1-4-99

Memorandum

To: A. R. Kerr
S. -K. Pan
K. Crady

cc: J. Webber

From: J. Effland

Date: 4 January 1999

Subject: Status Report for Automating SIS Mixer Measurements

1. Hardware

Several chassis are currently being constructed for use in Pan's rack and the new JT-1 rack. Most of the chassis contain a number of printed circuit boards (PCB's) that are also being built. The status of each chassis is documented in Table 1 below.

The latest system, chassis, and board-level schematics are attached. A Table of Contents at the beginning of the schematics serves as an aid to understanding their hierarchy.

2. Software

While waiting for parts to be delivered for the hardware work, work continued on implementing the Access-based measurement system. This differs from the Excel-based measurement system, which is considered to be an interim solution until the Access-based system is working.

The first phase of the Access-based system will concentrate on measuring, storing, and retrieving pumped and unpumped bias data. Bias measurements as a function of magnet current is a straight-forward extension of the pumped and unpumped measurements and will be developed after them, because a programmable power supply is available.

This project can be broken into three main areas:

1. Measurement user interface (this includes storing and retrieving data from the database)
2. Hardware interface
3. Spreadsheet results program

The measurement user interface is the program that allows the user to set up and run a measurement. This task includes coding to store and retrieve data from the database. The hardware interface is that section of the program that deals with controlling the instruments, and includes routines to repetitively compute the mean from a number of measurements until the standard deviation is below acceptable limits. The spreadsheet results program is the mechanism that will be used to retrieve, plot, and analyze measured data using Microsoft Excel.

Effort during the last three calendar weeks has focused on building the measurement user interface. Figure 1 shows the dialog box that is presented to the user when the measurement program is run. The top section entitled "Mixer ID" allows either the entry of a new mixer ID or the selection and recall of setup data for an existing mixer.

The control with the text "227: 68/71" is the database record selector that allows selection of a particular mixer, and it shows that record 68 has been selected out of a total of 71 records. The number 227 is the mixer record ID.

The middle section, entitled "Measurement Info," allows one to enter descriptive text and select a particular measurement from the "Meas Type" drop-down dialog box. Each record in the top "Mixer ID" area can contain an unlimited number of records in the "Measurement Info" section. An existing mixer can be selected and additional measurements run on it as defined in the middle section by pressing the "New Measurement" button. The control in this section with the text "163: 1/1" is another database record selector to allow selection of a measurement given a particular mixer, and shows that the current measurement record is number 1, and there is only a single measurement record for this mixer. The record ID for this measurement is 163.

The bottom section entitled "by stepping" defines which parameters are stepped, the order that each is stepped, and limits and step sizes for each. Parameters that remain constant during a measurement have a single text box associated with them in the bottom section. In the example of Figure 1, the LO frequency and Magnet current are fixed during the measurement. The bottom section is linked to the "Meas Type" drop-down box located in the middle section, in that when a particular measurement type is selected, the appropriate parameters are set to either vary or to be fixed.

Table 1: SIS Measurement System Project Status		
Area	**Details**	**Notes and Status**
Software Development		
General Access-Based Measurement System		
Measurement user interface		Code written for the following measurements: 1. Bias Measurement with manual stepping of LO power 2. Bias Measurement with stepping of Magnet current
Hardware Interface		Will use most drivers from the interim Excel-based measurement system, but this remains untested. Driver code required for programmable power supply.
Spreadsheet results program		To be developed from prototype created in October.
Interim Measurement System using Excel Interface		Ready to be tested with real mixers.
Hardware Development		
Coax Switch Control Chassis		
	Power Supply and Noise Diode Source PCB	Parts and board received. Board being stuffed.
	Switch Controller PCB	Parts and board received. Board being stuffed.
	Switch Driver PCB	Board received, parts on order.
	Chassis wiring and construction	
Digital Interface and Refrigerator Chassis		
	Multiplexer & Refrig Control PCB	Board ready to be picked up, parts on order.
	VLBA Sensor Card	Complete board obtained from Socorro
	Chassis wiring and construction	
Rack Construction		
Pan's Rack		
JT-1		

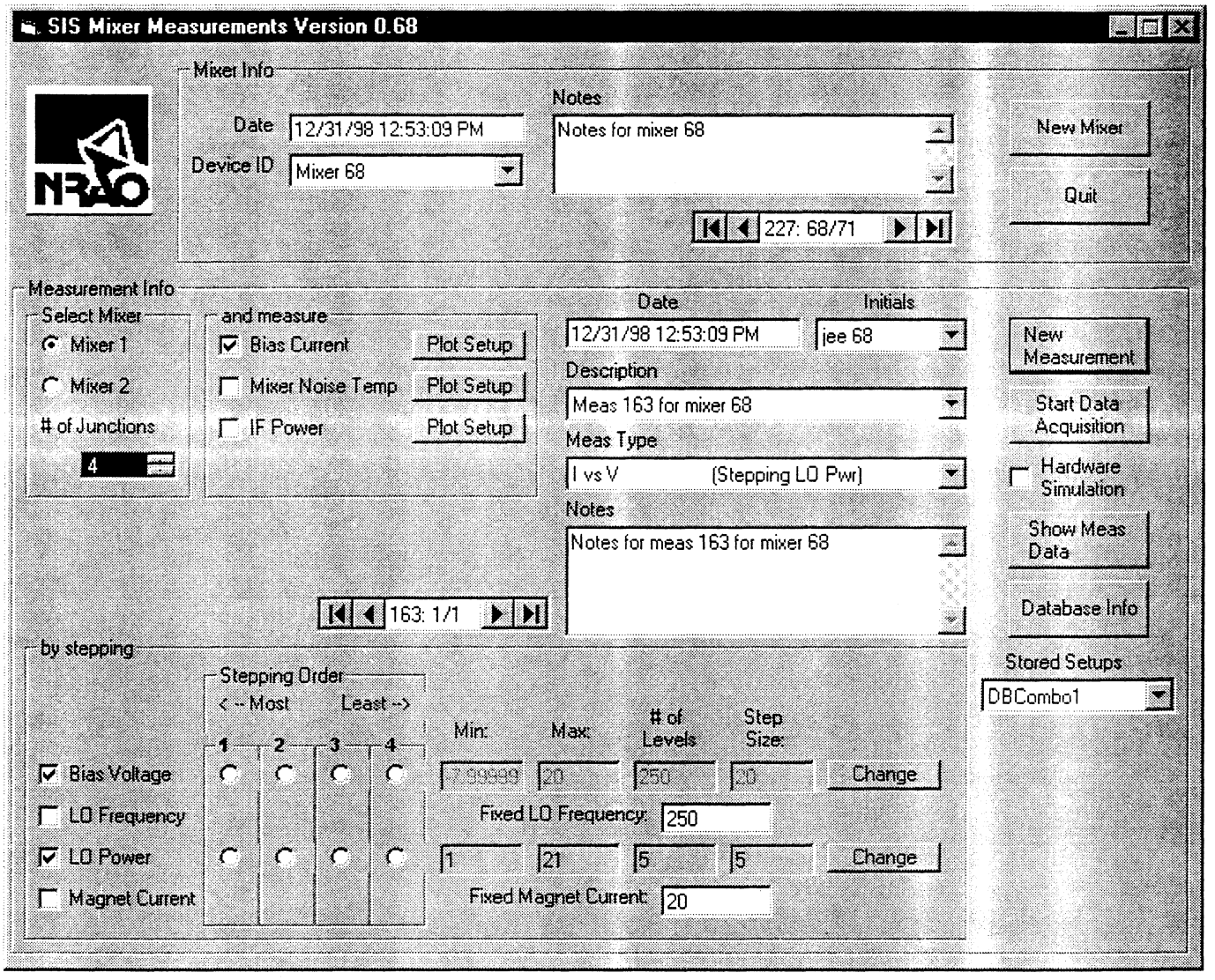
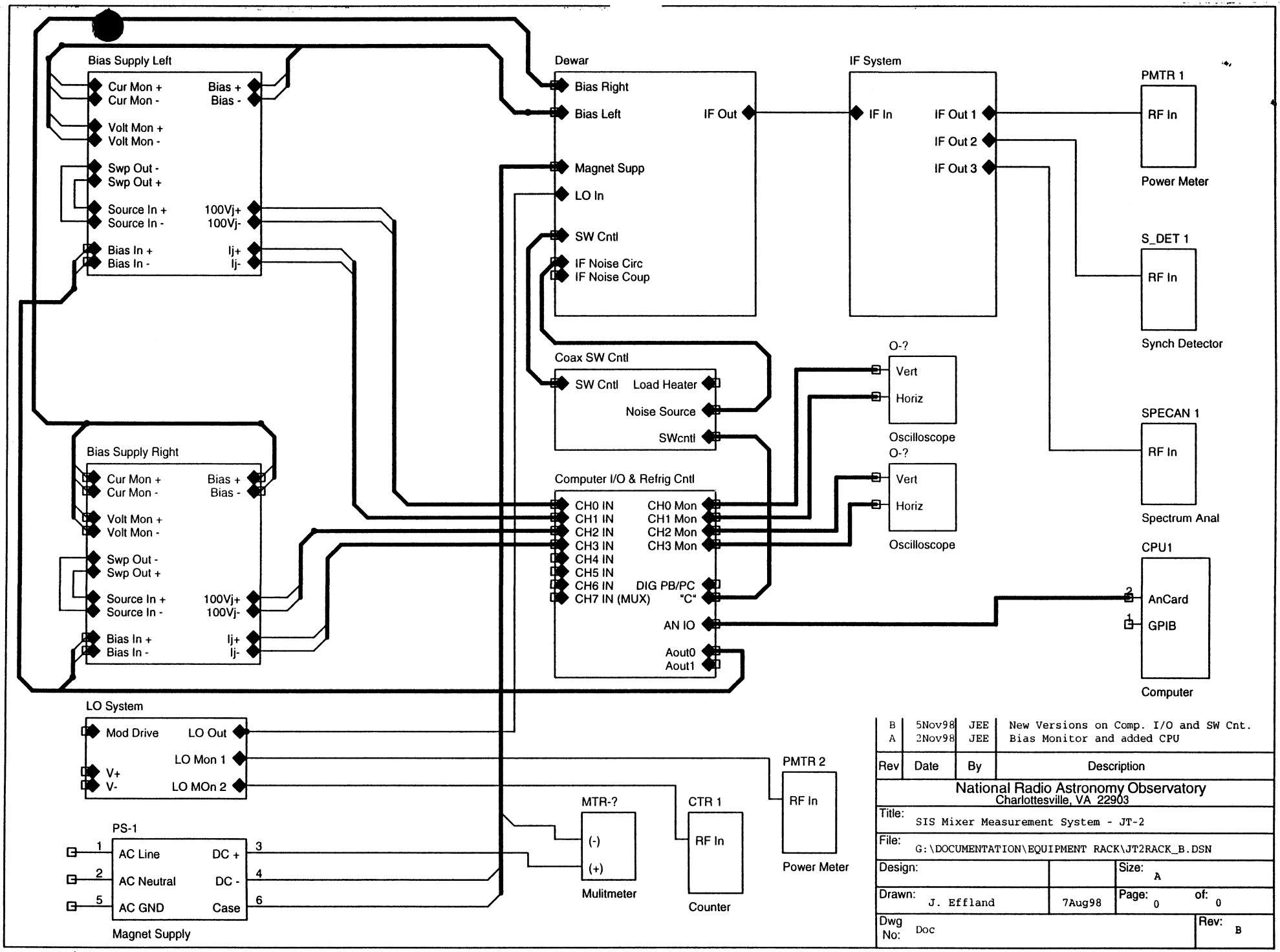


