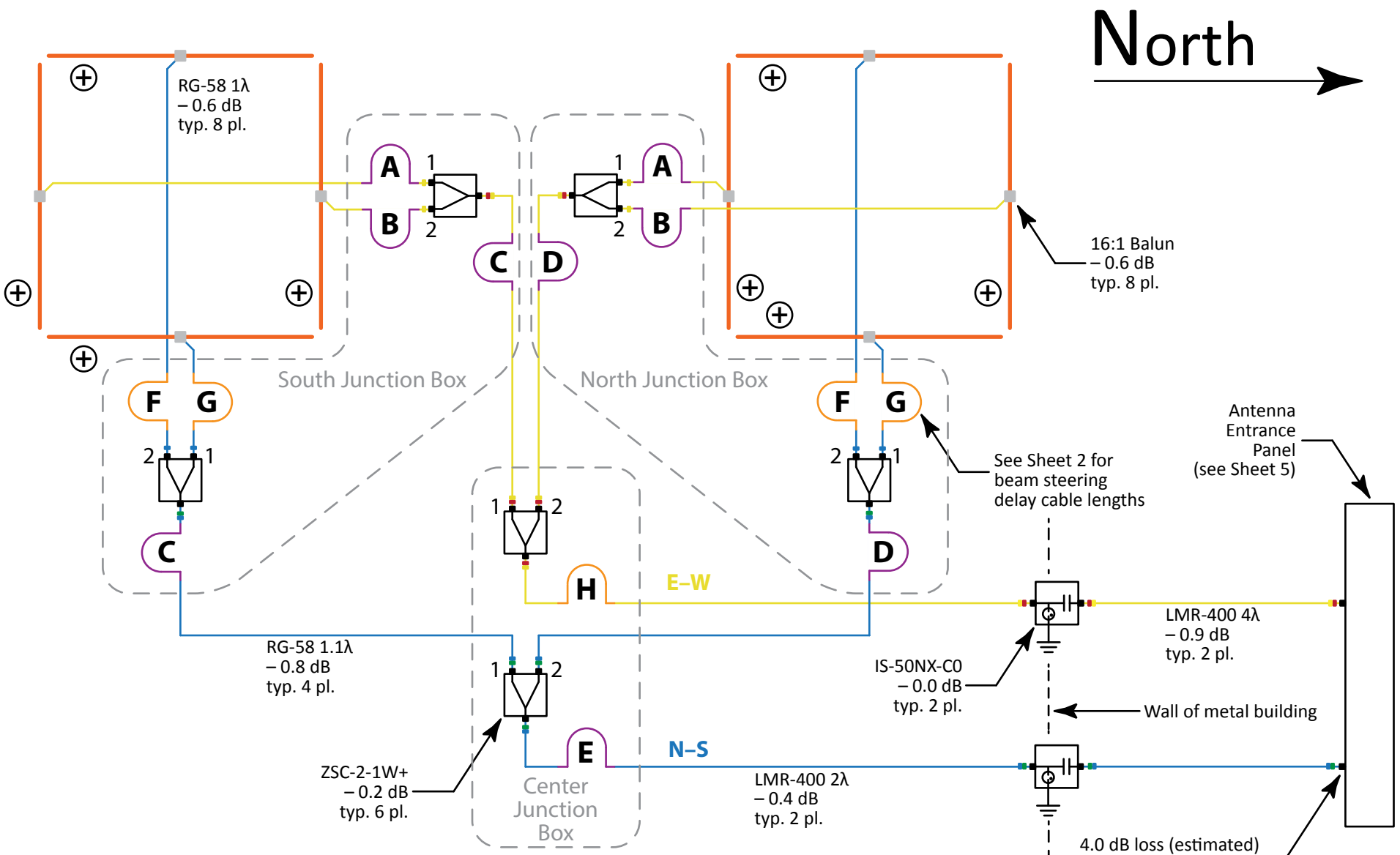


TFD ARRAY CONFIGURATION C CP MODE

See Sheet 5 for XY to CP 90° Hybrid

Noted coax lengths are in terms of wavelength at 20.1 MHz.

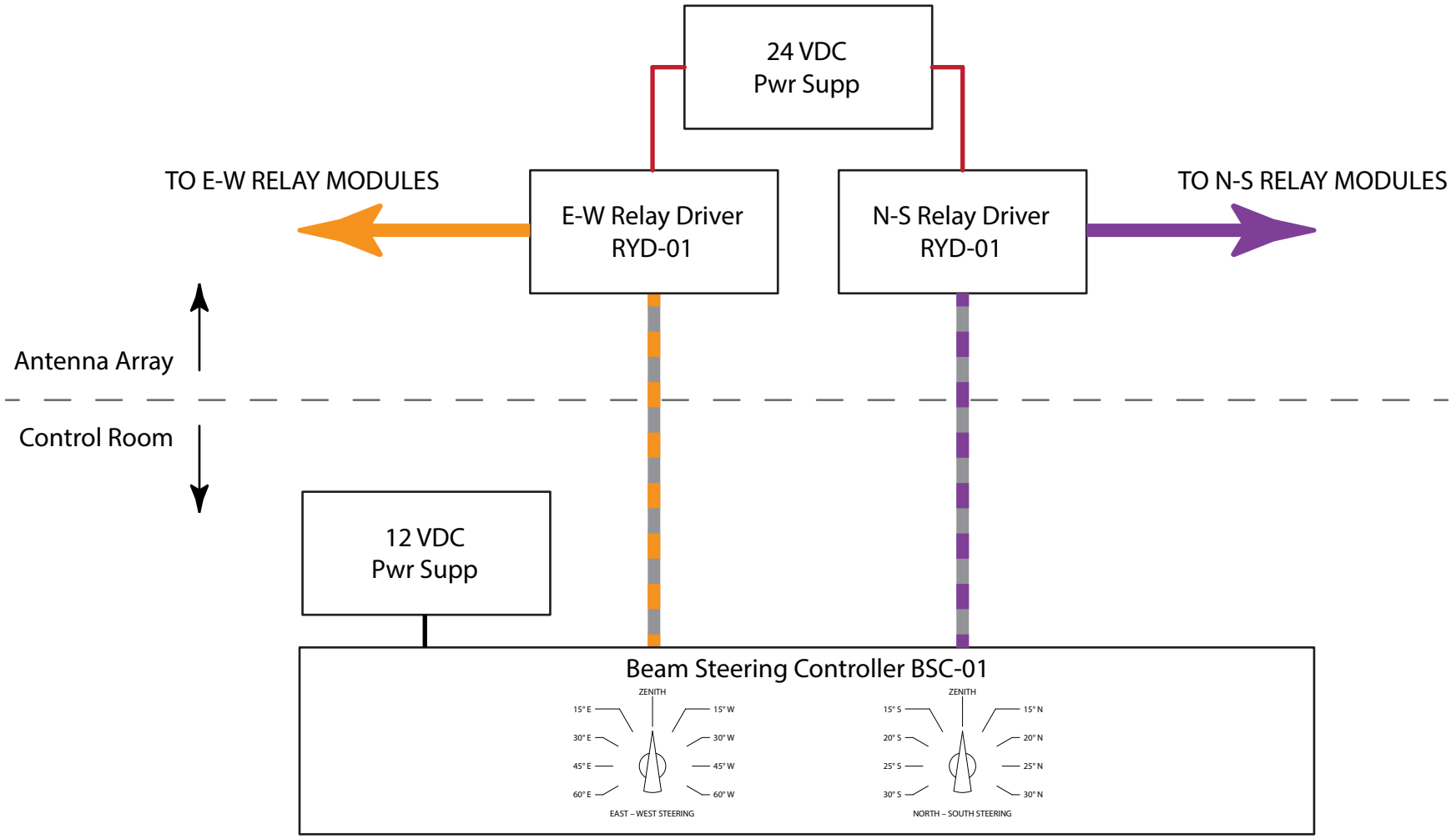
30' folded dipoles, top wire 9'2" height, 8" wire spacing, 32' element spacing, 800 Ω termination resistors, 16:1 baluns.

