MODIFICATION OF RINGING POWER PLANTS TO AVOID INTERFERENCE WITH 1000-CYCLE SIGNALING SYSTEMS EQUIPMENT DESIGN REQUIREMENTS POWER SYSTEMS

1. GENERAL

Scope

1.01 This specification, together with supplementary information listed herein, covers the general information for the modification of existing ringing power plants to avoid interference with 1000 cycle signaling systems caused by audible ringing tone.

Description

1.02 1000 cycle ringers are arranged to operate on pulses of 1000 cycle current interrupted at the rate of 20 cycles per second. Since audible ringing tone in local offices consists of harmonics of the 20 cycle generator output, interference with 1000 cycle ringers may sometimes occur if the wave shape and magnitude of this tone approximates the interrupted 1000 cycle current. This results in false operations of the 1000 cycle ringer which normally occur at the originating or intermediate toll office and occur when the called subscriber is being rung. Under this condition the audible ringing signal is returned from the local office thru the terminating toll office over the toll line where it is amplified by the repeaters. In the terminating toll office no interference has been reported for the reason that the directional selection equipment in the cut-off relay circuit in this office is poled in such a way as to produce considerable loss. In the originating toll office, however, or in an intermediate switching point if involved, the directional selection equipment is in the favorable direction to pass the high frequency components and false operation of the 1000 cycle ringer may occur if they lie close to 1000 cycles and are of sufficient magnitude. At the originating toll office, if equipped with 1000-20 cycle ringers, this would cause 20 cycle ringing current to be sent into the operator's telephone if her talking key is operated. If her talking key is not operated the false operation of the 1000 cycle ringer would bring in a lamp which is a recall or disconnect signal. If an intermediate operator is involved, the false operation would bring in a lamp which might cause her to disconnect without challenging. If she does challenge, it may be during a silent interval between rings in which case she may hear no conversation or not be answered immediately and would disconnect assuming the call had been finished.

1.03 In order to overcome this interference it has been found necessary in some cases to make minor modifications in the power ringing equipment at the local offices which are connected to the terminating toll office so as to suppress the higher harmonics in the audible ringing tone. In practically every case these modifications involve some reduction in the volume of the audible ringing signal which may affect adversely local traffic and therefore where practicable the changes have been given in steps so that if applied in the order given and a check made of the interference to ascertain whether further steps are necessary, the reduction in the audible ringing tone will be kept to a minimum. This procedure is also advisable in view of the wide variation in frequency characteristics of different ringing machines as well as other variables involving 1000 cycle ringer adjustment and loop conditions, all of which affect the severity of the interference.

2. SUPPLEMENTARY INFORMATION

802-000-000 - Power Systems Index
AA128.006 - List of General Equipment Requirement Sections
Power Data Book

3. DRAWINGS

Modification Information

SD-80784-01 - Ringing Circuit Modification of Existing Ringing Circuits to Avoid Interference with 1000 Cycle Signaling Systems

Power Ringing Circuits Affected

ES-291060 - Ringing Circuit - A-C/D-C Ringing - No. 11 Manual Offices - (P Type Ringing Machine)
ES-291095 - Ringing Circuit - A-C/D-C Ringing - Panel Offices - (P Type Ringing Machines)
H-58389)
H-61330) Ringing Converter Ckt. - 35E97
H-61347) Offices
H-61370)
SD-80045-01 - Ringing Circuit - A-C/D-C Machine Ringing - No. 11 Manual Offices - (KS-5133 Ringing Machines)
SD-80047-01 - Ringing Circuit - Superimposed Machine Ringing - No. 11 Manual Offices - (KS-5133 Ringing Machines)
SD-80077-01 - Ringing Circuit - Superimposed Machine Ringing - Panel Offices - (P Type Ringing Machines)
SD-80078-01 - Ringing Circuit - Superimposed Machine Ringing - No. 11 Manual Offices - (P Type Machines)
SD-80228-01 - Ringing Circuit - Superimposed Machine Ringing - Manual Offices - (KS-5133 Ringing Machine)

