

NATIONAL RADIO ASTRONOMY OBSERVATORY

User's Manual

Report Series

Computer Assisted Observing:

The 140-ft Manual

by

Green Bank Staff

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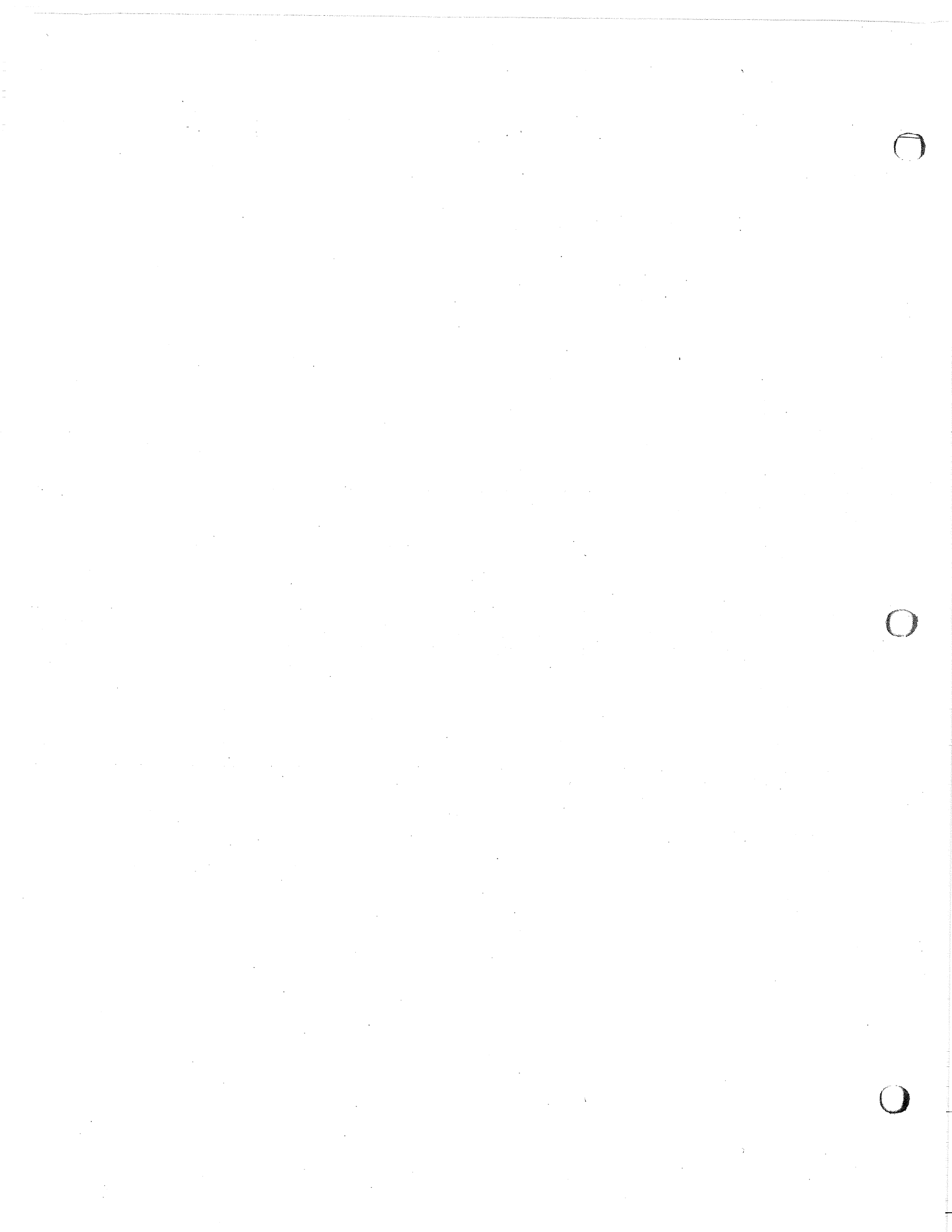


