

# THE NA5N TFD ANTENNA BASED ON

## U.S. NAVY - TACTICAL FIELD ANTENNA TERMINATED BROADBAND FOLDED DIPOLE (TBFD) FOR MILITARY AND MARITIME FREQUENCIES 3-30 MC/S (WWII) NAVSHIPS 900121, MIL-W-17211 1942, REVISED 1952 FIELD, SHIPBOARD, AND SUBMARINE DEPLOYMENT

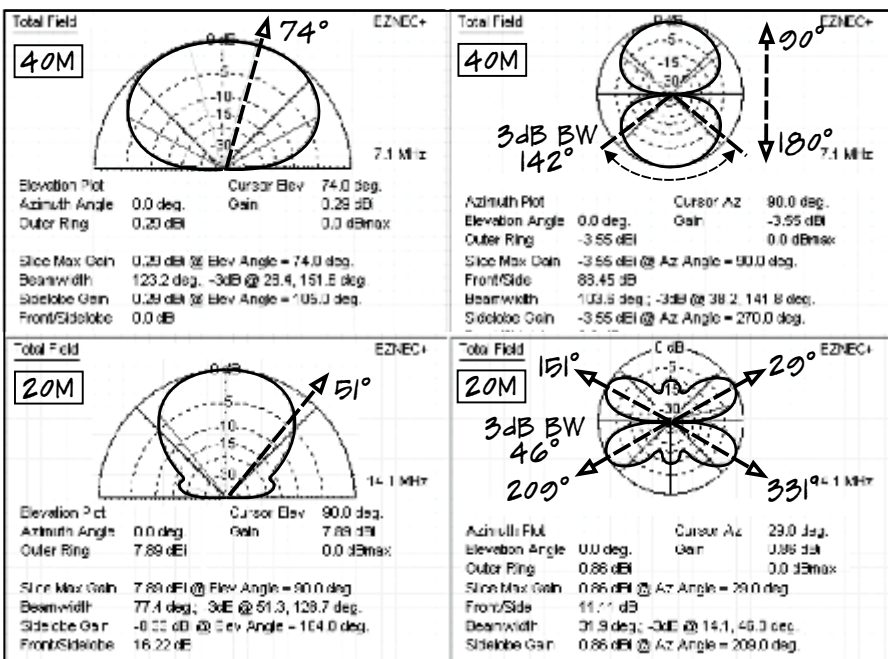
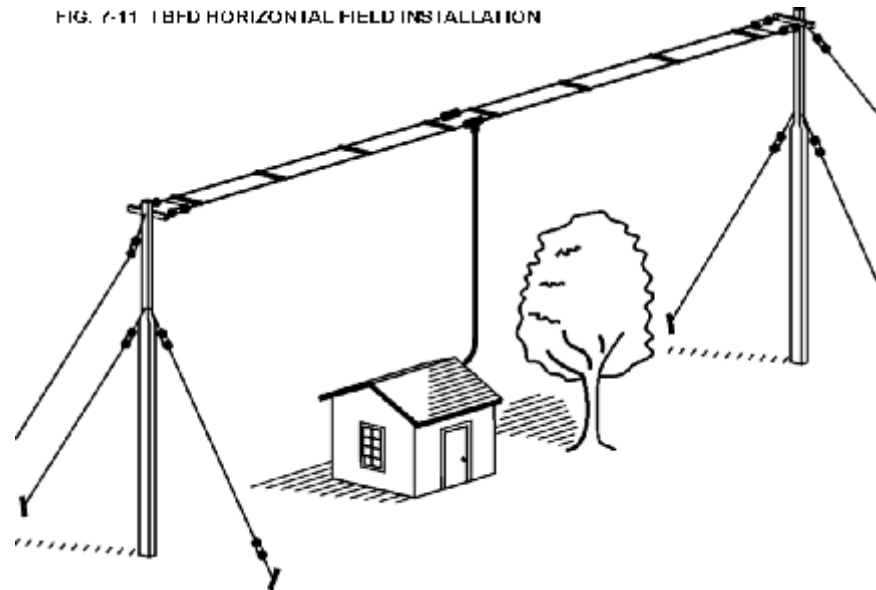


FIG. 7-11 TBFD HORIZONTAL FIELD INSTALLATION



## GATO CLASS SUBMARINE DEPLOYMENT

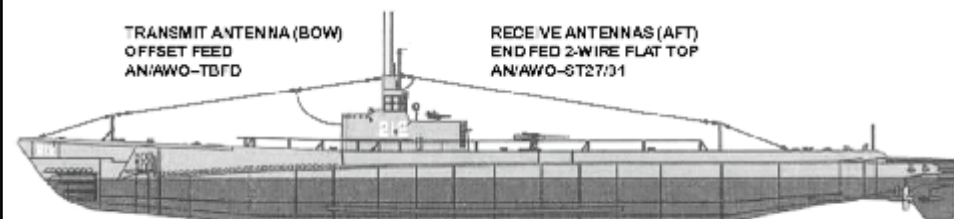
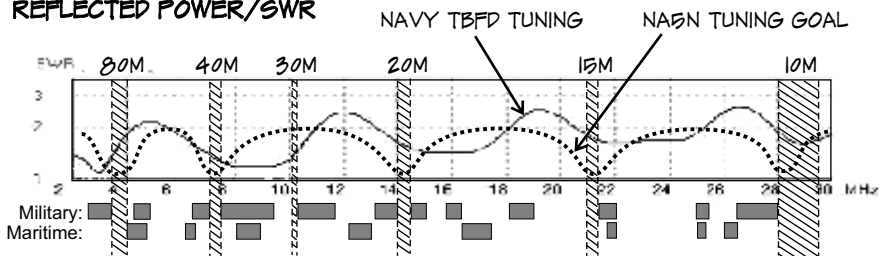