Figure 1 : Dialog Box for Data Aquisition System

Schematic Hierarchy



Rev	Date	By	Description
B	5Nov98	JEE	New Versions on Comp. I/O and SW Cnt.
A	2Nov98	JEE	Bias Monitor and added CPU

National Radio Astronomy Observatory
Charlottesville, VA 22903

Title: SIS Mixer Measurement System - JT-2

File: G:\DOCUMENTATION\EQUIPMENT RACK\JT2RACK_B.DSN

Design:

Size: A

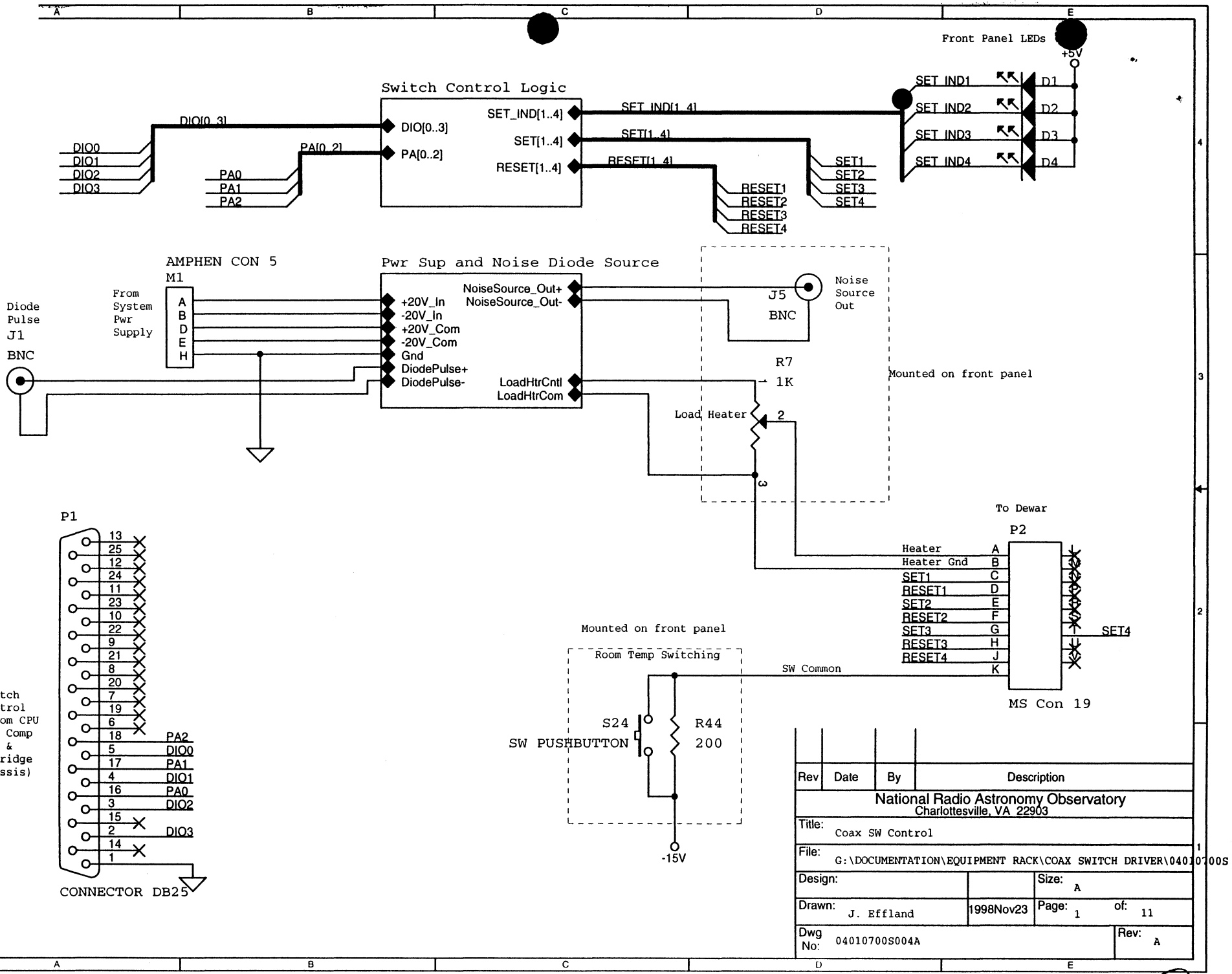
Drawn: J. Effland 7Aug98

Page: 0 of: 0

Dwg No: Doc

Rev: B

(1)



Rev	Date	By	Description

National Radio Astronomy Observatory
Charlottesville, VA 22903

Title: Coax SW Control			
File: G:\DOCUMENTATION\EQUIPMENT RACK\COAX SWITCH DRIVER\04010700S			
Design:		Size: A	
Drawn: J. Effland	1998Nov23	Page: 1	of: 11
Dwg No: 04010700S004A			Rev: A

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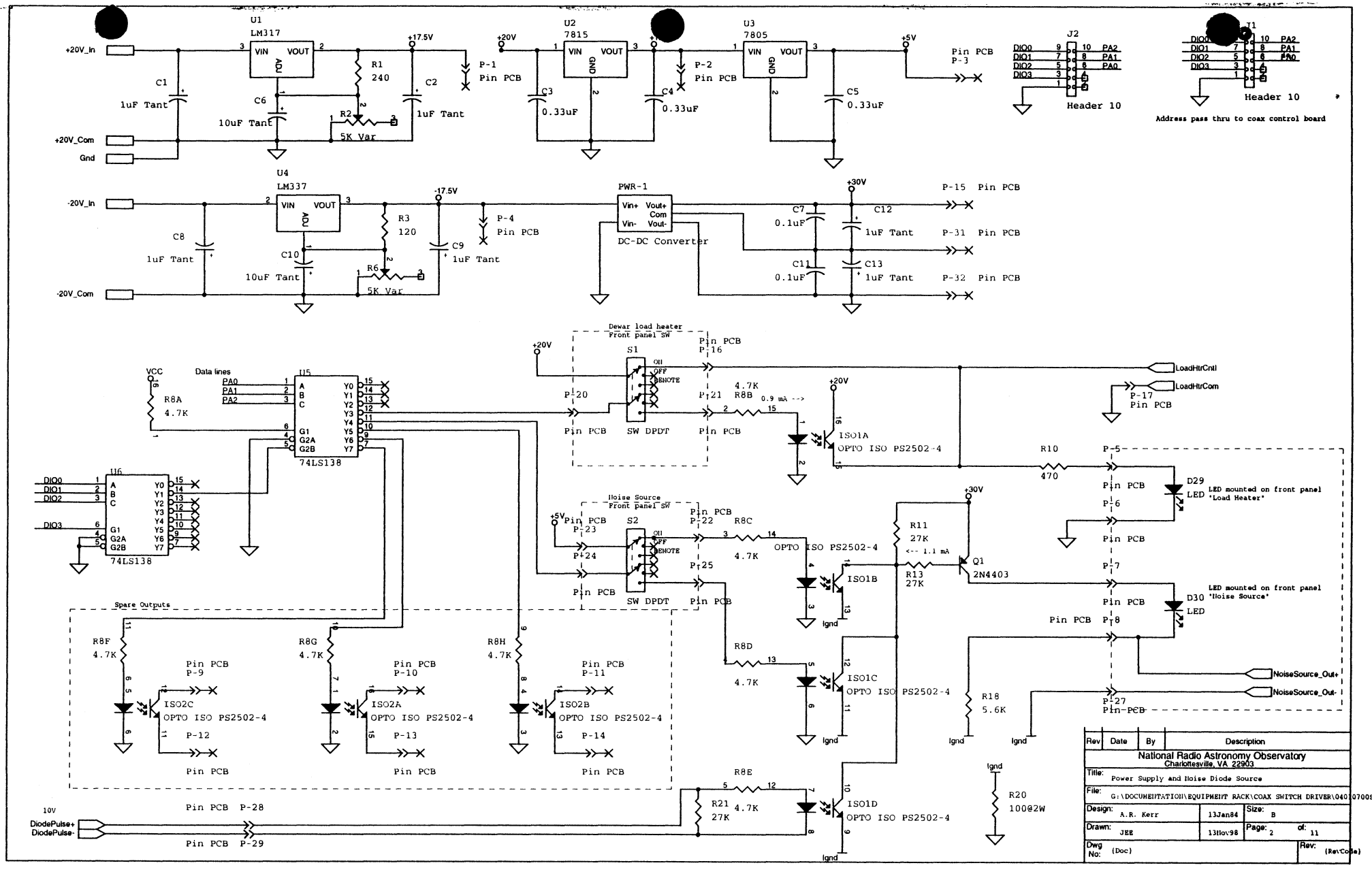
U1
LM317
+20V_In
+20V_Com
Gnd
C1
1uF Tant
C6
10uF Tant
R1
240
R2
5K Var
C2
1uF Tant
+17.5V
P-1
Pin PCB
U2
7815
+20V
C3
0.33uF
C4
0.33uF
P-2
Pin PCB
U3
7805
+5V
C5
0.33uF
Pin PCB
P-3
J2
Header 10
T1
Header 10
Address pass thru to coax control board
U4
LM337
-20V_In
-20V_Com
C8
1uF Tant
C10
10uF Tant
R3
120
R6
5K Var
C9
1uF Tant
-17.5V
P-4
Pin PCB
PWR-1
DC-DC Converter
+30V
C7
0.1uF
C12
1uF Tant
C11
0.1uF
C13
1uF Tant
P-15 Pin PCB
P-31 Pin PCB
P-32 Pin PCB
Dewar load heater
Front panel SW
S1
SW DPDT
P-20
P-21
R8B
4.7K
0.9 mA -->
ISO1A
OPTO ISO PS2502-4
LoadHtrCntl
LoadHtrCom
P-17
Pin PCB
R10
470
P-5
Pin PCB
P-6
D29
LED
LED mounted on front panel
'Load Heater'
VCC
Data lines
R8A
4.7K
U5
74LS138
PA0
PA1
PA2
U6
74LS138
DIO0
DIO1
DIO2
DIO3
Noise Source
Front panel SW
S2
SW DPDT
P-22
P-23
P-24
P-25
R8C
4.7K
ISO1B
OPTO ISO PS2502-4
R11
27K
<-- 1.1 mA
Q1
2N4403
R13
27K
P-7
Pin PCB
D30
LED
LED mounted on front panel
'Noise Source'
P-8
Pin PCB
Spare Outputs
R8F
4.7K
R8G
4.7K
R8H
4.7K
P-9
P-10
P-11
ISO2C
ISO2A
ISO2B
OPTO ISO PS2502-4
P-12
P-13
P-14
R8D
4.7K
ISO1C
OPTO ISO PS2502-4
R18
5.6K
NoiseSource_Out+
NoiseSource_Out-
P-27
Pin PCB
R8E
R21
27K
4.7K
ISO1D
OPTO ISO PS2502-4
R20
100@2W
lgnd
10V
DiodePulse+
DiodePulse-
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P-29
Rev
Date
By
Description
National Radio Astronomy Observatory
Charlottesville, VA 22903
Title: Power Supply and Noise Diode Source
File: G:\DOCUMENTATION\EQUIPMENT RACK\COAX SWITCH DRIVER\040107008004
Design: A.R. Kerr
13Jan84
Size: B
Drawn: JEE
13Nov98
Page: 2
of: 11
Dwg No: (Doc)
Rev: (Rev Code)

