Loma Linda University
TheScholarsRepository@LLU: Digital Archive of Research, Scholarship & Creative Works

Loma Linda University Electronic Theses, Dissertations & Projects

6-1983

Orthodontic Information Systems : A Developmental Study

Gary D. Sheldon

Follow this and additional works at: https://scholarsrepository.llu.edu/etd

Part of the Databases and Information Systems Commons, Design of Experiments and Sample Surveys Commons, and the Orthodontics and Orthodontology Commons

Recommended Citation

Sheldon, Gary D., "Orthodontic Information Systems : A Developmental Study" (1983). *Loma Linda University Electronic Theses, Dissertations & Projects*. 2001.
https://scholarsrepository.llu.edu/etd/2001

This Dissertation is brought to you for free and open access by TheScholarsRepository@LLU: Digital Archive of Research, Scholarship & Creative Works. It has been accepted for inclusion in Loma Linda University Electronic Theses, Dissertations & Projects by an authorized administrator of TheScholarsRepository@LLU: Digital Archive of Research, Scholarship & Creative Works. For more information, please contact scholarsrepository@llu.edu.

Abstract

ORTHODONTIC INFORMATION SYSTEMS:

A DEVELOPMENTAL STUDY

by

Gary D. Sheldon

The intent of this study was to design and implement a computer-based orthodontic system providing an integrated information environment throughout the entire patient treatment process.

Total system integration was achieved by restructuring the entire information gathering process. A complete evaluation of patient diagnosis and treatment evaluation procedures established five major information catagories and a critical information list for proper patient management. Information organization was outlined to provide a logical progression in the information gathering process and patient chart forms were designed to implement this. Defining the computer system's performance identified three functions as follows: 1) entry and editing of individual patient data, 2) search and retrieval of single patient information, and 3) search and retrieval of all patients fitting a user specified set of criteria. Computer program design and coding utilized all the previously defined specifications to

provide the necessary system integration.

The result of this project is an integrated orthodontic informtion system encompassing many areas of graduate orthodontic training. These include teaching diagnostic techniques with comprehensive clinical evaluation forms, treatment analysis by comparative study of similar cases, availability of patient data for prospective and retrospective research projects, and exposure to computer applications as they relate to an orthodontic practice.

UNIVERSITY LIBRARY
LOMA LINDA, CALIFORNIA

LOMA LINDA UNIVERSITY

Graduate School

ORTHODONTIC INFORMATION SYSTEMS:

A DEVELOPMENTAL STUDY

by

Gary D. Sheldon

A Manuscript Submitted in Partial Fulfillment

of the Requirements for the Degree Master of Science

in Orthodontics

June 1983

Each person whose signature appears below certifies that this manuscript in his opinion is adequate, in scope and quality, in lieu of a thesis for the degree Master of Science.

James R. Wise, Associate Professor of Orthodontics, Chairman

Joseph M. Caruso, Assistant Professor of Orthodontics

Alden B. Chase, Professor of Orthodontics

John K. Pearson, Associate Professor of Orthodontics

Guy D. Taylor, Assistant Professor of Orthodontics

ACKNOWLEDGMENTS

The author wishes to express his appreciation to the following individuals who assisted in the development of this project:

Drs. James Wise, John Pearson, Joseph Caruso, Guy Taylor, and Alden Chase, for serving as committee members and assisting in the organization and implementation of this project.

Dr. Jan Egelberg for his willingness to support and fund the development costs.

Dr. Roland Walters for his support and motivating influence.

The orthodontic alumni who gave their monetary support and encouragement for this and future projects.

A special acknowledgment is extended to Drs. John Pearson and James Wise for sharing their expertise and time to help design and evaluate this project, and to Mr. Craig Forss for his programming advice and suggestions.

And a very special thank you goes to my wife, Jodi, for her constant encouragement and understanding when a computer took precedence over her needs on so many occasions.

INTRODUCTION

Valuable diagnostic information exists within every orthodontic practice, however, many doctors have failed to embrace the concepts of information management and utilization despite the large quantities of data and complex evaluations necessary to diagnose and treat patients. The business world long ago realized the importance of consistently recording relevant information and establishing a traceable path for future reference. Industry also recognized past data's value for trend analysis, and for comparative studies between past and present information. Computerization has magnified these capabilities by significantly increasing both analytical processing and information availability.

Computer utilization for management of diagnostic information exists within orthodontics but the applications are often restricted and confined to the educational environment.[8] Because quantification of cephalometric radiographs is such an integral part of treatment planning this has been a primary focal point. Numerous computer programs have been specifically designed to digitize head films and store the data for later recall.[2,10,13] Further enhancements permit application of various cephalometric analysis with subsequent output to a digital plotter.[1,3,6] Ricketts,[14-16] Burstone,[4,5] and Faber[7] have each described

computer systems employing digital head film data to produce diagnostic information and treatment planning guidelines. Additional areas under investigation include growth forecasting,[9,12,16] establishing "normal" population parameters,[15] occlusion and model analysis,[5,12] and comparison of actual treatment results against predicted treatment objectives or untreated samples.[15,16] Although most of this information is based on cephalometric studies there are many additional factors which are difficult or impossible to determine from radiographs. Soft tissue evaluation, observation of functional and habit-related distortions to facial form, and response to treatment mechanics during and after therapy are having a significant impact on how orthodontists evaluate their ability to effectively treat malocclusions and alter facial appearance. Therefore, it becomes crucial to maintain and have available all pertinent information to successfully diagnose and plan treatment for long term stability.

Until recently the ability to perform such complex analysis was deemed beyond the capability of all but the largest mini or mainframe computers making these resources unavailable to the average orthodontic clinician. However, microcomputer technology now offers a practical, low-cost solution to the complex demands of patient information analysis and treatment evaluation. Advances in information

storage technology also provide a convenient method for large volumes of data to remain constantly accessable. The current and future generations of computer hardware will contribute toward orthodontists tailoring their diagnosis, treatment planning and therapy evaluation to personal criteria and permit evaluation of treatment techniques based on complete patient information accumulated from their own practice.

However, despite the availablity of computer hardware capable of meeting these requirements there remains a void in applications software to meet many of these needs. A design by Dr. Charles Burstone[4,5,8] is the only reference in current orthodontic literature to such a comprehensive information system. Therefore, the purpose of this project was to design a computerized orthodontic information system for comprehensive clinical data storage specifically designed to augment individual patient evaluation and treatment planning, as well as selective 'patient type' analysis for research purposes.

MATERIAL

Hardware

Factors which were considered important in the choice of useful computer hardware included: 1) ease of use, 2) sufficient storage capacity for 10,000 patients, 3) ability to duplicate (backup) all stored information for information security, 4) availabilty of hardware service, and 5) reasonable cost. The Apple ///* computer fit these criteria and was chosen for the project.

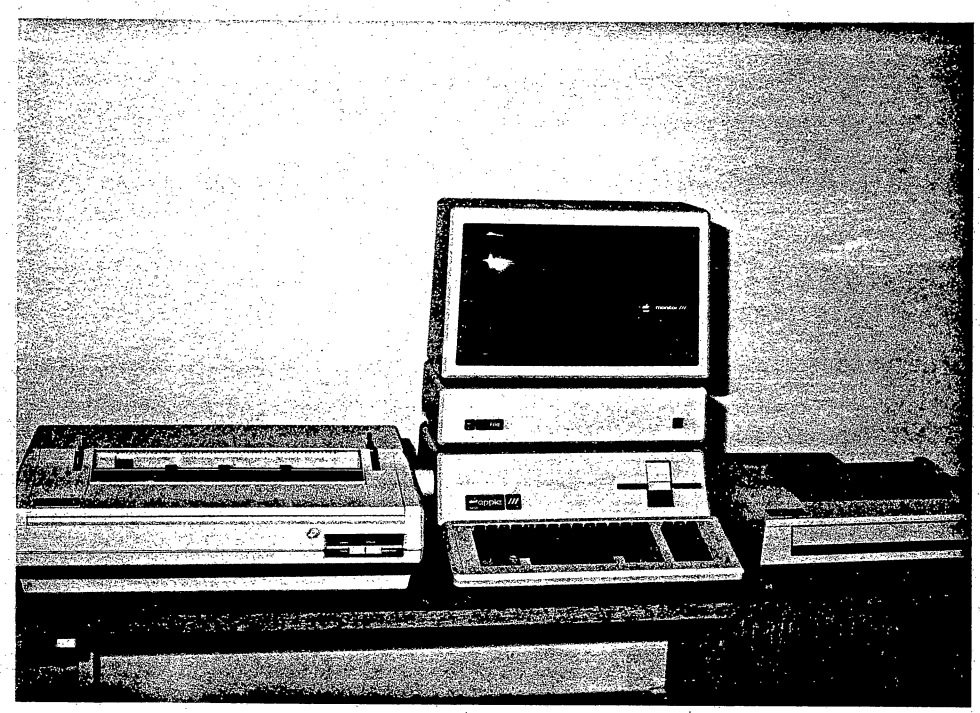
Information storage needs were met with a five megabyte hard disk drive capable of transferring all stored data to the computers built-in floppy disk drive. A dot-matrix printer and a letter-quality printer for hard-copy output completed the system (Figure 1).

Software

All software development was done using Apple /// Pascal version 1.1 based on UCSD Pascal+ version II.1. This language system was selected because of its structured style allowing easy program updating, fast execution of a compiled language, and the powerful extensions added by Apple Computer, Inc..

*Apple /// is a registered trademark of Apple Computer, Inc.

+UCSD Pascal is a registered trademark of The Regents of The University of California.



METHOD

Project development involved four phases prior to actual implementation. Phases one through three were performed by a committee of five practicing orthodontists in conjunction with the author. Phase four was produced by the author alone.

The first phase encompassed a systematic analysis of the diagnostic methods and treatment routines employed throughout a patient's course of treatment from initial examination through post-retention follow-up. By analyzing the patient charts of several practicing orthodontists and the chart used by the Graduate Orthodontic Department of Loma Linda University a comprehensive list of diagnostic and treatment evaluation criteria considered critical to the proper management of each patient was compiled. This list was divided into five major treatment information catagories associated with one or more defined time periods within the patient's total treatment experience. These included initial examination, initial records evaluation, cephalometric data (T_1 to T_5), treatment information, and retention information. Subheadings were added, where applicable, to allow grouping of similar information. The 'Summary Description'[11] outline defined by the Loma Linda University Graduate Orthodontic Department served as the template for information organization. A final evaluation

of the assembled information was then made to insure a complete and accurate history would be created as each patient progressed through their treatment plan.