FIG 3-7 TRANSMIT AND RECEIVE ANTENNAS, GATO CLASS FLEET SUBMARINE (MOD 4 1944)

## REFLECTED POWER/SWR



## NOTES:

1. NAVY SPECS: 50W FEEDLINE, 820W TERMINATION RES., L=166 FT. ( $1/2=3.0$  MHz)  
RADIATION PATTERNS LITTLE EFFECTED BY HEIGHT OR ORIENTATION
2.  $1/4$  COUNTERPOISE NEAR GROUND RECOMMENDED FOR LOWEST SWR
3. NAVY DIMENSIONS BASED ON OPTIMIZING SWR ON MILITARY & MARITIME FREQ.
4. NEW DIMENSIONS & TUNING FOR OPTIMIZING SWR ON 80/40/20/15M HAM BANDS
5. ADJUST L= FOR MIN. VOLTAGE NODE ON TERM. RES. FOR MIN. LOSS & HIGHER GAIN

## SHT

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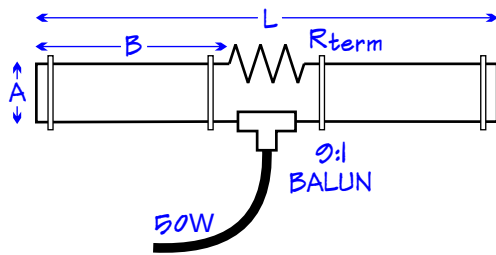
- 1 ANTENNA GENERAL ARRANGEMENT
- 2 MAST SUPPORT SCHEME & B.O.M.
- 3 MAST CONSTRUCTION DETAILS
- 4 80M-10M TFD SCHEME
- 5 TFD CONSTRUCTION DETAILS
- 6 INSTALLATION DETAILS

SHT



|                                              |                                                                                    |                                     |
|----------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NA5N | TITLE<br><b>NA5N TFD ANTENNA PROJECT</b><br>GENERAL ARRANGEMENT<br>AND INFORMATION | DATE<br>JAN 2019<br>SHEET<br>1 of 6 |
|----------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------|

## MILITARY DESIGN VERSIONS



### NAVY TFD/WIRBK

$R_{term} = 600W$  BALUN = 9:1

$$A = p \cdot \frac{3}{F_{MHz}} = p \cdot \frac{3}{3.55} \times p = 2.7' = 32''$$

$$B = p \cdot \frac{50}{F_{MHz}} = p \cdot \frac{50}{3.55} \times p = 44.2'$$

$$L = 2 \cdot B = 88'4''$$

ANTENNA RESONANCE ( $F_r$ )

$$F_r = \frac{468}{L_{ft}} = \frac{468}{88.4ft} = 5.3MHz$$

MIL. FREQ.

### BUXCOM MILITARY/K4ABT TFD

$R_{term} = 450W$  BALUN = 9:1

$$A = \frac{30}{F_{MHz}} = \frac{30}{3.55} = 8.45' = 32''$$

$$B = \frac{166}{F_{MHz}} = \frac{166}{3.55} = 46.8' = 46'10''$$

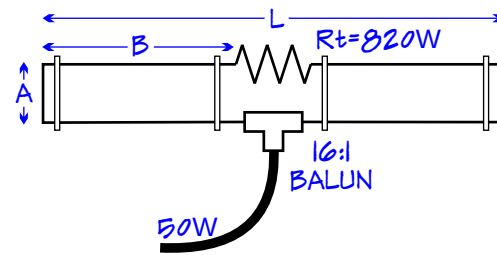
$$L = 2 \cdot B = 93'7''$$

ANTENNA RESONANCE ( $F_r$ )

$$F_r = \frac{468}{L_{ft}} = \frac{468}{93.6ft} = 5.0MHz$$

MIL. FREQ.

## B SQUARED ENGINEERING TFD



$R_{term} = 820W$  BALUN = 16:1

$$A = \frac{0.5}{F_{MHz}} = \frac{0.5}{3.55} = 2.67' = 32''$$

$$B = \frac{234}{F_{MHz}} = \frac{234}{3.55} = 65.9' = 65'11''$$

$$L = 2 \cdot B = 132'$$

LENGTHS FOR RESONANCE

$$80M \quad L = \frac{468}{F_{MHz}} = \frac{468}{3.55} = 131.8' = 131'10''$$

$$B = \frac{L}{2} = \frac{131.8'}{2} = 65.9' = 65'11''$$

## NAVY VERSION

TFD length for resonance at 7.05 MHz  
Folded dipole resonance at 3.55 MHz

Spacing based on USN design:

$$A = p \cdot \frac{3}{F_{MHz}} = \frac{3}{7.05} \times p = 1.34' = 16''$$

Standard 1/4 minus spacing width (A)  
plus 6" feed point tee/balun (T)

$$B = \frac{234}{F_{MHz}} - A + T = \frac{234}{7.05} - 1.3' + .5' = 32.4' = 32'5''$$

