in frame mode (64x64 9/sec) 1600 max frames, 250K cps max count rate, list mode (32x32) (64x64) (128x128) with position, time signals

<00>

Installation: Santa Clara Valley Medical Center
 Address: 751 South Bascom Avenue
 San Jose, California 95128

Phone: (415) 293-0262 Ext.272

Santa Clara Valley Medical Center is a Teaching Hospital institution which has 500 beds.

For further information, contact:

McLaughlin, W. T. (clinical)

McLaughlin, W. T. (hardware)

McLaughlin, W. T. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): H-P 5407A

System descriptions:

System 1: H-P 5407A with 12K 16-bit words; 75 cps PTP; 500 cps PTR; 1600 bpi, 45 ips magnetic tape; 1.25-meg removable pack disk; language(s) assembler, FORTRAN IV, BASIC, ALGOL; interfaced to 2 scintillation cameras; camera collection in frame mode (32x32 50/sec) (64x64 20/sec) 160 max frames, list mode (128x128) 1.25-meg max counts

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) assembler; CRT output
2. Brain (FLOW); language(s) assembler, BASIC, FORTRAN; CRT, list, graph output; symmetry
3. Heart (FLOW); language(s) assembler; CRT output
4. Heart (EFFUSION); language(s) assembler; CRT output
5. Liver (STATIC); language(s) assembler; CRT output
6. Liver (FUNCTION); language(s) assembler; CRT output; vascularity
7. Spleen; language(s) assembler; CRT output

<700>

Installation: Cancer Foundation of Santa Barbara
Address: P.O. Box 837
Santa Barbara, California 93102

Cancer Foundation of Santa Barbara is a Clinical institution.

For further information, contact:

McClintock, J. T. (clinical)

Devan, Don (Information Science, Inc.) (software)

The institution operates a central computing facility containing CDC 660C; DEC PDP-11/40 equipment. The responding department uses primarily magnetic tape; punched card for data interchange with the central facility.

System descriptions:

System 1: CDC 6600 with 128K 60-bit words; 200/556/800 bpi 75/150 ips 7-track magnetic tape; fixed disks; Diconed D36 CRT display with 64 grey scales

System 2: DEC PDP-11/40 with 32K 16-bit words; 50 cps PTP; 300 cps PTR; 200/556/800 bpi 45 ips 7-track magnetic tape; (2) 1.2-meg DEC RK-11 removable pack disks

Installation: Stanford University School of Medicine
Address: 300 Pasteur Drive
Stanford, California 94305

Stanford University School of Medicine is a teaching
Hospital institution.

For further information, contact:

Coris, Michael L.; Kriss, J. P. (clinical)
Coris, Michael L.; Kriss, J. P. (hardware)
Coris, Michael L.; Kriss, J. P. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): H-P 5407A

System descriptions:

System 1: H-P 5407A (HP 2001A C2U) with 12K 16-bit
words; PTP; PTR; 800 bpi magnetic tape; fixed disk;
removable pack disk; interfaced to scintillation camera,
rectilinear scanner; camera collection in frame mode
(32x32) (64x64) 360 max frames, 32K max counts per element,
list mode (128x128) 1.3-neg max counts with position time,
physiological signals; collection from scanner in list mode
(128x128) 1.3-neg max counts

On the computers described above, the following studies are
performed:

1. Heart (FLOW); language(s) FORTRAN II; 3/week
2. Heart (GATED); language(s) FORTRAN II; 1/week
3. Heart (DIFFUSION); language(s) FORTRAN II; less than
1/week
4. Heart (OUTPUT); language(s) FORTRAN II; 3/week

Installation: Denver VA Hospital
Address: 1055 Clermont
Denver, Colorado 80220

Phone: (303) 399-8020 Ext.428 FTS: 322-3322

Denver VA Hospital is a Teaching Hospital institution which has 450 beds.

For further information, contact:

Kirch, Dennis L. (clinical)

Kirch, Dennis L. (hardware)

Kirch, Dennis L. (software)

The institution operates a central computing facility containing CDC 6400 equipment. The responding department uses primarily magnetic tape; punched card for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Ohio-Nuclear Series 75 Data System; Ohio-Nuclear Series 75 Data System

User-designed system(s): DEC PDP-12

System descriptions:

System 1: DEC PDP-12 with 32K 12-bit words; 15 cps PIR; 7 cps PTP; 200 bpi 25 ips incremental magnetic tape; 9-tr 800 bpi 45ips magnetic tape; (2) 7-tr 550 bpi 25 ips magnetic tapes (2) TU-56 LINC tapes; .8-sec; DEC RK08 removable pack disk; DMA-drive CRT display with 64 grey scales; language(s) assembler (PAL), RUFUS, IMAGES, FORTRAN; interfaced to 2 scintillation cameras, 2 rectilinear scanners; camera collection in frame mode (32x3; 25/sec) (64x64 6/sec) 50 max frames, 4095 max counts at 64x64; scanner collection in frame mode, .1 inch steps, 4095 max counts with physiological signals

System 2: Ohio-Nuclear Series 75 Data System with 128 8-bit words; (2) 9-tr 800 bpi 75 ips magnetic tapes; 256x256 dot-density CRT display; interfaced to 2 scintillation cameras; camera collection in list mode (256x256) with position, time, and physiological signals

System 3: Ohio-Nuclear Series 75 Data System; identical to System 2

Comments: DIAGRAM; RUFUS and IMAGES are locally-developed interpretive command and control languages

On the computers described above, the following studies are performed:

1. Brain (STATIC) on system 1; language(s) IMAGES; CRT output; lesion identification; 1/week
2. Brain (FLOW) on system 1; language(s) IMAGES; graph output; Flow symmetry; 20/week
3. Renal on system 1; language(s) assembler (PAL); CRT, graph output; rejection, perfusion; 4/week
4. Lung (VENTILATION) on system 1; language(s) assembler (PAL); list output; small airway disease; 3/week
5. Heart (FLOW) on system 1; language(s) assembler (PAL); CRT, graph output; cardiac function; 5/week
6. Heart (EFFUSION) on system 1; language(s) assembler (PAL); CRT output, pericardial effusion; 1/week
7. Heart (OUTPUT) on system 1; list output; detect failure 10/week
8. Liver (STATIC) on system 1; language(s) IMAGES; CRT output; image enhancement; 1/week
9. Liver (FUNCTION) on System 1; language(s) IMAGES; graph output; differentiate obstruction vs. cellular disease; 2/week
10. Pancreas; language(s) IMAGES ; CRT output; find lesions; less than 1/week
11. Tumor Localization; language(s) FORTRAN II; CRT output; image enhancement; 5/week

< 1000 >

Installation: Yale-New Haven Hospital
Address: New Haven, Connecticut 06504

Yale-New Haven Hospital is a Teaching Hospital institution which has 900 beds.

For further information, contact:
Caride, Vicente J. (clinical)
Lange, R. (hardware)
Freedman, Gerald S. (software)

The responding department operates the following data acquisition and processing equipment:
Commercial system(s): Nuclear Data 50/50

<1100>

Installation: Georgetown University Hospital
Address: 3800 Reservoir Road, NW
Washington, D. C. 20007

Georgetown University Hospital is a Clinical; Teaching
Hospital institution which has 400 beds.

For further information, contact:

Sandock, Kenneth (clinical)
Sandock, Kenneth (hardware)
Sandock, Kenneth (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/40 cpu) with 16K 16-bit
words; 50 cps PTP; 100 cps PTR; 1.3-seg DEC RK05 removable
pack disk; DEC CRT display with 32 grey scales; language(s)
FOCAL; interfaced to 1 scintillation camera

On the computers described above, the following studies are
performed:

1. Brain (STATIC); unusual
2. Brain (FLOW); unusual
3. Renal; graph output; arterial flow; unusual
4. Thyroid (UPTAKE); language(s) GAMMA and FOCAL; list
output; Tc uptake; 10/week
5. Lung (V/Q); language(s) GAMMA and FOCAL; CRT, list,
graph output; tumor therapy; less than 1/week
6. Heart (FLOW); graph output; unusual
7. Liver (STATIC); rare
8. Liver (FUNCTION); occasional
9. Pancreas; language(s) GAMMA; CRT output; less than
1/week
10. Bone; CRT, graph output; dental disease, uptake; less
than 1/week

Installation: Gainesville VA Hospital
Address: Gainesville, Florida 32610

Gainesville VA Hospital is a Teaching Hospital institution which has 480 beds.

For further information, contact:

Ball, J.D. (clinical)

The institution operates a central computing facility containing IBM 370 equipment. The responding department uses primarily magnetic tape, direct cable for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-8/I

System descriptions:

System 1: DEC PDP-8/I with 16K 12-bit words; ASR33 PTP; ASR33 PTP; DEC tape; DEC fixed disk; M-P 1300A CRT display with 32 grey scales; interfaced to 1 scintillation camera, 1 rectilinear scanner

Installation: Mt. Sinai Medical Center (Miami)
Address: 4300 Alton Road
Miami, Florida 33140

Mt. Sinai Medical Center (Miami) is a Research; Clinical;
Teaching Hospital institution which has 700 beds.

For further information, contact:

Watson, D. D. (clinical)

Watson, D. D. (hardware)

Watson, D. D. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): Picker Gamma-11

User-designed system(s): H-P

System descriptions:

System 1: Picker Gamma-11 Standard System; interfaced
to 1 scintillation camera

System 2: H-P with 8K 16-bit words; ASR33 PTP;
high-speed PTR; 368K fixed disk; Tektronix 602 CRT display
with 50 grey scales; interfaced to 1 scintillation camera;
camera collection in frame mode (64x64 selectable rate) 64
max frames; 64K max counts

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Installation: University of Miami School of Medicine
 Department: Division of Nuclear Medicine
 Address: P.O. Box 520875 Biscayne Annex
 Miami, Florida 33136

Phone: (305) 325-6345

University of Miami School of Medicine is a Research;
 Clinical; Teaching Hospital institution which has 1200 beds.
 For further information, contact:

Miale, A. (clinical)

Garcia, Ernest V. (hardware)

Garcia, Ernest V. (software)

The institution operates a central computing facility
 containing Univac 1108 equipment. The responding
 department uses primarily Magnetic tape for data
 interchange with the central facility.

The responding department operates the following data
 acquisition and processing equipment:

Commercial system(s): NDS Simultaneity System

System descriptions:

System 1: NDS Simultaneity System (Data General Nova
 1200 cpu) with 32K 16-bit words; PTP; PTR; 800 lpi 45 ips
 magnetic tape; 1.2-meg HD-12 fixed disk; 1.2-meg HD-12
 removable pack disk; (2) H-P1330A CRT displays with 15 grey
 scales; simultaneous collection and processing; language(s)
 Assembler, FORTRAN, BASIC; interfaced to 5 scintillation
 cameras; camera collection in frame mode (64x64 25/sec) 600
 max frames at 256 max counts/element or 300 max frames at
 65535 max counts/element

Comments: DIAGRAM

On the computers described above, the following studies are
 performed:

1. Renal; language(s) assembler; CRT output; Renal
 function and perfusion; 5/week
2. Lung (PERFUSION); language(s) assembler; CRT output;
 3/week
3. Lung (VENTILATION); language(s) assembler; CRT output;

3/weeks

4. Heart (FLOW); language(s) assembler; CRT output, heart function, SD; 8/week

5. Heart (GATED); language(s) FORTRAN, assembler; 3/week

6. Heart (OUTPUT); language(s) FORTRAN; CRT output; 4/week

7. Pancreas; language(s) assembler; CRT output; liver subtraction; 3/week

8. Bone; language(s) assembler; list output; quantitate lesion; 3/week

Installation: Aerojet Nuclear Co.
Address: 550 E. Second St.
Idaho Falls,, Idaho

Aerojet Nuclear Co. is a Research institution.
For further information, contact:

English, G. O. (hardware)

Hyers, W. R. (software)

The institution operates a central computing facility containing IBM 360/75 equipment. The responding department uses primarily Magnetic tape; punched card; direct cable for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-9; DEC PDP-8; Data General NOVA-1200; Nuclear Data ND-812

System descriptions:

System 1: DEC PDP-9; PTP; PTR; magnetic tape; cassette tape; magnetic drum; DECtape; ADC Interface; noden; Teletype; CRT Display with light pen;

System 2: DEC PDP-8; magnetic tape; CRT display; ADC interface; Teletype

System 3: Data General NOVA-1200; cassette tape; CRT display; ADC interface; noden; Teletype

System 4: Nuclear Data ND-812; magnetic tape; cassette tape; CRT display; ADC interface; noden; Teletype

<1600>

Installation: University of Chicago
 Address: 950 E. 59th Street
 Chicago, Illinois 60637

University of Chicago is a Research; Clinical; Teaching Hospital institution which has 900 beds. The institution operates a central computing facility containing IBM 370/168 equipment. The responding department uses primarily Magnetic tape; Remote terminal for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Ohio-Nuclear Model 150 Data System

System descriptions:

System 1: IBM 370/168 with virtual 32-bit memory; 800 bpi 75 ips magnetic tape;

System 2: Ohio-Nuclear Model 150 Data System (storage only no processing); 800 bpi 75 ips magnetic tape; CRT display with 16 grey scales; interfaced to 1 scintillation camera; camera collection in frame mode (32x32 30/sec) (64x64 8/sec) (128x128 3/sec) 4096 max counts/element (32x32 and 64x64), 256 max counts/element (128x128)

On the computers described above, the following studies are performed:

1. Liver (STATIC) on system 2; language(s) FORTRAN; CRT output; motion correction; not routine

Installation: Edward Hines VA Hospital
Address: Hines, Illinois 60141

Phone: (312) 343-7200 Ext. 2440 PTS: 387-6700

Edward Hines VA Hospital is a Research; Clinical; Teaching Hospital institution which has 1500 beds.

For further information, contact:

Arnold, James S. (clinical)

Shponka, Samuel H. (hardware)

Shponka, Samuel H. (software)

The institution operates a central computing facility containing IBM 360 equipment. The responding department uses primarily magnetic tape for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Elscint CDP-2; Elscint CDP-3

System descriptions:

System 1: Elscint CDP-2 System

System 2: Elscint CDP-3 System (Data General NOVA-2 cps) with 32K 16-bit words; 600 cps PTR; 800 bpi incremental magnetic tape; cassette tape; 2.5-neg Pertec fixed disk; 2.5-neg Pertec removable pack disk; 1.25-neg Diablo model 31 removable pack disk; R-P 1300A CRT display with 8 grey scales; Elscint color printer; Brattle Physiological Synchronizer; language(s) FORTRAN, BASIC, assembler; interfaced to 1 scintillation camera, 2 rectilinear scanners (via cassette); camera collection in frame mode (96x96 10/sec) 200 max frames, 3,000,000 max counts/frame

Comments: DIAGRAM; 1) We are developing an image filing system on magnetic tape. 2) We teach computer technology and computing languages to 14 students per year. 3) We are developing a complete nuclear medicine image processing package for pulmonary, cardiac, and renal analysis

On the computers described above, the following studies are performed:

1. Brain (FLOW) on systems 1,2; language(s) FORTRAN, assembler; CRT, graph output; diagnosis
2. Renal on system 1; CRT, graph output; diagnosis; 3-5/week
3. Lung (PERFUSION) on systems 1,2; language(s) FORTRAN; CRT, graph output ; research; 1/week

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4. Lung(VENTILATION) on systems 1,2; language(s) FORTRAN;
CRT, graph output; diagnosis; 1/week
5. Heart (PERFUSION) on system 1; CRT output, diagnosis;
1/week
6. Liver (FUNCTION) on systems 1,2; language(s) FORTRAN;
CRT, graph output; diagnosis and research; 1/week
7. Pancreas on systems 1,2; CRT, list output; diagnosis
and research; 1/week
8. TL201 Heart Scans on systems 1,2; language(s) FORTRAN;
CRT output; research and diagnosis; 1/week
9. R818 Lung Ventilation on systems 1,2; language(s)
FORTRAN; CRT output; research; 1/week

**Installation: Kansas University Medical Center
Address: Rainbow at 39th Street
Kansas City, Kansas 66103**

Kansas University Medical Center is a Teaching Hospital institution which has 550 beds.

For further information, contact:

Robinson, Ralph G.; Preston, David (clinical)

Gallagher, Joe H. (hardware)

Gallagher, Joe H.; Merrin, William T. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Ohio-Nuclear Series 75 Data System

User-designed system(s): DEC PDP-15; Nuclear Data

System descriptions:

System 1: Ohio-Nuclear Series 75 Data System; collection only

System 2: DEC PDP-15 with 64K 18-bit words; 50 cps PTP; 300 cps PTR; DECtape; (2) .25-meg DEC RS09 fixed disks; (2) 10-meg DEC RP02 removable pack disks; 72-track DATA DISK display disk; CRT display with 16 grey scales; HIPED video system; simultaneous collection and processing; language(s) assembler, FORTRAN; interfaced to 2 scintillation cameras, 1 rectilinear scanner, 1 ultrasound unit; camera collection in frame mode (64x64 6/sec) 90 mri frames/study; scanner collection in frame mode, 510 max counts/element

System 3: Nuclear Data with 8K 12-bit words; 10 cps PTP; 10 cps PTR; Nuclear Data dual cassette tape; CRT display; language(s) ORCAL; interfaced to auto well changer

Comments: All studies done on PDP-15 system using HIPED/CUPAD IMAGE/ INFORMATION system (color TV). Most programs are in FORTRAN. All scans from 2 to 3 cameras acquired into computers.

<1900>

Installation: Touro Infirmary
Address: 1401 Poucher Street
New Orleans, Louisiana 70115

Touro Infirmary is a Clinical institution which has 500 beds.

For further information, contact:

Nidalgo, John U. (software)

The institution operates a central computing facility containing IBM 360/45 equipment. The responding department uses primarily Magnetic tape; punched card; nodes for data interchange with the central facility.

Installation: National Institutes of Health Clinical Center
Department: Nuclear Medicine Dept.
Address: Bethesda, Maryland 20014

National Institutes of Health Clinical Center is a Research institution which has 600 beds.

For further information, contact:

Green, Mike (clinical)

Ostrow, Harold (hardware)

Ostrow, Harold (software)

The institution operates a central computing facility containing DEC PDP-10; IBM 370/168 equipment. The responding department uses primarily Magnetic tape for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): H-P 5407; H-P 5407

System descriptions:

System 1: H-P 5407 with 32K 16-bit words; 75 cps PTP; 300 cps PTR; 1600 bpi 45 ips magnetic tape; 1.25-meg fixed disk; 1.25-meg removable pack disk; H-P 180 CRT display; H-P 1300 CRT display; interfaced to 3 scintillation cameras; camera collection in frame mode (32x32 82/sec) (64x64 20/sec) 318 max frames, 32K max counts, in list mode (128x128) 20,000,000 max counts with position, time, energy (3 isotopes) and physiological signals.

System 2: H-P 5407 with 16K 16-bit words; 10 cps PTP; 10 cps PTR; H-P 180 CRT display only; otherwise identical to system 1.

On the computers described above, the following studies are performed:

1. Brain (STATIC) on systems 1 and 2; language(s) assembler and FORTRAN; CRT output; automatic tumor detection; 10/week
2. Brain (FLOW) on systems 1 and 2; language(s) assembler and FORTRAN; CRT output; regional cerebral blood flow in stroke; 10/week
3. Renal on systems 1 and 2; language(s) assembler and FORTRAN; CRT output; evaluation of functional mapping; 2/week
4. Lung (VENTILATION) on systems 1 and 2; language(s) assembler and FORTRAN; CRT, List output; 5/week
5. Lung (PERFUSION) on systems 1 and 2; language(s) assembler and FORTRAN; CRT, List output; 5/week

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6. Lung (V/Q) on systems 1 and 2; language(s) assembler and FORTRAN; functional mapping evaluation; 5/week
7. Heart (FLOW) on systems 1 and 2, language(s) assembler and FORTRAN; Clinical validation; 5/week
8. Heart (GATED) on systems 1 and 2, language(s) assembler and FORTRAN; Clinical validation; 5/week
9. Heart (EFFUSION) on systems 1 and 2, language(s) assembler and FORTRAN; Clinical validation; 5/week
10. Heart (OUTFUT) on systems 1 and 2, language(s) assembler and FORTRAN; Clinical validation; 5/week

<2100>

Installation: National Naval Medical Center
Address: Bethesda, Maryland 20014

National Naval Medical Center is a Teaching Hospital
institution which has 600 beds.

For further information, contact:

Kiepfer, R. (clinical)
Kiepfer, R. (hardware)
Kiepfer, R. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): NDS Trinary System

System descriptions:

System 1: NDS Trinary System (Data General 1210 cpu)
with 32K 16-bit words; 1.25-meg Diablo fixed disk; 1.25-meg
Diablo removable pack disk; CRT display with 16 greyscales;
simultaneous collection and processing; language(s) FORTRAN
IV, BASIC, assembler; interfaced to 2 scintillation cameras

On the computers described above, the following studies are
performed:

1. Brain (FLOW); language(s) Assembler; graph, CRT output;
clinical; 1-5/week
2. Lung (PERFUSION); language(s) assembler, BASIC; list,
graph output; clinical diagnosis; 0-3/week
3. Lung (VENTILATION); language(s) assembler, BASIC; list,
graph output; clinical diagnosis; 0-3/week
4. Lung (V/Q); language(s) assembler, BASIC; list, graph
output; clinical diagnosis; 0-3/week

Installation: Johns Hopkins University
Department: Applied Physics Laboratory
Address: 8021 Georgia Avenue
Silver Spring, Maryland 20910

Johns Hopkins University is a Research institution.
For further information, contact:

Knowles, Lloyd G. (hardware)

Knowles, Lloyd G. (software)

The institution operates a central computing facility containing Univac 1206, 1230, 492 equipment. The responding department uses primarily Magnetic tape; punched card; for data interchange with the central facility.