The second phase involved designing new chart forms to facilitate information collection at the appropriate treatment intervals. Five new forms including Initial Examination, Initial Records Evaluation, Cephalometric Data, Treatment Planning Worksheet, and Treatment/Retention Information were developed. Form layouts were designed to follow a logical progression of information gathering and a box-check format was used, where possible, to establish standardized responses. Care was taken to maintain consistency between each form so that similar information appeared under the same heading and in the same format. This approach to layout and design insured ease of use, consistent data collection from patient to patient, and produced a systematic and comprehensive patient evaluation. All five forms were designed on and generated by the computer using a variable type-style dot-matrix printer to simplify updating as modifications are incorporated into the system. The blank forms are now included in each new patient's chart for completion at the designated stages of treatment.

Deciding what patient information to include in the computer files comprised the third phase. An evaluation was

made to determine what information recorded in the chart would be most beneficial not only for immediate diagnostic and treatment planning use, but also for future research purposes. This resulted in a condensation of the total diagnostic criteria for each patient down to 653 information items under 155 headings. Each patient record on the computer includes initial clinical examination, initial records evaluation (photographs, models, and radiographs), treatment evaluation, and retention data. Also, cephalometric radiograph data, based on the Rickett's analysis, for initial (T_1), post-treatment (T_2), post-retention (T_3), one year post-retention (T_4), and five year post-retention (T_5) records are incorporated as they become available throughout the patient's treatment history.

The fourth phase consisted of the computer program design and was accomplished in three stages. The first stage defined what the system performance should be. Three major functions were determined as follows: 1) entry and editing of individual patient data into the system, 2) search and retrieval of single patient information, 3) search and retrieval of all patients fitting a user defined set of criteria. Stage two focused on developing file structures for information storage and indexing algorithms to allow rapid retrieval of all patient information. Also designed were information screens to appear on the computers

CRT (cathode ray tube) for data input and display. These duplicate as closely as possible the new chart forms with screens grouped according to the five major information catagories. The third stage was the system programmming utilizing the specifications as defined in the first two stages. The program is controlled and user selections are made through a menu-driven interface to minimize input errors and simplify training.

RESULTS

An information system was designed and implemented on a microcomputer to assist orthodontic graduate students in patient diagnosis and treatment planning, and for analytical research involving accumulated patient data. Three distinct products emerged from the development of this system to form an integrated orthodontic information system. The first product was a comprehensive list of critical diagnostic and treatment evaluation criteria broken down into five major information catagories. Patient chart forms for the collection of this information were the second product (Figure 2 to Figure 7). The computer program to store and retrieve the defined patient data was the third product (Figure 8 to Figure 13).

Loma Linda University
Graduate Orthodontic Clinic

Date: _____

PATIENT INFORMATION:

Name: _____ **ID#:** |_|_|_|_|_|_|_|
(Last) (First) (Initial)

BD: [ ][ ][19] **Sex:** []M []F **Race:** []Caucasian []Black []Asian
(day) (month) (year) []Hispanic []_____

Consultation Reason: [] Esthetics [] Function [] TMJ [] Perio []_____
_____

Medical History: _____
_____

Dental History:
[] Craniofacial anomalies: Type: _____
[] Intra-oral pathology: _____
[] Extra-oral pathology: _____
[] _____

CLINICAL DESCRIPTION: (Extra-oral)

Facial Type:
[] Mesofacial
[] Brachyfacial
[] Dolichofacial

Esthetics:
[] Facial asymmetry: _____
[] E plane: [] Lips protruded [] Lips retracted
[] Sublabial contracture
[] Mentalis strain: [] Slight [] Moderate [] Severe
[] Upper lip: [] Smile:
Thickness: [] Thick [] Thin Fullness: [] Full [] Narrow
Length: [] Short [] Long Line: [] High [] Low

Functional Equilibrium:
[] Mouth breather
[] Allergies / Rhinitis
[] Habits: [] Digit [] Bruxism [] Lip
[] Muscle imbalance: Weaker side: [] R [] L
[] Perioral tension: [] Tight [] Loose
[] Accessability limited

TMJ Evaluation:
[] Symptoms: [] Pain [] Crepitus [] Pop
[] Limited opening [] Dev on open([]L []R)
[] Complete evaluation required
[] Potential: _____
_____
_____

CLINICAL DESCRIPTION: (Intra-oral)

Functional Equilibrium:
[] Adnoids present: (from medical history)
[] Tonsils present: (from medical history)
[] CO/CR Deviation:
[____mm] [] L [] R // [] Ant [] Post
[] Frenums w/ diastema: _____
[] Freeway space: [] Excessive [] Reduced
[] Tongue Malpositioned:
[] High [] Low // [] Frwd [] Lat

[] Swallow pattern abnormal
[] Saliva: [] Thick [] Thin
[] Gagging problem
Gingival status:
Hygiene: [] Good [] Fair [] Poor
Hyperplasia: [] Local [] General
Stripping: Present: _____
Potential: _____

Malocclusion:

Molar Relation:

Left: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

Right: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

Cuspid Relation:

Left: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

Right: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

Source of Problem:

Maxillary:

Maxilla: [] Prog [] Retro

MX Dent: [] Prot [] Retro

Mandibular:

Mandible: [] Prog [] Retro

MD Dent: [] Prot [] Retrs

Malocclusion Characteristics:

[] MX anterior relation: [] Div 1 [] Div 2

[] Arch asymmetry: (left/right discrepancy)

[] MX shift: [] Skel [] Dent

[] MD shift: [] Skel [] Dent

[] Deep bite: [___mm]

[] Open bite: [] Anterior [] Posterior

[] Bilat [] Unilat ([] L [] R)

[] Mutilated occlusion

[] Midline shift:

[] MX:

[] Skel: [] L [] R [___mm]

[] Dent: [] L [] R [___mm]

[] MD:

[] Skel: [] L [] R [___mm]

[] Dent: [] L [] R [___mm]

Dental Description:

OB: [____%] OJ: [____MM] ALD: [____mm] TSD: ([] Yes [] No)

[] Cross-bites: _____

[] Retained deciduous teeth: _____

[] Missing teeth: _____

[] Decay: _____

[] Stain: _____

[] Occlusal wear (excessive)

[] Curve of Spee: [] Flat [] Moderate [] Deep [] Reversed

[] Restorations needed at end of Tx: _____

Summary Description:

Preliminary Treatment Plan:

Special Considerations:

Loma Linda University
Graduate Orthodontic Clinic
Initial Records Evaluation

Date:_____

Patient Name:_____ **ID#:**|_|_|_|_|_|_|_|
(Last) (First) (Initial)

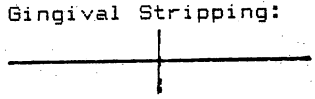
PHOTOGRAPHS:

Extra-oral:

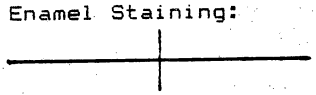
[] Facial Asymmetry:
[] MX Hypertrophy: [] L [] R
[] MD Hypertrophy: [] L [] R
[] Other:_____
[] Occlusal Plane canted DOWN: [] L [] R
[] MX Midline: [] L [] R [___mm]
[] Mentalis Strain: [] Slight [] Moderate [] Severe
[] Upper lip: [] Protrusive [] Retrusive [] Short
[] Lower lip: [] Protrusive [] Retrusive [] Everted
[] Smile line: [] High [] Low
[] Frenums w/ diastema:_____

Intra-oral:

[] Gingival Stripping:



[] Enamel Staining:



[] Dental Midline shift:
[] MX: [] L [] R
[] MD: [] L [] R

STUDY CASTS:

Molar Relation:
Left: [] Cl I [] Cl II [] Cl III // [] End-on [] Full
Right: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

Cuspid Relation:
Left: [] Cl I [] Cl II [] Cl III // [] End-on [] Full
Right: [] Cl I [] Cl II [] Cl III // [] End-on [] Full

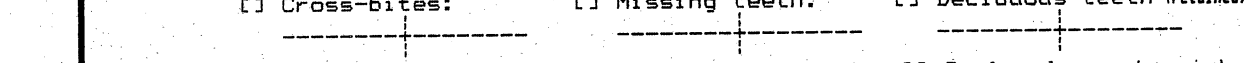
Malocclusion Characteristics:
[] MX anterior relation: [] Div 1 [] Div 2
[] Deep bite: [___mm]
[] Open bite: [] Anterior [] Posterior
[] Bilat [] Unilat ([] L [] R)

[] Midline shift:
[] MX: [] L [] R [___mm]
[] MD: [] L [] R [___mm]

Dental Description:
OB: [____%] OJ: [____mm] ALD: [____mm]

Bolton Analysis: MX 6 = _____mm MD 6 = _____mm Excess: [] MX [] MD Amount: [_____mm]
MX 12 = _____mm MD 12 = _____mm Excess: [] MX [] MD Amount: [_____mm]

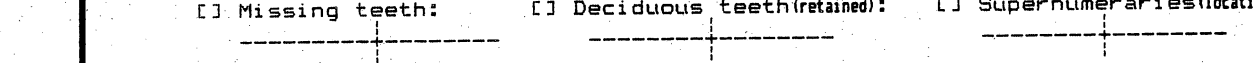
[] Cross-bites:
[] Missing teeth:
[] Deciduous teeth (retained):



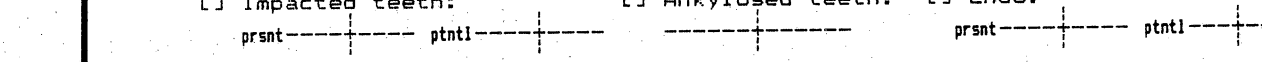
[] Curve of Spee: [] Flat [] Moderate [] Deep [] Reversed
[] Occlusal wear (excessive)

RADIOGRAPHS:

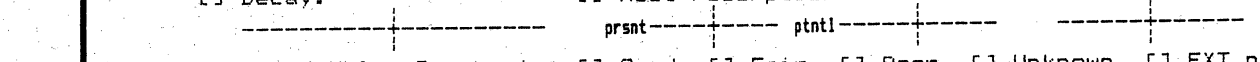
[] Pathology:_____
[] Missing teeth:
[] Deciduous teeth (retained):
[] Supernumeraries (location):



[] Impacted teeth:
[] Ankylosed teeth:
[] Endo:



[] Decay:
[] Root resorption:
[] Bone loss:



[] Third Molar Prognosis: [] Good [] Fair [] Poor [] Unknown [] EXT now
[] Restorations needed at end of Tx:_____

TMJ Evaluation:

[] R	[] L	Concentric	[] R	[] L	Fossae irregularities
[] R	[] L	Distal displacement	[] R	[] L	Flattened condyle
[] R	[] L	Anterior displacement	[] R	[] L	Bony lipping condyle
[] R	[] L	Superior displacement	[] R	[] L	Osteoporosis
[] R	[] L	Inferior displacement	[] R	[] L	Increased joint space

Loma Linda University
Graduate Orthodontic Clinic
Treatment Planning Worksheet

Date:_____

Patient Name:_____ ID#:|_|_|_|_|_|_|_|
(Last) (First) (Initial)

SUMMARY DESCRIPTION:

Facial Type:

Esthetics:

Malocclusion:

Functional Equilibrium:

Lateral Ceph:

Dental Description:

Frontal Ceph:

Medical History(significant):

Key Factors:

PRELIMINARY TREATMENT PLAN:

1. Mandibular rotation:
2. Convexity reduction:
3. Mandibular arch set-up — Change
   a. ALD
   b. Relocation of 1 x 2
   c. Relocation of 6
   d. E-space
   e. Extraction
   f. Expansion
   g. Interproximal reduction _____
   Net =
4. Maxillary molar position:
5. Maxillary incisor position:

Loma Linda University
Graduate Orthodontic Clinic
Cephalometric Evaluation

Date: _____

Patient Name: _____ ID#: |_|_|_|_|_|_|
(Last) (First) (Initial)

RICKETTS' ANALYSIS:

LATERAL CEPH:

NORMAL MEASUREMENTS	T-1	Prog1	Prog2	T-2	T-3
Anterior Cranial Base					
Maxillary Depth					
Facial Depth					
Convexity					
MX 1 to APO					
MD 1 to APO					
MD 1 Angulation					
Interincisal Angle					
Lower Lip to E-Plane					

	T-1	Prog1	Prog2	T-2	T-3
Mandibular Pln Angle					
Maxillary 6 to PTV					
Lower Face Height					
Mandibular Arc					
Facial Axis					
Cranial Deflection					
CLASS III INDICATORS:					
Porion Location					
Ramus Position					

SPECIAL MEASUREMENTS					
Molar Relation					
Cannine Relation					
Incisor Overjet					
Incisor Overbite					
MD 1 Extrusion					
MX 1 Anguiation					
Occlusal Pln to Ramus					
Occlusal Pln Inclin.					