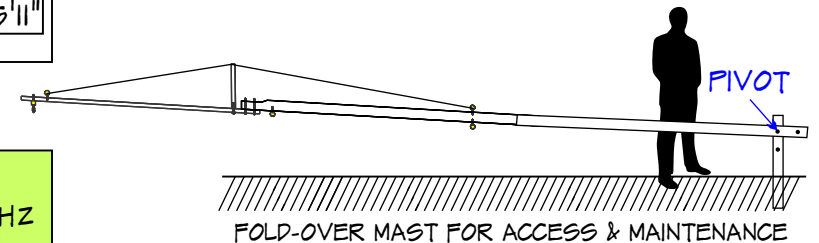
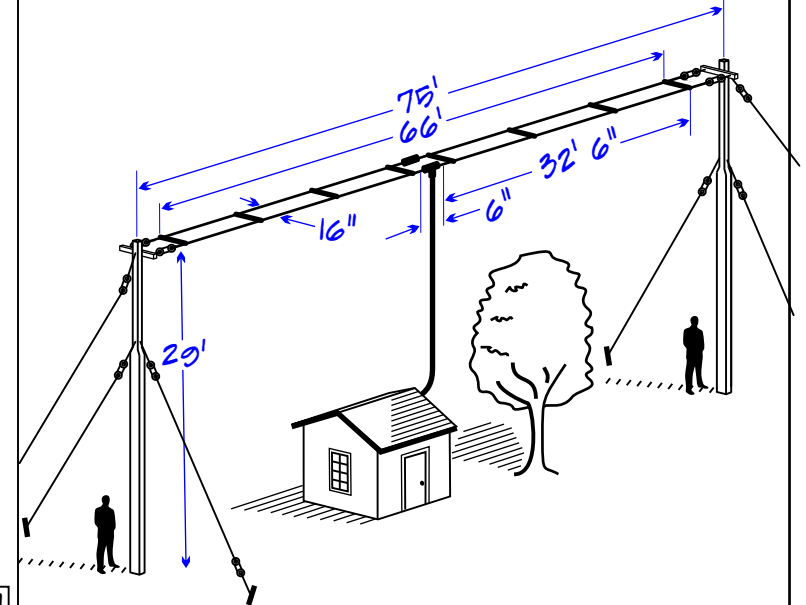
Total TFD dipole conductive length:

$$L = 2 \cdot B = 2 \cdot 32.4 = 64.8 = 64'10''$$

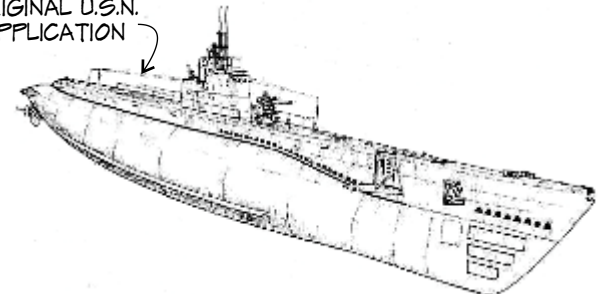
Total TFD folded dipole wire length:

$$L2 = 2 \cdot 64.8' + 2 \cdot 1.34' = 126.9 = 126'11''$$

## NAVY VERSION

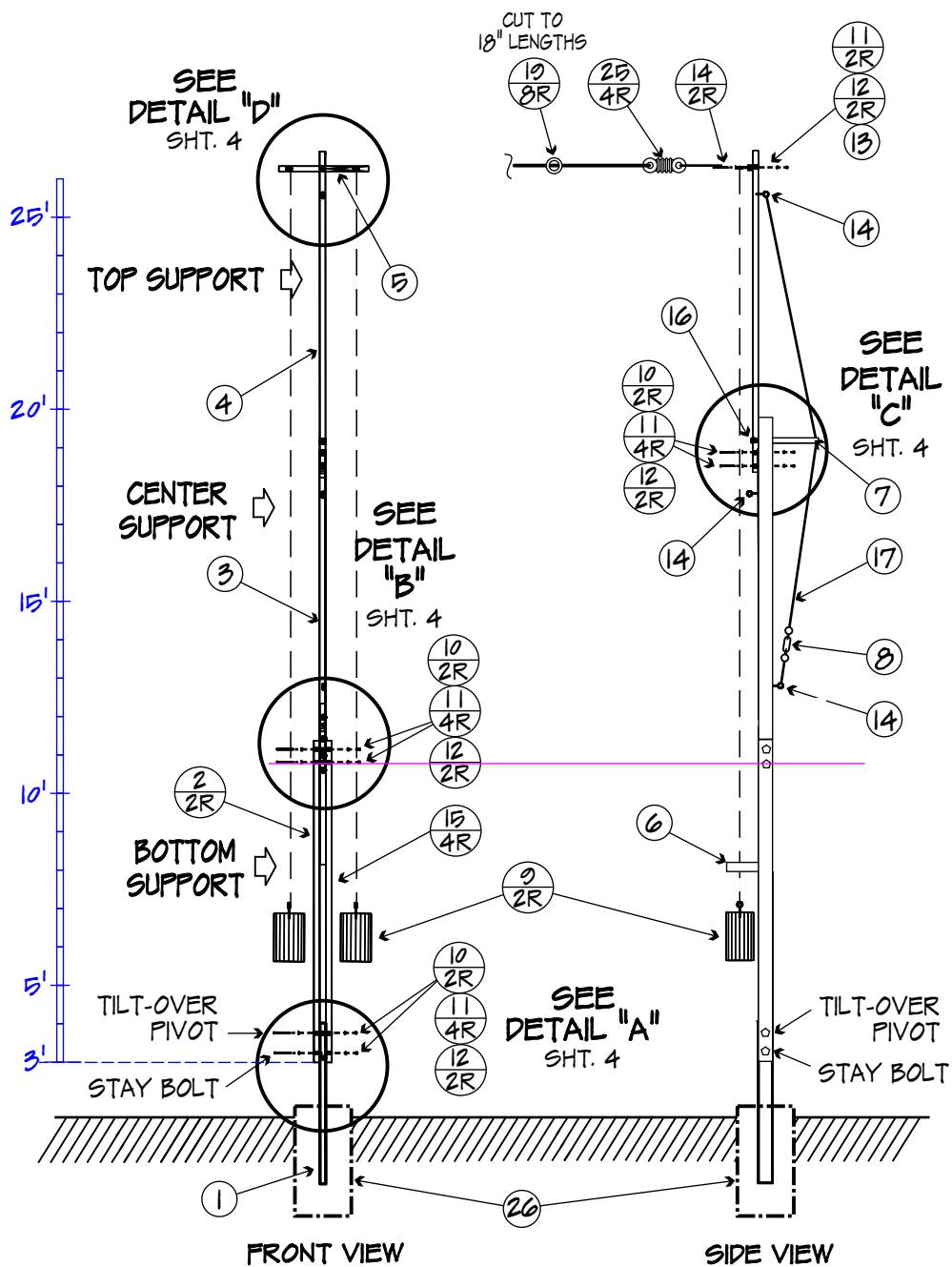


ORIGINAL U.S.N.  
APPLICATION



SHT  
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|                                              |                                                                 |                                     |
|----------------------------------------------|-----------------------------------------------------------------|-------------------------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NAVY | TITLE<br><b>NAVY TFD ANTENNA PROJECT</b><br>CALCULATION DETAILS | DATE<br>JAN 2019<br>SHEET<br>2 of 6 |
|----------------------------------------------|-----------------------------------------------------------------|-------------------------------------|



## BILL OF MATERIALS

DOES NOT INCLUDE ELECTRONIC COMPONENTS OR DIPOLE WIRING (SEE SHT. 5)

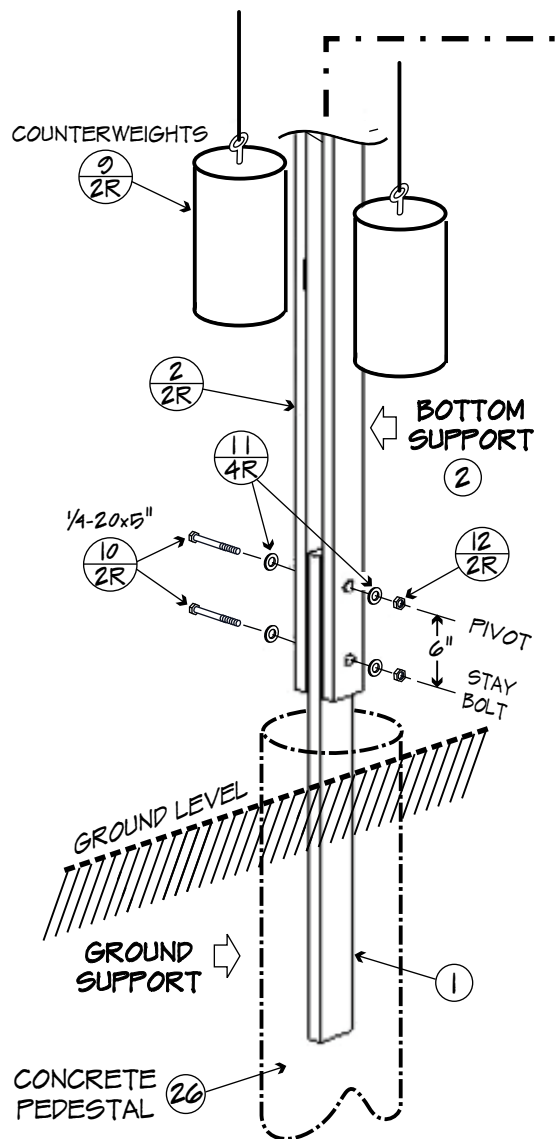
| ITEM | QTY | DESCRIPTION                        | MATERIAL                    |
|------|-----|------------------------------------|-----------------------------|
| 1    | 1   | GROUND SUPPORT                     | WOOD, 2"x4"x5 ft.           |
| 2    | 2   | BOTTOM SUPPORT                     | WOOD, 2"x4"x102" (8½ ft.)   |
| 3    | 1   | CENTER SUPPORT                     | WOOD, 2"x4"x102" (8½ ft.)   |
| 4    | 1   | TOP SUPPORT                        | +                           |
| —    | (5) | TOTAL WOOD STUDS 2x4x102" (8½ ft.) |                             |
| 5    | 1   | T-SECTION BRACE                    | WOOD, 2"x2"x2 ft.           |
| 6    | 1   | COUNTERWEIGHT STAY                 | WOOD, 2"x2"x24"             |
| 7    | 1   | STRESS SUPPORT                     | WOOD, 2"x2"x18"             |
| 8    | 2   | TURN BUCKLE                        | ¼-20x4"                     |
| 9    | 2   | COUNTERWEIGHT                      | SEE SHT. 2                  |
| 10   | 6   | BOLT SS, ¼-20x5"                   |                             |
| 11   | 14  | FLAT WASHER SS ¼-20                |                             |
| 12   | 10  | HEX NUT SS, ¼-20                   |                             |
| 13   | 1   | BOLT SS, ¼-20x3"                   |                             |
| 14   | 5   | SCREW, EYE BOLT                    |                             |
| 15   | 4   | SCREW, DRY WALL 3"                 |                             |
| 16   | 1   | SCREW, DRY WALL 4"                 |                             |
| 17   | A/R | TENSIONER ROPE                     | BALING WIRE, 2 RUNS TWISTED |
| 18   | 1   | COUNTERWEIGHT ROPE                 | PARACORD, 4mm 550 x 100 ft. |
| 19   | 8   | SPREADERS                          | PVC PIPE ½"x16"             |
| 20   | 1   | P/O BALUN                          | PVC 2" DIA. THD. TEE        |
| 21   | 3   | P/O BALUN                          | PVC 2" DIA. THD. ENDCAP     |
| 22   | 4   | BALUN, TERMINATOR                  | EYE BOLT, ¼-20x1.5"         |
| 23   | 1   | TERMINATOR                         | PVC 1"x1" THD. ADAPTER      |
| 24   | 2   | TERMINATOR                         | PVC 1" DIA. THD. ENDCAP     |
| 25   | 2   | TFD END CROSSOVER                  | EMT TUBING ½"x18"           |
| 26   | A/R | MAST PEDESTAL                      | CONCRETE                    |