N-S BW ~10° E-W BW ~20° for < 3 dB response variance at 24 MHz

AJ4CO OBSERVATORY

TFD Array RF Signal Paths

Station Diagrams	SIZE	DATE	PART NUMBER	REV
	A	01 NOV 2014	N/A	
	SCALE	NONE	DRAWN BY DAVE TYPINSKI	SHEET 1 OF



AJ4CO OBSERVATORY

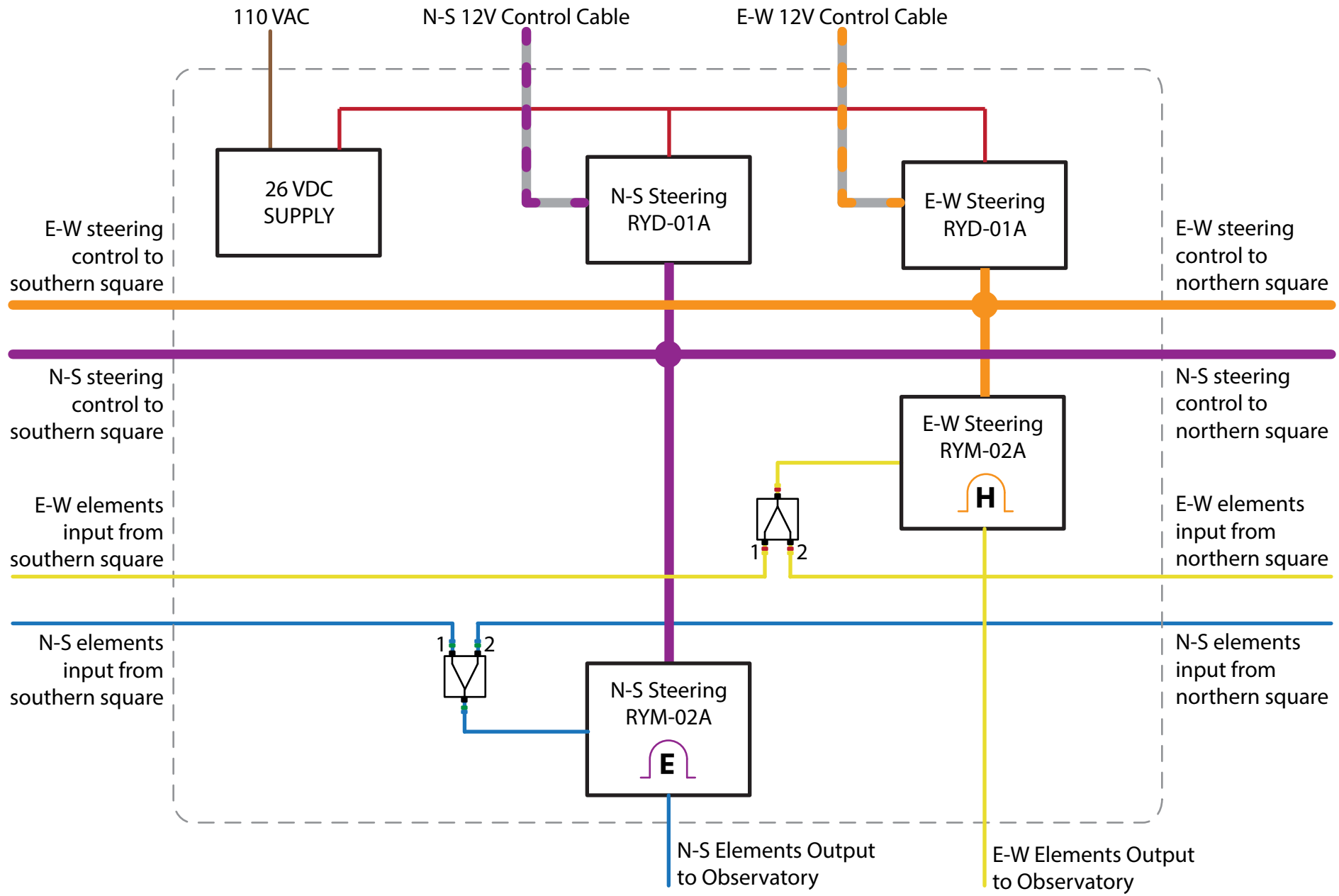
TFD Array Beam Steering

Station Diagrams

SIZE	DATE	DRAWN BY	REV
A	30-OCT-2014	DAVE TYPINSKI	A

SCALE 1:1

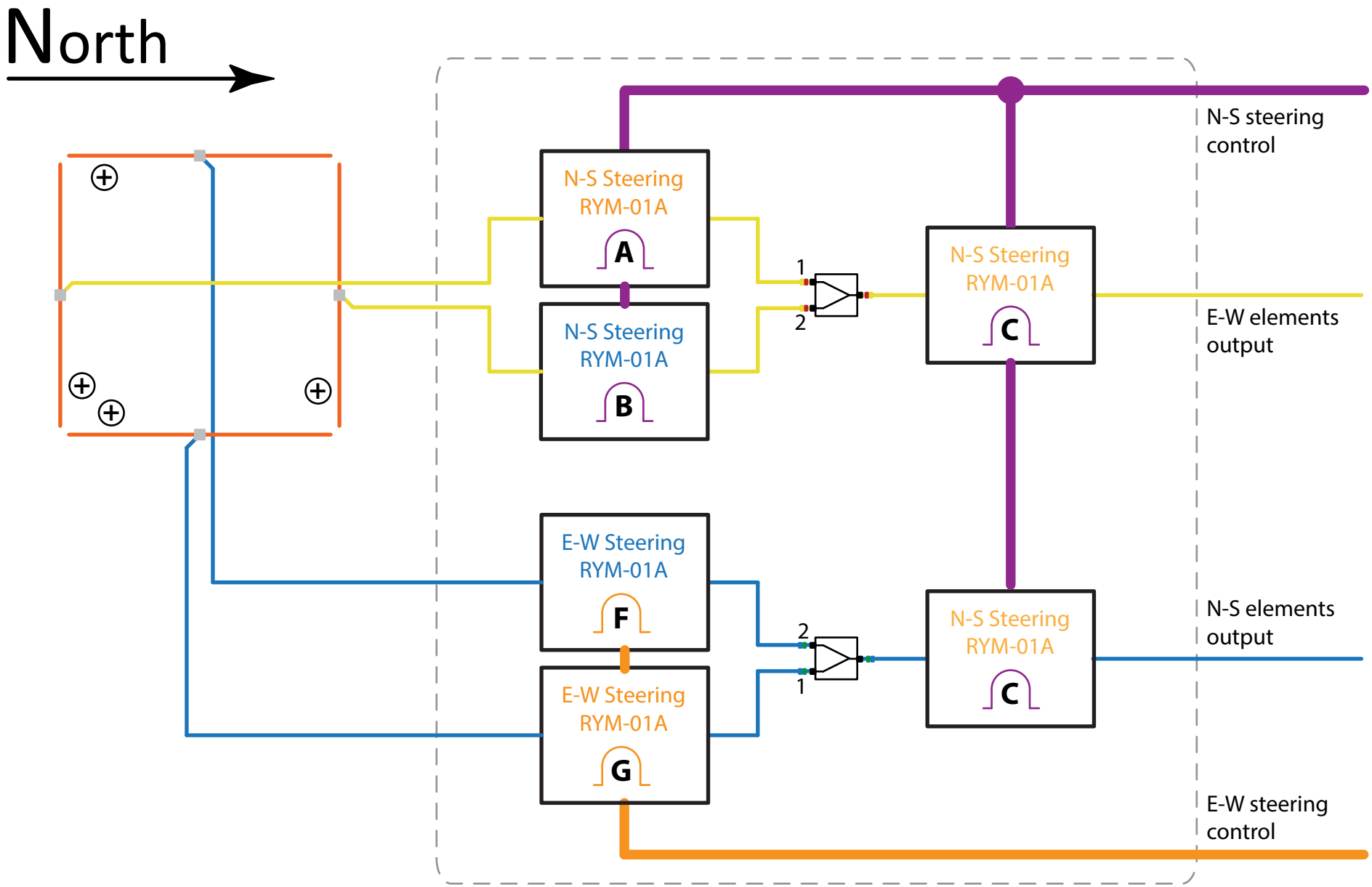
SHEET 2 OF



TFD Array Center Junction Box

NOTES:
1) See Observatory Diagram Sheets n through n for delay cable lengths.

AJ4CO OBSERVATORY	TFD Array Center Junction Box			
Station Diagrams	SIZE A	DATE 01 OCT 2014	PART NUMBER N/A	REV
	SCALE NONE	DRAWN BY DAVE TYPINSKI	SHEET 3 OF 1	



TFD Array Northern Junction Box

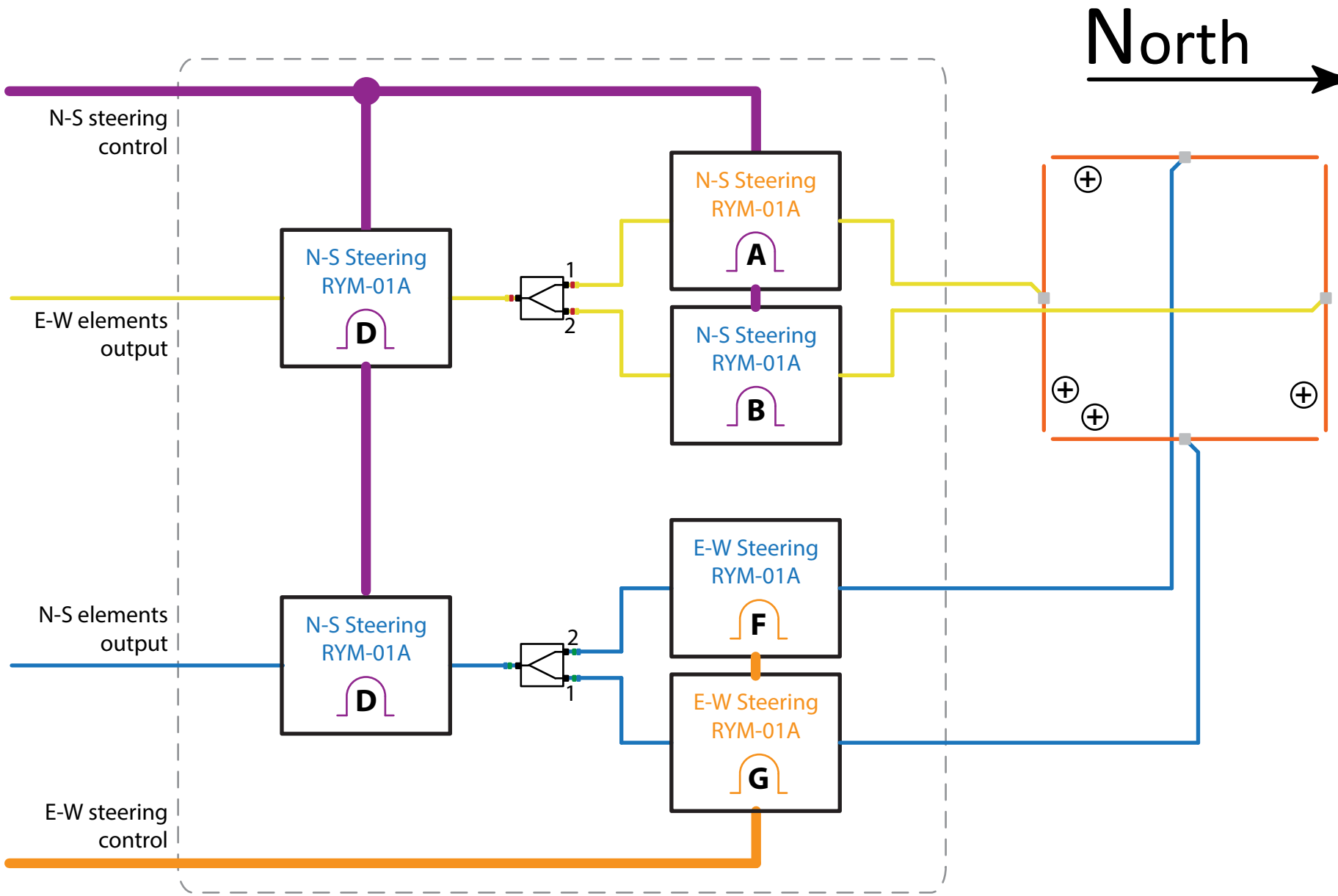
NOTES:

1) Color of text in RYM-01A boxes indicates Engage Line color
   ORG = South or East
   BLU = North or West

AJ4CO OBSERVATORY

TFD Array Southern Junction Box

Station Diagrams	SIZE A	DATE 01 OCT 2014	PART NUMBER N/A	REV
	SCALE NONE	DRAWN BY DAVE TYPINSKI	SHEET 5 OF	

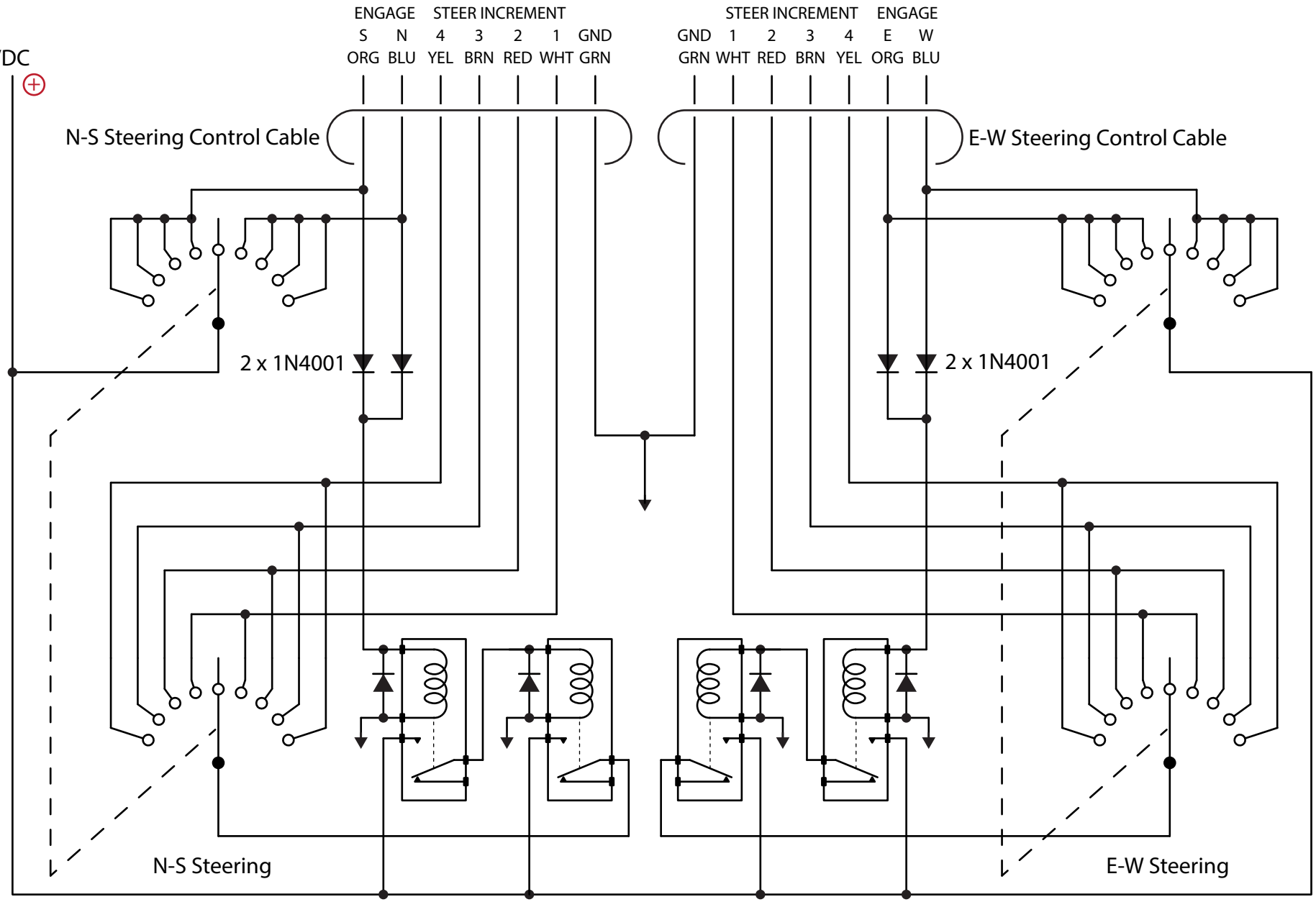


TFD Array Northern Junction Box

NOTES:

1) Color of text in RYM-01A boxes indicates Engage Line color
   ORG = South or East
   BLU = North or West

AJ4CO OBSERVATORY	TFD Array Northern Junction Box			
Station Diagrams	SIZE A	DATE 01 OCT 2014	PART NUMBER N/A	REV
	SCALE NONE	DRAWN BY DAVE TYPINSKI	SHEET 4 OF	



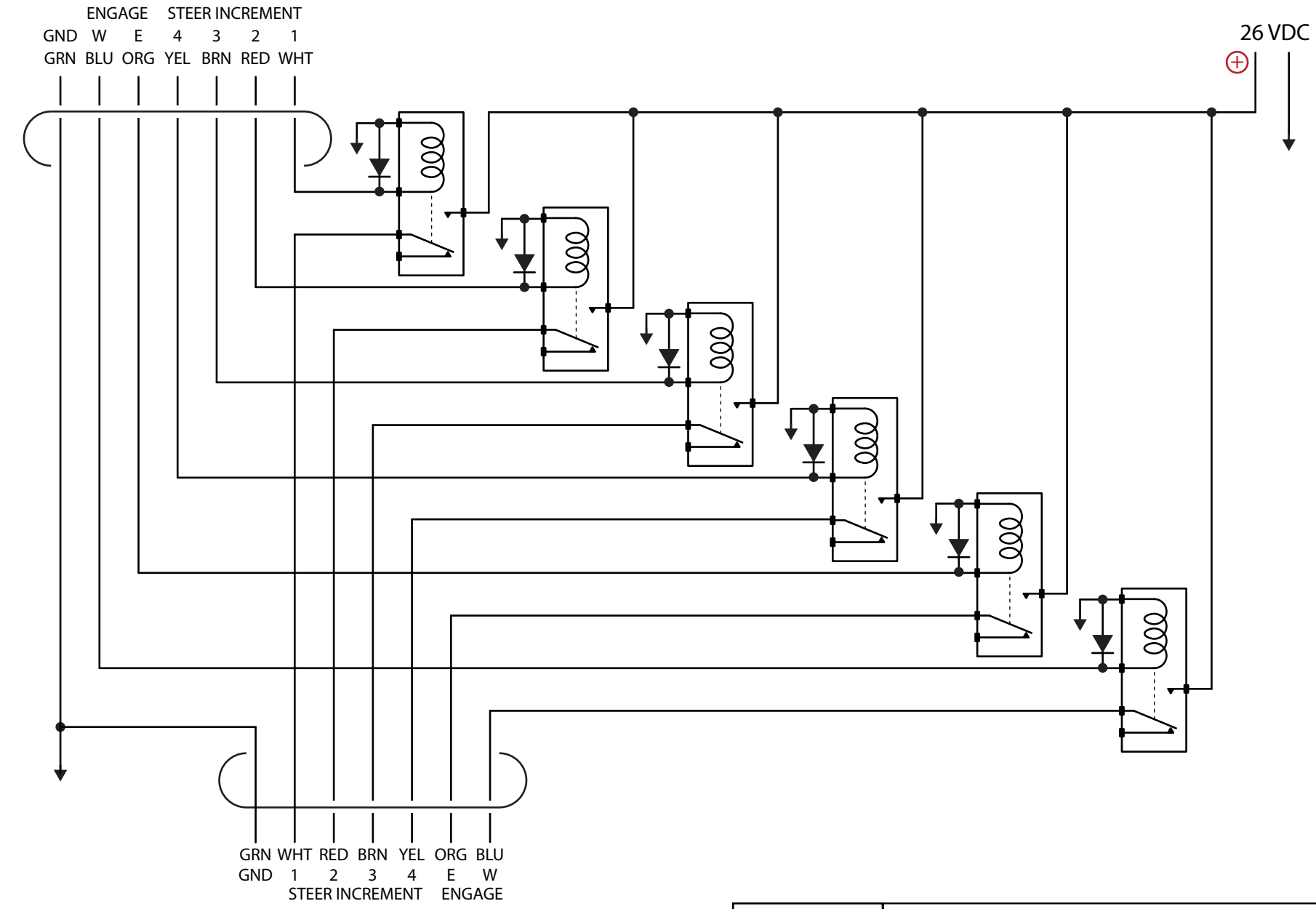
NOTES:
1) Rotary switches break before make, Mouser P/N 633-HS16-2N
2) Control cables 18/7 thermostat wire, Home Depot SKU 165468
3) SPDT relays Omron G2RL-14-E-DC12, 12 VDC, 33 mA
4) Diodes 1N4148 unless otherwise indicated