Upper Lip Length					
Lip Embras/Occlsl Pln					
Facial Taper					
Maxillary Height					
Palatal Plane					
Posterior Face Height					
Corpus Length					

FRONTAL CEPH:

NORMAL MEASUREMENTS	T-1	Prog1	Prog2	T-2	T-3
Facial Width					
Nasal Width					
Maxillary Width					
MX/MD Relation (right)					
MX/MD Relation (left)					
Molar to Jaw (right)					

	T-1	Prog1	Prog2	T-2	T-3
Molar to Jaw (left)					
Molar Relation (right)					
Molar Relation (left)					
Intermolar Width					
Intercuspid Width					
Mandibular Width					

SPECIAL MEASUREMENTS					
Denture Midline					
MX/MD Midline					
Denture/Jaw Midline					

Occlusal Plane Tilt					
Postural Symmetry					
Nasal Height					

STEINER ANALYSIS:

	T-1	Prog1	Prog2	T-2	T-3
SNA					
SNB					
ANB					
MX 1 to NA (distance)					
MX 1 - NA Angle					
MD 1 to NB (distance)					

	T-1	Prog1	Prog2	T-2	T-3
MD 1 - NB Angle					
PO to NB					
PO & MD 1 to NB (diff)					
SN - GoGn					
Interincisal Angle					

TWEED ANALYSIS:

	T-1	Prog1	Prog2	T-2	T-3
FMA					
FMIA					
IMPA					

	T-1	Prog1	Prog2	T-2	T-3
MX 1 - FH Angle					
MD 1 - SN					
MD 1 - GoGn					

Loma Linda University
Graduate Orthodontic Clinic
Treatment/Retention Information Date:_____

Patient Name:_____ ID#:|_|_|_|_|_|_|
(Last) (First) (Initial)

TREATMENT INFORMATION:

Treatment Begin: [ ] [ ] [19]
(day) (month) (year)

Treatment End: [ ] [ ] [19]
(day) (month) (year)

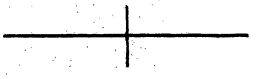
[] Two-Phase Treatment
[] First Phase Data [] Second Phase Data

[] Retreatment Required
[] First Treatment Data [] Second Treatment Data

[] Surgical Treatment
[] Maxilla only [] Mandible only
[] Maxilla & Mandible

[] Serial Extraction

[] Extractions:



TREATMENT MECHANICS

Appliances:

[] Haas RPE
[] Hyrax RPE
[] Quad-Helix
[] Bi-Helix
[] Nance Lingual Arch
[] Transpalatal Bar
[] Class II Jig
[] Functional Appliance

Headgear:

Force:
[] Othodontic
[] Orthopedic

Direction:
[] Cervical
[] High
[] Combi
[] Reverse

Elastics:

[] Class II
[] Class III
[] Up-Down (Box / Delta)
[] Midline
[] Cross
[] Squeeze
[] Saif-springs

RETENTION INFORMATION

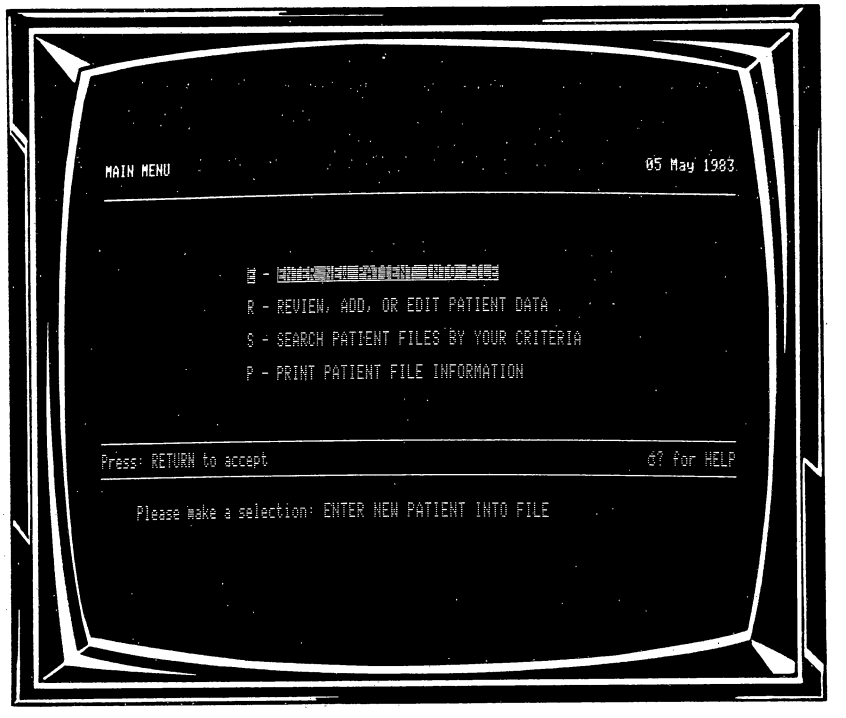
Retention Begin: [ ] [ ] [19]
(day) (month) (year)

Retention End: [ ] [ ] [19]
(day) (month) (year)

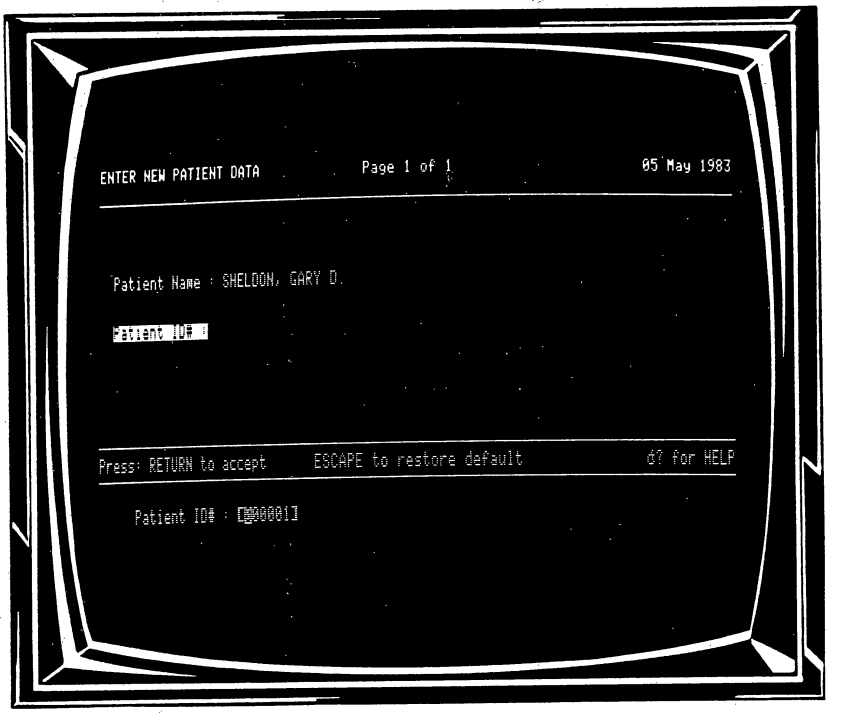
[] Positioner used

Maxillary Retainer
[] Hawley
[] Wrap-around
[] Fixed

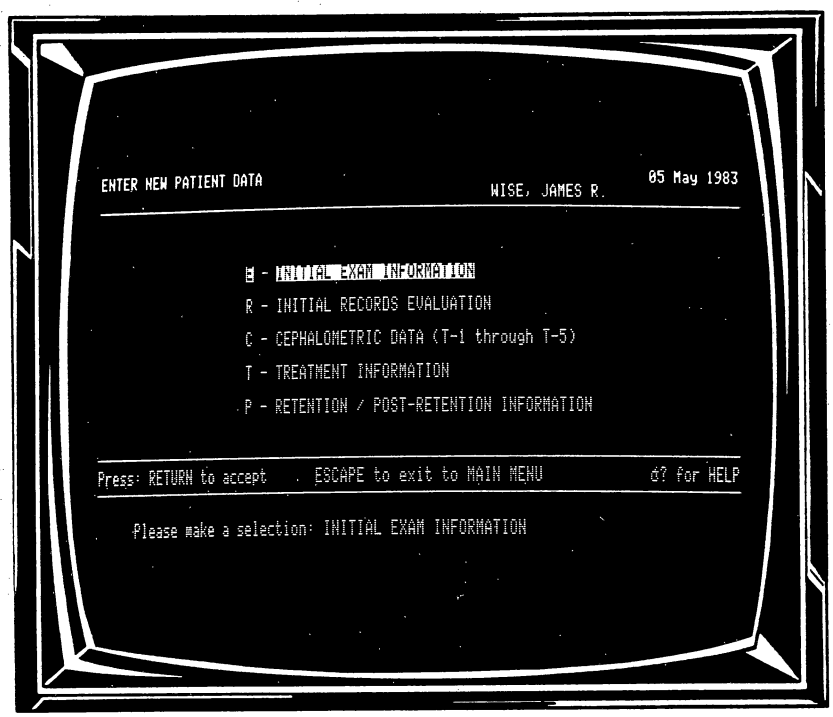
Mandibular Retainer
[] Hawley
[] Wrap-around
[] Fixed


MAIN MENU
05 May 1983
R - REVIEW, ADD, OR EDIT PATIENT DATA
S - SEARCH PATIENT FILES BY YOUR CRITERIA
P - PRINT PATIENT FILE INFORMATION
Press: RETURN to accept
0? for HELP
Please make a selection: ENTER NEW PATIENT INTO FILE