SHT

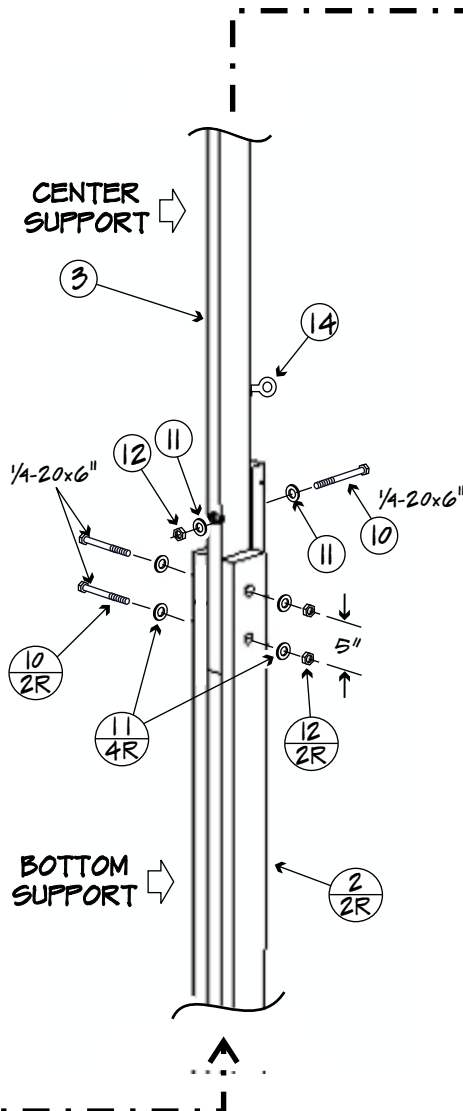
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|                                              |                                                                                        |                                     |
|----------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NASN | TITLE<br><b>NASN TFD ANTENNA PROJECT</b><br>MAST SUPPORT SCHEME<br>& BILL OF MATERIALS | DATE<br>JAN 2019<br>SHEET<br>3 of 6 |
|----------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------|