AJ4CO OBSERVATORY

Beam Steering Control

Station Diagrams

SIZE	DATE	DRAWN BY	REV
A	27-SEP-2014	DAVE TYPINSKI	A
SCALE 1:1	BSC-01	SHEET 6 OF	

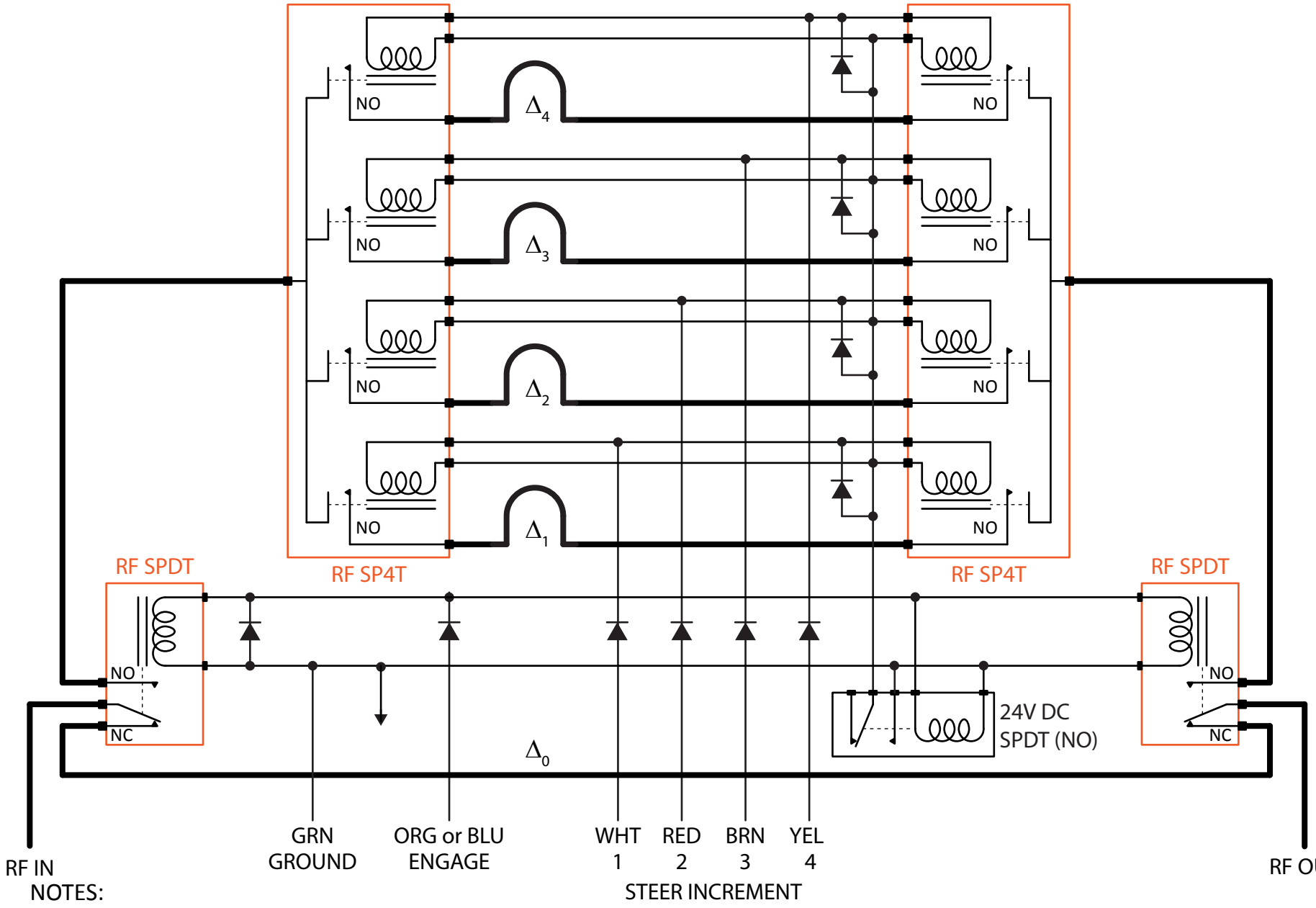


NOTES:
1) SPDT relays Omron G2RL-14-E-DC12, 12 VDC, 33 mA
2) EW RYD-01 shown, NS RYD-01 same layout
3) Diodes 1N4148

AJ4CO OBSERVATORY

Relay Driver RYD-01

Station Diagrams	SIZE A	DATE 29-SEP-2014	DRAWN BY DAVE TYPINSKI	REV A
	SCALE 1:1	RYD-01	SHEET 7 OF	



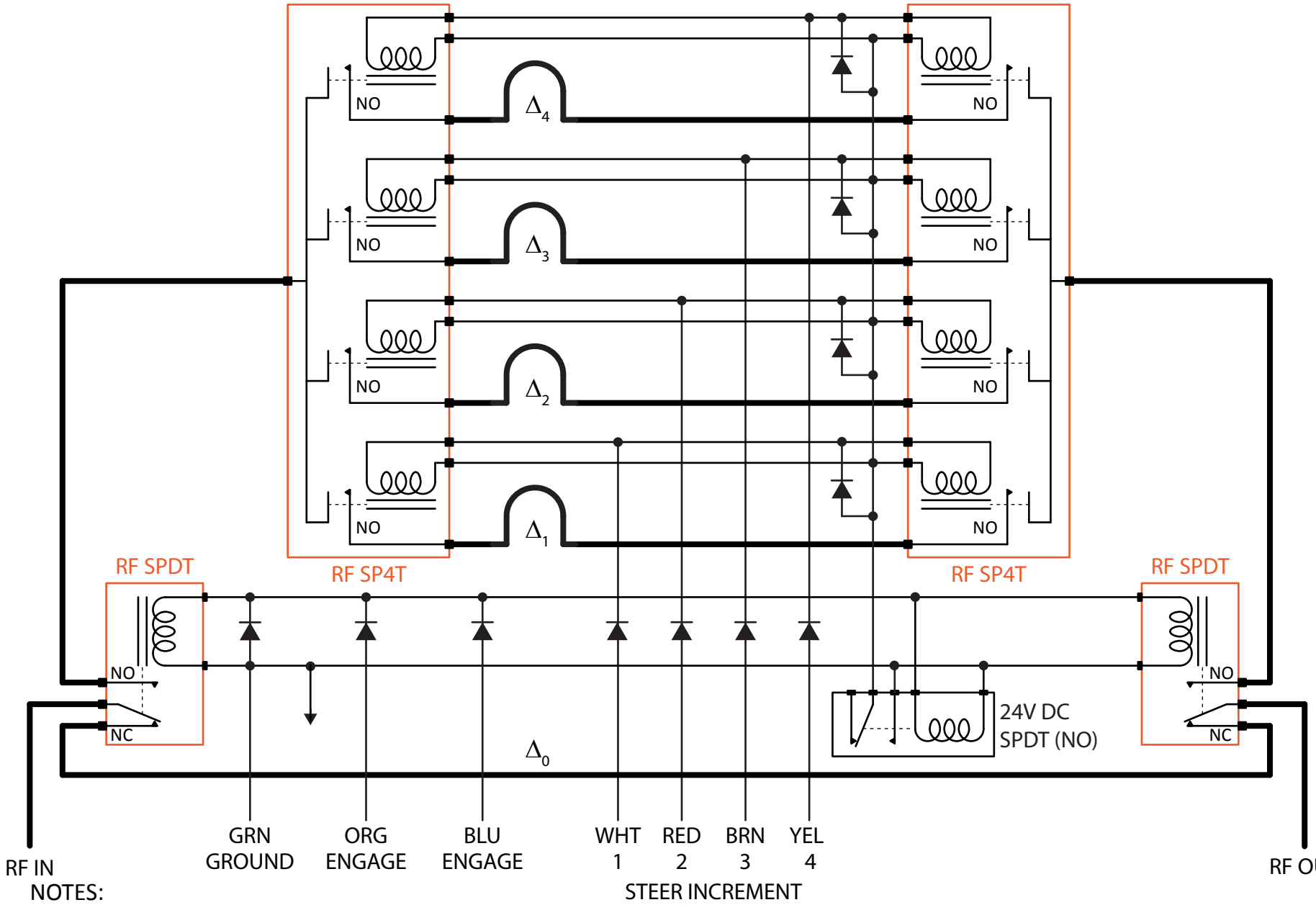
NOTES:

1) All coax Belden 8259 RG-58
2) Power failure mode to Δ_0
3) RF SPDT relays Amphenol 315-10002-3, 270Ω, 26 VDC, 96 mA
4) RF SP4T relays Amphenol 323-11651-3, 270Ω, 26 VDC, 96 mA
5) DC SPDT relay Omron G2RL-14-E-DC24, 24 VDC, 17 mA
6) Diodes 1N4007

AJ4CO OBSERVATORY

Relay Module RYM-01

Station Diagrams	SIZE A	DATE 27-SEP-2014	DRAWN BY DAVE TYPINSKI	REV A
	SCALE 1:1	RYM-01	SHEET 8 OF	