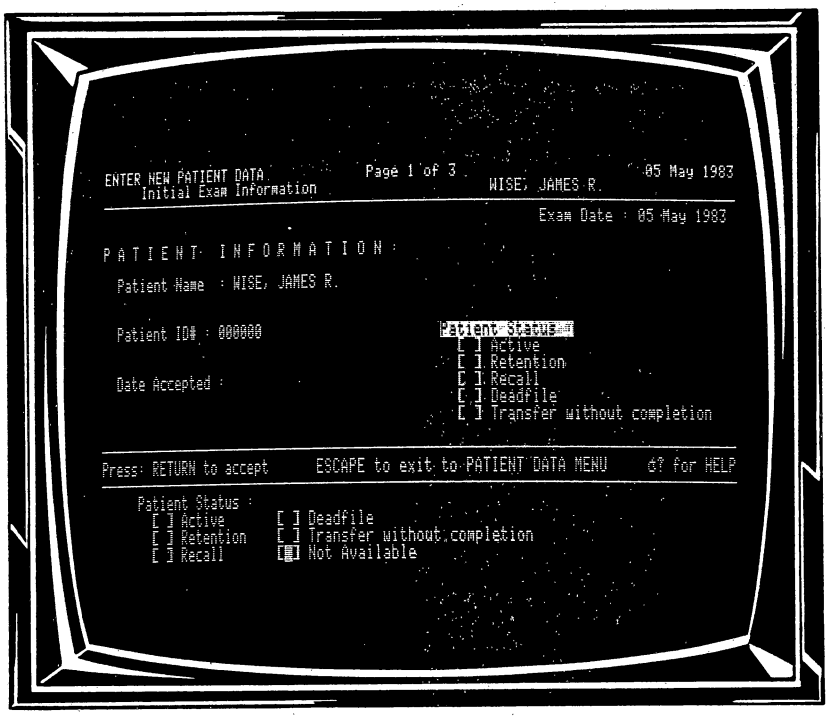
(a)


ENTER NEW PATIENT DATA
Page 1 of 1
05 May 1983
Patient Name : SHELDON, GARY D.
Patient ID# :
Press: RETURN to accept
ESCAPE to restore default
0? for HELP
Patient ID# : [00001]

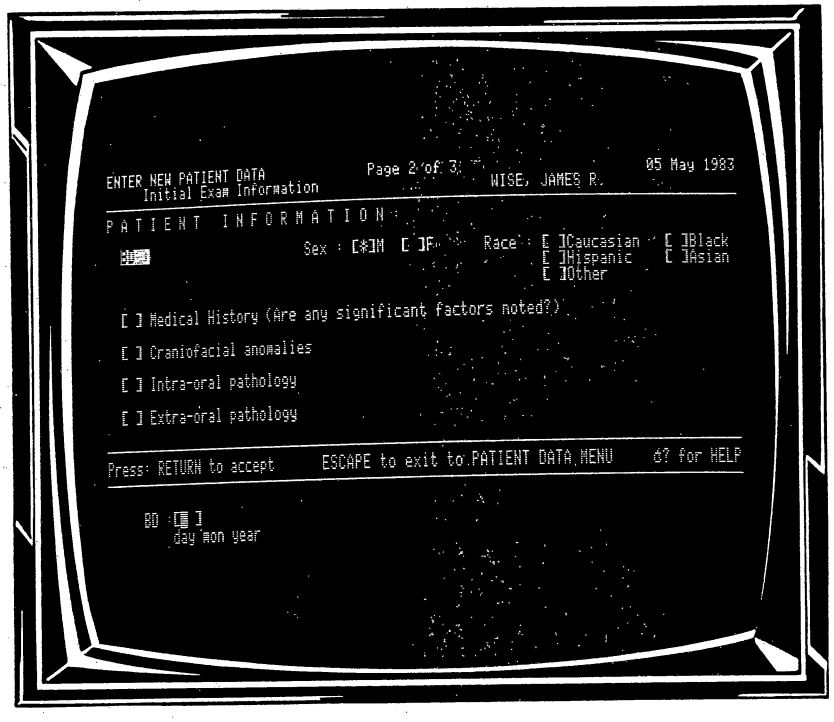
(b)


ENTER NEW PATIENT DATA
WISE, JAMES R.
05 May 1983
E - INITIAL EXAM INFORMATION
R - INITIAL RECORDS EVALUATION
C - CEPHALOMETRIC DATA (T-1 through T-5)
T - TREATMENT INFORMATION
P - RETENTION / POST-RETENTION INFORMATION
Press: RETURN to accept . ESCAPE to exit to MAIN MENU
d? for HELP
Please make a selection: INITIAL EXAM INFORMATION

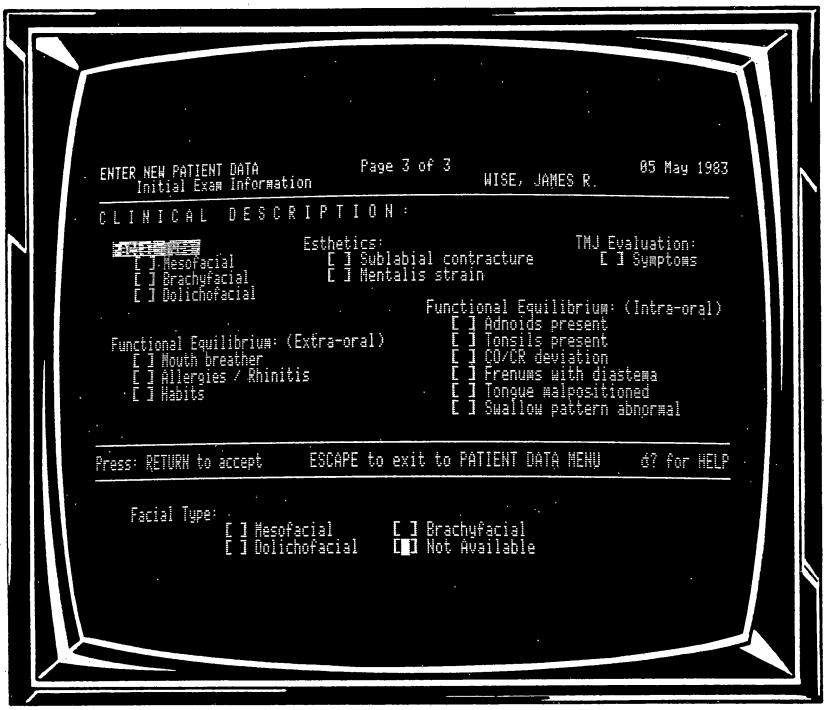
(a)


ENTER NEW PATIENT DATA
Initial Exam Information
Page 1 of 3
WISE, JAMES R.
05 May 1983
Exam Date : 05 May 1983
PATIENT INFORMATION:
Patient Name : WISE, JAMES R.
Patient ID# : 000000
Date Accepted :
Patient Status:
[ ] Active
[ ] Retention
[ ] Recall
[ ] Deadfile
[ ] Transfer without completion
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
d? for HELP
Patient Status :
[ ] Active
[ ] Retention
[ ] Recall
[ ] Deadfile
[ ] Transfer without completion
[ ] Not Available

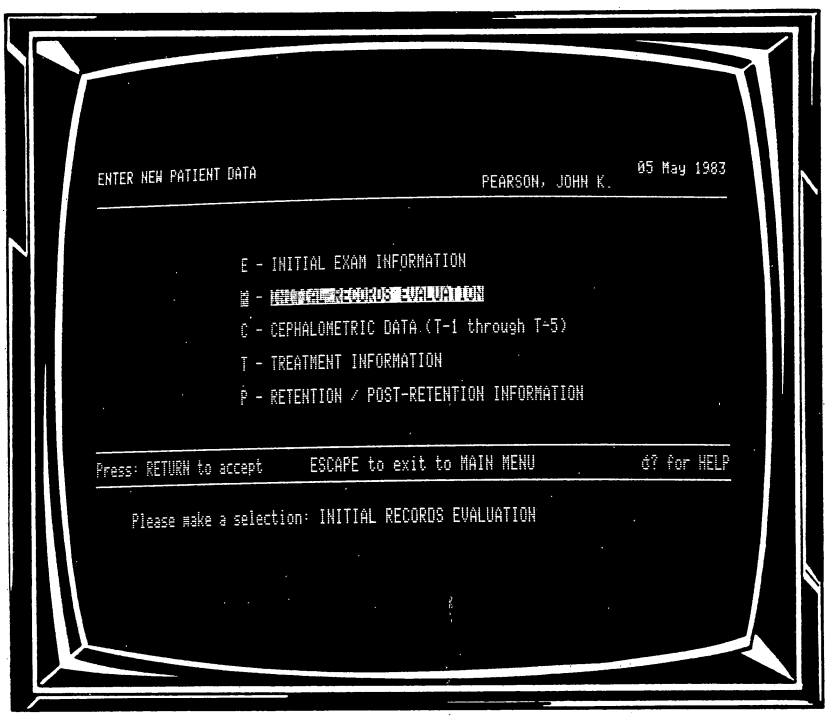
(b)


ENTER NEW PATIENT DATA
Initial Exam Information
Page 2 of 3
WISE, JAMES R.
05 May 1983
PATIENT INFORMATION:
Sex : [*]M [ ]F
Race : [ ]Caucasian [ ]Black
[ ]Hispanic [ ]Asian
[ ]Other
[ ] Medical History (Are any significant factors noted?)
[ ] Craniofacial anomalies
[ ] Intra-oral pathology
[ ] Extra-oral pathology
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
d? for HELP
BD : [ ]
day mon year

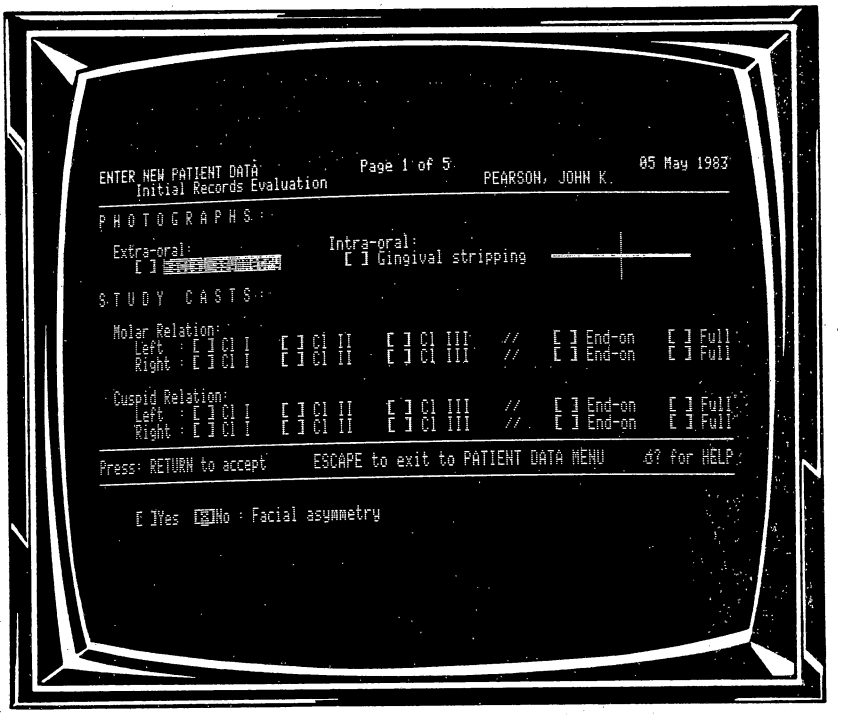
(c)


