

Overhead Distribution Line Specifications

**Jim Bohlk and Stephen Jones, Electrical Engineers,
Distribution Branch, RUS**

New Features in RUS Bulletin 1728F-803 (25 kV Construction Standards)

The 1963 version of Rural Utilities Service (RUS) Bulletin 50-5, "Specifications and Drawings for 14.4/24.9 kV Line Construction" was updated and revised so that the newest requirements of the National Electrical Safety Code (NESC) would be applied to RUS standard construction as required by RUS regulations. Also, some material and older assemblies, no longer accepted as RUS standards, needed to be replaced by newer materials and assemblies.

New Bulletin 1728F-803 (same title as *old* Bulletin 50-5) contains a total of 222 assembly and guide drawings. 89 of the drawings are of new assemblies or construction guides; 133 are drawings of old assemblies of which 52 have been modified.

Bulletin 1728F-803 incorporates the following new "general" construction standards:

- ◆ The use of post type insulators;
- ◆ Square washers placed under the shoulder of 15 kV crossarm pins;
- ◆ The use of anti-split bolts whenever double pole-top pins are installed; and,
- ◆ The use of neutral assemblies, matched in strength to their corresponding primary assemblies, for holding transverse conductor loads.

Each of the above factors allows greater line angles than previous, similar assemblies.

The new standard use of 3 inch, square, curved washers for all downguys, primary and neutral deadends attached to the pole allows greater longitudinal loads than the previous construction assemblies. Also, Bulletin 1728F-803 permits the use of stirrups under certain conditions without additional RUS approval.

Included on the assembly drawings, when applicable, are new "design parameters" which define or limit the allowable loading or line angles. Several new tables are included in the new bulletin which define the maximum line angles for pole-top assemblies given the NESC loading district, wind span, conductor size and transverse loads. These tables help assure the proper application of pole-top assemblies and will eliminate future, redundant engineering calculations.

New numbers were assigned to each assembly, and the new bulletin was reformatted so that assemblies are arranged in more logical order and easier to find. Pole-top assemblies for all possible line angles are so numbered and arranged order of increasing angles in the new bulletin.

Immediately after finalizing the new bulletin in December, 1998, some borrowers informed RUS of difficulties in changing to the new assembly numbers in their computer software. In order to assist borrowers in their changeovers, RUS delayed the effective date of Bulletin 1728F-803 until July 1, 2001. RUS also prepared a conversion table which matches the new assembly numbers with the old numbers (where applicable) and also list the material changes, if any, of the old assemblies whose use has been continued. Central Area Data Processing Cooperative and Daffron & Associates, Inc., suppliers of computer software to approximately 375 RUS borrowers have both told RUS that they estimate that it will take approximately 25 man-hours for each cooperative to make the assembly number changes in the software purchased from them.

As 1728F-803 was being revised, RUS identified certain problems with the numbers assigned to existing and new construction assembly units. First, 17 new assemblies were added and 39 new guide drawings were developed which needed new numbers. Secondly, 52 of the old assemblies were modified and therefore needed new numbers. Lastly, the 97 "M" (miscellaneous) assemblies and guide drawings were hard to find in the old Bulletin 50-5. RUS realized advantages to standardizing the format based on the original REA numbering scheme. In the revised new bulletin 803 many of the "M" drawings were removed, and others were placed in categories that were more specific which makes them easier to find.

RUS developed and documented the new assembly number system in new guide bulletin 1728F-800, "Assembly Unit Numbers and Standard Format." This bulletin explains the RUS system of defining and numbering standard construction assembly units. The bulletin explains in detail the format and meanings of assembly numbers. For your convenience, Bulletin 1728F-800 can be downloaded from the internet at www.usda.gov/rus/electric/bulletins.htm .

The 1728F-800 includes the standard assembly format which is $PL_1N_1N_2S_1S_2$.

Where,

"P" denotes voltage or type of use,

"L₁" denotes the assembly category,

"N₁" denotes the subcategory,

"N₂" denotes the assembly identification number,

"S₁ and S₂" denote variations from the same assembly number without the suffix.