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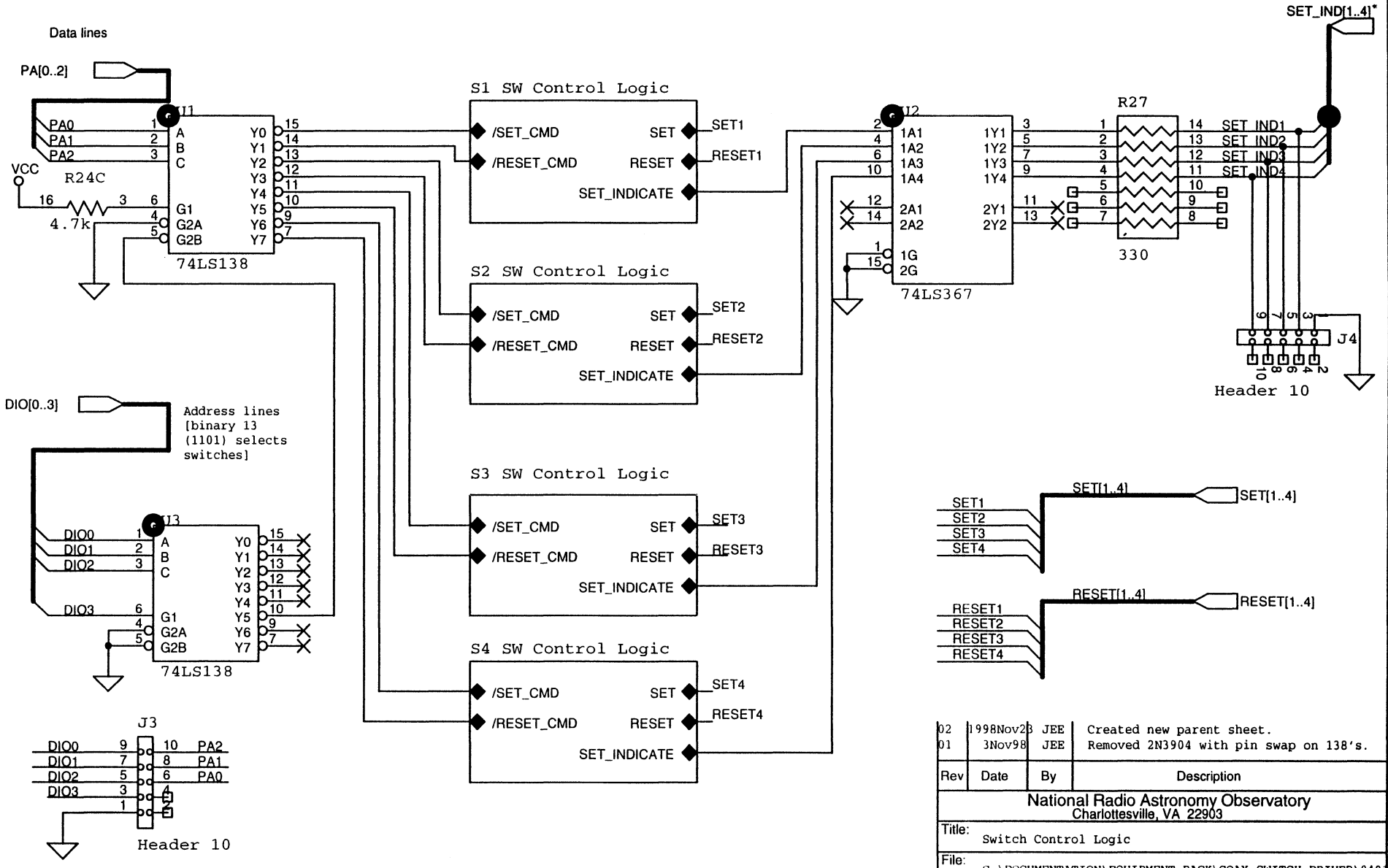

Rev	Date	By	Description
02	1998Nov23	JEE	Created new parent sheet.
01	3Nov98	JEE	Removed 2N3904 with pin swap on 138's.

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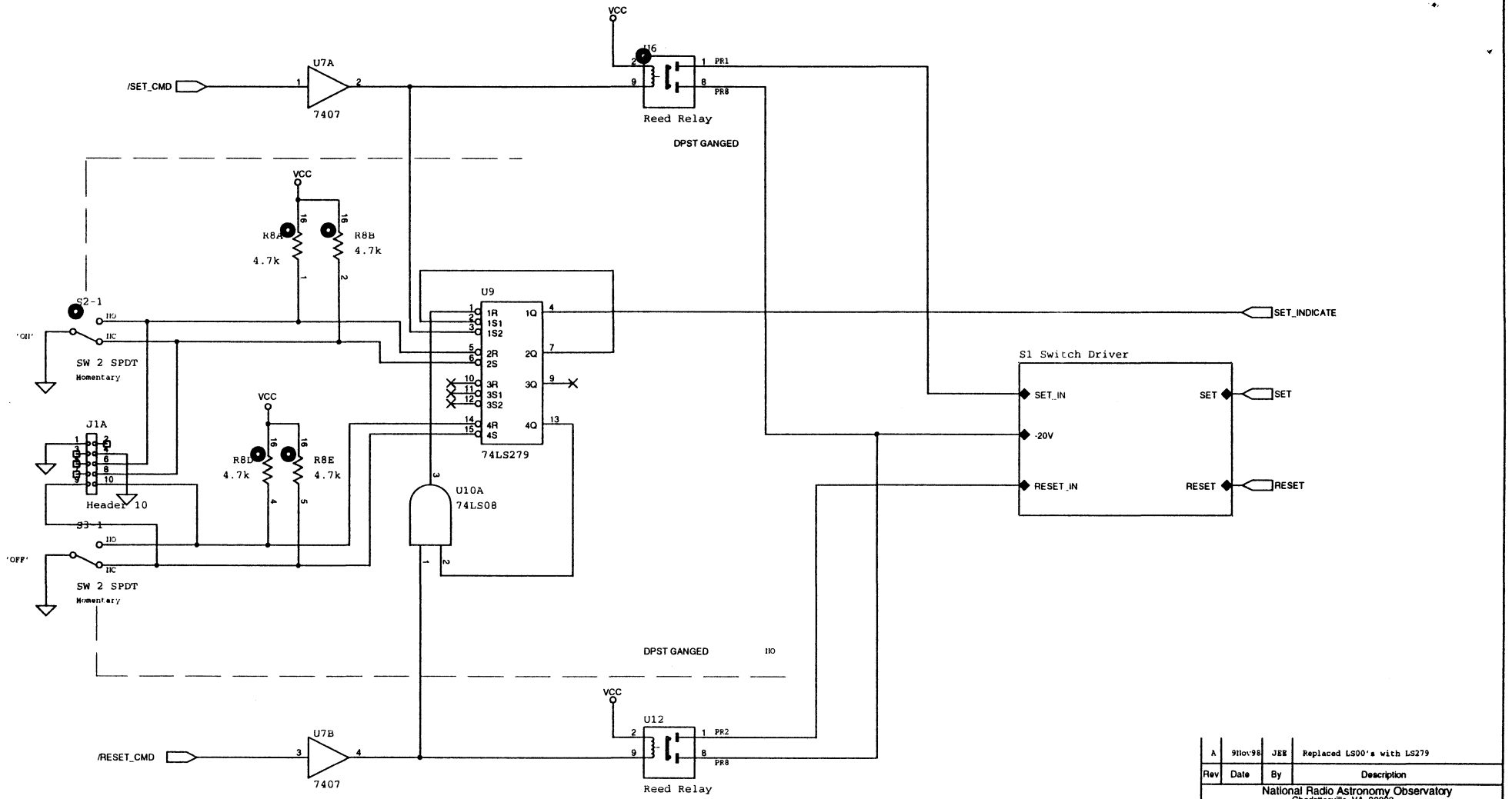
Charlottesville, VA 22903

Title: Switch Control Logic			
File: G:\DOCUMENTATION\EQUIPMENT RACK\COAX SWITCH DRIVER\04010700S			
Design: K. Crady		Size: A	
Drawn: J. Effland	7Aug98	Page: 7	of: 11
Dwg No: 04010700S004A			Rev: 02