ENTER NEW PATIENT DATA
Initial Exam Information
Page 3 of 3
WISE, JAMES R.
05 May 1983
CLINICAL DESCRIPTION:
Facial Type:
[ ] Mesofacial
[ ] Brachyfacial
[ ] Dolichofacial
Esthetics:
[ ] Sublabial contracture
[ ] Mentalis strain
TMJ Evaluation:
[ ] Symptoms
Functional Equilibrium: (Extra-oral)
[ ] Mouth breather
[ ] Allergies / Rhinitis
[ ] Habits
Functional Equilibrium: (Intra-oral)
[ ] Adnoids present
[ ] Tonsils present
[ ] CO/CR deviation
[ ] Frenums with diastema
[ ] Tongue malpositioned
[ ] Swallow pattern abnormal
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
d? for HELP
Facial Type:
[ ] Mesofacial
[ ] Brachyfacial
[ ] Dolichofacial
[ ] Not Available

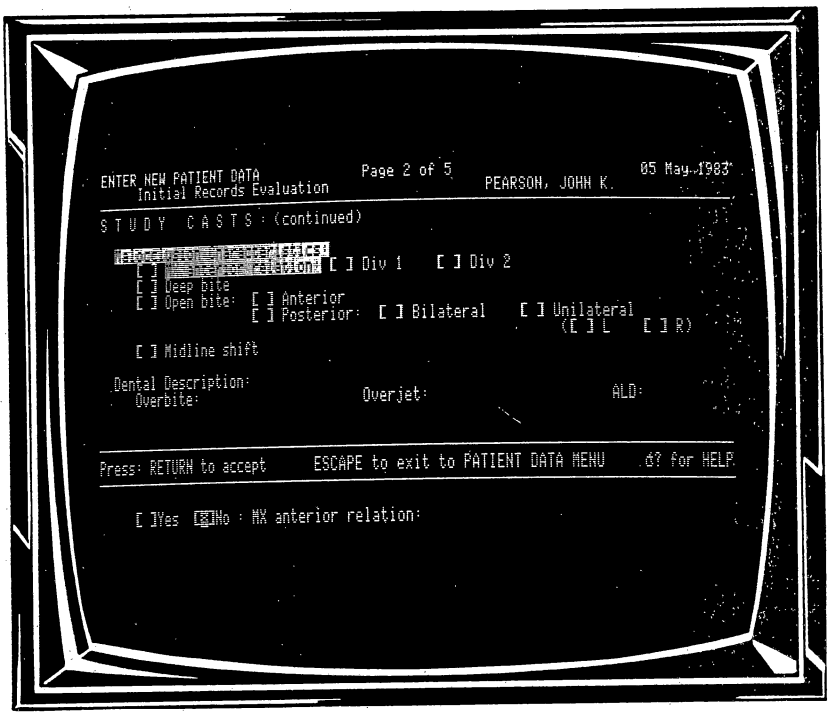
(d)


ENTER NEW PATIENT DATA
PEARSON, JOHN K.
05 May 1983
E - INITIAL EXAM INFORMATION
I - INITIAL RECORDS EVALUATION
C - CEPHALOMETRIC DATA (T-1 through T-5)
T - TREATMENT INFORMATION
P - RETENTION / POST-RETENTION INFORMATION
Press: RETURN to accept
ESCAPE to exit to MAIN MENU
d? for HELP
Please make a selection: INITIAL RECORDS EVALUATION

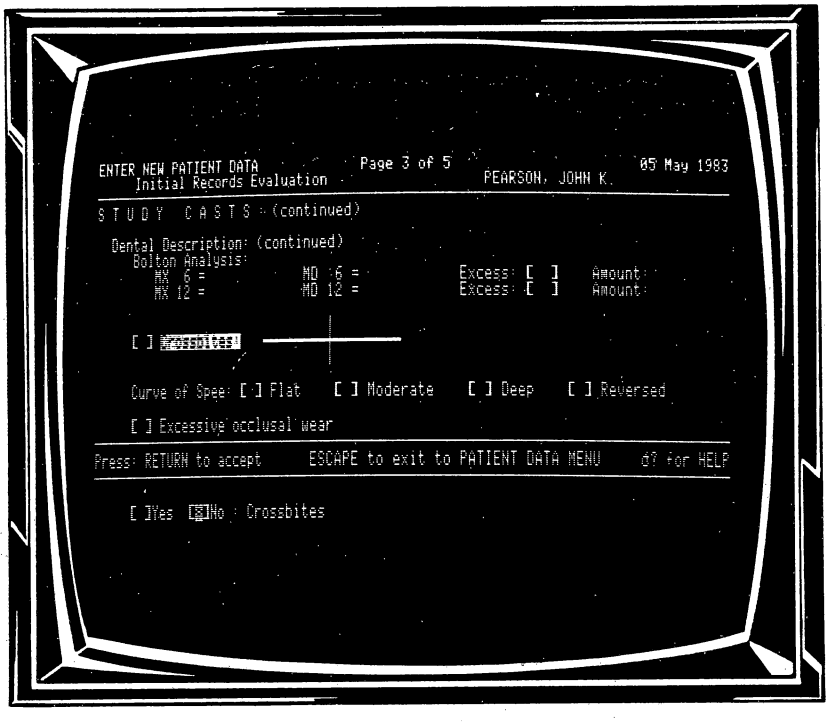
(a)


ENTER NEW PATIENT DATA
Initial Records Evaluation
Page 1 of 5
PEARSON, JOHN K.
05 May 1983
PHOTOGRAPHS:
Extra-oral:
Intra-oral:
[ ] Gingival stripping
STUDY CASTS:
Molar Relation:
Left : [ ] Cl I [ ] Cl II [ ] Cl III // [ ] End-on [ ] Full
Right : [ ] Cl I [ ] Cl II [ ] Cl III // [ ] End-on [ ] Full
Cuspid Relation:
Left : [ ] Cl I [ ] Cl II [ ] Cl III // [ ] End-on [ ] Full
Right : [ ] Cl I [ ] Cl II [ ] Cl III // [ ] End-on [ ] Full
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
^? for HELP
[ ]Yes [X]No : Facial asymmetry

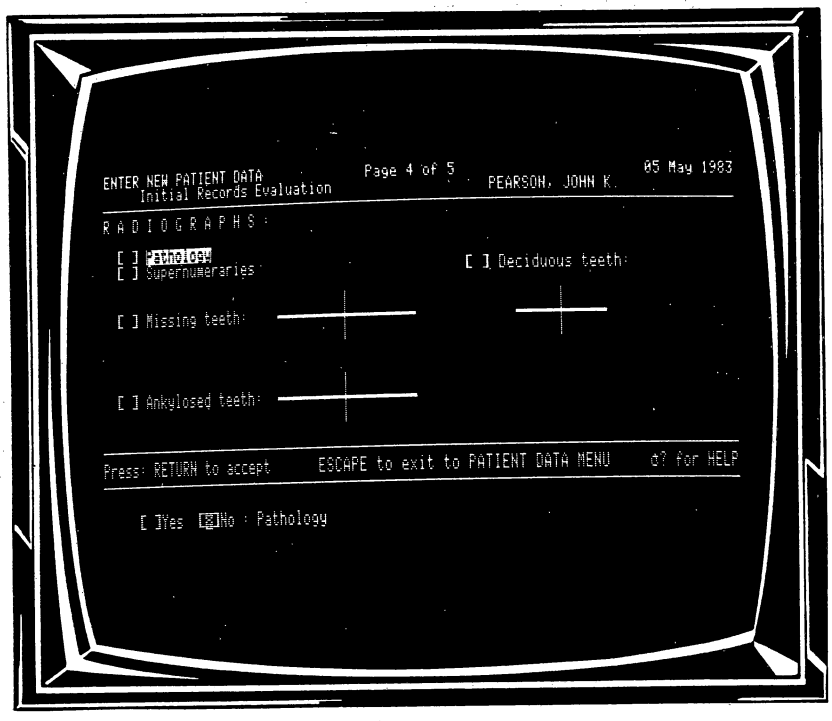
(b)


ENTER NEW PATIENT DATA
Initial Records Evaluation
Page 2 of 5
PEARSON, JOHN K.
05 May 1983
STUDY CASTS: (continued)
[ ] Div 1
[ ] Div 2
[ ] Deep bite
[ ] Open bite:
[ ] Anterior
[ ] Posterior:
[ ] Bilateral
[ ] Unilateral
([ ] L [ ] R)
[ ] Midline shift
Dental Description:
Overbite:
Overjet:
ALD:
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
^? for HELP
[ ]Yes [X]No : MX anterior relation:

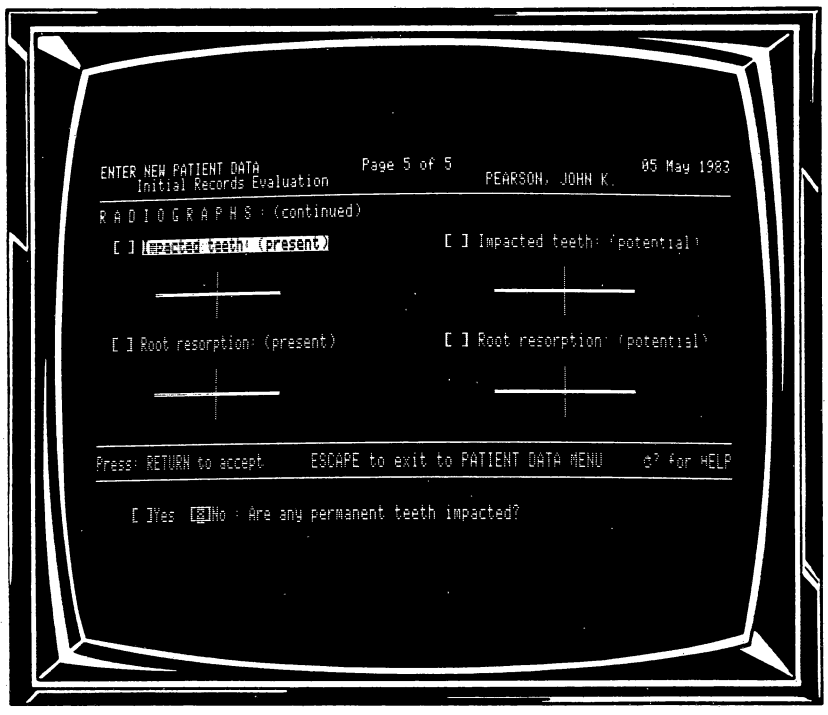
(c)