System descriptions:

System 1: Univac 1206 with 32K 30-bit words; PTP; PTR; 556 lpi magnetic tape; 160x250 CRT display with 64 greyscales;

System 2: Univac 1230 with 32K 30-bit words; PTP; PTR; 556 lpi magnetic tape;

Comments: DIAGRAM

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Installation: Massachusetts General Hospital
Department: Physics Research Laboratory
Address: Boston, Massachusetts 02114

Massachusetts General Hospital is a Teaching Hospital institution which has 1000 beds.

For further information, contact:

Alpert, B.; Hoop, B. (clinical)
Burnham, C. (hardware)
Correll, J.; Deveau, L. (software)

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-9; NODCOMP II

System descriptions:

System 1: DEC PDP-9 (NUMEDICS) with 16K 18-bit words; 50 cps PTP; 200 cps PTR; DECtape; 1-meg fixed disk; Data Disk 8-track display disk; 128x128 raster CRT display with 64 greyscales; language(s) Assembler; interfaced to 2 scintillation cameras; camera collection in frame mode (64x64 10/sec) 128 max frames, 512 max counts/element

System 2: NODCOMP II (PC-II) with 16K 16-bit words; PTP; PTR; 1.2-meg Diablo fixed disk; 1.2-meg Diablo removable pack disk; 128x128 raster CRT display with 64 greyscales; language(s) FORTRAN, Assembler; interfaced to 1 scintillation camera; camera collection in frame mode (64x64 10/sec) 300 max frames, 32K max counts/element;

On the computers described above, the following studies are performed:

1. Brain (STATIC) on System 1; language(s) Assembler; CRT output; Metabolism, Research
2. Lung (VENTILATION) on System 1; language(s) Assembler; CRT output; 12-15/week
3. Lung (V/Q) on System 1; language(s) Assembler; list, CRT output; 2-3/week
4. Heart (FLOW) on System 1; language(s) Assembler; CRT output; Regional Perfusion
5. Heart (GATED) on System 1; language(s) Assembler; CRT output; Left Ventricular Performance; 3/week
6. 3-D Imaging; Research

Installation: Massachusetts General Hospital
Department: Division of Nuclear Medicine
Address: Fruit Street
Boston, Massachusetts 02114

Massachusetts General Hospital is a Teaching Hospital institution which has 1000 beds.

For further information, contact:

Potsaid, M.S.; McKusick, K. A. (clinical)
Alpert, M.; Correll, J. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): H-P 5407A

System descriptions:

System 1: H-P 5407A (H-P 2000A cpu) with 12K 16-bit words; (2) 1.2-meg removable pack disks; refreshed CRT display with 16 greyscales; interfaced to 2 scintillation cameras; camera collection in frame mode (64x64 20/sec); 300 max frames, 16.5 K max counts/element, in list mode (128x128) 80K max counts/ second with position, time, energy, physiological signals

On the computers described above, the following studies are performed:

1. Renal; graph, CRT output; Transplant rejection; 3-5/week
2. Thyroid (IMAGE); 1-2/week
3. Thyroid (UPTAKE); 1-2/week
4. Heart (FLOW); graph, CRT output; Shunt detection; 1/week
5. Bone; list, graph output, assess therapy; 2/week
6. Tumor Localization; CRT output, Ga67 localization; 3/week

Installation: St. Joseph Mercy Hospital
Address: 326 W. Ingalls St.
Ann Arbor, Michigan 48104

St. Joseph Mercy Hospital is a Teaching Hospital
institution which has 490 beds.

For further information, contact:

Colvin, Jeff; Klein, E. W. (clinical)
Colvin, Jeff (hardware)
Colvin, Jeff (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): HDS Simultaneity System

System descriptions:

System 1: HDS Simultaneity System (Data General cpu)
16K 16-bit words; TTY PIP; TTY PTR; 1.2-meg Diablo fixed
disk; 1.2-meg Diablo removable pack disk; Hewlett-Packard
CRT display with 16 greyscales; simultaneous collection and
processing; language(s) Assembler; interfaced to 1
scintillation camera, camera collection in frame mode
(32x32 20/sec) (64x64 9.25/sec) 256/4096 max counts/element

On the computers described above, the following studies are
performed:

1. Brain (STATIC); language(s) assembler; CRT output;
30/week
2. Brain (FLOW); language(s) assembler, BASIC; list,
graph output; 25/week
3. Renal; language(s) assembler, BASIC; graph output;
less than 1/week
4. Lung (VENTILATION); language(s) assembler; CRT output;
backup; 15/week
5. Heart (FLOW); language(s) assembler; CRT output;
backup; less than 1/week

Installation: University of Michigan Hospital
Address: Division of Nuclear Medicine
Ann Arbor, Michigan 48104

University of Michigan Hospital is a Teaching Hospital institution which has 1000 beds.

For further information, contact:

Keyes, John W., Jr.(clinical)

Keyes, John W., Jr.(hardware)

Keyes, John W., Jr.(software)

The institution operates a central computing facility containing Andatl 470 equipment. The responding department uses primarily Magnetic tape; modem; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): NDS Trinary System

System descriptions:

System 1: NDS Trinary System (Data General Nova 1220 cpu) TTY PTP; TTY FTR; 1.2-meg Diablo fixed disk; (2) 1.2-meg Diablo removable pack disks; Hewlett-Packard CRT display with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN; BASIC, assembler; interfaced to 3 scintillation cameras, camera collection in frame mode (64x64 10/sec) 303 max frames, 65535 max counts/element; in list mode (64x64) 2,000,000 max counts with position, time, physiological signals

<2700>

Installation: Hackley Hospital
 Department: Dept. of Nuclear Medicine
 Address: Muskegon, Michigan 49443

Hackley Hospital is a Clinical institution which has 390 beds.

For further information, contact:

Carlson, James C. (clinical)
 Carlson, James C. (hardware)
 Carlson, James C. (software)

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-8/I

System descriptions:

System 1: DEC PDP-8/I with 8K 12-bit words; DECtape; Tektronix RM 503 CRT display with 32 greyscales; language(s) assembler, interfaced to 1 scintillation camera, camera collection in frame mode (64x64 1/sec) 45 max frames, 4095 max counts /word, in list mode (64x64) with position, time signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; pictures; 50/week
2. Brain (FLOW); language(s) Assembler; CRT output; pictures; 2/week
3. Renal; language(s) Assembler; CRT output; regional/total kidney curves; 2/week
4. Lung (PERFUSION); language(s) Assembler; CRT output; pictures; less than 1/week
5. Lung (VENTILATION); language(s) Assembler; CRT output; pictures; less than 1/week
6. Lung (V/Q); language(s) Assembler; CRT output; pictures; less than 1/week
7. Heart (FLOW); language(s) Assembler; CRT output; pictures/curves; less than 1/week
8. Pancreas; language(s) Assembler; CRT output; pictures; 5/week

<2800>

Installation: William Beaumont Hospital
Address: Royal Oak, Michigan 48072

Phone: (313) 549-7000 Ext.300

William Beaumont Hospital is a Teaching Hospital institution which has 700 beds.

For further information, contact:

Wetzel, R. A. (clinical)

Hill, Jack (hardware)

Hill, Jack (software)

The institution operates a central computing facility containing Burroughs 2100 equipment. The responding department uses primarily Punched card; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): H-P 5407A

System descriptions:

System 1: H-P 5407A (H-P 2100A cpu) with 16K 16-bit words; PTP; PTR; 800 bpi magnetic tape; 1.24-meg removable pack disk; CRT display; language(s) BASIC, assembler, interfaced to 4 scintillation cameras; camera collection in frame mode (64x64 20/sec) 300 max frames, 37,500 max counts/element, in list mode (128x128) with position, time, energy signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; occasional
2. Brain (FLOW); language(s) BASIC; graph, CRT output; Left/Right Comparison; 2-3/week
3. Renal; language(s) BASIC; graph output; parameters; variable
4. Thyroid (UPTAKE); language(s) BASIC; CRT, graph output; ratio; 10/week
5. Lung (VENTILATION); language(s) BASIC; graph output; washout; 5-6/week
6. Heart (FLOW); language(s) Assembler, BASIC; graph output; Static/Dynamic images; 1-2/week
7. Heart (PERFUSION); language(s) Assembler, Basic; CRT output; 1/week

<2900>

Installation: University of Minnesota
 Department: Div. of Nuclear Medicine
 Address: Box 382 Mayo
 Minneapolis, Minnesota 55455

University of Minnesota is a Teaching Hospital institution which has 800 beds.

For further information, contact:

Loken, M. K.; Goldberg, M. E. (clinical)
 Williams, L. E.; Ponto, R. A. (hardware)
 Williams, L. E.; Ponto, R. A. (software)

The institution operates a central computing facility containing CDC 3300 equipment. The responding department uses primarily Magnetic tape; punched card; modem; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data NED 2 System;
 Nuclear Data NED STOR

System descriptions:

System 1: Nuclear Data NED 2 System with 16K 12-bit words; TTY PTP; 125 cps PTR; 800 bpi 45 ips magnetic tape; .8-meg removable pack disk; Tectronix digital CRT display with 8-12 greyscales; language(s) NUTRAN; interfaced to 2 scintillation cameras, camera collection in frame mode (32x32 24/sec) (64x64 6/sec) 180 max frames, in list mode (128x128) with position, time, energy signals

System 2: Nuclear Data NED STOR with 16K 12-bit words; TTY PTP; TTY PTR; 800 bpi 75 ips magnetic tape; Tektronix digital CRT display with 12 greyscales; language(s) Assembler; interfaced to 1 scintillation camera, camera collection in frame mode (64x64 6/sec), in list mode (128x128) with position, time signals

On the computers described above, the following studies are performed:

1. Brain (FLOW) on System 1; language(s) NUTRAN; list output; Regional Flow; 1-2/week
2. Renal on Systems 1 and 2; language(s) NUTRAN, Assembler; graph output; Renal evaluation/flow; 5-15/week
3. Lung (PERFUSION) on System 1; language(s) NUTRAN; list, CRT output; embol; several/week
4. Lung (VENTILATION) on System 1; language(s) NUTRAN; list, CRT output; several/week

5. Lung(V/Q) on System 1; language(s) NUTRAN; list, CRT output; lung physiology; several/week
- ; 6. Heart (FLOW) on System 2; language(s) assembler; list, graph output; regional flow; 5-10 week
7. Heart (OUTPUT) on System 1; language(s) NUTRAN; CRT, graph output; localize infarcts, shunts ; several/week
8. Liver (STATIC) on System 1; language(s) NUTRAN; CRT output
9. Tumor Localization on System 1; language(s) NUTRAN; CRT output; liver

<3000>

Installation: Mayo Clinic
 Address: 200 First St. SW
 Rochester, Minnesota 55901

Phone: (507) 282-5460 Ext.3055

Mayo Clinic is a Research; Clinical; Teaching Hospital institution which has 2000 beds.

For further information, contact:

Robertson, James S. (clinical)

Becker, G. (hardware)

Sandberg, S. P. (software)

The institution operates a central computing facility containing CDC 360C; IBM 370/158 equipment. The responding department uses primarily magnetic tape for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): MDS Modumed System

System descriptions:

System 1: MDS Modumed System (Data General Nova 1220 cpu) with 32K 16-bit words; 9-tr 800 bpi 75 ips magnetic tape; 2.4 megabyte Diablo fixed disk; 2.4 megabyte Diablo removable pack disk; H-P dot intensity modulated CRT display with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN, assembler, interfaced to 2 scintillation cameras (1 LFOV); camera collection in frame mode (128x128 static) 1200 max frames, in list mode with position, time, physiological signals

System 2: CDC 3600 with 64K 48-bit words; 7/9-tr 556/800 bpi 37.5 ips magnetic tape; 8.2-megabyte 2311-type removable pack disk; language(s) FORTRAN

System 3: IBM 370/158 with 512K bytes; 7/9-tr 80C/1600 bpi 120 ips magnetic tape; 100 megabyte IBM 3330 disks, Sanders/IBM CRT display; language(s) FORTRAN, COBOL, Assembler

On the computers described above, the following studies are performed:

1. Brain (STATIC) on System 1; language(s) assembler; CRT, graph output; Evaluation of EMI; 10/week
2. Brain (FLOW) on System 1; language(s) assembler; CRT, graph output; arterial flow; 20/week
3. Renal on System 2; language(s) Assembler; graph, CRT output; arterial flow; 4/week
4. Lung (PERFUSION) on System 1; language(s) Assembler;

20/week

5. Lung (VENTILATION) on System 1; language(s) Assembler; 20/week

6. Lung(V/Q) on System 1; language(s) Assembler; 20/week

7. Heart (FLOW) on System 1; language(s) Assembler; CRT, graph output; Left-to-Right Shunt; 4/week

8. Heart (GATED) on System 1; language(s) Assembler; CRT output; myocardial infarct; 4/week

9. Heart (OUTPUT); planned

10. Pancreas on Systems 1,2; language(s) FORTRAN; graph output; Quantitate function; 1/week

11. Lung(WASHOUT) on systems 1,2; language(s) FORTRAN; CRT output; Xenon washout; less than 1/week

12. 3-D Imaging on Systems 1,2; language(s) FORTRAN; CRT output; myocardial blood flow; less than 1/week

<3100>

Installation: University of Mississippi Med. Center
Address: 2500 N. State St.
Jackson, Mississippi 39216

University of Mississippi Med. Center is a Teaching
Hospital institution.

For further information, contact:
Flowers, William H. (clinical)
Smith, Robert O. (hardware)
Smith, Robert O. (software)

The responding department operates the following data
acquisition and processing equipment:

User-designed system(s): H-P 2115A

System descriptions:

System 1: H-P 2115A cpu with 8K 16-bit words; 150 cps
PTP; 150 cps PTR; 184K Data Disk fixed disk; refreshed CRT
display with 32 greyscales; language(s) FORTRAN II,
interfaced to 1 scintillation camera, 1 rectilinear
scanner, camera collection in frame mode (32x32 10/sec) 200
max frames, 32,000 max counts, scanner collection in frame
mode, (64x128), 32,000 max counts

Comments: DIAGRAM

On the computers described above, the following studies are
performed:

1. Brain (FLOW); language(s) Assembler, FORTRAN II; list,
graph, CRT output; pictures/parameters; 2/week
2. Heart (FLOW); language(s) Assembler, FORTRAN II; list,
graph, CRT output; pictures/parameters; 6/week

<3200>

Installation: Omaha Veterans Administration Hospital
Address: 4101 Woolworth Ave.
Omaha, Nebraska 68105

Omaha Veterans Administration Hospital is a Research;
Clinical; Teaching Hospital institution which has 350 beds.
For further information, contact:

Blotcky, Alan (clinical)

Claussen, Harvey (hardware)

Blotcky, Alan; Claussen, Harvey (software)

The institution operates a central computing facility
containing IBM 1620 equipment. The responding department
uses primarily punched card; paper tape; for data
interchange with the central facility.

System descriptions:

System 1: IBM 1620 with 20K words; 15 cps PTP; 150 cps
PTR;

Installation: John F. Kennedy Medical Center
Address: Edison, New Jersey 08817

John F. Kennedy Medical Center is a Clinical institution which has 415 beds.

For further information, contact:

Wald, Frank (clinical)
Pollack, Richard (hardware)
Pollack, Richard (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Raytheon Cine-200

System descriptions:

System 1: Raytheon Cine-200 (Intertechnique Multi-20 cpu) with 32K 8-bit words; TTY PTP; TTY PTR; 2.5-meg CDC fixed disk; 2.5-meg CDC removable pack disk; CRT display with 64 greyscales; simultaneous collection and processing; language(s) FORTRAN, BASIC, assembler, LBN; interfaced to 1 scintillation camera, 1 rectilinear scanner, auto well changer; camera collection frame mode (64x64 22/sec) 255 max frames, 200 K/second max counts, in list mode (1/8" resolution) 34K/sec max counts with position, time, energy, physiological signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) assembler; CRT output; 20/week
2. Brain (PLCW); language(s) Assembler; CRT output; 20/week
3. Renal; language(s) Assembler; CRT output; 1/week
4. Lung (PERFUSION); language(s) Assembler; CRT output; 4/week
5. Lung (VENTILATION); language(s) Assembler; CRT output; 4/week
6. Lung (V/Q); language(s) Assembler; CRT output; 4/week
7. Heart (PLCW); language(s) Assembler; CRT output; 3/week

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8. Heart (GATED); language(s) Assembler; CRT output
9. Liver (STATIC); language(s) Assembler; CRT output;
10/week
10. Liver (FUNCTION); language(s) Assembler; CRT output;
2/week
11. Spleen; language(s) Assembler; CRT output
12. Pancreas; language(s) Assembler; CRT output; 5/week
13. Bone; language(s) Assembler; CRT output; 5/week
14. Tumor Localization; language(s) Assembler; CRT output;
3/week

<3400>

Installation: Albany Veterans Administration Hospital
Department: Nuclear Medicine Service
Address: Albany, New York 12208

Phone: (518) 462-3311 Ext.525 FTS: 563-9254

Albany Veterans Administration Hospital is a Teaching Hospital institution which has 800 beds.

For further information, contact:

Cicio, S. (clinical)
Tatarczuk, J. (hardware)
Tatarczuk, J. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/40 cpu) with 32K 16-bit words; 50 cps PTP; 300 cps PTR; 1.2-meg RM05 removable pack disk; dual floppy disks; AR11 Analog I/O Unit; Tektronix 611 CRT display with 32 greyscales; simultaneous collection and processing; language(s) FORTRAN IV, BASIC, assembler, interfaced to 2 scintillation cameras, camera collection in frame mode (32x32 50/sec) (64x64 12/sec) 512 max frames, 65K max counts/element, in list mode (128x128) with position, time signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; list, CRT output; pictures/curves; 5/week
2. Brain (FLOW); language(s) Assembler; list, CRT output; pictures/curves; 20/week
3. Renal; language(s) Assembler; list, graph, CRT output; pictures/curves; 1/week
4. Lung (VENTILATION); language(s) Assembler; list, graph, CRT output; pictures/curves
5. Heart (FLOW); language(s) Assembler; list, graph, CRT output; pictures/curves
6. Liver (STATIC); language(s) Assembler; list, CRT output; pictures/curves; 2/week
7. Liver (FUNCTION); language(s) Assembler; list, graph, CRT output; pictures/curves

8. Spleen; language(s) Assembler; list, CRT output;
pictures/curves; 2/week
9. Bone; language(s) Assembler; list, CRT output;
pictures/curves; 1/week
10. Lacrimal Duct; language(s) Assembler; list, graph, CRT
output; pictures/curves
11. RNA; language(s) Assembler; list, graph, CRT output;
pictures/curves
12. In-Vitro; language(s) PORTRAM; list, graph output;
radioimmunoassay data reduction

<3500>

Installation: Bronx-Lebanon Hospital
 Address: 1650 Grand Concourse
 Bronx, New York 10457

Bronx-Lebanon Hospital is a Clinical institution which has 600 beds.

For further information, contact:

Ochs, Daniel (clinical)
 Ochs, Daniel (hardware)
 Ochs, Daniel (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data ND-812

User-designed system(s): H-P

System descriptions:

System 1: Nuclear Data ND-812 with 16K 12-bit words; 200 cps PTP; 500 cps PTR; 1-meg removable pack disk; Tektronix CRT display with 64 greyscales; language(s) NUTRAN; interfaced to 1 scintillation camera, camera collection in frame mode (32x32 6/sec) (64x64 6/sec) 180 max frames, 20K counts/second, in list mode (3/8" resolution) 20K max counts/second with position, time signals

System 2: Hewlett-Packard with 32K 16-bit words; 120 cps PTP; 300 cps PTR; 1600 bpi 45 ips magnetic tape; cassette tape 2.5-meg fixed disk; 2.5-meg removable pack disk; Hewlett-Packard CRT display simultaneous collection and processing language(s) FORTRAN, BASIC, assembler, ALGOL; Planned System;

On the computers described above, the following studies are performed:

1. Brain (STATIC) on System 1; language(s) NUTRAN; CRT output; 10-15/week
2. Brain (FLOW) on System 1; language(s) NUTRAN; graph output; 10-15/week
3. Renal on System 1; language(s) NUTRAN; list, graph, CRT output; 3/week
4. Thyroid (IMAGE) on System 1; language(s) NUTRAN; CRT output; 5/week
5. Thyroid (UPTAKE) on System 1; language(s) NUTRAN; graph output; 3/week
6. Lung (PERFUSION) on System 1; language(s) NUTRAN; CRT output; > 10/week
7. Heart (FLOW) on System 1; language(s) NUTRAN; graph output; 2/week
8. Heart (GATED) on System 1; language(s) NUTRAN; CRT output; under development

9. Heart (PERFUSION) on System 1; language(s) NUTRAM; CRT output; 1-2/week
10. Heart (OUTPUT) on System 1; language(s) NUTRAM; graph output
11. Liver (STATIC) on System 1; language(s) NUTRAM; CRT output
12. Liver (FUNCTION) on System 1; language(s) NUTRAM; graph output
13. Spleen on System 1; language(s) NUTRAM; CRT output
14. Pancreas on System 1; language(s) NUTRAM; CRT output
15. Bone on System 1; language(s) NUTRAM; CRT output
16. Tumor Localization on System 1; language(s) NUTRAM; CRT output

Installation: Queens Hospital Center
Department: Dept. of Nuc. Medicine
Address: 82-68 164th Street
Jamaica, New York 11432

Queens Hospital Center is a Clinical institution which has 800 beds.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): Data General NOVA-1220

System descriptions:

System 1: Data General NOVA-1220 cpu with 32K 16-bit words; 60 cps PTP; 300 cps PTR; 2.5-meg removable pack disk; language(s) FCSTRAN, BASIC, assembler, interfaced to 1 scintillation camera, system under development

<3700>

Installation: Mt. Sinai Hospital (NYC)
Address: 5th Ave. & 100th Street
New York, New York 10029

Mt. Sinai Hospital (NYC) is a Research; Clinical; Teaching
Hospital institution which has 1600 beds.
For further information, contact:

Monahan, Gordon(hardware)

Monahan, Gordon(software)

The institution operates a central computing facility
containing IBM 360 equipment. The responding department
uses primarily Magnetic tape; punched card; for data
interchange with the central facility.