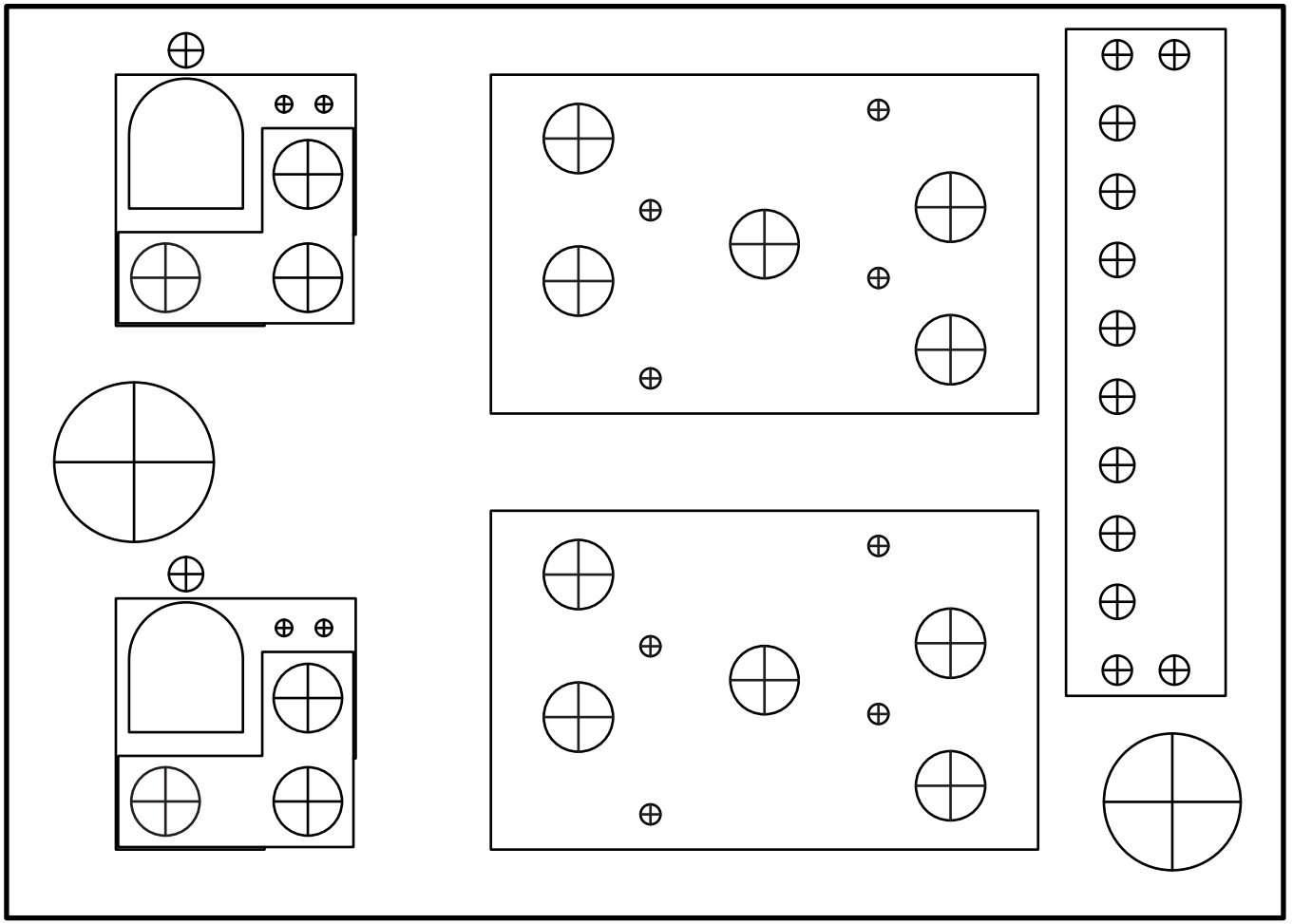
NOTES:

1) All coax Belden 8259 RG-58
2) Power failure mode to Δ_0
3) RF SPDT relays Amphenol 315-10002-3, 270Ω, 26 VDC, 96 mA
4) RF SP4T relays Amphenol 323-11651-3, 270Ω, 26 VDC, 96 mA
5) DC SPDT relay Omron G2RL-14-E-DC24, 24 VDC, 17 mA
6) Diodes 1N4007

AJ4CO OBSERVATORY

Relay Module RYM-02

Station Diagrams	SIZE A	DATE 01-OCT-2014	DRAWN BY DAVE TYPINSKI	REV A
	SCALE 1:1	RYM-02	SHEET 9 OF	



NOTES:
1) Relay control box chassis 7” x 5“ x 3”, 0.040“ gauge aluminum – Bud Industries P/N AC-429.
2) SPDT relay mounting holes 4-40, 7/32” apart (#30 clearance drill, 0.1285“).
3) SP4T relay mounting holes 6-32, 0.95” apart X, 1.25” apart Y (#25 clearance drill, 0.1495“).
4) BNC-F relay clearance holes 0.375”.
5) BNC-M feed-through grommet mounting hole 0.875”.
6) Control wires feed-through grommet mounting hole 0.750”.
7) Terminal block mounting holes #29 drill (0.136“) (8-32 tap drill).
8) Terminal block feed-through holes 3/16” or #10.
9) SPDT relay control wires feed-through hole 3/16” or #10 drill (no grommet).

AJ4CO OBSERVATORY

Relay Module RYM - Hole Pattern

Station Diagrams

SIZE	DATE	DRAWN BY	REV
A	31-OCT-2014	DAVE TYPINSKI	A

SCALE		SHEET
1:1		13 OF

TFD Array Beam Steering

Time Delay Cable VoP: 66%

Array elements N-S baseline spacing (feet): 32

Array elements E-W baseline spacing (feet): 32

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
20 N	60 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	18' 3-1/2"	9' 1-3/4"	78	29
20 N	45 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	14' 11-1/4"	7' 5-1/2"	70	43
20 N	30 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	10' 6-3/4"	5' 3-1/4"	58	56
20 N	15 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	5' 5-1/2"	2' 8-3/4"	36	66
20 N	0	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	0"	0"	0	70
20 N	15 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	5' 5-1/2"	2' 8-3/4"	324	66
20 N	30 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	10' 6-3/4"	5' 3-1/4"	302	56
20 N	45 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	14' 11-1/4"	7' 5-1/2"	290	43
20 N	60 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	18' 3-1/2"	9' 1-3/4"	282	29
15 N	60 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	18' 3-1/2"	9' 1-3/4"	81	30
15 N	45 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	14' 11-1/4"	7' 5-1/2"	105	44
15 N	30 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	10' 6-3/4"	5' 3-1/4"	115	58
15 N	15 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	5' 5-1/2"	2' 8-3/4"	135	69
15 N	0	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	0"	0"	180	75
15 N	15 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	5' 5-1/2"	2' 8-3/4"	225	69
15 N	30 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	10' 6-3/4"	5' 3-1/4"	245	58
15 N	45 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	14' 11-1/4"	7' 5-1/2"	255	44
15 N	60 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	18' 3-1/2"	9' 1-3/4"	261	30
10 N	60 E	3' 8"	7' 4"	1' 10"	18' 3-1/2"	9' 1-3/4"	96	30
10 N	45 E	3' 8"	7' 4"	1' 10"	14' 11-1/4"	7' 5-1/2"	100	45
10 N	30 E	3' 8"	7' 4"	1' 10"	10' 6-3/4"	5' 3-1/4"	107	59
10 N	15 E	3' 8"	7' 4"	1' 10"	5' 5-1/2"	2' 8-3/4"	123	72
10 N	0	3' 8"	7' 4"	1' 10"	0"	0"	180	80
10 N	15 W	3' 8"	7' 4"	1' 10"	5' 5-1/2"	2' 8-3/4"	237	72
10 N	30 W	3' 8"	7' 4"	1' 10"	10' 6-3/4"	5' 3-1/4"	253	59
10 N	45 W	3' 8"	7' 4"	1' 10"	14' 11-1/4"	7' 5-1/2"	260	45
10 N	60 W	3' 8"	7' 4"	1' 10"	18' 3-1/2"	9' 1-3/4"	264	30

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2A OF 5

TFD Array Beam Steering

Time Delay Cable VoP: **66%**

Array elements N-S baseline spacing (feet): **32**

Array elements E-W baseline spacing (feet): **32**

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
5 N	60 E	1' 10"	3' 8-1/4"	11"	18' 3-1/2"	9' 1-3/4"	87	30
5 N	45 E	1' 10"	3' 8-1/4"	11"	14' 11-1/4"	7' 5-1/2"	85	45
5 N	30 E	1' 10"	3' 8-1/4"	11"	10' 6-3/4"	5' 3-1/4"	81	60
5 N	15 E	1' 10"	3' 8-1/4"	11"	5' 5-1/2"	2' 8-3/4"	72	74
5 N	0	1' 10"	3' 8-1/4"	11"	0"	0"	360	85
5 N	15 W	1' 10"	3' 8-1/4"	11"	5' 5-1/2"	2' 8-3/4"	288	74
5 N	30 W	1' 10"	3' 8-1/4"	11"	10' 6-3/4"	5' 3-1/4"	279	60
5 N	45 W	1' 10"	3' 8-1/4"	11"	14' 11-1/4"	7' 5-1/2"	275	45
5 N	60 W	1' 10"	3' 8-1/4"	11"	18' 3-1/2"	9' 1-3/4"	273	30
0	60 E	0"	0"	0"	18' 3-1/2"	9' 1-3/4"	90	30
0	45 E	0"	0"	0"	14' 11-1/4"	7' 5-1/2"	90	45
0	30 E	0"	0"	0"	10' 6-3/4"	5' 3-1/4"	90	60
0	15 E	0"	0"	0"	5' 5-1/2"	2' 8-3/4"	90	75
0	0	0"	0"	0"	0"	0"	180	90
0	15 W	0"	0"	0"	5' 5-1/2"	2' 8-3/4"	270	75
0	30 W	0"	0"	0"	10' 6-3/4"	5' 3-1/4"	270	60
0	45 W	0"	0"	0"	14' 11-1/4"	7' 5-1/2"	270	45
0	60 W	0"	0"	0"	18' 3-1/2"	9' 1-3/4"	270	30
5 S	60 E	1' 10"	3' 8-1/4"	11"	18' 3-1/2"	9' 1-3/4"	93	30
5 S	45 E	1' 10"	3' 8-1/4"	11"	14' 11-1/4"	7' 5-1/2"	95	45
5 S	30 E	1' 10"	3' 8-1/4"	11"	10' 6-3/4"	5' 3-1/4"	99	60
5 S	15 E	1' 10"	3' 8-1/4"	11"	5' 5-1/2"	2' 8-3/4"	108	74
5 S	0	1' 10"	3' 8-1/4"	11"	0"	0"	180	85
5 S	15 W	1' 10"	3' 8-1/4"	11"	5' 5-1/2"	2' 8-3/4"	252	74
5 S	30 W	1' 10"	3' 8-1/4"	11"	10' 6-3/4"	5' 3-1/4"	261	60
5 S	45 W	1' 10"	3' 8-1/4"	11"	14' 11-1/4"	7' 5-1/2"	265	45
5 S	60 W	1' 10"	3' 8-1/4"	11"	18' 3-1/2"	9' 1-3/4"	267	30