Rev	Date	By	Description
A	9Nov98	JEE	Replaced LS00's with LS279

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Title:	S1 SW Control Logic
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Design:	K. Crady
Drawn:	K. Crady
Size:	B
Page:	3 of: 11
Dwg No:	040107005004-00
Rev:	A

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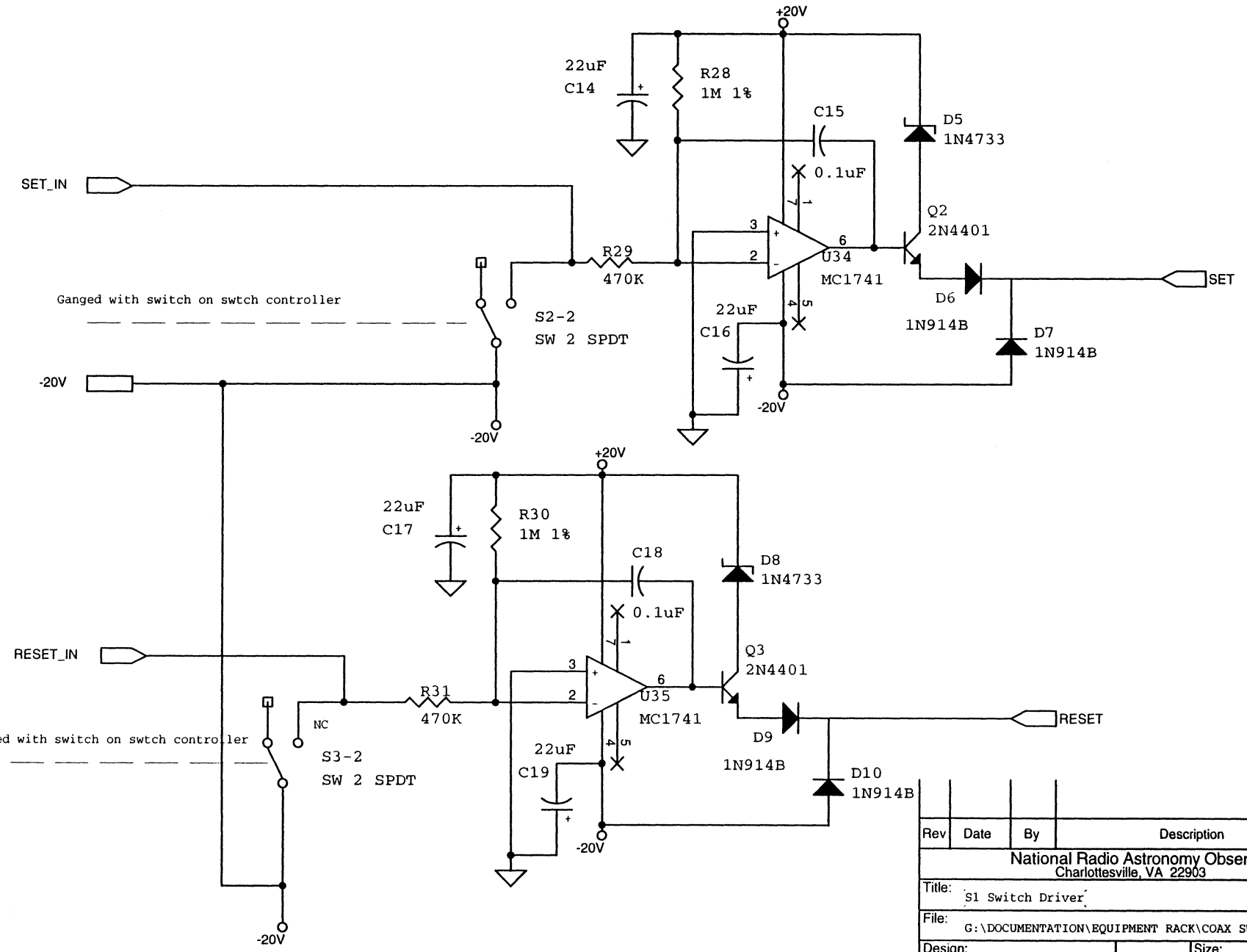

Rev	Date	By	Description

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Title: S1 Switch Driver			
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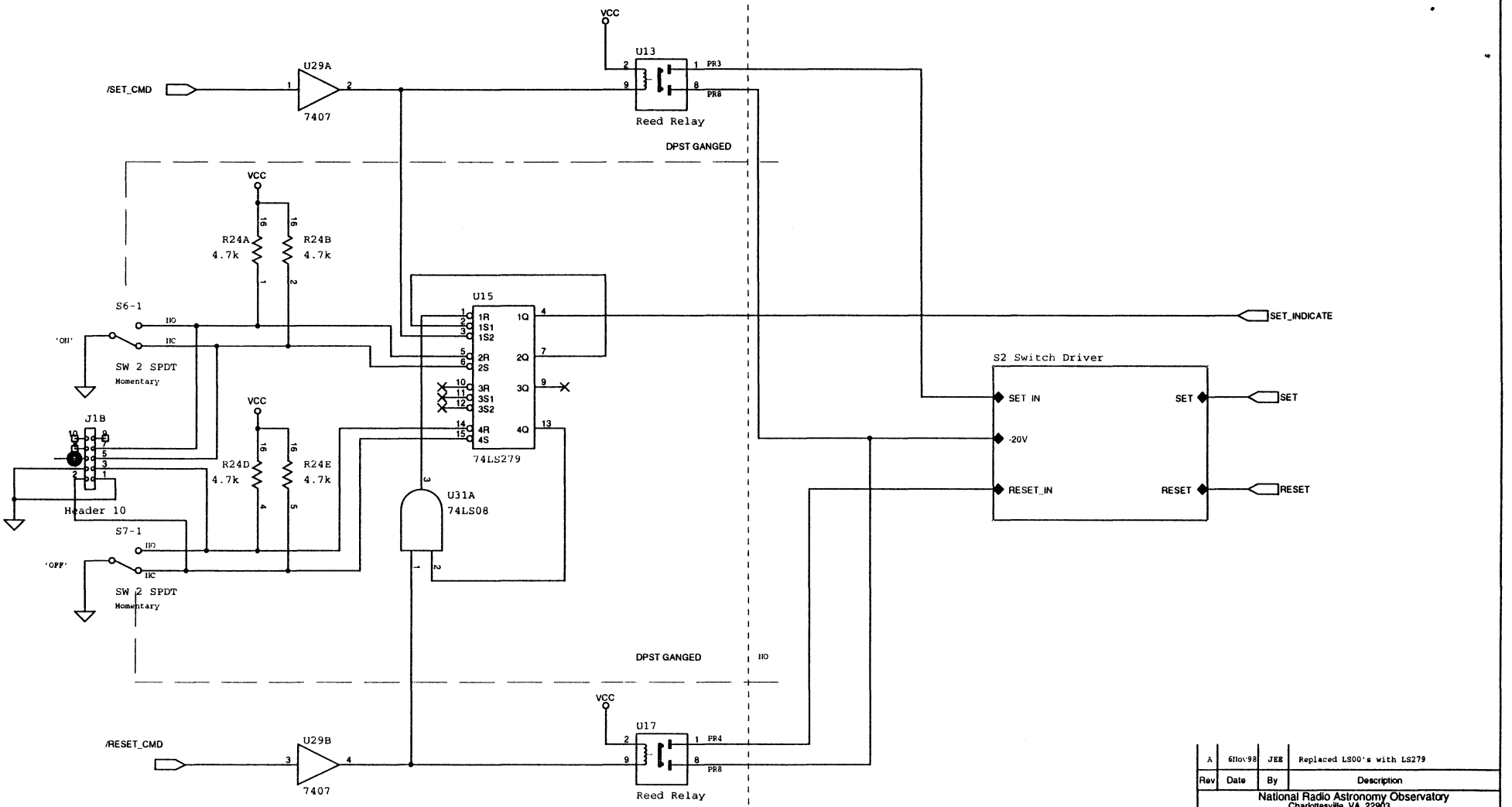
Design: A.R. Kerr		Size: A	
Drawn: Jee	11Nov98	Page: 8	of: 11
Dwg No: 04010700S004-00			Rev:

(6)



Rev	Date	By	Description
A	6Nov98	JEE	Replaced LS00's with LS279

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Title:	S2 SW Control Logic		
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Design: K. Crady		Size: B	
Drawn: K. Crady		Page: 4 of: 11	
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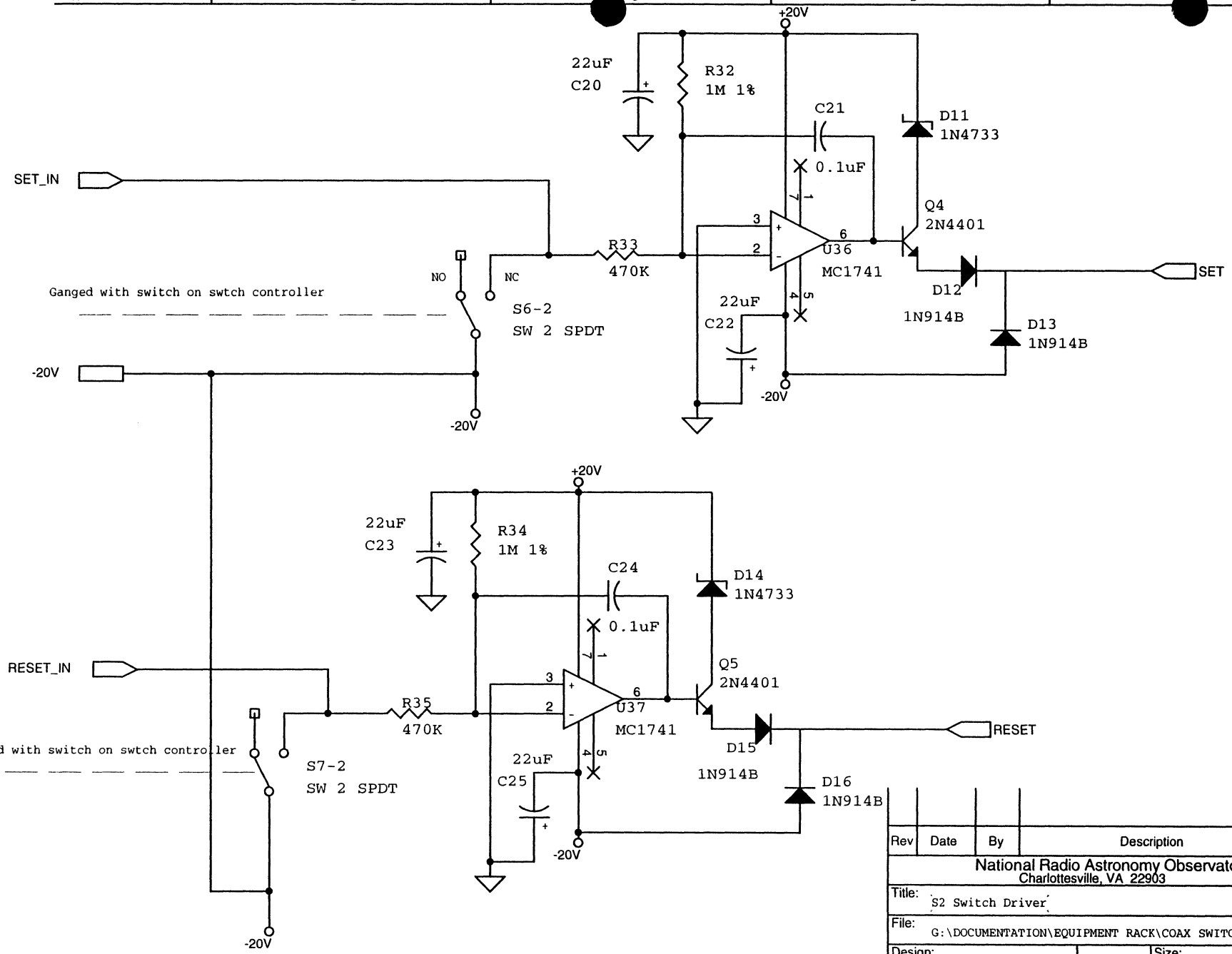