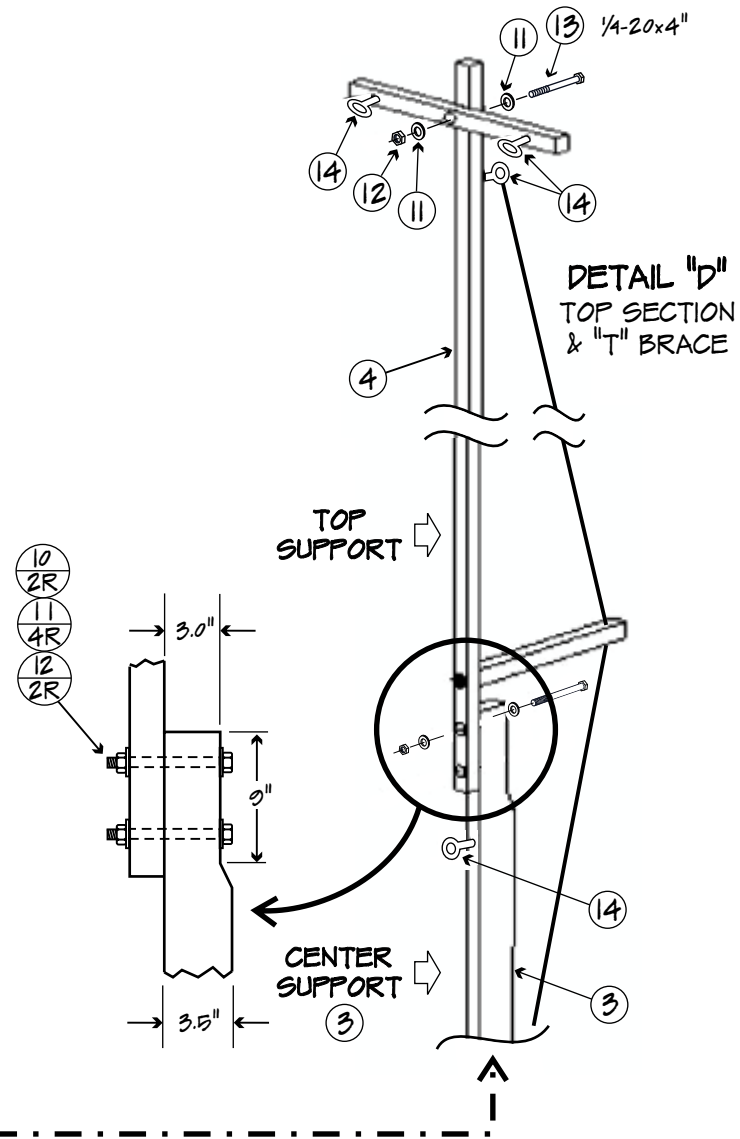
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DETAIL "A"  
GROUND SUPPORT  
& BOTTOM SECTION



DETAIL "B"  
JUNCTION WITH  
CENTER SECTION

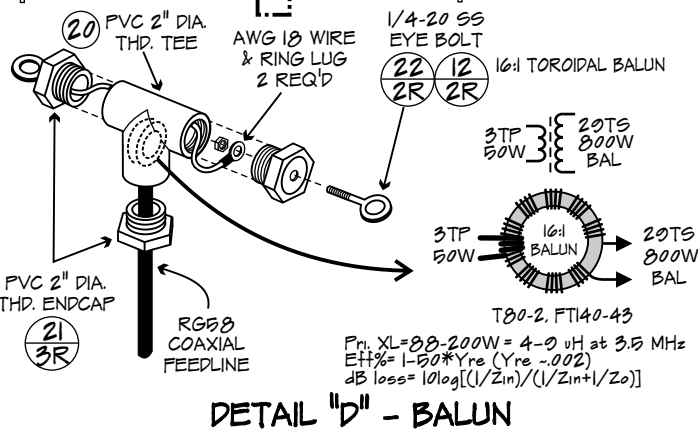
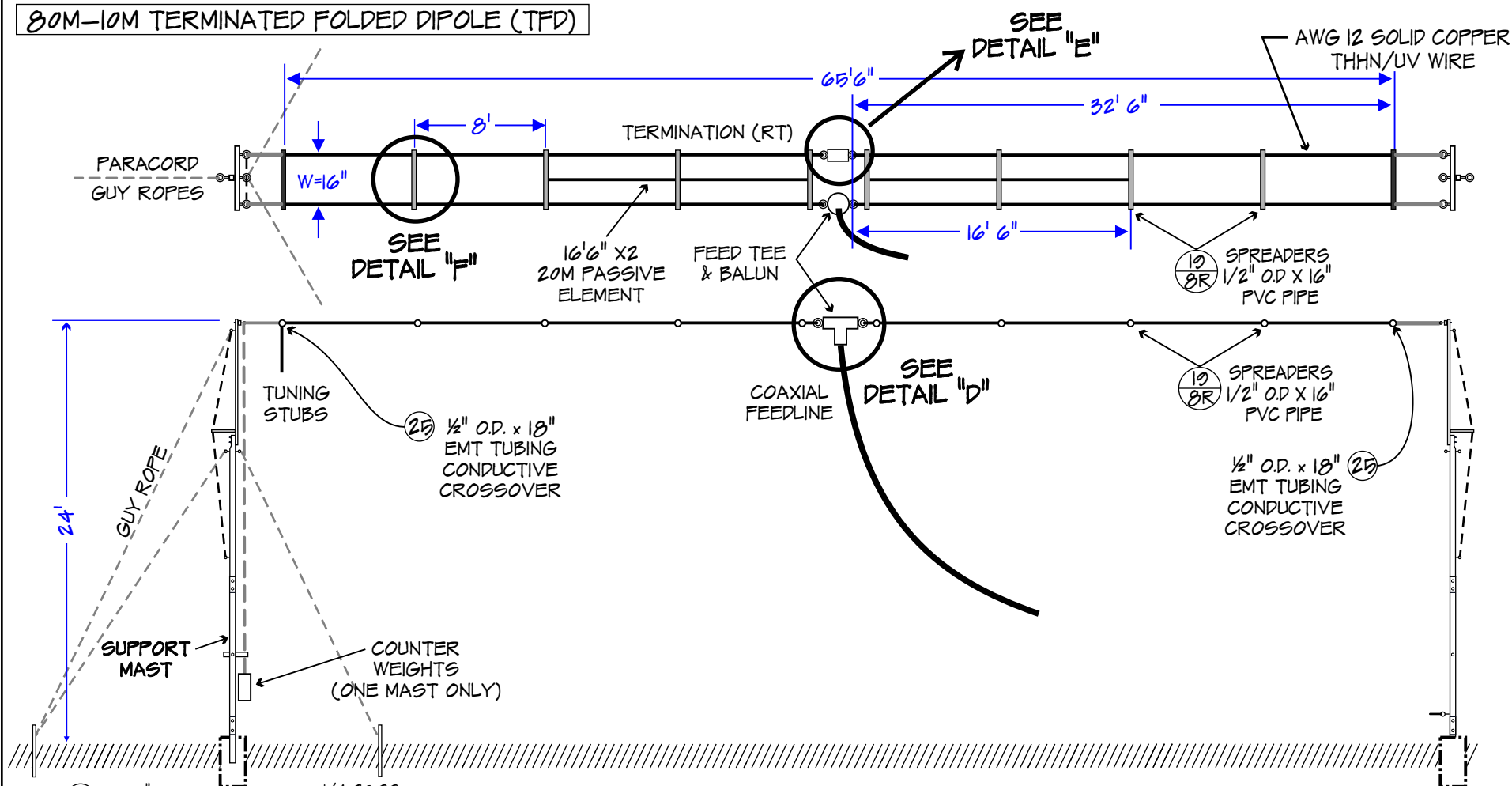