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2B OF 5

TFD Array Beam Steering

Time Delay Cable VoP: 66%

Array elements N-S baseline spacing (feet): 32

Array elements E-W baseline spacing (feet): 32

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
10 S	60 E	3' 8"	7' 4"	1' 10"	18' 3-1/2"	9' 1-3/4"	96	30
10 S	45 E	3' 8"	7' 4"	1' 10"	14' 11-1/4"	7' 5-1/2"	100	45
10 S	30 E	3' 8"	7' 4"	1' 10"	10' 6-3/4"	5' 3-1/4"	107	59
10 S	15 E	3' 8"	7' 4"	1' 10"	5' 5-1/2"	2' 8-3/4"	123	72
10 S	0	3' 8"	7' 4"	1' 10"	0"	0"	180	80
10 S	15 W	3' 8"	7' 4"	1' 10"	5' 5-1/2"	2' 8-3/4"	237	72
10 S	30 W	3' 8"	7' 4"	1' 10"	10' 6-3/4"	5' 3-1/4"	253	59
10 S	45 W	3' 8"	7' 4"	1' 10"	14' 11-1/4"	7' 5-1/2"	260	45
10 S	60 W	3' 8"	7' 4"	1' 10"	18' 3-1/2"	9' 1-3/4"	264	30
15 S	60 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	18' 3-1/2"	9' 1-3/4"	99	30
15 S	45 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	14' 11-1/4"	7' 5-1/2"	105	44
15 S	30 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	10' 6-3/4"	5' 3-1/4"	115	58
15 S	15 E	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	5' 5-1/2"	2' 8-3/4"	135	69
15 S	0	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	0"	0"	180	75
15 S	15 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	5' 5-1/2"	2' 8-3/4"	225	69
15 S	30 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	10' 6-3/4"	5' 3-1/4"	245	58
15 S	45 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	14' 11-1/4"	7' 5-1/2"	255	44
15 S	60 W	5' 5-1/2"	10' 11-1/4"	2' 8-3/4"	18' 3-1/2"	9' 1-3/4"	261	30
20 S	60 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	18' 3-1/2"	9' 1-3/4"	102	29
20 S	45 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	14' 11-1/4"	7' 5-1/2"	110	43
20 S	30 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	10' 6-3/4"	5' 3-1/4"	122	56
20 S	15 E	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	5' 5-1/2"	2' 8-3/4"	144	66
20 S	0	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	0"	0"	180	70
20 S	15 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	5' 5-1/2"	2' 8-3/4"	216	66
20 S	30 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	10' 6-3/4"	5' 3-1/4"	238	56
20 S	45 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	14' 11-1/4"	7' 5-1/2"	250	43
20 S	60 W	7' 2-3/4"	14' 5-1/4"	3' 7-1/4"	18' 3-1/2"	9' 1-3/4"	258	29

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2C OF 5

TFD Array Beam Steering

Time Delay Cable VoP: 66%

Array elements N-S baseline spacing (feet): 32

Array elements E-W baseline spacing (feet): 32

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
25 S	60 E	8' 11"	17' 10-1/4"	4' 5-1/2"	18' 3-1/2"	9' 1-3/4"	105	29
25 S	45 E	8' 11"	17' 10-1/4"	4' 5-1/2"	14' 11-1/4"	7' 5-1/2"	115	42
25 S	30 E	8' 11"	17' 10-1/4"	4' 5-1/2"	10' 6-3/4"	5' 3-1/4"	129	53
25 S	15 E	8' 11"	17' 10-1/4"	4' 5-1/2"	5' 5-1/2"	2' 8-3/4"	150	62
25 S	0	8' 11"	17' 10-1/4"	4' 5-1/2"	0"	0"	180	65
25 S	15 W	8' 11"	17' 10-1/4"	4' 5-1/2"	5' 5-1/2"	2' 8-3/4"	210	62
25 S	30 W	8' 11"	17' 10-1/4"	4' 5-1/2"	10' 6-3/4"	5' 3-1/4"	231	53
25 S	45 W	8' 11"	17' 10-1/4"	4' 5-1/2"	14' 11-1/4"	7' 5-1/2"	245	42
25 S	60 W	8' 11"	17' 10-1/4"	4' 5-1/2"	18' 3-1/2"	9' 1-3/4"	255	29
30 S	60 E	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	18' 3-1/2"	9' 1-3/4"	108	29
30 S	45 E	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	14' 11-1/4"	7' 5-1/2"	120	41
30 S	30 E	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	10' 6-3/4"	5' 3-1/4"	135	51
30 S	15 E	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	5' 5-1/2"	2' 8-3/4"	155	58
30 S	0	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	0"	0"	180	60
30 S	15 W	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	5' 5-1/2"	2' 8-3/4"	205	58
30 S	30 W	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	10' 6-3/4"	5' 3-1/4"	225	51
30 S	45 W	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	14' 11-1/4"	7' 5-1/2"	240	41
30 S	60 W	10' 6-3/4"	21' 1-1/2"	5' 3-1/4"	18' 3-1/2"	9' 1-3/4"	252	29
35 S	60 E	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	18' 3-1/2"	9' 1-3/4"	112	28
35 S	45 E	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	14' 11-1/4"	7' 5-1/2"	125	39
35 S	30 E	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	10' 6-3/4"	5' 3-1/4"	140	48
35 S	15 E	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	5' 5-1/2"	2' 8-3/4"	159	53
35 S	0	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	0"	0"	180	55
35 S	15 W	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	5' 5-1/2"	2' 8-3/4"	201	53
35 S	30 W	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	10' 6-3/4"	5' 3-1/4"	220	48
35 S	45 W	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	14' 11-1/4"	7' 5-1/2"	235	39
35 S	60 W	12' 1-1/4"	24' 2-3/4"	6' 0-3/4"	18' 3-1/2"	9' 1-3/4"	248	28

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2D OF 5

TFD Array Beam Steering

Time Delay Cable VoP: **66%**

Array elements N-S baseline spacing (feet): **32**

Array elements E-W baseline spacing (feet): **32**

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
40 S	60 E	13' 7"	27' 1-3/4"	6' 9-1/2"	18' 3-1/2"	9' 1-3/4"	116	27
40 S	45 E	13' 7"	27' 1-3/4"	6' 9-1/2"	14' 11-1/4"	7' 5-1/2"	130	37
40 S	30 E	13' 7"	27' 1-3/4"	6' 9-1/2"	10' 6-3/4"	5' 3-1/4"	145	44
40 S	15 E	13' 7"	27' 1-3/4"	6' 9-1/2"	5' 5-1/2"	2' 8-3/4"	162	49
40 S	0	13' 7"	27' 1-3/4"	6' 9-1/2"	0"	0"	180	50
40 S	15 W	13' 7"	27' 1-3/4"	6' 9-1/2"	5' 5-1/2"	2' 8-3/4"	198	49
40 S	30 W	13' 7"	27' 1-3/4"	6' 9-1/2"	10' 6-3/4"	5' 3-1/4"	215	44
40 S	45 W	13' 7"	27' 1-3/4"	6' 9-1/2"	14' 11-1/4"	7' 5-1/2"	230	37
40 S	60 W	13' 7"	27' 1-3/4"	6' 9-1/2"	18' 3-1/2"	9' 1-3/4"	244	27
45 S	60 E	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	18' 3-1/2"	9' 1-3/4"	120	27
45 S	45 E	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	14' 11-1/4"	7' 5-1/2"	135	35
45 S	30 E	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	10' 6-3/4"	5' 3-1/4"	150	41
45 S	15 E	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	5' 5-1/2"	2' 8-3/4"	165	44
45 S	0	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	0"	0"	180	45
45 S	15 W	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	5' 5-1/2"	2' 8-3/4"	195	44
45 S	30 W	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	10' 6-3/4"	5' 3-1/4"	210	41
45 S	45 W	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	14' 11-1/4"	7' 5-1/2"	225	35
45 S	60 W	14' 11-1/4"	29' 10-1/2"	7' 5-1/2"	18' 3-1/2"	9' 1-3/4"	240	27
50 S	60 E	16' 2-1/4"	32' 4-1/4"	8' 1"	18' 3-1/2"	9' 1-3/4"	125	25
50 S	45 E	16' 2-1/4"	32' 4-1/4"	8' 1"	14' 11-1/4"	7' 5-1/2"	140	33
50 S	30 E	16' 2-1/4"	32' 4-1/4"	8' 1"	10' 6-3/4"	5' 3-1/4"	154	37
50 S	15 E	16' 2-1/4"	32' 4-1/4"	8' 1"	5' 5-1/2"	2' 8-3/4"	167	39
50 S	0	16' 2-1/4"	32' 4-1/4"	8' 1"	0"	0"	180	40
50 S	15 W	16' 2-1/4"	32' 4-1/4"	8' 1"	5' 5-1/2"	2' 8-3/4"	193	39
50 S	30 W	16' 2-1/4"	32' 4-1/4"	8' 1"	10' 6-3/4"	5' 3-1/4"	206	37
50 S	45 W	16' 2-1/4"	32' 4-1/4"	8' 1"	14' 11-1/4"	7' 5-1/2"	220	33
50 S	60 W	16' 2-1/4"	32' 4-1/4"	8' 1"	18' 3-1/2"	9' 1-3/4"	235	25

