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Three general types of distribution transformers are used on the Ameren System. These differ from each other principally in the type and hookup of lightning arresters and switches used to protect the transformers. For purposes of uniformity the three transformer types will be referred to as:

Conventional Transformers (C)
Protected Transformers (P)
Completely Self Protected Transformers (CSP)

1. Conventional Transformers (C)

   These transformers require separately mounted lightning arresters and fused switches for their protection. Some Conventional transformers are still purchased new. A considerable number installed in past years are still in service. As non-standard Conventional transformers are removed from service they will be converted to Protected transformers by mounting lightning arresters on the transformers before they are placed in our transformer stock.

2. Protected Transformers (P)

   Transformers of this type have lightning arresters mounted on the transformer. Since the discharge path of the lightning arrester is by way of the transformer tank, good tank grounds are imperative.

   Protected transformers are standard for most new purchases of single-phase and three-phase transformers.

   Protected transformers shall have separately mounted fused switches installed. Transformers whose primary winding are connected phase-to-ground are provided with only one lightning arrester. This arrester is normally connected to the H_1 bushing, but may be shifted to the side of the tank giving the best clearances. The arrester shall be connected to the phase lead which is connected to the fused switch. Transformers whose primary winding are connected phase-to-phase will have two arresters mounted on the transformer.

3. Completely Self Protected Transformers (CSP)

   Completely Self Protected transformers have built into the unit internal primary fuse links (designed to open only on internal transformer faults) and a secondary breaker for protection against external overloads. These devices are all under oil. In addition, externally mounted lightning arresters are provided. The discharge path of the lightning arresters is by way of the transformer tank, therefore, good tank grounds are imperative.

   Single-phase Completely Self Protected transformers are no longer purchased new. Three-phase units in sizes 30 kVA to 150 kVA inclusive for 4.16kV and in sizes 30 kVA and 45 kVA for 12.47 kV units are still purchased new.

   Completely Self Protected transformers shall have separately mounted fused switches installed unless pole space does not allow and the number of customers affected by transformer failure is deemed acceptable. Only in such cases may the transformer be directly connected to the line wires.

4. Connecting Primary Leads

   Care should be exercised in connecting primary leads to transformers.

   On single-phase transformers connected phase-to-neutral the neutral connection shall be made before the primary lead is connected.

   On single-phase transformers connected phase-to-phase both primary terminals will be hot after the first primary lead is connected.

   On three-phase transformers all primary terminals will be hot after the first primary lead is connected.

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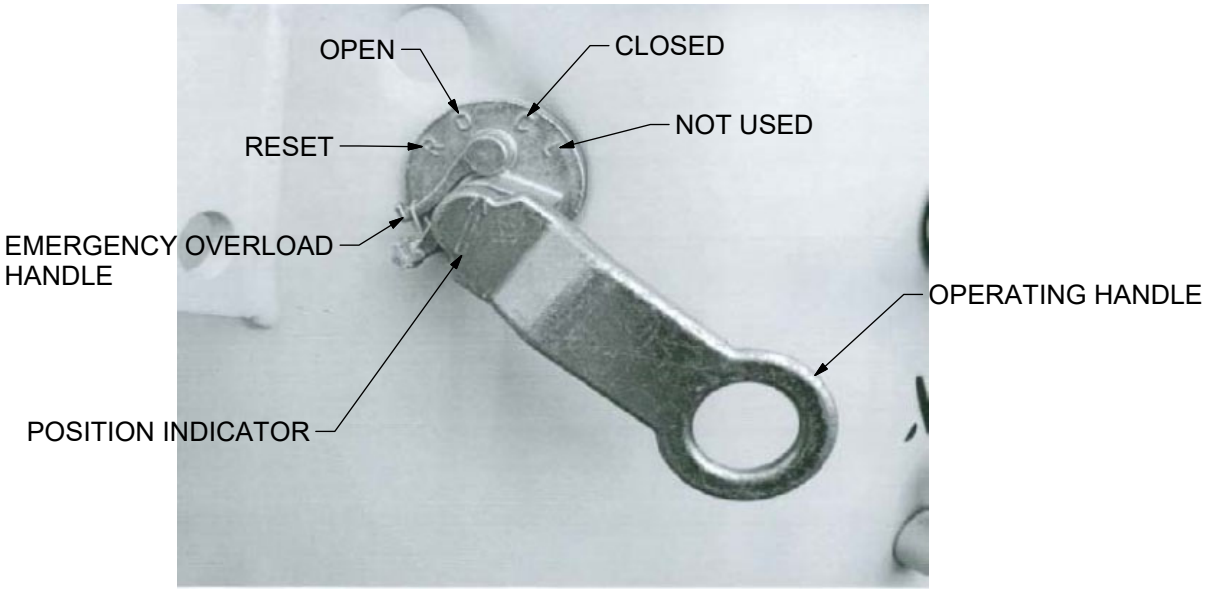
5. Breaker Operation on CSP Transformers



Breaker Switch

To Reset the breaker after it has opened due to overload move the handle to the ”Reset” position and then move it to the ”Close” position.

To Open the breaker raise handle until pointer coincides with the word ”Open".

To Close breaker (when it has not opened due to overload) lower handle until pointer coincides with the word ”Close”. On some units, this will be sufficient to close the breaker. On other units, it is necessary to move the handle to the Reset ”R” position before it can be closed. This is true even though the transformer has not tripped on overload.

The breaker will trip free of the handle permitting the closing on a short circuit with safety.

CSP transformers may also be equipped with an emergency overload control. Adjustment of this device will increase the capacity of the transformer for emergency loading. The emergency control is operated by a handle located so as to be partially concealed by the larger breaker operating handle.

In case the breaker has tripped because of excessive overload, an attempt should first be made to reset the breaker in the usual manner without moving the emergency control handle. Usually this will be possible, and no other action will be necessary. If the tripping is the result of overload, then the transformer should be replaced with a larger unit. However, if this replacement cannot be made immediately and if the breaker cannot be reclosed, then it may be possible to reclose the breaker by use of the emergency overload device. First rotate the emergency handle clockwise, then the breaker handle can be moved to the reset position and the breaker reclosed in the usual manner.

The transformer should be allowed to carry this loading only until the transformer can be replaced, preferably not more than a day.

Some CSP transformers have two secondary breakers connected in parallel. Both breakers must be closed to secure full capacity on these transformers.

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6. 480 Volt Three Wire Service From 480Y/277 Volt Four Wire Transformers

CAUTION: Do not make these conversions on three-phase transformers that have the primary and secondary neutrals internally connected together.

A. Three-wire 480 volt service is non-standard for new installations.

B. Corner-Grounded Three-Wire Service

a. Remove the secondary neutral ground strap(s) from all transformers.

b. Tape the secondary neutral terminal(s) to prevent accidental contact and any misunderstanding as to which terminals are being used and the type of service being provided.

c. Run a #2 copper lead from the ”A” phase secondary terminal to the tank ground connector. Ground the transformer tank(s) to a driven ground rod and to the common system neutral (if present).

CAUTION: After the “A” phase secondary terminal is energized, the taped neutral terminal(s) are energized.

d. Before connecting the customer's cable, determine which cable the customer has grounded (if any) and connect that cable to the now grounded ”A” phase secondary terminal.

C. Un-Grounded Three-Wire Service

a. Remove the secondary neutral ground strap(s) from all transformers.

b. Ground the transformer tank(s) to a driven ground rod and to the common system neutral (if present).

7. Un-Grounded Y Primary to △ Secondary

A. This connection is non-standard for new installations.

B. For un-grounded Y primary to △ secondary connected transformers, when primary voltage is lost to one of the bank phases or one of the cutouts is opened, a high temporary over-voltage can be impressed across the tank mounted arresters. Therefore, for 2.4 and 4.16 kV transformers 6 kV rated arrester Stock #10 01 184 is used. For 7.2 through 14.4 kV transformers 15 kV rated arrester Stock #10 01 188 is used.

8. Open Y or Open △ Primary to Open △ Secondary

A. Open Y primary to open △ secondary connections should only be used where the three phase load is small and three primary phases are not available. 120/240 V, 3-phase, 4-wire open △ service is provided with this connection. This connection can also be used for temporary situations where one transformer in a closed Y to closed △ bank of three transformers has failed. The capacity of this connection is 86.6% of the two remaining transformers or 57.7% of the initial three transformers (based on three equal size transformers).

B. Open △ primary to open △ secondary connections should only be used for temporary situations where one transformer in a closed △ to closed △ bank of three transformers has failed. The capacity of this connection is 86.6% of the two remaining transformers or 57.7% of the initial three transformers (based on three equal size transformers).

Table 1 - Transformer Voltage Code Explanation			
Codes	Primary & Secondary	Codes	Primary & Secondary
AA	2400/4160Y X 7200/12470Y X 7620/13200Y −120/240	HF	13200 − 480Y/277
AD	2400/4160Y X 7200/12470Y X 7620/13200Y −240/480	HN	7200 CONSTANT CURRENT
AN	2400 CURRENT TRANSFORMER	HP	7200 CONSTANT CURRENT
AP	2400 CURRENT TRANSFORMER	HQ	13200Y − 240 W/120 MIDTAP
AU	2400/4160Y X 7200/12470Y X 7620/13200Y − 277	HR	BLANK
BA	2400/4160Y − 120/240	IA	12000 − 120/240
BD	2400/4160Y − 240/480	IJ	12470 − 2400/4160Y
BJ	2400/4160Y − 2400	IU	12000 − 277
BM	2400/4160Y − 7200/12470Y	JA	7200/12470Y − 120/240
BR	2400/4160Y − 240/120	JD	7200/12470Y − 240/480
BT	2400/4160Y − 480	JJ	7200/12470Y − 2400/4160Y
BU	2400/4160Y − 277	JR	7200/12470Y − 240/120
BW	2400/4160Y − 240	JT	7200/12470Y − 480
CA	4160/7200Y − 120/240	JU	7200/12470Y − 277
CD	4160/7200Y − 240/480	JW	7200/12470Y − 240
CM	4160/7200Y − 7200/12470Y	KC	12470Y − 208Y/120
CU	4160/7200Y − 277	KE	12470Y − 240 X 480
DE	4160Y − 240 X 480	KF	12470Y − 480Y/277
DF	4160Y − 480Y/277	KG	12470Y − 240
DG	4160Y − 240	KH	12470Y − 480
DH	4160Y − 480	KQ	12470Y − 240 W/120 MIDTAP
DQ	4160Y − 240 W/120 MIDTAP	KU	12470Y − 277
EC	4160 − 208Y/120	LC	12470 − 208Y/120
EF	4160 − 480Y/277	LF	12470 − 480Y/277
EH	4160 − 480	LG	12470 − 240
EQ	4160 − 240 W/120 MIDTAP	LJ	12470 − 2400/4160Y
FA	4160GRDY/2400 − 120/240	LQ	12470 − 240 W/120 MIDTAP
FC	4160GRDY/2400 − 208Y/120	LX	12470 − 4160Y/2400
FF	4160GRDY/2400 − 480Y/277	MA	12470GRDY/7200 − 120/240
FR	4160GRDY/2400 − 240/120	MC	12470GRDY/7200 − 208Y/120
GA	24940GRDY/14400 − 120/240	MF	12470GRDY/7200 − 480Y/277
GP	24940GRDY/14400 − 14400Y/8300	MK	12470GRDY/7200 − 120
GX	69000 - 480	MQ	12470GRDY/7200 − 240 W/MIDTAP
HA	BLANK	MR	12470GRDY/7200 − 240/120
HB	13200 − 216Y/125		

Table 1 - Transformer Voltage Code Explanation (Cont.)			
Codes	Primary & Secondary	Codes	Primary & Secondary
MU	12470GRDY/7200 − 277	RU	14400/24940Y − 277
MX	12470GRDY/7200 − 4160Y/2400	RX	13200GRDY/7620 X 12470GRDY/7200 − 120/240
MZ	12470GRDY/7200 − 480/240	SA	13200GRDY/7620 − 120/240
NC	13200 − 208Y/120	SC	13200GRDY/7620 − 208Y/120
NF	13200 − 480Y/277	SD	13200GRDY/7620 − 240/480
NU	13200 − 277	SF	13200GRDY/7620 − 480Y/277
NX	13200 - 4160Y/2400	SK	13200GRDY/7620 − 120
OA	19920/34500Y − 120/240	SR	13200GRDY/7620 − 240/120
OD	19920/34500Y − 240/480	SU	2400/4160Y X 7620/13200Y − 277
OM	19920/34500Y − 7200/12470Y	SW	2400/4160Y X 7620/13200Y − 120/240
OU	19920/34500Y − 277	SX	13200GRDY/7620 − 4160Y/2400
PB	13800 − 216Y/125	SZ	13200GRDY/7620 − 480/240
PC	13800 − 208Y/120	TA	13800GRDY/7970 − 120/240
PF	13800 − 480Y/277	TC	BLANK
PM	13800 − 7200/12470Y	TF	4160GRDY/2400 X 12470GRDY/7200 X 13200GRDY/7620 − 480Y/277
PU	13800 − 277	TR	13800GRDY/7970 − 240/120
QA	34500 − 120/240	TX	4160GRDY/2400 X 13200GRDY/7620 − 120/240
QB	34500 − 2400/4160Y X 7200/12470Y	UA	7970/13800Y − 120/240
QC	34500 − 208Y/120	UB	14400 − 216Y/125
QD	34500 − 240/480	UC	14400 − 120/240
QF	34500 − 480Y/277	UD	7970/13800Y − 240/480
QJ	34500 − 2400/4160Y (1ph) or 34500 − 4160Y/2400 (3ph)	UE	14400 − 240/480
QK	34500 − 120	UF	14400 − 480Y/277
QM	34500 − 7200/12470Y (1ph) or 34500 − 12470Y/7200 (3ph)	UJ	14400 − 2400/4160Y
QT	34500 − 480	UR	4160GRDY/2400 X 13200GRDY/7620 − 240/120
QU	34500 − 277	UU	14400 − 277
RA	14400/24940Y − 120/240	VA	34500GRDY/19920 − 120/240 (1 BUSHING − 150KV BIL)
RD	14400/24940Y − 240/480	VC	34500GRDY/19920 − 208Y/120
RJ	14400/24940Y − 2400/4160Y	VD	34500GRDY/19920 − 240/480
RM	14400/24940Y − 7200/12470Y	VF	34500GRDY/19920 − 480Y/277
RO	14400/24940Y − 7620/13200Y	VM	34500GRDY/19920 − 7200/12470Y
RR	14400/24940Y x 24940GrdY/14400 - 240/120	VR	34500GRDY/19920 − 240/120

Table 1 - Transformer Voltage Code Explanation (Cont.)			
Codes	Primary & Secondary	Codes	Primary & Secondary
VU	34500GRDY/19920 − 277	YA	7620/13200Y − 120/240
WA	4160GRDY/2400 X 12470GRDY/7200 − 120/240	YD	7620/13200Y − 240/480
WC	4160GRDY/2400 X 12470GRDY/7200 − 208Y/120	YJ	7620/13200Y − 2400/4160Y
WF	4160GRDY/2400 X 12470GRDY/7200 − 480Y/277	YO	13800Y − 7620/13200Y
WR	4160GRDY/2400 X 12470GRDY/7200 − 240/120	YQ	13800Y − 240
WX	4160GRDY/2400 X 12470GRDY/7200 X 13200GRDY/7620 − 120/240	YU	7620/13200Y − 277
XA	2400/4160Y X 7200/12470Y − 120/240	ZA	13200GRDY/7620 X 12470GRDY/7200 − 120/240
XC	4160 X 12470 − 208Y/120	ZC	4160GRDY/2400 X 13200GRDY/7620 − 208Y/120
XD	2400/4160Y X 7200/12470Y − 240/480	ZD	2400/4160Y X 7620/13200Y − 240/480
XF	4160 X 12470 − 480Y/277	ZF	4160GRDY/2400 X 13200GRDY/7620 − 480Y/277
XG	4160 X 12470 − 240	ZQ	4160Y X 13200Y − 240 W/120 MIDTAP
XH	4160 X 12470 − 480	ZR	4160GRDY/2400 X 12470GRDY/7200 X 13200GRDY/7620 − 240/120
XQ	4160 X 12470 − 240 W/120 MIDTAP	ZZ	4160GRDY/2400 X 12470GRDY/7200 X 13200GRDY/7620 − 480/240
XU	2400/4160Y X 7200/12470Y − 277		

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Table 2 - Transformer Type/Style Code Explanation	
Codes	Types/Styles
A	CILCO padmount, 3Ø, radial feed, dead−front, w/bayonets
B	CILCO padmount, 3Ø, loop feed, dead−front, w/4−way switch or IP w/600A Bushing
C	Crossarm mount or IP 2400V 1Ø w/LA
D	Direct polemount, CSP, w/LA
E	Direct polemount, CSP, w/2 LA's
F	Direct polemount, conventional, w/LA
G	Direct polemount, conventional, no LA
H	Platform type, conventional, no LA
I	Direct polemount, w/breaker, w/LA
J	CIPS direct polemount, conventional, no LA
K	UE dry type or CILCO minipad, 1Ø, w/bayonet
L	Padmount, 3Ø, loop feed, dead−front
M	Padmount, 3Ø, radial feed, dead−front
N	CIPS platform type, 1Ø, conventional
O	CILCO padmount, 3Ø, selective primary, w/external fuses
P	Platform type, conventional, w/LA
Q	Vault type, 1Ø
R	CIPS padmount, 3Ø, radial feed, live−front
S	Subway type
T	CIPS direct polemount, 3Ø
U	CIPS platform type, 3Ø
V	Vault type, 3Ø
W	Padmount, 1Ø, no bayonet
X	Padmount, 1Ø, 32" high
Y	Padmount, 1Ø, low profile, w/bayonet
Z	Padmount, live−front

CONSTRUCTION NOTE(s):

1. The Style Codes are used by all companies unless marked for a specific legacy company (UE, CIPS, CILCO, IP).

Transformer Stock Number Format = AANNNNA
A = Alpha
N = Numeral
AA = Primary and Secondary Voltages
NNNN = Transformer Size w/ Leading Zeros
(Ex. 25 kVA = 0025, 150 kV = 0150)
A = Style Code Letter
Example: JA0025F
JA = 7200/12470Y-120/240 Transformer Voltage
0025 = 25 kVA Transformer
F = Pole Type, Conventional, w/ Lightning Arrester

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Table 1 - Single-Phase Transformers - Pole and Platform Mount

Stock Number by kVA

Voltage Primary-Secondary	Primary Bushings	Voltage Code	1	10	15	25	50	75	100	167	250	333	500
2400/4160Y-120/240	2	BA		0010C	0015F	0025C 0025F	0050C 0050F	0075C 0075F	0100C 0100F	0167C 0167F	0250C		
2400/4160Y-240/480	2	BD				0025F	0050C 0050F		0100C 0100F	0167F	0250C 0250P		0500P
2400/4160Y-277	2	BU							0100C	0167C		0333C	0500P
2400/4160Y-7200/12470Y	2	BM					0050G		0100G	0167G	0250G 0250P	0333G	
2400/4160Y x 7200/12470Y-120/240	2	XA		0010F	0015F	0025F	0050F	0075F	0100F	0167F	0250F	0333F	0500F
2400/4160Y x 7200/12470Y-240/480	2	XD		0010F		0025F	0050F		0100F	0167F	0250F	0333F	0500P
2400/4160Y x 7200/12470Y x 7620/13200Y-120/240	2	AA		0010F		0025F	0050F	0075F	0100F	0167F	0250F		
2400/4160Y x 7200/12470Y x 7620/13200Y-240/480	2	AD				0025F	0050F	0075F	0100F	0167F	0250F		
2400/4160Y x 7200/12470Y x 7620/13200Y-277	2	AU				0025F	0050F	0075F	0100F	0167F	0250F	0333F	0500P
4160/7200Y-120/240	2	CA				0025G	0050G	0075G	0100G	0167G			
4160/7200Y-277	2	CU								0167G			
7200/12470Y-120/240	2	JA		0010F	0015F	0025F 0037F	0050F	0075F	0100F	0167F	0250F	0333F	0500P
7200/12470Y-240/480	2	JD				0025F	0050F	0075F	0100F	0167F	0250F	0333F	0500P
7200/12470Y-277	2	JU					0050F		0100F	0167F	0250F	0333F	0500P
7620/13200Y-120/240	2	YA		0010F		0025F	0050F			0167F			
7620/13200Y-240/480	2	YD									0250F		
7620/13200Y-277	2	YU									0250F		
7620/13200Y-2400/4160Y	2	YJ							0100F	0167F	0250F		
7970/13800Y-120/240	2	UA			0015F	0025F	0050F	0075F	0100F	0167F			
7970/13800Y-240/480	2	UD				0025F	0050F		0100F	0167F			
12470 GrdY/7200-120	1	MK	0001F										
13200 GrdY/7620-120	1	SK	0001F										
14400/24940Y-120/240	2	RA			0015G	0025G	0050G	0075G	0100G	0167G	0250G	0333G	0500G
14400/24940Y-240/480	2	RD				0025G	0050G	0075G	0100G	0167G		0333G	0500G
14400/24940Y-2400/4160Y	2	RJ				0025G	0050G	0075G	0100G	0167G		0333G	
14400/24940Y-7200/12470Y	2	RM					0050G	0075G	0100G	0167G		0333G	0500G
14400/24940Y-7620/13200Y	2	RO										0333G	0500G
14400/24940Y-277	2	RU				0025G	0050G		0100G	0167G	0250G	0333G	0500H
19920/34500Y-120/240	2	OA				0025G							
19920/34500Y-240/480	2	OD				0025G	0050G		0100G	0167G			
34500 GrdY/19920-120/240	1	VA		0010F	0015F	0025F	0050F	0075F	0100F	0167F			
34500-120	2	QK		0010G									
34500-120/240	2	QA				0025F	0050F		0100F	0167F	0250F		
34500-277	2	QU					0050F		0100F	0167F	0250F	0333F	0500P

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DESIGN NOTE(s):

1. Transformers with voltage codes starting with B have side-wall mounted 4 kV primary bushings except for those with type code C and those 250 kVA and larger.

2. Type code C, F, and P transformers have tank mounted arresters. Type code G and H transformers do not have arresters.

3. Type code H and P transformers are platform mount transformers

4. Taps - Transformers are provided without taps except as follows:

   A. Transformers rated 2400, 4160, and 7200 volt primary 250 kVA and larger have two 2-1/2% taps above and two 2-1/2% taps below rated voltage. This applies to all units except dual and triple voltage transformers that have no taps.

   B. Transformers rated 19920 volt primary and higher have two 2-1/2% taps above and below rated voltage.

   C. BM (2400/4160Y) transformers have taps at 2520 / 2460 / 2400 / 2340 / 2280.

   D. RA, RD, RJ, RM, RO, & RU (14400/24940Y) transformers have taps at 14400 / 13800 /13200 /12870 /12540.

   E. UA & UD (7970/13800Y) transformers have taps at 7970 / 7795 / 7620 / 7410 / 7200.

   F. YA, YD, YU, & YJ (7620/13200Y) transformers have taps at 7811 / 7620 / 7430 / 7239 / 7049.

Table 2 - Three-Phase Transformers - Pole Mount

Stock Number by kVA								
Voltage Primary-Secondary	Primary Bushings	Voltage Code	30	45	75	150	300	500
4160Δ-208Y/120	3	EC		0045D	0075D	0150D	0300F	0500F
4160Y-240	3	DG				0150D	0300F	0500F
4160Δ-480Y/277	3	EF		0045F	0075F	0150F	0300F	0500F
12470Δ-208Y/120	3	LC	0030I	0045I	0075F	0150F	0300F	0500F
12470Y-240	3	KG	0030I	0045I	0075F	0150F	0300F	0500F
12470Δ-480Y/277	3	LF	0030F	0045F	0075F	0150F	0300F	0500F
13200Δ-208Y/120	3	NC					0300F	0500F
13200Δ-480Y/277	3	NF			0075F	0150F	0300F	0500F

DESIGN NOTE(s):

5. Transformers with 4160 primary voltage have side-wall mounted 4 kV primary bushings.

6. All three-phase transformers have tank mounted arresters.

7. Type code D and I are CSP transformers.

8. Taps -

   A. Transformers with 4160 and 12470 volt primary windings do not have taps.

   B. NC & NF (13200) transformers have taps at 14400 / 13800 / 13200 / 12870 / 12540.

Table 3 - Three-Phase Transformers - Platform Mount									
Stock Number by kVA									
Voltage Primary-Secondary	Primary Bushings	Voltage Code	300	500	750	1000	1500	2000	2500
4160Δ-208Y/120	3	EC	0300P	0500P	0750P	1000P			
4160Y-240	3	DG			0750P	1000P			
4160Δ-480Y/277	3	EF		0500P	0750P	1000P	1500P	2000P	2500P
12470Δ-208Y/120	3	LC	0300P	0500P	0750P	1000P			
12470Y-240	3	KG	0300P	0500P	0750P	1000P			
12470Δ-480Y/277	3	LF	0300P	0500P	0750P	1000P	1500P	2000P	2500P
13200Δ-208Y/120	3	NC	0300P	0500P	0750P	1000P			
13200Δ-480Y/277	3	NF	0300P	0500P	0750P	1000P	1500P	2000P	2500P
34500Δ-480Y/277	3	QF		0500P	0750P	1000P	1500P	2000P	2500P

DESIGN NOTE(s):

9. All new platform mounted transformers have cover mounted primary bushings.

10. All new platform mounted transformers have tank mounted arresters.

11. Taps -

    A. Transformers with 4160 and 12470 volt primary windings 500 kVA and below do not have taps. Transformers 750 kVA and larger have two 2-1/2% taps above and below the rated primary voltage.

    B. NC & NF (13200) transformers have taps at 14400 / 13800 / 13200 / 12870 / 12540.

    C. QF (34500) transformers have taps at 36225 / 35363 / 34500 / 33638 / 32775.

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Table 4 - Single-Phase Transformers - Pad Mount							
Stock Number by kVA							
Voltage Primary-Secondary	Voltage Code	25	50	75	100	167	250
4160 GrdY/2400-240/120	FR	0025X 0025Y	0050X 0050Y	0075X	0100X 0100Y	0167X	
4160 GrdY/2400 x 12470 GrdY/7200-240/120	WR	0025W 0025X 0025Y	0050W 0050X 0050Y	0075X	0100W 0100X 0100Y	0167W 0167X	
4160 GrdY/2400 x 12470 GrdY/7200 x 13200 GrdY/7620-240/120	ZR	0025X 0025Y	0050X 0050Y	0075X	0100X	0167X 0167Y	0250X
4160 GrdY/2400 x 12470 GrdY/7200 x 13200 GrdY/7620-480/240	ZZ	0025X		0075X 0075Y			
12470 GrdY/7200-240/120	MR	0025X	0050X 0050Y	0075X 0075Y	0100W 0100X	0167W 0167X 0167Y	
12470 GrdY/7200-480/240	MZ	0025X		0075X			
13200 GrdY/7620-240/120	SR	0025X	0050X	0075X	0100X		
13200 GrdY/7620-480/240	SZ			0075X 0075Y			
13800 GrdY/7970-240/120	TR	0025X	0050X	0075X	0100X	0167X	
14400/24940Y x 24940 GrdY/14400-240/120	RR		0050X				
34500 GrdY/19920-240/120	VR	0025X	0050X		0100X 0100Y	0167X	

DESIGN NOTE(s):

12. All single-phase padmount transformers have a non-field replaceable weak-link fuse or isolation link to clear the transformer from the circuit in the event of a winding failure.

13. Type code X are high-profile transformers. Starting in 4th quarter of 2015, these transformers are equipped with a Bay-O-Net fuse in series with an isolation link. Prior to this time, these transformers were equipped with a secondary breaker in series with a weak link fuse. Exception: ZRxxxxX transformers have always been equipped with a Bay-O-Net fuse in series with an isolation link.

14. Type code Y are low-profile transformers used primarily in Illinois. They are equipped with a Bay-O-Net fuse in series with an isolation link. Exception: VRxxxxY transformers are equipped with a Bay-O-Net fuse in series with a current-limiting fuse. Type Y transformers are no longer purchased but may be used for like-kind replacement until stock is depleted.

15. Type code W are high-profile transformers used in Illinois. They are equipped with only a non-field replaceable weak-link fuse.

16. Taps - All transformers are furnished without taps except as follows:
TR (13800 Grd Y/ 7970) transformers have taps at 7970 / 7795 / 7620 / 7410 / 7200.
VR (34500 Grd Y/ 19920) transformers have taps at 20916 / 20418 / 19920 / 19422 / 18924.

17. RR transformers have four primary bushings and a switch to allow operation on either 14400 Delta or 24490 GrdY circuits.

Table 5 - Three-Phase Transformers - Pad Mount											
Stock Number by kVA											
Voltage Primary-Secondary	Voltage Code	75	150	300	500	750	1000	1500	2000	2500	3000
4160Δ-208Y/120	EC	0075M	0150L 0150M	0300L 0300M		0750M	1000M				
4160Δ-480Y/277	EF		0150M	0300L	0500M		1000M	1500M 1500Z		2500M 2500Z	
4160 GrdY/2400 x 12470 GrdY/7200-208Y/120	WC	0075L 0075M	0150L 0150M	0300L 0300M	0500M	0750M	1000M				
4160 GrdY/2400 x 12470 GrdY/7200-480Y/277	WF		0150L 0150M	0300L 0300M	0500M	0750M	1000M	1500M	2000M		
4160 GrdY/2400 x 13200 GrdY/7620-208Y/120	ZC	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L						
4160 GrdY/2400 x 13200 GrdY/7620-480Y/277	ZF	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L						
4160Y x 13200Y-240Δ/120 Midtap	ZQ	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L	0750A		1500M			
12470Δ-208Y/120	LC	0075L 0075M	0150L 0150M	0300L 0300M	0500L 0500M	0750L 0750M	1000L 1000M				
12470Δ-480Y/277	LF		0150L 0150M	0300L 0300M	0500L 0500M	0750L 0750M	1000L 1000M	1500M	2000M	2500M	
12470 GrdY/7200-208Y/120	MC	0075L 0075M	0150L 0150M	0300L 0300M	0500L 0500M	0750L 0750M	1000L 1000M				
12470 GrdY/7200-480Y/277	MF		0150L 0150M	0300L 0300M	0500L 0500M	0750L 0750M	1000L 1000M	1500L 1500M	2000M	2500L 2500M	
12470 GrdY/7200 4160 GrdY/2400	MX								2000M		3000M
12470Y-240Δ/120 Midtap	KQ		0150L	0300L	0500L	0750L	1000L				
13200Δ-208Y/120	NC		0150M	0300M	0500M	0750M	1000M				
13200Δ-480Y/277	NF		0150M	0300M	0500M	0750M	1000M	1500M	2000M	2500M	
13200Δ-4160 GrdY/2400	NX				0500M						3000M
13200 GrdY/7620-208Y/120	SC	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L	0750A					
13200 GrdY/7620-480Y/277	SF	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L	0750A 0750L	1000A 1000L	1500M	2000M	2500M	
13200Y-240Δ/120 Midtap	HQ	0075A 0075L	0150A 0150L	0300A 0300L	0500A 0500L						
13200 GrdY/7620-4160 GrdY/2400	SX			0300A 0300L	0500A 0500L	0750A 0750L	1000A 1000L	1500M	2000M	2500M	
34500Δ-208Y/120	QC				0500L	0750L					
34500Δ-480Y/277	QF				0500L	0750L	1000L	1500L 1500M	2000M	2500L 2500M	3000M
34500Δ-4160 GrdY/2400	QJ									2500M	
34500Δ-12470 GrdY/7200	QM									2500M	
34500 GrdY/19920-208Y/120	VC			0300L	0500L	0750L					
34500 GrdY/19920-480Y/277	VF				0500L	0750L	1000L	1500L		2500L	

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DESIGN NOTE(s):

18. Type code A transformers are radial feed. They are equipped with Bay-O-Net fuses.

19. Type code M transformers are radial feed. They do not have fuses.

20. Type code L transformers are loop feed. They are equipped with Bay-O-Net fuses. Exception: See Note 24.

21. Type code Z transformers are live-front radial feed. They do not have fuses. **THESE TRANSFORMERS ARE NOT TO BE INSTALLED NEW. THEY ARE ONLY ALLOWED IF AVAILABLE FOR LIKE-KIND REPLACEMENT.**

22. Voltage code EF and WF transformers 1500 kVA and larger are equipped with 15 kV, 600 Amp non-loadbreak bushings.

23. QFxxxxM, QJxxxxM, and QMxxxxM transformers are quipped with 35 kV, 600 Amp non-loadbreak bushings.

24. All VCxxxxL, VFxxxxL, QCxxxxL, and QFxxxxL transformers are equipped with 35 kV, 200 Amp loadbreak bushings (large interface). These transformers are also equipped with clip style current limiting fuses instead of Bay-O-Net fuses.

25. VCxxxL and VFxxxxL **ARE NOT TO BE INSTALLED NEW. THEY ARE ONLY AVAILABLE FOR LIKE-KIND REPLACEMENT.**

26. MX, NX, and SX transformers 1500 kVA and larger are equipped with 15 kV, 600 Amp, non-loadbreak secondary bushings.

27. Taps -

    A. Transformers with 4160 and 12470 volt primary windings 500 kVA and below do not have taps. Transformers 750 kVA and larger have two 2-1/2% taps above and below the rated primary voltage.

    B. MX (12470 GrdY/7200) transformers have taps at 12782 / 12470 / 12158 / 11847 / 11535.

    C. NC, NF, and NX (13200Δ) transformers have taps at 14400 / 13800 / 13200 / 12870 / 12540.

    D. SC, SF, and SX (13200 GrdY/7620), and HQ (13200Y) transformers have taps at 13530 / 13200 / 12870 / 12540 / 12210.

    E. WC and WF (4160GrdY/2400 x 12470GrdY/7200) transformers manufactured prior to 2022 do not have taps. Starting in 2022, WC1000M, WF1000M, WF1500M, and WF2000M transformers are manufactured with taps on the 4160 winding at 4368 / 4264 / 4160 / 4056 / 3952.

    F. ZC and ZF (4160GrdY/2400 x 13200GrdY/7620) and ZQ (4160Y x 13200Y) transformers have taps on the 13200 winding at 13530 / 13200 / 12870 / 12540 / 12210.

    G. QC, QJ, QF, and QM (34500Δ), and VC and VF (34500 GrdY/19920) transformers have taps at 36225 / 35363 / 34500 / 33638 / 32775.

28. Secondary Supports -

    A. Transformers with 240Δ/120 Midtap and 208Y/120 volt secondary 500 kVA and larger are equipped with secondary bushing spade terminal supports.

    B. Transformers with 480Y/277 volt secondary 750 kVA and larger are equipped with secondary bushing spade terminal supports.

Table 6 - Three-Phase Transformers - Network						
Stock Number by kVA						
Voltage Primary-Secondary	Voltage Code	500	750	1000	1500	2000
13200Δ-216Y/125	HB	0500S	0750S	1000S		
13200Δ-480Y/277	NF	0500S	0750S	1000S		
13800Δ-216Y/125	PB	0500S	0750S			
13800Δ-480Y/277	PF			1000S	1500S	2000S
14400Δ-216Y/125	UB	0500S		1000S		
14400Δ-480Y/277	UF			1000S	1500S	2000S

DESIGN NOTE(s):

29. Voltage code HB and NF transformers are used in Bloomington and Decatur, IL.

30. Voltage code PB and PF transformers are used in St. Louis, MO.

31. Voltage code UB and UF transformers are used in Peoria, IL.

32. Taps -
    A. HB and NF (13200Δ) transformers have taps at 13200 / 12870 / 12540 / 12210 / 11880.
    B. PB and PF (13800Δ) transformers have taps at 14490 / 14145 / 13800 / 13455 / 13110.
    C. UB and UF (14400Δ) transformers have taps at 14400 / 14040 / 13680 / 13320 / 12960.

Table 7 - Three-Phase Transformers - Commercial Subsurface						
Stock Number by kVA						
Voltage Primary-Secondary	Voltage Code	150	225	300	500	750
12470Y/7200-208Y/120	MC	0150V	0225V	0300V	0500V	0750V
12470Y/7200-480Y/277	MF				0500V	0750V
4160Y/2400 x 12470Y/7200-208Y/120	WC	0150V		0300V	0500V	0750V
4160Y/2400 x 12470Y/7200-480Y/277	WF				0500V	0750V

DESIGN NOTE(s):

33. Commercial Subsurface Transformer are only used in Champaign, Galesburg, and Ottawa, IL.

34. Taps - Commercial Subsurface Transformers do not have taps.

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1. Transformer Installations

Details of transformer installations will vary based on the number of phases, voltage, whether delta or wye connected, kVA rating, whether common or isolated neutral, and grounding requirements. Some special considerations are detailed below and should be used in conjunction with the other transformer construction standards.

2. Transformer Removals

Transformers removed from service shall be either retained at the district for future use or locally retired.

A. Guidelines for Retaining a Transformer for Reuse

a. The transformer was known to be working when removed and is less than 20 years old.
b. The transformer is a current design.
c. The transformer is in good condition.
   i. There are no broken bushings.
   ii. It is not leaking oil.
   iii. The paint is okay, very little rust present.
   iv. Tanks are not badly dented and hanger brackets are not broken.
   v. If a padmount, it has a penta head bolt and the integrity of the cabinet security has not been compromised.

B. Operations to be Performed Prior to Reuse

a. Replace porcelain arrester with polymer arrester on overhead transformers.
b. On CSP transformers, remove all leads and check the low voltage breaker(s) operation and continuity.
c. On overhead transformers with cover mounted bushings, install wildlife guard(s). Refer to DCS **05 12 10 01**.
d. On CSP transformers, reset the emergency overload lever to the normal position and install a meter seal.

3. Grounding of Transformer Tanks

On all transformer installations, tanks shall be connected to the pole ground by connecting a #6 or #4 CU grounding wire from the pole ground to the tank grounding lug provided for this purpose.

All single-phase transformers with two primary bushings, which are intended for phase to neutral connection, shall be connected to the primary neutral (See DCS **13 00 06 02**). Also, all single-phase transformers having 120/240 volt secondaries with solderless connector type secondary bushings shall have a grounding strap between the secondary neutral bushing and the transformer tank. However, where grounding rules require the interconnection of the secondary and arrester ground leads through a spark gap the grounding strap shall be removed (See DCS **13 00 06 06**).

All transformer tanks shall be regarded as being "hot" when not positively known to be effectively grounded.

4. Single-Phase Delta Primary Systems

When a transformer is used on a delta primary system, lightning arresters must be attached to each primary bushing (See DCS **13 00 06 06**).

5. Three-Phase Service

Three-phase service where the secondary voltage is 480Y/277 or 480 volts may be provided using three-phase transformers or by banking three single-phase transformers.

Three single-phase conventional transformers shall be banked for 120/208Y or 240 volt service.

CSP transformers should not be banked.

CAUTION:
If single-phase transformers having 120/240 volt secondaries are banked for three-phase corner grounded delta, ungrounded delta, or grounded wye service, the grounding strap between the secondary neutral bushing and the tank must be removed from all transformers. If not, circulating currents may, under some conditions, be set up through one half the secondary coil of adjacent transformers, transformer tanks, and ground.
See DCS **13 00 07 04**, **13 00 07 05**, **13 00 07 08**, and **13 00 07 09**.

If single-phase transformers having 120/240 volt secondaries are banked for three-phase mid-tap grounded delta service, the grounding strap between the secondary neutral bushing and the tank must be left in-place on the middle/lighter transformer (transformer serving the single-phase 120/240 volt load).
See DCS **13 00 07 10**, **13 00 07 11**, **13 00 07 12**, and **13 00 07 13**.