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): VARIAN 74 System

System descriptions:

System 1: VARIAN 74 System with 48K 16-bit words; 1600
bpi 75 ips magnetic tape; IBM Card Reader 14-meg Century
Data fixed disk; Videc Terminal; electrostatic
printer/plotter display with 16 greyscales; simultaneous
collection and processing; language(s) FORTRAN, interfaced
to 3 scintillation cameras; 1 rectilinear scanner
(planned); camera collection in list mode 10K max counts

On the computers described above, the following studies are
performed:

1. Brain(FLOW); 20 total
2. Renal; 197 total
3. Heart(FLOW); 10 total
4. Heart(PERFUSION); 5 total
5. Liver(FUNCTION); 10 total

<3E00>

Installation: Presbyterian Hospital
Address: 622 W. 168th St.
New York, New York 10032

Phone: (212) 694-2721

Presbyterian Hospital is a teaching hospital institution which has 1300 beds.

For further information, contact:

Esser, Peter (clinical)

Esser, Peter (hardware)

Esser, Peter (software)

The institution operates a central computing facility containing IBM 370/145; IBM 370/145 equipment.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): NDS

System descriptions:

System 1: NDS (Data General CPU) with 32 K 16-bit words; 800 bpi 45 ips magnetic tape; fixed disk; removable pack disk (total 48 Megabits); refreshed CRT display with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN, BASIC; interfaced to 1 scintillation camera; (64x64 25/sec) (128x128), in list mode with position signals

On the computers described above, the following studies are performed:

1. Brain (FLOW) CRT output; 6/week
2. renal; CRT output; 10/week

<3900>

Installation: St. Luke's Hospital Center of Columbia
University

Address: Amsterdam Avenue and 113th St.
New York, New York 10025

St. Luke's Hospital Center of Columbia University is a
Teaching Hospital institution.

For further information, contact:

Pierson, Richard M.; Friedman, Marvin I. (clinical)

Friedman, Marvin I. (hardware)

Friedman, Marvin I. (software)

The institution operates a central computing facility
containing IBM 360/95 equipment. The responding department
uses primarily magnetic tape; for data interchange with the
central facility.

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11 cpu) with 28 K 16-bit
words; 10 cps PTP; 10 cps PTR(TTY); Kennedy 800 bpi 45 ips
magnetic tape; 2.5-meg Diablo fixed disk; 2.5-meg Diablo
removable pack disk; Tektronix 4012 CRT display with 32
greyscales; language(s) FORTRAN, assembler; interfaced to 1
scintillation camera (M. C. Pho-Gamma HP), probe; camera
collection in frame mode (64x64 25/sec) 511 max frames, 65
K max counts; in list mode (resolution 128) 80 K max
counts/sec with position, time, energy, physiological
signals

On the computers described above, the following studies are
performed:

1. Lung (V/Q); language(s) Assembler, FORTRAN; List, graph,
CRT output; Pulmonary Physiology; 4/week
2. Heart (FLOW); language(s) Assembler, FORTRAN; List,
graph, CRT output; Hemodynamics; less than 5/week
3. Heart (OUTPUT); language(s) Assembler, FORTRAN; List,
graph, CRT output; Hemodynamics; less than 5/week

<4000>

Installation: Sloan-Kettering Memorial Cancer Center
 Address: 1275 York Avenue
 New York, New York 10021

Sloan-Kettering Memorial Cancer Center is a Research;
 Clinical; Teaching Hospital institution which has 600 beds.
 For further information, contact:

Beaua, R. S. (clinical)
 Laughlin, J. S. (hardware)
 Laughlin, J. S. (software)

The institution operates a central computing facility
 containing IBM 180C equipment. The responding department
 uses primarily magnetic tape; punched card; direct cable;
 Paper tape; for data interchange with the central facility.

The responding department operates the following data
 acquisition and processing equipment:

User-designed system(s): H-P 2115A

System descriptions:

System 1: IBM 1800 with 32 K 16-bit words; PTR; 800
 bpi 37.5/75 ips magnetic tape; 512 K removable pack disk;
 Tektronix 611A CRT display with 16 dot density greyscales;
 simultaneous collection and processing; language(s) FORTRAN,
 assembler; interfaced to 1 scintillation camera, 4
 rectilinear scanners, via magnetic tape; camera collection
 in frame mode (40x40 1.2/sec) approx. 1000 max frames,
 1,000,000 max counts, in list mode (64x64 resolution)
 approx 30,000 max counts/sec with position, time signals;
 scanner collection in frame mode, Max resolution 15,500
 elements (0.1 inch) 32,000 max counts

System 2: H-P 2115A cpu with 8 K 16-bit words; PTR;
 PTR; 800 bpi 700 steps/sec incremental magnetic tape;
 language(s) FORTRAN, assembler; interfaced to 7
 scintillation probes

Comments: DIAGRAM

On the computers described above, the following studies are
 performed:

1. Brain (STATIC) on System 2; language(s) FORTRAN,
 assembler; line printer, CRT output; Pictures; occasional
2. Brain (FLOW) on System 1; language(s) FORTRAN,
 Assembler; list, graph, CRT output; Pictures, curves;
 occasional
3. Renal on System 1; language(s) FORTRAN, Assembler;
 list, graph, CRT output; Pictures, curves; less than 1/week
4. Thyroid (IMAGE) on System 1; language(s) FORTRAN,
 Assembler; list, CRT output; Pictures; occasional

5. Lung (PERFUSION) on Systems 1,2; language(s) FORTRAN, Assembler; list, graph, CRT output; curves, parameters; several/week
6. Lung (VENTILATION) on System 2; language(s) FORTRAN, Assembler; list, graph, CRT output; Curves, Parameters; several/week
7. Lung (V/Q) on System 2; language(s) FORTRAN, Assembler; list, graph, CRT output; Curves, Parameters; several/week
8. Liver (STATIC) on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; occasional
9. Liver (FUNCTION) on System 1; language(s) FORTRAN, Assembler; list, graph, CRT output; Pictures, Curves; occasional
10. Spleen on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures, uptake; 2/week
11. Pancreas on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; occasional
12. Bone on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; 17/week
13. Tumor Localization on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; 6/week
14. Bone Marrow on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; 1/week
15. Sites of Erythropoiesis on System 1; language(s) FORTRAN, Assembler; list, CRT output; Pictures; 1/week

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<4100>

Installation: Strong Memorial Hosp., U. of Rochester
 Address: 601 Elmwood Ave.
 Rochester, New York 14642

Strong Memorial Hosp., U. of Rochester is a Teaching
 Hospital institution which has 700 beds.

For further information, contact:

Wilson, G. A.; O'Sara, R. E. (clinical)

Weber, D. A. (hardware)

Weber, D. A. (software)

The institution operates a central computing facility
 containing IBM 360/44; IBM 360/65; DEC PDP-10 equipment.
 The responding department uses primarily Magnetic tape;
 magnetic disk; punched card for data interchange with the
 central facility.

The responding department operates the following data
 acquisition and processing equipment:

Commercial system(s): MDS Trinary System

System descriptions:

System 1: MDS Trinary System (Data General NOVA 1220
 cpu) with 32 K 16-bit words; 1.5-meg 2315 disk; 1.-meg
 2315 removable pack disk; refresh CRT display with variable
 numbers of greyscales; simultaneous collection and
 processing; language(s) FORTRAN, BASIC, Assembler;
 interfaced to 3 scintillation cameras; camera collection in
 frame mode (64x64 25/sec) 255 max counts/element, in list
 mode (under development);

On the computers described above, the following studies are
 performed:

1. Brain (STATIC); language(s) System Monitor; list, CRT
 output; pictures, parameters; variable frequency
2. Brain (FLOW); language(s) System Monitor; list, CRT
 output; pictures, parameters; variable frequency
3. Renal; language(s) FORTRAN; H. C. Graph output;
 parameters; variable frequency
4. Heart (FLOW); language(s) FORTRAN; E. C. Graph output;
 parameters; variable frequency
5. Heart (GATED); under development
6. Liver (STATIC); language(s) System Monitor; list, CRT
 output; pictures; variable frequency
7. Bone; language(s) System Monitor; list, CRT output;
 profile-research; variable frequency
8. Tumor Localization; variable frequency

Block diagram of the computer system used for data imaging and off-line programming applications in nuclear medicine at the University of Rochester School of Medicine and Dentistry.

<4200>

Installation: Univ. of New Mexico School of Medicine
 Address: Dept. of Nuclear Medicine
 Albuquerque, New Mexico 87133

Phone: (505) 843-2428

Univ. of New Mexico School of Medicine is a Teaching Hospital institution which has Total 650 (Two Hospitals) beds.

For further information, contact:

Jaaron, J. R. ; Byner, Carol (clinical)

Appledorn, C.R. (hardware)

Appledorn, C.R. (software)

The institution operates a central computing facility containing IBM 360/67 equipment. The responding department uses primarily Nodes for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Picker Image Enhancement System;
 Nuclear Data 50/50

System descriptions:

System 1: Picker Image Enhancement System (DEC PDP-8/E cpu) with 16 K 12-bit words; 10 cps PTP; 10 cps PTR; Sykes Cassette tape; (2) Tektronix 602 CRT displays with 16 color/greyscales; simultaneous collection and processing; language(s) POCAL, MACRO-8, Assembler; interfaced to 1 scintillation camera; camera collection in list mode (Resolution 50x50) 4096 max counts

System 2: Nuclear Data 50/50 (DEC PDP-8/I cpu) with 8K 16-bit words; 10 cps PTP; 10 cps PTR; magnetic tape; (2) Tektronix CRT displays; language(s) Assembler; interfaced to 1 scintillation camera; camera collection in frame mode (64x64 1/sec) 2400 max frames, in list mode (64x64) 4096 max counts

Comments: computer-assisted dynamic studies were under development at time of survey

Installation: Univ. of North Carolina Memorial Hospital
 Address: Dept. of Radiology
 Chapel Hill, North Carolina 27514

Univ. of North Carolina Memorial Hospital is a Clinical;
 Teaching Hospital institution which has 400 beds.

For further information, contact:

Staah, E. V.; Johnston, R. E. (clinical)

Teicher, R. J.; Johnston, R. E.; Chan, F. (hardware)

Teicher, R. J.; Johnston, R. E. (software)

The institution operates a central computing facility containing IBM 370 equipment. The responding department uses primarily Magnetic tape for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/20 cpu) with 16 K 16-bit words; 50 cps PTP; 300 cps PTR; 9-tr, 800 bpi 45 ips magnetic tape; 1.2-meg removable pack disk; VT01 CRT display with 32 greyscales; language(s) FORTRAN, BASIC, Assembler, POCAL; interfaced to 2 scintillation cameras, 1 rectilinear scanner; camera collection in frame mode (32x32 55/sec) (64x64 15/sec) (128x128 static) 512 max frames, 999,999,999 max counts, in list mode (64x64 resolution) 30,000 max counts/sec with position, time, energy, physiological signals

Comments: DIAGRAM

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT, graph output; 25/week
2. Brain (FLOW); language(s) Assembler; CRT, graph output; 25/week
3. Renal; language(s) Assembler; CRT, graph output; 20/week
4. Thyroid (IMAGE); language(s) Assembler; CRT, graph output; occasional
5. Thyroid (UPTAKE); language(s) Assembler; CRT, graph output; occasional
6. Lung (PERFUSION); language(s) Assembler; CRT, graph output; 10/week
7. Lung (VENTILATION); language(s) Assembler; CRT, graph output; 10/week
8. Lung (V/Q); language(s) Assembler; CRT, graph output;

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10/week

9. Heart (PLC); language(s) Assembler; CRT, graph output; occasional

10. Liver (STATIC); language(s) Assembler; CRT, graph output; occasional

11. Liver (FUNCTION); language(s) Assembler; CRT, graph output; occasional

12. Spleen; language(s) Assembler; CRT, graph output; occasional

13. Pancreas; language(s) Assembler; CRT, graph output; 1/week

NUCLEAR MEDICINE COMPUTER FACILITY

<4400>

Installation: Duke University Medical Center

Address: Durham, North Carolina 27710

Duke University Medical Center is a Teaching Hospital institution which has 700 beds.

For further information, contact:

Jones, Robert H. (clinical)

Jones, Robert H. (hardware)

Jones, Robert H. (software)

The institution operates a central computing facility containing IBM 370 equipment. The responding department uses primarily Magnetic tape; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial System(s): Baird-Atomic System 70

System descriptions:

System 1: Baird-Atomic System 70

<4500>

Installation: Cleveland Clinic Foundation
 Address: 9500 Euclid Avenue
 Cleveland, Ohio 44106

Cleveland Clinic Foundation is a Research; Clinical institution which has 1000 beds.

For further information, contact:

MacIntyre, W. J. (clinical)

Arnold, J. H. (hardware)

Arnold, J. H.; Sufka, B. J. (software)

The institution operates a central computing facility containing DEC PDP-15/76; Burroughs B4700 equipment. The responding department uses primarily Magnetic tape; punched card for data interchange with the central facility.

System descriptions:

System 1: DEC PDP-15/76 with 32 K 18-bit words; PTP; PTR; 800 bpi magnetic tape; DEC tape; (2) 1.2-meg removable pack disks; language(s) FORTRAN, Assembler; interfaced to scintillation camera by magnetic tape only; camera collection in frame mode (64x64 5/sec) 2500 max frames,

On the computers described above, the following studies are performed:

1. Brain (STATIC) ; language(s) FORTRAN; Cont. Symbols, 3-D output; 25/week
2. Brain (FLOW); language(s) FORTRAN; numerical output; 25/week
3. Renal; language(s) FORTRAN; list output; dilution curves; 5/week
4. Lung (PERFUSION); language(s) FORTRAN; 10/week
5. Heart (FLOW); language(s) FORTRAN; 1/week
6. Heart (OUTPUT); language(s) FORTRAN; dilution curves; 1/week
7. Liver (STATIC); language(s) FORTRAN; 15/week
8. Spleen; language(s) FORTRAN; 15/week

Installation: Mt. Sinai Hospital (Cleveland)
 Address: 1800 E. 105th St.
 Cleveland, Ohio 44106

Phone: (216) 795-6000 Ext.407

Mt. Sinai Hospital (Cleveland) is a Teaching Hospital institution which has 600 beds.

For further information, contact:

Wiener, S. W. (clinical)

Flynn, M. J. (hardware)

Flynn, M. J. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

User-designed system(s): DEC PDP-12

System descriptions:

System 1: DEC PDP-12 with 12 K 12-bit words; 15 cps PTP; 15 cps PTR; 800 bpi 24 ips magnetic tape; linctape; 1.6-meg Pertec fixed disk; 1.6-meg removable pack disk; CPT display with 16 greyscales; Electrostatic printer/plotter display with 16 greyscale; PDP-12 Floating Point Processor; language(s) FORTRAN, assembler; interfaced to 1 scintillation camera, camera collection in frame mode (32x32 4/sec) (64x64 static only) 200 max frames, 4096 max counts/element at (64x64);

System 2: DEC Gamma-11 (DEC PDP-11/40 cpu) with 32K 16-bit words; 300cps PTR; (2) 1.2-meg RK05 removable pack disks; Electrostatic printer/plotter; Graphic digitizer; 16-channel analog collection system; RT-11-F Floating Point Processor; Video CRT display with 64 greyscales, color; simultaneous collection and processing language(s) FORTRAN IV, BASIC, GAMMA-11, Assembler; RT-11 F/B Operating System; interfaced to two scintillation cameras; camera collection in frame mode (32x32 50/sec) (64x64 12/sec) (128x128 static only) 65535 max counts/element at 64x64; in list mode (128x128) 1,000,000 max counts with position, time, energy, physiological signals

On the computers described above, the following studies are performed:

1. Brain (FLOW) on system 2; language(s) GAMMA-11; CRT, graph output; Bilateral perfusion; 20/week
2. Renal on system 2; language(s) FORTRAN; list, graph output; Bilateral function; 3/week
3. Lung (PERFUSION); language(s) GAMMA-11; list, graph, CRT output; function evaluation; 2/week

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4. Lung (VENTILATION) on system 2; language(s) FORTRAN; list, graph, CRT output; function evaluation; occasional
5. Lung (V/Q) on system 2; language(s) FORTRAN; list, graph, CRT output; occasional
6. Heart (FLOW) on system 2 language(s) GAMMA-11; list, graph, CRT output; LV Function evaluation; 3/week
7. Heart (GATED); language(s) FORTRAN; list, graph, CRT output; 3/week
8. Heart (OUTPUT) on system 2; language(s) FORTRAN; list, graph, CRT output; 3/week
9. Pancreas on system 2; language(s) GAMMA-11; subtract liver image from pancreas
10. Bone on system 2; language(s) FORTRAN; list, graph, CRT output; quantitate mineral content; occasional

<4700>

Installation: University of Oklahoma
Department: Health Sciences Center
Address: 800 Northeast Thirteenth St.
Oklahoma City, Oklahoma 73190

University of Oklahoma is a Teaching Hospital institution which has 300 beds.

For further information, contact:
Smith, Carl W. (clinical)
Pirken, Vernon (software)

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-8/M

System descriptions:

System 1: DEC PDP-8/M with 32 K 12-bit words; lowspd PTP; lowspd PTR; 3.1-meg fixed disk; 3.1-meg removable pack disk; Zenron CRT display with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN IV, Assembler (PAL 8); interfaced to scintillation camera, camera collection in frame mode (32x32) (64x64) (128x128) 100 max frames, 4096 max counts/element; in list mode (64x64) 100,000 max counts

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; 3/week
2. Brain (FLOW); language(s) Assembler; CRT, graph output; 20/week
3. In-Vitro; language(s) FORTRAN IV; T3, T4 studies; 100/week

<4600>

Installation: Medical College of Pennsylvania
Address: 3300 Henry Avenue
Philadelphia, Pennsylvania 19129

Medical College of Pennsylvania is a Teaching Hospital
institution which has 300 beds.

For further information, contact:

Parker, Janet A. (clinical)
George, David L. (hardware)
George, David L. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/40 cpu) with 16 K
16-bit words; 50 cps PTF; 300 cps PTR; 800 bpi magnetic
tape; 1.2-meg removable pack disk; language(s) POCAL;
interfaced to 1 scintillation camera, camera collection in
frame mode (32x32 55/sec) (64x64 15/sec) 512 max frames, in
list mode with position, time signals;

On the computers described above, the following studies are
performed:

1. Brain (FLOW); language(s) POCAL; CRT output; 10/week
2. Renal; language(s) POCAL; CRT, list output;
Quantification of Renal Function; 5/week

<4900>

Installation: Mercy Catholic Medical Center
Address: 54th and Cedar Ave.
Philadelphia, Pennsylvania 19143

Mercy Catholic Medical Center is a Teaching Hospital
institution which has 800 beds.

For further information, contact:
Romminges, C. J. (software)

Comments: No systems at time of survey.

<5000>

Installation: Presbyterian-University Hospital
Address: 230 Lothrop Street
Pittsburgh, Pennsylvania 15261

Presbyterian-University Hospital is a Teaching Hospital institution which has 500 beds.

For further information, contact:

Gumernan, Lewis W.; Carroll, Robert (clinical)
Crawford, J. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): BDS Simultaneity System

System descriptions:

System 1: BDS Simultaneity System (Data General NOVA 210 cpu) with 32K 16-bit words; PTR; PTP; 1 removable pack disk; color CRT display; simultaneous collection and processing; interfaced to 2 scintillation cameras

Comments: System was being installed, had not been used at time of survey.

<5100>

Installation: Providence Veterans Administration Hospital
Address: Davis Park
Providence, Rhode Island 02908

Phone: (401) 521-1700 Ext.3390 PTS:838-3390

Providence Veterans Administration Hospital is a Clinical;
Teaching Hospital institution which has 347 beds.