ENTER NEW PATIENT DATA
Initial Records Evaluation
Page 3 of 5
PEARSON, JOHN K.
05 May 1983
STUDY CASTS (continued)
Dental Description: (continued)
Bolton Analysis:
MX 6 =
MD 6 =
Excess: [ ] Amount:
MX 12 =
MD 12 =
Excess: [ ] Amount:
[ ] Crossbites
Curve of Spee: [ ] Flat [ ] Moderate [ ] Deep [ ] Reversed
[ ] Excessive occlusal wear
Press: RETURN to accept ESCAPE to exit to PATIENT DATA MENU d? for HELP
[ ]Yes [X]No : Crossbites

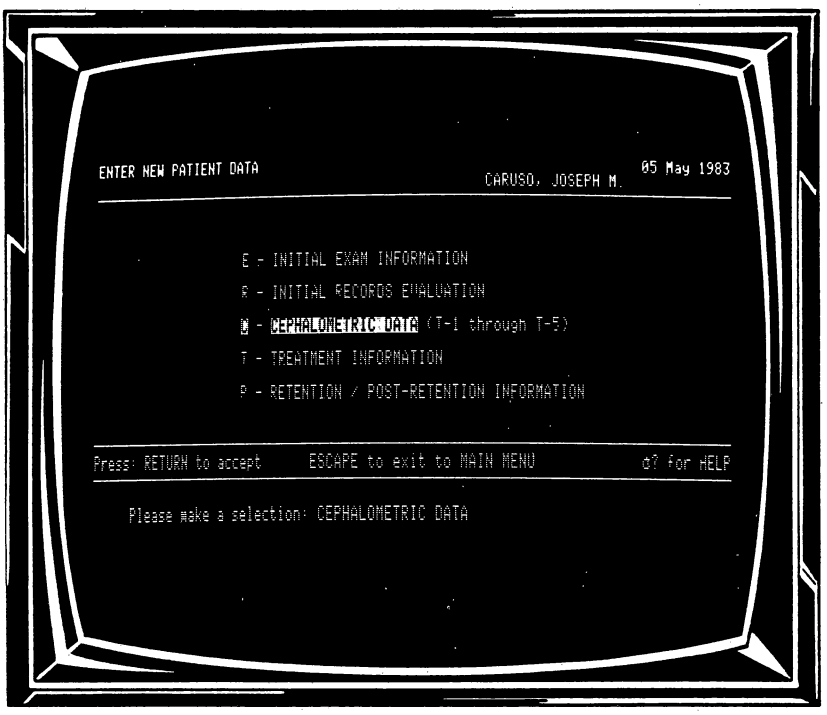
(d)


ENTER NEW PATIENT DATA
Initial Records Evaluation
Page 4 of 5
PEARSON, JOHN K.
05 May 1983
RADIOGRAPHS:
[ ] Pathology
[ ] Supernumeraries
[ ] Deciduous teeth:
[ ] Missing teeth:
[ ] Ankylosed teeth:
Press: RETURN to accept ESCAPE to exit to PATIENT DATA MENU d? for HELP
[ ]Yes [X]No : Pathology

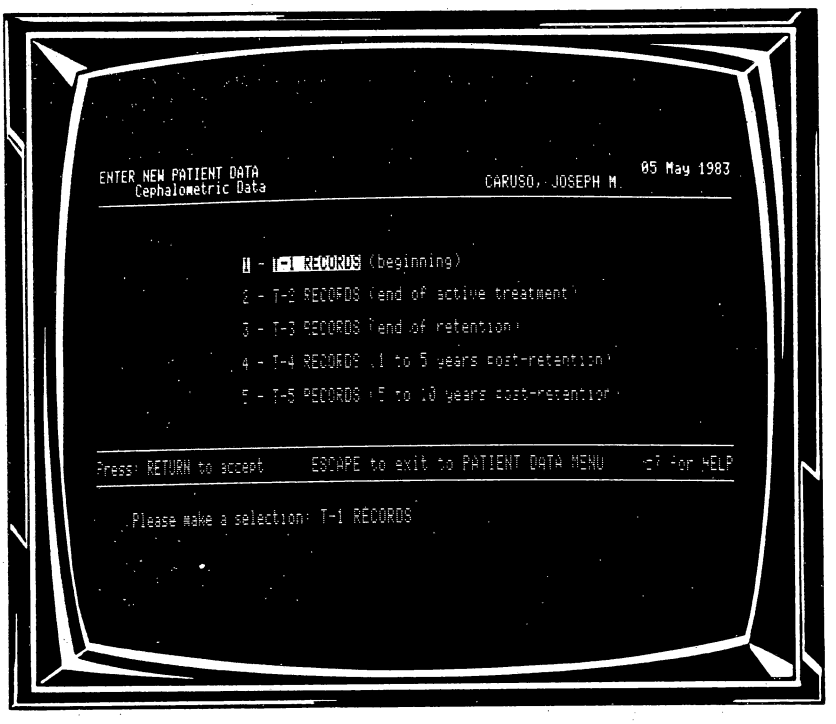
(e)


ENTER NEW PATIENT DATA
Initial Records Evaluation
Page 5 of 5
PEARSON, JOHN K.
05 May 1983
RADIOGRAPHS : (continued)
[ ] Impacted teeth: (present)
[ ] Impacted teeth: (potential)
[ ] Root resorption: (present)
[ ] Root resorption: (potential)
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
^? for HELP
[ ]Yes [X]No : Are any permanent teeth impacted?

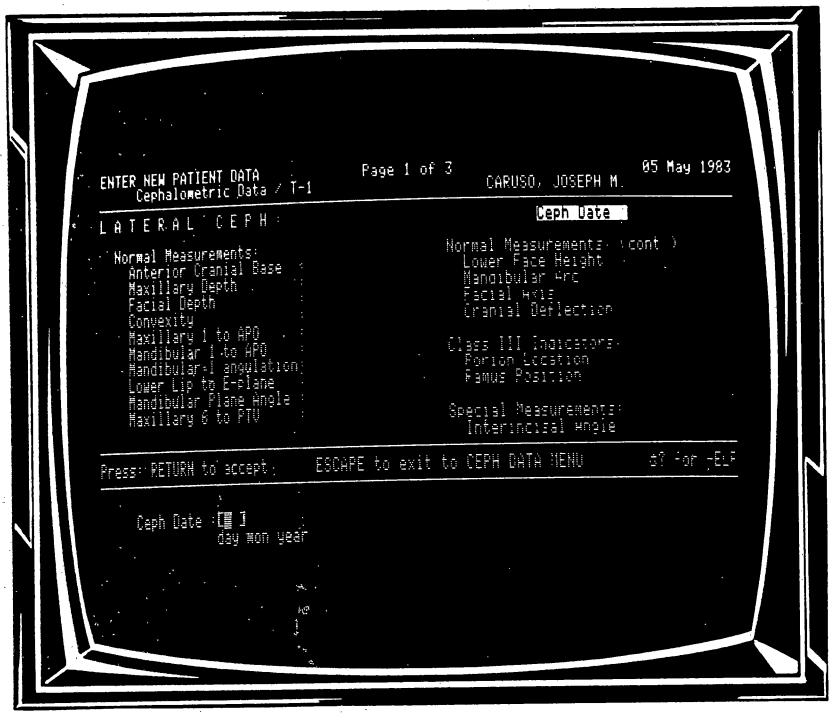
(f)


ENTER NEW PATIENT DATA
CARUSO, JOSEPH M.
05 May 1983
E - INITIAL EXAM INFORMATION
R - INITIAL RECORDS EVALUATION
C - CEPHALOMETRIC DATA (T-1 through T-5)
T - TREATMENT INFORMATION
P - RETENTION / POST-RETENTION INFORMATION
Press: RETURN to accept
ESCAPE to exit to MAIN MENU
^? for HELP
Please make a selection: CEPHALOMETRIC DATA

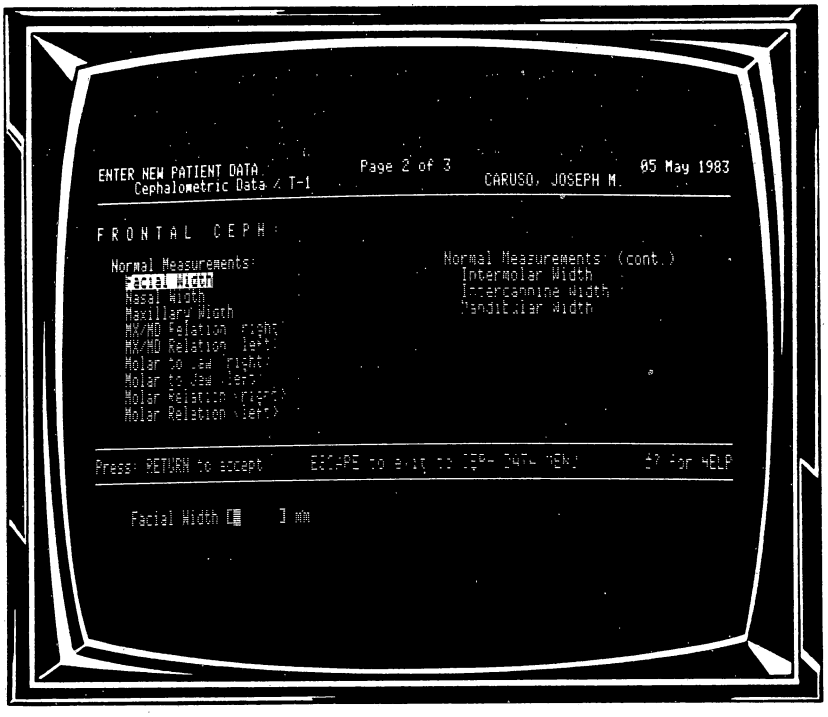
(a)


ENTER NEW PATIENT DATA
Cephalometric Data
CARUSO, JOSEPH M.
05 May 1983
1 - T-1 RECORDS (beginning)
2 - T-2 RECORDS (end of active treatment)
3 - T-3 RECORDS (end of retention)
4 - T-4 RECORDS (1 to 5 years post-retention)
5 - T-5 RECORDS (5 to 10 years post-retention)
Press: RETURN to accept ESCAPE to exit to PATIENT DATA MENU ?? for HELP
Please make a selection: T-1 RECORDS