6. "Open" Transformer Banks

The open wye-open delta and open delta-open delta type transformer banks are used to supply power to small three-phase customers in addition to taking care of their lighting requirements. These customers require a four-wire service and only two transformers. When connecting two transformers together to form a transformer bank, the bank will be referred to as an "open bank".

The open wye-open delta bank may be used where three-phase service is required but only two primary phases are present. The "open bank" may also be used in emergencies where one transformer in a bank of three fails and service must be restored immediately.

When an "open bank" is used, the capacity is only 57% of the three-phase rating of a closed bank of three transformers. If an "open bank" is used in an emergency situation, measures must be taken to reduce load. Additionally, the failed transformer should be replaced as soon as possible.

7. Paralleling Transformers

No attempt should be made to parallel a three-phase transformer with a bank of three single-phase transformers. Differences in phase shifts (angular displacements) will not permit paralleling.

8. 480 Volt Three-Wire Service From 480Y/277 Volt Four-Wire Transformer
See DCS **13 00 01 01** (Section 7), **51 12 00 **** (Note 11), and **51 12 02 **** (Note 12).

9. Elimination Of Stray Voltages

Relatively low levels of neutral-to-earth (stray) voltage may produce adverse effects in especially sensitive installations, such as dairy farms. If the neutral-to-earth voltage on the customer's premise cannot be reduced by conventional methods such as tightening connectors, replacing connectors, or adding ground rods, a neutral isolation device may be utilized. See DCS **13 00 06 08**.

1. Secondary Leads

The following copper lead sizes shall be used for connections from overhead transformer secondary terminals to a secondary, a secondary bus, or an individual secondary service. Aluminum leads shall not be used. Exception: If a transformer installation serves only one customer, aluminum service conductor can be extended to the transformer secondary terminals provided pin terminal connectors with copper studs are used.

Where a three-phase installation consists of a bank of three single-phase transformers the lead sizes between the transformers secondary terminals shall be determined by the size of the individual transformers, their single-phase voltage, and the change-out overload rating. The lead size from the transformers to the secondary/service bus shall be determined by the size of the bank, the three-phase voltage, and the change-out overload rating.

For 208Y/120 Volt and 480Y/277 Volt banks, the size of both the transformer-to-transformer and transformer-to-secondary/service bus leads are the same. For 240 Volt and 480 Volt delta banks, the size of the transformer-to-transformer leads can be smaller than the transformer-to-secondary/service bus leads. The three-phase tables in this standard reflect the preceding sizing criteria. For paralleled transformers, the transformer-to-transformer lead size is based on the kVA of the largest single transformer. The transformer-to-secondary lead size is based on the total kVA of the paralleled transformers. Tables of lead sizes for paralleling transformers are not provided since it is a non-standard application to be used only in emergency situations.

Where customer's circuit is over 50 Amps and involves more than one metallic duct, connections should not be made unless each of the phase wires and neutral are in each duct. This is an NEC requirement to avoid heating the metallic ducts by induced currents.

167 kVA and larger transformers with 120/240 and 240/480 Volt secondary have four (4) secondary bushings so that the secondary windings can be externally connected in series or parallel depending on the application. If the windings are to be connected in series, the external connection wire size must match the phase wire size (if single-phase) or transformer-to-transformer wire size (if banked three-phase delta). If the windings are to be connected in parallel, the external connection wire size can be one-half (1/2) the phase wire size (if single-phase or banked three-phase wye).

Table 1.1 Single−Phase 120/240 Volt 3−Wire and 240 Volt 2−Wire			
	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
Transformer kVA	Phase	Neutral	Stock Number
15 & Smaller	#6	#6	18 51 021
25	#2	#2	18 51 019
37−1/2	1/0	1/0	18 51 024
50	4/0	4/0	18 51 023
75	350	350	18 51 052
100	500	500	18 51 022
167	2−350	2−350	18 51 052
200	2−500	2−500	18 51 022
250	2−500	−	18 51 022
333	2−750	−	18 51 020

Table 1.2 Single−Phase 120 Volt 2−Wire and 120/240 Volt With Paralleled Windings		
Transformer kVA	Cross−Linked Polyethylene Covered Copper Wire	
Single−Phase ◇1◇	Size (AWG or KCMIL)	Stock Number
15 & Smaller	#2	18 51 019
25	1/0	18 51 024
37−1/2	4/0	18 51 023
50	350	18 51 052
75	500	18 51 022
100	2−350	18 51 052
167	2−750	18 51 020

DESIGN NOTE(s):

◇1.◇ See Table 1.5 for three-phase, 208Y/120 Volt secondary lead sizes.

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Table 1.3 Single−Phase 480 Volt 2−Wire		
Transformer kVA	Cross−Linked Polyethylene Covered Copper Wire	
	Size (AWG or KCMIL)	Stock Number
37−1/2 & Smaller	#6	18 51 021
50	#2	18 51 019
75	1/0	18 51 024
100	1/0	18 51 024
167	350	18 51 052
200	500	18 51 022
250	500	18 51 022
333	750	18 51 020

Table 1.4 Three−Phase 240 Volt			
Transformer or Bank kVA	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		Stock Number
	Transformer to Transformer ◇2◇	Transformer to Secondary/Service	
30 & Smaller	#6	#6	18 51 021
45	#2	#2	18 51 019
75	1/0	1/0	18 51 024
112−1/2	4/0	4/0	18 51 023
150	4/0	4/0	18 51 023
225	500	500	18 51 022
300	1−350	2−350	18 51 052
500	1−500	2−500	18 51 022
750	2−750	2−750	18 51 020
1000	2−750	3−750	18 51 020

DESIGN NOTE(s):

◇2.◇ Applicable only to a bank of single-phase transformers

Table 1.5 Three−Phase 208Y/120 Volt 4−Wire			
	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
Transformer or Bank kVA	Phase ◇3◇	Neutral ◇4◇	Stock Number
30 & Smaller	#6	#6	18 51 021
45	#2	#2	18 51 019
75	1/0	1/0	18 51 024
150	350	350	18 51 052
225	500	500	18 51 022
300	2−350	2−350	18 51 052
500	2−750	2−750	18 51 020
750	3−750	3−750	18 51 020
1000	3−750	3−750	18 51 020

DESIGN NOTE(s):

◇3.◇ Wire size is the same for the Transformer-to-Transformer (banked single-phase transformers) and Transformer-to-Secondary/Service leads.

◇4.◇ Full-size neutrals are required to accommodate the harmonic currents associated with increased usage of electronic office equipment.

Table 1.6 Three−Phase 480 Volt			
	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
Transformer or Bank kVA	Transformer to Transformer ◇5◇	Transformer to Secondary/Service	Stock Number
75 & Smaller	#2	#2	18 51 019
112−1/2	#2	#2	18 51 019
150	1/0	1/0	18 51 024
225	4/0	4/0	18 51 023
300	4/0	4/0	18 51 023
500	500	500	18 51 022
750	750	750	18 51 020
1000	1−500	2−500	18 51 022
1500	2−750	2−750	18 51 020
2000	2−750	3−750	18 51 020
2500	2−750	3−750	18 51 020

DESIGN NOTE(s):

◇5.◇ Applicable only to a bank of single−phase transformers.

Table 1.7 Three−Phase 480Y/277 Volt 4−Wire			
	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
Transformer or Bank kVA	Phase ◇6◇	Neutral ◇7◇	Stock Number
75 & Smaller	#2	#2	18 51 019
112−1/2	#2	#2	18 51 019
150	1/0	1/0	18 51 024
225	4/0	4/0	18 51 023
300	4/0	4/0	18 51 023
500	500	500	18 51 022
750	750	750	18 51 020
1000	2−500	2−500	18 51 022
1500	2−750	2−750	18 51 020
2000	3−750	3−750	18 51 020
2500	3−750	3−750	18 51 020

DESIGN NOTE(s):

◇6◇ Wire size is the same for the Transformer-to-Transformer (banked single-phase transformers) and Transformer-to-Secondary/Service leads.

◇7◇ Full-size neutrals are required to accommodate the harmonic currents associated with increased usage of electronic office equipment.

REV	DATE	ENG	DESCRIPTION
11	04/01/23	DG	Converted to new format
10	09/09/15	DG	

Table 1.8 Three−Phase 240 Delta/120 Volt Grounded Center Tap ◇8◇			
Transformer Bank kVA	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
	Transformer to Transformer	Transformer to Secondary/Service ◇9◇	Stock Number
3−10	#6	#6	18 51 021
3−15	#2	#2	18 51 019
3−25	1/0	1/0	18 51 024
3−50	4/0	4/0	18 51 023
3−100	1−350	2−350	18 51 052
2−10 & 1−25	#2	#2	18 51 019
2−25 & 1−50	1/0	1/0	18 51 024
2−50 & 1−100	350	350	18 51 052
2−100 & 1−167	1−350	2−350	18 51 052
2−167 & 1−250	1−500	2−500	18 51 022
3−167	1−500	2−500	18 51 022
3−250	2−750	2−750	18 51 020
3−333	2−750	3−750	18 51 020

DESIGN NOTE(s):

◇8◇ Bank of three single-phase transformers. This table is provided for maintenance of existing installations.

◇9◇ Center tap neutral is the same size as the Transformer-to-Secondary/Service phase conductors.

REV	DATE	ENG	DESCRIPTION
11	04/01/23	DG	Converted to new format
10	09/09/15	DG	

Table 1.9 Three−Phase 120/240 Volt Open Wye−Open Delta, Grounded Center Tap ◇10◇			
	Cross−Linked Polyethylene Covered Copper Wire		
	Size (AWG or KCMIL)		
Transformer Bank kVA	Transformer to Transformer ◇11◇	Transformer to Secondary/Service ◇12◇	Stock Number
2−10	#6	#6	18 51 021
1−25 & 1−10	#2	#2	18 51 019
1−50 & 1−10	1/0	1/0	18 51 024
2−25	#2	#2	18 51 019
1−50 & 1−25	1/0	1/0	18 51 024
1−100 & 1−25	350	350	18 51 052
2−50	1/0	1/0	18 51 024
1−100 & 1−50	350	350	18 51 052
1−167 & 1−50	350	2−350	18 51 052

DESIGN NOTE(s):

◇10◇ This transformer connection has one 208 V phase-to-neutral “wild” phase, and two 120 V phase-to-neutral “lighter” phases. All phase-to-phase voltages are 240 V.

◇11◇ Transformer-to-transformer and “wild” phase transformer-to-secondary/service leads are the same size.

◇12◇ Transformer-to-Secondary/Service “lighter” phase and center tap neutral leads are the same size.

2. Primary Phase Leads

Table 2.1 Single−Phase and Three−Phase 2400−4160 Volt Transformers With Cover Mounted Bushings			
Maximum KVA		Cross−Linked Polyethylene Covered Copper Wire Size	Stock Number
Single−Phase 2400V	Three−Phase 4160V		
333	1000	#4 CU, Solid ◇13◇	18 51 025
500	1500	#2 CU, 7 Strand	18 51 019
1000	2500	4/0 CU, 19 Strand	18 51 023

DESIGN NOTE(s):

◇13◇ Where long primary leads are required, a #2 or larger conductor shall be used for mechanical strength.

REV	DATE	ENG	DESCRIPTION
11	04/01/23	DG	Converted to new format
10	09/09/15	DG	

Table 2.2 Single-Phase and Three-Phase 2400-4160 Volt Transformers With Side-Wall Mounted Bushings			
Maximum KVA		EPR Covered Copper Wire Size	Stock Number
Single−Phase 2400V	Three−Phase 4160V		
167	500	#6 CU, 7 Strand − 5KV ◇13◇	18 53 011
250	750	#2 CU, 7 Strand − 5KV	18 53 018
333	1000	1/0 CU, 19 Strand − 5KV	18 53 022

Table 2.3 Single−Phase and Three−Phase 5000−15000 Volt Transformers With Cover Mounted Bushings			
Maximum KVA		Cross−Linked Polyethylene Covered Copper Wire Size	Stock Number
Single−Phase	Three−Phase		
500	2500	#4 CU, Solid ◇13◇	18 51 025

3. Primary Neutral Leads

A. Two Bushing Transformers

All single-phase, two bushing transformers, connected phase-to-neutral shall have the neutral bushing grounded twice. One of the grounding connections is from the neutral bushing to the grounded transformer tank. The second grounding connection is from the neutral bushing to the common neutral and is to be clearly separated from all other common neutral connections.

For all kVA sizes of 7.2 thru 19.9 kV transformers and 2.4 kV transformers thru 333 kVA, the grounding connections are made using a single piece of #4 soft−drawn solid covered copper wire (Stock #18 51 025) by extending the lead from the grounding boss on the transformer tank through the primary neutral bushing to the common neutral. Use a gradual sweep when taking the lead through the primary neutral bushing to the common neutral. See DCS **13 00 06 02**. For 500 kVA 2.4 kV transformers, use #2 CU (Stock #18 51 019) from the primary neutral bushing to the common neutral.

B. Single Bushing Transformers

All single-phase, single bushing transformers, connected phase-to-neutral shall have two separate grounding connections to the tank. One connection shall be made from the tank to the earth ground. The second connection shall be made from the tank to the common neutral and is to be clearly separated from all other common neutral connections. In all instances, this connection shall be made with #4 soft-drawn solid covered copper wire (Stock #18 51 025).

Table 1 - Single-Phase - Pole or Platform Mounted (1) 5kV and Below (Typical Values) Single-Voltage					
kVA Size	Height (Inches)		Width (Inches) (2)	Weight (Pounds)	Oil (Gal)
	Side Bushings	Cover Bushings (3)			
10	30	34	23	235	10
15	30	34	27	310	13
25	30	40	30	475	18
50	36	42	32	800	28
75	40	50	32	900	38
100	46	50	36	1100	50
167	50	54	38	1805	79
250	50	58	41	2360	95
333	58	66	41	2860	104
500	–	66	41	3215	104

Table 2 - Three-Phase - Pole Mounted (1) 5kV and Below (Typical Values)				
kVA Size	Height (Inches)	Width (Inches) (2)	Weight (Pounds)	Oil (Gal)
30	61	40	1450	71
45	61	40	1480	71
75	61	40	1830	81
150	61	40	1900	85
225	70	56	2500	90
300	70	56	3200	115
500	74	56	3800	150

DESIGN NOTE(s):

1. This table does not include step-up/step-down transformers.

2. Width includes cooling fins and tank mounted arresters in their extended positions.

3. Distance from upper support lug to HV terminal for cover mounted bushings is 15" ± 3".

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/25/16	DG	

Table 3 - Single-Phase - Pole or Platform Mounted ◇4◇ 7.2 Thru 14.4 kV (Typical Values) Single-Voltage				
kVA Size	Height (Inches) ◇6◇	Width (Inches) ◇5◇	Weight (Pounds)	Oil (Gal)
1	26	15	110	4
10	36	25	285	14
15	39	26	365	16
25	40	28	510	18
50	48	31	800	33
75	52	31	900	38
100	60	32	1120	66
167	60	39	1805	83
250	60	41	2360	95
333	75	52	2720	85
500	75	52	3060	98

Table 4 - Three-Phase - Pole Mounted ◇4◇ 12.47 Thru 13.8 kV (Typical Values)				
kVA Size	Height (Inches) ◇7◇	Width (Inches) ◇5◇	Weight (Pounds)	Oil (Gal)
30	65	40	1435	72
45	65	40	1500	72
75	65	40	1815	83
150	70	40	2275	91
225	70	56	2600	120
300	72	56	3125	125
500	85	56	4777	150

DESIGN NOTE(s):

◇4◇ This table does not include step-up/step-down transformers.

◇5◇ Width includes cooling fins and tank mounted arresters in their extended positions.

◇6◇ Thru 13.8 kV, distance from upper support lug to HV terminal is 15" ± 3". For 14.4 kV, distance from upper support lug to HV terminal is 16.5" ± 3" thru 167 kVA, and 19.5" ± 3" for 250 thru 500 kVA.

◇7◇ Distance from upper support lug to HV terminal is 15" ± 3".

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/25/16	DG	

Table 5 - Single-Phase - Pole or Platform Mounted ◇8◇ 19.9 and 34.5kV (Typical Values) Single-Voltage								
kVA Size	Height (Inches) ◇10◇		Width (Inches) ◇9◇		Weight (Pounds)		Oil (Gal)	
	19.9kV	34.5kV	19.9kV	34.5kV	19.9kV	34.5kV	19.9kV	34.5kV
10	44	48	29	32	380	685	17	32
15	44	–	32	–	435	–	18	–
25	44	49	32	32	500	685	18	36
50	50	58	34	42	815	1090	32	62
75	52	–	34	–	1255	–	42	–
100	55	62	34	42	1430	1890	56	85
167	55	70	36	47	1710	2200	58	94
250	–	66	–	48	–	2610	–	95
333	–	74	–	48	–	2770	–	105
500	–	82	–	48	–	5650	–	125

Table 6 - Single-Phase - Pole Mounted ◇8◇ Double and Triple Voltage (Typical Values)				
kVA Size	Height (Inches) ◇11◇	Width (Inches) ◇9◇	Weight (Pounds)	Oil (Gal)
10	36	27	485	20
15	37	27	390	18
25	42	27	500	23
50	46	31	955	42
75	54	32	1425	42
100	54	34	1430	64
167	58	39	1970	86
250	62	39	2415	93
333	66	41	2960	105
500	66	41	3505	105

DESIGN NOTE(s):

◇8◇ This table does not include step-up/step-down transformers.

◇9◇ Width includes cooling fins and tank mounted arresters in their extended positions.

◇10◇ Distance from upper support lug to HV terminal is 16.5" ± 3" thru 167 kVA and 19.5" ± 3" for 250 thru 500 kVA.

◇11◇ Distance from upper support lug to HV terminal is 15" ± 3".

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/25/16	DG	

Table 7 - Three-Phase - Platform Mounted 12 5 Thru 13.2kV (Typical Values)					
kVA Size	Height (Inches)	Width (Inches) 13	Depth (Inches) 13	Weight (Pounds)	Oil (Gals)
225	67	61	30	4040	241
300	67	61	32	4385	241
500	67	61	41	5500	241
750	75	75	49	8200	413
1000	75	77	49	9900	437
1500	78	81	49	10300	441
2000	89	81	49	13800	565
2500	89	93	51	17400	602

Table 8 - Three-Phase - Pad Mounted 12 5 Thru 13.2kV (Typical Values)					
kVA Size	Height (Inches)	Width (Inches) 14	Depth (Inches) 14	Weight (Pounds)	Oil (Gals)
75	62	74	50	3200	175
150	62	74	53	4000	175
300	68	74	60	8045	260
500	69	74	72	8270	316
750	74	76	68	8700	394
1000	74	76	72	12400	418
1500	77	80	81	13218	593
2000	80	92	86	17000	590
2500	80	97	92	17300	562

DESIGN NOTE(s):

12. This table does not include step-up/step-down transformers.

13. Width and depth dimensions include cooling fins and tank mounted arresters in their extended positions.

14. Width and depth dimensions include cooling fins. Refer to DCS **34 21 05 **** for pad requirements for these transformers.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/25/16	DG	

Table 9 - Single-Phase - Pad Mounted 2.4 Thru 7.97kV (Typical Values)						
kVA Size	15 Type	Height (Inches)	Width (Inches) 16	Depth (Inches) 16	Weight (Pounds) 17	Oil (Gals)
25	I	32	36	35	1070	56
50	I	32	40	38	1330	75
75	I	32	40	42	2035	87
100	I	36	40	44	2035	104
167	I	42	40	45	2855	116
250	I	42	40	51	2855	120
25	II	24	34	34	680	36
50	II	24	34	36	840	40
75	II	24	34	38	1005	69
100	II	32	36	38	1300	69
167	II	32	36	44	1840	91

Table 10 - Single-Phase - Pad Mounted 19.9kV (Typical Values)						
kVA Size	15 Type	Height (Inches)	Width (Inches) 18	Depth (Inches) 18	Weight (Pounds)	Oil (Gals)
25	I	36	38	38	1295	81
50	I	36	38	39	1415	82
100	I	36	38	43	1815	97
167	I	42	38	45	2500	120

DESIGN NOTE(s):

15 Type I are also referred to as high-profile transformers. Type II are also referred to as low-profile transformers.

16 Width and depth dimensions include cooling fins where applicable. Refer to DCS **34 21 05 **** for pad requirements for these transformers.

17 Weights for Type I padmount transformers are based on WR (dual voltage transformers) or ZR (triple voltage transformers). Single voltage transformers will typically weigh less.

18 Width and depth dimensions include cooling fins where applicable. Use pad stock #12 06 163 for these transformers per DCS **34 21 04 ****.

Table 11 - Three-Phase - Platform Mounted 19 35kV (Typical Values)					
kVA Size	Height (Inches)	Width (Inches) 20	Depth (Inches) 20	Weight (Pounds)	Oil (Gals)
500	84	77	48	6635	385
750	88	81	52	8900	451
1000	88	81	54	9200	456
1500	88	84	77	10785	456
2000	96	100	62	14500	585
2500	105	110	70	16500	605

Table 12 - Three-Phase - Pad Mounted 19 35kV (Typical Values)					
kVA Size	Height (Inches)	Width (Inches) 21	Depth (Inches) 21	Oil (Gals)	Weight (Pounds)
300 22	67	84	62	590	9300
500 22	77	87	66	685	11700
750 22	77	87	68	710	13400
1000 22	77	87	73	745	14900
1500 23	77	89	86	960	17600
2000 24	77	92	86	755	13065
2500 23	77	96	96	970	21100
3000 24	77	100	96	835	17900

DESIGN NOTE(s):

19 This table does not include step-up/step-down transformers.

20 Width and depth dimensions include cooling fins and tank mounted arresters in their extended positions.

21 Width and depth dimensions include cooling fins, but do not include the fuse cabinet provided on loop-feed transformers. With the fuse cabinet, the width of a loop-feed transformer can be up to 117”. Refer to DCS **34 11 00 00** for pad requirements for these transformers.

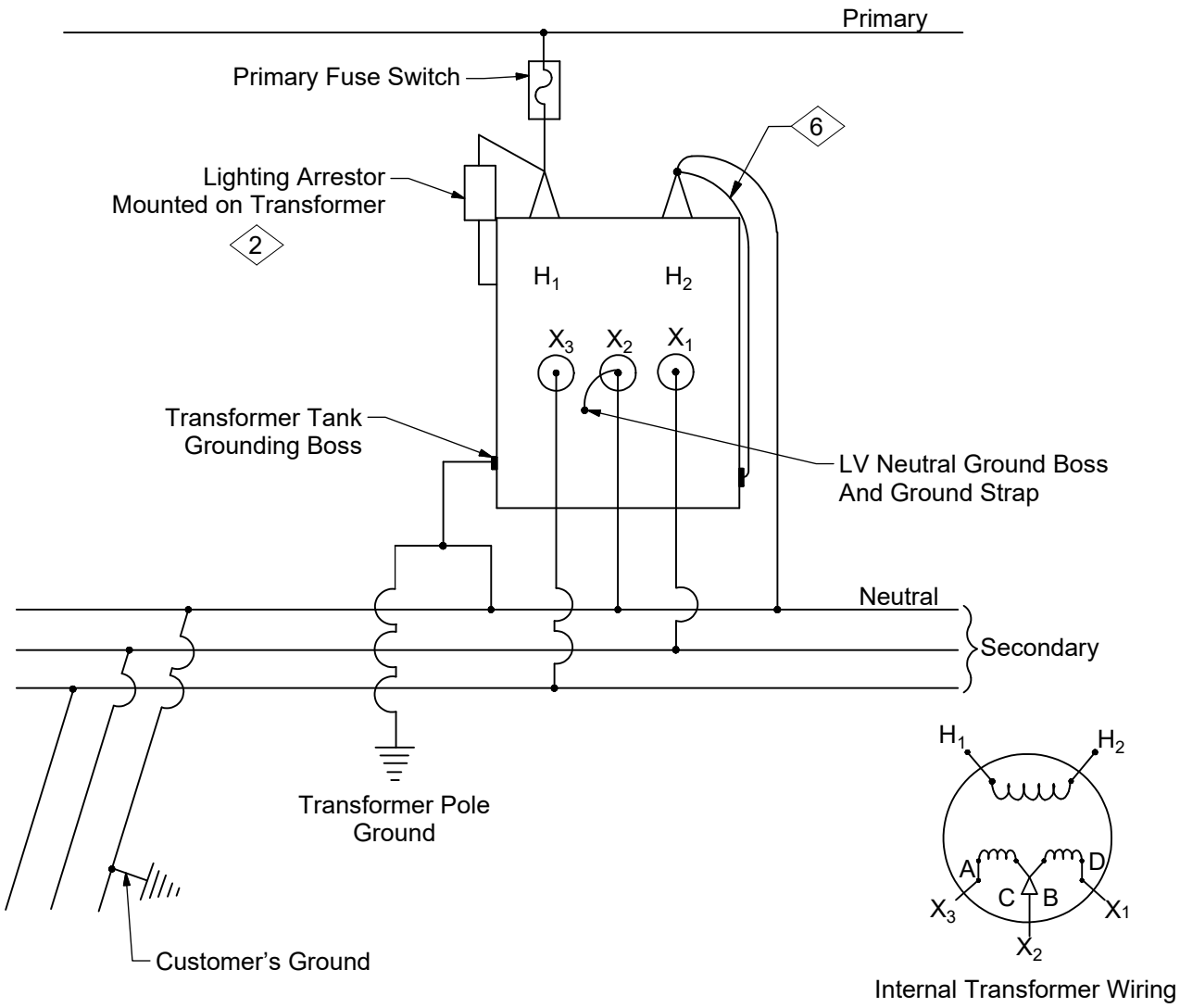
22 300 kVA thru 1000 kVA are only purchased as loop-feed.

23 1500 kVA and 2500 kVA are purchased in both radial-feed and loop-feed styles. These dimensions and weights are based on the loop-feed style.

24 2000 kVA and 3000 kVA transformers are only purchased as radial-feed.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/25/16	DG	

120 / 240 or 240 / 480 Volt 3-Wire Service



CONSTRUCTION NOTE(s):

1. Some 2400/4160 Y transformers have sidewall mounted HV bushings.

2. Primary phase connection may be on either the H_1 or H_2 bushing, with the lightning arrester connected to the same bushing. The ground lead is then connected to the other "H" bushing.

3. See DCS **13 00 01 01** for information about conventional and completely self protected transformers (CSP). See DCS **13 00 03 01** for primary and secondary leads.

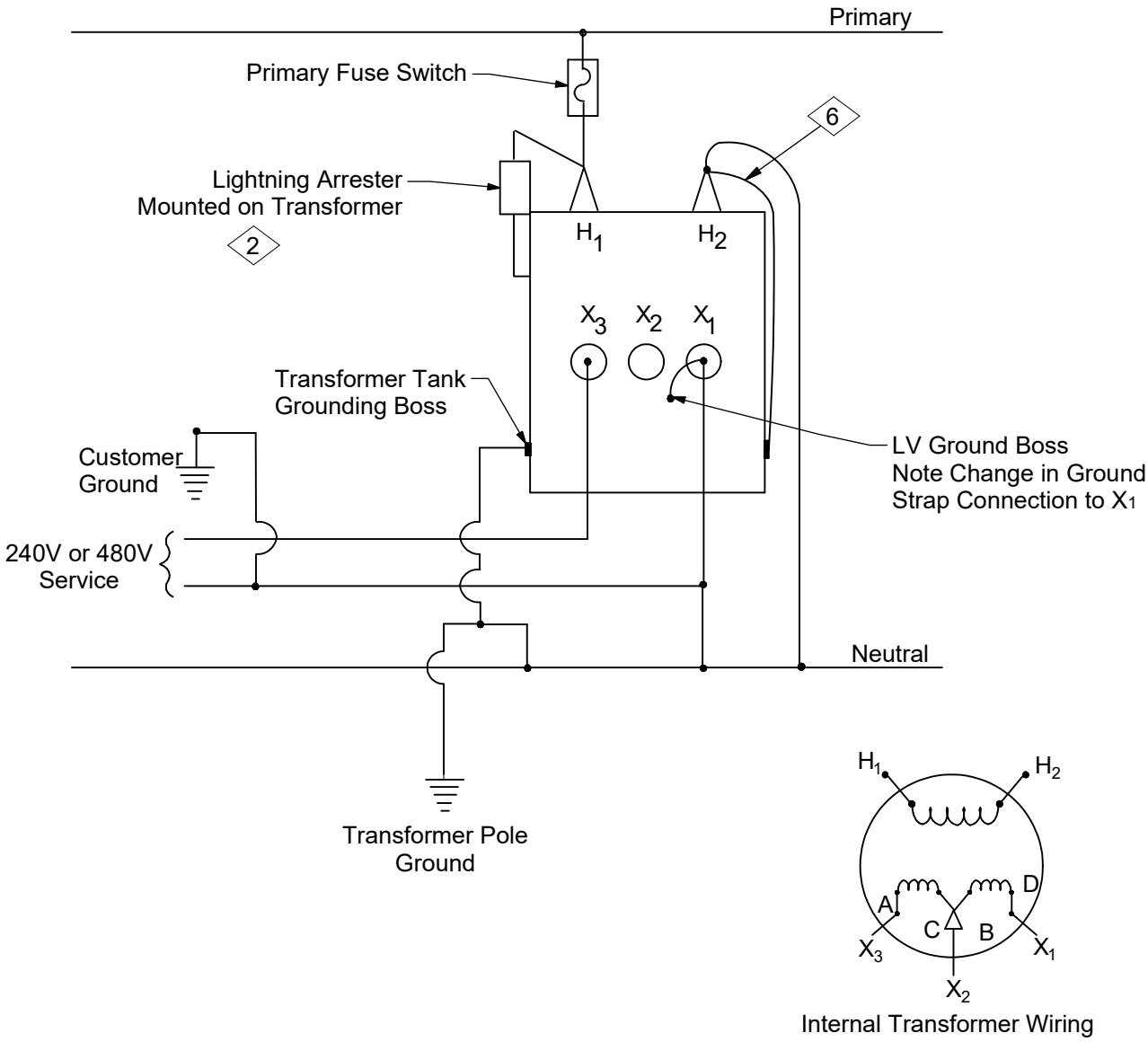
4. Transformers with a single HV bushing have one end of the winding grounded to the tank.

5. Transformer shown is additive polarity. Transformers 200 kVA and smaller with HV winding rated 8660 volts or less are additive polarity. All others are subtractive polarity. For subtractive polarity transformers, positions of the X_1 and X_3 bushings are reversed.

6. Extend lead from the ground boss through the primary neutral bushing to the common neutral. This lead should be clearly separated from all other common neutral connections (such as furthest connection from the pole or opposite side of pole from all other connections). Do not bend the primary neutral lead too severely. Use a gradual sweep when taking the lead to the common neutral.

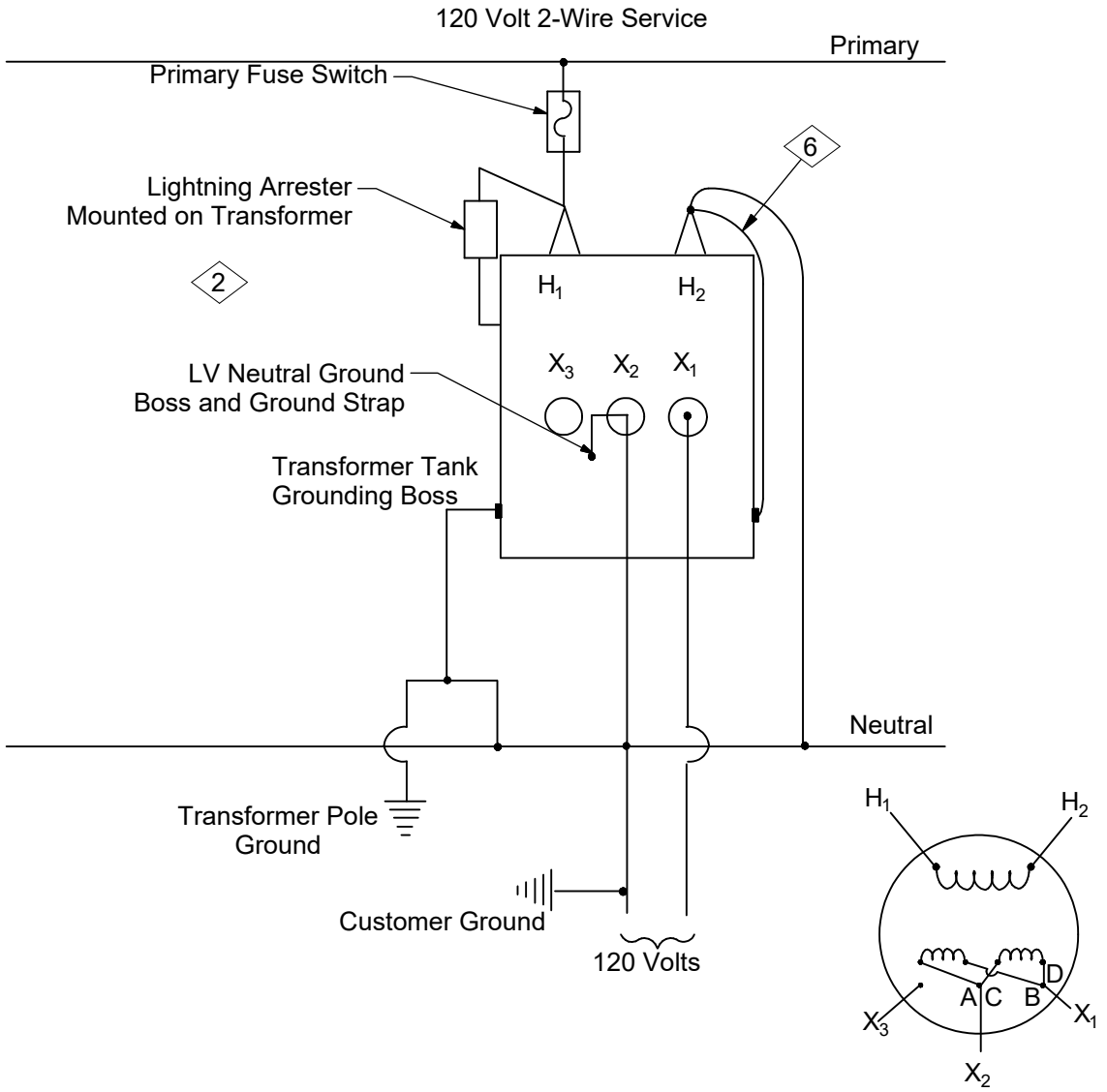
REV	DATE	ENG	DESCRIPTION
7	04/01/23	DG	Converted to new format
6	10/04/11	DG	

240 or 480 Volt 2-Wire Service



Internal Transformer Wiring

REV	DATE	ENG	DESCRIPTION
7	04/01/23	DG	Converted to new format
6	10/04/11	DG	



Internal Transformer Wiring
Requires Field Connection as Shown.
Winding X_3 X_2 is Reconnected as X_2 X_1

CONSTRUCTION NOTE(s):

1. 2400/4160 Y transformers may have sidewall mounted HV bushings.

2. Primary phase connection may be on either the H_1 or H_2 bushing, with the lightning arrester connected to the same bushing. The ground lead is then connected to the other "H" bushing.

3. See DCS **13 00 01 01** for information about conventional and completely self protected transformers (CSP). See DCS **13 00 03 01** for primary and secondary leads.

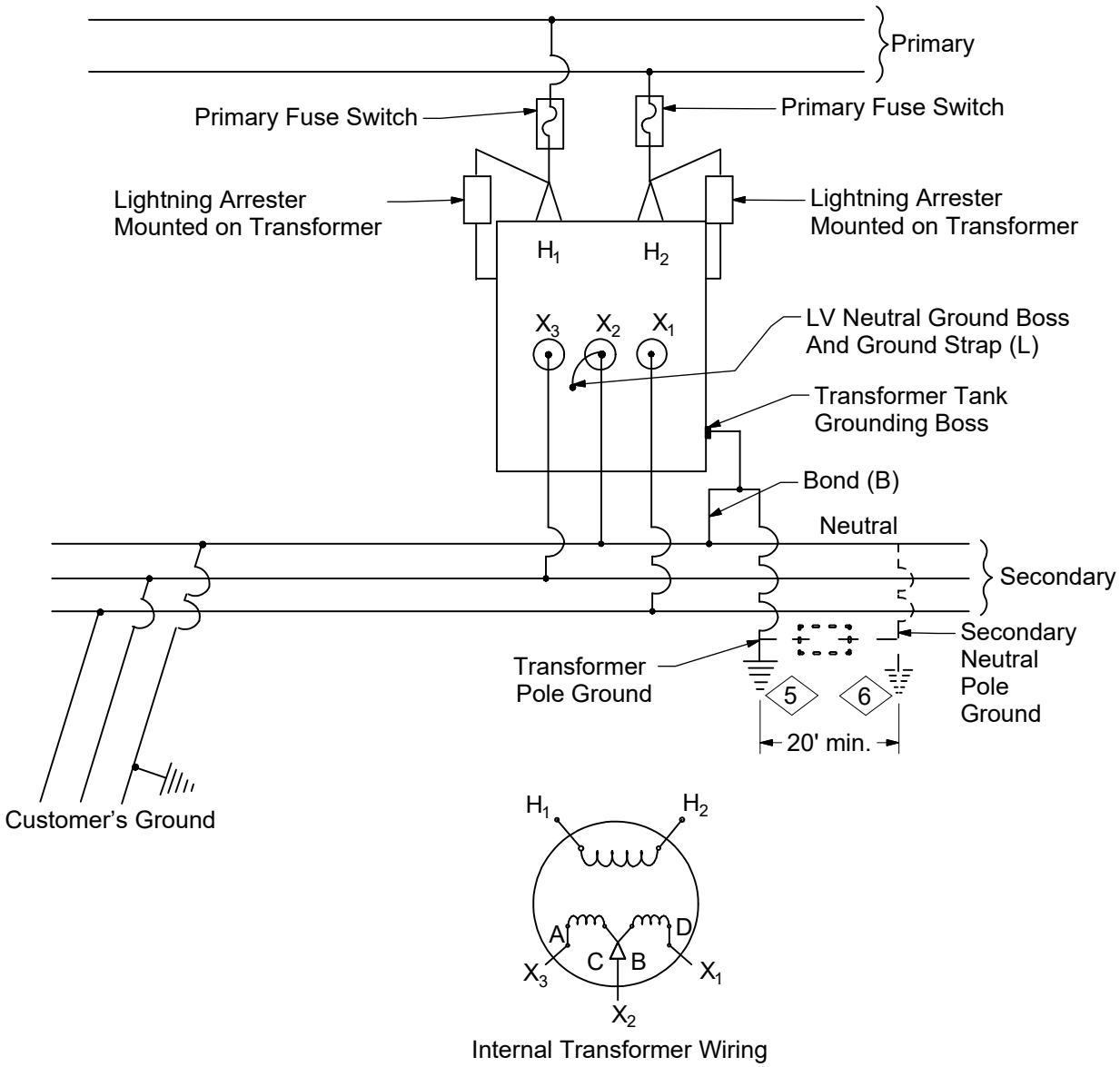
4. Transformers with a single HV bushing have one end of the winding grounded to the tank.

5. Transformer shown is additive polarity. Transformers 200 kVA and smaller with HV winding rated 8660 volts or less are additive polarity. All others are subtractive polarity. For subtractive polarity transformers, positions of X_1 and X_3 bushings are reversed.

6. Extend lead from the ground boss through the primary neutral bushing to the common neutral. This lead should be clearly separated from all other common neutral connections (such as furthest connection from the pole or opposite side of pole from all other connections). Do not bend the primary neutral lead too severely. Use a gradual sweep when taking the lead to the common neutral.

