

NATIONAL RADIO ASTRONOMY OBSERVATORY  
GREEN BANK, WEST VIRGINIA

ELECTRONICS DIVISION INTERNAL REPORT No. 151

NRAO 45-FOOT TELESCOPE  
GENERAL INTEREST NOTES AND WEATHER STATION

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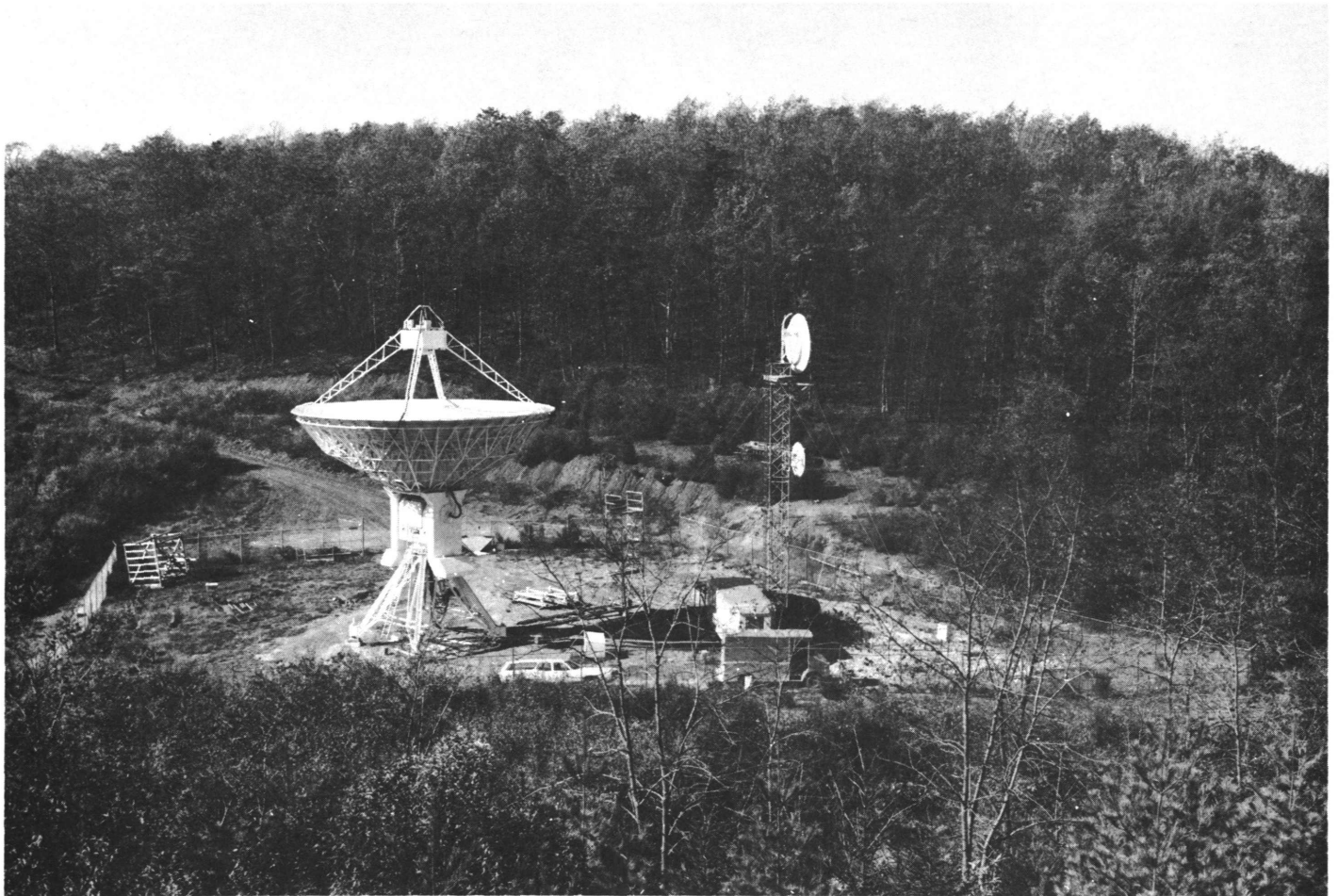