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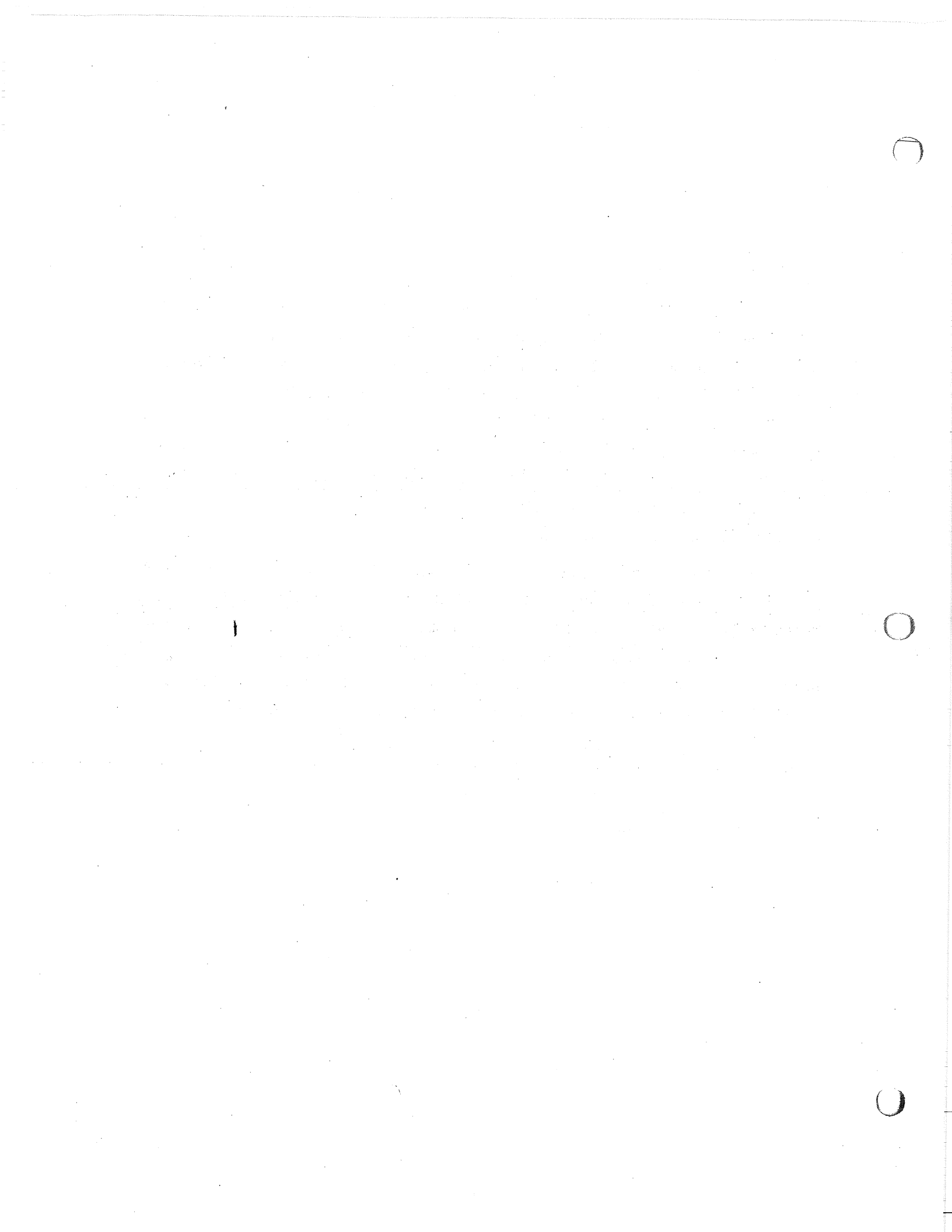
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added
 FED → look in back

Preface

This manual describes the features of the 140-ft control system and how to use it. The control system offers a variety of options to accommodate the observing techniques and styles of many observers. The system offers manual or computer operation of the telescope, local oscillator, focus, box rotation, noise tube modulation and data collection. The system operates from instructions supplied by the telescope operator or by punched cards, prepared by the observer. Manual operation requires a detailed knowledge of the equipment, which is beyond the scope of this report, and therefore it will not be discussed.