Rev	Date	By	Description

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Design: A.R. Kerr		Size: A	
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Dwg No: 04010700S004-00			Rev:

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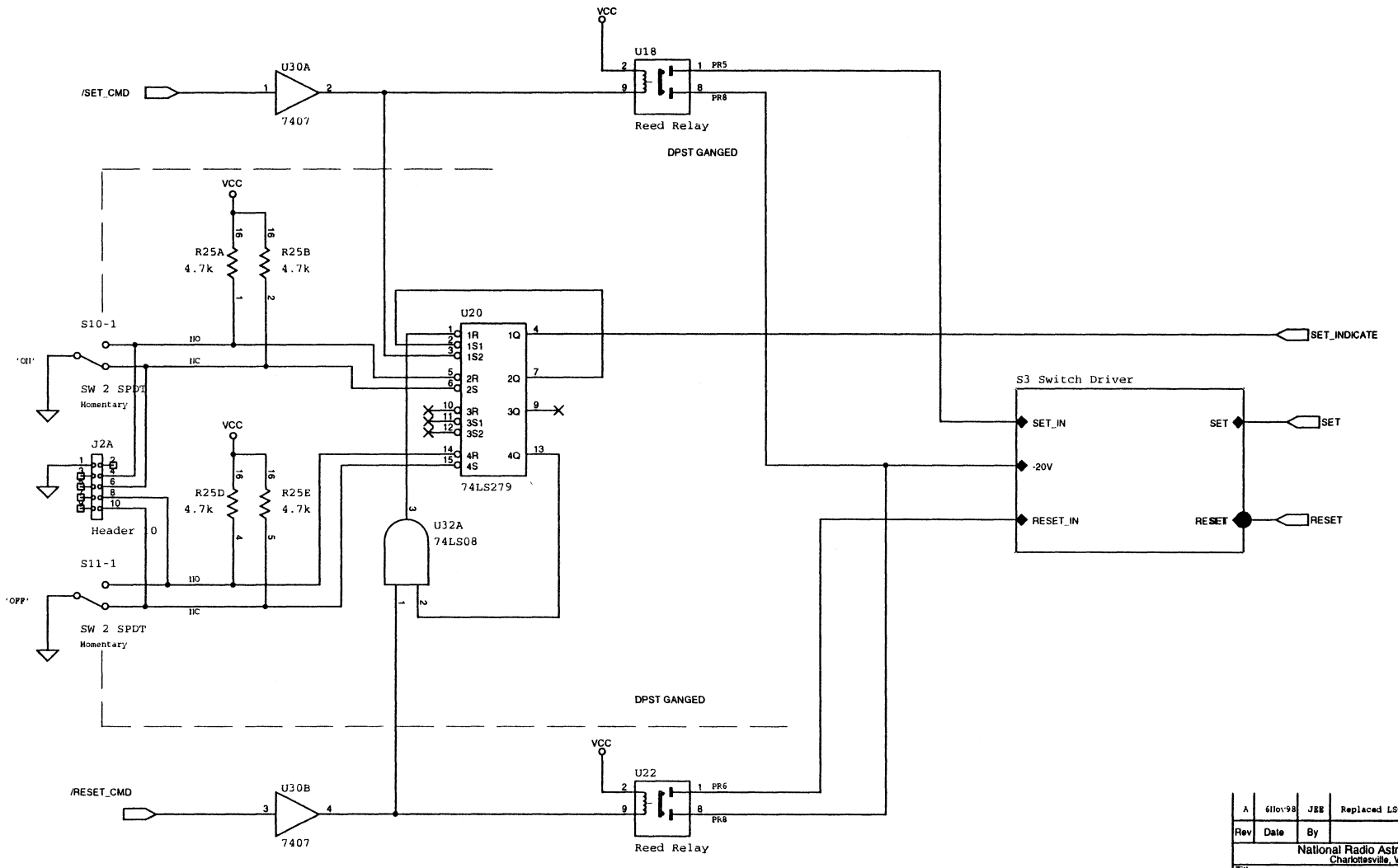

Rev	Date	By	Description
A	6Nov98	JEE	Replaced LS00's with LS279

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Title: S3 SW Control Logic			
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Drawn: K. Crady		Page: 5	of: 11
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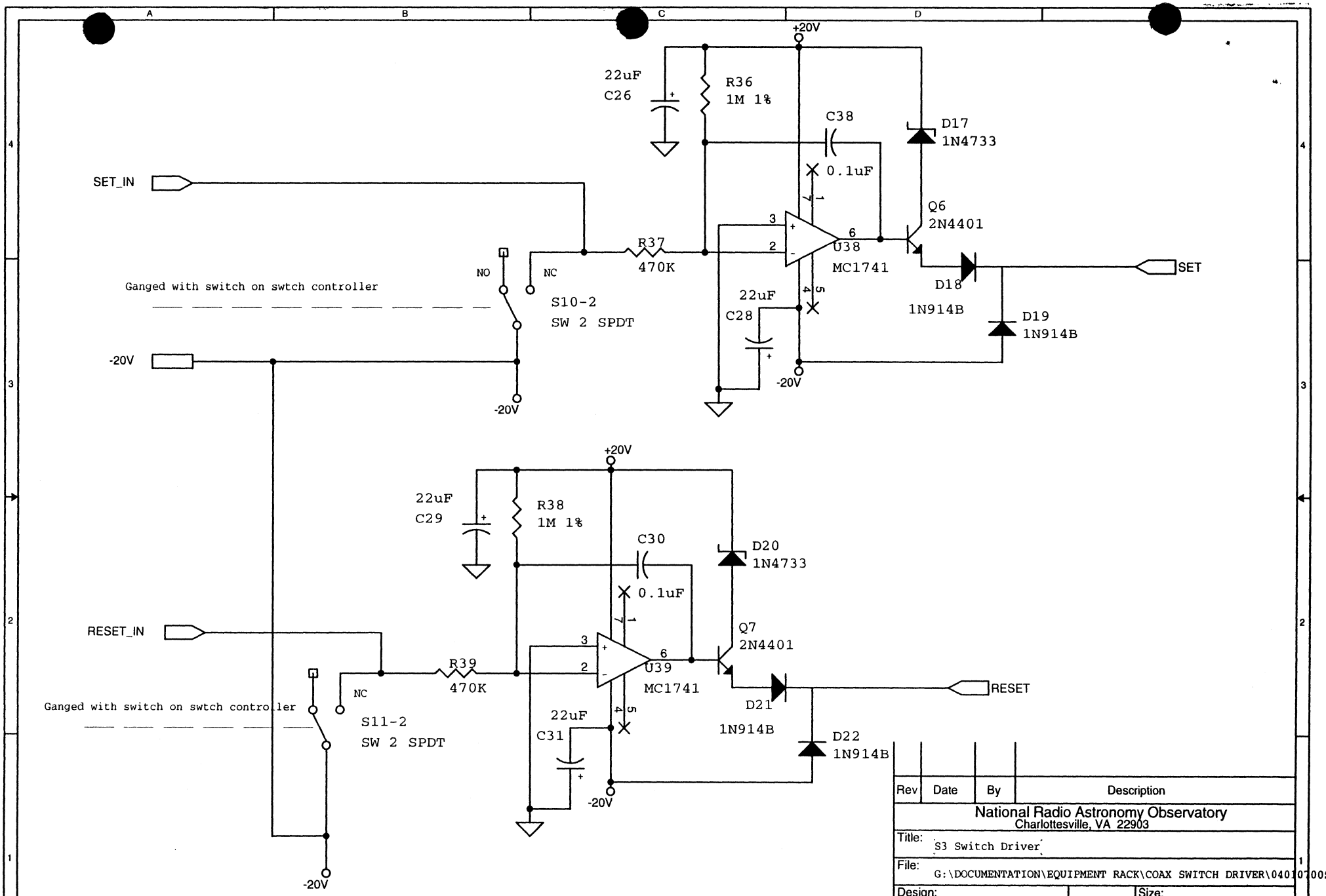