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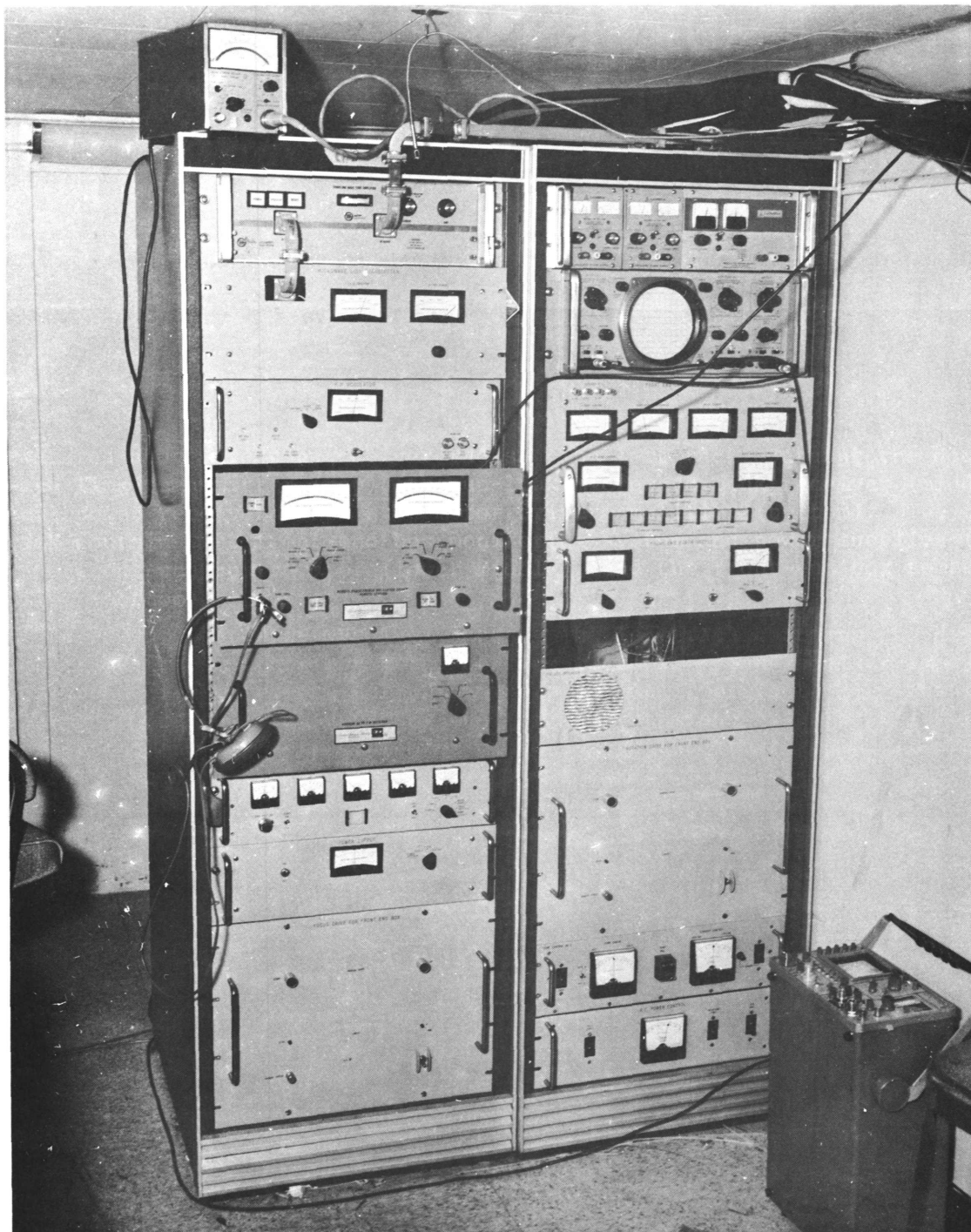
J. Ray Hallman

Introduction

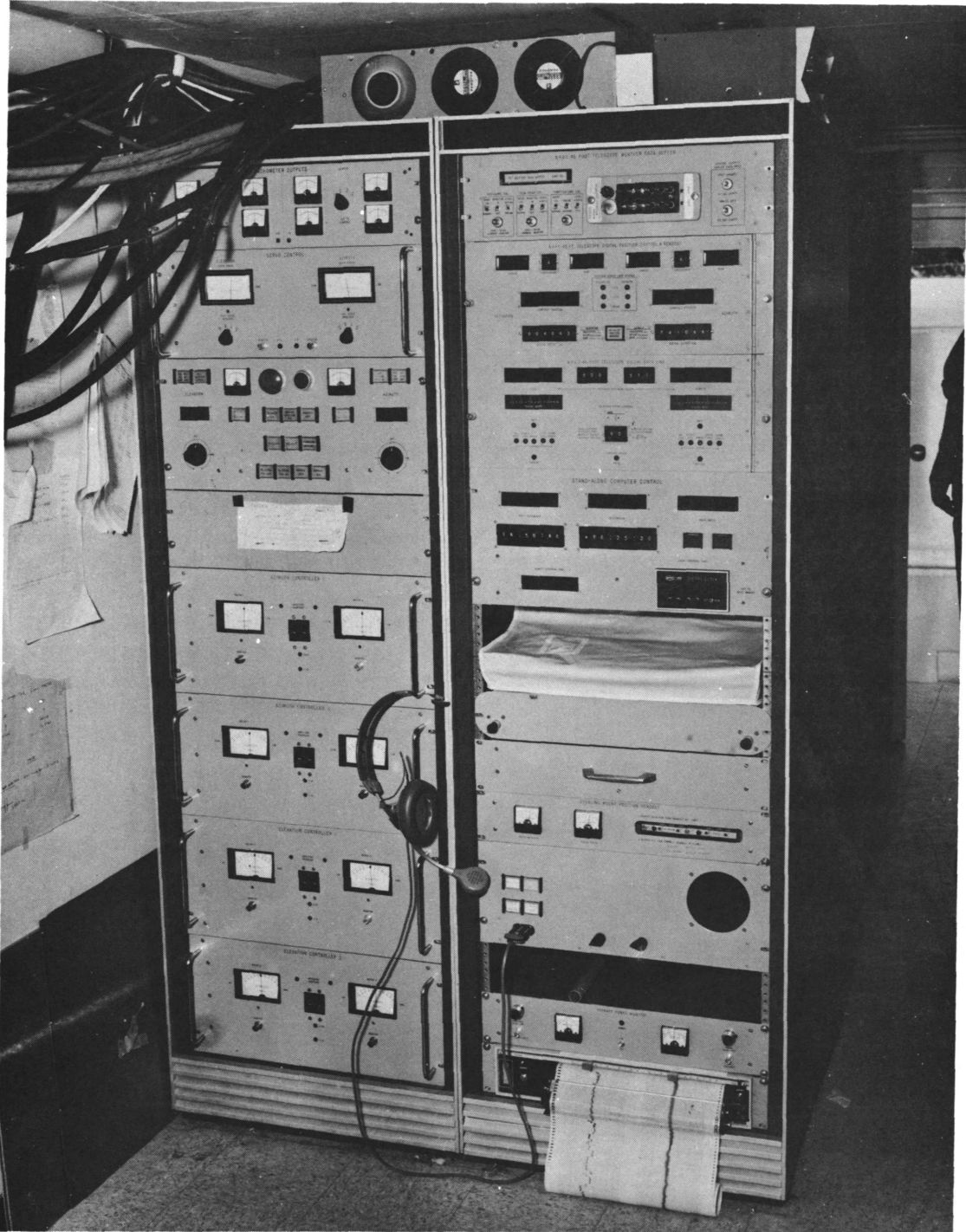
This Electronics Division internal report describes a new remote weather station telemetering facility associated with the NRAO 45-ft portable telescope. The paper also presents some interesting notes (mostly pictures) of the new NRAO 45-ft portable telescope which presently functions as a fourth element of the NRAO interferometer system.