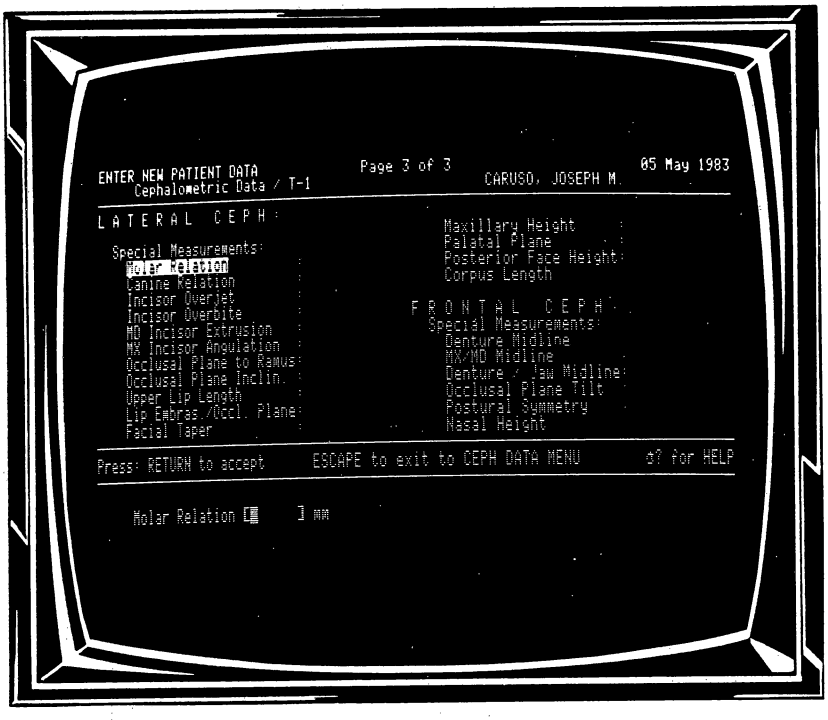
(b)


ENTER NEW PATIENT DATA
Cephalometric Data / T-1
Page 1 of 3
CARUSO, JOSEPH M.
05 May 1983
Ceph Date
LATERAL CEPH:
Normal Measurements:
Anterior Cranial Base
Maxillary Depth
Facial Depth
Convexity
Maxillary 1 to APO
Mandibular 1 to APO
Mandibular-1 angulation
Lower Lip to E-plane
Mandibular Plane Angle
Maxillary 6 to PTV
Normal Measurements: (cont)
Lower Face Height
Mandibular Arc
Facial Axis
Cranial Deflection
Class III Indicators:
Porion Location
Ramus Position
Special Measurements:
Interincisal Angle
Press: RETURN to accept ESCAPE to exit to CEPH DATA MENU ?? for HELP
Ceph Date:
day mon year

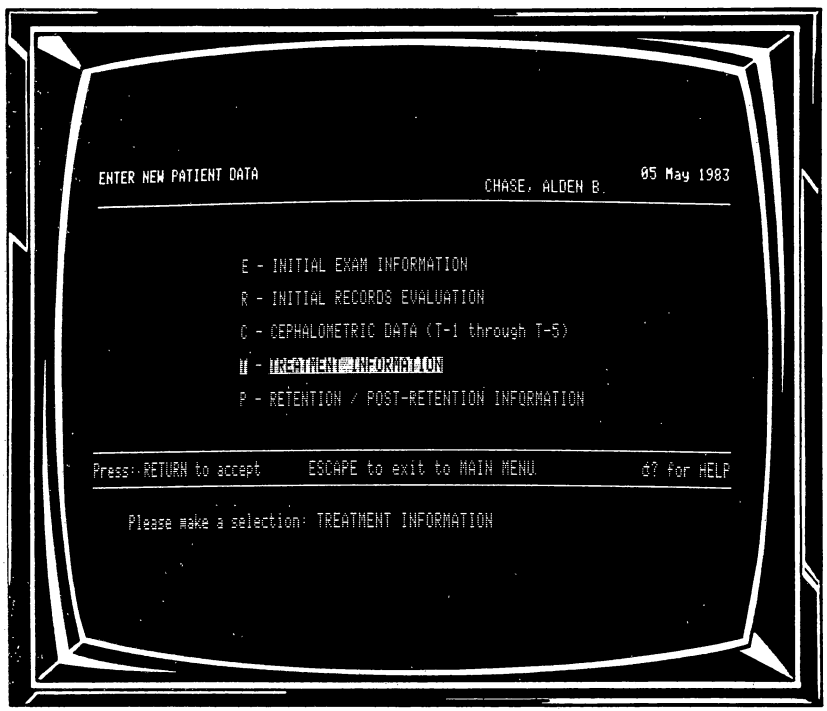
(c)


ENTER NEW PATIENT DATA
Cephalometric Data / T-1
Page 2 of 3
CARUSO, JOSEPH M.
05 May 1983
FRONTAL CEPH
Normal Measurements:
Facial Width
Nasal Width
Maxillary Width
MX/MD Relation right
MX/MD Relation left
Molar to Jaw right
Molar to Jaw left
Molar Relation (right)
Molar Relation (left)
Normal Measurements (cont.)
Intermolar Width
Intercanine Width
Mandibular Width
Press: RETURN to accept
ESCAPE to exit to CEPH DATA MENU
F? for HELP
Facial Width [ ] mm

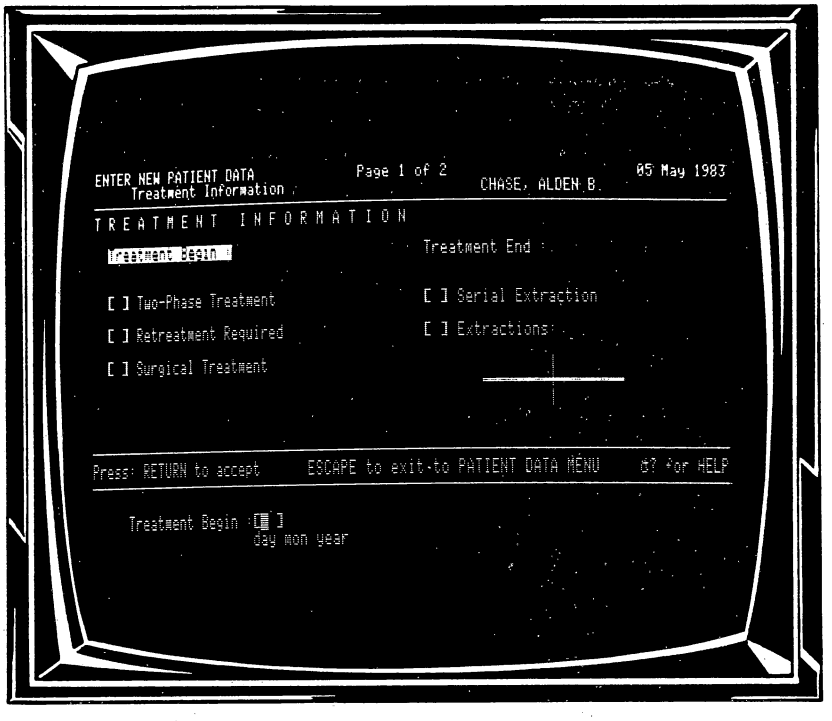
(d)


ENTER NEW PATIENT DATA
Cephalometric Data / T-1
Page 3 of 3
CARUSO, JOSEPH M.
05 May 1983
LATERAL CEPH
Special Measurements:
Molar Relation
Canine Relation
Incisor Overjet
Incisor Overbite
MD Incisor Extrusion
MX Incisor Angulation
Occlusal Plane to Ramus
Occlusal Plane Inclin.
Upper Lip Length
Lip Embras./Occl. Plane
Facial Taper
Maxillary Height
Palatal Plane
Posterior Face Height
Corpus Length
FRONTAL CEPH
Special Measurements:
Denture Midline
MX/MD Midline
Denture / Jaw Midline
Occlusal Plane Tilt
Postural Symmetry
Nasal Height
Press: RETURN to accept
ESCAPE to exit to CEPH DATA MENU
F? for HELP
Molar Relation [ ] mm

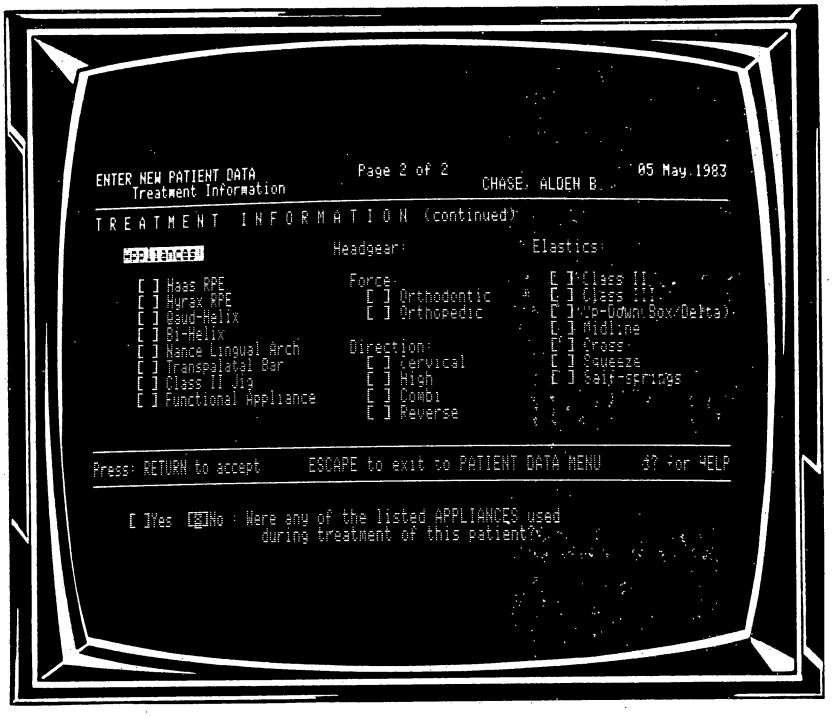
(e)


ENTER NEW PATIENT DATA
CHASE, ALDEN B.
05 May 1983
E - INITIAL EXAM INFORMATION
R - INITIAL RECORDS EVALUATION
C - CEPHALOMETRIC DATA (T-1 through T-5)
T - TREATMENT INFORMATION
P - RETENTION / POST-RETENTION INFORMATION
Press RETURN to accept
ESCAPE to exit to MAIN MENU
d? for HELP
Please make a selection: TREATMENT INFORMATION