The control system is not a single program, but rather a collection of programs that represent the functions of the telescope and observing equipment. These programs are incorporated into a command control system. A system of this type offers flexibility and reliability. Each observer is encouraged to study this report, visit the telescope, and talk with the staff prior to their observing, in order to discover how best to use the system.



I. Introduction

The 140-ft telescope has two computer systems which together enable an observer to collect and reduce line and continuum data at the telescope. These are the control and analysis systems. The control system handles the positioning of the telescope and the collection of data, and is the subject of this report. The analysis system deals with the reduction of spectral line data; it is described in NRAO User's Manual Report No. 28 On-Site Spectral Line Data Reduction.

A. Equipment

The control system provides the interface between the observer and the observing equipment. The system consists of a collection of routines which perform the basic functions of positioning the telescope and collecting data. These routines are activated by a set of system commands, called "verbs". Each verb performs one of the basic control system functions. Any observing plan can be carried out as a sequence of verbs.

The control system also allows the combination of a sequence of verbs into what is called an "observing procedure". Each procedure is stored under a unique name. When activated, each step of the stored procedure is executed in turn. This manual describes a set of procedures to suit most observing requirements. Customized procedures can be written by the telescope programmer to meet individual requirements.

The following table shows the equipment which is connected to the control system computer, and what the control system does with each device.

Table 1

Device	Operation of System
Telescope Drive Package	Commands desired position Reads current position
Model IV Autocorrelator	Reads A/C records every 20 sidereal seconds
Universal Local Oscillator	Sets the ULO synthesizer Reads the ULO synthesizer counter
64 Channel A/D Converter	Reads 1 to 64 Analog to Digital Channels
Computer Disk/Tape Drive	Records observation records; 9 track 1600 bpi
Analysis Computer	Receives a copy of the observation record

The telescope operator does the actual communication with the computer, using two control panels, various CRT screens, and a card reader. His control console is shown in figure 1. The position panel controls the telescope. It has twelve push buttons and eight data registers. The push buttons command movements of the telescope. The registers are used to specify the horizontal and vertical coordinates of the source position, rate, and two possible offsets. The definition of these registers is generally fixed, but they may be redefined for special observing procedures. For example, the offset registers are used by the continuum mapping procedure to specify the size of the area to be mapped. Such details are specified in the procedure definitions in Section VI. The position panel is described in greater detail in Section III B.

The sequence panel controls the data collection. It contains 17 push buttons and 6 registers. The registers are used to enter particular observing parameters, such as integration period, stop time, etc. Fifteen of the push buttons command particular observing functions. Two buttons are programmable, in that the telescope operator can attach an observing procedure to each button. The sequence panel is described in greater detail in Section III C.

There are five CRT status displays. Two are associated with telescope control, and are located directly in front of the telescope operator. They are shown in figure 2. The screen on the right displays the current telescope position. The screen on the left displays either commanded or actual telescope positions in equatorial, galactic, or descriptive coordinate systems. It can also display focus, box rotation, environmental parameters (temperature, pressure, dew point) or pointing information.

Two other screens are identical displays of observing variables. They are located on top of the control console and at the observer's station. Figure 3 shows the display format. The observing variables are explained in Appendix M.

The fifth screen displays the current data in graphic format. It is located under the card reader next to the line printer. Figure 4 shows the location.