The effect of the new numbering system on new bulletin 803 is that it is now easier to find assemblies. This is accomplished by the elimination of the "M" numbers, creating 19 sections which are grouped by category (type of unit), and covering line angles in ascending order.

As with the bulletin 803, RUS plans to format the 12.47/7.2 kV Drawings and Specifications, Bulletin 1728F-804, similarly and with the same numbering system. Many of the assemblies, such as all of the “E” (guy) drawings, will be the same in Bulletin 804 as presently in Bulletin 803.

BIOGRAPHICAL SKETCH

JIM BOHLK

Jim grew up in northwestern lower Michigan. He was graduated from Michigan State University in 1969 with a BSEE degree.

After college, Jim worked for 10 years at Ohio Edison Company in Akron. For the first 3 years he engineered distribution lines and facilities. Next he worked as an Industrial Sales Engineer. His last 4 years he performed short-ranged and long-ranged plans in the Planning Division.

Jim then accepted the position of System Engineer at Cherryland Electric Cooperative in Michigan. For 7 years he supervised the Engineering Department and performed all of the system's planning and special studies. He was then promoted to Operations Manager where he supervised both the Engineering and Line Departments.

Since coming to work at RUS in the Distribution Branch of the Electric Staff Division in 1990, Jim had updated the Construction Work Plan bulletin, the Long-Range System Planning bulletin, and the Specifications and Drawings for 24.9/14.4 kV overhead construction. He has made several presentations, including workshops, on various topics regarding distribution line design and planning. He serves on various NESC, NRECA, and ANSI/IEEE committees.

STEPHEN JONES

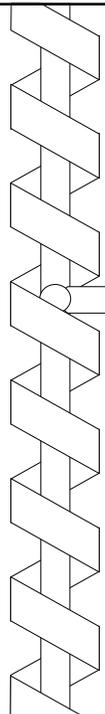
Born and raised in Richmond, Virginia

Graduated from North Carolina State University as a BSEE in 1993

Engineer for HC Yu Consulting Engineers located in Richmond, VA, 1994

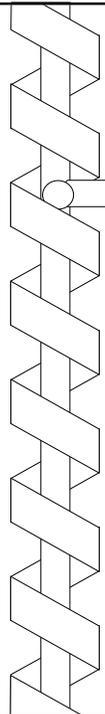
Engineer for the City of Manassas (Virginia), Municipal Electric Department, 1995

Engineer, Distribution Branch, ESD, RUS, 1997



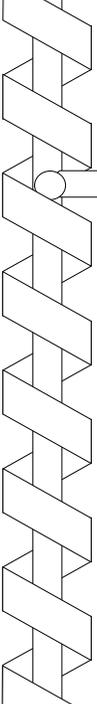
New Features in RUS Bulletin 1728F-803

Jim Bohlk
Electric Staff Division



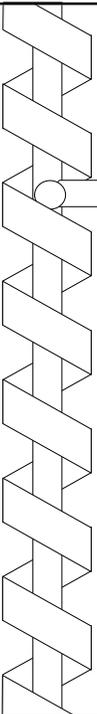
***Old* Bulletin 50-5 Was Updated Because ...**

- ➔ **Last Updated in 1963**
- ➔ **Changes in NESC**
- ➔ **Needed Neater (AutoCAD)
Drawings**
- ➔ **Eliminate Non-Standard
Assemblies and Materials**
- ➔ **Add New Assemblies**



Larger Allowable Line Angles Now Possible Because of ...