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2E OF 5

TFD Array Beam Steering

Time Delay Cable VoP: **66%**

Array elements N-S baseline spacing (feet): **32**

Array elements E-W baseline spacing (feet): **32**

N-S Offset (degrees)	E-W Offset (degrees)	Delay Cable Lengths (feet & inches) A (S) / B (N)	C (S) / D (N)	E	F (W) / G (E)	H	AZ (degrees)	EL (degrees)
55 S	60 E	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	18' 3-1/2"	9' 1-3/4"	130	24
55 S	45 E	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	14' 11-1/4"	7' 5-1/2"	145	30
55 S	30 E	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	10' 6-3/4"	5' 3-1/4"	158	33
55 S	15 E	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	5' 5-1/2"	2' 8-3/4"	169	35
55 S	0	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	0"	0"	180	35
55 S	15 W	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	5' 5-1/2"	2' 8-3/4"	191	35
55 S	30 W	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	10' 6-3/4"	5' 3-1/4"	202	33
55 S	45 W	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	14' 11-1/4"	7' 5-1/2"	215	30
55 S	60 W	17' 3-1/2"	34' 7-1/4"	8' 7-3/4"	18' 3-1/2"	9' 1-3/4"	230	24
60 S	60 E	18' 3-1/2"	36' 7"	9' 1-3/4"	18' 3-1/2"	9' 1-3/4"	135	22
60 S	45 E	18' 3-1/2"	36' 7"	9' 1-3/4"	14' 11-1/4"	7' 5-1/2"	150	27
60 S	30 E	18' 3-1/2"	36' 7"	9' 1-3/4"	10' 6-3/4"	5' 3-1/4"	162	29
60 S	15 E	18' 3-1/2"	36' 7"	9' 1-3/4"	5' 5-1/2"	2' 8-3/4"	171	30
60 S	0	18' 3-1/2"	36' 7"	9' 1-3/4"	0"	0"	180	30
60 S	15 W	18' 3-1/2"	36' 7"	9' 1-3/4"	5' 5-1/2"	2' 8-3/4"	189	30
60 S	30 W	18' 3-1/2"	36' 7"	9' 1-3/4"	10' 6-3/4"	5' 3-1/4"	198	29
60 S	45 W	18' 3-1/2"	36' 7"	9' 1-3/4"	14' 11-1/4"	7' 5-1/2"	210	27
60 S	60 W	18' 3-1/2"	36' 7"	9' 1-3/4"	18' 3-1/2"	9' 1-3/4"	225	22

AJ4CO OBSERVATORY

AJ4CO Observatory Diagram

SIZE	DATE	PART NUMBER	REV
A	01 OCT 2014	N/A	

SCALE	DRAWN BY	SHEET
NONE	DAVE TYPINSKI	2F OF 5

TFD Beam Steering System Coax Requirements

Typinski, 2014

Delay cable lengths in FEET

EW°	4xF/G	H	Subtotal	
15	6	3	27	
30	11	5	49	
45	15	8	68	
60	18	9	81	
				225

Note: Northern steerings (cables B & D) not implemented

NS°	2xA	2xC	E	Subtotal	
5	2	4	1	13	
10	4	7	2	24	
15	5	11	3	35	
20	7	14	4	46	
25	9	18	4	58	
30	11	21	5	69	
35	12	24	6	78	
40	14	27	7	89	
45	15	30	7	97	
50	16	32	8	104	
55	17	35	9	113	
60	18	37	9	119	
					845

Modules	3xIntertie	Δ_0	Subtotal	
14	1	1	56	
				56

Boxes	4xfeeds	2xfeeds	Subtotal	
3	40	90	340	
				340
				1,466

To implement northern steerings (cables B & D), add following

NS°	2xB	2xD	Subtotal	
5	2	4	12	
10	4	7	22	
15	5	11	32	
20	7	14	42	
25	9	18	54	
30	11	21	64	
35	12	24	72	
40	14	27	82	
45	15	30	90	
50	16	32	96	
55	17	35	104	
60	18	37	110	
				780
				780