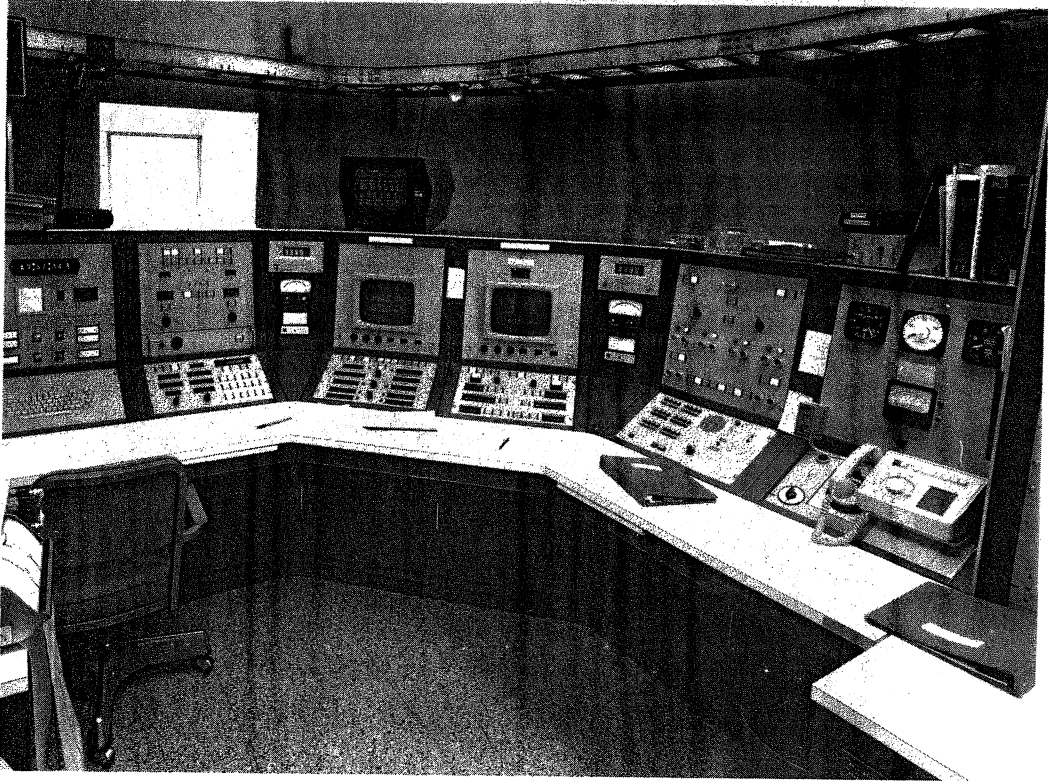


Figure 1. - The Telescope Operator's Console

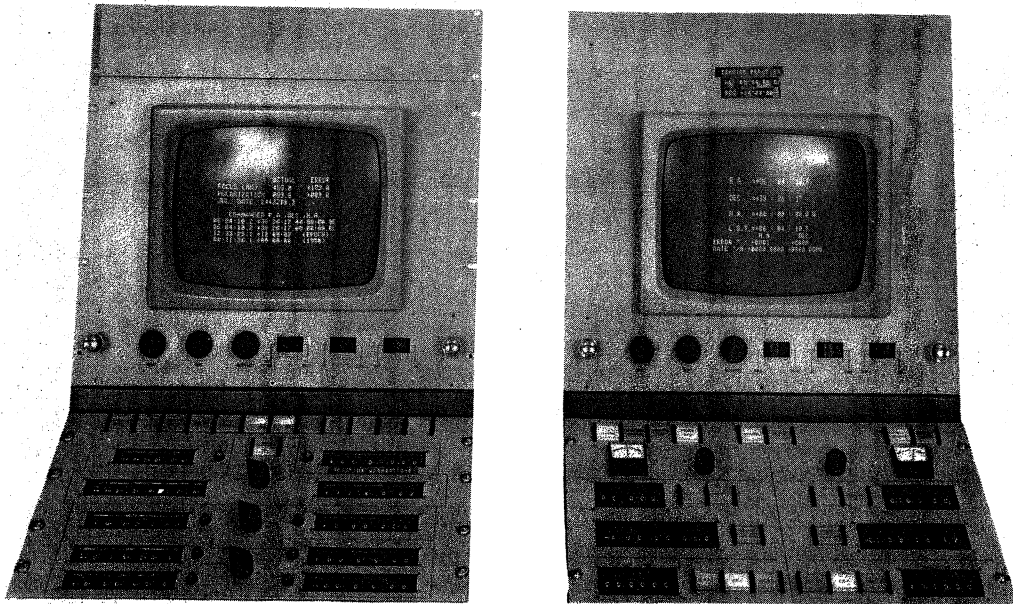


Figure 2. - The Telescope Control CRT Displays

SCAN	10385	159	R L BROWN	B367C	DR21(OH)-A	4	OFTPO	494
DATE	EST	LST	IND POSITION		POLAR FOCUS		OFF	
7 2 81	9:33:40	3:56:30	3:56:30.2	38:26:9	90	440	10384	
	L1	L1F1	L1F2	LA	LB	SF01		
L01	410.528623	410.522113	410.522113	398.900	398.900	0.000		
	L2	L2F1	L2F2	LC	LD	SF02		
L02	0.000000	0.000000	0.000000	398.900	398.900	0.000		
RCYR	CNTR FREQ	REST FREQ	CNTR VEL RA	DEL VEL RA	RVSYS LR	CMD CV		
A	327.4360	327.3843	-28.95	0.56	-10.35	0.00		