The above picture shows the 45-ft telescope as it looks from an adjacent mountain peak at its location at the Hunterville site which is about 20 miles south of Green Bank.



Pictured above are the receiver racks. The left rack contains the down-link microwave link transmitter (top), the up-link microwave link receiver (middle), and focal point receiver focus step motor driver amplifier (bottom). The right-hand rack contains the front-end box monitoring system and power supplies (upper half, the front-end box rotator (lower middle), and the front-end box temperature controller (bottom).

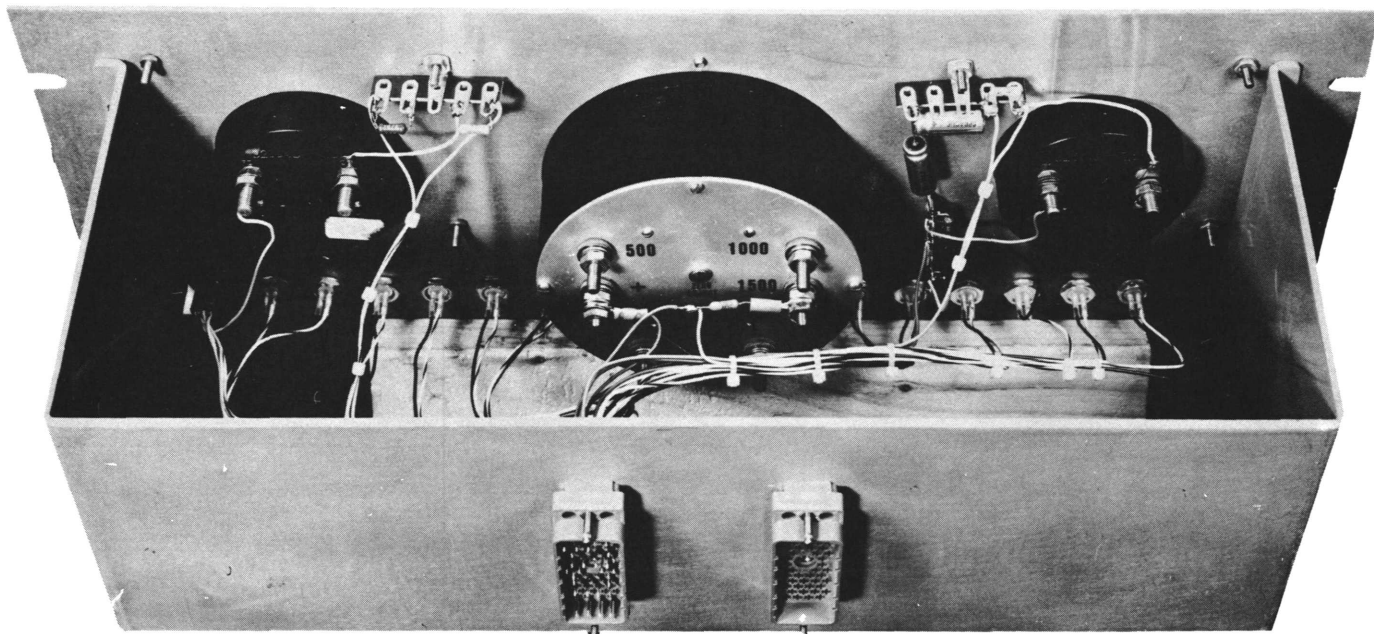
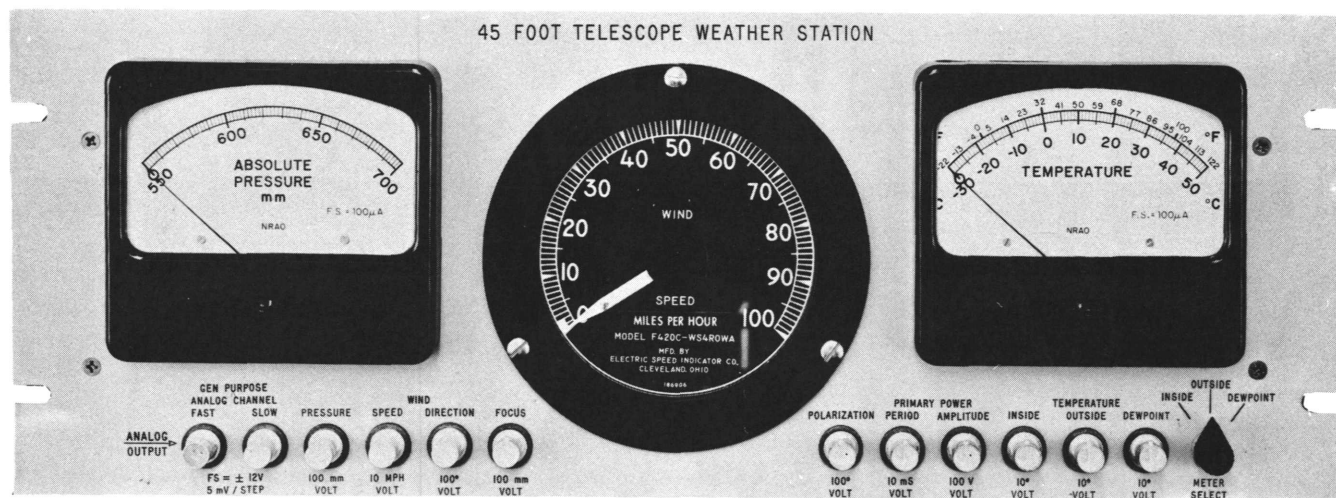