REV	DATE	ENG	DESCRIPTION
7	04/01/23	DG	Converted to new format
6	10/04/11	DG	

120 / 240 or 240 / 480 Volt 3-Wire Service



Internal Transformer Wiring

CONSTRUCTION NOTE(s):

1. 2400/4160Y or 4160 two wire transformers may have sidewall mounted HV bushings.
2. Lightning arresters must be connected to the H_1 and H_2 bushings.
3. See DCS **13 00 01 01** for information about conventional and completely self protected transformers (CSP). See DCS **13 00 03 01** for primary and secondary leads.
4. Transformer shown is additive polarity. Transformers 200 kVA and smaller with HV winding rated 8660 volts or less are additive polarity. All others are subtractive polarity. For subtractive polarity transformers, positions of X_1 and X_3 bushings are reversed.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	10/04/11	DG	

5. Per NESC 097D1, the lightning arrester ground (Transformer Pole Ground) and secondary neutral can only be tied solidly together as shown if one or the other or both of the following requirements are met:

   A. The secondary neutral shall have at least one connection to a continuous metallic underground water pipe system.

   B. The secondary neutral shall be connected to a primary neutral or shield wire having not less than four ground connections in each mile of continuous line in addition to a ground connection at each individual service.

6. If the above requirements cannot be met, proceed as follows:

   A. Remove ground strap (L) and omit bond (B).

   B. Drive an additional ground rod for the secondary neutral not less than 20 ft. from the arrester ground rod and connect the ground lead through an isolation arrester (Stock #10 01 019) to the lightning arrester/transformer tank ground lead (shown dotted in figure).

   C. The secondary grounding conductor shall be insulated for 600V (use riser wire Stock #18 53 011).

   D. The secondary grounding conductor shall be buried 18" deep from the pole to the ground rod.

   E. Both ground leads must be covered with plastic moulding for a distance of 8 ft.from the ground.

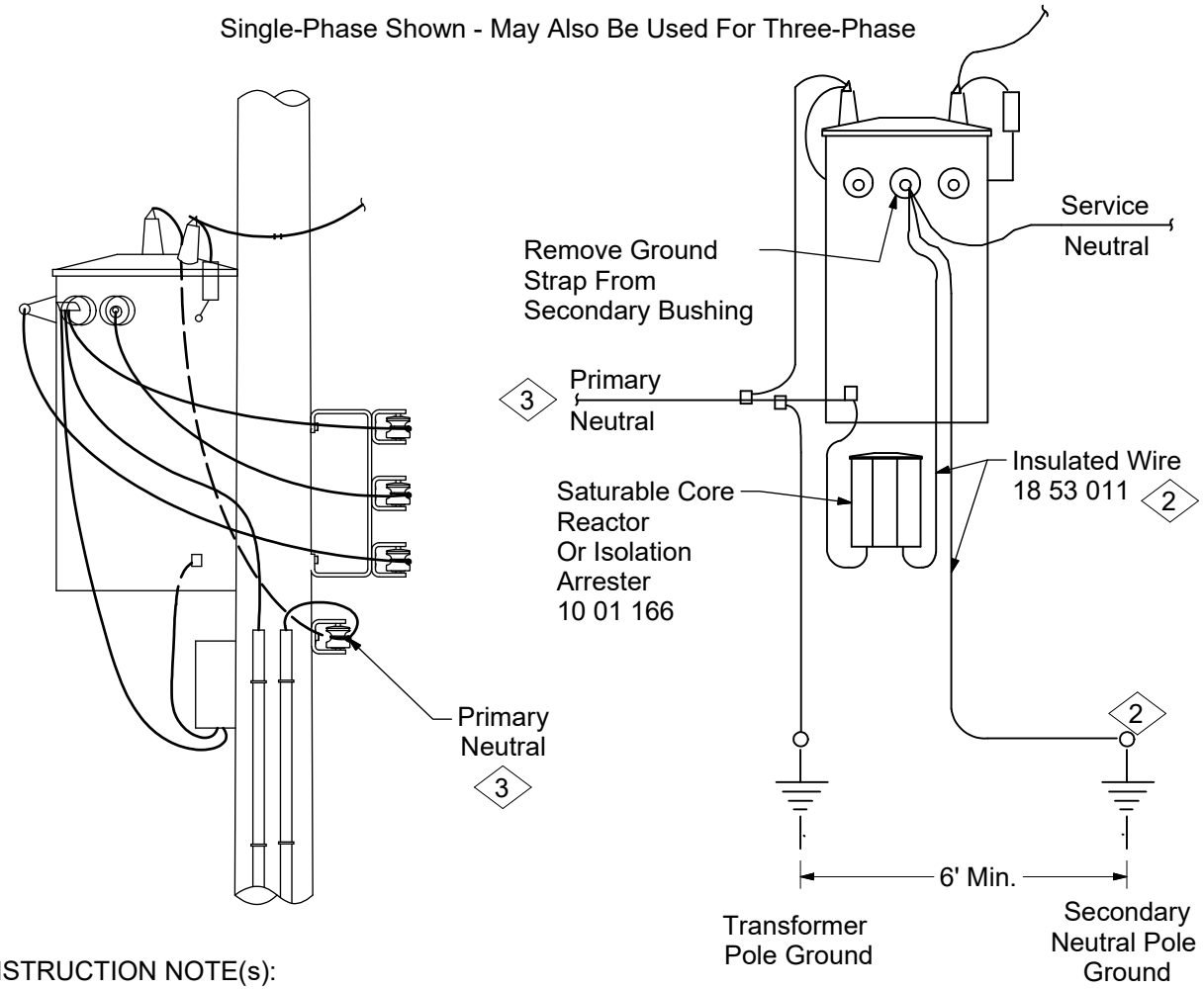
   F. The resistance of both grounds should not exceed 25 ohms.

7. If Communications needs to ground their messenger on this structure, they must bond ONLY to the Secondary Neutral Pole Ground.

DESIGN NOTE(s):

8. Information - Arrester (Stock #10 01 019) meets the NESC 097D1 requirement having a minimum 60 Hz flashover rating as the lessor of 2 times the primary circuit voltage or 10 kV.

Single-Phase Shown - May Also Be Used For Three-Phase



CONSTRUCTION NOTE(s):

1. Relatively low levels of neutral-to-earth (stray) voltage may produce adverse effects in especially sensitive installations, such as dairy farms. Usually stray voltages result from factors such as earth currents, ground electrode resistance, earth resistivity, or impedance of current carrying neutral conductors. If neutral-to-earth voltage on the customer's premise (as measured by Ameren personnel with customer's main disconnect in the open position, or with only 240 V loads connected) cannot be reduced to 1.0 volt AC or less across a 470 OHM 5% resistor by conventional methods such as tightening connectors, replacing connectors, or adding ground rods, a neutral isolation device may be utilized. **All options to eliminate stray voltages should be explored prior to installing either a saturable core reactor or an isolation arrester.**

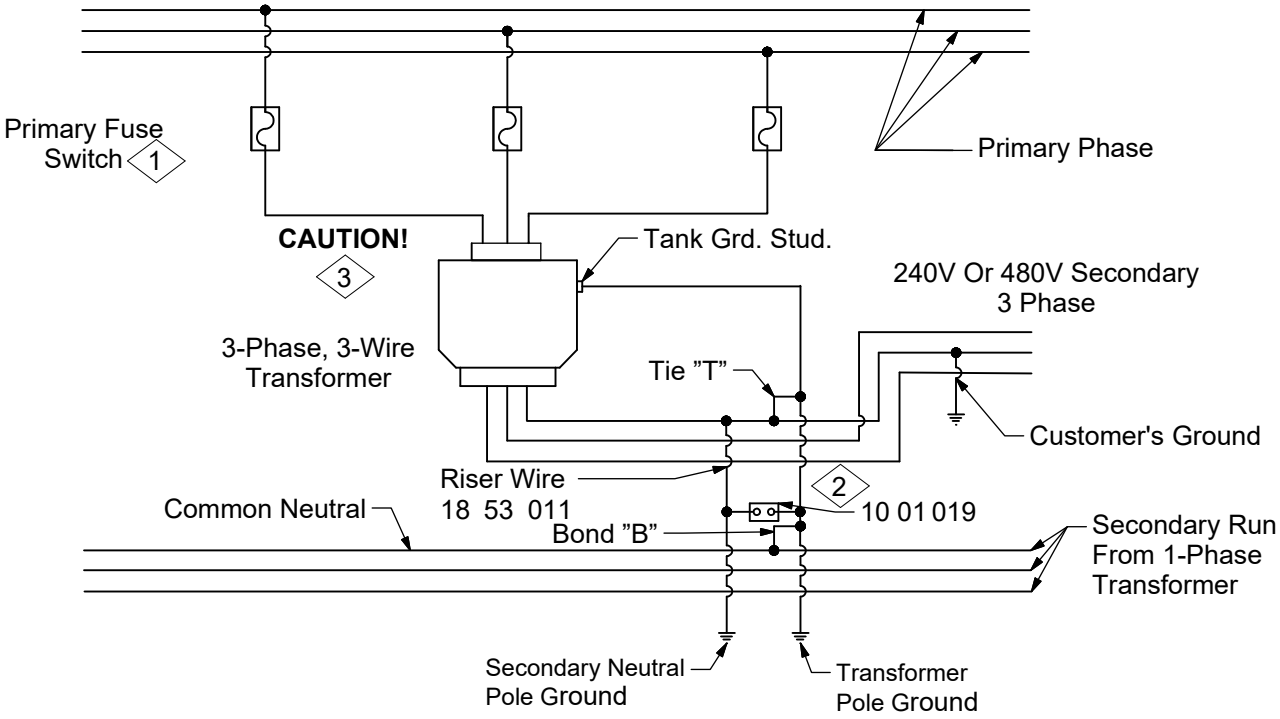
2. Rule 97D2 of the National Electrical Safety Code allows the primary and secondary neutrals of a multi-grounded system to be separated but interconnected through a spark gap or similar isolation device. The gap or device shall have a 60 Hz. breakdown voltage not exceeding 3 kV. Additionally, at least one other grounding connection on the secondary neutral shall be provided. This secondary ground rod shall be installed at least six feet from the primary ground rod. The secondary grounding conductor shall be insulated for 600 V, must be covered with plastic molding for a distance of 8 feet from the ground, and be buried a minimum of 18 inches deep to the ground rod. Resistance of the secondary ground should not exceed 25 ohms.

3. The system neutral must be connected to the grounded primary neutral bushing and the Transformer Pole Ground that connects the lightning arrester and transformer tank ground.

4. The reactor or isolation arrester ground must be completely isolated from other grounds.

5. Communications if present, must bond their messenger ONLY to the primary ground (Transformer Pole Ground) per NESC 97G.

REV	DATE	ENG	DESCRIPTION
2	04/01/23	DG	Converted to new format
1	06/24/11	DG	



CONSTRUCTION NOTE(s):

1. If installing CSP transformer, install fused switches as shown unless pole space does not allow and number of customers affected by transformer failure is deemed acceptable.

2. If a common neutral is not present omit bond "B" and tie "T" and install a second ground rod a minimum distance of 20 feet from the ground at the pole. Connect the lightning arrester/Transformer Pole Ground and Secondary Neutral Pole Ground together through an isolation arrester (Stock #10 01 019). The ground lead to the secondary ground rod shall be insulated for 600 V (use Stock #18 53 011). Both ground leads must be covered with plastic molding for a distance of 8 feet from the ground. The resistance of both grounds should not exceed 25 ohms.

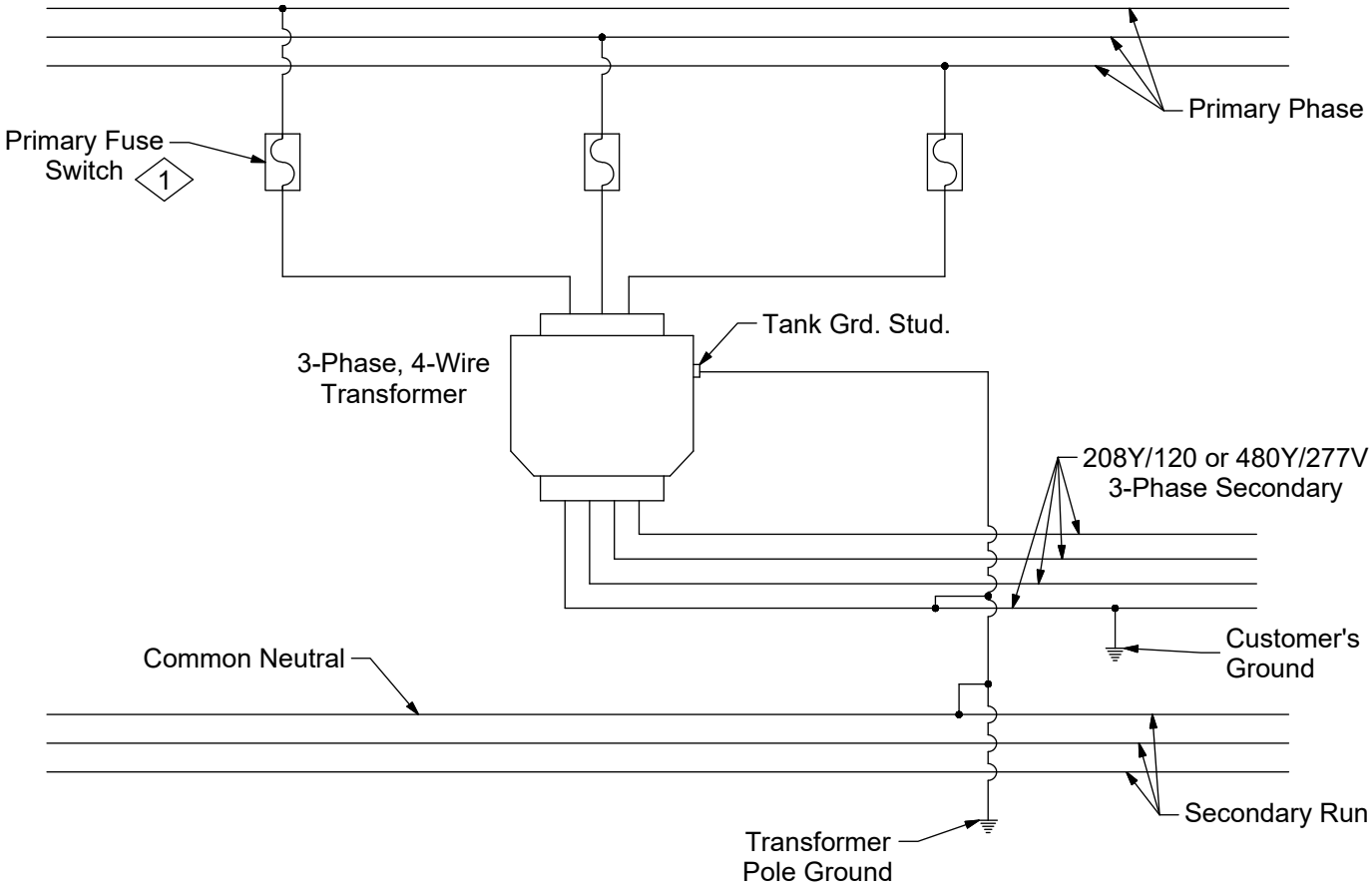
   Note: If Communications needs to ground their messenger on this structure, they must bond ONLY to the Secondary Neutral Pole Ground.

3. For 4.16 kV Y transformers use 6 kV arrester Stock #10 01 184. For 12.47 kV Y transformers use 15 kV arrester Stock #10 01 188.

DESIGN NOTE(s):

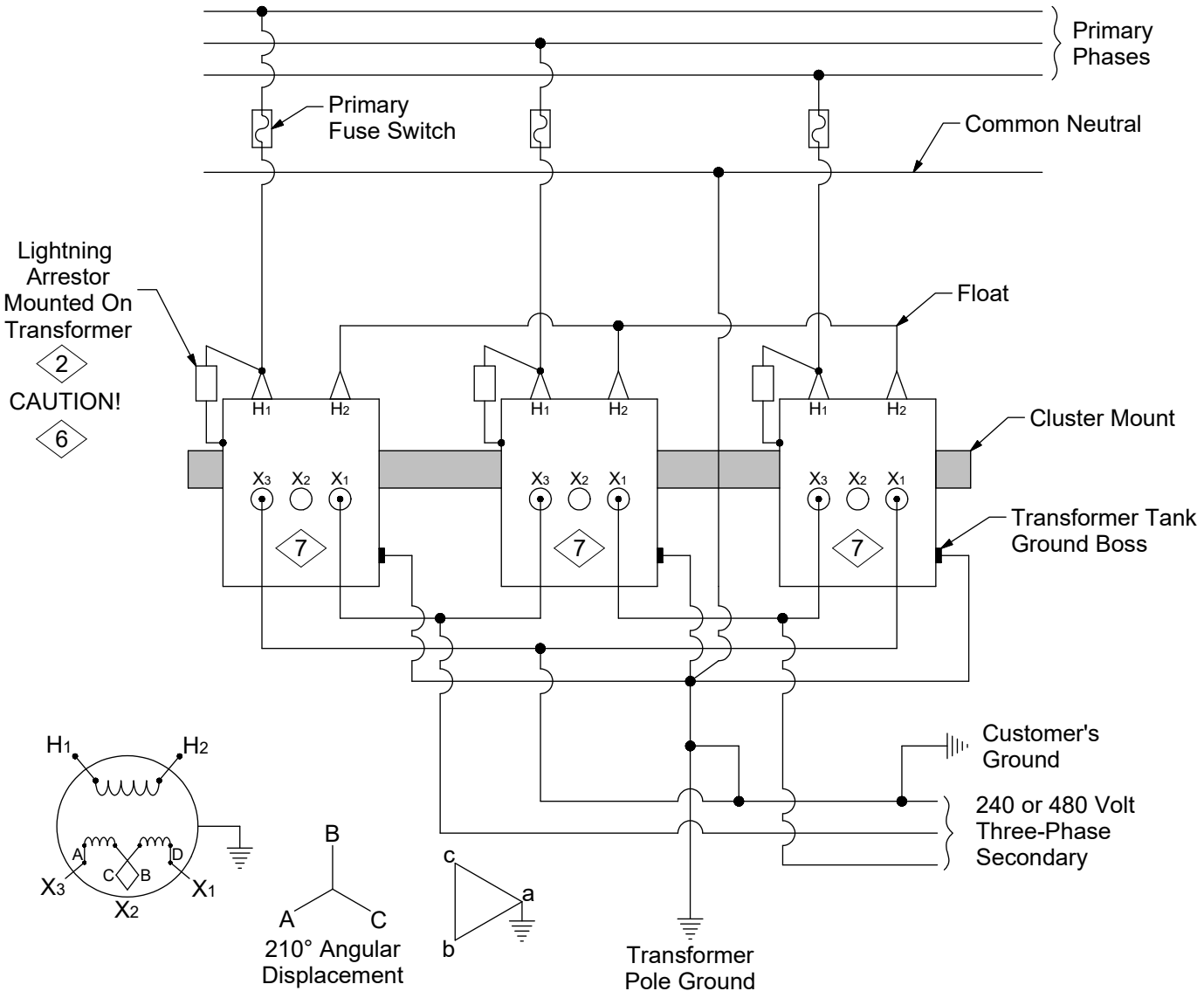
4. Information - Arrester (Stock #10 01 019) meets the NESC 097D1 requirement having a minimum 60 Hz flashover rating as the lessor of 2 times the primary circuit voltage or 10 kV.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	07/08/11	DG	



CONSTRUCTION NOTE(s):

1. If installing CSP transformer, install fused switches as shown unless pole space does not allow and number of customers affected by transformer failure is deemed acceptable.



CONSTRUCTION NOTE(s):

1. 2400/4160 Y transformers may have sidewall mounted HV bushings.

2. Primary phase connections may be on either H_1 or H_2 bushings, with the lightning arresters connected to the same bushings. The floating (ungrounded) neutral is then connected to the other "H" bushings.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

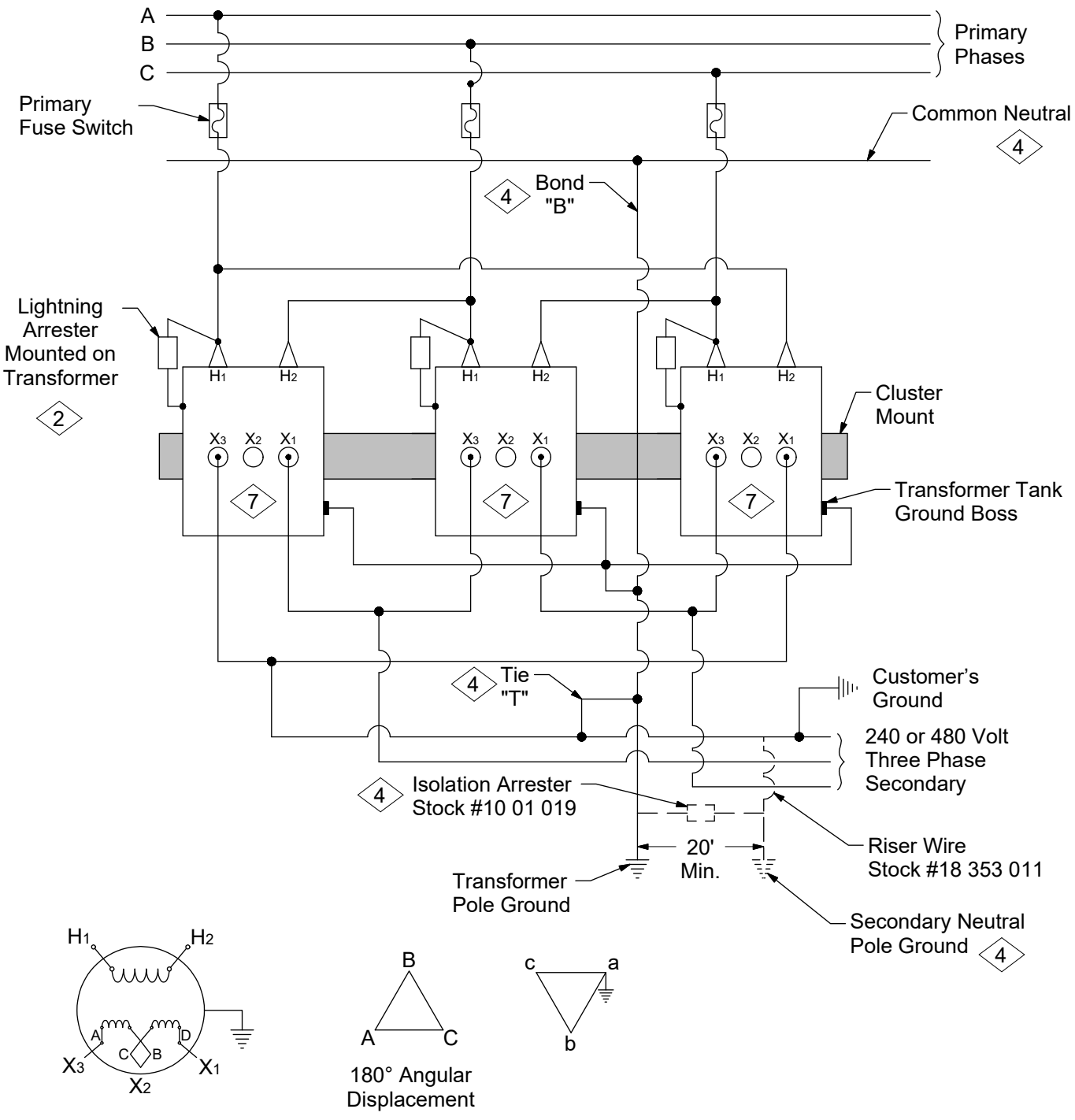
4. Transformer impedances do not need to match.

5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

6. For 7.2, 7.62, 7.97 kV, and multi-voltage (i.e., XA, XD, AA, AD) transformers use 15 kV arrester stock #10 01 188. For 2.4 kV transformers use 6 kV arrester stock #10 01 184.

7. Remove ground straps from all three transformers.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	07/11/11	DG	



REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	06/24/11	DG	

CONSTRUCTION NOTE(s):

1. 2400 / 4160 transformers may have sidewall mounted HV bushings.

2. Lightning arrester may be on either H_1 or H_2 bushing.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

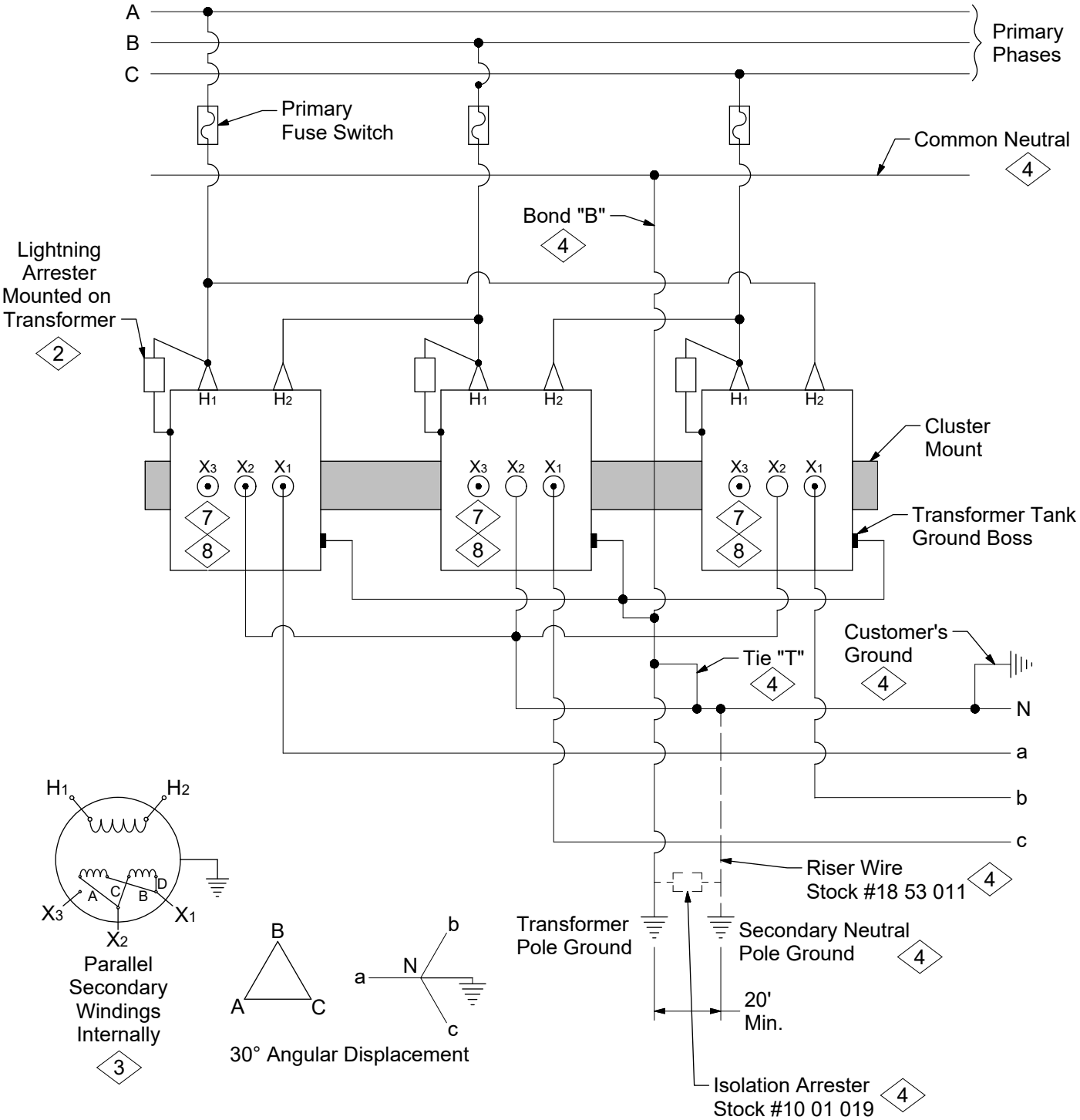
4. If a common neutral is not present omit Bond “B” and Tie “T” and install a second ground rod a minimum distance of 20 feet from the Transformer Pole Ground. Connect the lightning arrester/Transformer Pole Ground and Secondary Neutral Pole Ground together through an Isolation Arrester (Stock #10 01 019). The ground lead to the secondary ground rod shall be insulated for 600 V (use Stock #18 53 011). Both ground leads must be covered with plastic molding for a distance of 8 feet from the ground. The resistance of both grounds should not exceed 25 ohms. These requirements are to meet NESC 097.D.1.

5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

6. Transformer impedances must be closely matched (±10%).

7. Remove ground straps from all three transformers.

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	06/24/11	DG	



REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	05/19/11	DG	

CONSTRUCTION NOTE(s):

1. 2400/4160 transformers may have sidewall mounted HV bushings.

2. Lightning arrester may be on either H_1 or H_2 bushing.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings. For 120/208 V service, units with three secondary bushings must be reconnected internally to parallel the secondary windings. Units with four secondary bushings must have the secondaries paralleled externally. For 277/480 V service, 277 V transformers are used and they have only two secondary bushings.

4. If a common neutral is not present omit Bond "B" and Tie "T" and install a second ground rod a minimum distance of 20 feet from the Transformer Pole Ground. Connect the lightning arrester/Transformer Pole Ground and Secondary Neutral Pole Ground together through an Isolation Arrester (Stock #10 01 019). The ground lead to the secondary ground rod shall be insulated for 600 V (use Stock #18 53 011). Both ground leads must be covered with plastic molding for a distance of 8 feet from the ground. The resistance of both grounds should not exceed 25 ohms. These requirements are to meet NESC 097.D.1.

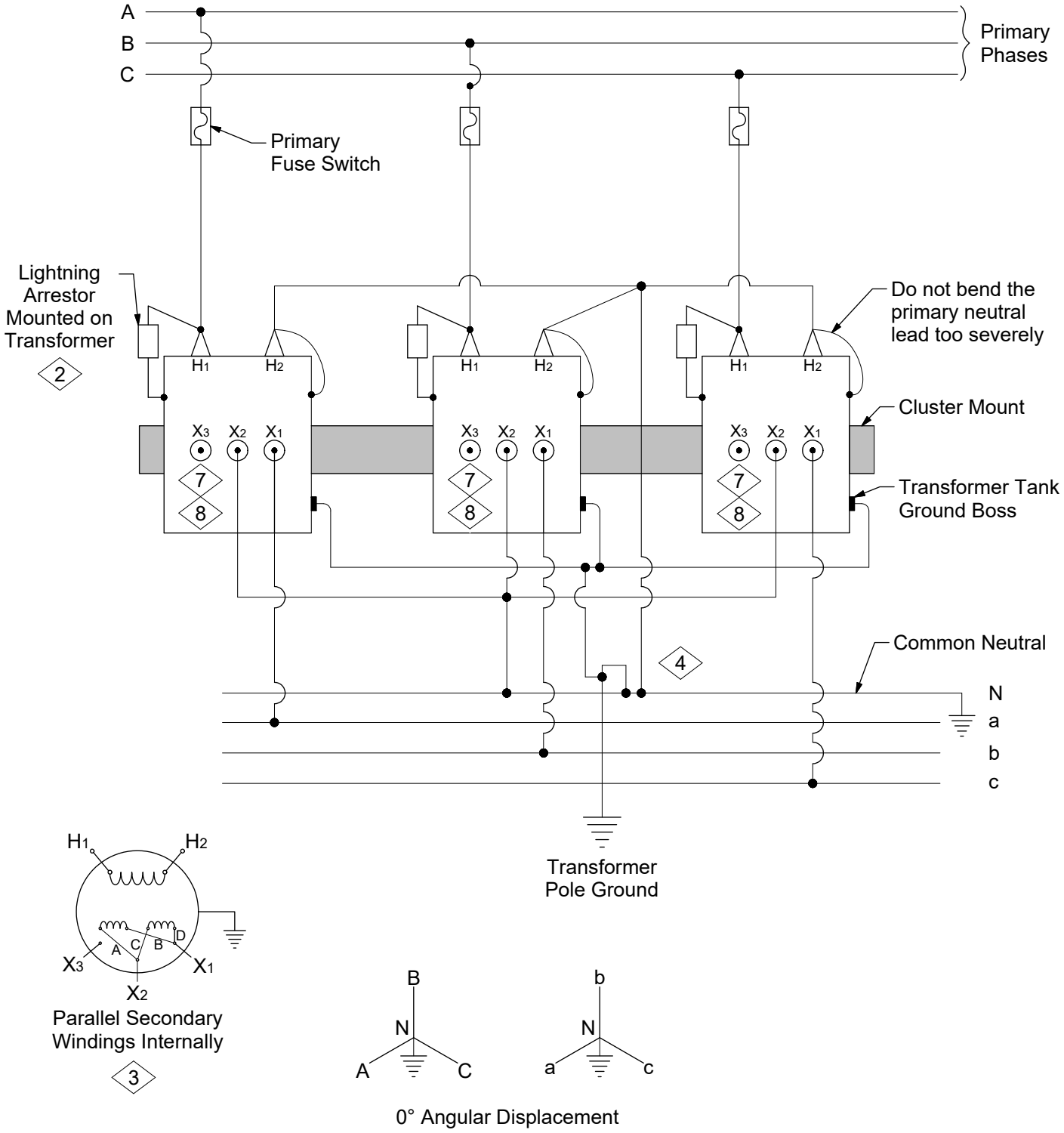
5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

6. Transformer impedances do not need to match.

7. Use tag, Stock #16 01 301 to identify transformers that have been wired internally for 120/208Y service. The tag should be attached to the secondary bushing that is no longer connected internally.

8. Remove ground straps from all three transformers.

REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	05/19/11	DG	



REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	05/11/15	DG	

CONSTRUCTION NOTE(s):

1. 2400/4160 transformers may have sidewall mounted HV bushings.

2. Primary phase connections may be on either H_1 or H_2 bushings, with the lightning arresters connected to the same bushings. The grounded neutral is then connected to the other ”H” bushings.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings. For 120/208 V service, units with three secondary bushings must be reconnected internally to parallel the secondary windings. Units with four secondary bushings must have the secondaries paralleled externally. For 277/480 V service, 277V transformers are used and they have only two secondary bushings.

4. The transformer primary neutral bus must be solidly connected to the system neutral.

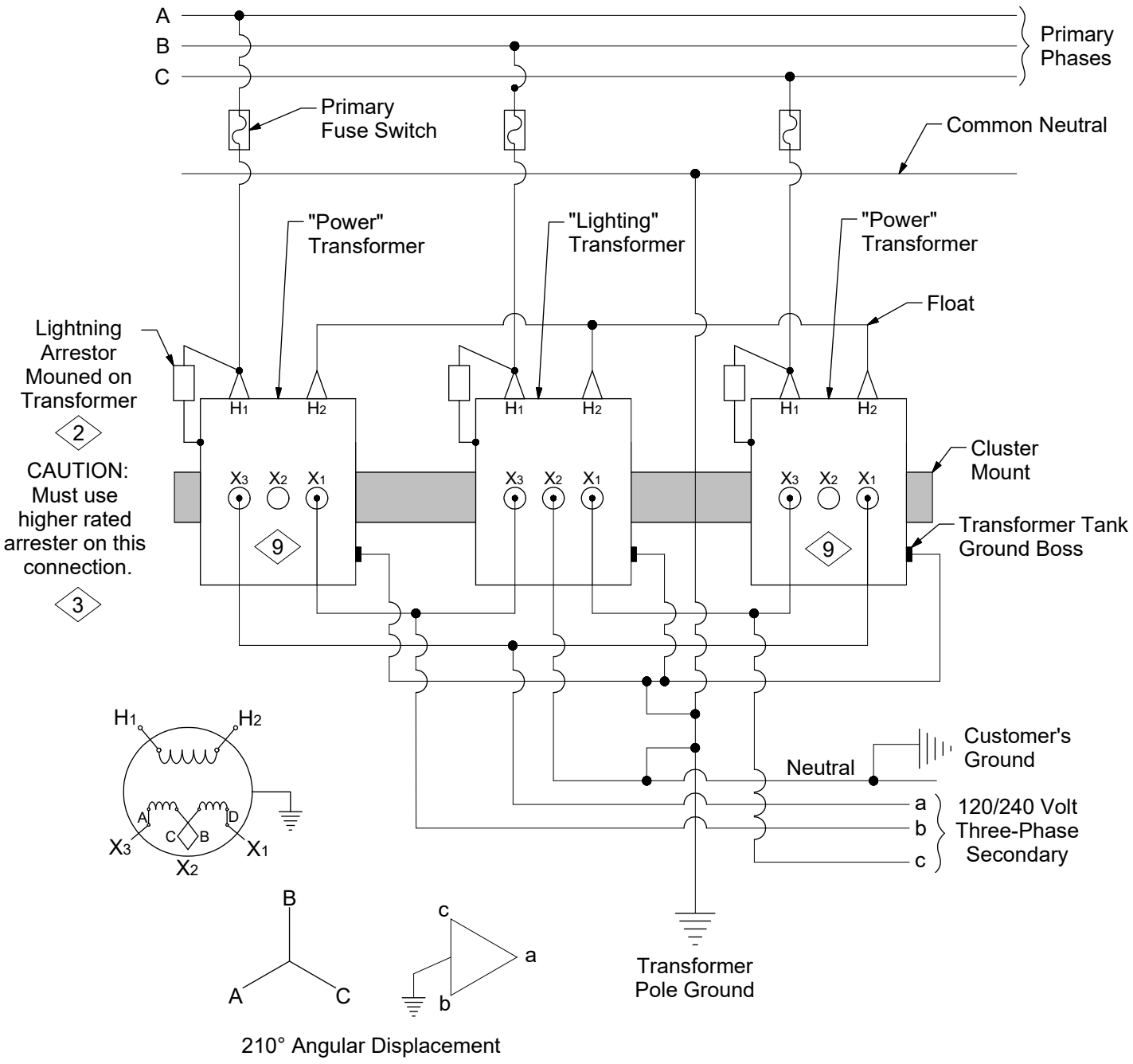
5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

6. Transformer impedances do not need to match.

7. Use tag, Stock #16 01 301 to identify transformers that have been wired internally for 120/208Y service. The tag should be attached to the secondary bushing that is no longer connected internally.