Rev	Date	By	Description

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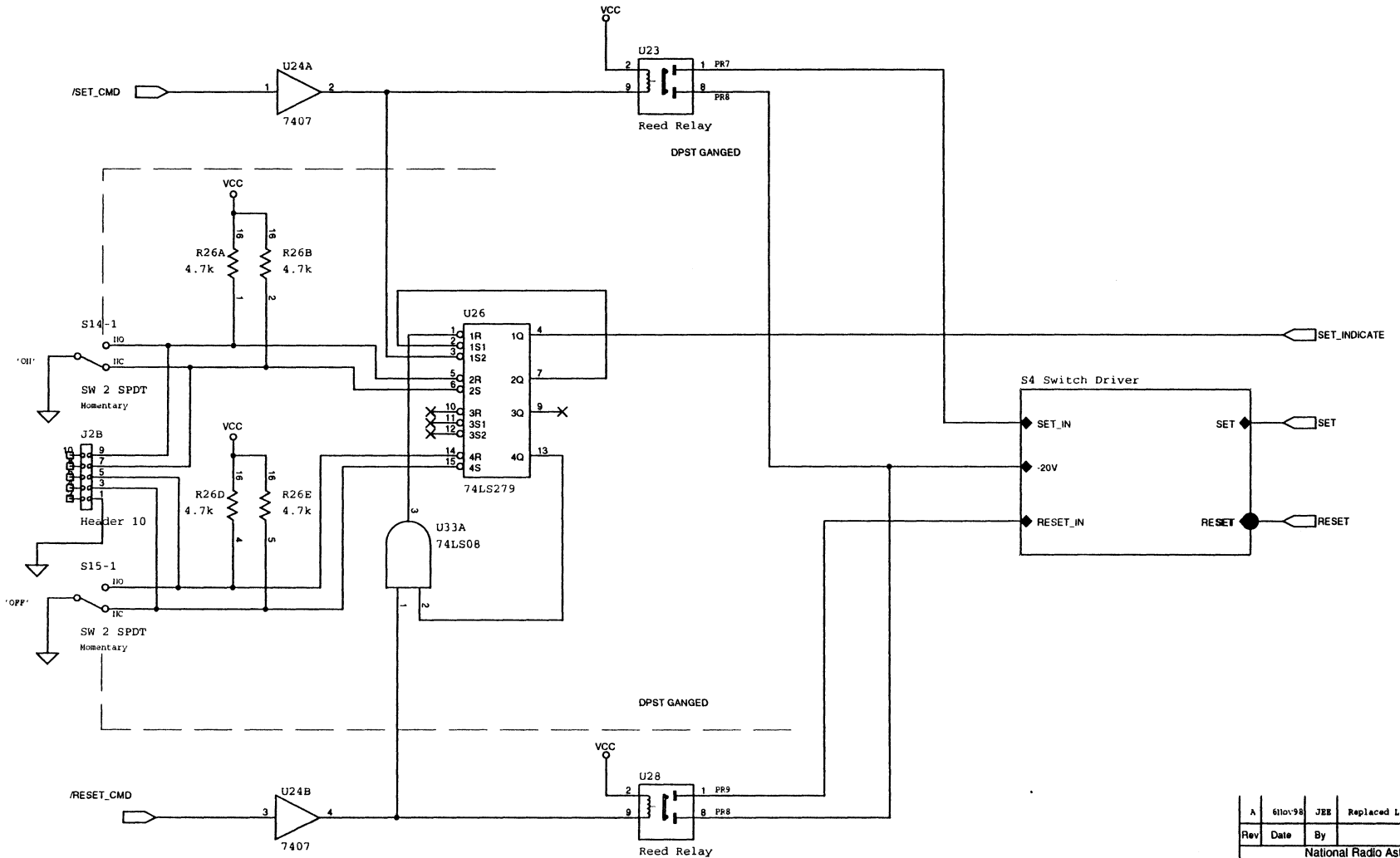
10



Rev	Date	By	Description
A	6Nov98	JEE	Replaced LS00's with LS279

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Title:	S4 SW Control Logic
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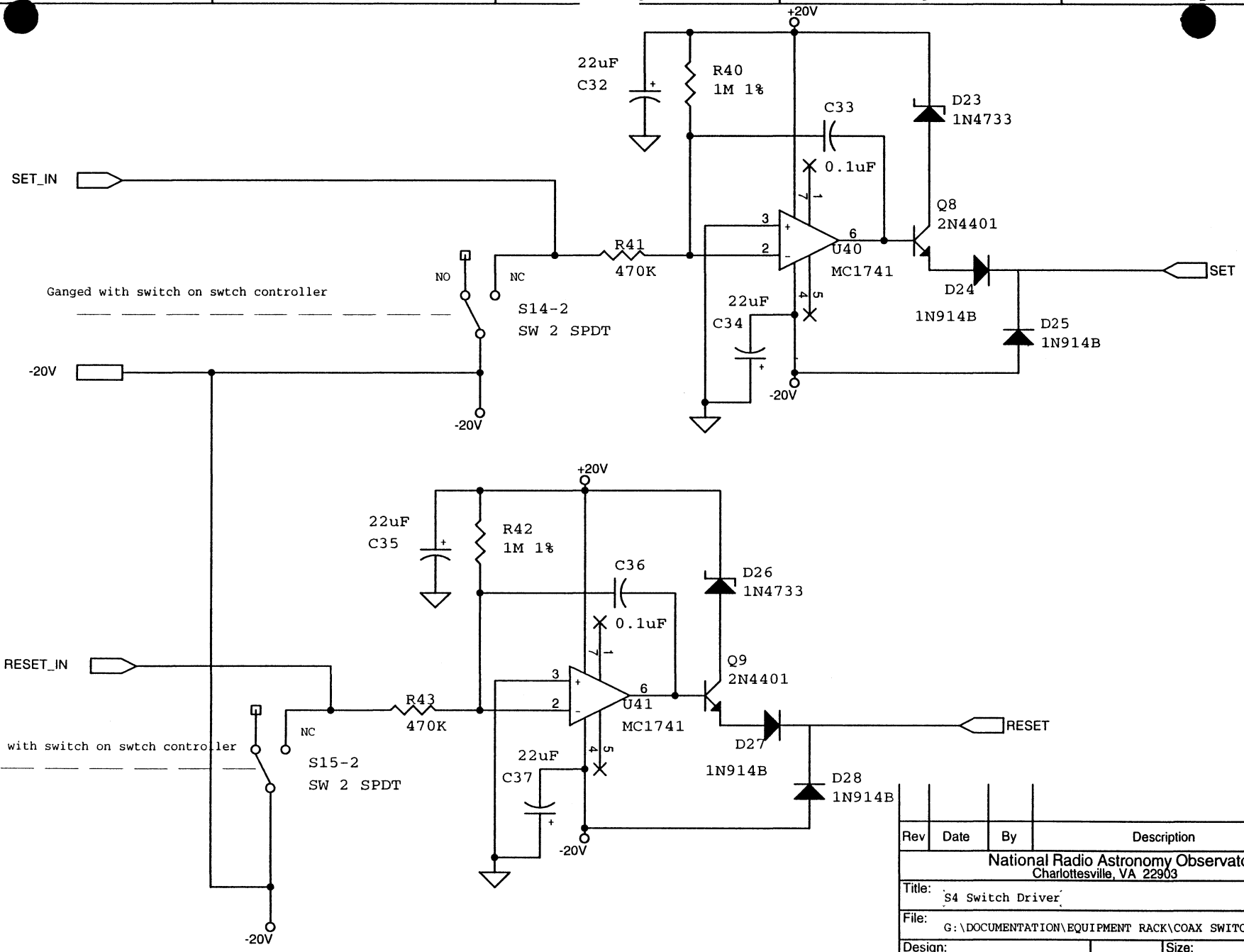
Design:	K. Crady
Drawn:	K. Crady
Size:	B
Page:	6 of: 11
Dwg No:	040107 00S004-00
Rev:	A



Rev	Date	By	Description

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Title: S4 Switch Driver			
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Design: A.R. Kerr		Size: A	
Drawn: Jee	11Nov98	Page: 11	of: 11
Dwg No: 04010700S004-00			Rev:

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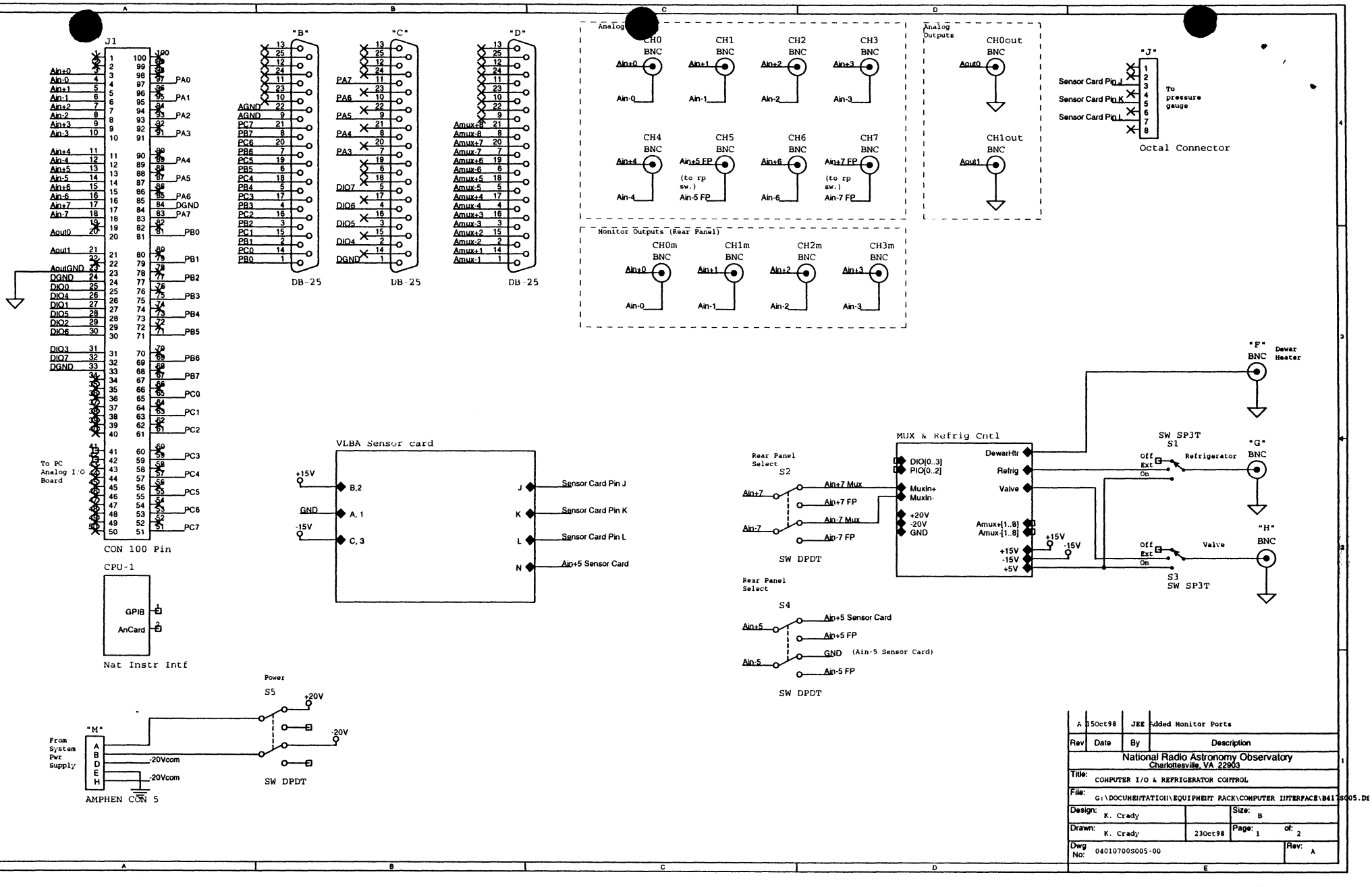