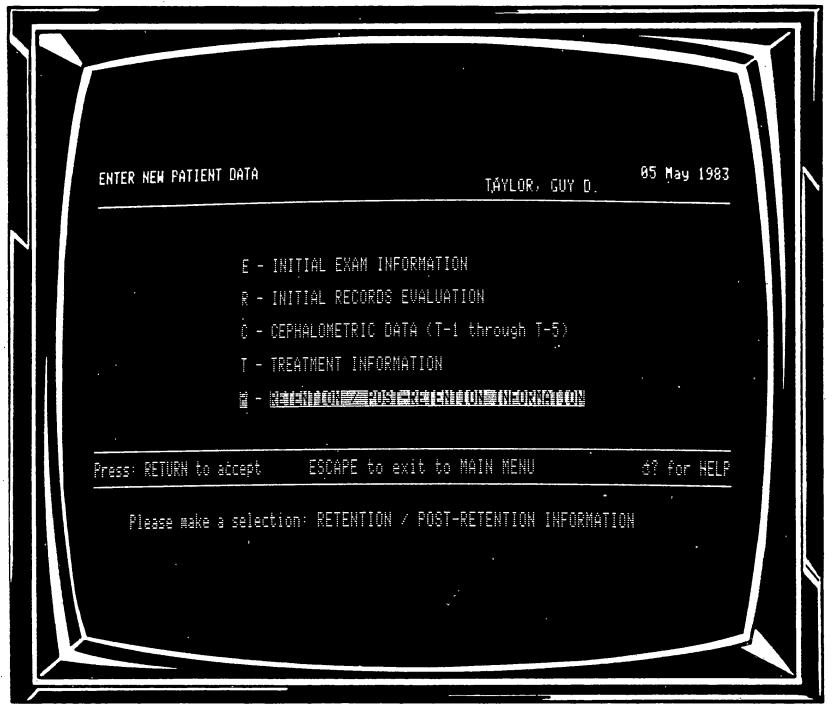
(a)


ENTER NEW PATIENT DATA
Treatment Information
Page 1 of 2
CHASE, ALDEN B.
05 May 1983
TREATMENT INFORMATION
Treatment Begin :
Treatment End :
[ ] Two-Phase Treatment
[ ] Serial Extraction
[ ] Retreatment Required
[ ] Extractions:
[ ] Surgical Treatment
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
^? for HELP
Treatment Begin : [ ]
day mon year

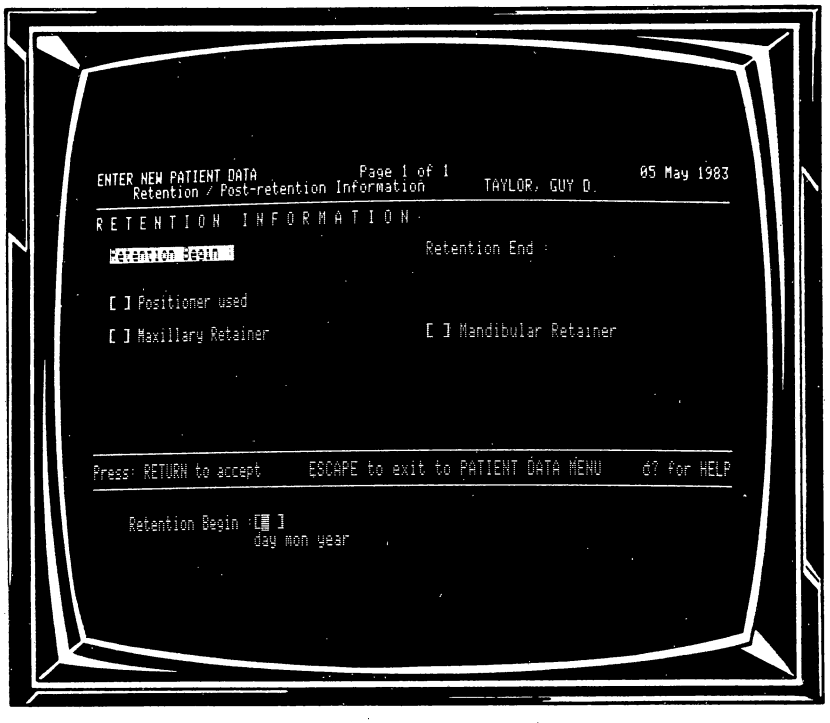
(b)


ENTER NEW PATIENT DATA
Treatment Information
Page 2 of 2
CHASE, ALDEN B.
05 May 1983
TREATMENT INFORMATION (continued)
Appliances:
[ ] Haas RPE
[ ] Hyrax RPE
[ ] Quad-Helix
[ ] Bi-Helix
[ ] Nance Lingual Arch
[ ] Transpalatal Bar
[ ] Class II Jig
[ ] Functional Appliance
Headgear:
Force:
[ ] Orthodontic
[ ] Orthopedic
Direction:
[ ] Cervical
[ ] High
[ ] Combi
[ ] Reverse
Elastics:
[ ] Class II
[ ] Class III
[ ] Up-Down Box/Delta)
[ ] Midline
[ ] Cross
[ ] Squeeze
[ ] Salt-springs
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
^? for HELP
[ ]Yes [X]No : Were any of the listed APPLIANCES used during treatment of this patient?

(c)


ENTER NEW PATIENT DATA
TAYLOR, GUY D.
05 May 1983
E - INITIAL EXAM INFORMATION
R - INITIAL RECORDS EVALUATION
C - CEPHALOMETRIC DATA (T-1 through T-5)
T - TREATMENT INFORMATION
M - RETENTION / POST-RETENTION INFORMATION
Press: RETURN to accept
ESCAPE to exit to MAIN MENU
a? for HELP
Please make a selection: RETENTION / POST-RETENTION INFORMATION

(a)


ENTER NEW PATIENT DATA
Page 1 of 1
05 May 1983
Retention / Post-retention Information
TAYLOR, GUY D.
RETENTION INFORMATION
Retention Begin :
Retention End :
[ ] Positioner used
[ ] Maxillary Retainer
[ ] Mandibular Retainer
Press: RETURN to accept
ESCAPE to exit to PATIENT DATA MENU
d? for HELP
Retention Begin : [ ]
day mon year

(b)

DISCUSSION

Retrospective orthodontic studies are commonly undertaken involving an analysis of a specific patient problem or treatment technique that is incompletely understood and attempting to explain it by evaluation and analysis of patients who have exhibited the problem or undergone a specific mode of correctional therapy. Often the largest hurdle in these projects is locating an adequate sample for both study and control. This information system helps overcome that problem by searching for patients matching user specified criteria and displaying all pertinent data for study and analysis in conjunction with either research topics or diagnostic planning.

Prospective research is acknowledged as the best but also the most difficult type of study to produce. However, by using a comprehensive information management system prospective studies can be designed and consistant, systematic data collection can be achieved over the time periods often necesssary to collect adequate sample information. Significant long-range inquires into all aspects of orthodontics can be realized by utilizing standardized information systems to implement prospective studies.

The orthodontic information system permits the user to query all aspects of the patient information files to allow

comparative analysis of beginning cases against treatment results achieved on patients with similarly diagnosed problems. Aided by information screens designed to duplicate chart forms new patient information can also be added to the existing data base allowing specific diagnostic information to be referenced during all phases of treatment. Designing the system in this manner provides an economical and educational method for entry of new information into the growing patient research/analysis database.

The result of this project is an integrated orthodontic information system encompassing many areas of graduate orthodontic training. These include teaching diagnostic techniques with comprehensive clinical evaluation forms, treatment analysis by comparative study of similar cases, availability of patient data for prospective and retrospective research projects, and exposure to computer applications as they relate to an orthodontic practice.

This development lays the groundwork for several future enhancements to the system including programs for analysis and diagnosis, statistical evaluation, and digitizing of cephalometric x-rays.

SUMMARY AND CONCLUSIONS

An orthodontic information system was designed, and implemented to integrate the patient evaluation and treatment planning process with complete information accessability for comparative patient analysis and for prospective and retrospective research projects. This was achieved through the following progression of steps.

1. A complete reevalutaion of the current patient diagnosis procedure to identify critical information.
2. Logical organization into related information blocks.
3. Planned patient chart forms to promote methodical sequencing of diagnostic data gathering and consistent information.
4. Determination of significant information for available computer access.
5. Development of computer data entry and display screens to duplicate the patient chart forms.
6. System programming to allow sophisticated patient information retrieval according to user specified criteria.

Proper information management and utilization are all that separate a guess from a diagnosis. Advancing diagnostic and treatment technology requires the development of new methods to maintain and analyze complete patient information. The concept of an integrated orthodontic

information system has been presented and one installation described for the training of qualified, self-critical specialists. However, the need to expand this system into the private sector still remains. Utilizing the capabilities of computers and shared information systems[17] orthodontists could benefit not only from accumulated data within their own practices but also from their colleagues. The maximum potential for individual and cumulative progress within the orthodontic profession lies within this realm.

BIBLIOGRAPHY

1. Baumrind, S., and Miller, D.M.: Computer-aided head film analysis: The University of California San Francisco method. Am. J. Orthod. 78:41-65, 1980.

2. Birnie, D.J.: On-line digitizing: a basic system. Br. J. Orthod. 7:81-87, 1980.

3. Bondevik, O., Rosler, M., and Slagsvold, O.: The digital read-out system CM-1: an instrument for rational measuring on radiographic headplates and dental models. Eur. J. Orthod. 3:1-8, 1981.

4. Burstone, C.J.: Dr. Charles J. Burstone on the uses of the computer in orthodontic practice (part 1). J. Clin. Orthod. 13:442-453, 1979.

5. Burstone, C.J.: Dr. Charles J. Burstone on the uses of the computer in orthodontic practice (part 2). J. Clin. Orthod. 13:539-551, 1979.

6. Chebib, F.S., Cleall, J.F., and Carpenter, K.J.: On-line computer system for the analysis of cephalometric radiographs. Angle Orthod. 46:305-311, 1976.

7. Faber, R.D., Burstone, C.J., and Solonche, D.J.: Computerized interactive orthodontic treatment planning. Am. J. Orthod. 73:36-46, 1978.

8. Freer, T.J.: A computer system for research in orthodontics. Aust. Orthod. J. 6:102-109, 1980.

9. Greenberg, L.Z., and Johnston, L.E.: Computerized prediction: The accuracy of a contemporary long-range forecast. Am. J. Orthod. 67:243-252, 1975.

10. Houston, W.J.B.: The application of computer aided digital analysis to orthodontic records. Eur. J. Orthod. 1:71-79, 1979.

11. Introduction to graduate orthodontics syllabus, volume 2. Loma Linda University, 1982.

12. Krogman, W.M.: Use of computers in orthodontic analysis and diagnosis: A symposium. Am. J. Orthod. 61:219-254, 1972.

UNIVERSITY LIBRARY
LOMA LINDA, CALIFORNIA

13. Oka, S.W., and Trussell, H.J.: Digital Image Enhancement of Cephalograms. Angle Orthod. 48:80-84, 1978.

14. Ricketts, R.M.: The evolution of diagnosis to computerized cephalometrics. Am. J. Orthod. 55:795-803, 1969.

15. Ricketts, R.M.: The value of cephalometrics and computerized technology. Angle Orthod. 42:179-199, 1972.

16. Ricketts, R.M., Bench, R.W., Hilgers, J.J., and Schulhof, R.: An overview of computerized cephalometrics. Am. J. Orthod. 61:1-28, 1972.

17. Sloan, R.F.: Computer applications in orthodontics. Int. Dent. J. 30:189-200, 1980.