For further information, contact:

Claunich, Ben C. (clinical)

Brown, Paul H. (hardware)

Brown, Paul H. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/40 cpu) with 28K 16-bit words; 50 cps PTP; 300 cps PTR; (2) 1.2-meg removable pack disks; DEC CRT display with 32 greyscales; simultaneous collection and processing; language(s) FORTRAN, BASIC, POCAL, Assembler; interfaced to 1 scintillation camera; camera collection in frame mode (32x32 50/sec) (64x64 12/sec) 512 max frames, 255 or 65535 max counts/element, in list mode 65535 max counts with position, time, energy, physiological signals

Comments: Computer delivered 2/76. Have not used it sufficiently to complete Part IV (Studies Descriptions). Expect to use computer strongly in dynamic studies, such as lung perfusion/ventilation. Computer also used to analyze radioimmunoassay data and for other clinical analysis purposes.

Installation: Vanderbilt University Hospital
 Department: Division of Nuclear Medicine
 Address: Nashville, Tennessee 37232

Vanderbilt University Hospital is a Teaching Hospital institution.

For further information, contact:

Brill, A. B. (clinical)

Erickson, Jon J. (hardware)

Erickson, Jon J.; Price, Ronald R. (software)

The institution operates a central computing facility containing Xerox Data Systems Sigma/7 equipment. The responding department uses primarily Magnetic tape; punched card; modem; direct cable for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Intertechnique Model 66

Cinescintigraphy System; ORTEC 4860 Nuclear Medicine System

User-designed system(s): DEC PDP-9; DEC PDP-11/05

System descriptions:

System 1: DEC PDP-9 with 24 K 18-bit words; 50 cps PTP; 300 cps PTB; 800 bpi 24 ips magnetic tape; Dectape; 332 K Data Disk; Refreshed CRT display with 64 greyscales; language(s) FORTRAN, Assembler; interfaced to 3 scintillation cameras, 3 rectilinear scanners, camera collection in frame mode (64x64 .25/sec) 20,000 max counts; in list mode (256x256) 6,000,000 max counts with position, time, energy, physiological signals; scanner collection in frame mode (128x512) 512 max counts/element;

System 2: Intertechnique Model 66 Cinescintigraphy System (Multi-8 cpu) with 16 K 8-bit words; 15 cps PTB; 800 bpi 24 ips incremental magnetic tape; Electrical Storage Tube Scan Converter CRT display with 64 greyscales; language(s) Assembler; interfaced to 2 scintillation cameras, camera collection in frame mode (32x32 10/sec) (64x64 4/sec) approx 2000 max frames, 256 or 32 K counts; scanner collection in frame mode, (64x64) 32 K max counts

System 3: DEC PDP-11/05 with 16K 16-bit words; AED 3100P Dual Floppy Disks; CAIAC crate; X-Y storage CRT display; language(s) ORACLE, FORTRAN, Assembler; interfaced to 1 scintillation camera

Comments: DIAGRAM; System 3 is at present entirely devoted to instrument development

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On the computers described above, the following studies are performed:

1. Brain (FLOW) on System 2 (collection), 1 (analysis); language(s) Assembler and FORTRAN; list, CRT output; Parameters /Pictures; 15/week
2. Renal on System 2 (collection), 1 (Analysis); language(s) FORTRAN; list output; parameters; 30/week
3. Thyroid (IMAGE) on System 2 (collection), 1 (analysis); language(s) FORTRAN; list output; Pictures/Parameters; 15/week
4. Thyroid (UPTAKE) on System 2 (collection), 1 (Analysis); language(s) FORTRAN; list output; parameters; 5/week
5. Heart (FLOW) on System 2; language(s) CRT output; Pictures
6. Heart (OUTPUT) on System 1; language(s) FORTRAN; list output; Curves, Parameters; 2/week
7. Tumor Localization on System 1; language(s) FORTRAN; CRT output; Pictures; 2/week

<5300>

Installation: Oak Ridge Nat'l Laboratory
 Department: Medical Instrumentation Group
 Address: P. O. Box Y
 Oak Ridge, Tennessee 37830

Phone: (615) 483-8611 Ext.3-6146 FTS:850-6146

Oak Ridge Nat'l Laboratory is a Research institution.
 For further information, contact:

Bell, P. R. (hardware)

Dillon, R. S.; Bell, P. R. (software)

The institution operates a central computing facility containing DEC PDP-10; IBM 360/91 equipment. The responding department uses primarily DECtape for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-8/E; DEC PDP-8/I

System descriptions:

System 1: DEC PDP-8/E with 16 K 12-bit words; TTY FTP; TTY PTR; DECtape; 256 K RPO9 fixed disk; H-P 1300 CRT display with 32 greyscales; language(s) Assembler, interfaced to 1 rectilinear scanner; camera collection in frame mode (32x32 20/sec) 180 max frames, (64x64 10/sec) 45 max frames; 4095 max counts/element; scanner collection in frame mode, max resolution 1/8" steps, 4096 max counts/element

System 2: DEC PDP-8/I with 8K 12-bit words; TTY FTP; TTY PTR; DECtape; Tennetape; 32 K LP32 fixed disk; Tektronix 547 CRT display with 32 greyscales; language(s) Assembler; interfaced to 1 rectilinear scanner; scanner collection as in System 1

Comments: Programs are also available for 3K8E cartridge disk system and for DECtape-only systems (DECtape-only systems limited to static images).

On the computers described above, the following studies are performed:

1. Brain (STATIC) on Systems 1,2; language(s) Assembler; CRT output

2. Brain (FLOW) on System 1; language(s) Assembler; CRT, DECTape output;
3. Heart (FLOW) on System 1; language(s) Assembler; CRT, DECTape output,
4. Heart (GATED) on System 1; language(s) Assembler; CRT, DECTape output;
5. Liver (STATIC) on Systems 1, 2; language(s) Assembler; CRT output,
6. Whole Body on Systems 1,2; language(s) Assembler; CRT output,

<5400>

Installation: University of Texas
Department: Health Science Center
Address: 5301 Harry Hines Blvd.
Dallas, Texas 75235

University of Texas is a Research; Clinical; Teaching
Hospital institution.

For further information, contact:

Farkey, Robert (clinical)
Stokely, Ernest (hardware)
Stokely, Ernest (software)

The institution operates a central computing facility
containing DEC PDP-10 equipment. The responding department
uses primarily Magnetic tape for data interchange with the
central facility.

The responding department operates the following data
acquisition and processing equipment:

User-designed system(s): DEC PDP-8/I

System descriptions:

System 1: DEC PDP-8/I with 32 K 12-bit words; 125 cps
PTP; 360 cps PTR; 9-tr 800 bpi 75 ips magnetic tape; 256 K
RP08 fixed disk; Tektronix 4002A CRT display with 26
greyscales; interfaced to 1 scintillation camera, camera
collection in frame mode (64x64 5/sec) 1500 max frames,
1,000,000 or 4095/element

Comments: Computer used almost exclusively for cardiac
research programs with static and dynamic, gated
and ungated data collection. Usage varies.

UNIVERSITY OF TEXAS AT DALLAS
HEALTH SCIENCES CENTER

<5500>

Installation: William Beaumont Army Medical Center
Address: El Paso, Texas 79920

William Beaumont Army Medical Center is a Teaching Hospital institution which has 600 beds.

For further information, contact:

Musynowitz, M. (clinical)

Benedetto, A. (hardware)

Benedetto, A. (software)

The institution operates a central computing facility containing GE 665 Time-Sharing System; IBM 1440 equipment. The responding department uses primarily modem; punched cards for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data 50/50

System descriptions:

System 1: Nuclear Data 50/50 (DEC PDP-8/L cpu) with 32K 12-bit words; 30 cps PTR; 30 cps PTP; magnetic tape; 2.5-meg DEC RK82 removable pack disk; language(s) FORTRAN, BASIC, POCAL; interfaced to 1 scintillation camera; camera collection in frame mode (64x64) 8 max frames, 4095 max counts/element; in list mode with position, time, physiological signals

On the computers described above, the following studies are performed:

1. Renal; language(s) Assembler; CRT, list output
2. Lung (PERFUSION); language(s) Assembler; CRT, list output
3. Lung (VENTILATION); language(s) Assembler; CRT, list output
4. Lung (V/Q); language(s) Assembler; CRT, list output
5. Heart (FLOW); language(s) Assembler; CRT, list output
6. Heart (GATED); language(s) Assembler; CRT, list output
7. Heart (PERFUSION); language(s) Assembler; CRT, list output
8. Heart (OUTPUT); language(s) Assembler; CRT, list output

<5600>

Installation: Baylor College of Medicine
 Department: Dept. of Radiology
 Address: 1200 Moursund
 Houston, Texas 77025

Baylor College of Medicine is a Research; Clinical;
 Teaching Hospital institution which has 1500 beds.
 For further information, contact:

Burdine, John A. ; Murphy, Paul H. (clinical)
 Alagarsamy, V.; Thompson, Wayne (hardware)
 Alagarsamy, V.; Thompson, Wayne (software)

The responding department operates the following data
 acquisition and processing equipment:

Commercial system(s): Zentron; Zentron

System descriptions:

System 1: Zentron (DEC cpu) with 32 K 12-bit words; 10
 cps PTP; 300 cps PTR; 800 bpi 7.5 ips incremental magnetic
 tape; Sykes Cassette tape; 1.6 meg Systems Industries
 removable pack disk; raster CRT display with 16 color
 scales; language(s) FORTRAN, Assembler, etc.; interfaced to
 2 scintillation cameras, camera collection in frame mode
 (64x64 10/sec) (128x128 4/sec) 200 max frames, 220 K cps

System 2: Zentron (DEC cpu) with 24K 12-bit words; 10
 cps PTP; 10 cps PTR; 800 bpi 7.5 ips incremental magnetic
 tape; Sykes Cassette tape; 1.6-meg Systems Industries
 removable pack disk; raster CRT display with 16 color
 scales; language(s) FORTRAN, BASIC, Assembler, etc;
 interfaced to 1 scintillation camera, camera collection in
 frame mode (64x64 10/sec) (128x128 4/sec) 200 max frames,
 220 K cps, in list mode (64x64) with position, time signals

On the computers described above, the following studies are
 performed:

1. Brain (FLOW) on Systems 1,2; language(s) Assembler,
 FORTRAN; list, graph, CRT output; 2/week
2. Lung (V/Q) on Systems 2,3; language(s) Assembler,
 FORTRAN; list, graph, CRT output; research; 5/week
3. Heart (FLOW) on Systems 1,2; language(s) Assembler,
 FORTRAN; list, graph, CRT output; research; 2/week
4. Liver (FUNCTION) on Systems 1,2; language(s)
 Assembler, FORTRAN; list, graph, CRT output; research;
 3/week
5. Bone on Systems 1, 2; language(s) Assembler, FORTRAN;
 list, graph, CRT output; research; 3/week

<5700>

Installation: Houston Veterans Administration Hospital
Address: Houston, Texas 77031

Houston Veterans Administration Hospital is a Teaching Hospital institution.

For further information, contact:

Pircher, F. J. (clinical)

Lerner, S. R. (hardware)

Lerner, S. R. (software)

The institution operates a central computing facility containing Univac 1108 equipment. The responding department uses primarily Magnetic tape; punched card for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Computer Corporation of America

System descriptions:

System 1: Computer Corporation of America (DEC FDP-8/E cpu) with 8 K 12-bit words; TTY PTP; TTY PTR; 556 bpi 30 ips magnetic tape; 556 bpi 45 ips magnetic tape; 1.6-meg Systems Industries removable pack disk; Tektronix 546 storage CRT display with 8 greyscales; language(s) FORTRAN, Assembler, FOCAL; interfaced to 2 scintillation cameras, 1 rectilinear scanner; camera collection in frame mode (32x32 5/sec) 2000 max frames, 4095 max counts/element; scanner collection in frame mode, (Max resolution 1/8" steps) 999,999 max counts

On the computers described above, the following studies are performed:

1. Renal; language(s) Assembler; list graph, CRT output; Routine clinical; 6/week
2. Lung (VENTILATION); language(s) Assembler; list, graph, CRT output; Routine clinical, array map; 3/week
3. Heart (FLOW); language(s) Assembler; list, graph, CRT output; 1/week
4. Heart (EFFUSION); language(s) Assembler; CRT output; less than 1/week
5. Liver (FUNCTION); language(s) Assembler; CRT output; flow; less than 1/week
6. Pancreas; language(s) Assembler; CRT output; subtraction; less than 1/week

<5800>

Installation: Brooke Army Medical Center
Address: San Antonio, Texas 78234

Phone: (512) 221-2060

Brooke Army Medical Center is a Teaching Hospital institution which has 800 beds.

For further information, contact:

Lull, Robert J. (clinical)

Lull, Robert J. (hardware)

Lull, Robert J. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): MDS Trinary System

System descriptions:

System 1: MDS Trinary System (Data General NOVA 210 cpu) with 32 K 16-bit words; (2) slow spd PTP; (2) slow spd PTR; (1) 1.2-meg Diablo fixed disk; (2) 1.2-meg Diablo removable pack disks; Tektronix, Hewlett-Packard CRT displays with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN, BASIC, Assembler; interfaced to 2 scintillation cameras (1 whole-body), camera collection in frame mode (64x64 10 or 40/sec) 65 K max counts/element (128x128 10/sec) 256 max counts/element, 400 max frames; in list mode (128x128 or 192x64) at 37,000 counts/sec with position, time, physiological signals

Comments: DIAGRAM; Whole-bcdy table data collection (in list mode) and reformatting are done with full Trinary capability (i.e., can acquire from either camera and process data at central terminal during acquisition OR can acquire from both cameras during processing of list data).

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; Statistical lesion enhancement, background subtraction; 40/week
2. Brain (FLOW); language(s) Assembler; CRT, graph output; Flow characteristics; 4/week
3. Renal; language(s) Assembler, BASIC; CRT, graph output; Cortex and Medulla
4. Thyroid (IMAGE); language(s) Assembler; CRT output; size; 1-10/week
5. Thyroid (UPTAKE); language(s) Assembler; CRT, graph output; uptake measurement; 1-10/week
6. Lung (PERFUSION); language(s) Assembler; CRT output;

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Image Enhancement; 5-15/week

7. Lung (VENTILATION); language(s) Assembler; CRT, graph output; Washout curves, V/Q ratio 5-15/week

8. Lung (V/Q); language(s) Assembler; CRT, graph output; 5-15/week

9. Heart (FLOW); language(s) Assembler, FORTRAN; CRT, graph output; shunts calculations; less than 1/week

10. Heart (EFFUSION); language(s) Assembler; CRT output; Image Enhancement; less than 1/week

11. Heart (OUTPUT); language(s) Assembler, FORTRAN; CRT graph output; Cardiac Output Calculation; less than 1/week

12. Liver (STATIC); language(s) Assembler; CRT output; Image Enhancement, Size; 40/week

13. Liver (FUNCTION); language(s) Assembler; CRT output; Image Enhancement, Size; 40/week

14. Spleen; language(s) Assembler; CRT output; Image Enhancement, Size; 40/week

15. Pancreas; language(s) assembler; CRT output; Image Enhancement, Uptake Rates, Subtraction; 3-5/week

16. Bone; language(s) Assembler; CRT output; lesion/normal bone ratio, bone/tissue ratio; 10-15/week

<5900>

Installation: University of Virginia
Department: Department of Radiology
Address: Charlottesville, Virginia 22901

Phone: (804) 924-5201

University of Virginia is a Teaching Hospital institution which has 600 beds.

For further information, contact:

Howard, B. Y. (clinical)

Howard, B. Y. (hardware)

Howard, B. Y. (software)

The institution operates a central computing facility containing CDC 6500 equipment. The responding department uses primarily Magnetic tape; punched card; for data interchange with the central facility.

System descriptions:

System 1: CDC 6500; PTP; PTR; AMPEX 200/556/800 bpi magnetic tape; CRT display with 16 greyscales; language(s) FORTRAN, BASIC, COBOL; interfaced to 1 scintillation camera, camera collection in frame mode (64x64 8.3 sec) 6 cpm

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) FORTRAN; list, CRT, tape output; filtering; 1/week
2. Renal; language(s) FORTRAN; list, graph output; transplant evaluation; 3/week
3. Thyroid (IMAGE); language(s) FORTRAN; tape output; function evaluation with TC-99m; 6/week
4. Lung (PERFUSION); language(s) FORTRAN; list output; V/Q Evaluation; 3/week
5. Lung (VENTILATION); language(s) FORTRAN; list output
6. Lung (V/Q); language(s) FORTRAN; list output
6. Pancreas; language(s) FORTRAN; tape output; subtraction; rare

<€000>

Installation: Fairfax Hospital
Address: 3300 Gallows Road
Falls Church, Virginia 22046

640 beds

Comments: No systems at time of survey

<E100>

Installation: U. S. Veterans Administration Center (Wood)
Address: Dept. 172
Wood, Wisconsin 53193

U. S. Veterans Administration Center (Wood) is a Teaching Hospital institution which has 800 beds.

For further information, contact:

Kronenwetter, C.; Meade, R. C. (clinical)
Kronenwetter, C.; Meade, R. C. (hardware)
Kronenwetter, C.; Meade, R. C. (software)

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-12

System descriptions:

System 1: DEC PDP-12 with 32 K 12-bit words; ASF33 PTP; ASR33 PPR; Linctape; DECtape; 1.6-meg Diablo 33 removable pack disk; VR-14 CRT display with 16 greyscales; language(s) FORTRAN, Assembler, interfaced to 2 scintillation cameras, camera collection in frame mode (32x32 10/sec) 112 max frames, 4096 max counts/element

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; Image Enhancement; 1-2/week
2. Renal; language(s) Assembler, FORTRAN; Plotter, CRT output; Computer model of renal function
3. Liver (STATIC); language(s) Assembler; CRT output; filtration/defect location; 5-10/week

<6200>

Installation: Institute of Medical and Veterinary Sciences
Department: Division of Nuclear Medicine
Address: Box 14, Fundle Street P.O.
Adelaide, 5000
Australia

Institute of Medical and Veterinary Sciences is a Research;
Clinical; Teaching Hospital institution which has 1000 beds.
For further information, contact:

Marion, M. A. (clinical)
Marion, M. A. (hardware)
Collins, E. J. (software)

The institution operates a central computing facility
containing CDC 6400 equipment. The responding department
uses primarily Magnetic tape; for data interchange with the
central facility.

Comments: RIDL 1600 Multichannel Analyzer for Data
Acquisition

On the computers described above, the following studies are
performed:

1. Brain (FLOW); language(s) FORTRAN; list, graph output;
to compare regional cerebral perfusion; 60/week

<6300>

Installation: Maisonneuve - Rosemont Hospital
 Address: 5415 Bd. de l'Assomption
 Montreal, (P.Q.) H1T 2M4
 Canada

Phone: (514) 254-8341 Ext.531

Maisonneuve - Rosemont Hospital is a Clinical; Teaching
 Hospital institution.

For further information, contact:

Page, Maurice(hardware)

Page, Maurice(software)

The responding department operates the following data
 acquisition and processing equipment:

Commercial system(s): Baird-Atomic System 70

User-designed system(s): DEC PDP-8/I

System descriptions:

System 1: PDP-8/I with 8 K 12-bit words; 10 cps PTP;
 10 cps PTR; (2) DECTapes; Tektronix 611 CRT display with 16
 or 64 greyscales; language(s) Assembler; interfaced to 1
 rectilinear scanner; scanner collection in frame mode,
 maximum resolution 1/8" steps, 2047 max counts

System 2: Baird-Atomic System 70 (DCC 116 cpu) with
 16K 16-bit words; 10 cps PTP; 10 cps PTR; 800 bpi 24 ips
 magnetic tape; magnetic cassette tape; 2-meg Diablo 33F
 removable pack disk; Refreshed CRT display with 16
 greyscales; language(s) Assembler, interfaced to
 Autofluoroscope (Baird Matrix Crystal); collection in frame
 mode (64x64 10/sec) 2000 max frames, 65,536 max counts

System 3: DCC 116 computer with 24K 16-bit words; 10
 cps PTP; 10 cps PTR; 5-meg Wangco F1212 fixed disk; 5-meg
 Wangco F1212 removable pack disk; language(s) FORTRAN,
 assembler; interfaced to systems 1 and 2

Comments: DIAGRAM; Either system 2 or system 3 computer may
 be connected to the System 70's I/O bus. System 3
 is used primarily for software development
 (automatic flagging of ROI or manipulation of
 data gathered by System 70). Both DCC 116's may
 exchange data with the PDP-8/I by an asynchronous
 line.

On the computers described above, the following studies are
 performed:

1. Brain (STATIC) on System 2; language(s) Assembler; list
 CRT output; pictures; 50/week

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2. Brain (FLOW) on System 2; language(s) Assembler; list, CRT output; 50/week
3. Renal on System 2; language(s) Assembler; list, CRT output; 5/week
4. Heart (FLOW) on System 2; language(s) Assembler; list, CRT output; 1/week
5. Heart (OUTPUT) on System 2; language(s) Assembler; list, CRT output; 1/week
6. Pancreas on System 1; language(s) Assembler; persistence scope output; pictures; 1/week
7. Bone on System 1; language(s) Assembler; persistence scope output; pictures; 7/week
8. Tumor Localization on System 1; language(s) Assembler; persistence scope output; pictures; 3/week

MAISONNEUVE-ROSEMONT
HOSPITAL

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Installation: Toronto General Hospital
 Address: 101 College Street
 Toronto, Ontario M5G 1L7
 Canada

Toronto General Hospital is a Clinical; Teaching Hospital institution which has 1000 beds.