DETAIL "C"  
JUNCTION WITH  
TOP SECTION

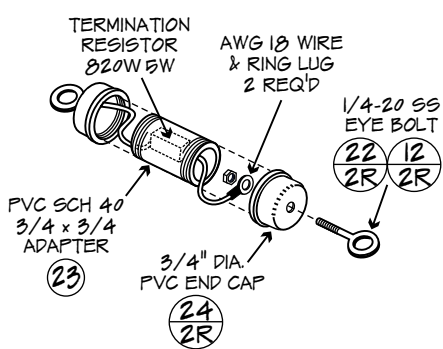
SHT  
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|----------------------------------------------|-----------------------------------------------------------------------|-------------------------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NA5N | TITLE<br><b>NA5N TFD ANTENNA PROJECT</b><br>MAST CONSTRUCTION DETAILS | DATE<br>JAN 2019<br>SHEET<br>4 of 6 |
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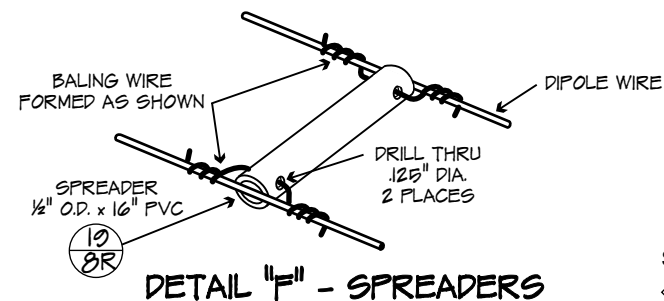
# 80M-10M TERMINATED FOLDED DIPOLE (TFD)