B	327.4360	327.3843	-28.95	0.56	-10.35	0.00		
C	327.4360	327.3843	-28.95	0.56	-10.35	0.00		
D	327.4360	327.3843	-28.95	0.56	-10.35	0.00		
	TSYS	NOISE TUBE	RMS CHECK	BW MHZ	SCAN TIME	TIME LEFT		
A	448.28	5.20	4.55	0.156	0: 0:20	0: 0: 0		
B	454.56	5.20	4.62	0.156	0: 0:20	0: 0: 0		
C	388.35	4.10	3.94	0.156	0: 0:20	0: 0: 0		
D	473.55	4.10	4.81	0.156	0: 0:20	0: 0: 0		
	RA (1981.50)	DEC	L	B	H	V	Z01ST ELEV	
	3:54:22.4	38:21:22	158.34	-11.25	58:35:35	38:21:22	0.0 90.0	

Figure 3. - The Observing Variables CRT Display

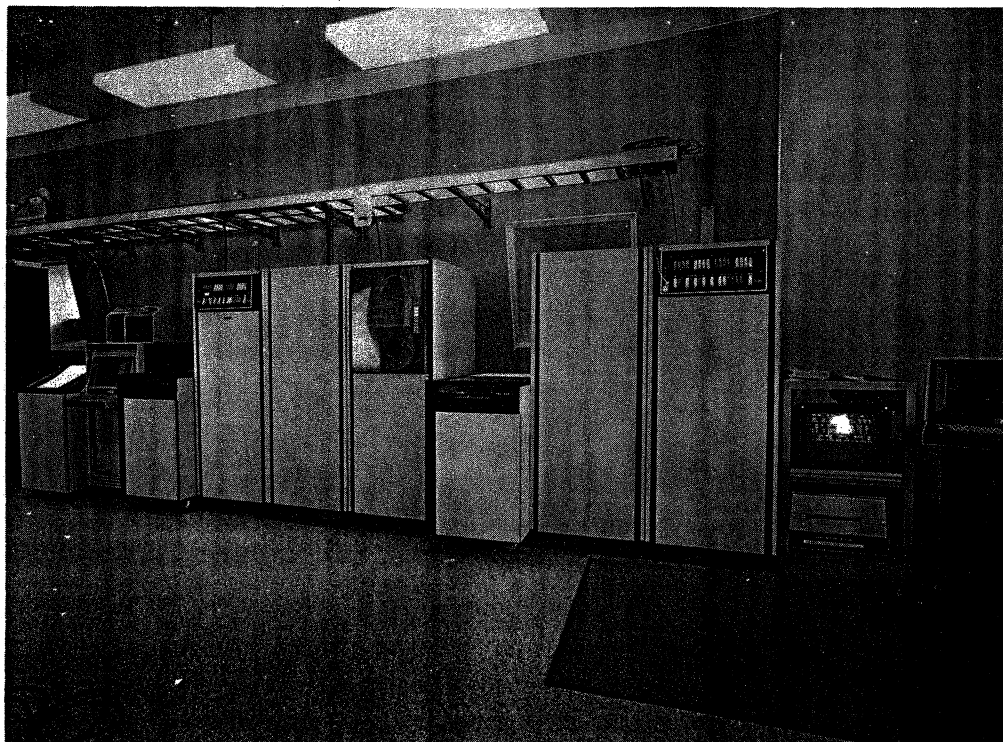


Figure 4. - The 140-foot Computers