For further information, contact:

Feiglin, D. H. I. (clinical)

Feiglin, D. H. I. (hardware)

Feiglin, D. H. I. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 (PDP-11/40 cpu) with 32 K 16-bit words; 50 cps PTP; 300 cps PTR; 800 bpi 45 ips magnetic tape; 1.2-meg removable pack disk; Tektronix 611 Storage CRT display with 32 gray scales; capable of simultaneous collection and processing language(s) FORTRAN, BASIC, Assembler; interfaced to 1 scintillation camera, camera collection in frame mode (32x32 50/sec) (64x64 12/sec) 512 max frames, in list mode (64x64) 1,000,000 max counts with position, time, energy signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; 2. Visualization; 23/week
- ; 2. Brain (FLOW); language(s) Assembler, BASIC; list, CRT, output; Differential L-B; 17/week
3. Renal; language(s) Assembler, BASIC; list, CRT output; 1/week
4. Lung (PERFUSION); language(s) Assembler; CRT output; 8/week
- ; 5. Lung (VENTILATION); language(s) Assembler; CRT output; 1/week

6. Lung (V/Q); language(s) Assembler; CRT output; 1/week
7. Liver (STATIC); language(s) Assembler; CRT output;
14/week
8. Spleen; language(s) Assembler; CRT output; 14/week
9. Myocardial Infarct; language(s) Assembler, BASIC;
list, CRT output; infarcts; 3/week
10. Gastric Emptying; language(s) Assembler, BASIC; list,
CRT output; Halftime; 1/week
11. Skin Clearance; language(s) Assembler, BASIC; list,
CRT output; Circulation; 1/week

Installation: Rigshospitalet
Department: Dept. of Nuclear Medicine
Address: Copenhagen, DK-2100
Denmark

Rigshospitalet is a Research; Clinical; Teaching Hospital institution.

For further information, contact:

Munkner, T.; Lomborg, H. (software)

The institution operates a central computing facility containing CDC 3300 equipment. The responding department uses primarily Magnetic tape; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data 50/50 Numed;
Nuclear Data 50/50 Numed; NUKAB System 2530; NUKAB System 2530

System descriptions:

System 1: Nuclear Data 50/50 Numed (DEC PDP-8/L cpu) with 8 K 12-bit words; 50 cps PTP; 300 cps PTR; PRC 800 bpi 45 ips magnetic tape; Nuclear Data Cartridge tape; CRT display with 16 greyscales; language(s) Assembler, interfaced to 1 scintillation camera, camera collection in frame mode (64x64 5/sec) 2400 max frames, 4095 max counts/element, in list mode with position, time, physiological signals

System 2: Nuclear Data 50/50 Numed (DEC PDP-8/L cpu) with 8 K 12-bit words; 50 cps PTP; 300 cps PTR; Ampex 800 bpi 45 ips magnetic tape; Nuclear Data Cartridge tape CRT display with 16 greyscales language(s) Assembler, interfaced to 1 scintillation camera, camera collection in frame mode (64x64 5/sec) 2400 max frames, 4095 max counts/element in list mode with position, time, physiological signals

System 3: NUKAB System 2530 (DEC PDP-8/B cpu) with 12

K 12-bit words; TTY PTP; TTY PTR; Tennecomp cartridge tape;
NUKAB/SONY CRT display with 8 greyscales language(s)
Assembler, interfaced to 1 rectilinear scanner; scanner
collection in frame mode (64x64) 4 K max counts

System 4: NUKAB System 2530 (DEC PDP-8/E cpu) with 12
K 12-bit words; TTY PTP; TTY PTR; Nuclear Data cartridge
tape NUKAB/SONY CRT display with 8 greyscales; language(s)
Assembler, interfaced to 1 rectilinear scanner, scanner
collection in frame mode (64x64) 4 K max counts

<6600>

Installation: Kent & Canterbury Hospital
Address: Ethelbert Road
Canterbury, Kent
England

Kent & Canterbury Hospital is a Clinical institution which has 400 beds.

For further information, contact:

Hall, P. H. (hardware)
Corfield, J. R.; Cox, W. J.; Diffey, B. I. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): NUKAB System 2530

System descriptions:

System 1: NUKAB System 2530 (DEC PDP-8/E cpu) with 28 K 12-bit words; 500 cps PTR; TD8/E DECtape; 800 K RK01 removable pack disk; 1.6-meg RK05 removable pack disk; NUKAB CRT display with 8 greyscales; simultaneous collection and processing; language(s) FORTRAN, Assembler; interfaced to 1 scintillation camera, camera collection in frame mode (64x64 f/sec) 200 max frames, 4095 max counts/element

Comments: Original system was NUKAB 2530, with subsequent additions of 16K core, disk, display, etc. it is hardly recognizable. Particularly in respect of software which is on its second re-write and hopefully its last. New software allows acquisition and processing using FORTRAN or other high-level language with full access to all assembler routines and devices.

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; 5-6/week
2. Renal; language(s) FORTRAN; CRT output; 6-7/week
3. Lung (VENTILATION); language(s) Assembler; CRT output; 2-3/week
4. Liver (FUNCTION); language(s) FORTRAN; CRT output; 6/week

KENT - CANTERBURY HOSPITAL NUCLEAR MEDICINE COMPUTING SYSTEM

Installation: General Infirmary
Department: Dept. of Nuclear Medicine
Address: Leeds, LS 1 3PX
England

General Infirmary is a Teaching Hospital institution.
For further information, contact:
Smith, A. M. (clinical)
Palmer, A. B. (hardware)
Smith, A. M. (software)

The responding department operates the following data
acquisition and processing equipment:
User-Designed system(s): DEC PDP-8

System descriptions:

System 1: DEC PDP-8 with 8 K 12-bit words; DECtape;
Tektronix RM503 CRT display with 5 greyscales; language(s)
Assembler, interfaced to 2 scintillation cameras, camera
collection in frame mode (32x32 1/sec) (64x64 1/sec) 60 max
frames, 4096 max counts/element

On the computers described above, the following studies are
performed:

1. Brain (STATIC); language(s) Assembler; CRT output
2. Brain (FLOW); language(s) Assembler CRT output
3. Renal; language(s) Assembler; CRT output
4. Lung (PERFUSION); language(s) Assembler; CRT output
5. Heart (FLOW); language(s) Assembler; CRT output
6. Heart (GATED); language(s) Assembler; CRT output
7. Heart (PERFUSION); language(s) Assembler; CRT output
8. Liver (STATIC); language(s) Assembler; CRT output
9. Liver (FUNCTION); language(s) Assembler; CRT output
10. Spleen; language(s) Assembler; CRT output
11. Pancreas; language(s) Assembler; CRT output
12. Bone; language(s) Assembler; CRT output

GENERAL INFIRMARY
Leeds, England

Installation: Charing Cross Hospital
Department: Dept. of Nuclear Medicine
Address: Fulham Palace Rd.
London, W.G.
England

Charing Cross Hospital is a Teaching Hospital institution which has 600 beds.

For further information, contact:

Vernon, P. (hardware)
Vernon, P. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): VARIAN Variscan System

System descriptions:

System 1: VARIAN Variscan System (Varian 620 L-100 cpu) with 16 K 16-bit words; 120 cps PTP; 300 cps PTR; 800 bpi 3 1/2 ips magnetic tape; 1.2-meg fixed disk; 1.2-meg top loading removable pack disk; greyscale electrostatic printer/plotter; Tektronix 611 CRT display with 16 greyscales; simultaneous collection and processing; language(s) FORTRAN, Assembler; interfaced to 1 scintillation camera, 1 rectilinear scanner, camera collection in frame mode (64x64 5/sec) 100 max frames, 32 K per element in list mode (8 bit resolution, up to 3400 K cps) 2,000,000 max counts, 1,000,000 with position, time, energy, physiological signals scanner collection in frame mode, 1 mm. max resolution, 32 K max counts/element

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler, FORTRAN; hard copy, CRT output; uniformity correction, image enhancement; 25/week
2. Brain (FLOW); language(s) Assembler, FORTRAN; 0-2/week
3. Renal; language(s) Assembler, FORTRAN; list, graph output; 6/week
4. Lung (PERFUSION); language(s) Assembler, FORTRAN; 10/week
5. Heart (FLOW); curiosity only; rare
6. Liver (STATIC); language(s) Assembler, FORTRAN; hard copy, CRT, list output; 25/week

<6900>

Installation: North Middlesex Hospital
Department: Medical Physics Dept.
Address: Sterling Way
London, N18 1QX
England

Phone: 01-867-3071 Ext.581

North Middlesex Hospital is a Clinical institution which has 700 + beds.

For further information, contact:

Pestenstein, J. (clinical)
Wilks, R. (hardware)
Wilks, R. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): DEC Gamma-11

System descriptions:

System 1: DEC Gamma-11 with 24 K 16-bit words; 50 cps PTP; 300 cps PTR; (2) 1.2-meg removable pack disks; Tektronix Storage CRT display with 32 (multidot) greyscales; language(s) FORTRAN, POCAL, Assembler; interfaced to 1 scintillation camera, camera collection in frame mode (32x32 30 or 55/sec) (64x64 7 or 15/sec) 511 max frames, 64 K or 255 max counts/element, in list mode 1,000,000 max counts with position, time signals

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler; CRT output; lesions; 10/week
2. Renal; language(s) Assembler, POCAL; CRT output; 1/week
3. Lung (PERFUSION); language(s) Assembler CRT output; 3-4/week
4. Liver (STATIC); language(s) Assembler; CRT output; 6/week
5. Liver (FUNCTION); language(s) Assembler; CRT output; 2/week
6. Spleen; language(s) Assembler; CRT output; 1/week
7. Pancreas; language(s) Assembler CRT output; 2/week;

<7000>

Installation: University College Hospital
 Department: Dept. of Medical Physics
 Address: London, W.C.1
 England

University College Hospital is a Teaching Hospital institution which has 1200 beds.

For further information, contact:

Sutton, H. (clinical)

Gill, C. (hardware)

Todd-Pokropek, A.; Dcwsett, D. J. (software)

The institution operates a central computing facility containing IBM 360/65; CDC 760; CDC 6600 equipment. The responding department uses primarily Magnetic tape; punched card; modem; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): DEC PDP-11/45

System descriptions:

System 1: DEC PDP-11/45 with 32 K 16-bit words; 110 cps PTP; 300 cps PTB; 800 bpi 45 ips magnetic tape; (2) 1.2-meg RK05 removable pack disks; CRT display with 64 greyscales; simultaneous collection and processing; language(s) FORTRAN, Assembler; interfaced to 1 scintillation camera, 1 rectilinear scanner offline, ultrasound planned; camera collection in frame mode (64x64 3/sec) 240 max frames, 16 K max counts/element, in list mode (128x128) with position, time signals, scanner collection in frame mode, 1 mm max resolution, 10 K max counts

Comments: DIAGRAM

On the computers described above, the following studies are performed:

1. Brain (STATIC); language(s) Assembler, FORTRAN; CRT output; filtering; 20/week
2. Brain (FLOW); language(s) Assembler, FORTRAN; graph output; Early uptake; 5/week
3. Renal; language(s) Assembler, FORTRAN; graph output; I123 Hippuran, etc.; 2/week
4. Thyroid (IMAGE); language(s) Assembler, FORTRAN; list output, quantitation; 10/week

5. Liver (STATIC); language(s) Assembler, FORTRAN; CRT output; Filtering; 30/week
6. Liver (FUNCTION); language(s) Assembler, FORTRAN; graph output; Hepatic/Portal; 2/week
7. Spleen; language(s) Assembler, FORTRAN; CRT output; Filtering; 5/week
8. Bone; language(s) Assembler, FORTRAN; CRT, list output; Filtering and Quantitation; 40/week
9. Tumor Localization; language(s) Assembler, FORTRAN; CRT output; Filtering; 10/week

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Installation: Manchester Royal Infirmary
 Address: Manchester, M13 9WL
 England

Phone: 061-273-3300

Manchester Royal Infirmary is a Research; Clinical;
 Teaching Hospital institution which has 600 beds.
 For further information, contact:

Testa, R. J. (clinical)
 Shields, R. A.; Bone, D. E. (hardware)
 Shields, R. A.; Bone, D. E. (software)

The responding department operates the following data
 acquisition and processing equipment:

Commercial system(s): Nuclear Data MED2 System
 User-designed system(s): DEC PDP-12

System descriptions:

System 1: DEC PDP-12 with 8 K 12-bit words; TTY PTP;
 200 cps PTR; Dual Linctape; Interpolated 128x128 CRT
 display with 16 greyscales; language(s) Assembler,
 interfaced to 1 scintillation camera, 1 rectilinear
 scanner; camera collection in frame mode (32x32 1/sec) 90
 max frames, 1,000,000 max counts

System 2: Nuclear Data MED2 System with 16 K 12-bit
 words; TTY PTP; TTY PTR; 2-meg Wangco fixed disk; 2-meg
 Wangco removable pack disk; (64x64) CRT display with 8
 greyscales; language(s) NUTRAN; interfaced to 1
 scintillation camera, camera collection in frame mode (32x32
 40/sec) (64x64 10/sec) 700 max frames, 4,000,000 max counts,
 in list mode 1,000,000 max counts with position, time,
 signals

On the computers described above, the following studies are
 performed:

1. Brain (STATIC) on System 2; language(s) NUTRAN; CRT
 output
2. Brain (FLOW) on System 2; language(s) NUTRAN; CRT,
 graph output; dynamics; 5/week
3. Renal on Systems 1,2; language(s) NUTRAN and
 Assembler; list, graph, CRT output; renal flow studies;
 8/week
4. Heart (FLOW) on System 2; language(s) NUTRAN; CRT
 output
5. Heart (GATED) on System 2; language(s) NUTRAN CRT
 output; 1-2/week
6. Heart (OUTPUT) on System 2; language(s) NUTRAN; CRT
 output

7. Liver (STAFIC) on System 2; language(s) NUTRAN; CRT output; diagnosis; 30/week
8. Pancreas on System 2; language(s) NUTRAN; CRT output; diagnosis; 10/week
9. Bone on System 2; language(s) NUTRAN; CRT output; diagnosis; 4/week
10. Tumor Localization on Systems 1 and 2; CRT output; research; 4/week
11. Myocardial Infarct on System 2; language(s) NUTRAN; CRT output;

<7200>

Installation: University of Manchester
Department: Dept. of Medical Biophysics
Address: Oxford Road
Manchester, 13
England

University of Manchester is a Research institution.
For further information, contact:

Goddard, J. (clinical)
Goddard, J. (hardware)
Goddard, J. (software)

The institution operates a central computing facility containing ICL 1906A equipment. The responding department uses primarily Punched card; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data MED2 System

System descriptions:

System 1: Nuclear Data MED2 System with 32 K 16-bit words; TTY PTP; TTY PTR; 1.2-meg Wangco fixed disk; 1.2-meg Wangco removable pack disk; Textronix 602 CRT display with 16 greyscales; language(s) MUTRAN interfaced to 1 scintillation camera, camera collection in frame mode (32x32) (64x64) 700 max frames, in list mode (.16 second resolution) 128,000,000 max counts with position, time, signals

On the computers described above, the following studies are performed:

1. Brain (FLOW); language(s) MUTRAN; CRT output; atraumatic CBP examination in 3-D; 5/week (anticipated)

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<7300>

Installation: Radiologische Universitätsklinik
 Address: Arnold-Heller-Str. 9
 Kiel, D-23
 Germany

Radiologische Universitätsklinik is a Clinical institution which has 36 beds.

For further information, contact:

Grennel, Prof.(clinical)
 Wendhauser, Dr.(hardware)
 Wendhauser, Dr.(software)

The institution operates a central computing facility containing H-P 3000 equipment. The responding department uses primarily Cable; for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

User-designed system(s): H-P 2100; H-P 2100; H-P 2100;
 H-P 2100

System descriptions:

System 1: H-P 3000 with 64 K 16-bit words; PTP; PTR; 1600 bpi 45 ips magnetic tape; (2) 6-meg fixed disks; (2) 6-meg removable pack disks; X44, 181A/AR CRT display language(s) FORTRAN, Assembler; interfaced to computers 2, 3, 4, 5 and 4-probe detector;

System 2: H-P 2100 with 32 K 16-bit words PTP; PTR; 1600 bpi 45 ips magnetic tape; X44, 181A/AR CRT display language(s) FORTRAN, Assembler, interfaced to whole-body counter;

System 3: H-P 2100 with 12 K 16-bit words; PTP; PTR; 6-meg fixed disk; 6-meg removable pack disk; X44, 181A/AR CRT display language(s) FORTRAN, Assembler, interfaced to 1 scintillation camera, camera collection in frame mode (32x32 10/sec) 160 max frames, 1,240,000 max counts, in list mode (128x128) with position, time, energy, physiological signals

System 4: H-P 2100 with 12 K 16-bit words; simultaneous collection and processing; language(s) FORTRAN, Assembler; interfaced to 1 rectilinear scanner, scanner collection in frame mode, (128x128)

System 5: H-P 2100 with 12 K 16-bit words; simultaneous collection and processing; language(s) FORTRAN, Assembler; interfaced to 1 rectilinear scanner, scanner collection in frame mode (128x128)

Comments: DIAGRAM

On the computers described above, the following studies are performed:

1. Brain (STATIC) on Systems 1,3,4,5; language(s) FORTRAN, Assembler; CRT output; 30/week
2. Renal on System 1; language(s) FORTRAN, Assembler; Graph output; 5/week
3. Thyroid (IMAGE) on Systems 1,3,4,5; language(s) FORTRAN, Assembler; CRT output; 15/week
4. Heart (FLOW) on Systems 1,3; language(s) FORTRAN; Assembler; CRT output; 2/week
5. Liver (STATIC) on Systems 1,4,5; language(s) FORTRAN, Assembler; CRT output; 10/week
6. Liver (FUNCTION) on System 1; language(s) FORTRAN, Assembler; Graph output; 3/week
7. Spleen on Systems 1,3,4,5; language(s) FORTRAN, Assembler; CRT output; 5/week
8. Pancreas on Systems 1,3,4,5; language(s) FORTRAN, Assembler; CRT output; 2/week
9. Bone on System 1, 4; language(s) FORTRAN, Assembler; CRT output; 5/week
10. Tumor Localization on Systems 1, 3, 4, 5; language(s) FORTRAN, Assembler; CRT output; 10/week

Installation: Academic Hospital
Department: Central Isotope Laboratory
Address: Groningen
Holland

Academic Hospital is a Research; Clinical; Teaching
Hospital institution which has 1100 beds.

For further information, contact:

Piers, D. A. (clinical)
van Herk, G.; Beekhuis, H. (hardware)
van Herk, G.; Beekhuis, H. (software)

The institution operates a central computing facility
containing CDC 7600 equipment. The responding department
uses primarily Magnetic tape; punched card; punched tape;
for data interchange with the central facility.

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): Nuclear Chicago Image Processor

On the computers described above, the following studies are
performed:

1. Lung (PERFUSION); language(s) ALGOL; list output; on
CDC machine; 3/week
2. Lung (VENTILATION); language(s) ALGOL; list output; on
CDC machine; 3/week
3. Lung (V/Q); language(s) ALGOL; list output; on CDC
machine; 3/week

<7500>

Installation: N.I.R.S.
 Department: Nuclear Medical Group
 Address: 9-1, 4-chome Anagawa
 Chiba-Shi, 280
 Japan

N.I.R.S. is a Research; Clinical; Teaching Hospital
 institution which has 10 beds.