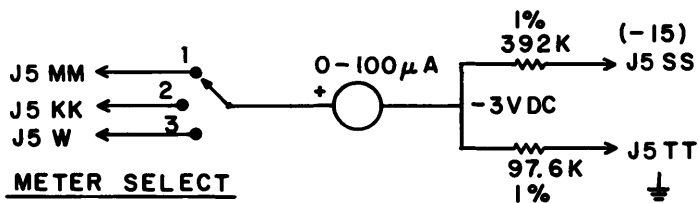
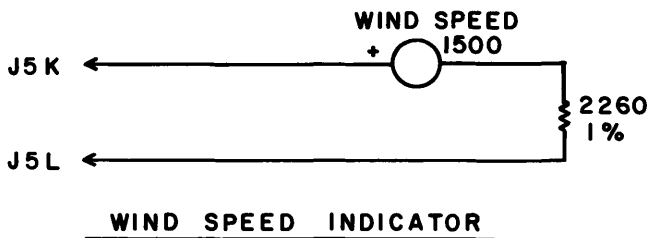
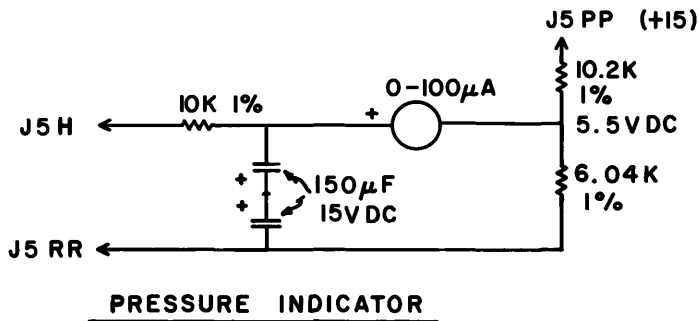
Pictured above are the telescope motion drive system rack on the left containing the servo system analog monitoring and control loops (top), operator's control panel (upper middle), and drive motor servo amplifiers (bottom). The right-hand rack contains the digital systems comprising from top to bottom: Remote weather monitoring station, digital position control and readout system, digital data link, stand-alone calculator control system, HP-9810 calculator, rotation and focus position readouts, communication system, space, primary power monitor, and chart recorder.



### Weather Station

The remote weather station monitoring panel located at the interferometer control building, front and back views, are shown below:





1. INSIDE
2. OUTSIDE
3. DEW POINT

**INSIDE, OUTSIDE & DEW POINT TEMP. INDICATOR**

- J5 AA ← FAST ANALOG CHANNEL
- J5 BB ← SLOW ANALOG CHANNEL
- J5 CC ← BAROMETRIC PRESSURE
- J5 DD ← WIND SPEED
- J5 H ← WIND DIRECTION
- J5 J ← PRIMARY POWER AMPLITUDE
- J5 K ← PRIMARY POWER PERIOD
- J5 L ← INSIDE TEMP.
- J5 MM ← OUTSIDE TEMP.
- J5 NN ← DEW POINT TEMP.
- J5 P ← POLARIZATION
- J5 Q ← FOCUS
- J5 R ←
- J5 S ←
- J5 T ←
- J5 U ←
- J5 V ←
- J5 W ←
- J5 X ←
- J5 Y ←
- J5 Z ←
- J5 AA ←
- J5 BB ←
- J5 CC ←
- J5 DD ←
- J5 EE ←
- J5 FF ←
- J5 GG ←
- J5 HH ←
- J5 II ←
- J5 JJ ←
- J5 KK ←
- J5 LL ←
- J5 MM ←
- J5 NN ←
- J5 OO ←
- J5 PP ←
- J5 QQ ←
- J5 RR ←
- J5 SS ←
- J5 TT ←
- J5 UU ←
- J5 VV ←
- J5 WW ←
- J5 XX ←
- J5 YY ←
- J5 ZZ ←

**45' WEATHER STATION CONTROL BUILDING TERMINAL**



The 45-ft weather station control building terminal electronic circuit is presented in the above drawing.

The following connector list shows all connections between the data link and weather station control building terminal via the J-5 cable.