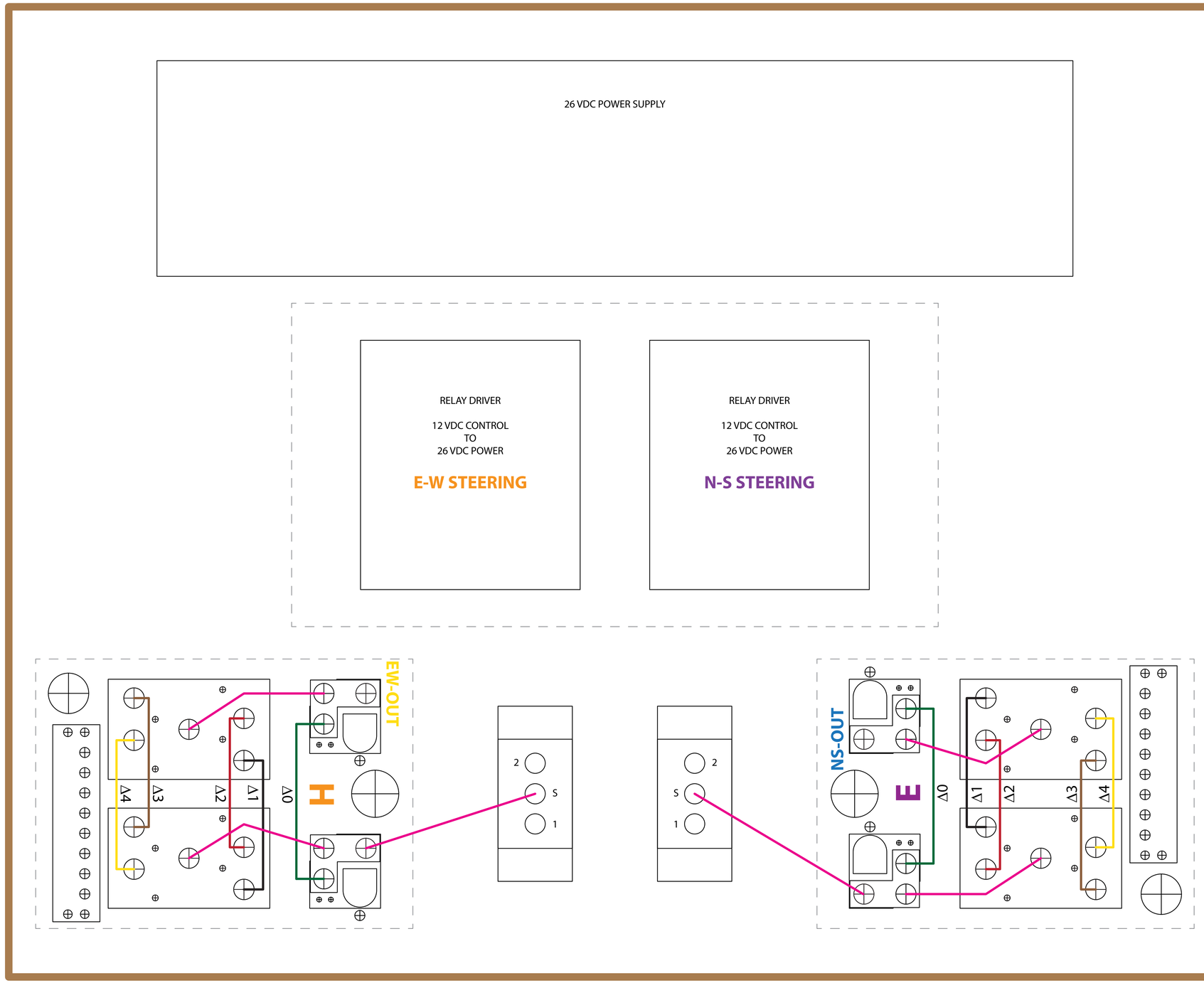
GRAND TOTAL RG-58, FEET **2,246**

Modules	BNC's per module	Subtotal
14	16	224

Module to Module Interties	BNC's	Subtotal
14	2	28

GRAND TOTAL CRIMP CONNECTORS **252**

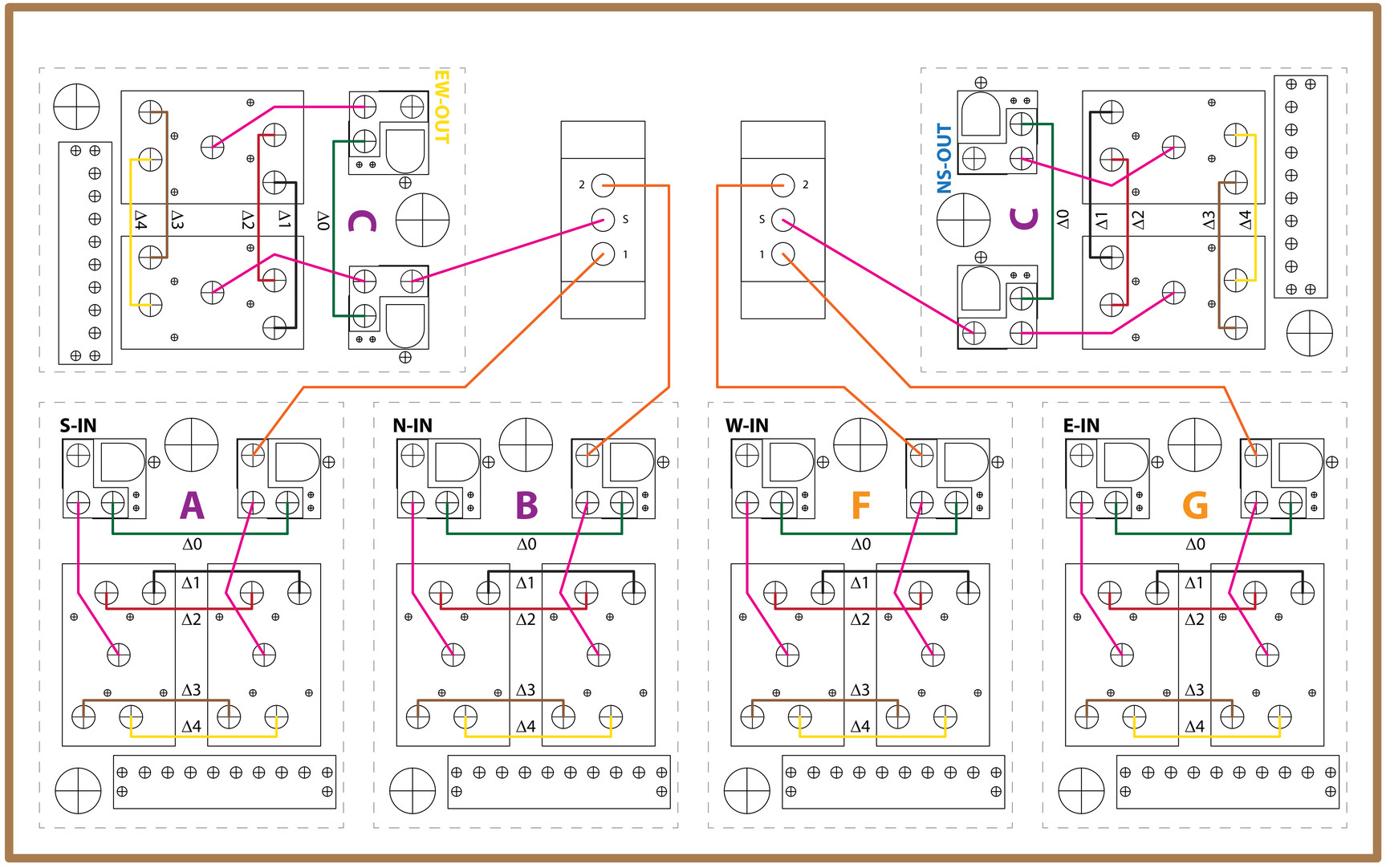
NOTES:
1) Relay control box chassis 7" x 5" x 3", 0.040" gauge aluminum – Bud Industries P/N AC-429.
2) SPDT relay mounting holes 4-40, 7/32" apart (#30 clearance drill, 0.1285").
3) SP4T relay mounting holes 6-32, 0.95" apart X, 1.25" apart Y (#25 clearance drill, 0.1495").
4) BNC-F relay clearance holes 0.375".
5) BNC-M feed-through grommet mounting hole 0.875".
6) Control wires feed-through grommet mounting hole 0.750".
7) Terminal block mounting holes #29 drill (0.136") (8-32 tap drill).
8) Terminal block feed-through holes 3/16" or #10.
9) SPDT relay control wires feed-through hole 3/16" or #10 drill (no grommet).
10) Mount RYM modules and combiners on 3/4" PT plywood 14" x 22.5" with piano hinge at upper edge; assy will rest on 1x4 PT lumber to give 4" space for cabling and conduit terminations.
11) All umber to be painted white with oil based exterior grade paint.



AJ4CO OBSERVATORY	Junction Box - C - Mechanical		
Station Diagrams	SIZE D	DATE 12-OCT-2014	DRAWN BY DAVE TYPINSKI
	REV A	SCALE 1:1	SHEET 10 OF

4 3 2 1

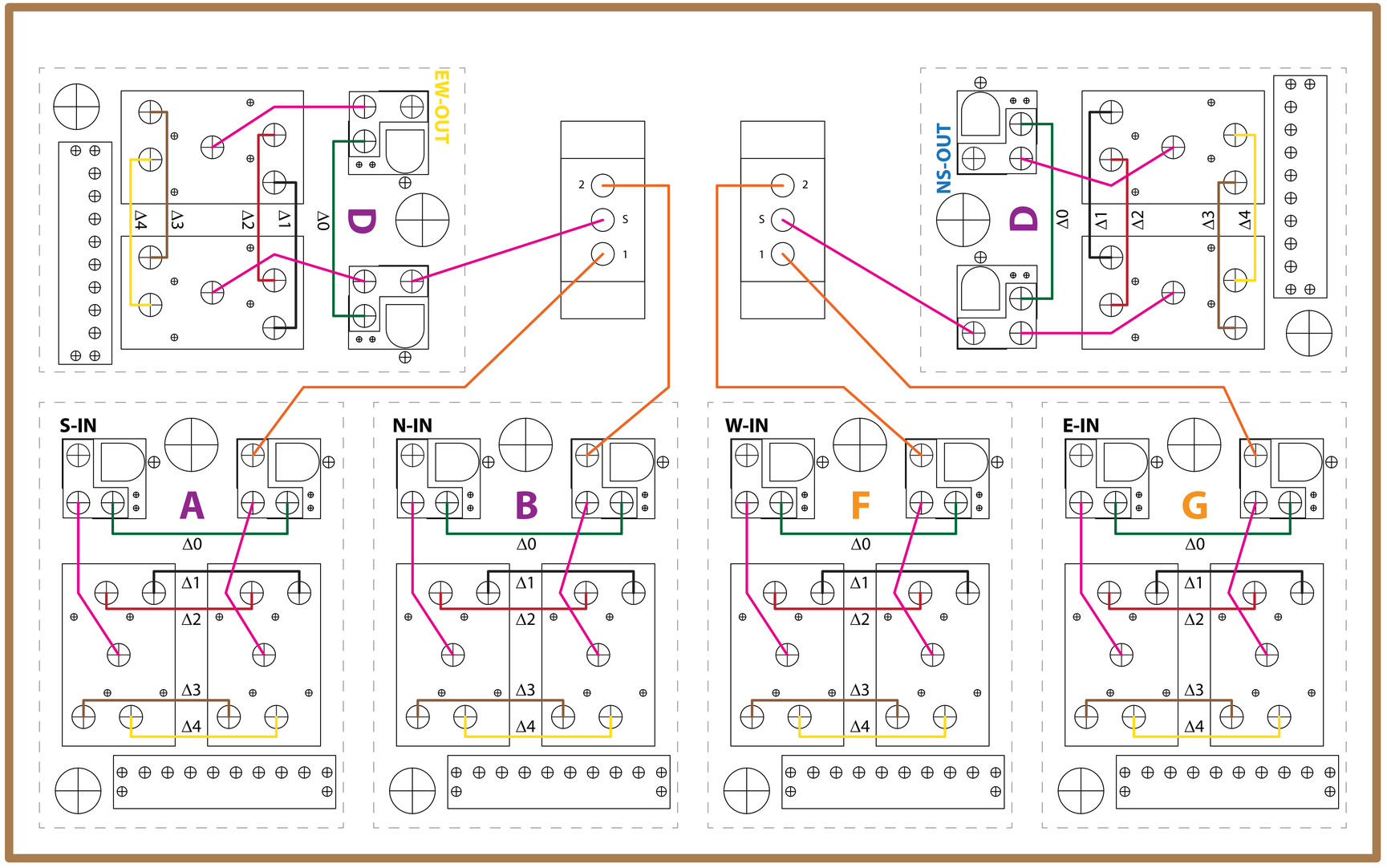
NOTES:
1) Relay control box chassis 7" x 5" x 3", 0.040" gauge aluminum – Bud Industries P/N AC-429.
2) SPDT relay mounting holes 4-40, 7/32" apart (#30 clearance drill, 0.1285").
3) SP4T relay mounting holes 6-32, 0.95" apart X, 1.25" apart Y (#25 clearance drill, 0.1495").
4) BNC-F relay clearance holes 0.375".
5) BNC-M feed-through grommet mounting hole 0.875".
6) Control wires feed-through grommet mounting hole 0.750".
7) Terminal block mounting holes #29 drill (0.136") (8-32 tap drill).
8) Terminal block feed-through holes 3/16" or #10.
9) SPDT relay control wires feed-through hole 3/16" or #10 drill (no grommet).
10) Mount RYM modules and combiners on 3/4" PT plywood 14" x 22.5" with piano hinge at upper edge; assy will rest on 1x4 PT lumber to give 4" space for cabling and conduit terminations.
11) All umber to be painted white with oil based exterior grade paint.



AJ4CO OBSERVATORY	Junction Box - S - Mechanical		
Station Diagrams	SIZE D	DATE 26-OCT-2014	DRAWN BY DAVE TYPIŃSKI / REV A
	SCALE 1:1		SHEET 12 OF

4 3 2 1 D C B A

NOTES:
1) Relay control box chassis 7" x 5" x 3", 0.040" gauge aluminum – Bud Industries P/N AC-429.
2) SPDT relay mounting holes 4-40, 7/32" apart (#30 clearance drill, 0.1285").
3) SP4T relay mounting holes 6-32, 0.95" apart X, 1.25" apart Y (#25 clearance drill, 0.1495").
4) BNC-F relay clearance holes 0.375".
5) BNC-M feed-through grommet mounting hole 0.875".
6) Control wires feed-through grommet mounting hole 0.750".
7) Terminal block mounting holes #29 drill (0.136") (8-32 tap drill).
8) Terminal block feed-through holes 3/16" or #10.
9) SPDT relay control wires feed-through hole 3/16" or #10 drill (no grommet).
10) Mount RYM modules and combiners on 3/4" PT plywood 14" x 22.5" with piano hinge at upper edge; assy will rest on 1x4 PT lumber to give 4" space for cabling and conduit terminations.
11) All umber to be painted white with oil based exterior grade paint.



AJ4CO OBSERVATORY	Junction Box - N - Mechanical		A
Station Diagrams	SIZE D	DATE 26-OCT-2014	DRAWN BY DAVE TYPINSKI	REV A
	SCALE 1:1		SHEET 11 OF

4 3 2 1