For further information, contact:

Arimizu, M. (clinical)
 Tanaka, E.; Fukuhisa, K.; Matsumoto, T. (hardware)
 Iinuma, T. A.; Fukuhisa, K.; Matsumoto, T. (software)

The responding department operates the following data
 acquisition and processing equipment:

User-designed system(s): Toshiba TOSBAC-3400 Model 31

System descriptions:

System 1: Toshiba TOSEAC-3400 Model 31 with 16 K
 24-bit words; 200 cps PTP; 1000 cps PTR; Toshiba-AMPEX 7-tr
 800 bpi magnetic tape; cartridge tape; 2400 K MKM-0016B
 removable pack disk; Tokyo Electric Co. ST-5036 CRT display
 with 4 greystales; simultaneous collection and processing;
 language(s) FORTRAN IV, Assembler; interfaced to 1
 scintillation camera, 1 rectilinear scanner, camera
 collection in frame mode (32x32 8.13/sec) (64x64 .13/sec)
 2000 max frames, 8,000,000 max counts, in list mode
 (512x512) 1,800,000 max counts with position, time, energy,
 physiological signals; scanner collection in list mode
 (512x512) 1,800,000 max counts

Comments: DIAGRAM

On the computers described above, the following studies are
 performed:

1. Brain (STATIC); language(s) Assembler, FORTRAN; list,
 CRT output; Pictures; less than 1/week
2. Brain (FLOW); language(s) Assembler, FORTRAN; list,
 CRT output; parameters/curves; less than 1/week
3. Thyroid (IMAGE); language(s) Assembler, FORTRAN; list,
 CRT output; parameters; pictures; 1/week
4. Thyroid (UPTAKE); language(s) Assembler, FORTRAN;
 list, CRT output; parameters; 1/week
5. Lung (PERFUSION); language(s) Assembler, FORTRAN;
 list, CRT output, Pictures, parameters; 1/week
6. Lung (VENTILATION); language(s) Assembler, FORTRAN;
 list, CRT output; pictures, parameters; 1/week
7. Lung (V/Q); language(s) Assembler, FORTRAN; list, CRT
 output; pictures, parameters; 1/week
8. Liver (STATIC); language(s) Assembler, FORTRAN; list,

CRT output; pictures; 2/week

9. Liver (FUNCTION); language(s) Assembler, FORTRAN; list, CRT output; pictures and parameters; 1/week

10. Spleen ; language(s) Assembler, FORTRAN; list, CRT output; pictures; 1/week

11. Pancreas; language(s) Assembler, FORTRAN; list, CRT output; pictures; less than 1/week

12. Bone; language(s) Assembler, FORTRAN; list, CRT output; pictures 1/week

13. Tumor Localization language(s) Assembler, FORTRAN; list, CRT output; pictures; 1/week

Installation: Aberdeen University
Department: Medical Physics Dept.
Address: Aberdeen
Scotland

Aberdeen University is a Research institution.
For further information, contact:

Keyes, W. I.; Sharp, P. P. (clinical)

Undrill, P. E. (hardware)

Keyes, W. I.; Undrill, P. E. (software)

The institution operates a central computing facility containing ICL System 4/70 equipment. The responding department uses primarily Punched card; papertape; terminal for data interchange with the central facility.

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Nuclear Data 50/50

User-designed system(s): DEC PDP-11/40

System descriptions:

System 1: Nuclear Data 50/50 (DEC PDP 8/I cpu) with 9 K 12-bit words; 50 cps PTP; 300 cps PTR; 9-tr 800 bpi 45 ips magnetic tape; cassette tape; 1.6-meg removable pack disk; CRT display with 64 greyscales; language(s) FORTRAN, POCAL, Assembler; interfaced to 1 scintillation camera, 1 rectilinear scanner, Nuclear Data Multichannel Analyzer; camera collection in frame mode (32x32 6/sec) (64x64 4/sec) 4095 max counts/element at (64x64); in list mode (256x256) 4,000,000 max counts

System 2: DEC PDP-11/40 with 29 K 16-bit words; 75 cps PTP; 300 cps PTR; 9-tr 800 bpi 45 ips magnetic tape; (2) 1.2-meg removable pack disks; 16 color or greyscale CRT display;

Comments: System 1 is the Nuclear Medicine Data Collection system; System 2 is the Nuclear Medicine Advanced Imaging and Tomographic Processing System shared with other real-time departmental processing functions; Scanner collection parameters very much job-dependent

On the computers described above, the following studies are performed:

1. Brain (STATIC) on System 1; language(s) Assembler; CRT output; 10/week
2. Brain (FLOW) on System 1; language(s) Assembler; CRT output; 2/week
3. Renal on System 1; language(s) Assembler; CRT output;

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2/week

4. Thyroid (IMAGE) on System 1; language(s) Assembler;

CRT output; 2/week

5. Lung (PERFUSION) on System 1; language(s) Assembler;

CRT output; 10/week

6. Lung (VENTILATION) on System 1; language(s) Assembler;

CRT output; 10/week

7. Heart (EFFUSION) on System 1; language(s) Assembler;

CRT output; 1/week

8. Liver (STATIC) on System 1; language(s) Assembler; CRT

output; 5/week

9. Liver (FUNCTION) on System 1; language(s) Assembler;

CRT output; 5/week

10. Pancreas on System 1; language(s) Assembler; CRT

output; 2/week

11. Bone on System 1; language(s) Assembler; CRT output;

5/week

12. Tumor Localization on System 1; language(s) Assembler,

CRT output; 2/week

<7700>

Installation: Addington Hospital
Department: Radiophysics Dept.
Address: Durban
South Africa

Addington Hospital is a Clinical institution which has 700 beds.

For further information, contact:

Moulder, A. E. (clinical)
Moulder, A. E. (hardware)
Moulder, A. E. (software)

The responding department operates the following data acquisition and processing equipment:

Commercial system(s): Zentron

System descriptions:

System 1: Zentron (DEC PD2-8/4 cpu) with 28 K 12-bit words; cassette tape, 3.3-meg fixed disk; 3.3-meg removable pack disk; CRT display with 16 greyscales; language(s) FORTRAN, BASIC, Assembler, interfaced to 1 scintillation camera, camera collection in frame mode (64x64 1/sec) 100 max frames, 4096 max counts/element in list mode with position, time, signals

On the computers described above, the following studies are performed:

1. Brain (FLOW); language(s) Assembler; CRT output; perfusion defects; 20/week
2. Renal; language(s) Assembler; CRT output; function and perfusion; 5/week
3. Lung (PERFUSION); language(s) Assembler; CRT output; 2/week
4. Lung (VENTILATION); language(s) Assembler; CRT output; 2/week
5. Lung (V/Q); language(s) Assembler; CRT output; 2/week
6. Heart (FLOW); language(s) Assembler; CRT output; pediatric use; 1/week
7. Pancreas; language(s) Assembler; CRT output; 2/week
8. Tumor Localization; language(s) Assembler; CRT output; Selenite uptake in lung tumors; 2/week

Installation: Clinica Puerta De Hierro
Address: el San Martin De Porres N.
Madrid, 35
Spain

Clinica Puerta De Hierro is a Research; Clinical; Teaching;
Hospital institution which has 700 beds.

For further information, contact:

Ortiz-Merroval, T. (clinical)
Moreno, T. (hardware)
Martinez-Alonso, Jr. (software)

The responding department operates the following data
acquisition and processing equipment:

Commercial system(s): H-P 2116 B; CLINCON System;

System descriptions:

System 1: H-P 2116 E with 16 K 16-bit words; 120 cps
PTP; 300 cps PTH; 2CC/556/800 bpi 10-45 ips magnetic tape;
1.5-meg fixed disk; 1.5-meg removable pack disk; Line
Printer display with 10 greyscales; language(s) FORTRAN,
BASIC, Assembler, ALGOL; interfaced to 2 scintillation
cameras, camera collection in frame mode (64x64), in list
mode 999,000 max counts

System 2: CLINCON System; TTY PTP; TTY PTH; H-P
200/756/900 bpi 10-45 ips magnetic tape; cassette,
cartridge, DECtape; TTY-compatible CRT display language(s)
FORTRAN, BASIC; interfaced to 1 scintillation camera,

On the computers described above, the following studies are
performed:

1. Brain (STATIC) on System 1; language(s) FORTRAN; list,
graph output
2. Brain (FLOW) on System 2; language(s) Assembler; CRT
output
3. Renal on System 1; language(s) FORTRAN; list, graph
output
4. Thyroid (IMAGE) on System 1; language(s) FORTRAN;
graph output
5. Thyroid (UPTAKE) on System 1; language(s) FORTRAN;
list output

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Heart-F 300, 400, 800, 900, 1100, 1400, 2000, 2300, 2400, 2500, 2700, 2800, 2900, 3000, 3100, 3300, 3400, 3500, 3700, 3900, 4100, 4300, 4500, 4600, 5200, 5300, 5500, 5600, 5700, 5800, 6300, 6700, 6800, 7100, 7300, 7700	Myocardial Infarct 6400, 7100
Heart-G 800, 1400, 2000, 2300, 3000, 3300, 3500, 4100, 4600, 5300, 5500, 6700, 7100	Pancreas 400, 900, 1100, 1400, 1700, 2700, 3000, 3100, 3500, 4000, 4300, 4600, 5700, 5800, 5900, 6300, 6700, 6900, 7100, 7300, 7500, 7600, 7700
Heart-H 300, 800, 900, 1400, 2000, 2700, 3000, 3500, 3900, 4500, 4600, 5200, 5500, 5400, 6300, 7100	Renal 300, 900, 1100, 1400, 1700, 2000, 2100, 2400, 2500, 2700, 2800, 2900, 3000, 3300, 3400, 3500, 3700, 3800, 4000, 4100, 4300, 4500, 4600, 4700, 4800, 5200, 5500, 5700, 5800, 5900, 6100, 6300, 6400, 6600, 6700, 6800, 6900, 7000, 7100, 7300, 7600, 7700, 7800
Heart-P 400	RNA 3400
In-Vitro 300, 3400, 4700	Sites of Erythropoiesis 4000
KPAH Lung Ventilation 1700	Skin Clearance 6400
Lacrimal Duct 3400	

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Spleen 600, 3300, 3400, 3500,
4000, 4300, 4500, 5800, 6400,
6700, 6900, 7000, 7300, 7500

Thyroid-T 2400, 3500, 4000, 4300,
5200, 5400, 5900, 7000, 7300,
7500, 7600, 7900

Thyroid-T 1100, 2400, 2800, 3500,
4100, 5200, 5800, 7500, 7800

TL-201 Heart Scans 1700

Tumor Localization 900, 2400,
2900, 3300, 3500, 4000, 4100,
5700, 6300, 7000, 7100, 7300,
7500, 7600, 7700

Whole Body 5300

3-D Imaging 2300, 3000

Contact: John N. Burgess

Regional Manager
Analytical Development Associates Corp.
 10300 Bubb Road
 Cupertino, California 95014
 (408) 255-6353

Manufacturer: Analytical
 Development
 Associates Corporation (ADAC)
Model: Clinical Data System

I. System Configuration

A. General Description

The ADAC Clinical Data System is based on the DEC LSI-11 microcomputer. It is a dedicated, stand-alone system operating in a foreground/background (F/B) mode and providing the following:

- Data acquisition from one camera
- Simultaneous data acquisition and analysis
- Simultaneous data acquisition and program development
- Remote acquisition of EIA data through punched paper tape

The system is programmable using FORTRAN IV under the ADAC operating system.

Output to the physician is black-and-white or color polaroids, 8"x10" X-ray film, an optional remote video display, and line printer for curves, alphanumeric information, and program listings.

B. CPU/Peripherals

The LSI-11 CPU has a 1.2 microsecond cycle time and 40K (64K optional) words of static MOS memory. Its word length is 16 bits (8-bit bytes).

The clinical data system includes the following standard peripherals:

- 2 Shugart flexible disks (6.4K bits each)
- 7"x9" alphanumeric CRT
- 7"x9" image display CRT
- Line Printer
- Camera interface
- Probe interface

The following are optional peripherals:

- Third flexible disk drive
- CDC 80K byte high-speed disk
- High-speed paper tape reader
- Interfaces to Microdot, Illinois Nuclear, and Ultimat hard copy devices

C. Storage Allocation

Main memory is allocated as follows:

System resident programs: 8K words
 Overlays: 4K
 Image data buffers: 8K
 Curve data buffers: 2k words
 Interchangeable flexible disks are utilized as a storage medium for all information. Programs, static data, dynamic data, and patient information utilize 256K words per disk.

D. Physical Requirements, Service, Training
 Physical requirements are as follows:

	Min.	Avg.	Max.
Floor Space:	36 ft. ²	48 ft. ²	400 ft. ²
Remote Terminal:		12 ft. ²	

Power Requirements:

System: 20 amps, 115 volts

Remote Terminal: 5 amps, 115 volts

GSA contract is pending, lease available.
 Service centers are available through the Honeywell Test Instruments Division at all major cities. (28 centers, over 60 trained service personnel). Training is available at no charge on site after installation of the equipment.

II. Nuclear Medicine Application

A. Data Collection

The ADAC Clinical Data System may be interfaced to the following scintillation cameras:

Searle
 Raytheon
 Picker
 Ohio-Nuclear
 General Electric
 Toshiba

Collection from one camera is standard. An option is available allowing a second camera to be interfaced. No scanner interfaces are currently available. The camera interface uses the ADAC type A/D converter with a 1.5 microsecond conversion time for 12-bit resolution. There are 40 FIFO buffer stages. Cameras may be located up to 250 feet from the computer.

List mode is optional and will handle up to 500,000 counts/second. Histogram mode is available at the following image sizes and framing rates:

32x 32	20/second
64x 64	5/second
128x128	1/second

Whole body imaging will be available for all of the cameras above. Physiologic signals may be digitized at a rate up to 100/second. Inputs to any commercial gate are provided. Automatic well counters, two mobile probe inputs with software-controlled pulse height analyzers, and any other input meeting EIA standards can be interfaced.

B. Image Processing

Dead-time and patient-motion corrections were planned for incorporation in April 1976. Camera uniformity correction is accomplished by division by stored constants.

The following image manipulations are available to the user:

- * (.2 sec.), - (.2 sec.) x (.4 sec.), $\div$ (.4 sec.) of an image by another image (times for 64x64)
- +, -, I, - of an image by a constant or function
- Unlimited other manipulation possibilities.

Curve analysis is fully programmable and can be accomplished step-by-step by the user. Floating-point arithmetic and a comprehensive subroutine package provide the user with the flexibility to perform most any mathematical computation. Eight regular or irregular areas of interest can be defined and stored on the flexible disk as part of the patient file.

The patient index information is stored on the flexible disk as part of the patient file. Patient information may include any parameters desired (patient name, ID number, date, procedure, referring physician, etc.) and is retrievable by patient name and ID number or by any other parameter (programmable).

Programs are available to handle the following clinical studies:

Cerebral Flow	Cardiac Output	Ejection Fraction
GFR	Hepatic Perfusion	RIA Analysis
Renal Perfusion/Excretion		Pulmonary Function

C. Data Display

Images are displayed on a 7" x 9" CRT in a 512 X 512 matrix with 64 gray shades. Hard copy can be obtained by polaroid or 8" X 10" X-Ray film or on the line printer (80 characters/line at 70 lines/minute).

The CRT output is a 7"x9" video monitor driven through the DMA channel, intensity-modulated, with P4 phosphor, color display is optional. Image matrix sizes up to 512x512 can be displayed flicker-free at 60 fields/sec.

Control of the display is through the keyboard, and a light pen is provided for location of the area-of-interest cursor. 1920 alphanumeric characters or 512 graphic points may be displayed at once.

Remote displays, which operate independent of the CPU, may be located at any distance from the computer.

COMMENTS:

The ADAC clinical data system represents a unique concept in nuclear medicine computers. Utilization of the latest computer hardware technology provides the user with such more capability than is possible with comparably-priced minicomputer systems. The display provides images that are almost identical to original analog scintiphotos. Phantom studies demonstrate that there is no degradation of the original camera's resolution or image

quality. Software is provided for most organ function studies and static image enhancement. Ease of operation is stressed in all facets of the system (most technologists trained to date have mastered the system in less than one day). All future software developments will be provided to users at no charge.

Contact: John D. Marasa
Artronix Incorporated
 1314 Hanley Industrial Ct.
 St. Louis, Missouri 63143
 (314) 968-4740

Manufacturer: Artronix Incorporated
Model: Modulex/MMS

I. SYSTEM CONFIGURATION

A. General Description

MMS is based on the Artronix Modulex multi-tasking computer system. It is a multiple bus/multiple processor system with background/foreground capability. It optionally provides for simultaneous data analysis, data acquisition, and programming.

The system is programmable in MUMPS, FORTRAN or Assembly language.

Output to the physician is Polaroid photos or multi-format images on X-ray film.

B. Processor/Peripherals

The Artronix Modulex System for MMS has a 600 nanosecond cycle time with a minimum of 96K bytes of semiconductor memory (expandable with options).

The MMS system includes the following peripherals:

- Dual platter double density cartridge disk drives (10M bytes)
- Gamma camera interface with list and frame mode
- Dual alphanumeric CRT and Videographic display station with 32 shades of gray

Also available as optional peripherals:

- Disk storage module (80 megabytes)
- Dual "floppy" diskettes (200K bytes)
- Matrix line printer
- Remote acquisition terminal
- Incremental plotter.

C. Storage Allocation

Memory is partitioned between two busses.
 The control bus is allocated as follows:

Resident System 48K bytes

Application Overlays 16K bytes(expandable)

The memory bus is dedicated to image buffers:

Image Data Buffers 32K bytes(expandable)

The dual cartridge disk is capable of storing over 1000 frames of (typical) 64x64 data.

Each of the optional "floppy" diskettes is capable of storing 35 frames of (typical) 64x64 data.

The disk storage modules can accommodate approximately 4000 frames of (typical) 64x64 data.

Patient information is contained within the data files.

D. Physical Requirements, Service, Training
Physical Requirements are as follows:

	Min.	Avg.	Max.
Floor Space	55 sq. ft.	103 sq. ft.	150 sq. ft.
Power Requirement			208 VAC, 5 KVA
Remote Terminal			208 VAC, 1 KVA

Lease is available.

Service is provided through the main center in St. Louis and various regional offices in North America, Europe, and Asia. Training is conducted at the customer's site immediately after installation.

II. NUCLEAR MEDICINE APPLICATION

A. Data Collection

MHS has been interfaced to Pho Gamma III and LPOV scintillation cameras. (Rectilinear scanner interface is not yet available.)

The camera interface uses LSI A/D converters which can handle 400K events/second, 8 bits each for X and Y. The cameras and A/D may be located up to 300 feet from the computer.

List mode acquisition accommodates up to 250,000 counts/second.

Frame-mode acquisition is available with a collection rate of 100 frames/second for 64x64 images. Data matrices of 32x32, 64x64, 128x128 or 256x256 are offered.

An optional physiological gate is available.

Patient data acquisition is programmably controlled through user defined protocols.

B. Image Processing

The processing of image data is controlled by the user through a high-level mnemonic image processing command language. Available techniques include image enhancement with 32 gray levels, profile histograms, isometric contours, organ area and regional quantitation, functional imaging including V/Q images, delineation of up to 12 irregularly shaped regions, a flexible image arithmetic package and a comprehensive subsystem of tracer curve analyses.

Also provided is a detailed package to sample and analyze detector non-uniformity (flood) fields.

A Cardiac Analysis package designed especially for isotope angiography of the heart will soon be available.

An RIA option is available.

Full patient information plus remarks are stored with the image data and printed with a study summary by the report generator programs.

C. Data Display

Image displays are implemented at a dual alphanumeric CRT and videographic display station consisting of two matching 12" diagonal video monitors and an operator's keyboard with light pen and function keys.

Text may be displayed on the alphanumeric CRT or Video CRT with hardcopy available on an optional matrix line printer or printing terminal. An optional 22" incremental plotter is also supported.

The Video CRT for image display is driven by a video graphic storage unit consisting of 672x512 digital RAM memory with 32 levels of gray. Images are presented on the monitor at 525 lines/second.

Interactive displays are controlled with keyboard commands, special function keys and lightpen. Hardcopy of images is obtained by Polaroid photography or optional multi-format camera. Remote display stations may be operated up to 300 feet from the computer.

COMMENTS:

The Modulex/MMS system is directly compatible with other Artronix Systems and may share its data bases and hardware configuration with other applications such as Patient Scheduling, Record and Verify, Radiation Treatment Planning, or the Neuro/Torso CAT Scanners.

Contact: Richard P. Corley, Marketing Manager **Manufacturer:** Baird-Atomic

Baird-Atomic Nuclear Division
125 Middlesex Turnpike
Bedford, Massachusetts 01730
(617) 276-6500

Model: System Seventy-Seven

I. SYSTEM CONFIGURATION

A. General Description

The Baird Atomic System Seventy-Seven is based on a Digital Computer Corporation Model D116 General Purpose Computer. It is a dedicated, stand-alone system capable of simultaneous data analysis and acquisition. The system runs under a DOS operating system and is programmable in Assembly language.

Remote Data acquisition is not supported.

Output to the physician is by polaroid (B/W or color), 70 mm, 8x10 x-ray format, remote CRT and video hard copy.

B. CPU/Peripherals

The DCC-D116 computer has 24K of 16 bit, 1200 nano second memory.

The system seventy-seven is capable of supporting the following peripherals:

- (2) Diablo model 30 1 million word disc
- 9-track Ampex magnetic tape
- Teletype
- Sykes CC100 cassette tape
- Static MOS B/A memory
- Tekronix video hard copy
- TV display
- Keyboard
- Video to Film Organizer (Multi-Formatter)

C. Storage Allocation

Program storage is allocated as follows:

Resident Program	1,600 words
Program Overlays	60,480 words
Image Buffers	213,280 words
Curve Data Buffers	2880 words

Each 1 million word disk may contain 2000-3000 frames of static or dynamic image data.

Each 2400 foot reel of 9 track magnetic tape will hold 5.67 million words of data or 18000 frames.

Each 126K word magnetic tape cassette will hold 400 frames.

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D. Physical Requirements, Service, Training
Physical Requirements are as follows:

	Min.	Avg.	Max.
Floor Space:	80 ft. ²	100 ft. ²	
Power Requirements:	1600 watts	1800 watts	2400 watts

Lease is available but not GSA contract.

Service Centers in 10 major metropolitan areas with 17 trained service personnel. Customer training is held after installation at the customer's site and is included in the purchase price.

II. Nuclear Medicine Application

A. Data Collection

The system seventy-seven is dedicated to collection and analysis of data from the Baird Atomic System Seventy-Seven imaging system.

Data is collected by direct x, y addressing to random access buffer memory at speeds up to 235,000 cts per second and 20 frames/second.

Physiological data is not digitized but a physiological gate using a Brattle Bioengineering gate is available.