Rev	Date	By	Description
A	15Oct98	JEE	Added Monitor Ports

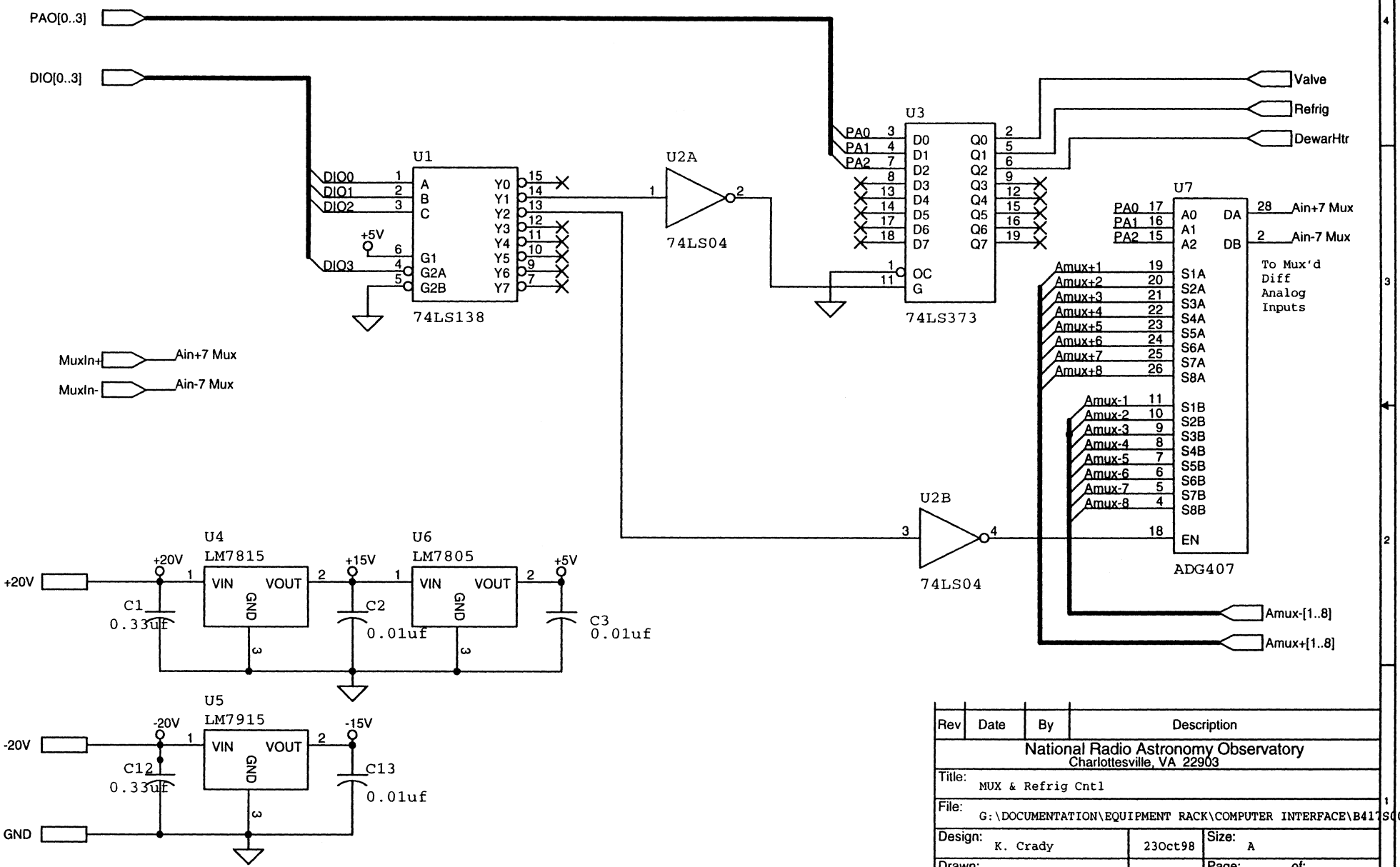
National Radio Astronomy Observatory
Charlottesville, VA 22903

Title: COMPUTER I/O & REFRIGERATOR CONTROL

File: G:\DOCUMENTATION\EQUIPMENT RACK\COMPUTER INTERFACE\B417S005.DS

Design: K. Crady		Size: B	
Drawn: K. Crady	23Oct98	Page: 1	of: 2
Dwg No: 04010700S005-00			Rev: A

13



Rev	Date	By	Description

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Charlottesville, VA 22903

Title: MUX & Refrig Cntl			
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Design: K. Crady	23Oct98	Size: A	
Drawn: JEE	15Dec98	Page: 2	of: 2
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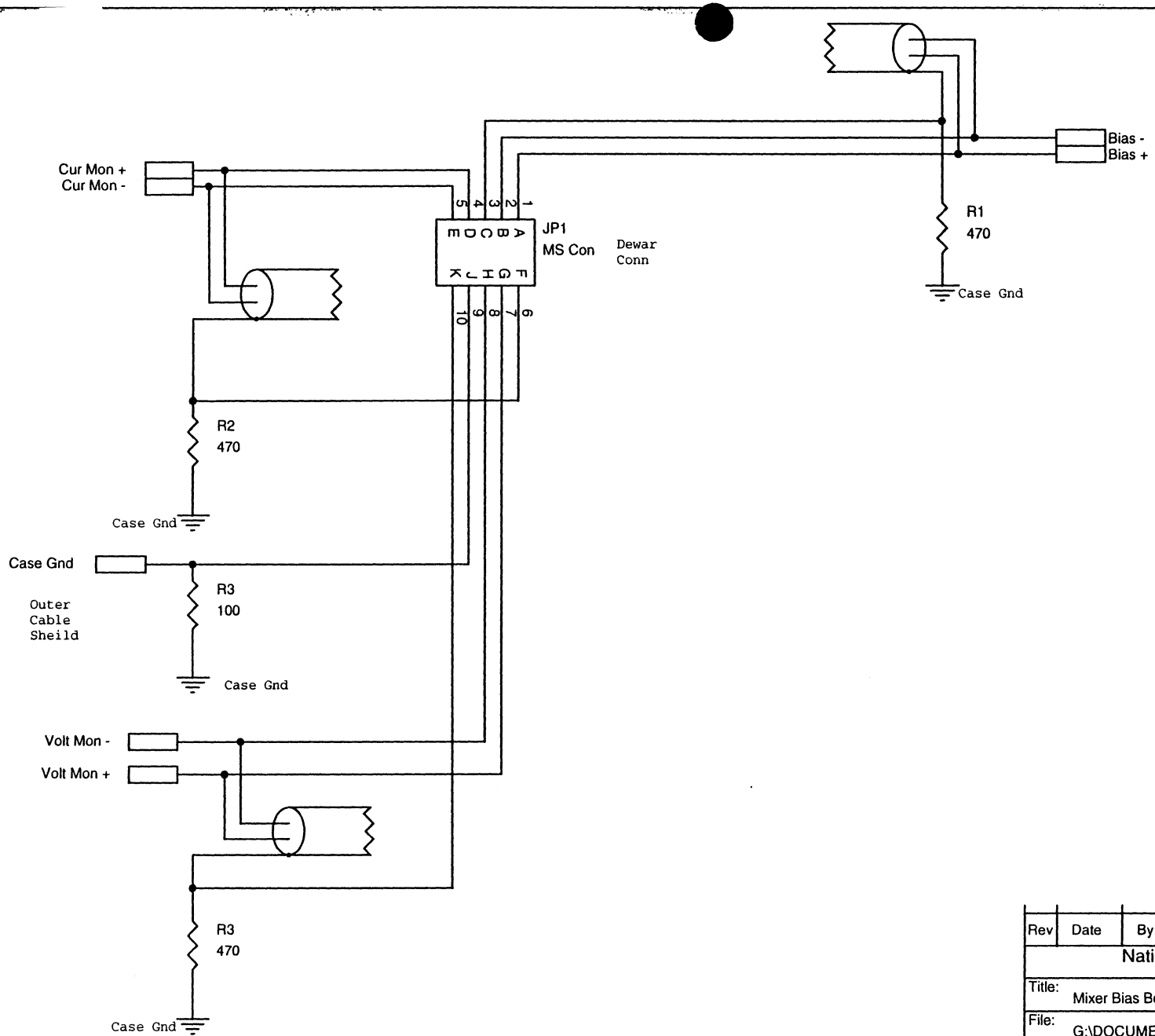