DETAIL "D" - BALUN

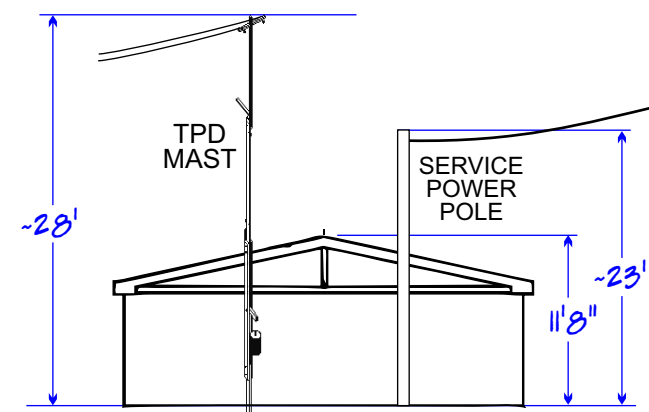
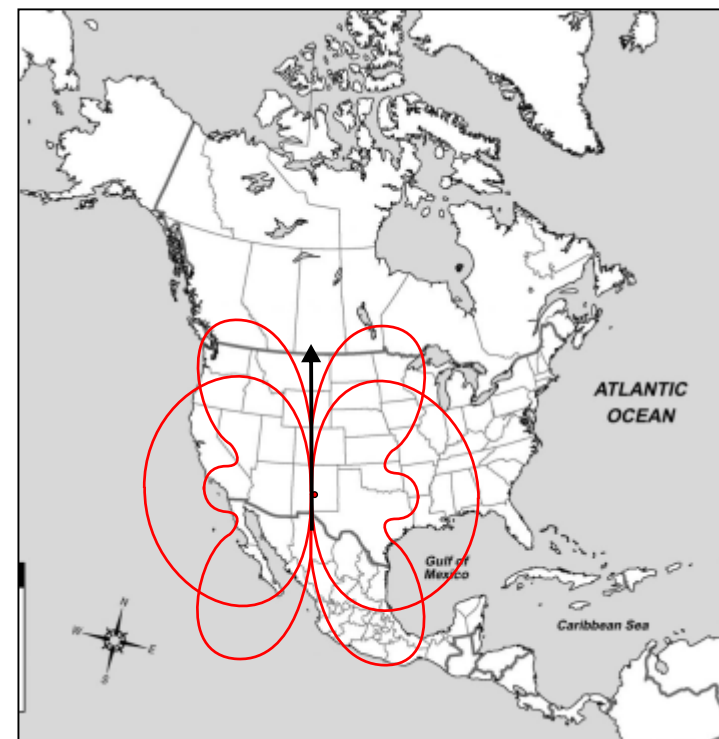
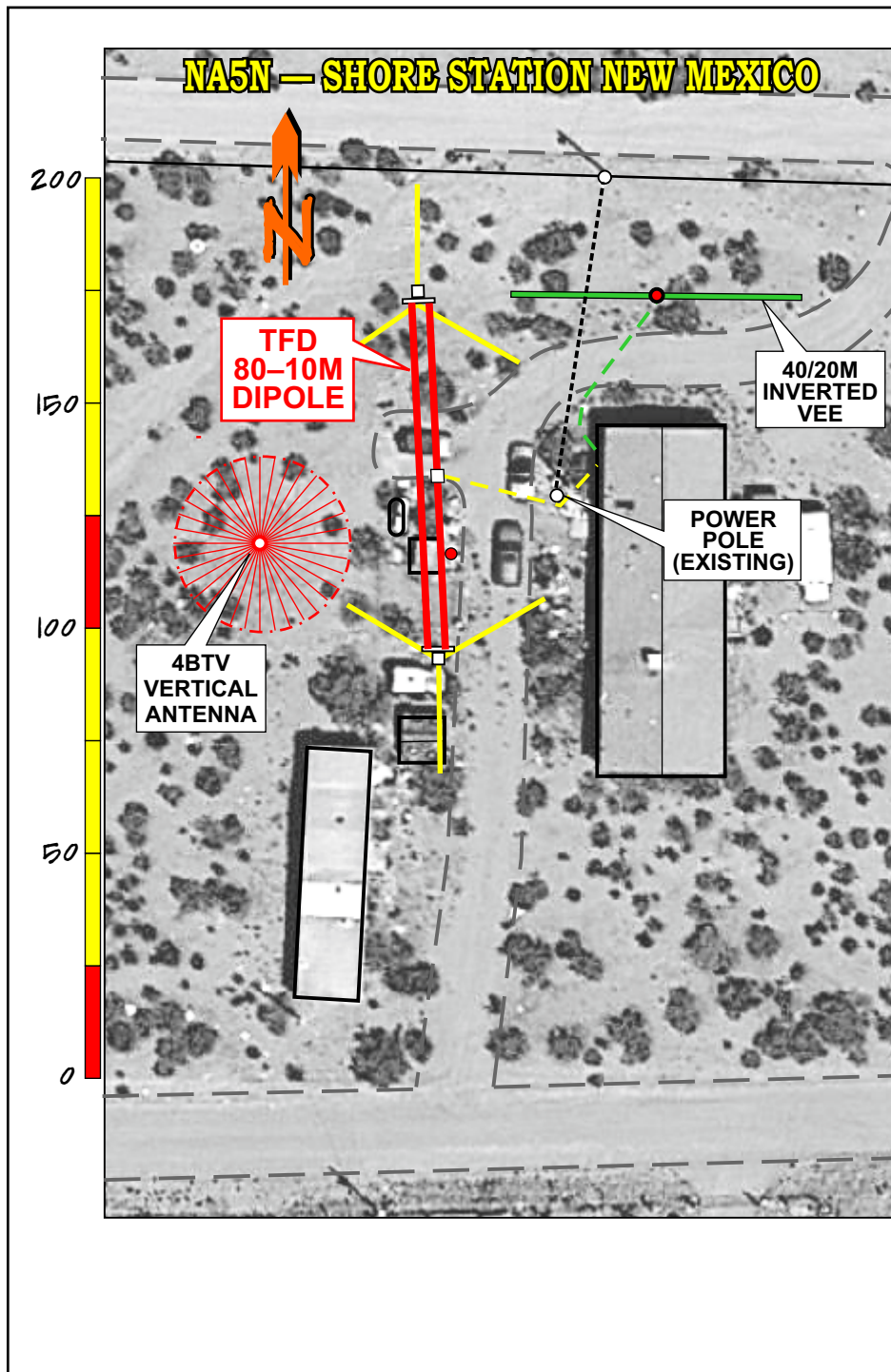


DETAIL "E" - TERMINATION



DETAIL "F" - SPREADERS

|                                              |                                                                                     |                  |
|----------------------------------------------|-------------------------------------------------------------------------------------|------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NASN | TITLE<br>NASN TFD ANTENNA PROJECT<br>80/40/20M TFD SCHEME<br>& CONSTRUCTION DETAILS | DATE<br>JAN 2019 |
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|                                              |                                                                  |                                     |
|----------------------------------------------|------------------------------------------------------------------|-------------------------------------|
| PROJECT<br><b>TFD</b><br>PAUL HARDEN<br>NA5N | TITLE<br><b>NA5N TPD ANTENNA PROJECT</b><br>INSTALLATION DETAILS | DATE<br>JAN 2019<br>SHEET<br>6 of 6 |
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