SD-80229-01 - Ringing Circuit - Superimposed Machine Ringing - No. 11 Manual Offices - (P Type Ringing Machines)
SD-80230-01 - Ringing Circuit - A-C/D-C Machine Ringing - No. 11 Manual Offices - (KS-5133 Ringing Machines)
SD-80231-01 - Ringing Circuit - A-C/D-C Machine Ringing - No. 11 Manual Offices - (P Type Ringing Machines)
SD-80243-01 - Ringing Circuit - A-C/D-C Machine Ringing - Step-by-Step Offices - (P Type Ringing Machine)
SD-80244-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (P Type Ringing Machine)
SD-80246-01 - Ringing Circuit - A-C/D-C Machine Ringing - 2 Party Selective - Panel Offices - (P Type Ringing Machines)
SD-80247-01 - Ringing Circuit - Superimposed Machine Ringing - Panel Offices - (P Type Ringing Machines)
SD-80248-01 - Ringing Circuit - A-C/D-C Machine Ringing - Step-by-Step Offices - (P Type Ringing Machines)
SD-80249-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (P Type Ringing Machines)
SD-80250-01 - Ringing Circuit - A-C/D-C Machine Ringing - 4 Party Semi-Selective - Panel Offices - (P Type Ringing Machine)
SD-80300-01 - Ringing Circuit - A-C/D-C Machine Ringing - Manual Offices - (P Type Ringing Machine)
SD-80301-01 - Ringing Circuit - Superimposed Machine Ringing - Manual Offices - (P Type Ringing Machines)
SD-80302-01 - Ringing Circuit - A-C/D-C Machine Ringing - Step-by-Step Offices - (P Type Ringing Machines)
SD-80303-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (P Type Ringing Machines)
SD-80308-01 - Ringing Circuit - A-C/D-C Machine Ringing - Step-by-Step Offices - (KS-5133 Ringing Machines)
SD-80309-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (KS-5133 Ringing Machines)
SD-80361-01 - Ringing Circuit - A-C/D-C Machine Ringing No. 11 Manual Offices - (KS-5133 Ringing Machines)
SD-80362-01 - Ringing Circuit - Superimposed Machine Ringing - No. 11 Manual Offices - (KS-5133 Ringing Machines)
SD-80365-02 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (KS-5396 Generators)
SD-80366-01 - Ringing Circuit - A-C/D-C Machine Ringing - Manual Offices (KS-5396 Generators)
SD-80367-02 - Ringing Circuit - A-C/D-C Machine Ringing - Step-by-Step Offices - (KS-5396 Generators)
SD-80368-01 - Ringing Circuit - Superimposed Machine Ringing - Manual Offices - (KS-5396 Generator)
SD-80420-01 - Ringing Circuit - A-C/D-C Machine Ringing - Two Party Selective - Panel Offices - (KS-5396 Generators)
SD-80421-01 - Ringing Circuit - A-C/D-C Machine Ringing - 4 Party Semi-Selective - Panel Offices - (KS-5396 Generators)
SD-80422-01 - Ringing Circuit - Superimposed Machine Ringing - Panel Offices - (KS-5396 Generators)
SD-80514-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (KS-5133-01 Ringing Machines)
SD-80515-01 -02 - Ringing Circuit - A-C/D-C Machine Ringing - No. 11 Manual Offices - (KS-5133-01 Ringing Machines)
SD-80516-01 - Ringing Circuit - Superimposed Machine Ringing - Step-by-Step Offices - (KS-5133-01 Ringing Machines)
SD-80517-01 - Ringing Circuit - Superimposed Machine Ringing - No. 11 Manual Offices - (KS-5133-01 Ringing Machines)
SD-80594-01 - Ringing Circuit - Generator and Control Equipment - (KS-5396-01 Generators)
SD-80686-01 - Ringing Circuit - Generator and Control Equipment - (KS-5396-02 Generators)
SD-80727-01 - Ringing Circuit (KS-6546 Generator)
SD-80877-01 - Ringing Circuit (KS-5546 Generator)

4. DETAILED MODIFICATIONS INVOLVED

4.01 The specific modifications for the different types of ringing machines which will usually be encountered are covered below.

4.02 KS-5396, -01, -02 Commercial Type Ringing Machines or P Type Ringing Machines with Tone Alternators: Laboratory tests indicate that no interference will be obtained if 4 mf. (B) and 12 mf. (C) condensers are connected on each side of the 152B or 163 retardation coil in the output of the tone alternator audible ringing tone channel. These condensers are shown on SD-80594-01 and SD-80686-01 for commercial type ringing machines. SD-80246-01, SD-80300-01 and other circuits listed above show a similar arrangement for the P type ringing machines except that the (B) and (C) condensers have not been added. In case interference is involved they should be connected as shown on SD-80784-01, Fig. 1.

4.03 P Type Ringing Machines with Pulsating Brush Audible Ringing Tone Connections:

(1) A 0.2 mf. condenser should be connected in series with the primary winding of the 60A repeating coil between the pulsating brush on the ringing generator and the 400 or 500 ohm resistance now connected to that brush as shown on SD-80784-01, Fig. 2.

(2) If this does not fully correct the trouble, also connect a 400 ohm 18AJ resistance to ground between the 0.2 mf. condenser and the series resistance as shown in Fig. 2.

(3) If failures continue, rotate the a-c and pulsating brush holder on the ringing machine until the failures are eliminated. This may result in a marked reduction in the audible ringing tone and for reasons outlined above it should only be applied where absolutely necessary. Circuits SD-80077-01, ES-291095 and others listed above are typical of those showing the pulsating brush method of obtaining audible ringing tone.

4.04 KS-5133 and KS-5133-01 Ringing Machines: Although machines of this type were not available for test in the laboratory, it is felt that the measures outlined under paragraph 4.03 above should be followed since the pulsating brush method of generating audible ringing tone is involved.

4.05 KS-5546 Code Ringing Machines: The (R2) condenser shown in Fig. 4 of SD-80877-01 and the (TR1) condenser shown on Fig. 3 or Fig. 7 of SD-80727-01 should be increased in case interference occurs from 2 mf. to a maximum of 3 mf. No failures were found in the laboratory due to these ringing machines but if failures are experienced in the field it is believed that this will eliminate them.

4.06 QD-15 and QD-18 Ringing Machines: The output of these machines is filtered to a greater degree than the similar KS-5546 machines and for this reason no 1000 cycle interference is anticipated.

4.07 35-E-97 Offices: No failures have been observed as a result of the 35-E-97 office ringing vibrator but it was determined that if failures do occur in the field, the .25 mf. condenser in multiple with the 5000 ohm resistance shown in Fig. C of H-61347 should be added. If this does not correct the failures this capacity may be increased to a maximum of 0.4 mf. which should be sufficient. As noted above this increase will affect the audible ringing tone which should be checked after the increase in the capacity. The same applies to other ringing and converter circuits such as H-58489 and H-61330.

Bell Telephone Laboratories, Inc.