8. Remove ground straps from all three transformers.

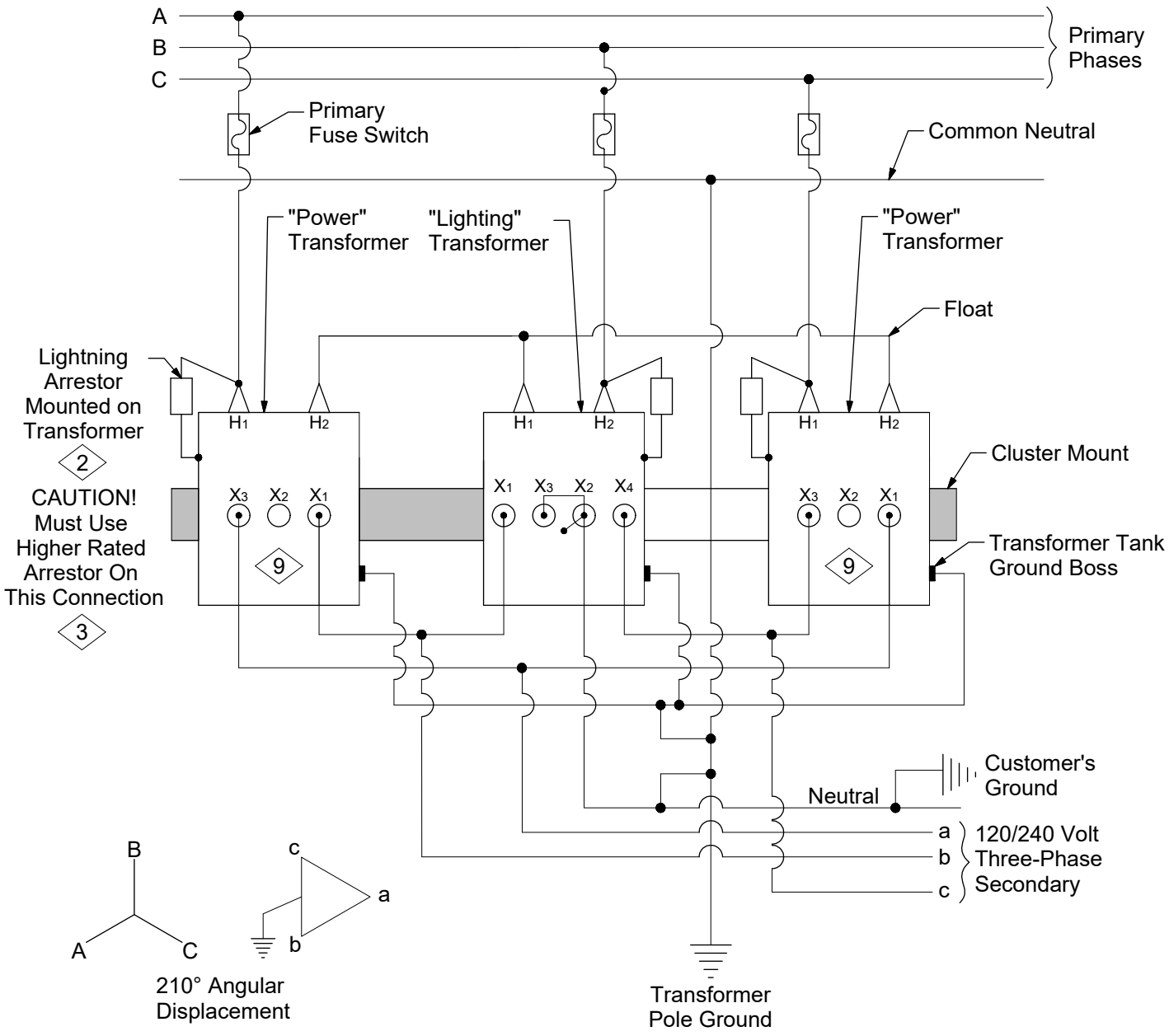
REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	05/11/15	DG	

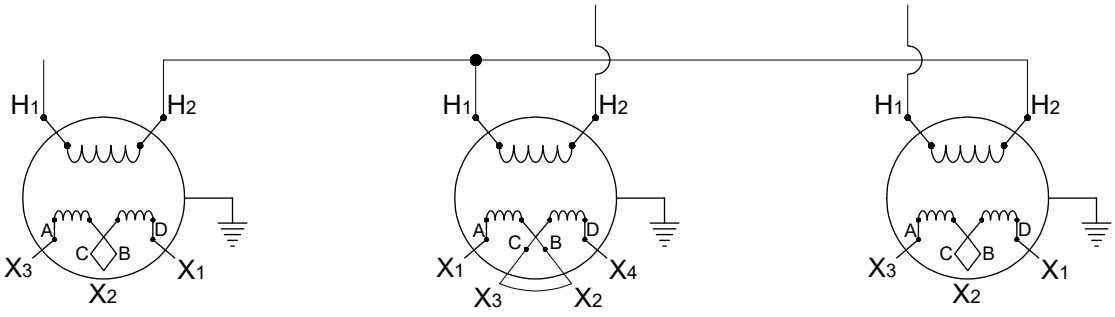


210° Angular Displacement

Three Additive Polarity Transformers

REV	DATE	ENG	DESCRIPTION
2	04/01/23	DG	Converted to new format
1	07/11/11	DG	





Two Additive and One Subtractive Polarity Transformers

REV	DATE	ENG	DESCRIPTION
2	04/01/23	DG	Converted to new format
1	07/11/11	DG	

CONSTRUCTION NOTE(s):

1. 2400/4160 transformers may have sidewall mounted HV bushings.

2. Primary phase connections may be on either H_1 or H_2 bushings with the lightning arresters connected to the same bushings. The floating neutral is then connected to the other "H" bushings.

3. For 7.2, 7.62, 7.97 kV, and multi-voltage (i.e., XA, AA) transformers use 15 kV arrester Stock #10 01 188. For 2.4 kV transformers use 6 kV arrester Stock #10 01 184.

4. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

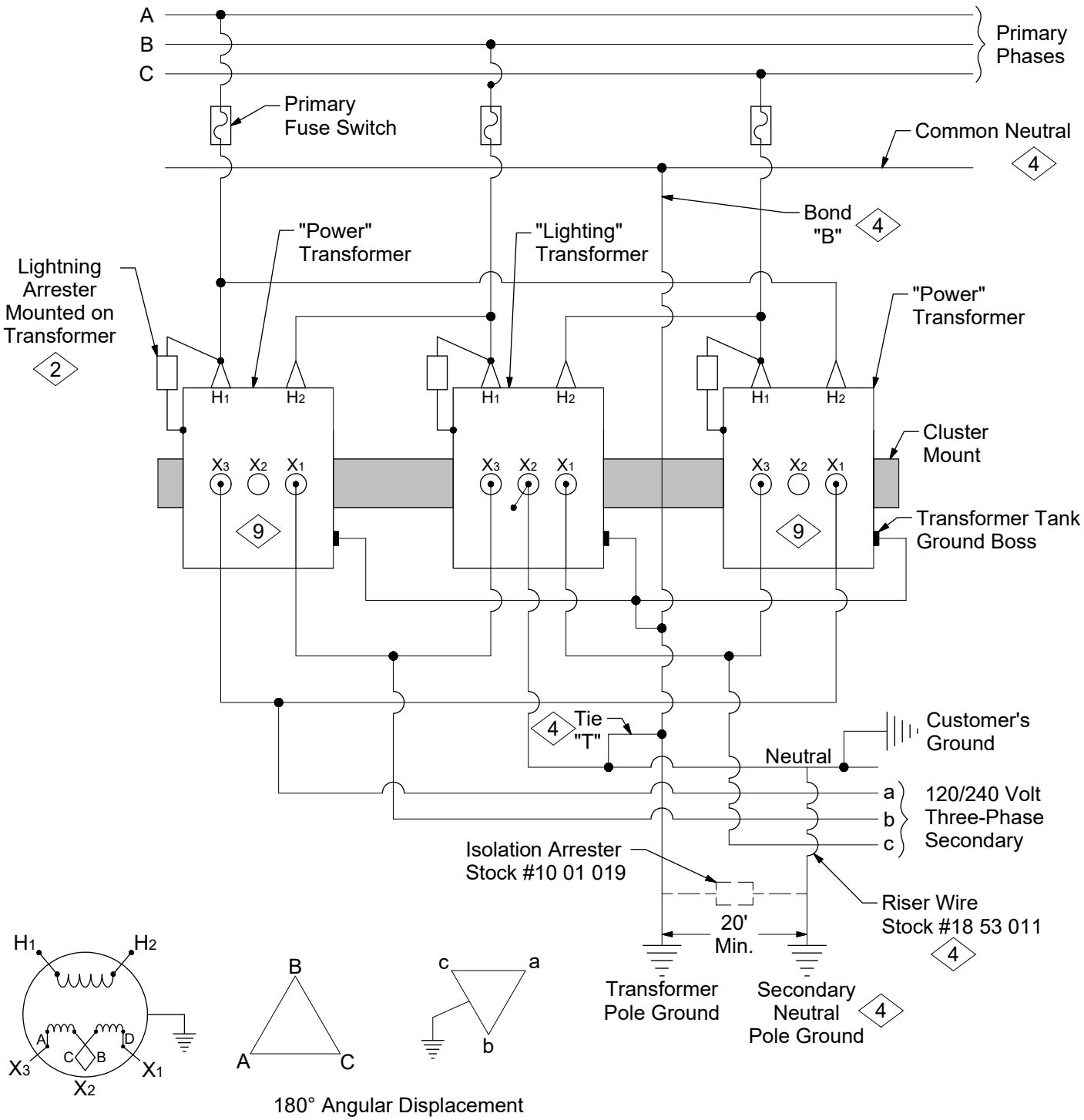
6. Transformer impedances do not need to match.

7. Rule of thumb: The "Lighting" transformer carries 2/3 of the single-phase load and 1/3 of the three-phase load. The "Power" transformers each carry 1/3 of the three-phase load and 1/3 of the single-phase load.

8. Phase rotation can be changed by reversing the secondary leads on the "Lighting" transformer (preferably on the secondary).

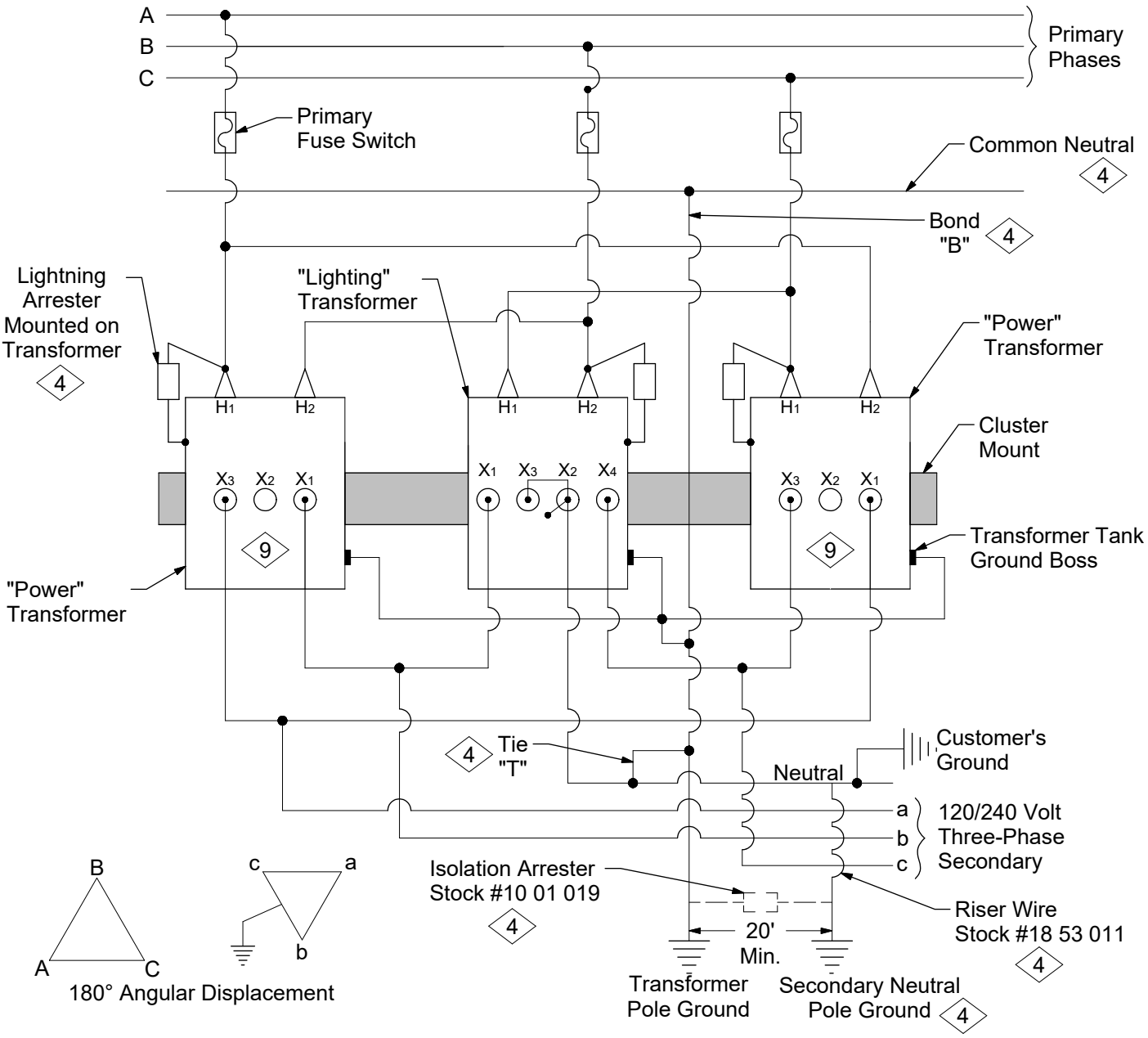
9. Remove ground straps from the outer two "Power" transformers.

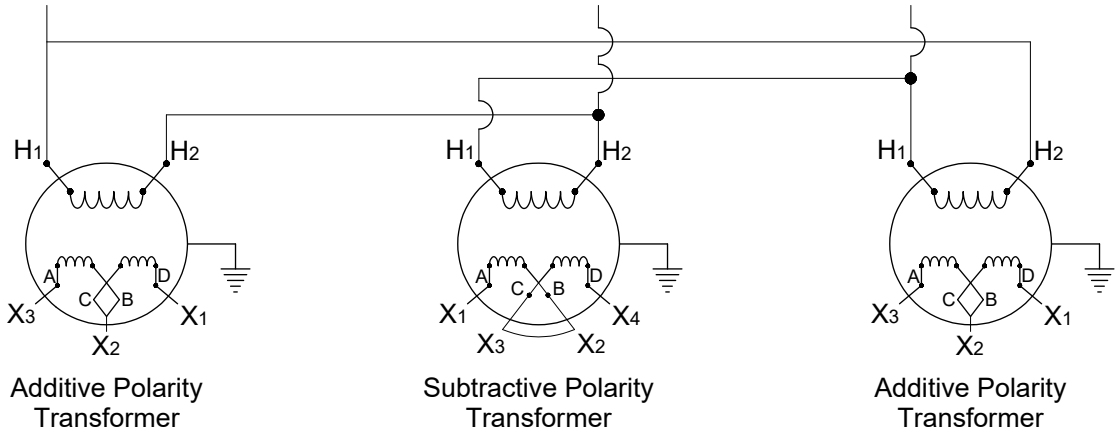
REV	DATE	ENG	DESCRIPTION
2	04/01/23	DG	Converted to new format
1	07/11/11	DG	



Three Additive Polarity Transformers

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	12/05/11	DG	





Two Additive and One Subtractive Polarity Transformers

DISTRIBUTION CONSTRUCTION STANDARDS

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	12/05/11	DG	

CONSTRUCTION NOTE(s):

1. 2400/4160 transformers may have sidewall mounted HV bushings.

2. Lighting arrester may be on either H1 or H2 bushings.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

4. If a common neutral is not present omit X2 ground strap on center "Lighting" transformer, Bond "B", and Tie "T", and install a second ground rod a minimum distance of 20 feet from the Transformer Pole Ground. Connect the lighting arrester/Transformer Pole Ground and Secondary Neutral Pole Ground through an Isolation Arrester (Stock # 10 01 019). The ground lead to the secondary ground rod shall be insulated for 600 V (use Stock #18 53 011). Both ground leads must be covered with plastic molding for a distance of 8 feet from the ground. The resistance of both grounds should not exceed 25 ohms. These requirements are to meet NESC 097.D.1.

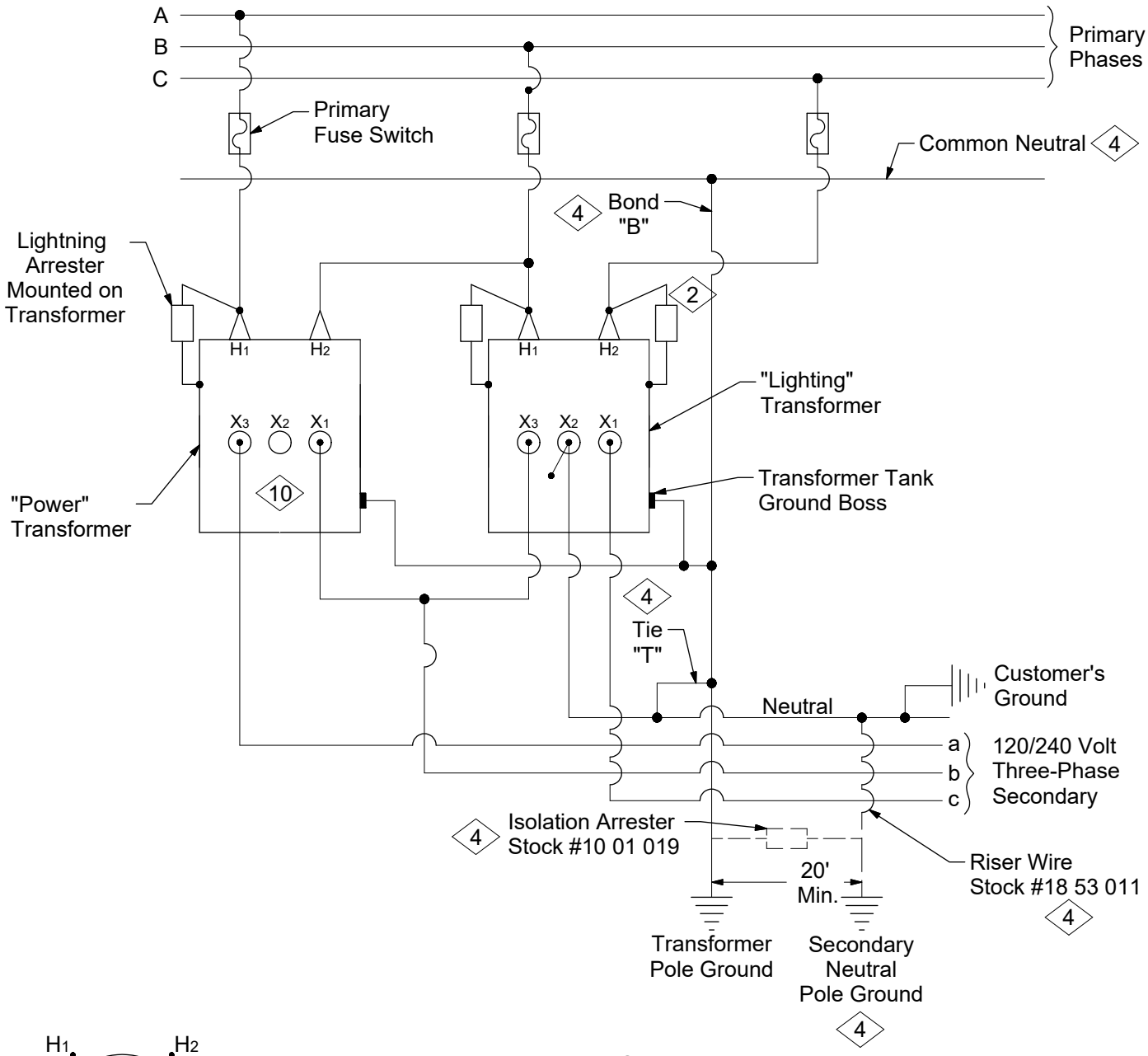
5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

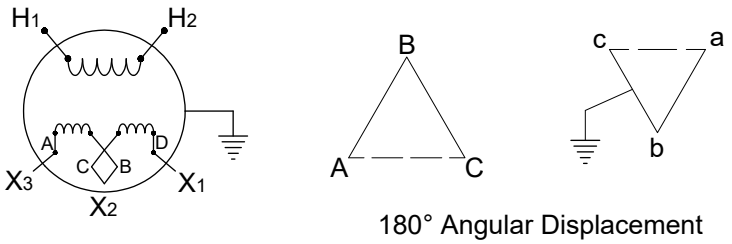
6. Transfomer impedances must be closely matched (±10%).

7. Rule of thumb: The "Lighting" transformer carries 2/3 of the single-phase load and 1/3 of the three-phase load. The "Power" transformers each carry 1/3 of the three-phase load and 1/3 of the single-phase load.

8. Phase rotation can be changed by reversing the secondary leads on the mid-tapped "Lighting" transformer (preferably on the secondary).

9. Remove ground straps from the outer two "Power" transformers.





180° Angular Displacement

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	04/01/19	DG	

CONSTRUCTION NOTE(s):

1. 2400 / 4160 Transformers may have sidewall mounted HV bushings.

2. Add arrester to H_2 of this transformer if transformer does not already have arresters on both bushings.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

4. If a common neutral is not present omit X_2 ground strap on both transformers, Bond "B", and Tie "T" and install a second ground rod a minimum distance of 20 feet from the Transformer Pole Ground. Connect the lightning arrester/Transformer Pole Ground and Secondary Neutral Pole Ground together through an Isolation Arrester (Stock #10 01 019). The ground lead to the secondary ground rod shall be insulated for 600 V (use Stock #18 53 011). Both ground leads must be covered with plastic molding for a distance of 8 feet from the ground. The resistance of both grounds should not exceed 25 ohms. These requirements are to meet NESC 097.D.1.

5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

6. Transformer impedances do not need to match.

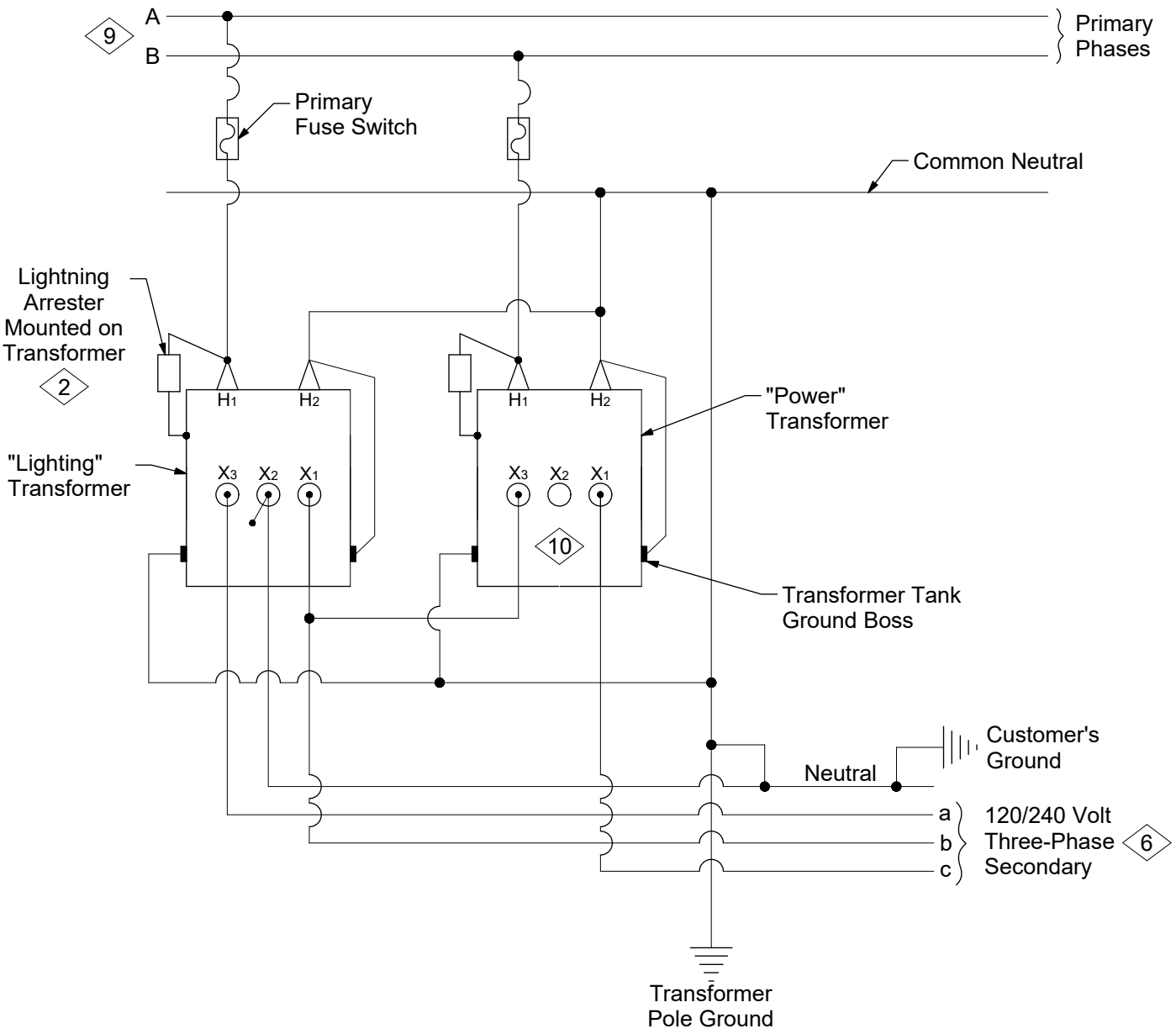
7. 3-Wire 240 V corner grounded delta secondary can be provided by removing the lead and ground strap from X2 on the "Lighting" transformer and bonding the "a" phase at the pole and customer service grounds.

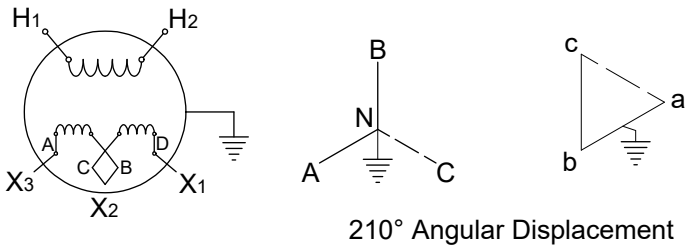
8. The "Lighting" transformer supplies all of the single-phase load and 1/2 of the three-phase load. The total three-phase load should not exceed 1.73 times the kVA of the smallest transformer.

9. Phase rotation can be changed by reversing any pair of primary line leads or by reversing the two secondary leads on the "Lighting" transformer (preferably on the secondary).

10. Remove ground strap from the "Power" transformer.

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	04/01/19	DG	





210° Angular Displacement

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	11/01/12	DG	

CONSTRUCTION NOTE(s):

1. 2400/4160 transformers may have sidewall mounted HV bushings.

2. Primary phase connections may be on either H_1 or H_2 bushings, with the lightning arresters connected to the same bushings. The neutral is then connected to the other "H" bushings.

3. Transformers 100 kVA and below have three secondary bushings. Transformers 167 kVA and above have four secondary bushings.

4. Transformer impedances do not need to match.

5. Transformers 200 kVA and below are additive polarity. Transformers 250 kVA and above are subtractive polarity.

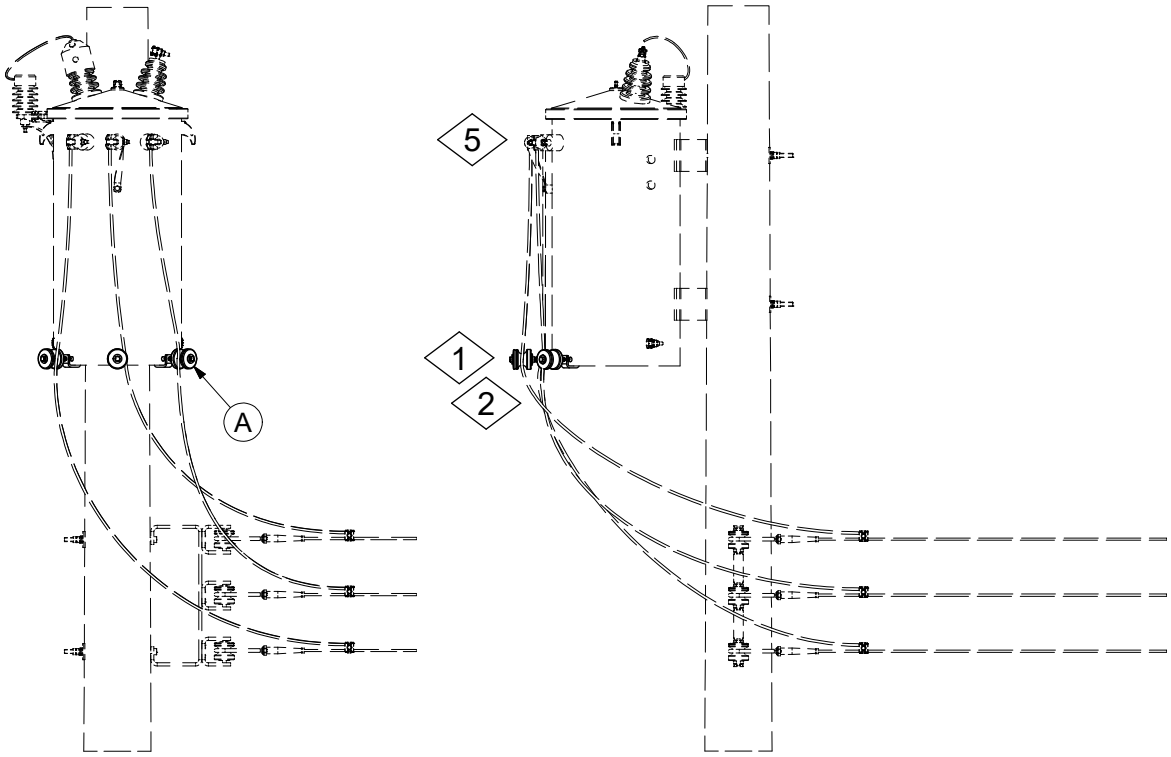
6. A 3-wire 240 V corner grounded delta secondary can be provided by removing the lead and ground strap from X_2 on the "Lighting" transformer and bonding the "a" phase at the pole and customer service grounds.

7. The "Lighting" transformer supplies all of the singlee-phase load and 1/2 of the three-phase load. The total three-phase load should not exceed 1.73 times the kVA of the smallest transformer.

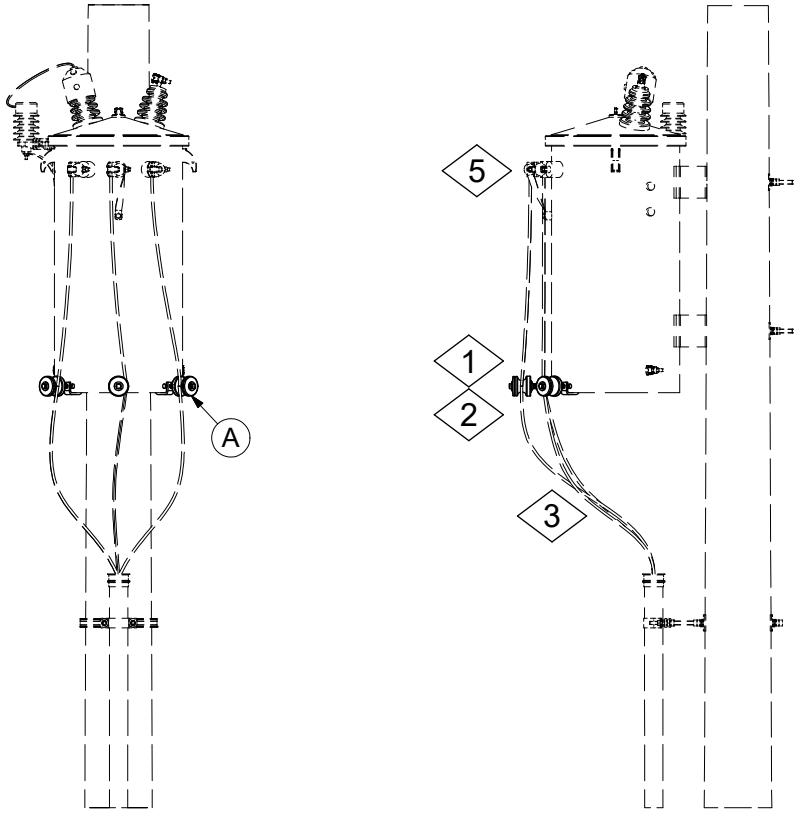
8. Phase rotation can be changed by reversing any pair of primary line leads or by reversing the two secondary leads on the "Lighting" transformer (preferably on the secondary).

9. Primary connection shown is for AmerenIL (ABC rotation). Primary connection for Ameren MO (CBA rotation) should be reversed. Connecting the leading primary phase to the "Lighting" transformer gives better utilization of transformer capacity, less voltage dip, less voltage unbalance.

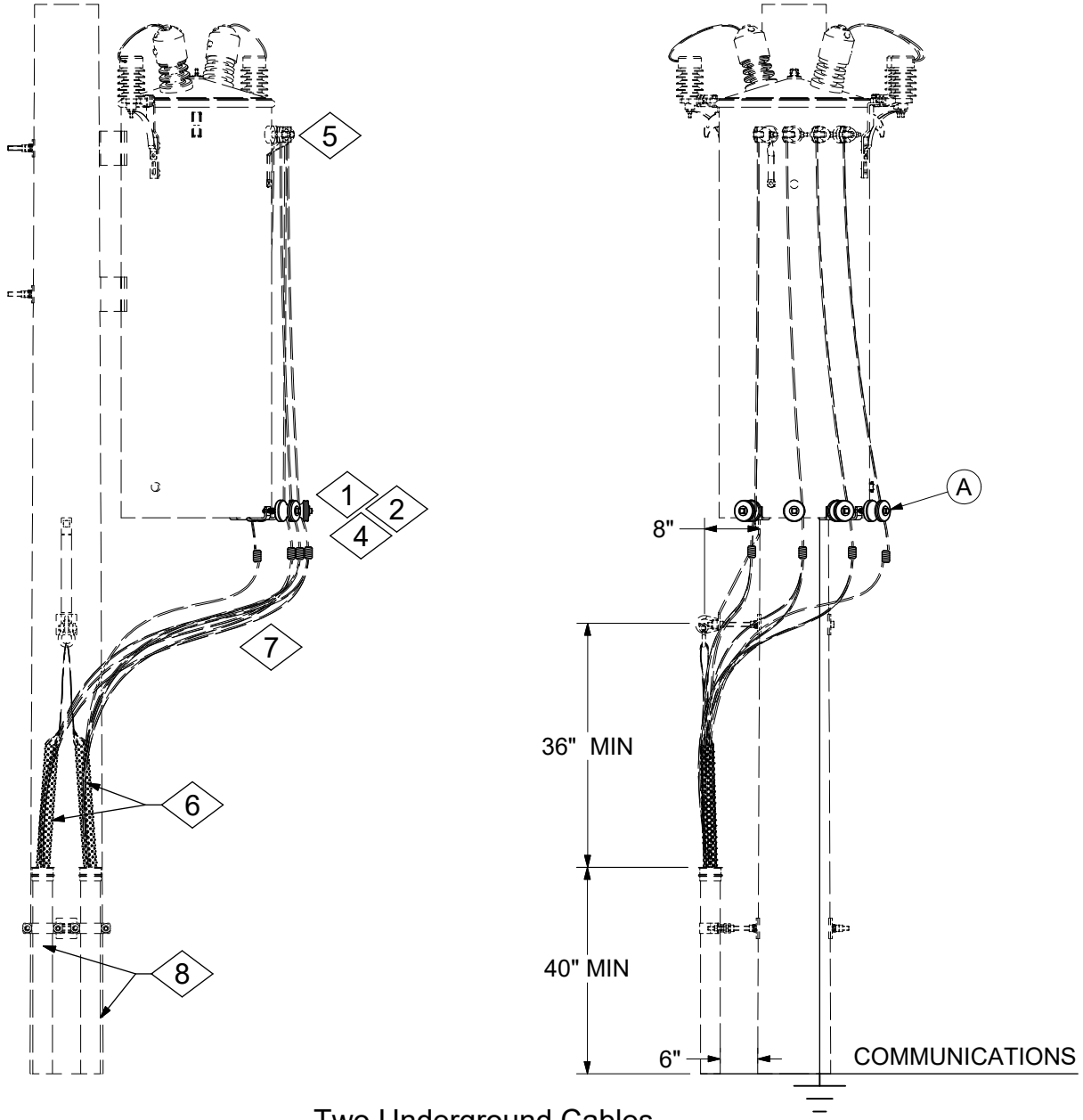
10. Remove ground strap from the "Power" transformer.



Overhead Service



Underground Service



Two Underground Cables

CONSTRUCTION NOTE(s):

1. This standard shows the training of secondary leads, using a bracket, Stock #69 08 249, which attaches to the bottom of the transformer. The bracket may be used with either 1Ø or 3Ø secondary and with all primary distribution voltages.

2. For additional clearance from the transformer use 1/2” x 8” machine bolts, Stock #23 52 041. Use 5/8” nuts, Stock #23 65 011 as spacers.

3. If an underground service must be located on a transformer pole with overhead secondary, attach the underground service to the secondary, per DCS **14 02 01 ****** NOT TO THE TRANSFORMER.

4. Cover with sealing compound (Stock #31 53 055) and tape so that water cannot enter strands.

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	05/17/11	DG	

5. Do not put aluminum conductors in transformer bushing connectors. Use copper secondary leads as per DCS **13 00 03 01**, or copper pin terminal connectors. For multiple conductors, use pin terminal lug connectors with copper studs as per DCS **13 01 04 ****. For transformers with secondary spade connections (1Ø>100 kVA and 3Ø>300 kVA) cable-to-flat lug connectors can be used (Stock #17 55 289 or 17 55 344).

6. See DCS **14 02 02** for cable grips, conduits, and stand off bracket. Apply 2 layers of tape under grips.

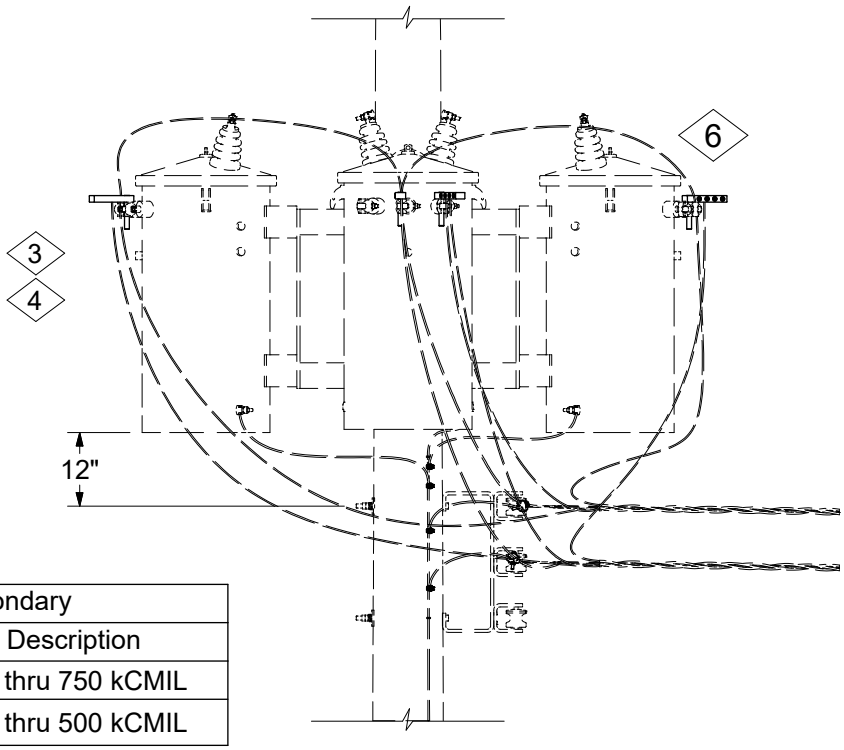
7. Pair cables, tape together and form drip loop.