B. Image Processors

Deadtime correction is performed by means of parameterized table lookup algorithms, image uniformity correction is performed with factors obtained from a uniform flood. Background correction is performed with factors obtained from a background frame.

- + (3.5 sec.), - (3.5sec.), x (4.4 sec), ÷ (4.4 sec.) of an image by another image
- Background subtract
- Deadtime correction
- Uniformity Correction
- Alphanumerics (Total Count, Bmax, ID Number, Orientation, Time Interval)
- Renormalization
- Image rotation (90 degree increments)
- Positive/negative display
- Isometric display
- Numeric Display
- Multiple images (1,2,12)
- Profile slices
- Integration of counts in areas of interest
- Linear interpolation
- Five point image averaging
- 0-100% activity level and range

progressive contrast enhancement
 dynamic cine playback
 Functional images of axinus count and time of maximum count
 in each image element of a dynamic study

The following curve analysis and manipulation functions are available:

*, -, X, $\frac{1}{x}$
 Background correction
 Deadtime correction
 Uniformity
 Renormalization
 Max of histogram
 Total counts in histogram
 Time compression of histogram
 Smoothing
 Derivatives
 Linear extrapolation
 Exponential extrapolation
 Separation of curve into existing primary, secondary components
 For each curve component:
 Mean transit time
 Mode transit time
 Arrival time
 Integral
 Two component exponential least squares fit to a curve
 Straight line least squares fit to a curve

The curve and image functions are not programmable for later execution.

Four simultaneous irregular areas of interest are available.

Four simultaneous profile slices are available.

The patient information which is stored with the study on the disk consists of a preassigned study number. This is retrieved with all operations and is displayed with all displays.

Programs are available to handle the following clinical studies:

Pulmonary function

V/Q ratio
 Lung ventilation mean washout time
 Representative ventilation cycle
 Separation of washout components by two component exponential least squares fit

Cerebral blood flow

Separation of arterial and venous components
 Unilateral diagnosis by ratio of right and left perfusion
 Bilateral diagnosis by transit times

Liver-pancreas separation

Renal study

Cardiovascular function

RV, LV ejection fraction - global or regional

Representative cardiac cycle

Ejection velocity

Cardiac wall motion analysis

Regional myocardial blood flow

Transit times

General dynamic study curve analysis

Smoother

Derivatives

Integrals

Linear extrapolation

General dynamic study curve analysis

Exponential extrapolation

Linear least squares fit

Two component exponential least squares fit

Mean transit time

Mode transit time

Arrival time

Separation of curve into existing primary and secondary components

C. Data Display

Images are displayed in video format on B/W, color TV monitor displays and multi-formatter. Hard copy is available via polaroid (B/W or color), 70mm, 8x10 x-ray format and tektronix video hard copy. Multiformatter uses 8x10 x-ray film with images 1x1, 2x2, 3x3, 4x4.

The CRTs for image display are 5", 12" B/W video monitor and 12" color video monitor multi-formatter uses a 5" high resolution, magnetically deflected B/W video monitor. The displays are driven through the DMA of the computer with remote displays up to 2500 feet away.

The display schemes available are: half-tones, z-axis modulated half-tones, z-axis modulation, continuous tone image (analog image of continuous z-axis modulation over two dimensional Gaussian filter matched to collimator response function), color.

Stepper buttons exist for background suppression and contrast control. A magnetic zone grid is used for area of interest designation. POS/NEG image inversion is hardwired. Contours are software controlled.

Contact: Paul Shields **Manufacturer:** Digital Equipment Corporation
 Digital Equipment Corporation **Model:** Gamma-11 P/B
 200 Forest Street
 Marlboro, Massachusetts 01752
 (617) 881-9511 Ext. 6982

I. System Configuration

A. General Description

The DEC Gamma-11 P/B system is based on Digital Equipment Corporation's PDP-11 series general-purpose computer. It is a dedicated, stand-alone system operating in a foreground/background (P/B) mode and providing any one of the following:

- simultaneous data acquisition and analysis
- simultaneous data acquisition and program development

The system is programmable using FORTRAN, BASIC and POCAL: and runs under the RT-11 operating system. The optional magnetic tape provides archival data storage as well as access to remote processing facilities.

Output to the physician is black-and-white or color polaroids and hardcopy of patient demographic data.

B. CPU/Peripherals

The PDP-11 cpu has an 800 ns cycle time with 16K or 32K 16-bit words 8-bit bytes).

The Gamma-11 system includes the following standard peripherals:

- Video color display
- Dual 2.4-megabyte moving head cartridge disk
- 1 Camera interface (dual isotope)
- LA 36 DEC writer
- Alphanumeric CRT terminal

The following are optional peripherals:

- 800 bpi 45 ips magnetic tape
- Paper tape Reader/Punch
- Additional disks
- Line printer
- Cassette tapes
- Floppy disks
- AN-11 Analog-to-Digital Converter system

C. Storage allocation

Main memory is allocated as follows:

- Resident programs: 1.5K single job
- 3.5K for foreground/background
- Overlays: Dynamically allocated
- Image data buffers: 8K (Dynamically allocated)
- Curve data buffers: 8K (dynamically allocated)

Each 1.2-Megaword disk may contain any combination of programs, static image data, or dynamic image data, since all of the above are operating system files and are dynamically allocated. Patient information is contained within the data files.

Each magnetic tape is capable of storing 12 million words of static and/or dynamic data.

D. Physical Requirements, Service, Training
Physical requirements are as follows:

	Min.	Avg.	Max.
Floor Space:	100 ft. ²	100 ft. ²	100 ft. ²
Remote Terminal:		4 ft. ²	
Power Requirement:	1500W.	2000W.	

GSA contract, lease available.

Service centers at major population centers throughout the U.S. and World (250 centers, over 2000 trained service personnel world-wide).

Training available in Massachusetts, Illinois, Pennsylvania, and California, held periodically throughout the year.

II. Nuclear Medicine Application

A. Data Collection

The DEC Gamma-11 P/B System has been interfaced to the following scintillation cameras:

Searle
Ohio-Nuclear
Toshiba
Picker
Elscint

Collection from one camera is standard. (no scanner interfaces are currently available) The camera interface uses a Wilkinson ramp-type A/D converter with a 3.5 μ -sec conversion time for 7-bit resolution. There is a three-stage buffer in the interface. Cameras may be located up to 100' from the interface.

List mode is available, and will handle up to 33,000 counts/second. Histogram mode is available at the following image sizes and framing rates:

32x 32	35/second
64x 64	12/second
128x128	Static

Whole-body imaging is available for all scintillation cameras. Physiological gating can be accomplished by use of a Brattle Bioengineering gate. Additional counters or probes can be interfaced through the optional AS-11 Analog-to-Digital Converter System.

B. Image Processing

No dead-time correction or patient motion correction is available. Camera uniformity correction is available with correction factors calculated from the average of all cells above a user-selected threshold.

The following image manipulations are available to the user:

- + (0.1 SEC.), - (0.1 SEC.), $\div$ (<1 SEC.), $\times$ (<1 SEC.) of an image by another image (times for 64x64)
- +, -, $\div$, $\times$ of an image by a constant
- Thresholding
- Contrast enhancement
- Negative image
- Mini (4-view) display
- Non-linear image display
- Flood correction
- Vertical and horizontal slices (static/dynamic)
- Isometric display
- Smoothing
- Isocontour Generation
- Dual Full-size display

The following curve analysis and manipulation functions are available:

- +, -, $\div$, $\times$ of one curve by a second curve
- +, -, $\div$, $\times$ of a curve by a constant
- Smoothing
- exponential fit
- integral
- Slope
- Linear fit (least squares)
- Logarithm
- Normalization
- Time base compression

The image and curve analysis commands may be called one at a time or may be programmed to run in a predetermined sequence.

Twelve regular or irregular areas of interest may be defined and stored in save areas on the disk. The patient index information stored with the image file is as follows:

- Name
- Matrix size
- Free Text (500 char.)
- I.D. Number
- Number of frames

Type of Study
 Frame rate (dynamic) or
 Acquisition time (static)
 Organ
 Dose
 Isotope View
 Camera orientation and rotation
 Date and time of acquisition

These parameters are retrieved via a study number assigned by the user.

Programs are available to handle the following clinical studies:

Cardiac Shunt
 Cardiac output
 Stroke Volume
 PHTT
 Left Vent. Ejection Fraction
 Cerebral Blood Flow
 V/Q
 XEBR
 Kidney
 Gastric Emptying
 Radioimmunoassay
 Functional Imaging
 Curve analysis

C. Data Display

Images can be displayed by the VT01 storage tube CRT or the VIV01/VB01 video black-and-white or color display. Hard copy of text is available from the LA-36 DEC writer (132 char./line at 30 char./sec.) or the optional LP-11 line printer (40 or 132 columns, up to 1200 lines/minute).

The CRT's for image display are 12" video monitors with dedicated memory, intensity modulated and/or in color. 128x128 images may be displayed at 7 frames/second, 64x64 images at 15 frames/second. Alphanumeric and graphic information (up to 25 lines of 64 characters each) may be displayed.

A control exists for contrast, and a joystick is provided for location of the area-of-interest cursor. Hard copy is obtained by photographing the display.

Remote displays may be located up to 100 feet from the cpu.

COMMENTS: All system functions are controlled by logical two-letter commands. These commands may be linked together to form what is called a MACRO program which may be stored under a program name.

Contact: M. Ben-Porath
 Elscint, Inc.
 P. O. Box 297
 Palisades Park, New Jersey 07650

Manufacturer: Elscint, Inc.
Model: CDP-3

I. SYSTEM CONFIGURATION

A. General Description

The Elscint CDP-3 system is a hybrid system based on the Data General Nova 2/10 general-purpose computer and the hardwired Elscint CDP-2 system (which can operate independently of the CPU). The system provides for:

simultaneous data acquisition and analysis and simultaneous programming and data acquisition.

The system is programmable in Assembler Language.

There is no provision for remote or off-line data acquisition.

Output to the physician is via CRT terminal, Polaroid photos, hard copy of images, and printed listings. Background/foreground capability is available with the ZDOS operating system.

B. CPU/Peripherals

The Data General Nova 2 CPU has a 1.2 microsecond cycle time with 16K 16-bit words (8-bit bytes) of core memory.

The Elscint CDP-3 system includes the following peripherals:

Tektronix or Hewlett-Packard CRT display
 Color/black-and-white video monitor
 Teletype
 (2) 2.5-meg Pertec disks (one fixed, one removable)

Also available as peripherals are:

9-track, 900 bpi, 45 ips Wang magnetic tape
 Cassette tape
 Centronics line printer
 Versatec printer/plotter

C. Storage Allocation

Main memory is allocated as follows:

System resident programs:	8K
Overlays:	None
Image Data Buffers:	5K
Curve Data Buffers:	2K
Other:	1K

The two 2.5 meg disk drives (one fixed, one removable may contain any combination of static and/or dynamic data, with patient information.

Other storage is optionally available on magnetic tape or cassettes.

D. Physical Requirements, Service, Training

Physical Requirements are as follows:

	Min.	Avg.	Max.
Floor Space	25"x50"	25"x75"	25"x100"
Power Requirement	1KW	1.3KW	2.8KW

GSA contract, lease available.

Service centers at 25 locations coast to coast.
Training held during installation.

II. NUCLEAR MEDICINE APPLICATION

A. Data Collection

The Elscint CDP-3 System has been interfaced to the following scintillation cameras:

Elscint	Searle	Picker
---------	--------	--------

(Also, the system has been interfaced to the following rectilinear scanners:

Elscint	GE	Picker
Ohio-Nuclear	Searle	Siemens

The scanner may be located up to 100 feet from the system. Scan images are 96x128. Dual whole-body imaging is accommodated). The camera interface uses a Wilkinson/Elscint A/D converter with a 3 usec conversion time.

Maximum conversion time for 7-bit resolution. There is a one-stage buffer in the interface. Cameras may be located up to 100 feet from the interface.

List mode is not available. Histogram mode handles 96x96 element images at the rate of 10/second.

There is no provision for whole-body camera imaging. Physiological gating may be accomplished with a MATRIX gate.

B. Image Processing

The Elscint CDP-3 system performs dead-time, uniformity, and patient-motion correction as desired.

The following image manipulations are available to the user:

- *, -, $\div$, x of an image by a matrix
- *, -, $\div$, x of an image by a constant
- Scaling
- Isometric display (positive or negative)
- Soothing
- Profiles (static and dynamic)
- LP interaction for regions of interest

The following curve analysis and manipulation functions are available:

- *, - of background curve from other curves
- *, -, x, $\div$ of curves by constant
- smoothing
- patient movement correction
- simultaneous display of up to 8 curves
- exponential fit (in program, or interactive through use of light pen)

The image manipulation and curve analysis commands are used in a single-step fashion and are not programmable.

Eight regular or irregular areas-of-interest may be defined and stored in computer memory or on disk.

The patient index information stored in the acquisition unit is as follows:

- Patient I.D.
- Date
- Time/frame
- Total Count
- Frame Number

These data are stored on disk memory. Additional parameters may be added later if transferred to tape storage. They may be retrieved from disk by frame number, from tape by name, file number, etc.

Programs are available to handle the following clinical studies:

- RCBP
- Renogram (single, multiple)
- Cardiac Output (stroke volume)
- Pulmonary Perfusion (transit time)

C. Data Display

Images can be displayed on Tektronix or HP CRT's or on the video color or black-and-white display. Hard copy of text is available on a Centronix line printer (132 char./line at 160 char./sec. or on the Teletype (72 char./line at 10 char./sec.). A Versatec

plotter is also available.

The color video monitor is a 12" diagonal, 8-color display, 128x128 elements at 60 frames/second. The CRT's display 128x128 frames at 45 frames/second, DDA-driven, IIZ mode, intensity or time modulated, with P-11 or P-7 phosphors available. 15 characters of alphanumeric information may be displayed on the screen.

Contrast is adjusted by rotary switch and pushbutton, the area-of-interest cursor is moved by pushbutton and light pen. Buttons are also provided for producing a negative image, isometrics, or contouring. Latitude control is under software command.

Hard copy is obtained by Polaroid photography of the screen, line printer or Tektronix hard copy unit.

Penote displays may be operated by modes at any distance from the cpu, without dedicated memory and independent of the cou.

Contact: Thomas J. Goliash, Product Manager ~~Manufacturer:~~ General Electric
Nuclear Data Processing
 General Electric Medical Systems Division
 4855 Electric Avenue
 Milwaukee, Wisconsin 53201
 (414) 383-3211

I. System Configuration

A. General Description

The General Electric MD912 nuclear medicine system is based on the Nuclear Data Corporation MD812 general purpose computer. It is a dedicated stand-alone computer and provides both simultaneous data acquisition and analysis program development

The system is programmable using NOTRAN and Assembly Language.

Off-line data acquisition is possible with this system with data transmission to the computer via dial-up telephone line, permanent data lines, or magnetic tape.

Output to the physician is black and white or color polaroid, line printer (both images and curves) and remote video and CRT terminals.

B. CPU/Peripherals

The MD812 CPU has 16K of 12 bit, 2 microsecond solid state memory.

The MD812 Nuclear Medicine System includes the following standard peripherals:

- image display CRT
- WANGCO Disc
- 9 track, 45 ips magnetic tape
- camera interface
- ADC
- Diablo Printer
- Teletype or CRT terminal

C. Storage Allocation

Main memory is allocated as follows:

- Resident Programs: 8K
- Overlays: Disc interchangeable
- Image buffers: 2-4K
- Curve buffers: 2-4K

The 4 megaword disc may contain 64K words of program as well as 750 images in either static or dynamic mode.

Each magnetic tape can store 3000 images on a 2400 foot reel of tape.

D. Physical Requirements, Service, Training
Physical requirements are as follows:

	Min.	Avg.	Max.
Floor Space:	30 ft. ²	35 ft. ²	45 ft. ²
Power Requirements:	125V/15A	125V/25A	125V/35A

There are 67 service centers located in all major cities.

Training is included in the purchase price and is available at the time of installation at the buyer's site.

GSA contract is available as well as lease.

II. NUCLEAR MEDICINE APPLICATION

A. Data Collection

The General Electric ND912 system has been interfaced to the following scintillation cameras:

Searle
Picker
General Electric
Ohio Nuclear

Simultaneous Dual camera collection is not possible. No scanner interfaces are currently available. The camera ADC requires 750 nano seconds conversion time for 8 bit resolution in both X and Y and has one word buffer. Cameras may be located up to 50 feet from the interface.

List mode is available with a maximum count rate of 80K counts per second. Histogram mode is available at 80 frames/second at 32x32 or 20 frame/second at 64x64, static image resolution of up to 256x256 is available.

Physiological data can be digitized and stored with the image data but physiological gating is not available. Other interfaces are available for position cameras and Krypton Units.

B. Image Processors

Deadtime correction can be performed using a reference source in the field of view. Field uniformity correction can be performed on all image data. Patient motion correction is performed on the basis of position of the centroid of activity.

The following image manipulations are available to the user:

Floating point $\times$ (.7 sec.), $-$ (.7 sec.) $\times$ (.7 sec.), $\div$ (.7 sec.)

Fixed point $\times$ (.4), $-$ (.4), $\times$ (.4), $\div$ (.4) of an image by

another image (times for 64x64)
 +, -, $\div$, $\times$ image by constant
 Determination of median rows or columns
 Level selection
 Count summation
 Smoothing (user selected weights)
 Negative image

The following curve analysis and manipulation functions are available:

+, -, $\div$, $\times$ of curve by constant or curve
 Deadtime correction
 Linear, exponential, gamma variant file
 Smoothing
 Interpolation
 Compression

The image and curve analysis commands may be called one at a time or programmed to run in a predetermined sequence.

Twelve regular or irregular areas of interest can be defined and permanently saved on disc.

The patient information stored with the image file on disc is:

ID number
 Date
 Mode of Acquisition
 Time per frame
 Number of records
 Patient position
 100 characters of free text

These can be retrieved by patient number or study number. Programs are available for the following clinical studies:

Cerebral blood flow
 Left ventricular ejection fraction
 Gated heart study ejection fraction
 Pulmonary transit times
 Pulmonary V/Q ratio
 Renal analysis
 Linear flow
 Dual Isotope study
 Functional image

C. Data Display

Images are displayed in intensity modulated color on a display driven through the DMA of the computer. Flicker free display is available for 32x32, 64x64, 128x128 images. Controls provide contrast, contouring, and isometric control. A light pen and Z

intensified elliptical markers are available.

Alphanumeric and graphic information may be displayed (120 character on CRT or 240 on video terminal).

Remote terminals with optional dedicated memory may operate up to 200 feet from the system.

Hard copy text is available from the 10 characters per second teletype or the optional 120 character per second Diablo (or Centronics) line printer.

Contact: Ronald G. Gesell

Marketing Manager
244 Goodwin Crest Drive
Room 120
Birmingham, Alabama 35209
(205) 942-9462

Manufacturer: Informatek
States, Inc.
Model: SINIS 3

I. System Configuration

A. General Description

The Informatek States, Inc., SINIS 3 system is based on the VARIAN/INFORMATEK MATRK 1026 (VARIAN 620L 100 modified) general-purpose computer. It is a dedicated, stand-alone system operating in a foreground/background (F/B) mode and providing the following:

- Data acquisition from four cameras (static and dynamic)
- Simultaneous data acquisition and analysis
- Simultaneous data acquisition and program development
- On-line image enhancement and manipulation on-line curve extraction, quantitation, and analysis
- Demographic patient data
- Non-imaged radionuclide data storage and analysis (on request)
- Isotope Inventory control (on request)
- Report Generation (on request)

The system is programmable using Assembly language and FORTRAN IV operating under the RTEIX operating system. The digital magnetic tape provides archival storage and access to remote processing facilities. On-line acquisition of data is possible from remote stations at distances up to one mile without loss in performance. Output to the physician is provided on black-and-white or color Polaroids, on an electrostatic printer/plotter (images, curves, text), or on a line printer,

B. CPU/Peripherals

The MATRK 1026 has a 900 nsec cycle time with 32K 16-bit words. The SINIS 3 system includes the following peripherals:

- 9-track magnetic tape (800 bpi)
- Dual 2.4-megaword disks
- Teletypewriter terminal
- Two alphanumeric CRT displays
- Video color display (256x256)
- Electrostatic printer/plotter
- Line Printer

C. Storage Allocation

The system resident programs utilize 2.5K words of main memory, with .5K words allocated for overlays. The multitask operating system dynamically allocates memory for loaded programs. Buffers of any size can be allocated.

One 2.4M word disk may contain any combination of programs, static image data, and dynamic image data, since all of these are dynamically allocated by the system. List mode acquisition uses the second 2.4M word disk. The magnetic tape can be used 'ad

lib' to store any of the above.

D. Physical Requirements, Service, Training
Physical Requirements are as follows:

Floor Space: 6 square meters
Power Requirements: 40 amps, 115 volts

Service center is located at Birmingham, Alabama.
One office in East and West coast cities will be opened soon.
Service offices are also available in France, Italy, Brazil and Japan.

Two weeks of on-site training are available free of charge after the installation of a system. Seminars on the system will be held at regular intervals at Informatek's Birmingham facility.