ELCO CONNECTOR LIST FOR BOX/RACK/DRAWER TWDBCB

CONNECTOR: DESIGNATION J-5; TYPE Elco; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_; PANEL E CABLE P

Pin	To	Function	Pin	To	Function
A		Focus + Out	u		
B		Focus - Out	v		
C			w		
D			x		
E			y		
F			z		
H		Pressure +	AA		
J		Pressure -	BB		
K		Wind Speed +	CC		
L		Wind Speed -	DD		
M			EE		
N			FF		
P		Polarization +	HH		
R		Polarization -	JJ		
S			KK		
T			LL		
U			MM		
V			NN		
W		Dew Point +			
X		Dew Point -			
Y		Wind Direction +			
Z		Wind Direction -			
AA	a	Fast Analog +			
BB	b	Fast Analog -			
CC	c	Slow Analog +			
DD	d	Slow Analog -			
EE	e	Power Amplitude +			
FF	f	Power Amplitude -			
HH	h	Power Period +			
JJ	j	Power Period -			
KK	k	Outside Temperature +			
LL	l	Outside Temperature -			
MM	m	Inside Temperature +			
NN	n	Inside Temperature -			
PP	p	+15			
RR	r				
SS	s	-15			
TT	t				

End 56 Pin →

End 20 Pin →

End 38 Pin →

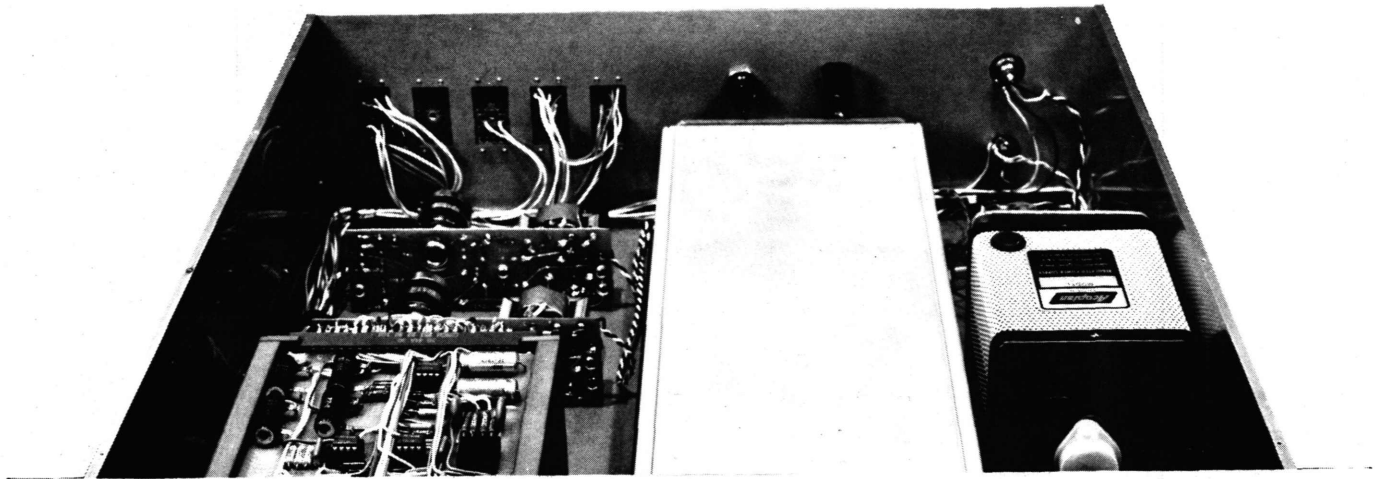
Abbreviations:  
Ex: S25-22 | J9-MM  
Slot 25, Pin 22 | Elco J9, Pin MM

Elco Connectors: J1, J2, J3, etc.  
Slot Connectors: S1, S2, S3, etc.  
Pin No.'s -3, -X, -B,