8. Install all 3 phases and neutral in each conduit.

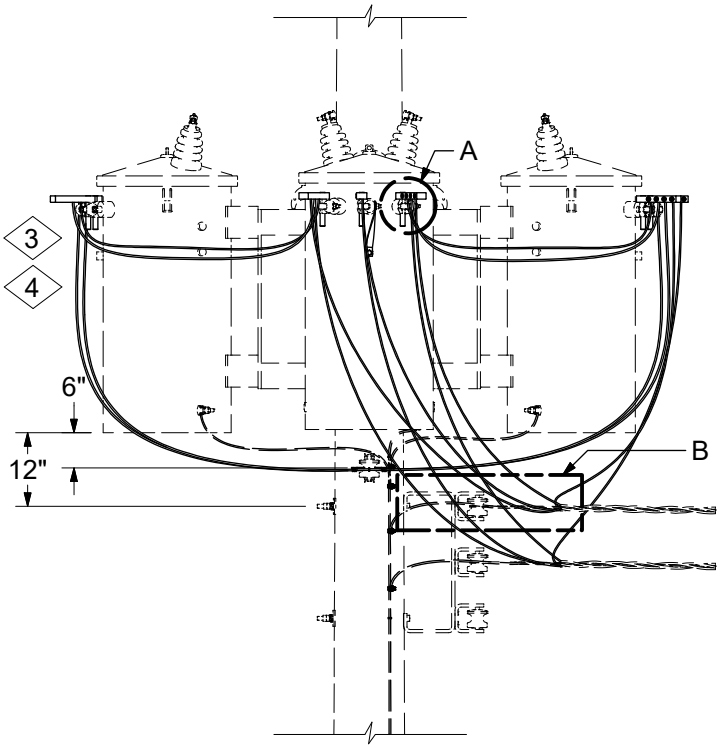
DCS #	Description
13 01 01 01	Single-Phase Transformer
13 01 01 03	Three-Phase Transformer

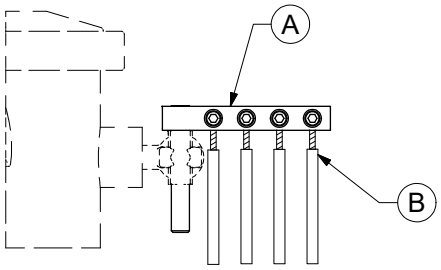
ITEM	STK / DCS #	DESCRIPTION 13 01 01 **	01	03
A	69 08 249	Bracket - Transformer Secondary Lead	3	4

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	05/17/11	DG	

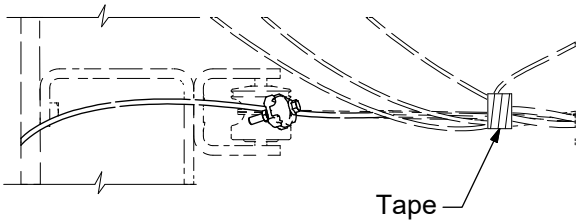


Wye Secondary	
DCS #	Description
13 01 04 03	1/0 thru 750 kCMIL
13 01 04 04	4/0 thru 500 kCMIL





Detail A



Detail B

Delta Secondary	
DCS #	Description
13 01 04 01	1/0 thru 750 kCMIL
13 01 04 02	4/0 thru 500 kCMIL

7

REV	DATE	ENG	DESCRIPTION
5	04/01/23	DG	Converted to new format
4	06/24/11	DG	

	ITEM	STK / DCS #	DESCRIPTION 13 01 04 **	01	02	03	04
2	A	17 54 245	Lug, 1/0 750 kcmil, 4 Position	7	-	6	-
		17 54 214	Connector - 4 Hole #2 - 500 Kcmil	-	7	-	6
	B	30 52 360	Compound, Sealing	1	1	1	1
		399	Op Code, Multiple Service Lug	7	7	6	6

CONSTRUCTION NOTE(s):

1. Clean cable surfaces and apply a liberal coating of corrosion inhibitor compound (Stock #31 59 058).

2. Use Stock #30 52 360 to weather seal lugs.

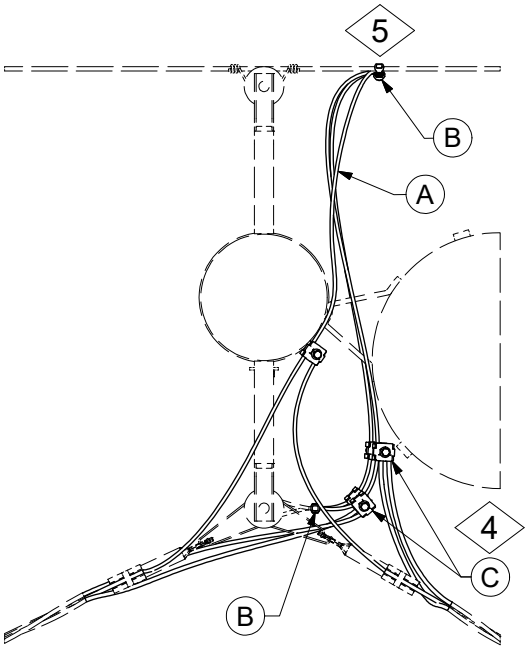
3. For buss sizing between the transformer secondary bushings see DCS **13 00 03 01**.

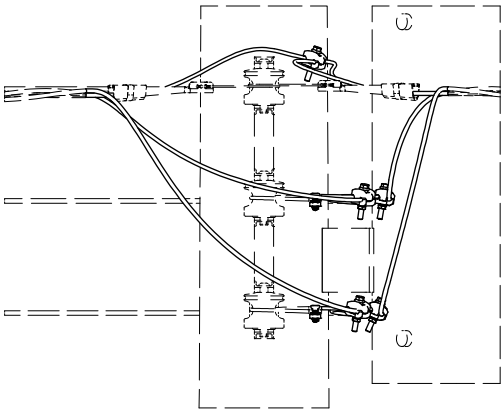
4. For wye connected secondary see connection diagram on DCS **13 00 07 08** or **13 00 07 09**. For delta connected secondary see connection diagram on DCS **13 00 07 04**, **13 00 07 05**, **13 00 07 10** or **13 00 07 11**.

5. The messengers of the quadruplex cables shall be grounded at the pole by connecting to the secondary neutral, if available, or to a ground rod. Exception: For non-standard ungrounded three-wire services the messengers are not grounded.

6. For wye connected secondary, neutral will need to be connected to the X_2 bushing of either the left or right transformer.

7. For ungrounded or corner grounded delta, use DCS **13 01 04 03** or **13 01 04 04**.





CONSTRUCTION NOTE(s):

1. Service buses shall be installed only where it is evident that two or more services will be required from each side of pole.

2. Normally a service bus should not be added to an existing installation when an additional service is installed.

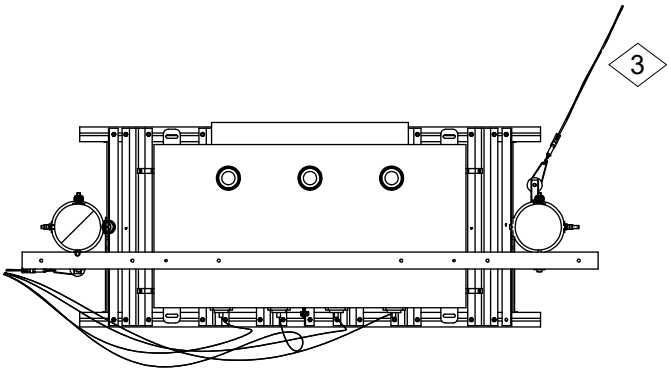
3. In many cases it may be desirable to install the service bus for the neutral only and connect the covered wires of the triplex cable directly to the secondary.

4. Tape connectors in accordance with DCS **07 00 25 00** and **07 00 27 00**.

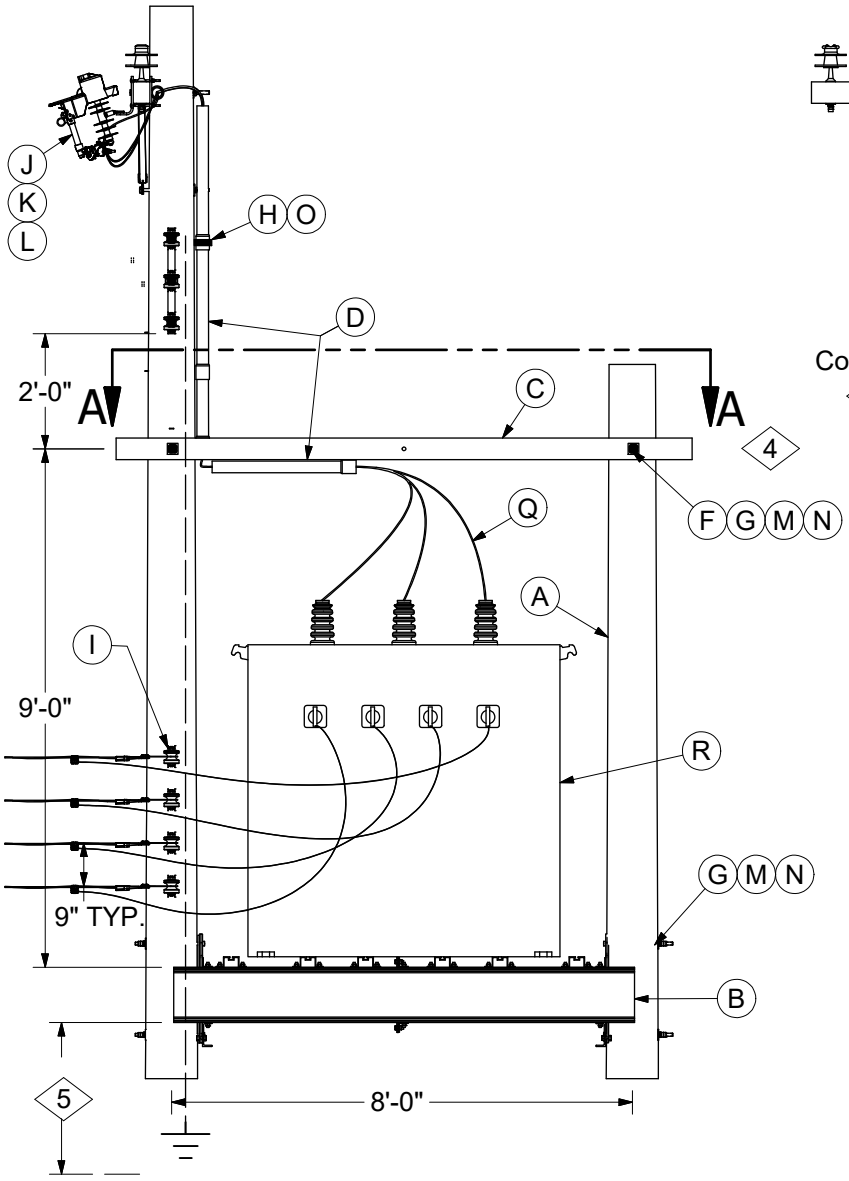
5. If aluminum secondary, use PG clamp, Item C.

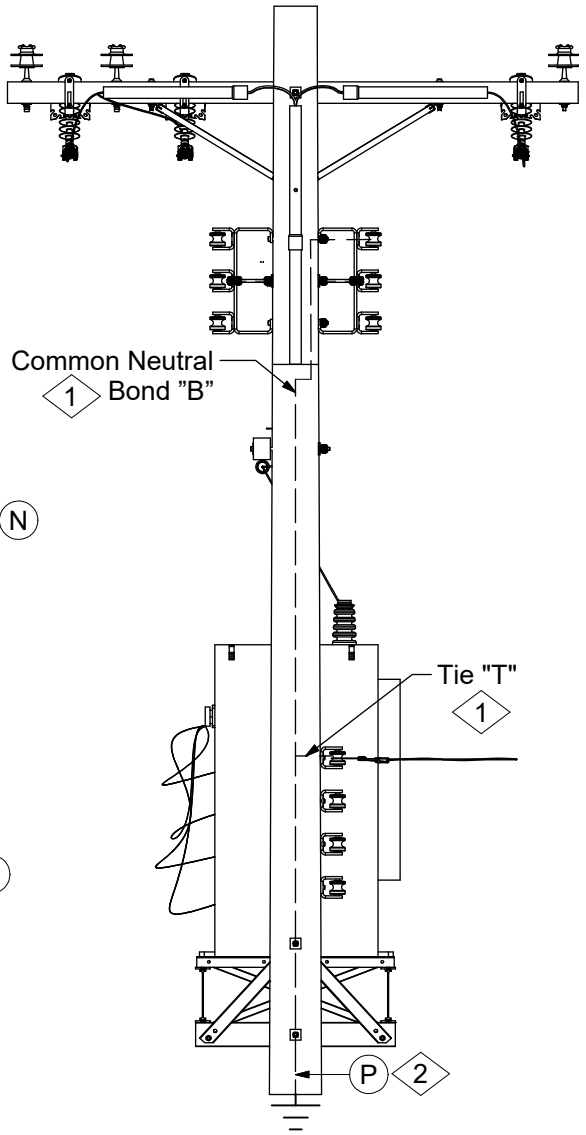
ITEM	STK / DCS #	DESCRIPTION 13 01 07 **	00
A	18 01 020	Wire - #2 Copper - W.P.	10
B	17 54 005	Connector - Split Bolt, #2 Copper	6
C	17 51 032	Clamp, Parallel Groove	6

REV	DATE	ENG	DESCRIPTION
3	04/01/23	DG	Converted to new format
2	06/08/11	DG	



Section A-A





REV	DATE	ENG	DESCRIPTION
6	04/01/23	DG	Converted to new format
5	11/30/11	DG	

CONSTRUCTION NOTE(s):

1. Common neutral is not present, refer to DCS **13 00 07 02** for installation of grounds.

2. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

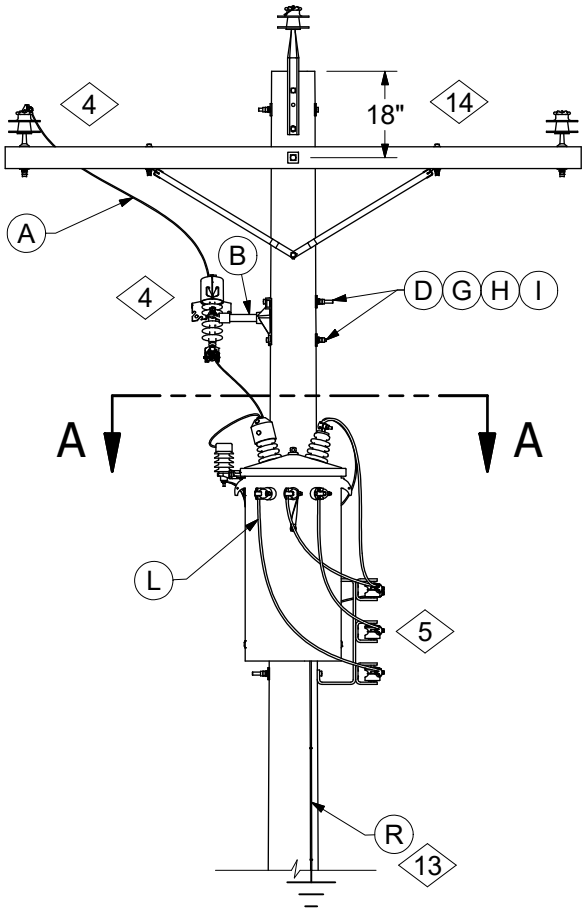
3. Optional Service takeoff. See DCS **09 01 12 00**.

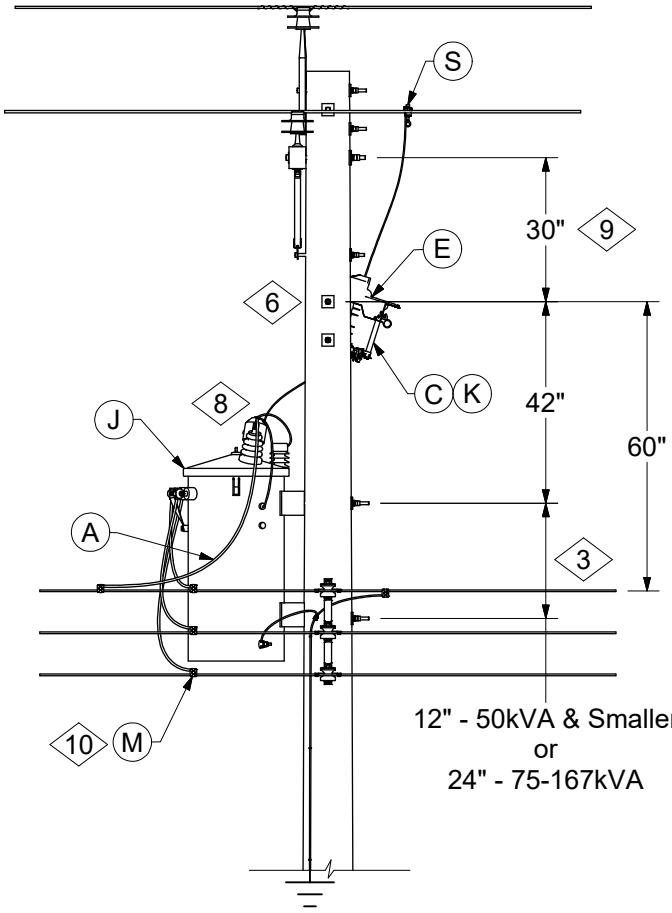
	ITEM	STK / DCS #	DESCRIPTION 13 04 58 **	01
	A	41 02 351	SYP CL 1 35' Pole	1
	B	23 17 174	Platform, Trans, 8'-0”	1
	C	41 01 008	10' Crossarm - 3-1/2" x 4-1/2"	1
	D	12 01 280	Conduit - 2" Schedule 40 (ft.)	15
	E	23 52 069	Bolt, Mach., 5/8" x 18" w/ square nut	4
	F	23 52 065	Bolt, Mach., 5/8” x 12”	2
	G	23 66 027	Washer, Square, 5/8”	20
	H	27 60 035	Strip, Hanger (Ft.)	6
	I	**06 01 01 01**	Secondary Clevis	4
	J	54 07 209	Switch, Fused, 200A, 15kV	3
	K	23 17 411	Wildlife Guard - Cover Cutout	3
	L	17 58 054	Bracket, Arrester/Cutout Mounting	3
	M	23 66 134	Lock Washer - 5/8" Double Coil	6
	N	23 65 043	Lock Nut - 5/8" Square	6
	O	23 60 023	Screw - Lag, 1/4" x 2"	20
2,@	P	**12 00 10 ** **	Grounding Unit	1
@	Q	**13 00 03 01**	Wire, Ins., 5 kV (Ft.)	60
@	R	**13 00 01 02**	Transformer	1

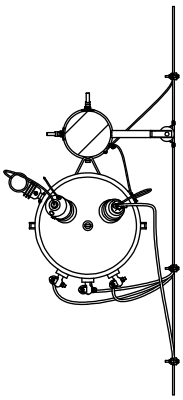
DESIGN NOTE(s):

4. Transformer platform may be either parallel or at right angle to the line to facilitate most convenient service take-off.

5. See DCS **29 00 17 03** for minimum clearance from ground to the transformer platform.







Section A-A

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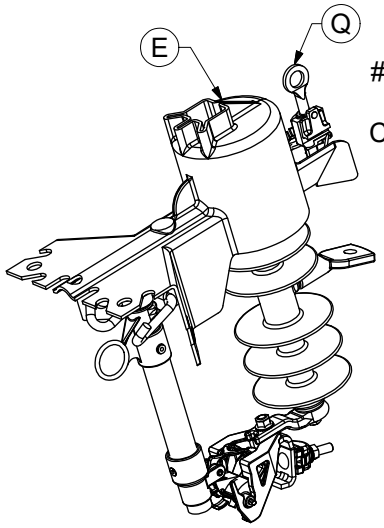
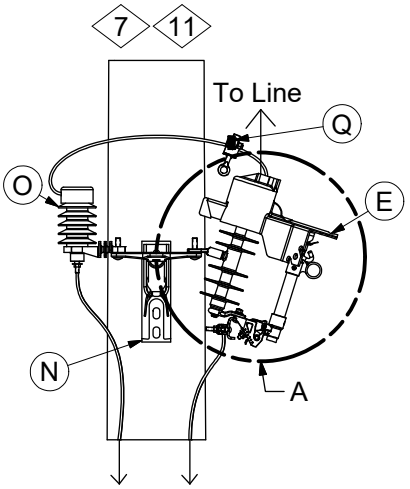


Detail A
Missouri Only



Arrester Mounting Detail For
Transformer Without Tank
Mounted Arrester
Missouri Only

REV	DATE	ENG	DESCRIPTION
13	04/01/23	DG	Converted to new format
12	11/17/15	DG	

CONSTRUCTION NOTE(s):

1. Arrester may be shifted to most convenient side of tank on two bushing transformers.

2. Transformer position may be rotated to obtain proper clearance from the secondary. Fused switch may also be rotated with respect to the transformer position.

3. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

4. Switch may be mounted on either side of pole. To avoid replacing an existing pole when adding a transformer, the switch may be mounted on the crossarm. If the switch is mounted on the crossarm, it should be positioned 12" from the pin insulator or from the pole. The transformer may be raised 12" to 24" when the switch is located on the crossarm. Omit items B and D.

5. See DCS **13 01 01 ****** for secondary support and DCS **03 01 20 ****** for secondary configurations.

6. If installing a CSP transformer, a fused switch shall be installed as shown. Exception: If existing pole space does not allow for installation of a fused switch and the number of customers affected by transformer failure is deemed acceptable, then items B, C, D, E, and K may be omitted and connect the transformer primary lead to overhead conductor.

7. In Missouri, if installing a transformer that does not have a tank mounted lightning arrester, install arrester on transformer mounting bracket per DCS 12 12 05 ** or use items N, O, P, and Q and install the appropriate lightning arrester on the bracket beside the switch. Keep arrester leads as short as possible. See note 10 for avian protection requirements. In Illinois, only the DCS **12 12 05 ****** option is allowed.

8. 2400/4160Y transformer may have side wall or cover mounted HV bushings. If side wall mounted bushings:
   a. Build according to this DCS except use 2.5kV primary lead wire (Stock #18 53 011), or
   b. If pole is congested, 2.5kV primary lead wire (Stock #18 53 011) in conduit similar to Limited Use DCS **13 04 14 01** may be used.

9. This dimension is to top bolt position if FG crossarm is used.

10. If pole is NOT truck accessible, make secondary connections on the climbing side of the pole.

11. For locations in Missouri where additional avian protection is needed, omit the piece of #2 copper wire and hotline clamp, R. Connect #6 copper poly covered arrester wire, Q ,directly to the fused switch connector.

REV	DATE	ENG	DESCRIPTION
13	04/01/23	DG	Converted to new format
12	11/17/15	DG	

DCS #	Description
13 12 00 01	50 kVA or Smaller Transformer
13 12 00 02	75 - 167 kVA Transformer

	ITEM	STK / DCS #	DESCRIPTION 13 12 00 **	01	02
8T	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (FT.)	22	22
	B	23 06 127	Bracket - Standoff, 12" FG	1	1
6	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	2	2
	E	23 17 411	Wildlife Guard - Cover Cutout	1	1
T	F	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut	-	2
T	G	23 66 207	Washer, Curved, Square, 5/8"	4	2
		23 66 031	Washer, Curved, Square, 3/4"	-	2
	H	23 66 134	Lock Washer - 5/8" Double Coil	4	2
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	I	23 65 043	Lock Nut - 5/8" Square	4	2
		23 65 042	Lock Nut - 3/4" Square	-	2
@	J	**13 00 01 02**	Transformer	1	1
@	K	**10 00 01 01**	Link, Fuse	1	1
T@	L	**13 00 03 01**	Secondary Leads (FT.)	12	12
T@	M	**07 00 25 00**	Parallel Groove Clamp, PG*	3	3
7@	N	23 56 063	Bracket, 3 Position, Equipment Mount	1	1
7@	O	**12 00 01 01**	Arrester, Lightning	1	1
7@	P	18 51 021	Wire, #6 Cu, S.D. Poly Covered (FT.)	2	2
7,11@	Q	23 78 394	Clamp, Hotline, #6 to 2/0	1	1
13@	R	**12 00 10 ** **	Grounding Unit	1	1
@	S	**07 00 21 00**	Hot Line Clamp, HLC*W	1	1

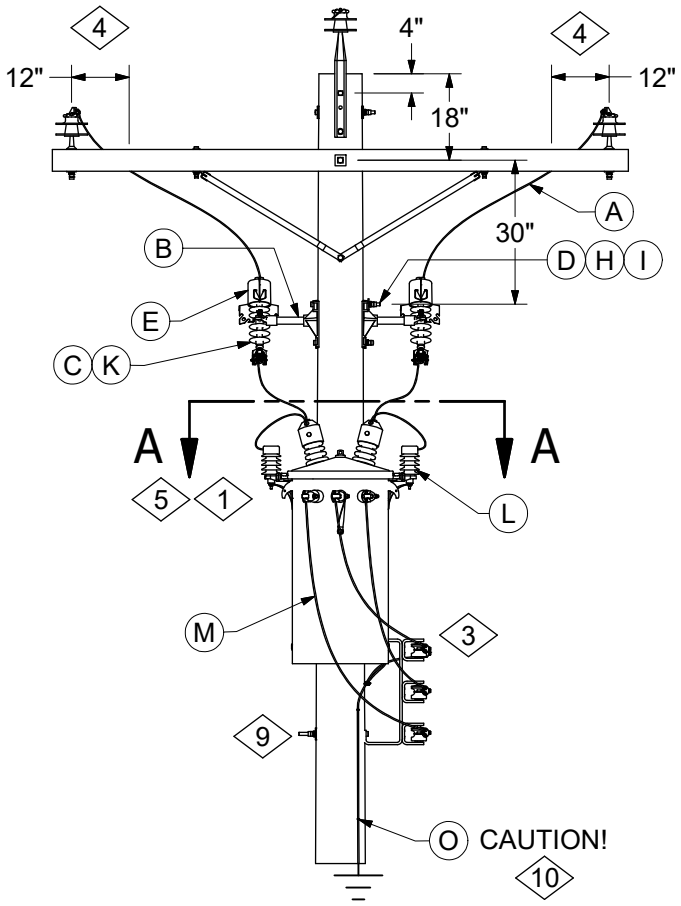
DESIGN NOTE(s):

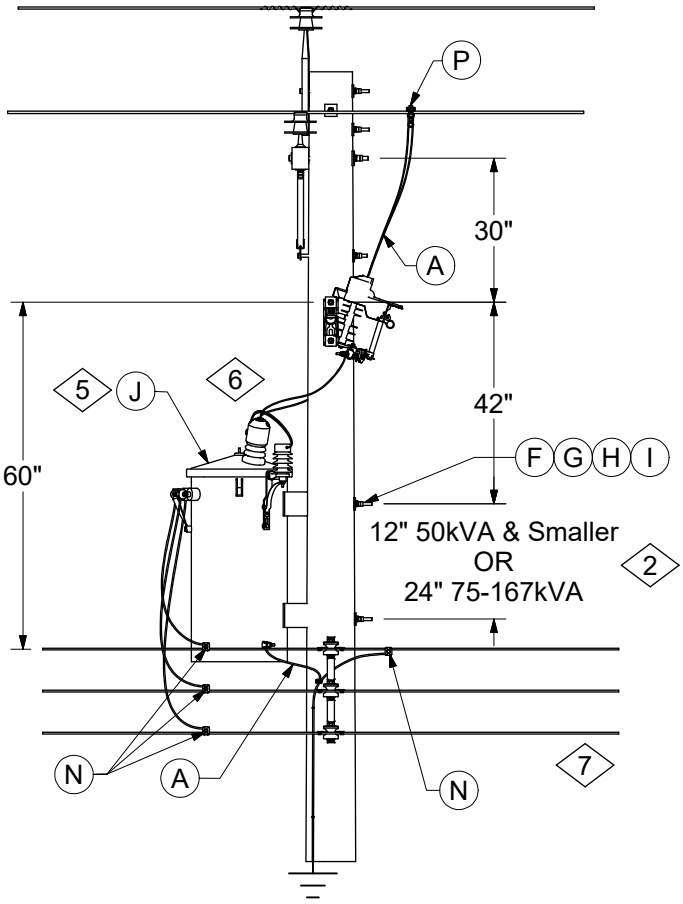
12. Deadend construction - Deadend primary one span past transformer pole if there is another pole in the lead. If not, see DCS **13 12 07 ****.

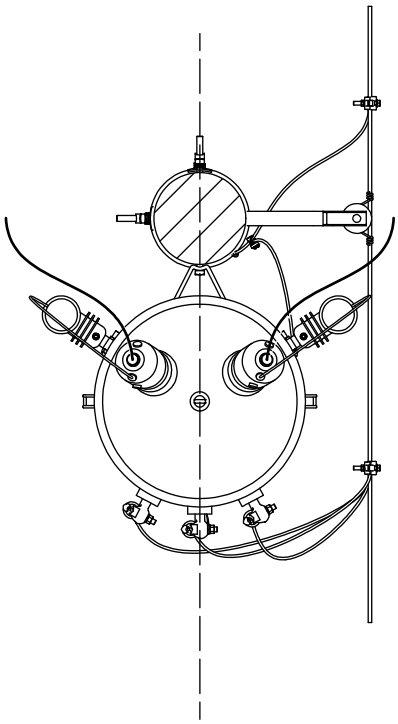
13. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

14. On single phase pole lines where future addition of crossarm for adding additional phases is not reasonably expected, this dimension can be reduced to 6" (i.e., total of 36" from the pole top to the top bolt of the cutout bracket).

REV	DATE	ENG	DESCRIPTION
13	04/01/23	DG	Converted to new format
12	11/17/15	DG	







Section A-A

REV	DATE	ENG	DESCRIPTION
0	04/01/23	DG	New

CONSTRUCTION NOTE(s):

1. Arresters must be connected to each HV bushing. Transformers coded BA, BD, JA, JD, XA, and XD have one arrester included, all others have no arrester.
2. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.
3. See DCS **13 01 01 ****** for secondary support and DCS **03 01 20 ****** for secondary configurations.
4. To avoid replacing an existing pole when adding a transformer, switches may be mounted on the crossarm. If the switches are mounted on the crossarm, they should be positioned 12" from the pin insulators. The transformer may be raised 12" to 24" when the switches are located on the crossarm. Omit items B, D, H, and I.
5. Only install transformers that have provision for tank mounting the arresters.
6. 2400/4160 Y transformers may have sidewall or cover mounted HV bushings.
7. If pole is NOT truck accessible, make secondary connections on climbing side of the pole.

DCS #	Description
13 12 05 01	50 kVA or Smaller Transformer
13 12 05 02	75 - 167 kVA Transformer

	ITEM	STK / DCS #	DESCRIPTION 13 12 05 **	01	02
	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (FT.)	24	24
4	B	23 06 127	Bracket - Standoff, 12" FG	2	2
	C	54 07 208	Switch, Fused, Open Type	2	2
4	D	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	2
	E	23 17 411	Wildlife Guard - Cover Cutout	2	2
T	F	23 52 066	Bolt, Mach., 5/8" x 14" (50 kVA & Smaller)	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" (75-167 kVA)	-	2
T	G	23 66 027	Washer, Flat, Square 5/8" (50 kVA & Smaller)	2	-
		23 66 031	Washer, Curved, Square, 3/4" (75-167 kVA)	-	2
	H	23 66 134	Lock Washer - 5/8" Double Coil	4	2
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	I	23 65 043	Lock Nut - 5/8" Square	4	2
		23 65 042	Lock Nut - 3/4" Square	-	2
@	J	**13 00 01 02**	Transformer	1	1
@	K	**10 00 01 01**	Link, Fuse	2	2
1,@	L	**12 00 01 01**	Arrester, Lightning	#	#
T@	M	**13 00 03 01**	Secondary Leads (Ft.)	12	12
T@	N	**07 00 25 00**	PG* Connector	3	3
9,10@	O	**12 00 10 ******	Grounding Unit	1	1
@	P	**07 00 21 00**	HLC*W Hot Line Clamp	2	2

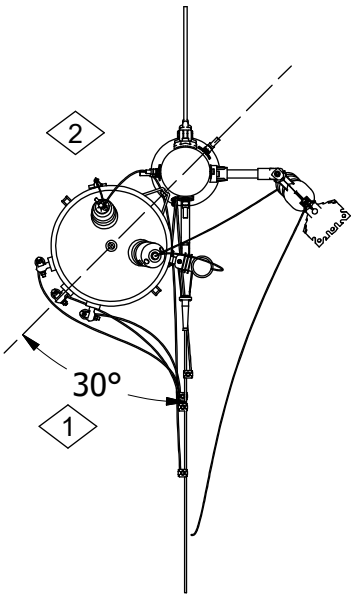
REV	DATE	ENG	DESCRIPTION
0	04/01/23	DG	New

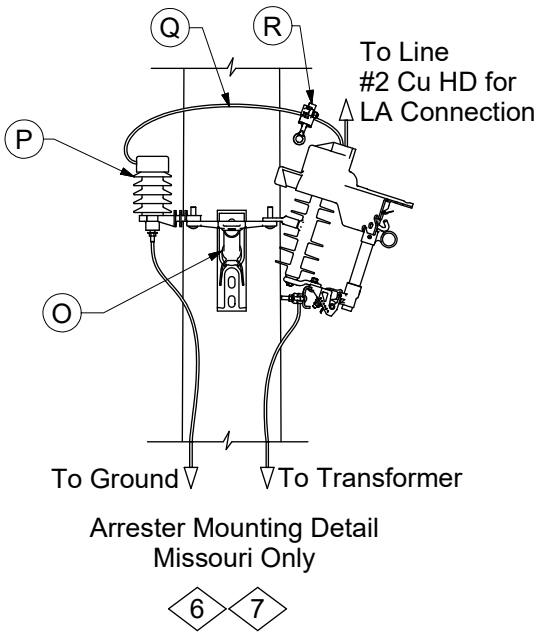
DESIGN NOTE(s):

8. Deadend construction Deadend primary one span past transformer pole if there is another pole in the lead. If not, see DCS **13 12 10 01**.

9. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

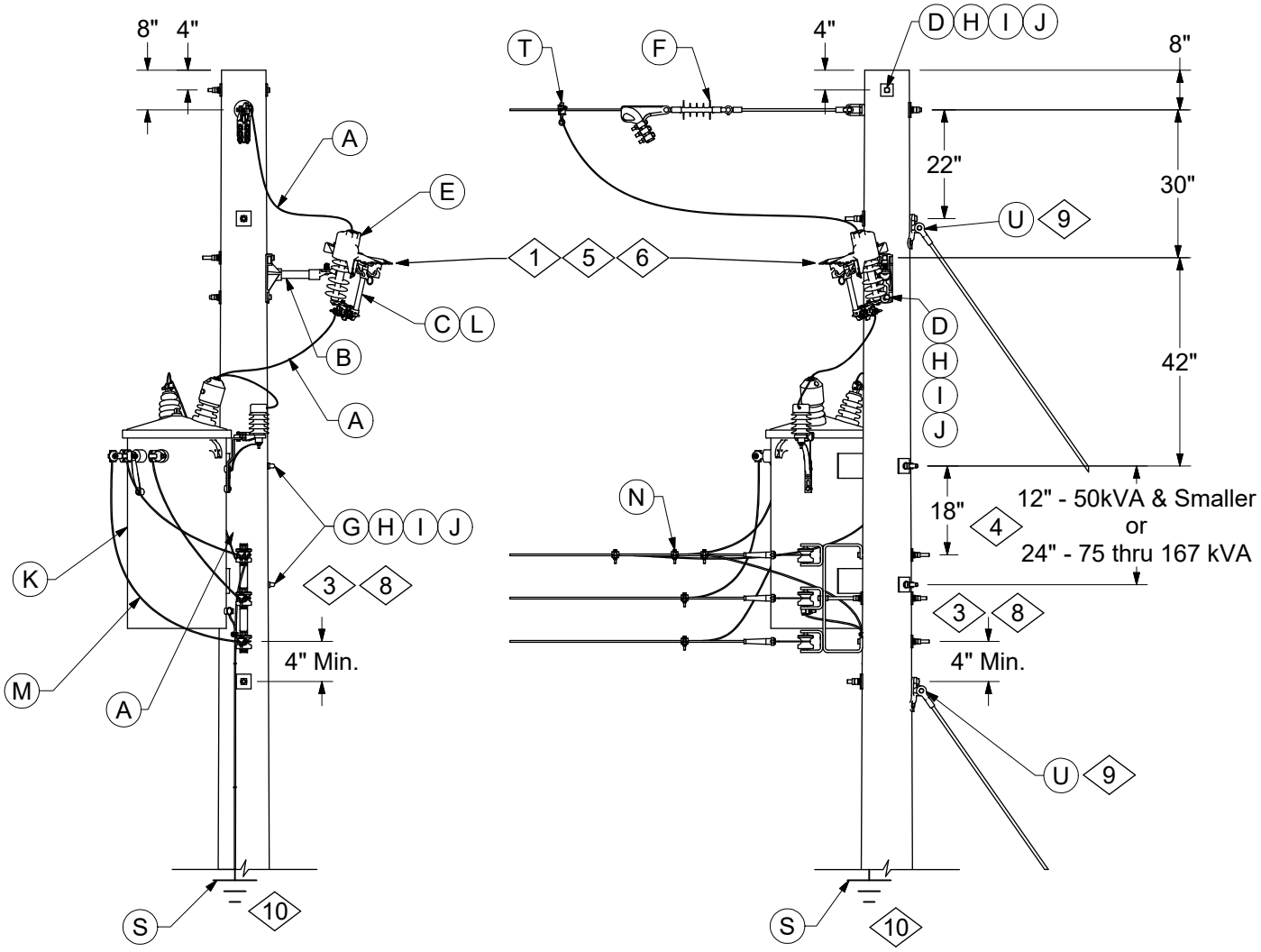
10. Arrester ground and secondary ground may be required to be separate. See DCS **13 00 06 06** for details on this requirement.





Arrester Mounting Detail
Missouri Only

6 7



DISTRIBUTION CONSTRUCTION STANDARDS

REV	DATE	ENG	DESCRIPTION
0	04/01/23	DG	New Standard

CONSTRUCTION NOTE(s):

1. Angle is shown as 30°; but may be varied depending on the size and shape of the transformer, to obtain proper clearance from the secondary. Fused switch can also be rotated with respect to the transformer position.

2. Arrester may be shifted to the most convenient side of tank on two bushing transformers.

3. Where primary deadends, and secondary runs through, construct as on DCS **13 12 00 ****.

4. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

5. If installing a CSP transformer, a fused switch shall be installed as shown. Exception: If existing pole space does not allow for installation of a fused switch and the number of customers affected by transformer failure is deemed acceptable, then items B, C, L, D(2), and E may be omitted and connect the transformer primary lead to the overhead conductor.

6. In Missouri, if installing a transformer that does not have a tank mounted lightning arrester, install arrester on transformer mounting bracket per DCS **12 12 05 **** or use items O, P, Q, and R and install the appropriate lightning arrester on the bracket beside the switch. Keep arrester leads as short as possible. See note 7 for avian protection requirements. In Illinois, only the DCS **12 12 05 ** ** option is allowed.

7. For locations in Missouri where additional avian protection is needed, omit the #2 bare CU stud and hot line clamp, R, and connect the #6 CU poly covered arrester lead wire directly to the fused switch connector.