Rev	Date	By	Description
National Radio Astronomy Observatory Charlottesville, VA 22903			
Title: Mixer Bias Box			
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Design: Designed by		Size: A	
Drawn: J. Effland	7Aug98	Page: 0 of: 0	
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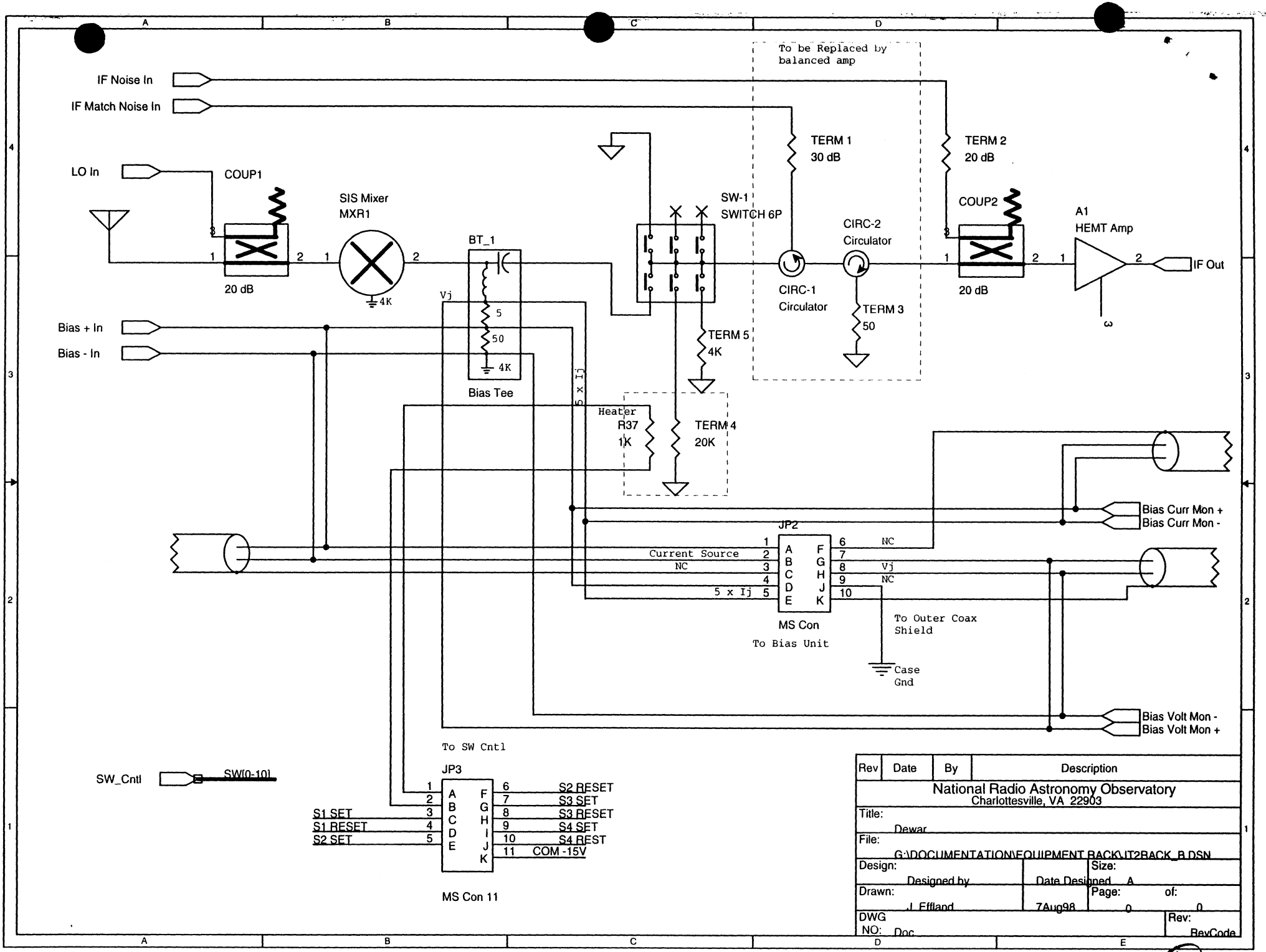

Rev	Date	By	Description

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Title: Dewar		
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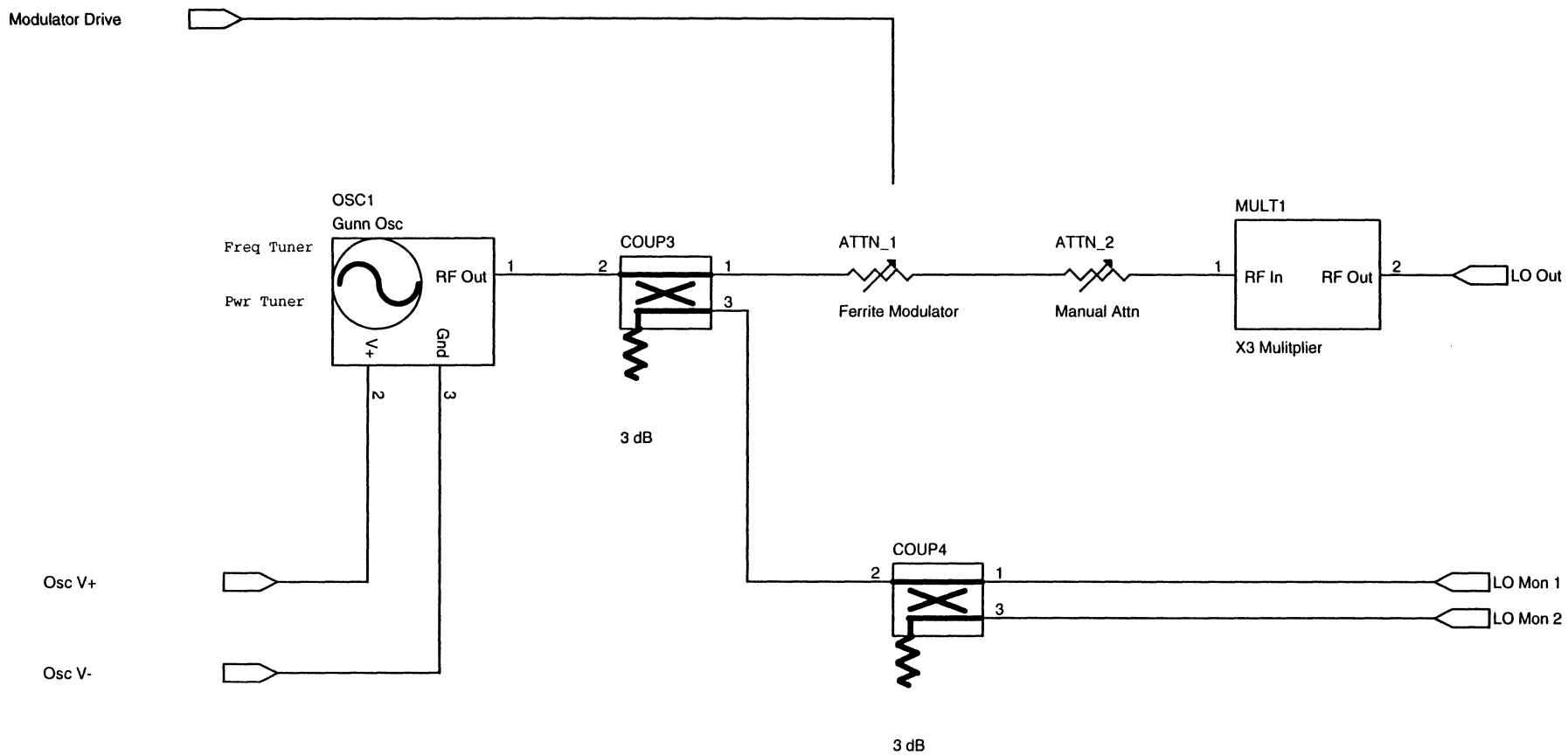
Design: Designed by	Date Designed 7Aug98	Size: A
Drawn: J. Effland		Page: 0 of: 0
DWG NO: Doc		Rev: RevCode



Rev	Date	By	Description

National Radio Astronomy Observatory
Charlottesville, VA 22903

Title: LO System			
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Design: Designed by		Size: A	
Drawn: J. Effland	7aug98	Page: 0	of: 0
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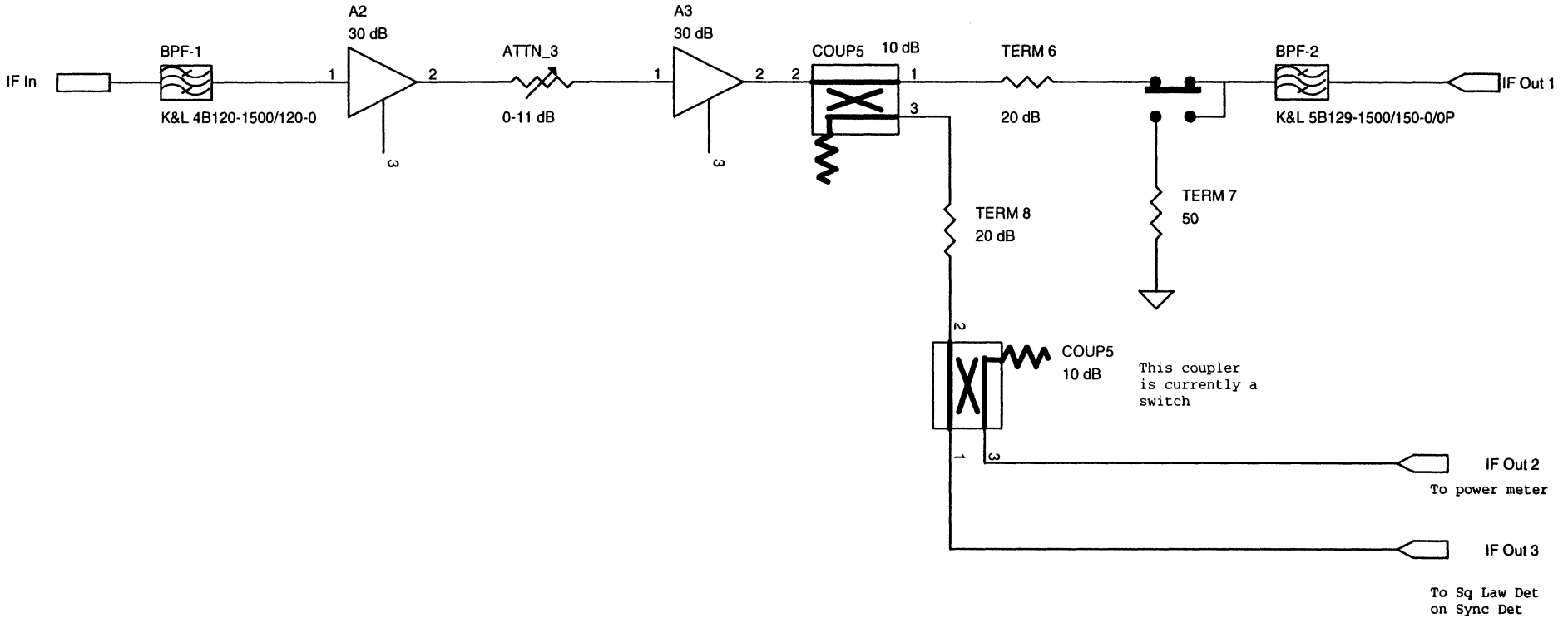

Rev	Date	By	Description

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Charlottesville, VA 22903

Title: IF System

File: G:\DOCUMENTATION\EQUIPMENT RACK\IT2RACK_B.DSN

Design:		Size:
Designed by	Date Designed	A
Drawn:		Page: of:
J. Effland	7Aug98	0 0
DWG NO: Doc		Rev: -

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