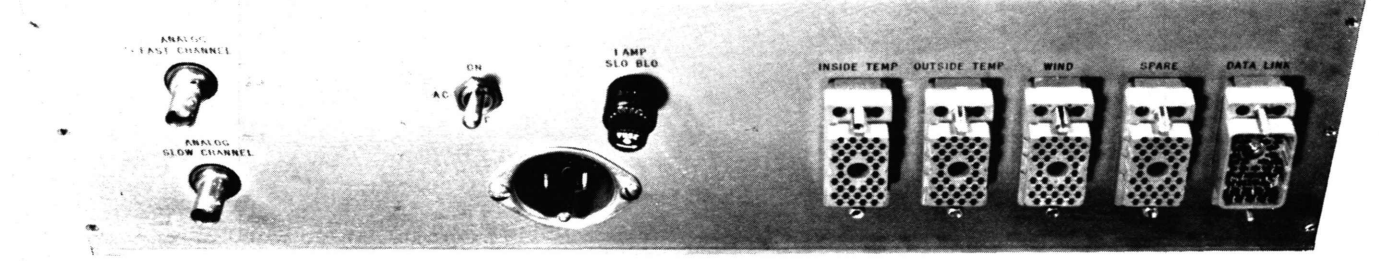
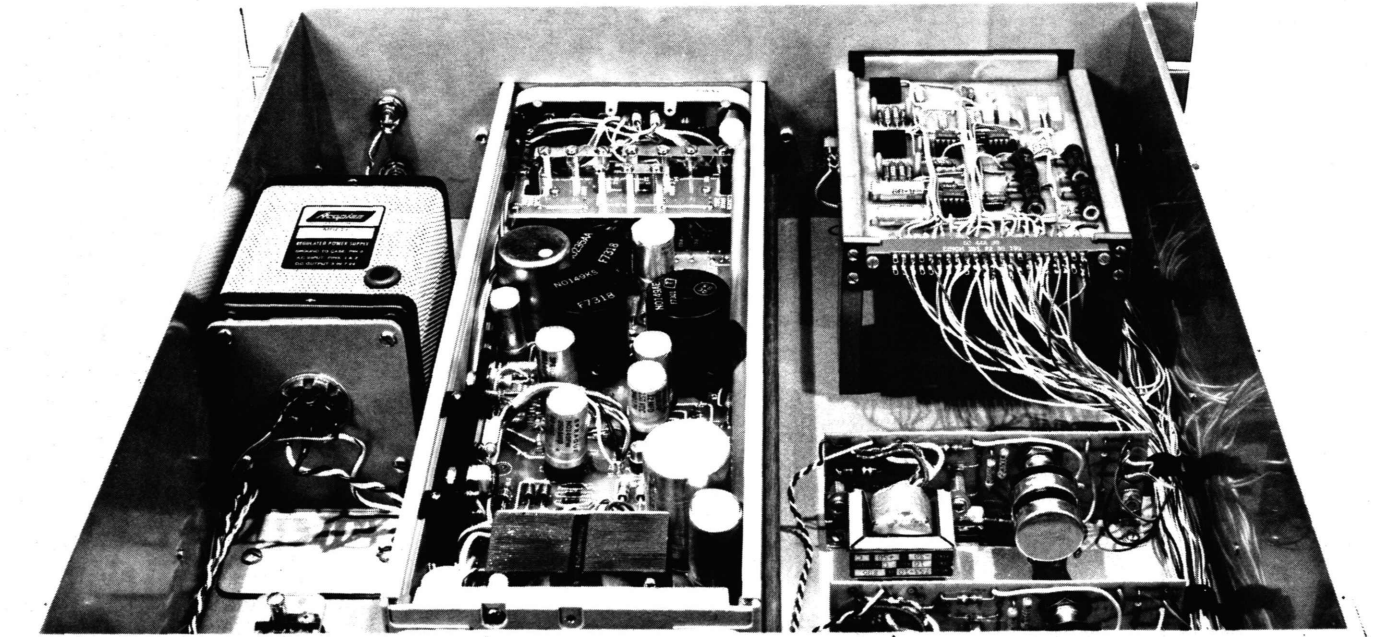
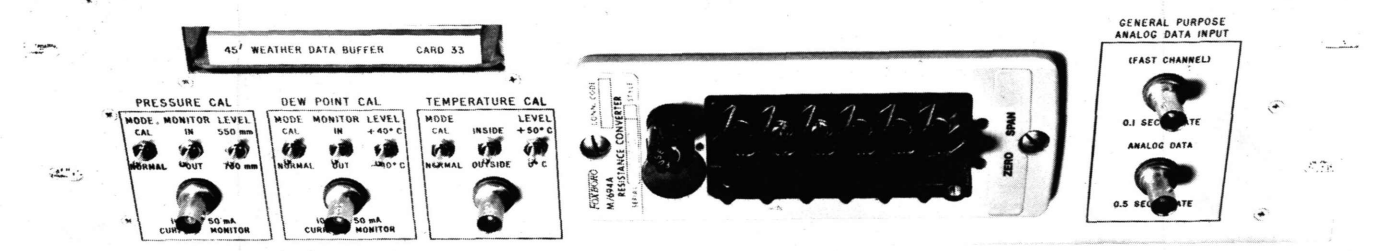


Remote Weather Station Data Buffer 45-ft Terminal

Pictured below are front and back views of the weather data buffer:



NRAO 45 FOOT TELESCOPE WEATHER DATA BUFFER



The weather instrument sensors are housed in the enclosure located out behind the 45-ft control trailer pictured below:



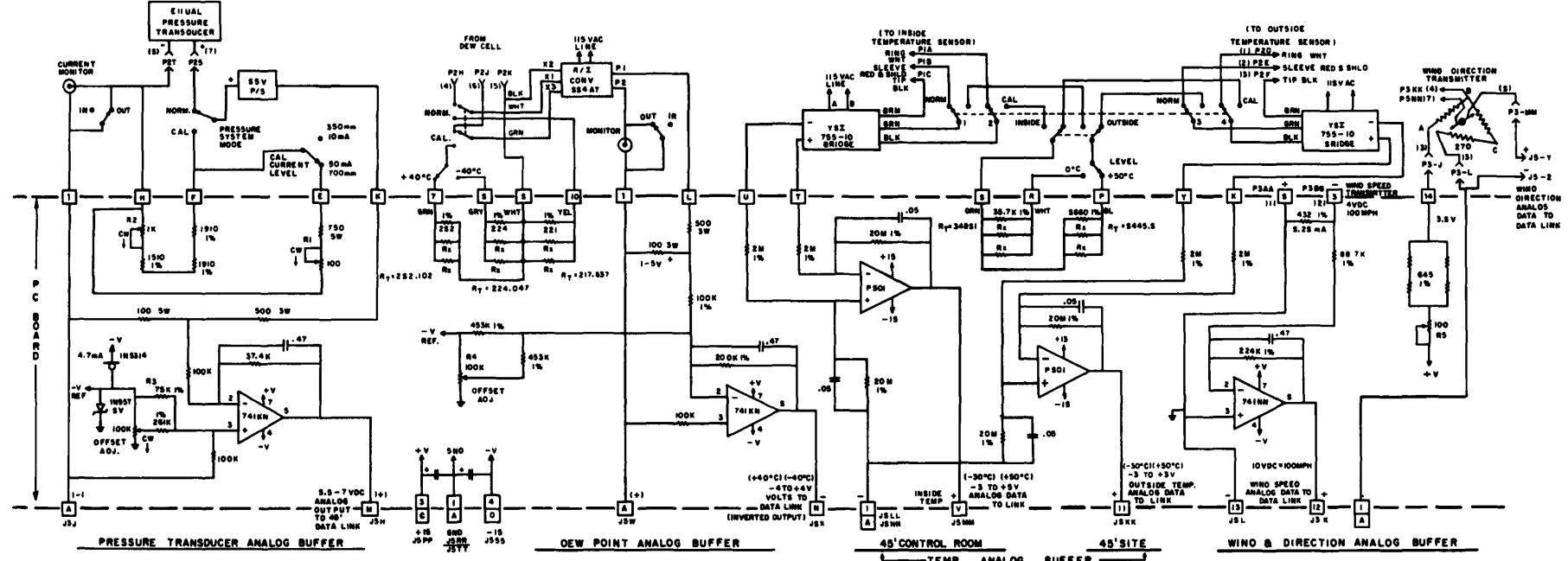
The schematic of the data buffer electronic circuits shown on the adjacent page shows the four basic sections. From left to right are the barometric pressure buffer, dew point buffer, inside temperature buffer, and outside temperature buffer. The analog data from the circuits is connected via cable J-5 to the data link system (DL45').