8. See DCS **13 01 01 ** ** for secondary support and DCS **03 01 20 ** ** for secondary configurations.

9. See DCS **11 00 02 02** for typical guy insulator placement.

REV	DATE	ENG	DESCRIPTION
0	04/01/23	DG	New Standard

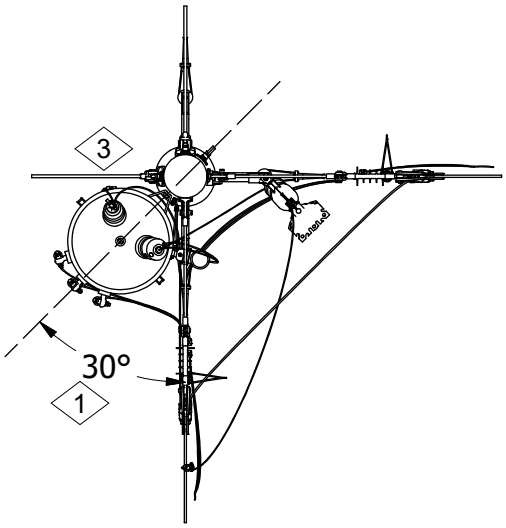
DCS #	Description
13 12 07 01	Deadend - 50 kVA or Smaller Transformer
13 12 07 02	Deadend - 75 - 167 kVA Transformer

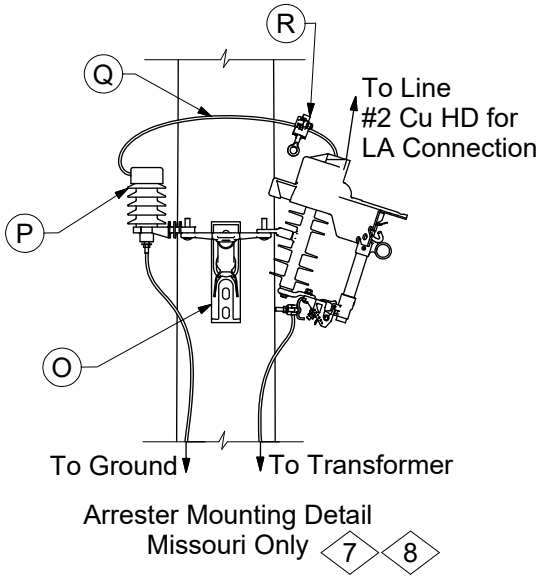
	ITEM	STK / DCS #	DESCRIPTION 13 12 07 **	01	02
	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (FT.)	12	12
	B	23 06 127	Bracket - Standoff, 12" FG	1	1
	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	3	3
	E	23 17 411	Wildlife Guard - Cover Cutout	1	1
	F	**06 12 30 01 @**	Deadend w/ Extension	1	1
T	G	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut (50 kVA & Smaller)	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut (75 kVA - 167 kVA)	-	2
T	H	23 66 207	Washer, Curved, Square, 5/8" (50 kVA & Smaller)	5	3
		23 66 031	Washer, Curved, Square, 3/4" (75 kVA - 167 kVA)	-	2
	I	23 66 134	Lock Washer - 5/8" Double Coil	5	3
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	J	23 65 043	Lock Nut - 5/8" Square	5	3
		23 65 042	Lock Nut - 3/4" Square	-	2
@	K	**13 00 01 02**	Transformer	1	1
@	L	**10 00 01 01**	Link, Fuse	1	1
T@	M	**13 00 03 01**	Secondary Leads (FT.)	12	12
T@	N	**07 00 25 00**	Clamp, Parallel Groove, PG*	3	3
6@	O	23 56 063	Bracket, 3 Position, Equipment Mount	1	1
6@	P	**12 00 01 01**	Arrester, Lightning	1	1
6@	Q	18 51 021	Wire, #6 Cu, S.D. Poly Covered (FT.)	2	2
6,7@	R	23 78 394	Clamp, Hotline, #6 to 2/0	1	1
10@	S	**12 00 10 ** **	Grounding Unit	1	1
@	T	**07 00 21 00**	Clamp, Hotline, HLC*W	1	1
9@	U	**11 00 4* ** **	Guying Unit	1	1

DESIGN NOTE(s):

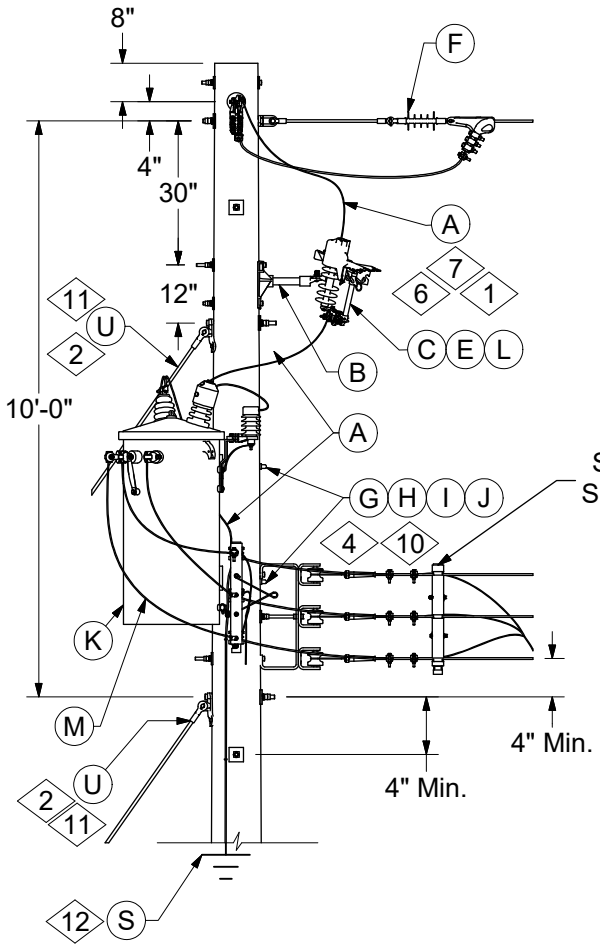
10 Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

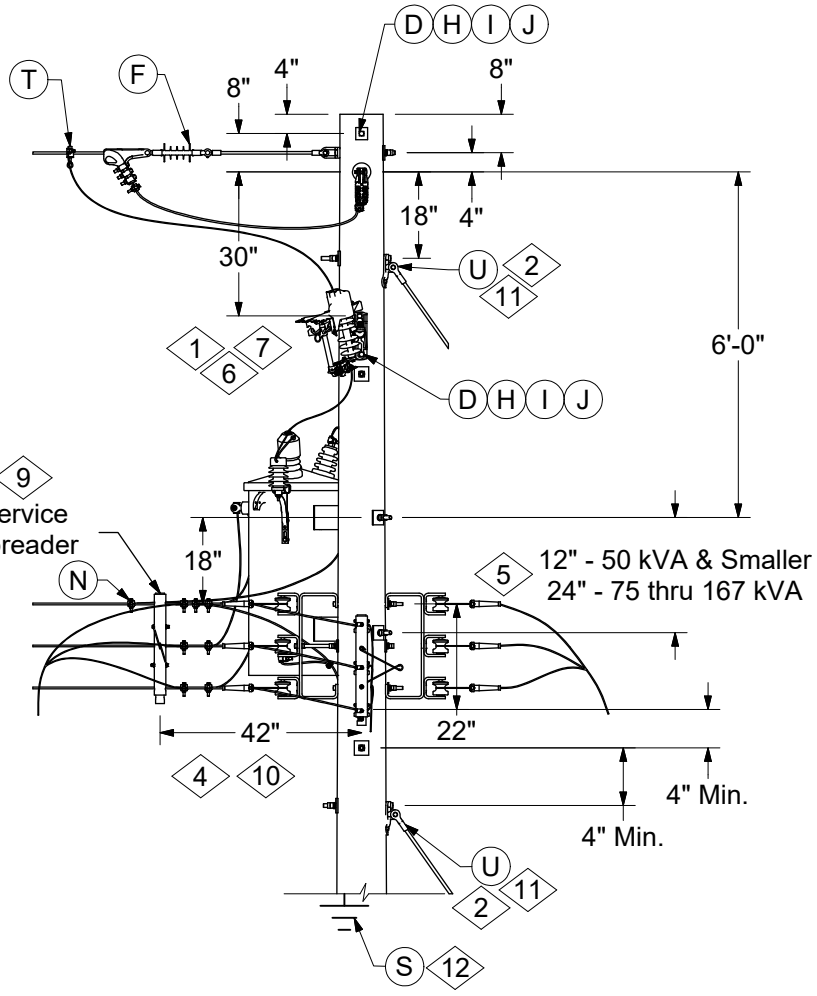
REV	DATE	ENG	DESCRIPTION
0	04/01/23	DG	New Standard





Arrester Mounting Detail
Missouri Only 7 8





DISTRIBUTION CONSTRUCTION STANDARDS

REV	DATE	ENG	DESCRIPTION
15	04/01/23	DG	Converted to new format
14	05/24/18	DG	

CONSTRUCTION NOTE(s):

1. Angle is shown as 30°; but may be varied depending on the size and shape of the transformer, to obtain proper clearance from the secondary. Fused switch can also be rotated with respect to the transformer position.

2. Where guy must be installed below transformer, a Class 4 or heavier pole shall be used. A Class 4 pole will provide adequate strength for deadening 1 - 1/0 bare AAAC at 1,400 lbs. max. tension. For conductor tension greater than this, contact Distribution Standards for determination of pole class.

3. Arrester may be shifted to the most convenient side of tank on two bushing transformers.

4. Where primary deadends, and secondary runs through, construct as on DCS **13 12 00 ****.

5. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

6. If installing a CSP transformer, a fused switch shall be installed as shown. Exception: If existing pole space does not allow for installation of a fused switch and the number of customers affected by transformer failure is deemed acceptable, then items B, C, L, D(2), and E may be omitted and connect the transformer primary lead to the overhead conductor.

7. In Missouri, if installing a transformer that does not have a tank mounted lightning arrester, install arrester on transformer mounting bracker per DCS **12 12 05 ** or use items O, P, Q, and R and install the appropriate lightning arrester on the bracket beside the switch. Keep arrester leads as short as possible. See note 8 for avian protection requirements. In Illinois, only the DCS **12 12 05 ** option is allowed.

8. For locations in Missouri where additional avian protection is needed, omit the #2 bare CU stud and hot line clamp, R, and connect the #6 CU poly covered arrester lead wire directly to the fused switch connector.

9. Service Spreaders, Stock #23 17 227 (triplex) or Stock #23 17 219 (open-wire), can be used to increase climbing and working space around transformer.

10. See DCS **13 01 01 ** for secondary support and DCS **03 01 20 ** for secondary configurations.

11. See DCS **11 00 02 02** for typical guy insulator placement.

REV	DATE	ENG	DESCRIPTION
15	04/01/23	DG	Converted to new format
14	05/24/18	DG	

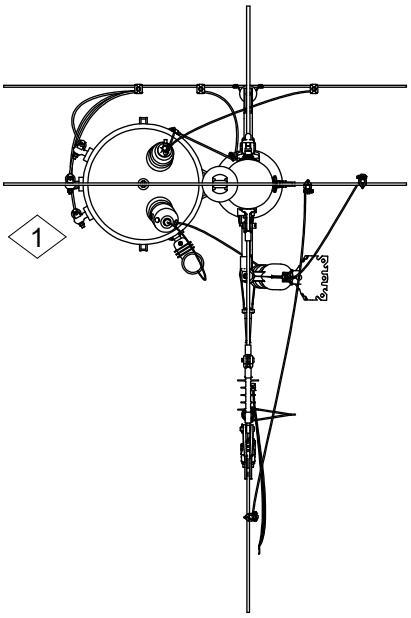
DCS #	Description
13 12 10 02	"L" Corner - 50 kVA & Smaller Transformer
13 12 10 03	"L" Corner - 75 thru 167 kVA Transformer

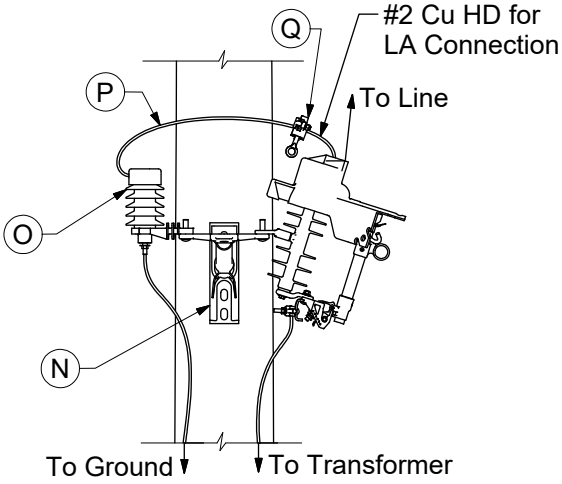
	ITEM	STK / DCS #	DESCRIPTION 13 12 10 **	02	03
	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (FT.)	12	12
	B	23 06 127	Bracket - Standoff, 12" FG	1	1
	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	3	3
	E	23 17 411	Wildlife Guard - Cover Cutout	1	1
	F	**06 12 30 01 @**	Deadend w/ Ext.	2	2
T	G	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut	-	2
T	H	23 66 207	Washer, Curved, Square, 5/8"	5	3
		23 66 031	Washer, Curved, Square, 3/4"	-	2
	I	23 66 134	Lock Washer - 5/8" Double Coil	5	3
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	J	23 65 043	Lock Nut - 5/8" Square	5	3
		23 65 042	Lock Nut - 3/4" Square	-	2
@	K	**13 00 01 02**	Transformer	1	1
@	L	**10 00 01 01**	Link, Fuse	1	1
T@	M	**13 00 03 01**	Secondary Leads (FT.)	12	12
T@	N	**07 00 25 00**	Parallel Groove Clamp, PG*	3	3
7@	O	23 56 063	Bracket, 3 Position, Equipment Mount	1	1
7@	P	**12 00 01 01**	Arrester, Lightning	1	1
7@	Q	18 51 021	Wire, #6 Cu, S.D. Poly Covered (FT.)	2	2
7,8@	R	23 78 394	Clamp, Hotline, #6 to 2/0	1	1
12@	S	**12 00 10 ** **	Grounding Unit	1	1
@	T	**07 00 21 00**	Hot Line Clamp, HLC*W	1	1
11@	U	**11 00 4* ** **	Guying Unit	2	2

DESIGN NOTE(s):

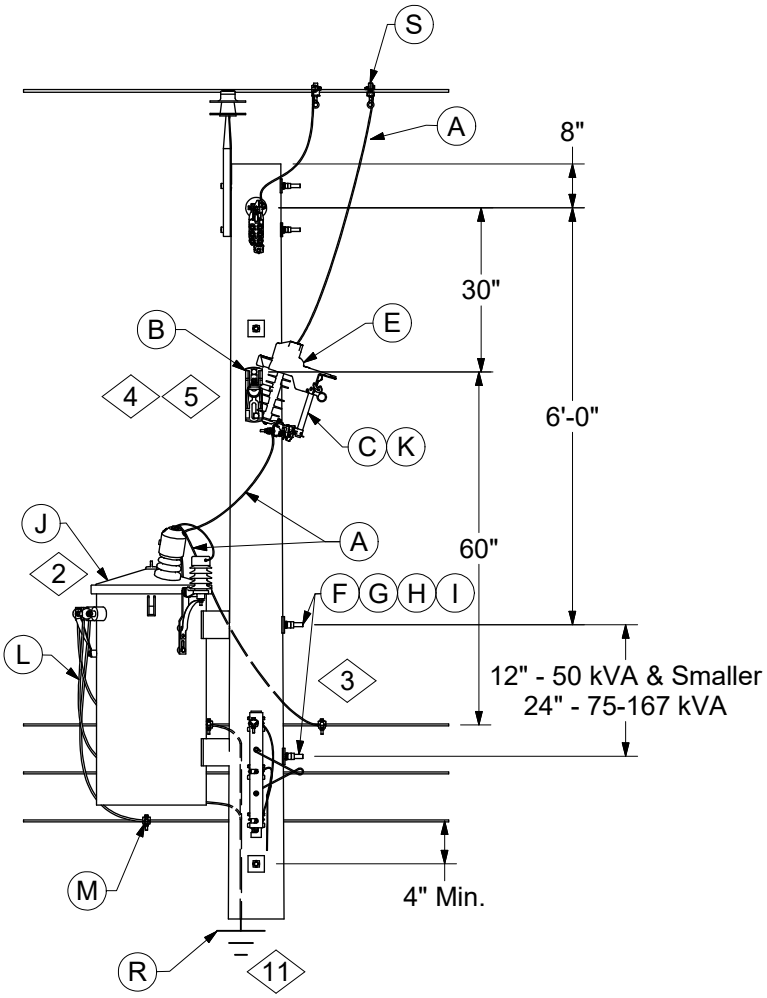
12. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

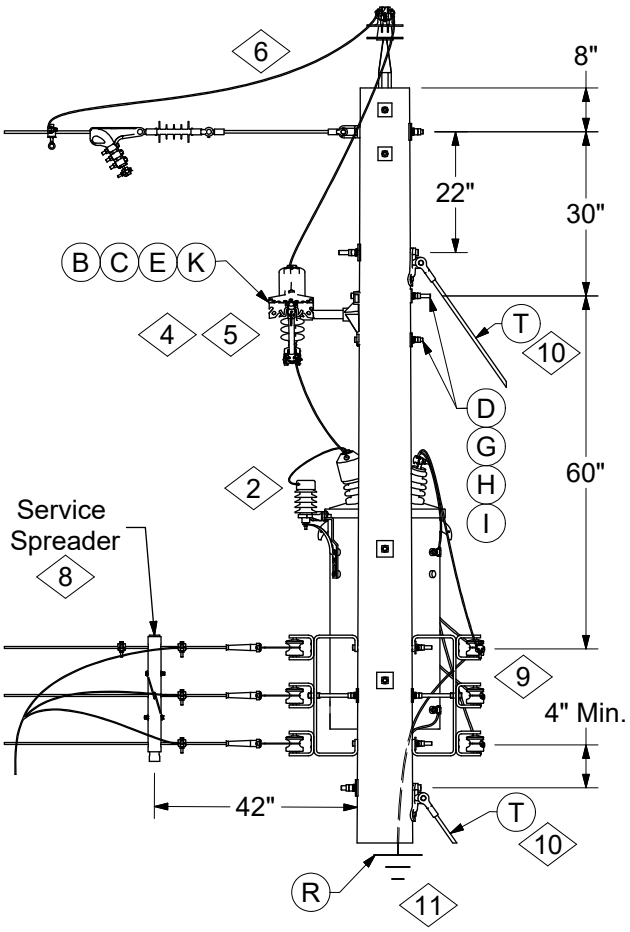
REV	DATE	ENG	DESCRIPTION
15	04/01/23	DG	Converted to new format
14	05/24/18	DG	





Arrester Mounting Detail
Missouri Only 5 7





CONSTRUCTION NOTE(s):

1. Transformer position may be rotated depending on the size and shape of the transformer to obtain proper clearance from the secondary. Fused switch can also be rotated with respect to the transformer position.

2. Arrester may be shifted to the most convenient side of tank on two bushing transformers.

3. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

4. If a CSP transformer is used, a fused switch shall be provided as shown. Exception: If existing pole space does not allow for installation of a fused switch and the number of customers affected by transformer failure is deemed acceptable, then items B, C, E, K, and D may be omitted and connect the transformer primary lead to the overhead conductor.

5. In Missouri, if installing a transformer that does not have a tank mounted lightning arrester, install arrester on transformer mounting bracket per DCS **12 12 05 **** or use items N, O, P, and Q and install the appropriate lightning arrester on the bracket beside the switch. Keep arrester leads as short as possible. See note 7 for avian protection requirements. In Illinois, only the DCS **12 12 05 ** ** option is allowed.

6. If there is space available on the pole, a fused switch for the primary tap can be installed on “T” corners. Refer to DCS **10 12 19 ****.

7. For locations in Missouri where additional avian protection is needed, omit the #2 bare CU stud and hotline clamp Q and connect the #6 CU poly covered arrester lead wire P directly to the fused switch connector.

8. Service spreaders Stock #23 17 227 (triplex) or Stock #23 17 219 (open-wire) can be used to increase climbing and working space around transformer.

9. See DCS **13 01 01 ** ** for secondary support and DCS **03 01 20 ** ** for secondary configurations.

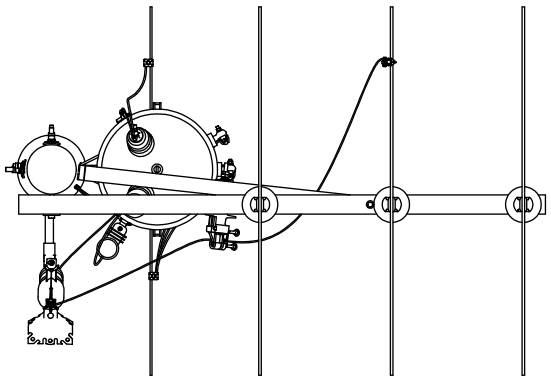
10. See DCS **11 00 02 02** for typical guy insulator placement.

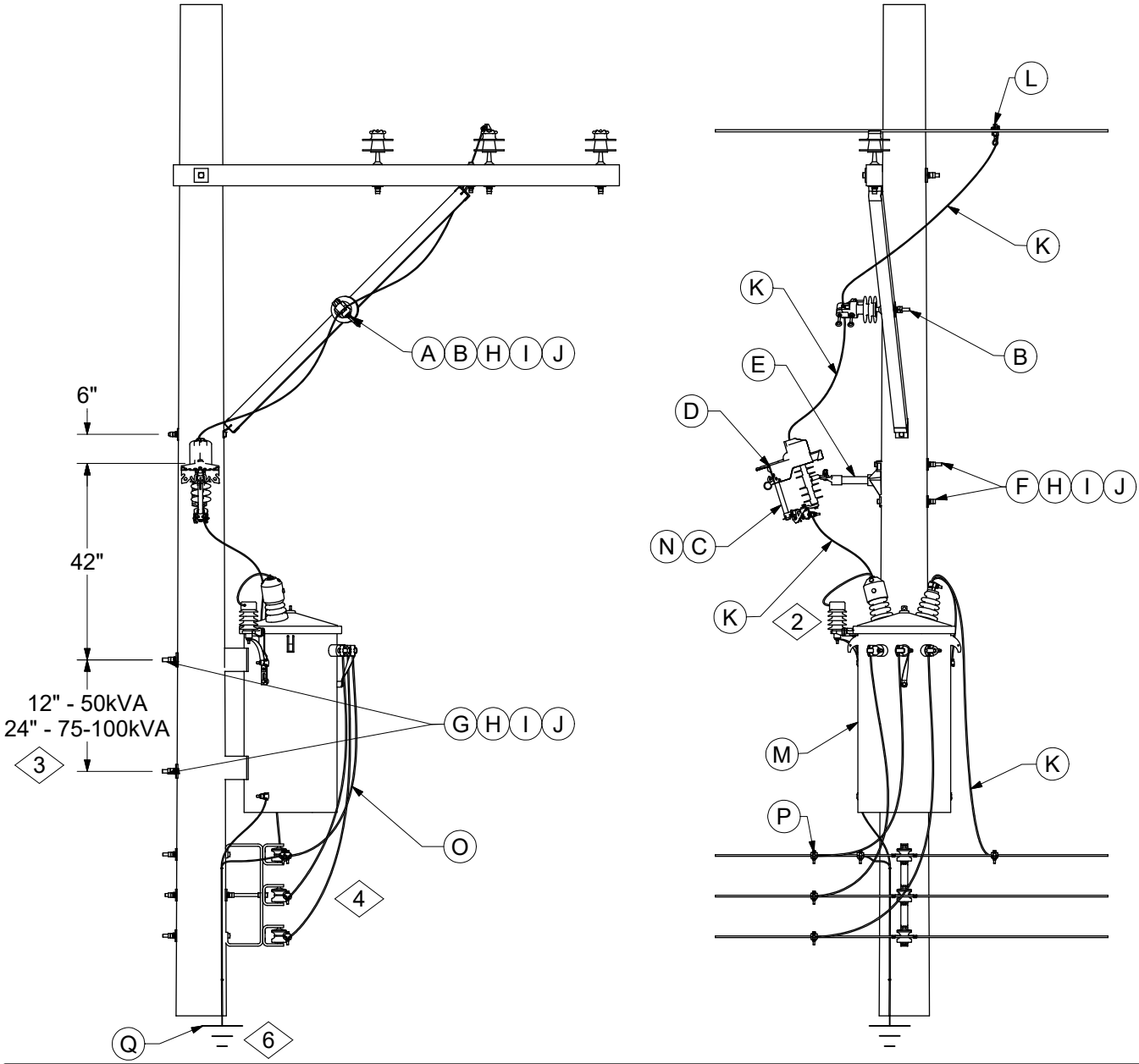
DCS #	Description
13 12 14 01	"T" Corner - 50 kVA or Smaller Transformer
13 12 14 02	"T" Corner - 75-167 kVA Transformer

	ITEM	STK / DCS #	DESCRIPTION 13 12 14 **	01	02
	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (Ft.)	12	12
	B	23 06 127	Bracket - Standoff, 12" FG	1	1
	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	2	2
	E	23 17 411	Wildlife Guard - Cover Cutout	1	1
T	F	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut	-	2
T	G	23 66 207	Washer, Curved, Square, 5/8"	4	2
		23 66 031	Washer, Curved, Square, 3/4"	-	2
	H	23 66 134	Lock Washer - 5/8" Double Coil	4	2
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	I	23 65 043	Lock Nut - 5/8" Square	4	2
		23 65 042	Lock Nut - 3/4" Square	-	2
@	J	**13 00 01 02**	Transformer	1	1
@	K	**10 00 01 01**	Link, Fuse	1	1
T@	L	**13 00 03 01**	Secondary Leads (Ft.)	12	12
T@	M	**07 00 25 00**	Parallel Groove Clamp, PG*	3	3
5@	N	23 56 063	Bracket, 3 Position, Equipment Mount	1	1
5@	O	**12 00 01 01**	Arrester, Lightning	1	1
5@	P	18 51 021	Wire, #6 Cu, S.D. Poly Covered (Ft.)	2	2
5,7@	Q	23 78 394	Clamp, Hotline, #6 to 2/0	1	1
11@	R	**12 00 10 ** **	Grounding Unit	1	1
@	S	**07 00 21 00**	Hot Line Clamp, HLC*W	1	1
10@	T	**11 00 4* ** **	Guying Unit	1	1

DESIGN NOTE(s):

11 Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.





REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	11/30/11	DG	

CONSTRUCTION NOTE(s):

1. For CSP transformers, a fused switch shall be installed as shown.

2. Arrester may be shifted to the most convenient side of tank on two bushing transformers.

3. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

4. See DCS **13 01 01 ****** for secondary support and DCS **03 01 20 ****** for secondary configurations.

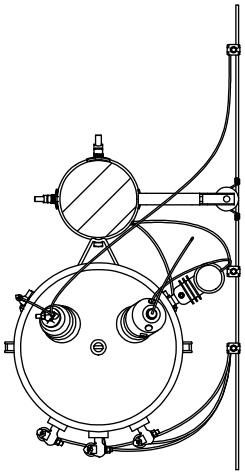
5. Transformer and fused switch positions may be rotated if additional working space is needed.

DCS #	Description
13 12 21 01	50 kVA or Smaller Transformer
13 12 21 02	75 - 100 kVA Transformer

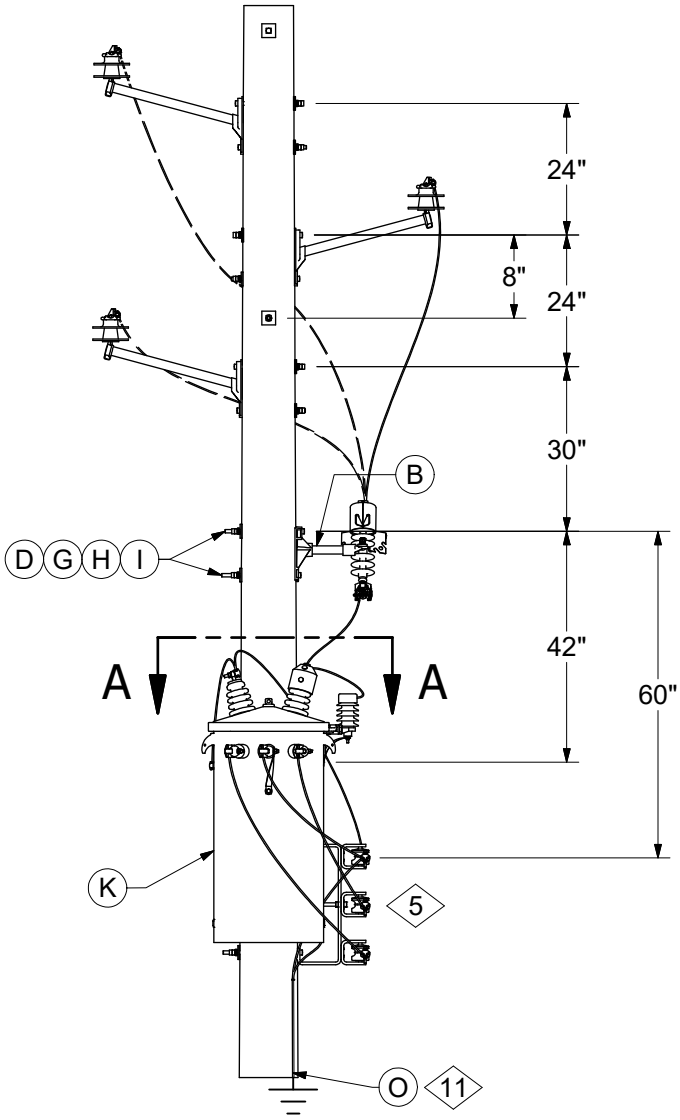
	ITEM	STK / DCS #	DESCRIPTION 13 12 21 **	01	02
	A	25 05 143	Insulator, Vice Top, 12kV	1	1
	B	23 62 028	Pin, Insulator, Long Shank	1	1
	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 17 411	Wildlife Guard - Cover Cutout	1	1
	E	23 06 127	Bracket - Standoff, 12" FG	1	1
	F	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	2	2
T	G	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut	-	2
T	H	23 66 207	Washer, Curved, Square, 5/8"	5	3
		23 66 031	Washer, Curved, Square, 3/4"	-	2
	I	23 66 134	Lock Washer - 5/8" Double Coil	5	3
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	J	23 65 043	Lock Nut - 5/8" Square	5	3
		23 65 042	Lock Nut - 3/4" Square	-	2
	K	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (Ft.)	22	22
@	L	**07 00 21 00**	Clamp, Hotline, HLC*W	1	1
@	M	**13 00 01 02**	Transformer	1	1
@	N	**10 00 01 01**	Link, Fuse	1	1
T@	O	**13 00 03 01**	Secondary Leads (Ft.)	12	12
T@	P	**07 00 25 00**	Clamp, Parallel Groove, PG*	4	4
5@	Q	**12 00 10 ******	Grounding Unit	1	1

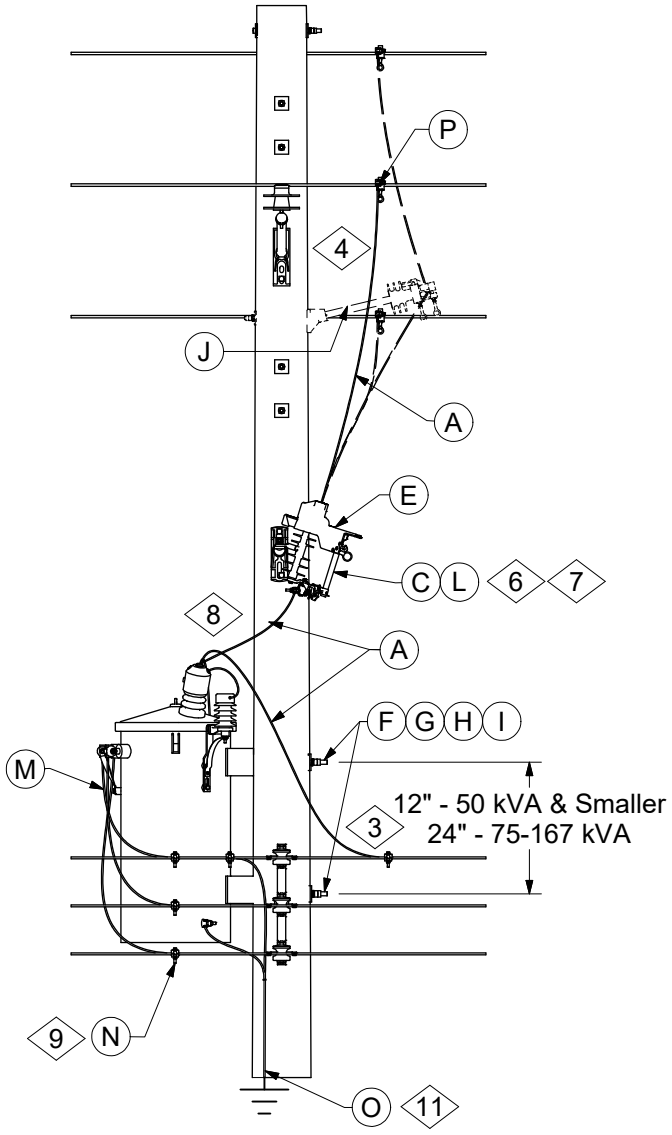
DESIGN NOTE(s):

6. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.



SECTION A-A ◇1 ◇2





REV	DATE	ENG	DESCRIPTION
11	04/01/23	DG	Converted to new format
10	09/14/15	DG	

CONSTRUCTION NOTE(s):

1. Arrester may be shifted to most convenient side of tank on two bushing transformers.

2. Transformer position may be rotated to obtain proper clearance from the secondary. Fused switch may also be rotated with respect to the transformer position.

3. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

4. When transformer must be connected to top phase, install 24” fiberglass standoff.

5. See DCS **13 01 01 ****** for secondary support and **DCS 03 01 20 ****** for secondary configurations.

6. Switch may be mounted on either side of the pole.

7. If installing a CSP Transformer, a fused switch shall be installed as shown. Exception: If existing pole space does not allow for installation of a fused switch and the number of customers affected by transformer failure is deemed acceptable, then items B, C, D, E, and L may be omitted and connect the transformer primary lead to the overhead conductor.

8. 2400/4160 Y transformer may have side wall or cover mounted HV bushings. If side wall mounted bushing:
   a. Build according to this DCS except use 2.5kV primary lead wire (Stock #18 53 011), or
   b. If pole is congested, 2.5kV primary lead wire (Stock #18 53 011) in in conduit similar to Limited Use DCS **13 04 14 01** may be used.

9. If pole is NOT truck accessible, make secondary connections on the climbing side of the pole.

DCS #	Description
13 12 34 03	50 kVA or Smaller Transformer
13 12 34 04	75 - 167 kVA Transformer

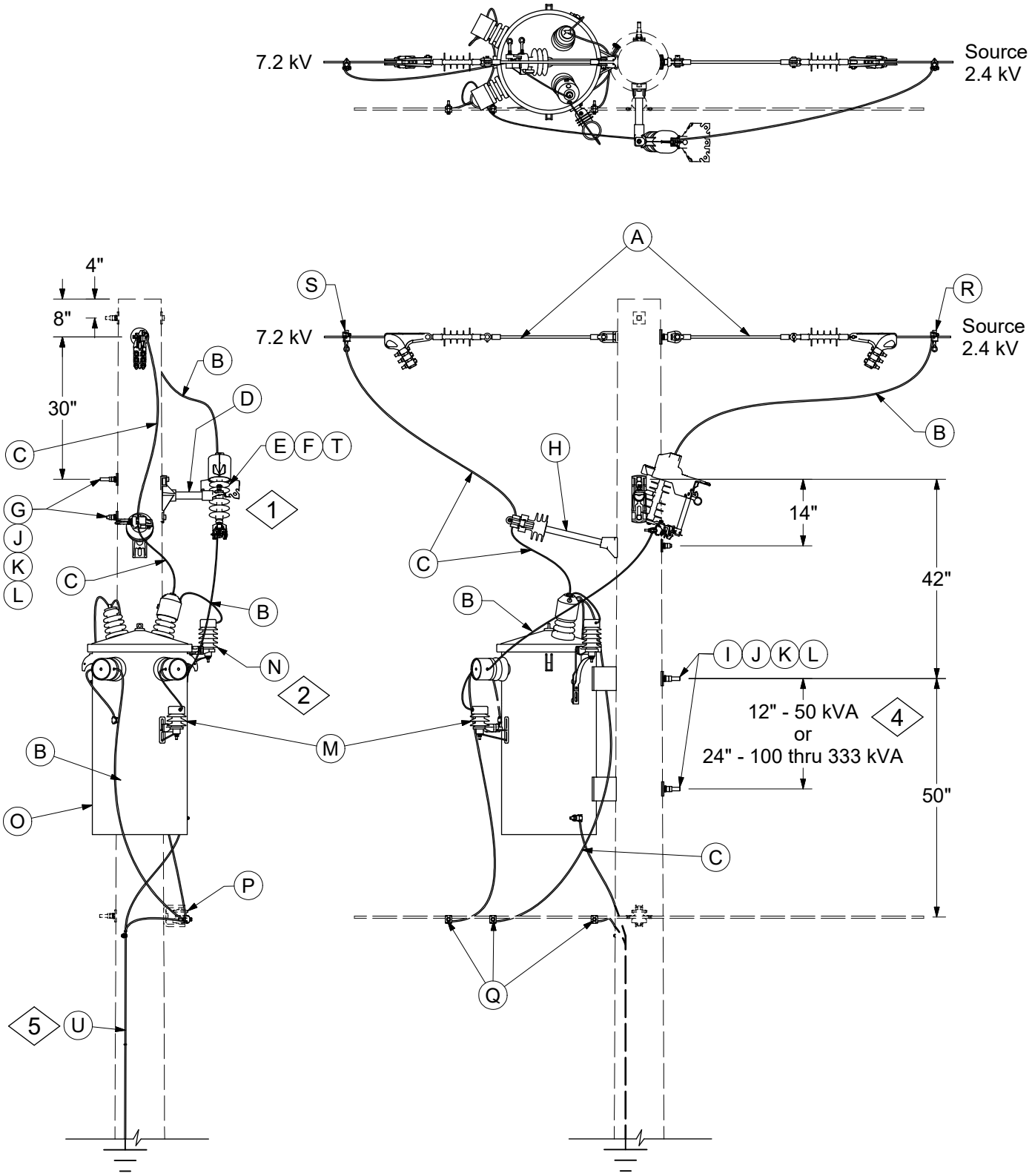
	ITEM	STK / DCS #	DESCRIPTION 13 12 34 **	03	04
	A	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (Ft.)	22	22
	B	23 06 127	Bracket - Standoff, 12" FG	1	1
	C	54 07 208	Switch, Fused, Open Type	1	1
	D	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	2
	E	23 17 411	Wildlife Guard - Cover Cutout	1	1
T	F	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut	2	-
		23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	-	2
T	G	23 66 207	Washer, Curved, Square, 5/8"	4	2
		23 66 031	Washer, Curved, Square, 3/4"	-	2
	H	23 66 134	Lock Washer - 5/8" Double Coil	4	2
		23 66 135	Lock Washer - 3/4" Double Coil	-	2
	I	23 65 043	Lock Nut - 5/8" Square	4	2
		23 65 042	Lock Nut - 3/4" Square	-	2
4@	J	**06 12 20 04**	Insulator, Standoff, L.D.	1	1
@	K	**13 00 01 02**	Transformer	1	1
@	L	**10 00 01 01**	Link, Fuse	1	1
T@	M	**13 00 03 01**	Secondary Leads (Ft.)	12	12
T@	N	**07 00 25 00**	Clamp, Parallel Groove, PG*	3	3
11@	O	**12 00 10 ** **	Grounding Unit	1	1
@	P	**07 00 21 00**	Clamp, Hotline, HLC*W	1	1

DESIGN NOTE(s):

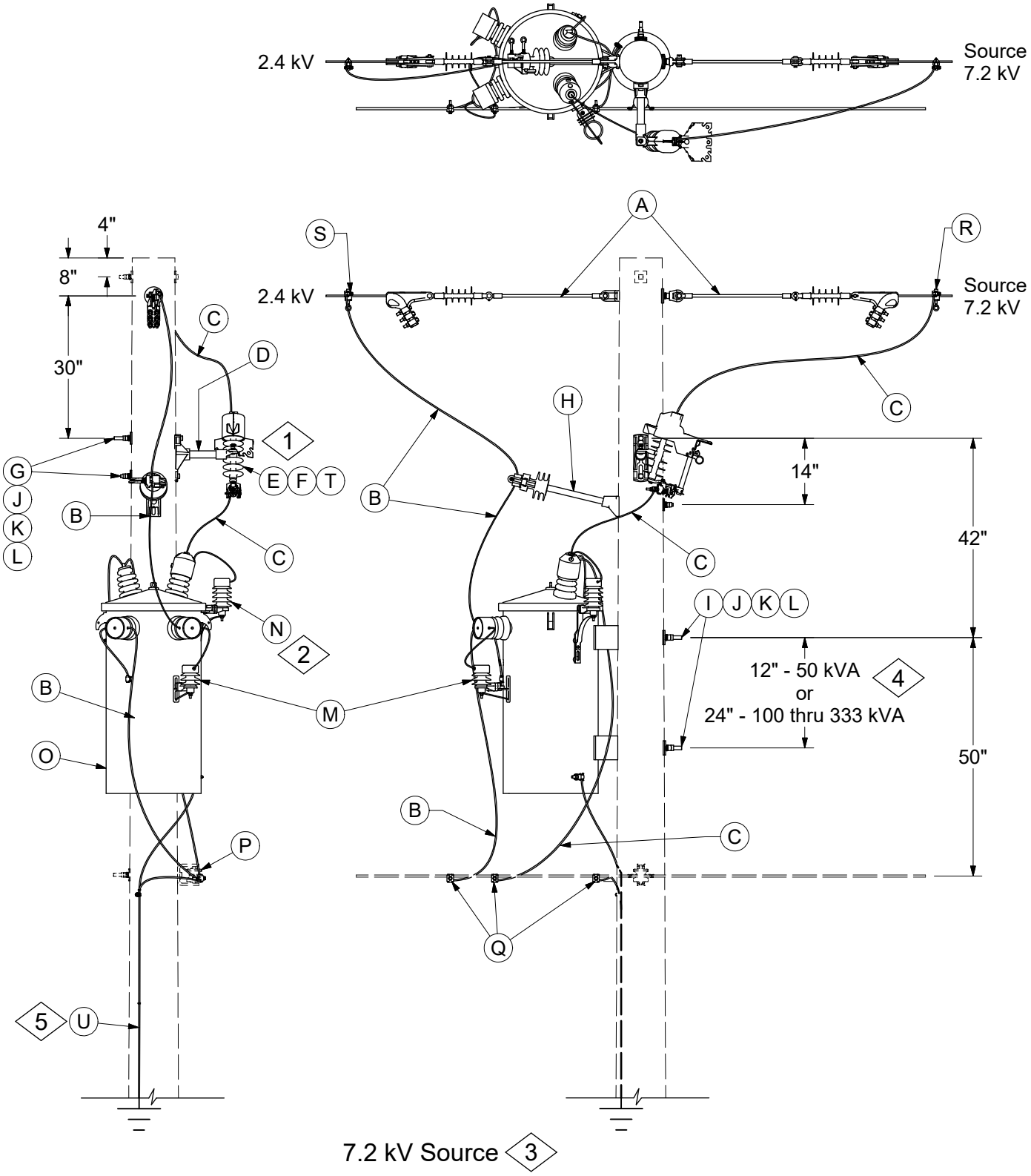
10. Deadend construction - Deadend primary one span past transformer pole if there is another pole in the lead. If not, see DCS **13 12 07 ****.

Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

REV	DATE	ENG	DESCRIPTION
11	04/01/23	DG	Converted to new format
10	09/14/15	DG	



REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	08/22/11	DG	



7.2 kV Source 3

REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	08/22/11	DG	

CONSTRUCTION NOTE(s):

1. Install switch on source side only.

2. Install arresters on both source and load sides of transformer.

3. Connection shown is for subtractive polarity (250 and 333 kVA). On additive polarity transformers (50 thru 167 kVA), secondary bushings are reversed.

4. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.

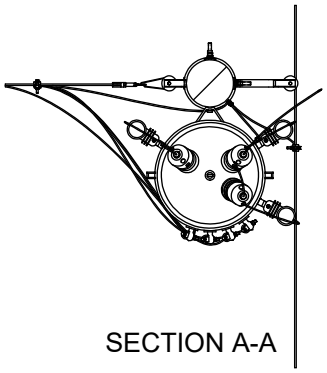
DCS #	Description
13 12 48 01	50 kVA, Step-Up or Step-Down
13 12 48 02	100-167 kVA, Step-Up or Step-Down
13 12 48 03	250 kVA, Step-Up or Step-Down
13 12 48 04	333 kVA, Step-Up or Step-Down

	ITEM	STK / DCS #	DESCRIPTION 13 12 48 **	01	02	03	04
	A	**06 12 30 03 @**	Double Deadend w/ FG Extensions	1	1	1	1
	B	18 53 011	Wire, #6 CU, 7 Strand, 5 kV (FT.)	15	15	-	-
		18 53 018	Wire, #2 CU, 7 Strand, 5 kV (FT.)	-	-	15	-
		18 53 022	Wire, 1/0 CU, 7 Strand, 5 kV (FT.)	-	-	-	15
	C	18 51 025	Wire, Cu., #4 S.D., Covered	20	20	20	20
	D	23 06 127	Bracket - Standoff, 12" FG	1	1	1	1
	E	54 07 208	Switch, Fused, Open Type	1	1	1	1
	F	23 17 411	Wildlife Guard - Cover Cutout	1	1	1	1
	G	23 52 065	Bolt, Mach., 5/8" x 12" w/ square nut	2	2	2	2
	H	**06 12 20 04**	Wire Training Assembly	1	1	1	1
	I	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut	2	-	-	-
		23 52 219	Bolt, Mach., 3/4" x 14" w/ square nut	-	2	2	2
	J	23 66 207	Washer, Curved, Square, 5/8"	4	2	2	2
		23 66 031	Washer, Curved, Square, 3/4"	-	2	2	2
	K	23 66 134	Lock Washer - 5/8" Double Coil	4	2	2	2
		23 66 135	Lock Washer - 3/4" Double Coil	-	2	2	2
	L	23 65 043	Lock Nut - 5/8" Square	4	2	2	2
		23 65 042	Lock Nut - 3/4" Square	-	2	2	2
	M	10 01 122	Arrester Kit, 3kV, w/ "T" Transformer Mtg. Brkt.	1	1	1	1
	N	10 01 145	Arrester Kit, 10kV, w/ "L" Transformer Mtg. Brkt.	1	1	1	1
@	O	**13 00 01 02**	Transformer - BMxxxxG	1	1	1	1
@	P	**06 01 01 ****	Single Clevis With or Without Extension Bracket	1	1	1	1
@	Q	**07 00 25 00**	Parallel Groove Clamp, PG*	3	3	3	3
@	R	**07 00 21 00**	Clamp, Hot Line, HLC*W	1	1	1	1
@	S	**07 00 21 00**	Hot Tap With/Stirrup, STC*W	1	1	1	1
@	T	**10 00 01 01**	Link, Fuse	1	1	1	1
5@	U	**12 00 10 ****	Grounding Unit	1	1	1	1

DESIGN NOTE(s):

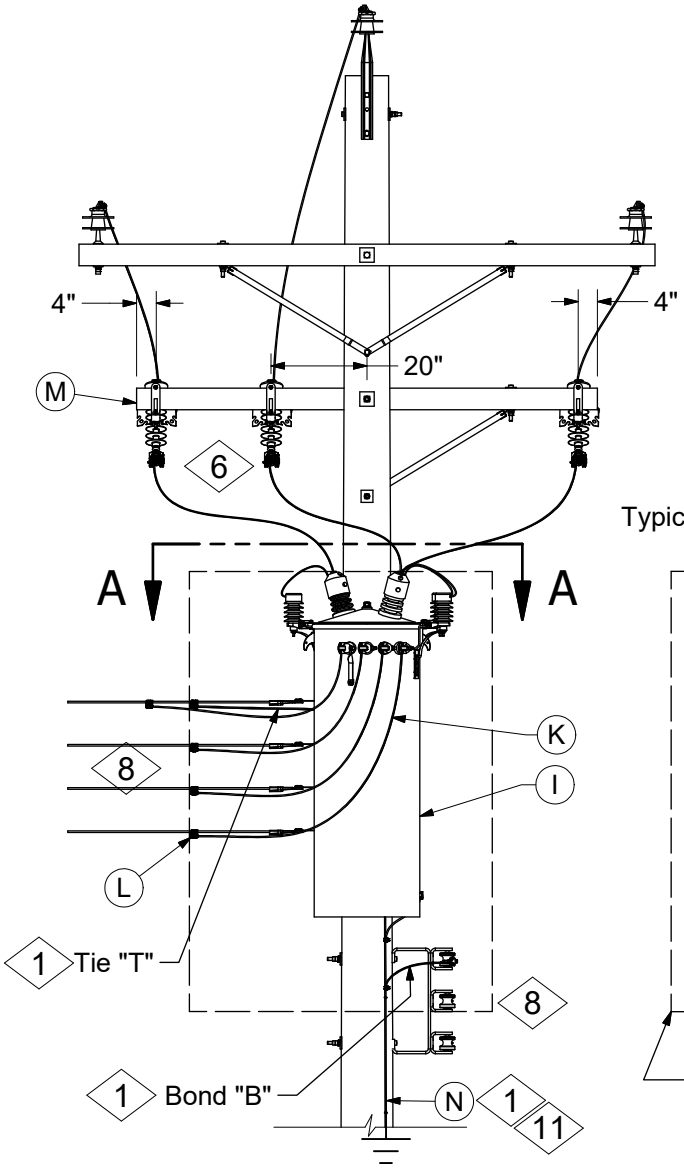
5. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

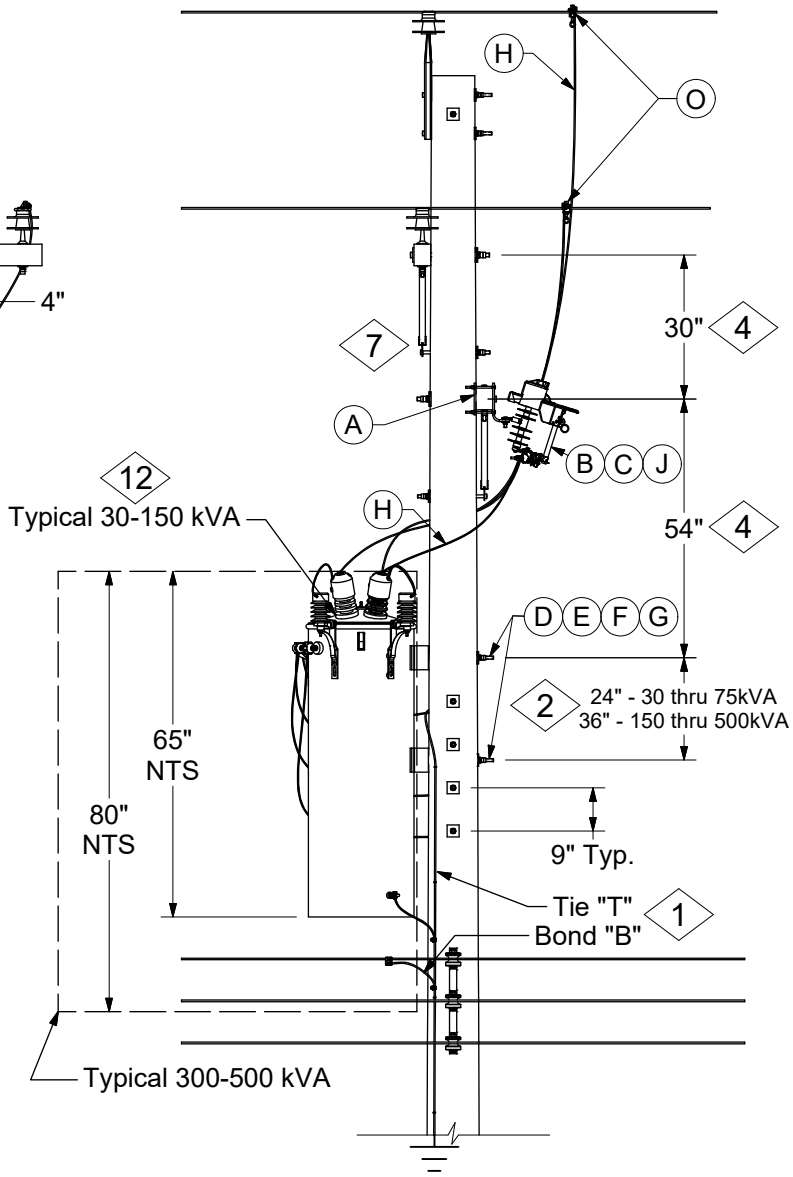
REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	08/22/11	DG	



SECTION A-A

CAUTION:
All primary terminals are hot after the first phase wire is connected.





REV	DATE	ENG	DESCRIPTION
8	04/01/23	DG	Converted to new format
7	12/03/15	DG	

CONSTRUCTION NOTE(s):

1. If common neutral is not present refer to DCS **13 00 07 02** for installation of grounds.
2. Measure distance between mounting slots and drill so that transformer rests evenly on both bolts.
3. Units weighing in excess of 3400#'s (500 kVA) must be mounted using 1" bolts.
4. These dimensions may be reduced for existing installation to 24" and 48".
5. Instructions for converting a 480Y/277 volt four wire transformer to 480 volt three wire service are shown on DCS **13 00 01 01**.
6. If wood arm, use only one V brace. Keep the extra brace for future use.
7. For installation on a dead-end structure, use vice-top insulators on the fused switch drop arm for training the primary jumpers.
8. See DCS **13 01 01 **** for secondary support and DCS **03 01 20 **** for secondary configurations.

DCS #	Description
13 12 54 01	30 kVA Transformer
13 12 54 02	45-75 kVA Transformer
13 12 54 03	150-300 kVA Transformer
13 12 54 04	500 kVA Transformer

	ITEM	STK / DCS #	DESCRIPTION 13 12 54 **	01	02	03	04
	A	17 58 054	Bracket, Crossarm, Heavy Duty	3	3	3	3
	B	23 17 411	Wildlife Guard - Cover Cutout	3	3	3	3
	C	54 07 208	Switch, Fused, Open Type	3	3	3	3
	D	23 52 066	Bolt, Mach., 5/8" x 14" w/ square nut (30 kVA)	2	-	-	-
T		23 52 219	Bolt, Mach., 3/4" x 14" (45 thru 75 kVA)	-	2	-	-
		23 52 254	Bolt, Mach., 3/4" x 14" (150 thru 300 kVA)	-	-	2	-
		23 52 269	Bolt, Mach., 1" x 16" (500 kVA)	-	-	-	2
	E	23 66 027	Washer, Flat, Square 5/8" (30 kVA)	2	-	-	-
T		23 66 031	Washer, Curved, Square, 3/4" (45 thru 300 kVA)	-	2	2	-
		23 66 106	Washer, Curved, Square, 1" (500 kVA)	-	-	-	2
	F	23 66 134	Lock Washer - 5/8" Double Coil	2	-	-	-
		23 66 135	Lock Washer - 3/4" Double Coil	-	2	2	-
	G	23 65 043	Lock Nut - 5/8" Square	2	-	-	-
		23 65 042	Lock Nut - 3/4" Square	-	2	2	-
		23 65 055	Lock Nut - 1" Square	-	-	-	2
T	H	18 51 025	Primary Leads, S.D. (FT.)	35	35	35	35
@	I	**13 00 01 02**	Transformer	1	1	1	1
@	J	**10 00 01 01**	Fuse, Link	1	1	1	1
T@	K	**13 00 03 01**	Secondary Leads (FT.)	20	20	20	20
T@	L	**07 00 25 00**	Parallel Groove Clamp, PG*	4	4	4	4
	M	**04 00 20 02**	Crossarm, Wood, 8' w/ 60" V Brace	1	1	1	1
12@		**04 00 20 03**	Crossarm, Wood, 10' w/ 60" V Brace	1	1	1	1
		04 00 41 14	Crossarm, FG, 8'	1	1	1	1
		04 00 41 16	Crossarm, FG, 10'	1	1	1	1
11@	N	**12 00 10 ******	Grounding Unit	1	1	1	1
@	O	**07 00 21 00**	Hot Line Clamp, HLC*W	3	3	3	3
7@	P	**06 12 01 01**	Insulator, Vice-Top, 15 kV, with Pin, Insulator, Long Shank	3	3	3	3

DESIGN NOTE(s):

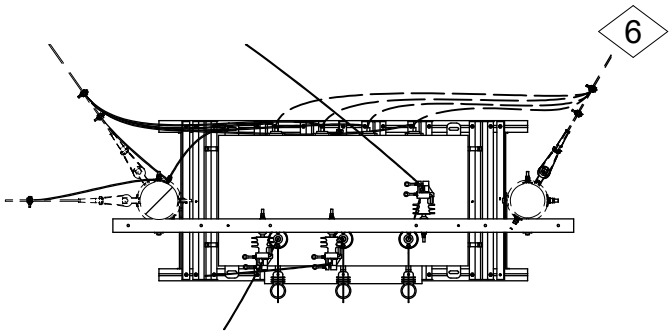
9. See DCS **02 00 02 00** for pole class.

10. See DCS **13 00 04 01** for dimensions and weights of transformers.

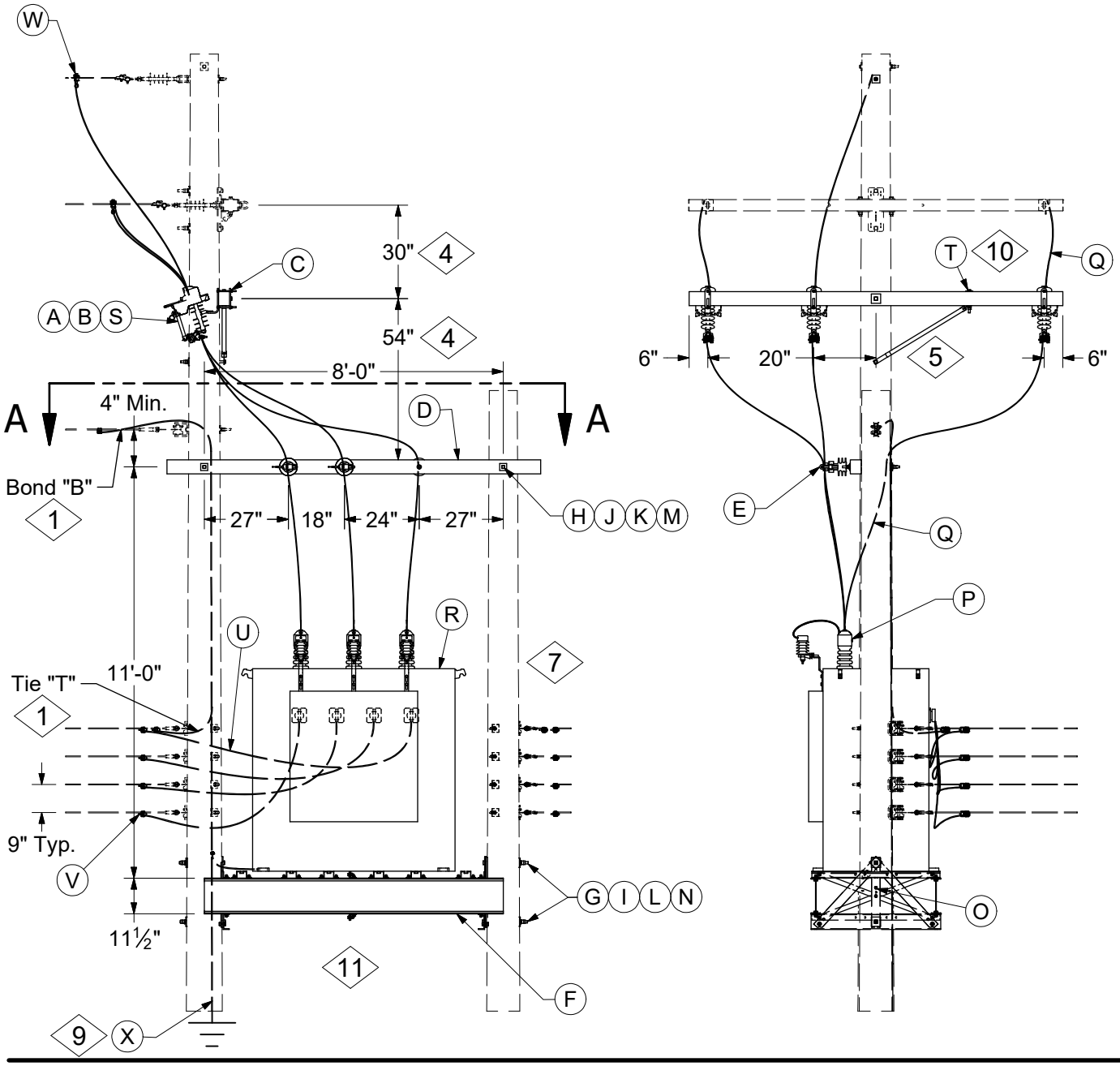
11. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS 12 00 10 02 for ground rod application on existing pole installation.

12. 8' arms may be used only in Missouri. Use 10' arms if underbuilt on subtransmission structure. Use FG arms if on composite pole or underbuilt on subtransmission structure.

REV	DATE	ENG	DESCRIPTION
8	04/01/23	DG	Converted to new format
7	12/03/15	DG	



SECTION A-A



REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	10/08/15	DG	

CONSTRUCTION NOTE(s):

1. If common neutral is not present, refer to DCS **13 00 07 02** for installation of grounds.
2. See DCS **13 01 01 **** for underground service arrangement.
3. Instructions for converting a 480/277 volt four wire transformer to 480 volt three wire service are shown on DCS **13 00 01 01**.
4. These dimensions may be reduced for existing installation to 24" and 48".
5. If wood arm, use only one V brace. Keep extra brace for future use.
6. Optional service takeoff. See DCS **09 01 12 00**.

	ITEM	STK / DCS #	DESCRIPTION 13 12 58 **	02
	A	54 07 208	Switch, Fused, Open Type	3
	B	23 17 411	Wildlife Guard - Cover Cutout	3
	C	17 58 054	Bracket, Arrester/Cutout Mounting	3
	D	41 01 008	10' Crossarm - 3-1/2" x 4-1/2"	1
	E	**06 12 01 01**	Insulator, Vice Top, 15kV, with Pin, Insulator, Long Shank	3
	F	23 17 174	Platform, Trans, 8'−0"	1
	G	23 52 103	Bolt, Mach., 3/4" x 18" w/ Square Nut	4
	H	23 52 068	Bolt, Mach., 5/8" x 16" w/ Square Nut	2
	I	23 66 031	Washer, Curved, Square, 3/4"	4
	J	23 66 207	Washer, Curved, Square, 5/8"	2
	K	23 66 134	Lock Washer - 5/8" Double Coil	2
	L	23 66 135	Lock Washer - 3/4" Double Coil	4
	M	23 65 043	Lock Nut - 5/8" Square	2
	N	23 65 042	Lock Nut - 3/4" Square	4
	O	23 60 007	Screw, Lag, 1/2" x 4"	2
	P	69 58 181	Guard, Wildlife, Clam-Shell, Tall	3
T	Q	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (Ft.)	35
@	R	**13 00 01 02**	Transformer	1
@	S	**10 00 01 01**	Link, Fuse	3
	T	**04 00 20 02**	Crossarm, Wood, 8' w/ 60" V Brace	1
10@		**04 00 41 14**	Crossarm, FG, 8'	1
		04 00 41 16	Crossarm, FG, 10'	1
		04 00 20 03	Crossarm, Wood, 10' w/ 60" V Brace	1
T@	U	**13 00 03 01**	Secondary Leads (Ft.)	#
T@	V	**07 00 25 00**	Parallel Groove Clamp, PG*	#
@	W	**07 00 21 00**	Hot Line Clamp, HLC*W	3
9@	X	**12 00 10 ****	Grounding Unit	1

REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	10/08/15	DG	

DESIGN NOTE(s):

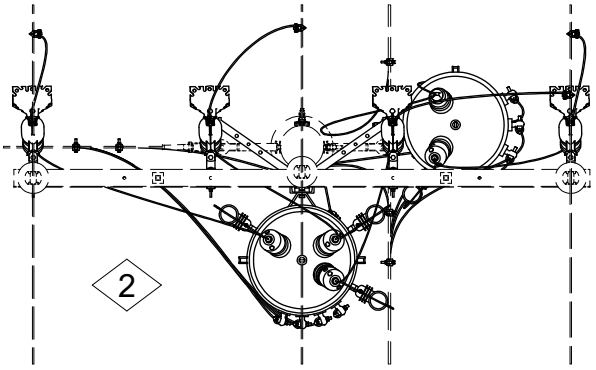
7. See DCS **02 00 02 00** for pole class.

8. See DCS **13 00 04 01** for dimensions and weights of transformers.

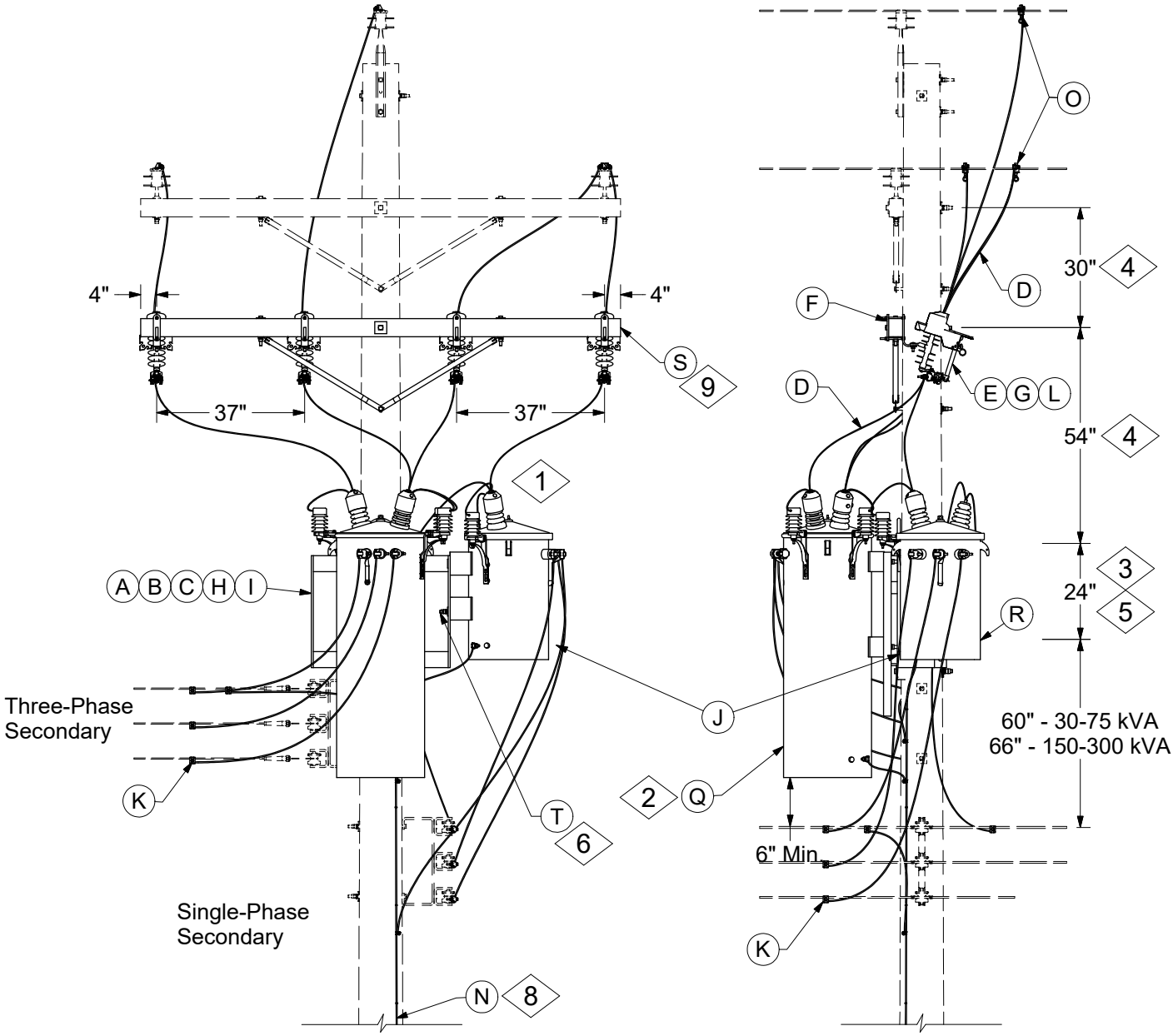
9. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

10. 8' arms may be used only in Missouri. Use 10' arms if underbuilt on subtransmission structure. Use FG arms if on composite pole or underbuilt on subtransmission structure.

11. Minimum ground clearance to bottom of platform:
    A: Places accessible to pedestrians only: 9 ft.
    B: Places accessible to vehicular traffic: 15 ft.



CAUTION:
All Primary Terminals of Three-Phase Transformer Are Hot After the First Phase Wire is Connected



REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	11/18/15	DG	

CONSTRUCTION NOTE(s):

1. Single phase transformer shall be connected to outside phase only.

2. Install three-phase transformer in center position of the cluster mount bracket.

3. Measure distance between mounting slots on cluster mount bracket and drill pole so that weight rests evenly on both bolts.

4. These dimensions may be reduced for existing installation to 24" and 48".

5. Three-phase transformers through 75 kVA have 24" spacing between mounting lugs and can be installed directly to the cluster mount bracket. 150 kVA and larger have 36" spacing between mounting lugs and require adapter for installing on the cluster mount bracket.

6. Mounting unit comes equipped with 3/4" bolts for mounting transformers to the cluster mounting unit. Single-phase transformers 50 kVA and smaller require 5/8".

7. For installation on a deadend structure, use vice-top insulators on the fused switch drop arm for training the primary jumpers.

	ITEM	STK / DCS #	DESCRIPTION 13 12 75 **	02
	A	23 17 202	Mounting Unit, 3 Pos. Heavy (Three 75kVA to 167kVA Trans.)	1
	B	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	2
T	C	23 66 031	Washer, Curved, Square, 3/4"	2
T	D	18 51 025	Wire, Trans. Riser, #4, S.D. Poly Covered (FT.)	35
	E	54 07 208	Switch, Fused, Open Type	4
	F	17 58 054	Bracket, Arrester/Cutout Mounting	4
	G	23 17 411	Wildlife Guard - Cover Cutout	4
	H	23 66 135	Lock Washer - 3/4" Double Coil	2
	I	23 65 042	Lock Nut - 3/4" Square	2
T@	J	**13 00 03 01**	Secondary Leads (ft.)	30
T@	K	**07 00 25 00**	Parallel Groove Clamp, PG*	9
@	L	**10 00 01 01**	Link, Fuse	4
7@	M	**06 12 01 01**	Insulator, Vice Top, 15kV, with Pin, Insulator, Long Shank	4
8@	N	**12 00 10 ** @**	Grounding Unit	1
@	O	**07 00 21 00**	Hot Line Clamp, HLC*W	4
5@	P	69 58 127	Adapter, Mounting Plate 36” to 24” Lug Spacing	1
@	Q	**13 00 01 02**	Transformer, 3-Phase Polemount	1
@	R	**13 00 01 02**	Transformer, 1-Phase Polemount	1
9@	S	**04 00 20 03**	Crossarm, Wood, 10' w/ 60" V Brace	1
		04 00 41 16	Crossarm, FG, 10'	1
6@	T	23 52 049	Bolt, Mach., 5/8" x 2" w/ square nut (50kVA and smaller Trans.)	2

DESIGN NOTE(s):

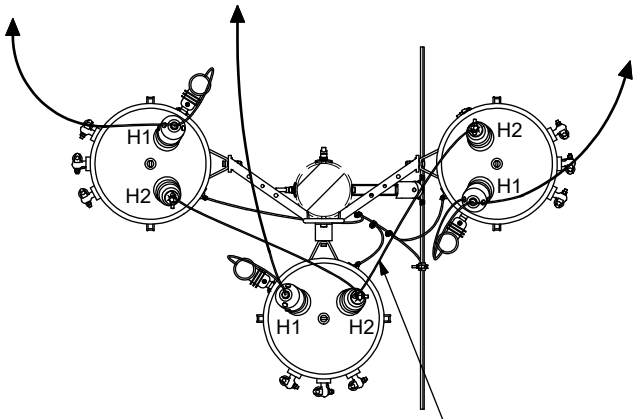
8. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

9. Use FG arms if on composite pole or underbuilt on subtransmission structure.

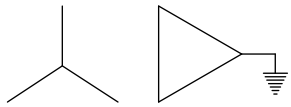
10. Maximum total weight limit is based on installation of transformers on a Class 1 pole.

11. This DCS is for providing single-phase 120/240 V and three-phase 240 V delta service.

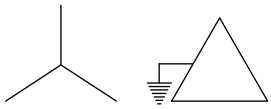
REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	11/18/15	DG	



SECTION A-A

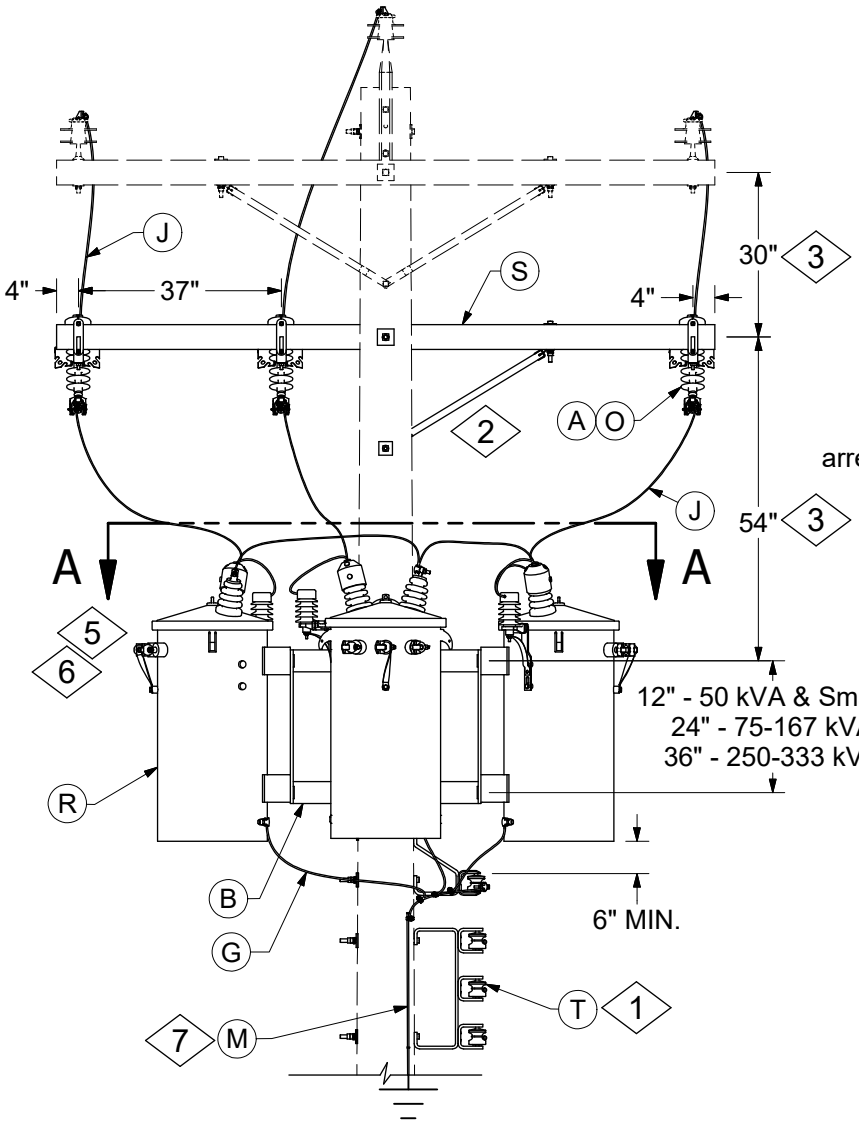


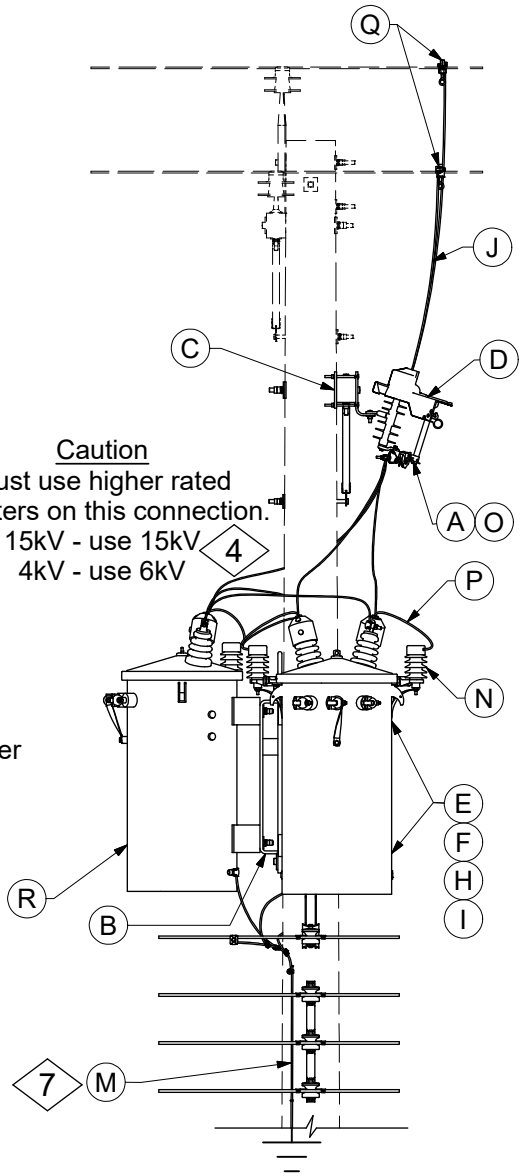
DCS **13 00 07 04**



DCS **13 00 07 10**

Ungrounded or Floating
High Voltage Neutral - Do Not
Connect to System Neutral
or Tank or Pole Ground





Caution
Must use higher rated
arresters on this connection.
15kV - use 15kV
4kV - use 6kV
4

REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	06/10/15	DG	

CONSTRUCTION NOTE(s):

1. See DCS **13 01 01 **** for secondary support and DCS **03 01 20 **** for secondary configurations. DCS **03 01 20 03** modified should be used unless conditions do not allow.

2. Use only one V brace. Keep the extra brace for future use.

3. These dimensions may be reduced to 24" and 48" for installation on existing pole.

4. For 7.2, 7.62, 7.97 kV, and multi-voltage transformers use 15 kV arrester Stock #10 01 188. For 2.4 kV transformers use 6 kV arrester Stock #10 01 184.

5. 2400/4160 Y transformers may have sidewall or cover mounted HV bushings. If sidewall mounted bushings:
   a. Build according to the DCS except use 2.5kV primary lead wire Table 2.2 of DCS **13 00 03 01**, or
   b. If pole is congested, 2.5kV primary lead wire in conduit similar to Limited Use Standard DCS **13 04 50 01**.