II. Nuclear Medicine Application

A. Data Collection

The SINIS 3 system has been interfaced to the following scintillation cameras:

Searle	Ohio Nuclear	Nuclear Enterprises
Picker	Toshiba	General Electric

Collection of static images can be made from four cameras simultaneously. Simultaneous acquisition of two dynamic images or one dynamic and three static images can also be accommodated. The physical distance between the interface and the camera can be up to one mile without loss in performance. An Informatek successive-approximation A/D converter provides 69 buffer stages with a one-microsecond deadtime for 8-bit resolution.

List mode is available and will handle up to 70,000 events/second or 100 frames/second. Histogram mode is available at the following image sizes and framing rates:

64x64	13/second
128x128	3/second
256x256	

Whole body imaging is available for the Ohio Nuclear and Picker cameras. Physiological signals are digitized for every event in the list mode and are stored with the raw image data. The physiological gating is accomplished by software.

The SINIS 3 has been interfaced with the PICKER, SILO, and RECASERTO Rectilinear scanners. The interface will handle data acquisition from as many as seven scanners simultaneously at a distance up to one mile. Digitized pulse height information is optional. Image matrix sizes accommodated are 64x64, 128x128, 64x256 and 256x256. Dual whole body imaging is also accommodated.

Other interfaces are available for INTERTECHNIQUE multi-channel analyzers; CANAC crates with clock, scalar, input registers, displays and terminals; and the Baufors thermograph. Interfacing for ultrasound probes will be available soon.

B. Image processing

Dead time correction is available on request, uniformity correction using division by a stored flood phantom and patient-motion correction using center-of-mass algorithms are available.

The following image manipulations are available to the user:

- Fixed point arithmetic (single precision) on single images or two series of images (.12 second for + or -, .16 second for $\times$ or $\div$ for 64x64 array)
- Sum of series of images
- Background subtraction
- Linear combination
- Copy
- Masking
- Scaling
- Smoothing
- Filtering
- Convolution
- Rotation
- Symmetry
- Multi-isotope separation

The following curve analysis and manipulation functions are available:

- Double-precision arithmetic on pairs of curves
- Logarithms
- Decay correction
- Linear and exponential fits
- Scaling and simultaneous display of up to 15 curves at a time
- Integration between points
- Smoothing

Image manipulation and curve analysis commands are programmable.

As many as 4000 regular and irregular areas of interest may be defined and permanently stored, fifteen per file, on the disk or on magnetic tape. Patient index information, stored with the image file, may be entered as follows:

- Patient name
- ID number
- Type of Study
- Organ, isotope, etc. (as free comments)

Patient files may be retrieved by name, ID number, or type of study.

A protocol generator, included in the standard system, enables the user to link different programs contained in a library file and to store for access using his own macros.

Matrices and curves are accessible from FORTRAN programs, permitting the user great latitude in writing his own function routines. Function programs available include renal, cardiac, and cerebral studies,

C. Data Display

Images of matrix size up to 1024×1024 elements can be displayed by the 8"x6" of TEKRONIX 611 storage CRT at a speed of 100 microseconds per element. The 19" CONRAC 5111 video monitor provides color displays of 256×256 points, programmable, with 256 levels of color (2.6 microsecond element). Hard copy of images and graphs is available from polaroid prints and from the VARIAN electrostatic printer/plotter (14" wide at 80 lines/second). Text output is obtainable on the CDC 9316 line printer, the Electrostatic printer and on an alphanumeric CRT (16 lines X 80 characters).

CRT displays are driven either under program control (optional) or through the DMA hardware. 64×64 images are displayed at a rate of 13 frames/second (16 images displayable at a time), 128×128 at 3 frames/second (84 images at a time), and 256×256 images in a continuous play-back mode.

Contrast and latitudes of the displays are adjustable by a knob on the CRT. The area-of-interest cursor is controlled either by a joystick or through the keyboard. Negative imaging and contour displays are provided through software isometric displays may be obtained either by hardware or software.

The system has the capability for remote displays.

Contact: Don Strange
 Medical Data Systems
 3920 Varsity Drive
 Ann Arbor, MI 48104

Manufacturer: Medical Data Systems
Model: Modumed Series

I. System Configuration:

A. General Description

The Medical Data Systems Modumed nuclear medicine data acquisition and analysis series is based on a Data General general purpose computer. It is a dedicated, stand alone system and provides the following: data acquisition from up to 3 cameras simultaneously,
 simultaneous data acquisition and analysis,
 simultaneous data acquisition and program development

The system is programmable in FORTRAN, BASIC, ALGOL and assembler, and runs under the MDOS monitor.

Output to the physician is black and white or color video, polaroid, 70 mm film or 8x10 X-ray film.

B. CPU/Peripherals

The Data General computer is a general purpose computer with a cycle time of (8bit bytes).

The following peripherals are available for the Modumed Series:

2.5 megabyte Diablo Disk
 75 ips-800 bpi, DGC magnetic tape
 Color video image display.

C. Storage Allocation

Main memory is dynamically allocated depending on the needs of the specific programs. The resident monitor requires 2K of core.

The 2.5 megabyte disc may contain a combination of 240 k words of program, 150-300 static images, 600 dynamic images and personal information on up to 64 patients. A dedicated disc for the patient census program can hold information about 32,000 patients, including name, number, sex, date of study, study information, result, diagnosis, comments, and teaching file tags.

D. Physical Requirements

Physical requirements are as follows:

	Min.	Avg.	Max.
Floor Space	10 ft. ²		30 ft. ²
Power Requirement			110 VAC, 2 amp
Remote Terminal			110 VAC, 1 amp

GSA contract is available, leases are available through leasing companies.

Training is available on the following basis.

Introductory: 2 1/2 days each month in Ann Arbor

Advanced: Quarterly

Other: PORTPAN, cardiac, clinical procedures - T.S.A.

Users group also holds meetings and workshops

Service offices are located in New York, Atlanta, Ohio, San Antonio, and Los Angeles.

II. Nuclear medicine Applications

A. Data Collection

The Modumed series has been interfaced to the following cameras:

Searle, Ohio Nuclear, Picker, General Electric, Toshiba.

Up to 3 cameras may be interfaced simultaneously. With line drivers the cameras may be up to one mile from the computer. The camera ADC is available in 64 x 64, 128 x 128, or 256 x 256 images sizes with an 8-stage buffer. Energy pulse height cannot be digitized.

List mode collection at up to 32,500 events/sec is available. Histogram mode is also available in 64 x 64 or 128 x 128 resolution at 25 and 10 frames per second.

Digitization of physiological signals is available.

Whole body camera capability is available for Searle, Toshiba, Ohio Nuclear, and Picker.

Raytheon and Ohio Nuclear scanners have been interfaced and image collection in 256 x 256 is available. Dual whole body imaging is accommodated.

Ultrasound and single probe interfaces are available.

B. Image Processing

Dead time and uniformity correction routines are available. Patient motion is not corrected.

The following image manipulations are available:

Frame math (+, -, x, /)
Square
Negative image
Smooth

Profile
 Zoom
 Foreground suppression
 Background subtraction
 Uniformity correction
 Translation table selection (2-32 gray levels)

The following curve analysis and manipulation functions are available:

Curve math (+, -, x, /)
 Log
 Integral
 Smooth
 Standard, overlaid displays
 Exponential and gamma variable fit.

Both image and curve analysis routines may be called one at a time or be programmed to run in a predetermined sequence.

Sixteen areas of interest can be defined by software and light pen and stored permanently on the disc.

The patient information stored with the data on disc is:

Name
 Number
 Date
 Time
 Camera I.D.
 Location of study
 Length of study
 Type of study
 Comments

Programs are available to handle the following:

V/Q ratios
 Renal analysis
 Xenon washout
 Cerebral transit time
 Shunt quantitation
 Cardiac output
 Edge detection
 Organ uptake
 Patient census

C. Data Display

Images are displayed on a color video display. Video images are displayed in a 256 X 240 matrix.

Contrast, background, contouring, negative image, and isometrics are all software controlled.

Displays may be located up to 500 feet from the processor.

Hard copy is obtained by polaroid, 70 mm film or 8 x 10 x-ray film. Graph and text output are also available at the keyboard. Versatec printer/plotter is in development.

Contact: Jim Bessett, Marketing Manager **Manufacturer:** Ohio Nuclear
 Ohio-Nuclear **Model:** 160/75
 6000 Cochran Road
 Solon, Ohio 44139
 (216) 248-8500

I. SYSTEM CONFIGURATION

A. General Description

The Ohio Nuclear model 160/75 nuclear medicine System is a hardwired stand-alone, dedicated, data collection and analysis system. Collection and analysis are performed separately.

The system is programmable in BASIC with the addition of the Hewlett-Packard 9830 computer.

The system does have optional remote data acquisition capabilities with the data being handcarried on 9 track magnetic tape to the central facility for analysis.

The output to the physician is available on Polaroid film (color and b/w) 35mm, 70mm, remote video (color or B/W) or by the 9930 printout.

B. Hardware Systems

The 160/150/75 system is based on a special purpose CPU with a cycle time of 1 microsecond and a word length of 8 or 12 bits depending on the system configuration.

The standard system includes:

- 16 to 48 K bytes core
- Color and B/W display
- 9-track magnetic tape
- Camera and scanner interfaces

The HP 9830 computer is optional for programmable curve analysis.

C. Storage Allocation

Memory is totally dedicated to image buffers with up to 16K bytes allocated to flood images.

Each reel of magnetic tape can contain 20M bytes of data with a transfer rate of 60 K bytes/sec.

Physical requirements are as follows:

	Min.	Avg.	Max.
Floor Space:	30 ft. ²	30 ft. ²	50 ft. ²
Power Requirements:			2.5 KVA

Both GSA contracts and leasing arrangements are available.

Service centers are located in 60 centers in USA. Service is provided by Siemens outside of the USA.

Training is provided on site at the time of installation.

II. NUCLEAR MEDICINE APPLICATIONS

A. Data Collection

The Ohio Nuclear 160/75 system has been interfaced to the following scintillation cameras:

Ohio Nuclear 100/110/120
Picker
Ohio Nuclear 94 scanner

The system will handle one camera at a time with a maximum camera/interface distance of 30 feet. One scanner may be handled at one time with a scanner/interface distance of up to 100 feet. The scanner mode provides a single 128x120 image or a dual 60x120 image.

The camera interface uses a Wilkinson ramp type ADC with a conversion time of 4 nseconds for 7 bit resolution in X and Y. A one-stage buffer is used.

List mode is available and will handle up to 30,000 cts./second. Histogram mode is available at the following image sizes and rates:

32x30 39/sec.
64x60 13/sec.
128x120 3/sec.

Physiological gating for the EKG is available and physiological signals are digitized in the series 75 system and stored on FM tape.

The Ohio Nuclear 100/110 cameras are operational in whole body imaging mode.

B. Image Processing

Field uniformity correction is provided by a division with the flood image. No deadtime or patient motion correction is provided.

The following image manipulations are available:

+ (24 nsec.)
- (24 nsec.)
÷ (120 nsec.)
of an image by normalization constants or a flood image (times for 64x60)

Digital persistence for dynamics
 5 point smoothing
 Count/Unit area
 Isometric display

Curve analysis is provided with the HP 9830 option which provides BASIC language programmable functions. The curve analysis commands may be stored for later execution. Two image profiles of adjustable position and width are available. Sixteen irregular areas of interest may be defined but not permanently stored.

No clinical protocols are available.

C. Data Display

Images are displayed in standard video format of 30 frames/second. All images are available in color and flicker free. The isometric display is 12x120 while a 256x240 interpolated matrix is available for intensity modulated images. Contrast and latitude are adjustable with user controls. Photographs of the display provide the hard copy output.

Up to 24 alphanumeric characters may be displayed with the images.

Remote black and white video displays may be operated at distances up to 1000 feet.

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Contact: Michael Bono
 Medical Electronics Operation
 Raytheon Company
 P. O. Box 397
 Fourth Avenue
 Burlington, Massachusetts 01803
 (617) 272-7270

Manufacturer: Raytheon Company
Model: CINE 200

I. System Configuration

A. General Description

The Raytheon CINE 200 system is based on the INTERTECHNIQUE H-20/MICRODATA 1600 general purpose computer. It is a dedicated, stand-alone system providing the following capabilities:

Simultaneous data acquisition from two cameras
 Simultaneous data acquisition from two scanners
 Simultaneous data acquisition and analysis

The system is programmable using FORTRAN, the LBN interpretive language, and Assembly language. The software executive enables subprograms to be executed with a minimum of operator dialog and without the necessity of special programming knowledge.

Output to the physician is provided on black-and-white Polaroid film, and X-Y Plotter, a Printer-Plotter, and a CRT Hardcopy unit.

B. CPU/Peripherals

The CPU has a 900 ns cycle time with up to 48K 8-bit bytes of magnetic core storage.

The CINE 200 system includes the following peripherals:

CDC disk (4.8 or 9.6M bytes)
 Perdec Magnetic tape (9-track, 800 bpi, 25 ips)
 HP X-Y plotter
 Tektronix 4010 CRT
 Versatec electrostatic plotter
 Control keyboard
 2K byte control store memory
 ASR 33 teletypewriter
 Optical code reader
 special Display for image and characters

C. Storage Allocation

Main memory is allocated as follows:

Resident programs: 10.5K bytes
 Overlays: 6.0K bytes
 Image data buffers: 16K to 32K bytes
 Curve data analysis: 4K bytes
 FORTRAN: up to 21K
 LBN: up to 12K

The magnetic disk may contain up to 720K bytes of programs, each disk has the additional capacity for 300 64x64 static images (using 16 bits per element), 600 64x64 dynamic images (using 8 bits per element), and 72K bytes for patient information. Up to 1680K bytes are available for the user.

D. Physical Requirements, Service, Training

The physical requirements for the system are as follows:

	Min.	Avg. ²	Max. ²
Floor Space:	12 ft. ²	12 ft. ²	24 ft. ²
Power Requirements	10A, 120V	10A, 120V	15A, 120V

A GSA contract is in the process; lease is available.

Service centers are located in the major metropolitan areas depending on the equipment concentrations. Fifteen service personnel are in the field.

Training is available at no cost on a continuing basis on site.

II Nuclear Medicine Application

A. Data Collection

The CINE 200 system has been interfaced to the following scintillation cameras:

Searle	Ohio Nuclear
Pickar	Raytheon

Data acquisition from two cameras is standard, with a maximum distance from interface to camera of 300 feet. The camera interface uses Wilkinson/Intertechnique A/D converters with a 3.5 usec conversion time for 7-bit resolution. Pulse-Height information can be digitized using an optional module.

List mode is available and will handle up to 62,000 events per second. Histogram mode is available at the following image sizes and framing rates:

32x 32	20/sec.
64x 64	20/sec.
128x128	8/sec.

Whole-body imaging is available for the Searle scintillation camera. Physiological signals can be digitized, one per input pulse, and are stored in the list mode. Physiological gating can be accomplished by use of a Brattle Bioengineering gate.

The system has been interfaced to the Ohio-Nuclear, Picker, and Raytheon rectilinear scanners. The interface will acquire data from two scanners simultaneously at scanner-interface distances up to 150 feet, image matrix sizes accommodated are:

32 x 64 128 x 128
 64 x 128 32 x 128
 64 x 64

Dual whole body imaging is accommodated.

B. Image Processing

No dead-time correction or patient-motion correction is available. Camera uniformity corrections are applied by multiplying the counts in each channel by a correction coefficient.

The following image manipulations are available to the user:

Fixed point $+$, $-$, $\div$, $\times$ of an image by another image
 Fixed point $+$, $-$, $\div$, $\times$ of an image by a constant
 Total Counts, number of channels, and Density of Regions of Interest
 Smoothing
 Data bounding
 Decay correction
 Normalization

The following curve analysis and manipulation functions are available:

Fixed Point $+$, $-$, $\div$, $\times$ of one curve by a second curve or by a constant
 Smoothing
 Normalization of area or to number of channels
 Further analysis using LBN language

The image and curve analysis commands may be executed one at a time or may be programmed to run in a predetermined sequence, subroutines are callable through the control keyboard using FORTRAN or LBN,

As many as eight regions of interest, either regular or irregular, can be defined and stored on disk with the patient file.

The patient index information is stored on removable disk with the patient file and includes the following:

Name
 Type of study
 ID Number
 Number of Images
 Isotope
 Matrix size
 Time
 Seven Lines (32 characters) free comments

Images can be displayed on any standard monitor, e.g., HP 1311A or Tektronix 4010, or on the SONY color video display. Hardcopy of images can be obtained on the Versatec printer/plotter or on the Tektronix 4011 hardcopy unit. Screen dimensions for CRT display up to 12 in. x 10 in. are obtainable. The displays use the DMA channel in the normal system; program control is optional. Normal display is in XYZ mode, intensity modulated giving flicker-free, real-time viewing of 32x32, 64x64, or 128x128 image sizes.

Contrast and contouring of image displays may be controlled by a switch and potentiometer; latitude of display by potentiometer. Areas of interest are specified by switches and light pen. A switch control provides isometric displays, a negative image is available through software control.

Other hard-copy devices accommodated by the system are the Diablo and Versatec Lineprinters, the Siemens color plotter, the ASP-33 teletypewriter, and the Tektronix 632 unit. Sixteen lines of thirty-two characters each of alphanumeric data and curves of 256 points may be displayed on the CRT display. Remote displays may be located up to 150 feet from the cpu.

NUCLEAR MEDICINE LABORATORY PROFILE
 (to be included in the Directory of Computer Users)

Please circle appropriate answer(s) or fill in blanks:

I. Institution Description

A. Institution Name : _____
 B. Street Address : _____
 C. City : _____
 D. State and ZIP code: _____
 E. Country : _____
 F. Phone: (A.C. _____) - _____ ext. _____ PIS: _____
 G. Type of Facility: Research Clinical Teaching
 H. Number of beds : _____
 I. Number of Research Personnel: _____

II. Contacts

A. Clinical: _____
 B. Hardware: _____
 C. Software: _____

III. Available Hardware:

A. Central Computing Facility:
 Do you have access to a large central computer? Y N
 If so, what type/model? _____

How do you supply data to/from it?

Mag Tape Punched Cards

Modem(Terminal) Paper Tape

Other(describe): _____

B. Commercial Systems:

Do you own any commercially available nuclear medicine data acquisition/processing systems? Y N
 If so, what type(s)/model(s)? _____

C. User-Designed Systems:

Do you have any user-developed nuclear medicine data processing systems? Y N
 If so, on what computers are they based? _____

If possible, attach a block diagram of your system.

C. SYSTEM DESCRIPTIONS:

	System1	System2	System3
CPU model	_____	_____	_____
Core Size	_____ words	_____ words	_____ words
Word Size	_____ bits	_____ bits	_____ bits
Paper Tape			
reader	Y N _____ cps	Y N _____ cps	Y N _____ cps
punch	Y N _____ cps	Y N _____ cps	Y N _____ cps
Mag Tape	Y N	Y N	Y N
tracks	_____ tr	_____ tr	_____ tr
density	_____ bpi	_____ bpi	_____ bpi
speed	_____ ips	_____ ips	_____ ips
incremental?	Y N	Y N	Y N
Other tapes	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
Mag Disks			
fixed (type)	_____	_____	_____
capacity	_____ Meg-w	_____ Meg-w	_____ Meg-w
removable	_____	_____	_____
capacity	_____ Meg-w	_____ Meg-w	_____ Meg-w
Other peripherals	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
CAT display	_____	_____	_____
greyscales	_____	_____	_____
color?	Y N	Y N	Y N
Capable of Simultaneous Collection and Processing?	Y N	Y N	Y N

Languages Used: (FORTRAN, BASIC, Assembler, etc.)

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

D. SYSTEM DESCRIPTIONS (Continued...)

Interfaced to	___ camera(s)	___ camera (s)	___ camera (s)
	___ scanner (s)	___ scanner (s)	___ scanner (s)

Camera Collection

frame mode

32x32	___/second	___/second	___/second
64x64	___/second	___/second	___/second
128x128	___/second	___/second	___/second

max number of frames

___ frames	___ frames	___ frames
------------	------------	------------

max number of counts

___ cts/ele	___ cts/ele	___ cts/ele
at (___x___)	(___x___)	(___x___)

list mode

size (___x___)	(___x___)	(___x___)
max counts ___ counts	___ counts	___ counts
signals collected		
position Y N	Y N	Y N
time Y N	Y N	Y N
energy Y N	Y N	Y N
physiological Y N	Y N	Y N

Scanner Collection

max resolution

___ in. steps	___ in. steps	___ in. steps
image size (___x___)	(___x___)	(___x___)
max counts ___ counts	___ counts	___ counts

IV. Comments Regarding your System or Installation:
 (Anything you wish to add to the survey data)

V. Studies Performed on Computer (Collection and/or processing)

Studies	System Used (1,2,etc.)	Language(s) Used (FOR, etc.)	Output Form (List, Graph, etc.)	Objective of study	Frequency (#/week)
A. Brain					
1. Static					
2. Flow					
B. Renal					
C. Thyroid					
1. Image					
2. Uptake					
D. Lung					
1. Perfusion					
2. Ventilation					
3. V/Q					
E. Heart					
1. Flow					
2. Gated					
3. Effusion					
4. Output					
F. Liver					
1. Static					
2. Function					
G. Spleen					
H. Pancreas					
I. Bone					
J. Tumor Localization					
K. Others					