The connector lists are presented at the end.

PRESSURE CALIBRATION		
MODE MONITOR LEVEL		
CAL IN	590mm	10mA
CAL	0	0
NORM OUT	700mm	50mA

DEWCEL CAL		
MODE MONITOR LEVEL		
CAL IN	+40°C	0
CAL	0	0
NORM OUT	-40°C	0

TEMPERATURE CAL.		
MODE MONITOR LEVEL		
CAL IN	+30°C	0
CAL	0	0
NORM OUT	0°C	0



S2-575-1  
**NRAO TELESCOPE WEATHER STATION**  
**45' WEATHER STATION & REMOTE TERMINAL**

J.R. HALLMAN  
 9-28-73 T.M.  
 10-17-73 T.M.

ELCO CONNECTOR LIST FOR BOX/RACK/DRAWER TWDB 45'

CONNECTOR: DESIGNATION P1; TYPE Elco; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_; PANEL P, CABLE E

Pin	To	Function	30K	Pin	To	Function
A	Wht	Ring } Inside		u		
B	Red & Shld	Sleeve } Temp.		v		
C	Blk	Tip } Sensor		w		
D				x		
E				y		
F				z		
H				AA		
J				BB		
K				CC		
L				DD		
M				EE		
N				FF		
P				HH		
R				JJ		
S		Pressure + }		KK		
T	S-H	Pressure - }	} Input	LL		
U				MM		
V			End 56	NN		
W			Pin			
End 20 Pin →	X		→			
	Y					
	Z					
AA	a					
BB	b					
CC	c					
DD	d					
EE	e					
FF	f					
HH	h					
JJ	j					
KK	k					
LL	l					
MM	m					
NN	n					
PP	p					
RR	r					
SS	s					
TT	t					

End 38 → Pin

Abbreviations:	Elco Connectors:	J1, J2, J3, etc.
Ex: S25-22	Slot Connectors:	S1, S2, S3, etc.
Slot 25, Pin 22	Elco J9, Pin MM	Pin No. 's
		-3, -X, -B,

ELCO CONNECTOR LIST FOR BOX/RACK/DRAWER TWDB 45'

CONNECTOR: DESIGNATION P2 ; TYPE Elco ; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_ ; PANEL P, CABLE E

Pin	To	Function	Pin	To	Function
A			u		
B			v		
C			w		
D		1 Ring } Outside	x		
E		2 Sleeve } Temp.	y		
F		3 Tip } Sensor	z		
H	X1	4 White)	AA		
J	X2	5 Black) DEWCEL	BB		
K	X3	6 Green)	CC		
L			DD		
M			EE		
N			FF		
P			HH		
R			JJ		
S		7 Pressure + } Input	KK		
T	S-H	8 Pressure - }	LL		
U			MM		
V			NN		
W					
X					
Y					
Z					
AA	a				
BB	b				
CC	c				
DD	d				
EE	e				
FF	f				
HH	h				
JJ	j				
KK	k				
LL	l				
MM	m				
NN	n				
PP	p				
RR	r				
SS	s				
TT	t				

End 20 Pin →

End 56 Pin →

End 38 Pin →

Abbreviations:

Ex: S25-22 | J9-MM  
Slot 25, Pin 22 | Elco J9, Pin MM

Elco Connectors: J1, J2, J3, etc.  
Slot Connectors: S1, S2, S3, etc.  
Pin No.'s -3, -X, -B,

ELCO CONNECTOR LIST FOR BOX/RACK/DRAWER TWDB 45'

CONNECTOR: DESIGNATION P3; TYPE Elco; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_; PANEL P, CABLE E

Pin	To	Function	Pin	To	Function
A			u		
B			v		
C			w		
D			x		
E			y		
F			z		
H			AA		
J			BB		
K			CC		
L			DD		
M			EE		
N			FF		
P			HH		
R			JJ		
S			KK		
T			LL		
U			MM		
V			NN		
W			End 56 Pin →		
X					
Y					
Z					
AA	a	S-6 1			Wind + Speed (A)
BB	b	S5 2			Wind - Speed (B)
CC	c	8			Spare
DD	d				
EE	e				
FF	f				
HH	h				
JJ	j	14 3			Wind Direction (A)
KK	k	NC 4			(B)
LL	l	A-1 5			(C)
MM	m	J5-Y 6			(D)
NN	n	NC 7			(E)
PP	p				
RR	r				
SS	s				
TT	t				