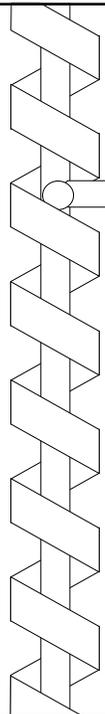
- ➔ **Use of Post Type Insulators**
- ➔ **Washer Under Shoulder of
Crossarm Pins**
- ➔ **Use of Anti-Split Bolts**
- ➔ **Neutral Assembly Properly
Matched to Pole-Top Assembly**



More Improvements

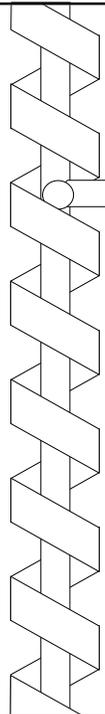
“Design Parameters” on Drawings and Maximum Line Angles Tables Result in:

- ➔ **Proper Application of Assemblies**
- ➔ **Fewer Required Engineering
Calculations**



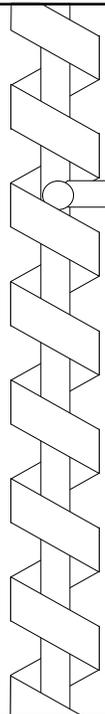
Additional Features

- ➔ **More Modern Now With 4 - ¼ Inch Deadend Insulators Assemblies**
- ➔ **3 Inch Square Curved Washers at All Deadends for More Strength and**
- ➔ **Stirrups Allowed Without RUS Permission !**



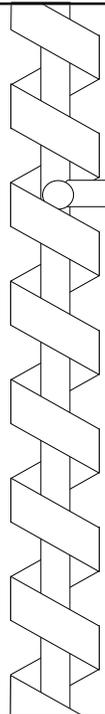
To Help Implement, We ...

- ➔ **Delayed Effective Date Until 7/1/2001**
- ➔ **Wrote Guide Bulletin 1728F-800**
- ➔ **Prepared New Retirement Unit Tables**
- ➔ **Prepared Listing of Material Changes
(in 1999 Items of Engineering Interest)**



Assembly Numbers Were Changed Because ...

- ➔ **17 New Assemblies + 39 New Guide Drawings Needed New Numbers**
- ➔ **52 Old Assemblies Modified - Needed New Numbers**
- ➔ **97 Old “M’ (miscellaneous) Assemblies and Guide Drawings Were Hard to Find**



Guide Bulletin 1728F-800

- ➔ **“Assembly Unit Number and Standard Format”**
- ➔ **Explains Format & Meanings of Assembly Numbers**
- ➔ **www.usda.gov/rus/electric/bulletins.htm**

Standard Assembly Format

$PL_1N_1.N_2S_1S_2$

P = Voltage or Type of Use

L_1 = Assembly Category

N_1 = Subcategory

N_2 = Assembly Identification No.

S_1 = Variation of Similar Assembly

S_2 = “ “ “ “

Example of Standard Format

$PL_1N_1.N_2S_1S_2 = VC4.1LG$

P (Voltage): V = 24.9/14.4 kV

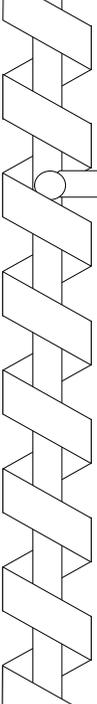
L_1 (Category): C=3-Phase Primary

N_1 (Subcategory): 4 = Large Angle

N_2 (Assembly No.): 1 = First Drawing

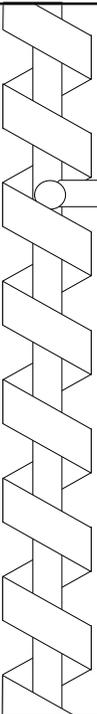
S_1 (Variation): L = Large Wires

S_2 (Variation): G = Guide Drawing



Now Easier to Find Assemblies Because ...

- ➔ **Elimination of the “M” numbers**
- ➔ **19 Sections by Category
(type of unit)**
- ➔ **All Line Angles are Covered
and in Ascending Order**



New Bulletin 1728F-804 12.47/7.2 kV Drawings and Specifications

- ➔ **Same Format and Assembly
Numbering as 1728F-803**
- ➔ **Possible Additions**
 - ➔ **Raptor Protection Drawings**
 - ➔ **Narrow Profile Assemblies**
 - ➔ **Steel Pole Assemblies**
 - ➔ **Extra Large Conductors**