6. See DCS **13 00 07 04** and **13 00 07 10** for neutral ground strap and secondary wiring connections

DCS #	Description
13 12 80 02	50 kVA & Smaller
13 12 80 03	75 - 167 kVA
13 12 80 04	250 - 333 kVA

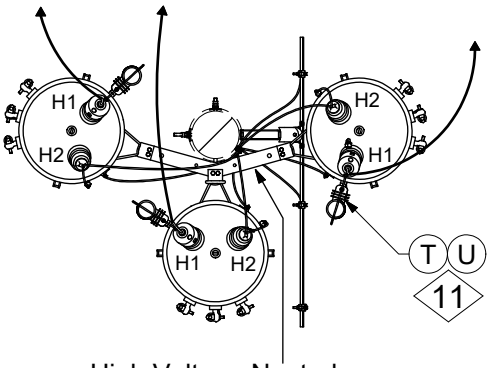
	ITEM	STK / DCS #	DESCRIPTION 13 12 80 **	02	03	04
8	A	54 07 208	Switch, Fused, Open Type	3	3	3
	B	23 17 209	Mounting Unit, 3 Pos. Heavy (Up to Three 50 kVA Trans.)	1	-	-
		23 17 202	Mounting Unit, 3 Pos. Heavy (Three 75 - 167 kVA Trans.)	-	1	-
		23 17 354	Mounting Unit, 3 Pos. Heavy (Three 250 - 333 kVA Trans.)	-	-	1
	C	17 58 054	Bracket, Arrester/Cutout Mounting	3	3	3
	D	23 17 411	Wildlife Guard - Cover Cutout	3	3	3
	E	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	2	2	-
5	F	23 66 031	Washer, Curved, Square, 3/4"	2	2	-
	G	18 51 025	Wire, #4 CU, S.D. Poly Covered (Ft.)	15	15	15
	H	23 66 135	Lock Washer - 3/4" Double Coil	2	2	-
	I	23 65 042	Lock Nut - 3/4" Square	2	2	-
T@	J	**13 00 03 01**	Primary Leads (Ft.)	40	40	40
T@	K	**13 00 03 01**	Secondary Leads (Ft.)	#	#	#
T@	L	**07 00 25 00**	Clamp, Parallel Groove, PG*	#	#	#
7@	M	**12 00 10 ** @**	Grounding Unit	1	1	1
4@	N	10 01 184	Arrester, 6kV	3	3	3
		10 01 188	Arrester, 15kV	3	3	3
@	O	**10 00 01 01**	Link, Fuse	3	3	3
@	P	18 51 021	Wire, #6 CU, S.D. Poly Covered (Ft.)	6	6	6
@	Q	**07 00 21 00**	Clamp, Hotline, HLC*W	3	3	3
@	R	**13 00 01 02**	Transformer	3	3	3
2@	S	**04 00 20 03**	Crossarm, Wood, 10' w/ 60" V Brace	1	1	1
		04 00 41 16	Crossarm, FG, 10'	1	1	1
1@	T	**03 01 20 03**	Single Plus Triple Extension Rack	1	1	1

DESIGN NOTE(s):

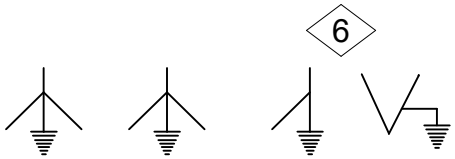
7. Use DCS **12 00 10 01** for ground coil application on new pole installation. Use DCS **12 00 10 02** for ground rod application on existing pole installation.

8. For transformer banks greater than 500 kVA on 4kV circuits, substitute 200A fused switches Stock #54 07 209.

REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	06/10/15	DG	

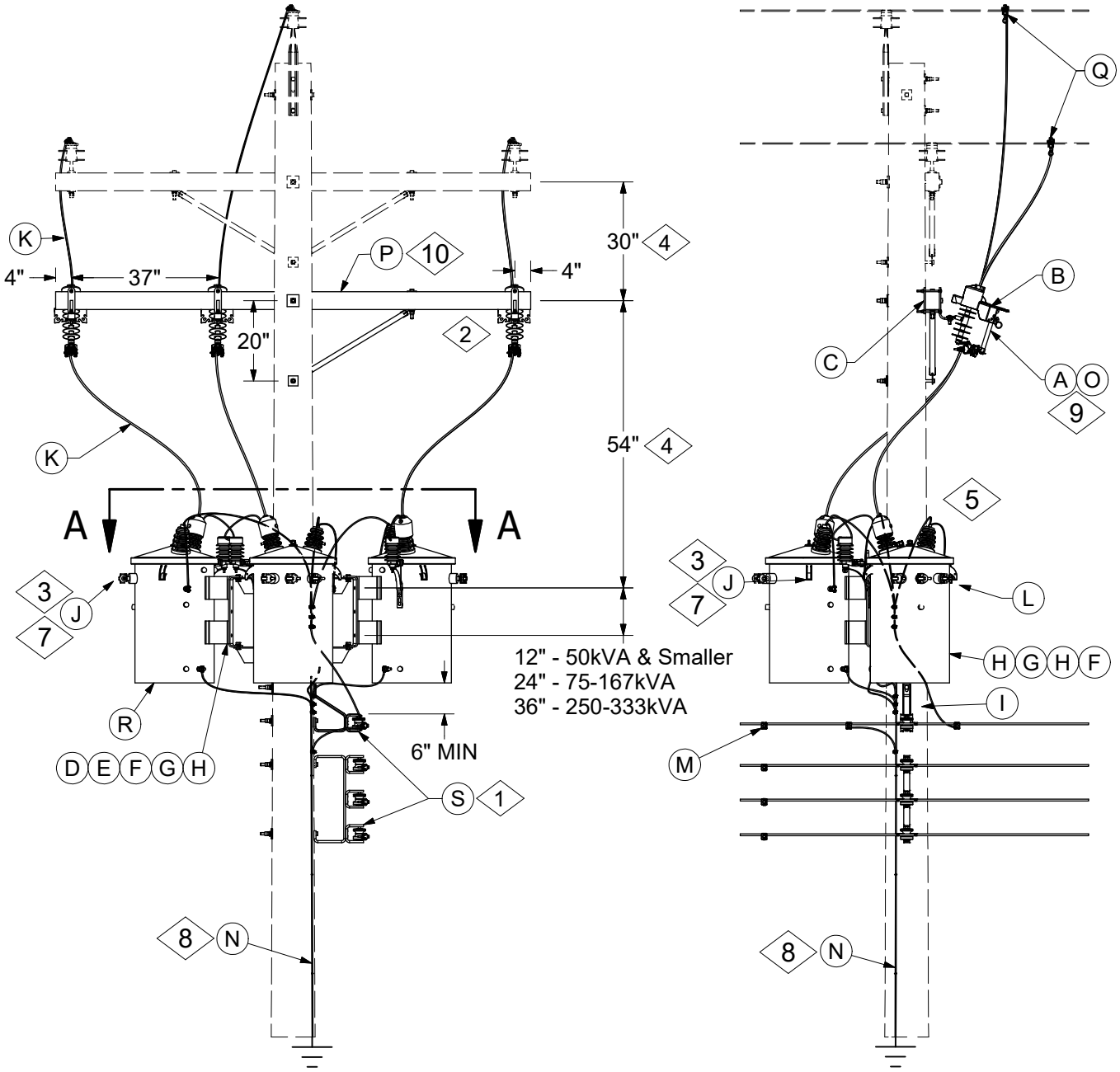


High Voltage Neutral
Connect to System Neutral
SECTION A-A



DCS **13 00 07 09**

DCS **13 00 07 13**



REV	DATE	ENG	DESCRIPTION
8	04/01/23	DG	Converted to new format
7	09/02/15	DG	

CONSTRUCTION NOTE(s):

1. See DCS **13 01 01 **** for secondary support and DCS **03 01 20 **** for secondary configurations. DCS **03 01 20 03** modified as per DCS **06 01 07 02** should be used unless conditions do not allow.

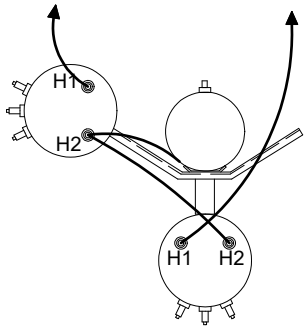
2. Use only one V Brace. Keep the extra brace for future use.

3. Use tag (Stock #16 01 301) to identify transformers that have been rewired internally for 120/208Y service. The tag should be attached to the secondary bushing that is no longer connected internally. See DCS **13 00 07 09**.

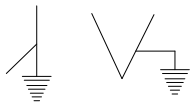
4. These dimensions may be reduced to 24" and 48" for installation on existing pole.

5. 2400/4160Y transformers may have side wall or cover mounted HV bushings. If side wall mounted bushings:
   a. Build according to this DCS except use 2.5 KV primary lead wire per Table 2.2 of DCS **13 00 03 01**, or
   b. If pole is congested, 2.5KV primary lead wire in conduit similar to Limited Use standard DCS **13 04 54 01**.

6. This DCS can also be used for open-wye primary to open-delta secondary installations.



Open-Wye Primary Connection



DCS **13 00 07 13**

7. See DCS **13 00 07 09** and **13 00 07 13** for neutral ground strap and secondary wiring connections.

DCS #	Transformer Size	Description
13 12 81 01	50 kVA & Smaller	Grd Open Y to Mid-Tap Grd Open Delta Secondary
13 12 81 02	50 kVA & Smaller	Grd Y Primary to Grd Y Secondary
13 12 81 03	75-167 kVA	Grd Y Primary to Grd Y Secondary
13 12 81 04	75-167 kVA	Grd Open Y to Mid-Tap Grd Open Delta Secondary
13 12 81 05	250-333 kVA	Grd Y Primary to Grd Y Secondary

	ITEM	STK / DCS #	DESCRIPTION 13 12 81 **	01	02	03	04	05
9	A	54 07 208	Switch, Fused	2	3	3	2	3
	B	23 17 411	Wildlife Guard - Cover Cutout	2	3	3	2	3
	C	17 58 054	Bracket, Arrester/Cutout Mounting	2	3	3	2	3
	D	23 17 209	Mounting Unit, 3 Pos. Light (Up to Three 50 KVA Trans.)	1	1	-	-	-
		23 17 202	Mounting Unit, 3 Pos. Heavy (Three 75kVA to 167kVA Trans.)	-	-	1	1	-
		23 17 354	Mounting Unit, 3 Pos. Xtra Hvy. (Three 250−333 kVA)	-	-	-	-	1
	E	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	2	2	2	2	-
	F	23 66 031	Washer, Curved, Square, 3/4"	2	2	2	2	-
	G	23 66 135	Lock Washer - 3/4" Double Coil	2	2	2	2	-
	H	23 65 042	Lock Nut - 3/4" Square	2	2	2	2	-
	I	18 51 025	Wire #4 CU, S.D. Poly Covered (Ft.)	10	15	15	10	15
3	J	16 01 301	Tag, Banked Transformer	-	3	3	-	3
5T@	K	**13 00 03 01**	Primary Leads (Ft.)	30	40	40	30	40
T@	L	**13 00 03 01**	Secondary Leads (Ft.)	24	36	36	24	36
T@	M	**07 00 25 00**	Parallel Groove Clamp, PG*	#	#	#	#	#
8@	N	**12 00 10 ** @**	Grounding Unit	1	1	1	1	1
@	O	**10 00 01 01**	Link, Fuse	2	3	3	2	3
2,10@	P	**04 00 20 03**	Crossarm, Wood, 10' w/ 60" V Brace	1	1	1	1	1
		04 00 41 16	Crossarm, FG, 10'	1	1	1	1	1
@	Q	**07 00 21 00**	Hot Line Clamp, HLC*W	2	3	3	2	3
@	R	**13 00 01 02**	Transformer	2	3	3	2	3
1@	S	**06 01 07 02 @**	Single Plus Triple Extension Rack	1	1	1	1	1
11@	T	10 01 143	Arrester, 18 kV	2	3	3	2	3
11@	U	23 06 122	Bracket, Arrester, Transformer Mounting, 10" to 12" Long	2	3	3	2	3

DESIGN NOTE(s):

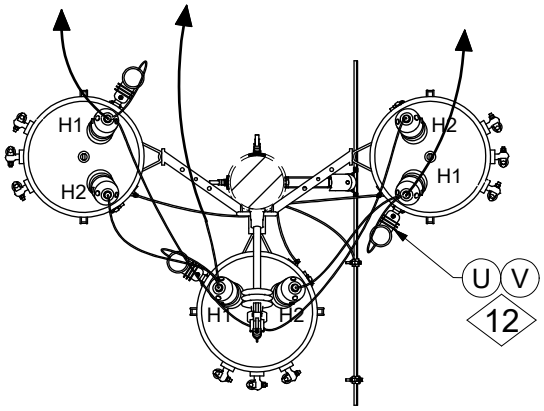
8. Use DCS **12 00 10 01** for ground coil application on new pole installation and DCS **12 00 10 02** for ground rod application on existing pole installation.

9. For transformer banks greater than 500 kVA on 4 kV circuits, substitute 200 A fused switches Stock #54 07 209.

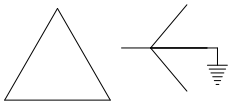
10. Use FG arms if on composite pole or underbuilt on subtransmission structure.

11. 14.4kV transformers must have arresters ordered separately and field installed. Use arrester Stock #10 01 143 with tank mounting bracket Stock #23 06 122.

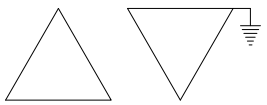
REV	DATE	ENG	DESCRIPTION
8	04/01/23	DG	Converted to new format
7	09/02/15	DG	



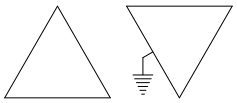
SECTION A-A



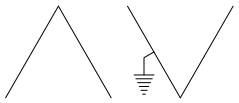
DCS **13 00 07 08**



DCS **13 00 07 05**

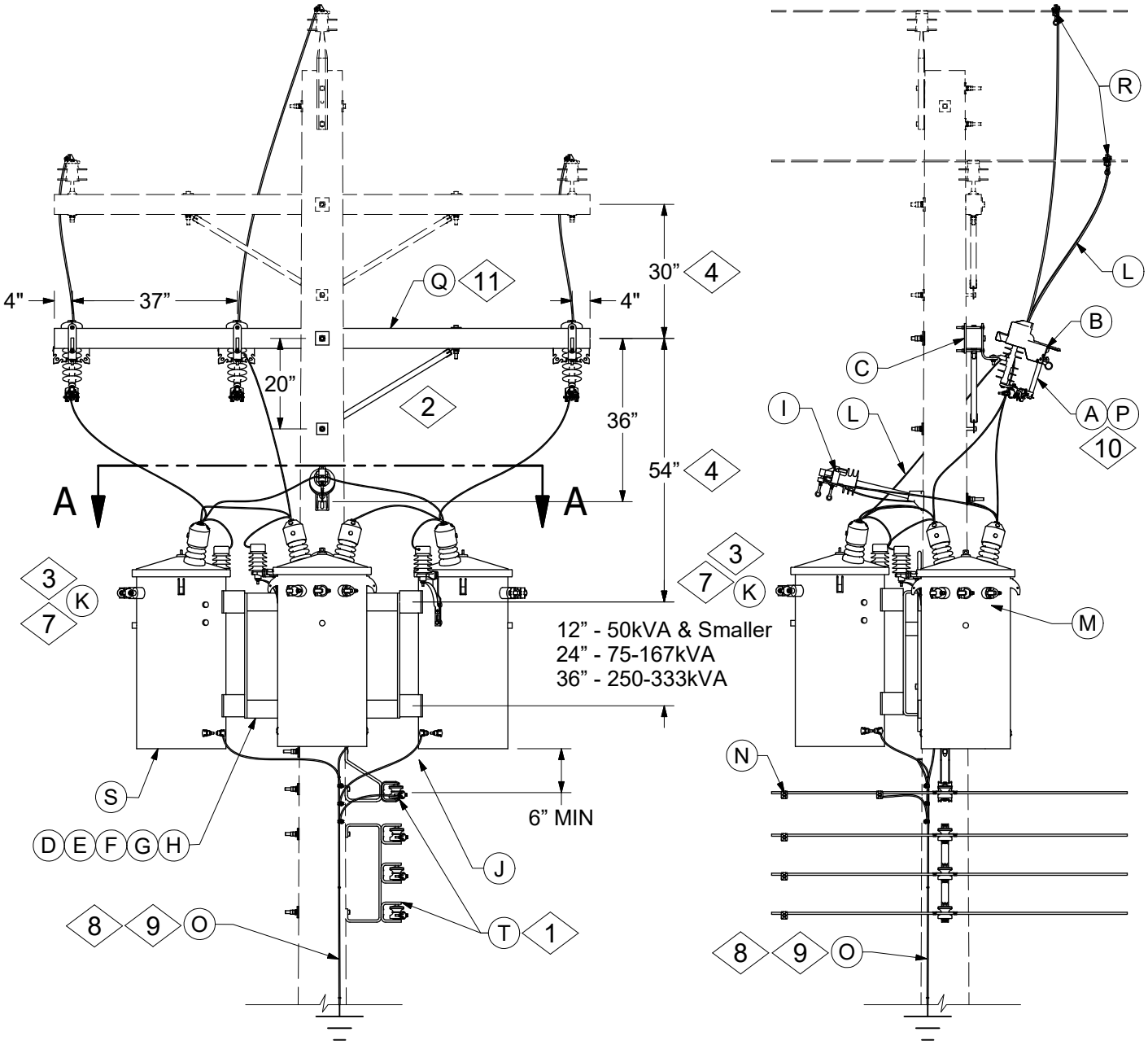


DCS **13 00 07 11**



DCS **13 00 07 12**

6



REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	12/04/15	DG	

CONSTRUCTION NOTE(s):

1. See DCS **13 01 01 **** for secondary support and DCS **03 01 20 **** for secondary configurations. DCS **03 01 20 03** modified as per DCS **06 01 07 02** should be used unless conditions do not allow.

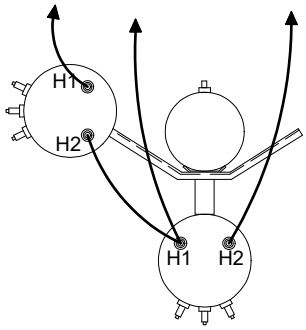
2. Use only one V brace. Keep the extra brace for future use.

3. Use tag, Stock #16 01 301, to identify transformers that have been rewired internally for 120/208Y service. The tag should be attached to the secondary bushing that is no longer connected internally. See DCS **13 00 07 08**.

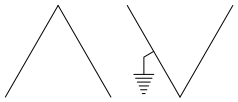
4. These dimensions may be reduced to 24” and 48” for installation on an existing pole.

5. 2400/4160Y transformers may have side wall or cover mounted HV bushings. If side wall mounted bushings:
   a. Build according to this DCS except use 2.5 kV primary lead wire per Table 2.2 of DCS **13 00 03 01**, or
   b. If pole is congested, 2.5 kV primary lead wire in conduit similar to Limited Use standard DCS **13 04 54 01**.

6. This DCS can also be used for open-delta primary to open-delta secondary installations.



Open-Delta Primary Connection



DCS **13 00 07 12**

7. See DCS **13 00 07 05**, **13 00 07 08**, **13 00 07 11**, and **13 00 07 12** for neutral ground strap and secondary wiring connections.

8. Arrester ground and secondary ground may be required to be separate. See DCS **13 00 06 06** for details on this requirement.

DCS #	Transformer Size	Description
13 12 82 01	50 kVA & Smaller	Open Delta to Mid-Tap Grd Open Delta Secondary
13 12 82 02	50 kVA & Smaller	Delta Primary to Grd Y or Delta Secondary
13 12 82 03	75-167 kVA	Delta Primary to Grd Y or Delta Secondary
13 12 82 04	75-167 kVA	Open Delta to Mid-Tap Grd Open Delta Secondary
13 12 82 05	250-333 kVA	Delta Primary to Grd Y or Delta Secondary

	ITEM	STK / DCS #	DESCRIPTION 13 12 82 **	01	02	03	04	05
10	A	54 07 208	Switch, Fused	3	3	3	3	3
	B	23 17 411	Wildlife Guard - Cover Cutout	3	3	3	3	3
	C	17 58 054	Bracket, Arrester/Cutout Mounting	3	3	3	3	3
	D	23 17 209	Mounting Unit, 3 Pos. Light (Up to Three 50 KVA Trans.)	1	1	-	-	-
		23 17 202	Mounting Unit, 3 Pos. Heavy (Three 75kVA to 167kVA Trans.)	-	-	1	1	-
		23 17 354	Mounting Unit, 3 Pos. Xtra Hvy. (Three 250−333 kVA)	-	-	-	-	1
	E	23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut	2	2	2	2	-
	F	23 66 031	Washer, Curved, Square, 3/4"	2	2	2	2	-
	G	23 66 135	Lock Washer - 3/4" Double Coil	2	2	2	2	-
	H	23 65 042	Lock Nut - 3/4" Square	2	2	2	2	-
	I	**06 12 20 04**	Insulator, Standoff 18” LD	1	1	1	1	1
	J	18 51 025	Wire #4 CU, S.D. Poly Covered (Ft.)	10	15	15	10	15
3@	K	16 01 301	Tag, Banked Transformer	-	3	3	-	3
5@	L	**13 00 03 01**	Primary Leads (Ft.)	30	40	40	30	40
T@	M	**13 00 03 01**	Secondary Leads (Ft.)	24	36	36	24	36
T@	N	**07 00 25 00**	Parallel Groove Clamp, PG*	#	#	#	#	#
9@	O	**12 00 10 ** @**	Grounding Unit	1	1	1	1	1
@	P	**10 00 01 01**	Link, Fuse	3	3	3	3	3
2,11@	Q	**04 00 20 03**	Crossarm, Wood, 10' w/ 60" V Brace	1	1	1	1	1
		04 00 41 16	Crossarm, FG, 10'	1	1	1	1	1
@	R	**07 00 21 00**	Hot Line Clamp, HLC*W	3	3	3	3	3
@	S	**06 12 20 04**	Transformer	2	3	3	2	3
1@	T	**06 01 07 02 @**	Single Plus Triple Extension Rack	1	1	1	1	1
12@	U	10 01 143	Arrester, 18 kV	3	3	3	3	3
12@	V	23 06 122	Bracket, Arrester, Transformer Mounting, 10" to 12" Long	3	3	3	3	3

DESIGN NOTE(s):

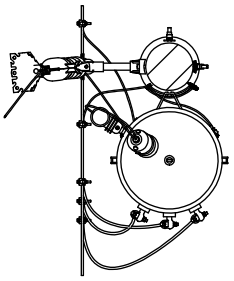
9. Use DCS **12 00 10 01** for ground coil application on new pole installation and DCS **12 00 10 02** for ground rod application on existing pole installation.

10. For transformer banks greater than 500 kVA on 4 kV circuits, substitute 200 A fused switches stock #54 07 209.

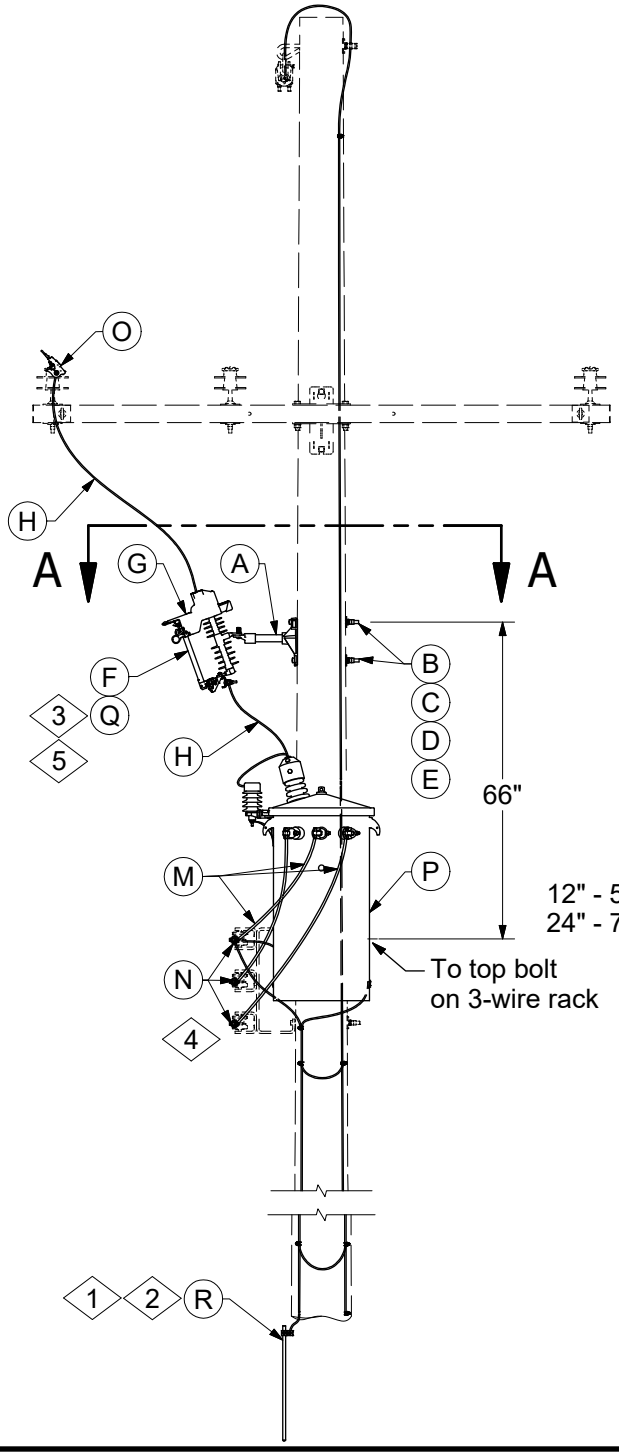
11. Use FG arms if on composite pole or underbuilt on subtransmission structure.

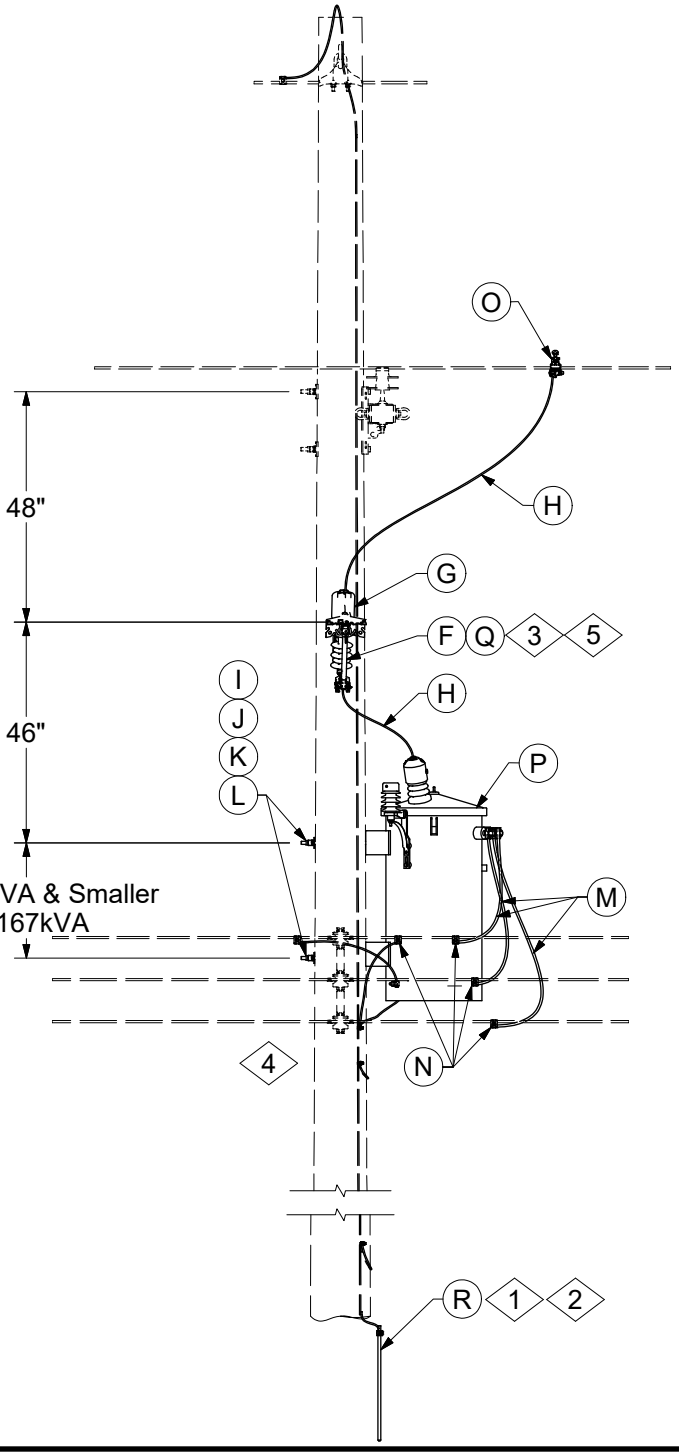
12. 14.4kV transformers must have arresters ordered separately and field installed. Use arrester Stock #10 01 143 with tank mounting bracket Stock #23 06 122.

REV	DATE	ENG	DESCRIPTION
9	04/01/23	DG	Converted to new format
8	12/04/15	DG	



SECTION A-A





REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	8/22/11	DG	

CONSTRUCTION NOTE(s):

1. On existing structure, the static wire ground may not be adequate to use as a transformer ground. Therefore, a separate ground (DCS **12 00 10 02**) shall be installed for the transformer and it shall be bonded to the static ground.

2. On new structure, use grounding unit DCS **12 00 10 09** as both the static and transformer ground.

3. If fuse refill is required, contact Distribution Standards for proper size to use.

4. See DCS **13 01 01 ****** for secondary support and DCS **03 01 20 ****** for secondary configurations.

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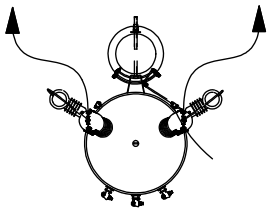
DCS #	Description
13 34 01 01	With 27kV 100 A Fused Switch
13 34 01 02	With 34kV SMD-20 Fused Switch

	ITEM	STK / DCS #	DESCRIPTION 12 34 01 **	01	02
	A	23 06 127	Bracket - Standoff, 12" FG	1	1
	B	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut	2	2
	C	23 66 027	Washer, Flat, Square 5/8"	2	2
	D	23 66 134	Lock Washer - 5/8" Double Coil	2	2
	E	23 65 043	Lock Nut - 5/8" Square	2	2
5	F	54 07 234	Switch, Fused, 100A 27kV	1	-
		54 06 052	Switch, Fused, SMD−20, 34kV	-	1
5	G	23 17 411	Wildlife Guard - Cover, Cutout	1	-
		23 17 532	Wildlife Guard - Cover, SMD-20	-	1
T	H	18 51 025	Primary Leads (ft.)	15	15
T@	I	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut (50kVA & Smaller)	2	2
		23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut (75 thru 167kVA)	2	2
T@	J	23 66 027	Washer, Square 5/8" (50kVA & Smaller)	2	2
		23 66 031	Washer, Curved 3/4" (75 thru 167kVA)	2	2
@	K	23 66 134	Washer - Lock, 5/8" Double Coil (50kVA & Smaller)	2	2
		23 66 135	Washer - Lock, 3/4" Double Coil (75 thru 167kVA)	2	2
@	L	23 65 042	Lock Nut, 5/8" Square (50kVA & Smaller)	2	2
		23 65 043	Lock Nut, 3/4" Square (75 thru 167kVA)	2	2
T@	M	**13 00 03 01**	Secondary Leads (ft.)	12	12
T@	N	**07 00 25 00**	Parallel Groove Clamp, PG*W	#	#
@	O	**07 00 21 00**	Hot Line Clamp, HLC*W	1	1
@	P	**13 00 01 02**	Transformer, VAXXXXF, 34500 GRD Y /19920	1	1
3,5@	Q	**10 00 01 01**	Link, Fuse	1	-
		-	Refill, Fuse	-	1
1,2@	R	**12 00 10 ******	Grounding Unit	1	1

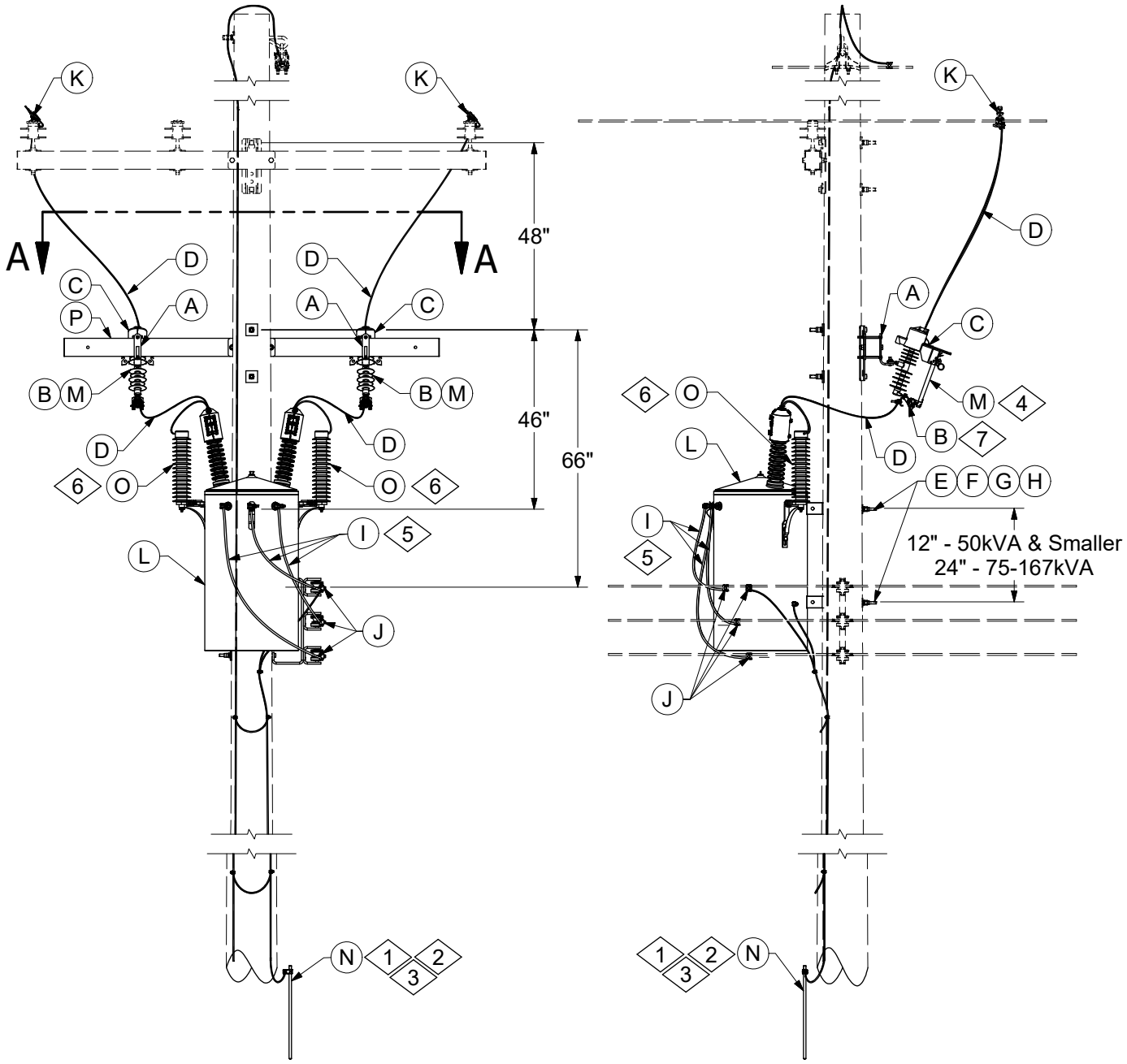
DESIGN NOTE(s):

5. If available fault current is less than 12 kA asymmetrical use DCS **13 34 01 01**. If available fault current is equal to or greater than 12 kA asymmetrical but less than 16 kA asymmetrical use DCS **13 34 01 02**. If asymmetrical fault current is greater than 16 kA, contact Distribution Standards.

REV	DATE	ENG	DESCRIPTION
10	04/01/23	DG	Converted to new format
9	8/22/11	DG	



SECTION A-A



REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	08/22/11	DG	

CONSTRUCTION NOTE(s):

1. On an existing structure, the static wire ground may not be adequate to use as a transformer ground. Therefore, a separate ground (DCS **12 00 10 02**) shall be installed for the transformer and it shall be bonded to the static ground.

2. On new structures, use grounding unit DCS **12 00 10 09** as both the static and transformer ground.

3. If no static or common/primary neutral is present refer to DCS **13 00 06 06** for installation of grounds.

4. If fuse refill is required, for QK0010G transformer use 1A fuse refill (Stock #20 04 361). For QAXXXXF transformer, contact Distribution Standards for proper size to use.

5. See DCS **13 01 01 ****** for secondary support and DCS **03 01 20 ****** for secondary configurations.

6. QAXXXXF transformer are purchased with arresters pre−installed. Arresters must be field installed on QK0010G transformer.

DCS #	Description
13 34 02 01	With 27kV 100 A Fused Switch
13 34 02 02	With 34kV SMD-20 Fused Switch

	ITEM	STK / DCS #	DESCRIPTION 13 34 02 **	01	02
	A	17 58 054	Bracket, Arrester/Cutout Mounting	2	2
7	B	54 07 234	Switch Fused 100A 27kV	2	-
		54 06 052	Switch, Fused, SMD−20, 34kV	-	2
7	C	23 17 411	Wildlife Guard - Cover, Cutout	2	-
		23 17 532	Wildlife Guard - Cover, SMD-20	-	2
T	D	18 51 025	Primary Leads (ft.)	30	30
T@	E	23 52 068	Bolt, Mach., 5/8" x 16" w/ square nut (50kVA & Smaller)	2	2
		23 52 254	Bolt, Mach., 3/4" x 16" w/ square nut (75kVA thru 167kVA)	2	2
T@	F	23 66 027	Washer, Flat, Square 5/8" (50kVA & Smaller)	2	2
		23 66 031	Washer, Curved, Square, 3/4" (75kVA thru 167kVA)	2	2
@	G	23 66 134	Lock Washer - 5/8" Double Coil (50kVA & Smaller)	2	2
		23 66 135	Lock Washer - 3/4" Double Coil (75kVA thru 167kVA)	2	2
@	H	23 65 043	Lock Nut - 5/8" Square (50kVA & Smaller)	2	2
		23 65 042	Lock Nut - 3/4" Square (75kVA thru 167kVA)	2	2
T@	I	**13 00 03 01**	Secondary Leads (ft.)	12	12
T@	J	**07 00 25 00**	Parallel Groove Clamp, PG*W	#	#
@	K	**07 00 21 00**	Hot Line Clamp, HLC*W	2	2
@	L	**13 00 01 02**	Transformer, QK0010G or QAXXXXF, 34500 Delta	1	1
4@	M	**10 00 01 01**	Link, Fuse	2	-
		-	Refill, Fuse	-	2
1,2,3@	N	**12 00 10 ******	Grounding Unit	1	1
6@	O	10 01 235	Arrester 36kV, w/ Transformer Mtg Brkt	2	2
@	P	**04 00 41 14**	Crossarm - Tangent, F/G 8'	1	1
		04 00 41 16	Crossarm - Tangent, F/G 10'	1	1

DESIGN NOTE(s):

7. If available fault current is less than 12 kA asymmetrical use switch and fuse link shown. If available fault current is equal to or greater than 12 kA asymmetrical but less than 16 kA asymmetrical use SMD-20 (Stock #54 06 052). If asymmetrical fault current is greater than 16 kA contact Distribution Standards.

REV	DATE	ENG	DESCRIPTION
4	04/01/23	DG	Converted to new format
3	08/22/11	DG	