End 38 →  
Pin

Abbreviations:

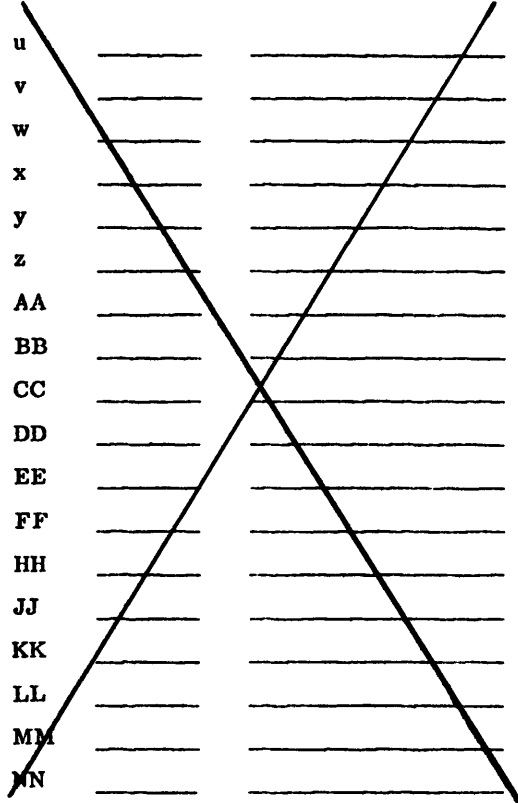
Ex: S25-22 | J9-MM  
Slot 25, Pin 22 | Elco J9, Pin MM

Elco Connectors: J1, J2, J3, etc.  
Slot Connectors: S1, S2, S3, etc.  
Pin No.'s -3, -X, -B,

CONNECTOR: DESIGNATION P4; TYPE Elco; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_; PANEL P, CABLE E

Pin	To	Function	Pin	To	Function
A			u		
B			v		
C			w		
D			x		
E			y		
F			z		
H			AA		
J			BB		
K			CC		
L			DD		
M			EE		
N			FF		
P			HH		
R			JJ		
S			KK		
T			LL		
U			MM		
V			NN		
W					
X					
Y					
Z					
AA	a				
BB	b				
CC	c				
DD	d				
EE	e				
FF	f				
HH	h				
JJ	j				
KK	k				
LL	l				
MM	m				
NN	n				
PP	p				
RR	r				
SS	s				
TT	t				



End 20 Pin →

End 56 Pin →

SPARE  
NC

End 38 Pin →

Abbreviations:  
 Ex: S25-22 | J9-MM  
 Slot 25, Pin 22 | Elco J9, Pin MM

Elco Connectors: J1, J2, J3, etc.  
 Slot Connectors: S1, S2, S3, etc.  
 Pin No.'s -3, -X, -B,



ELCO CONNECTOR LIST FOR BOX/RACK/DRAWER

CONNECTOR: DESIGNATION J-5; TYPE Elco; 38 PINS

SMALL KEY \_\_\_\_\_, LARGE KEY \_\_\_\_\_; PANEL P, CABLE E

Pin	To	Function	Pin	To	Function
A	_____	_____	u	_____	_____
B	_____	_____	v	_____	_____
C	_____	_____	w	_____	_____
D	_____	_____	x	_____	_____
E	_____	_____	y	_____	_____
F	_____	_____	z	_____	_____
H	<u>S-M</u>	<u>Pressure + Output</u>	AA	_____	_____
J	<u>S-A</u>	<u>Pressure - Output</u>	BB	_____	_____
K	<u>S-12</u>	<u>Wind Speed + Out</u>	CC	_____	_____
L	<u>S-13</u>	<u>Wind Speed - Out</u>	DD	_____	_____
M	_____	_____	EE	_____	_____
N	_____	_____	FF	_____	_____
P	_____	_____	HH	_____	_____
R	_____	_____	JJ	_____	_____
S	_____	_____	KK	_____	_____
T	_____	_____	LL	_____	_____
U	_____	_____	MM	_____	_____
V	_____	_____	NN	_____	_____
W	<u>S-A</u>	<u>Dew Point + Out</u>	End 56 Pin →		
X	<u>S-N</u>	<u>Dew Point - Out</u>			
Y	<u>P3-m</u>	<u>Wind Direction + Out</u>			
Z	<u>A-1</u>	<u>Wind Direction - Out</u>			
AA	a	_____			
BB	b	_____			
CC	c	<u>Spare #1 + Out</u>			
DD	d	<u>Spare #1 - Out</u>			
EE	e	_____			
FF	f	_____			
HH	h	_____			
JJ	j	_____			
KK	k	<u>S-11</u>	<u>45' Site Temp + Out</u>		
LL	l	<u>S-A</u>	<u>45' Site Temp - Out</u>		
MM	m	<u>S-V</u>	<u>45' Room Temp + Out</u>		
NN	n	<u>S-A</u>	<u>45' Room Temp - Out</u>		
PP	p	<u>S-C</u>	<u>+15 V DC</u> )		
RR	r	<u>S-A</u>	_____ )	<u>Power</u>	
SS	s	<u>S-D</u>	<u>-15 V DC</u> )	<u>Input</u>	
TT	t	<u>S-A</u>	_____ )		

End 38 Pin →

Abbreviations:  
 Ex: S25-22 | J9-MM  
 Slot 25, Pin 22 | Elco J9, Pin MM

Elco Connectors: J1, J2, J3, etc.  
 Slot Connectors: S1, S2, S3, etc.  
 Pin No. 's -3, -X, -B,