

TIME ANNOUNCEMENT SYSTEM

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1. INTRODUCTION

1.01 This addendum is being reissued to include information on talking volume measurements and system line-up procedures when the volume indicator of the Audichron machine is equipped with a vu meter rather than a db meter, as is the case with machines of late manufacture. This addendum also includes information contained in the previous issue which described the transmission features of the 1A and 1B time announcement systems as modified for operation with the Audichron Model No. R-72-2B-A (AB22.343) automatic time announcing machine.

1.02 This issue of the addendum includes the information contained in Issue 1, i.e., additional information on the equalization of types of trunk facilities not previously covered in the section. Transmission design and transmission maintenance features of volume indicator circuits SD-96127-01 and SD-96286-01 which have been made available for association with the time announcement desk No. 1B are also covered. In connection with the features of the volume indicator circuits this information

modifies the section only to the extent that where SD-96127-01 or SD-96286-01 circuits are used, the older volume indicator arrangements can be eliminated.

2. MODIFICATION OF THE 1A AND 1B TIME ANNOUNCEMENT SYSTEM WHEN USED WITH THE AUDICHRON MACHINE

(A) Audichron Machine

2.01 General: The Audichron machine consists of two units designed to reproduce the time announcement and the tone signal from recorded film. The two units each include amplifiers, switching facilities and low volume indicator alarms which provide flexibility in the use of either unit and automatic switching from one unit to another in case of low volume or failure of voice announcements for any reason. Each unit contains three separate film drums and two separate optical systems which are fed into a common preamplifier. Due to variations during processing strips of film there is a volume variation between film strips. There are also variations between the optical systems. These variations result in a volume variation between speech and tone signal levels. The tone signal volume can vary as much as 6 db above the speech volume of one machine and 6 db below the speech volume of another machine. There are also volume differences between successive strips of film used on the same machine. These variations must be taken into account when the subcenter amplifiers of the Time Announcement System are adjusted on the time tone signal from the Audichron equipment as described in Paragraph 2.10.

2.02 Changes in the 1A and 1B System: The changes in the 1A and 1B system necessitated by the addition to the system of the Audichron equipment are in the desk circuit or main announcement bureau. The interamplifier, terminating amplifier, outgoing supply and trunk circuits remain essentially the same from a transmission viewpoint. The modification of the 1A and 1B systems differ sufficiently to require separate consideration and this is done in the following divisions.

(B) Application to 1A Announcement System

2.03 General: When the Audichron machines are applied to the 1A announcement system, the transmission controls of the Audichron

equipment provide the automatic control for the system. Attached Drawing ES-887389 shows a transmission schematic of this arrangement which is covered in Circuit Drawing SD-95527-01. The volume indicator, the volume alarms, the transfer circuit, the third amplifier and the key for manual operation are all located within the Audichron machine. Transfer is made from one of the two Audichron units to the other by means of a transfer relay under the control of the low speech alarm circuit. A transfer from one machine to the other may also be made by means of a manual control which is not shown on Drawing ES-887389. The volume indicator, calibrated in db, is used to monitor the speech volume output of either machine or to monitor the output of a third amplifier which is used for manual equipment when the key is thrown for voice operation. It is necessary to insert a pad in each supply circuit where trunk losses are 15 db or less due to the fact that the speech volume on the announcement distributing bus is higher than that provided by the unmodified IA circuit.

2.04 Volume Output: During normal operation both units of the Audichron machine are operating continuously. The volume of the speech or tone, as measured across the output of the amplifier associated with each machine, is measured by the volume indicator provided with the Audichron equipment. The older models of the Audichron equipment are equipped with db meters while the more recent Audichron equipment is equipped with a vu meter. For normal operation, the pointer of the db meter swings between +3 and -7 on speech peaks and tones while the pointer of the vu meter swings between +1 and -10 on peaks of speech and tones. The speech volume which the calling subscriber receives is about the same as that provided in the IA system before modification when the peaks of speech are -2 on the db meter and -4 on the vu meter and the intermediate and terminating amplifiers are lined up according to Paragraph 2.10. This speech volume is -22 db based on the old volume indicator scale and about -16 vu based on the vu scale. The 6 db correction (db to vu) takes into account the 7.8 db difference in reference power and an estimated 1.8 db difference in the dynamic characteristics of the two volume indicator meters as used to measure speech in this type of application.

2.05 Volume Indicator: The volume of the speech or tone as measured across the output of the amplifier associated with each machine can be measured by the volume indicator provided with the Audichron equipment. With the older

equipment, the volume indicator has a scale reading -10 to -6 db and should read 0 when bridged across a 600-ohm resistance dissipating six milliwatts of 1000-cycle power. As a voltmeter, the pointer should indicate 0 ± 0.5 when 1.91 volts of 1000-cycle tone is connected across the meter terminals. More recent Audichron equipment is supplied with a vu meter having a scale reading -20 to +3 vu. This is the standard meter used by the Radio Broadcasting Companies and by the Bell System. This meter as used in the Audichron equipment has associated with it a building-out resistor of 3600 ohms and a 4 db resistance pad so that it reads zero on about the same applied tone as did the former volume indicator. The vu meter together with the series resistance and pad arrangement should read zero when 1.94 volts of 1000-cycle tone is connected across the combination whereas the old or db meter reads zero when 1.91 volts of 1000-cycle tone is connected across its terminals.

2.06 Low Speech Alarms: A low speech voltage alarm circuit is connected across the output of each one of the two power amplifiers which are associated with the automatic announcement channels. When the volume output of either amplifier falls about 9 db below its nominal value or no speech occurs, the alarm circuit associated with it functions. If the channel in question is connected to the announcement bus when the alarm circuit functions, the bus will be transferred to the other channel by means of the transfer relays. When both channels have failed a major alarm is operated.

2.07 Monitoring: Monitoring jacks are connected across the output of each power amplifier associated with the automatic equipment. These jacks can be used for monitoring the time announcement at this point with a crystal head set provided with the Audichron equipment. For monitoring the announcement as distributed to the system, a hand set is connected to the distributing bus through a resistance pad.

2.08 Voice Operation: For emergency use a microphone is connected to the input of the third power amplifier. When the voice announcement key is operated, the announcement machines are disconnected from the distributing bus and the voice announcement circuit is connected to the bus. The heaters of the vacuum tubes which are used in this power amplifier will not be turned on until the voice announcement key is operated. The warm-up period is about one minute.

2.09 Supply Circuits:

(a) General. The supply circuits associated with the distributing bus of the main bureau connect the bureau to the interamplifier trunks of the 1A system. Before modification the maximum number of supply circuits from a transmission standpoint was 36 where allowable interamplifier trunk losses ranged from 0 to 14 db (B.S.P. Section AB22.330, Paragraph 1.14). As modified for use with Audichron equipment, more than 36 supply circuits can be connected to the distributing bus and trunk losses in excess of 20 db are permissible as covered below.

(b) Impedance. When the impedance of the load which is bridged across the main announcement bus is held to 14 ± 0.5 ohms about 70 supply circuits can be connected to the bus. When the combined load impedance is reduced to about 6 ohms about 160 supply circuits can be connected to the bus. The disadvantage of reducing the load impedance below the 14-ohm value is that series resistance in the wiring between the trunk circuits and the output of the power amplifier becomes important and must be kept low.

(c) Loss. Supply circuit trunk losses of 0 to 15 db are permissible when the pad shown between the announcement bus and the repeating coil of the supply circuit is used. With this pad omitted, supply circuit trunk losses of 15 to 30 db are permissible. Adjustment of the equalizers of the intermediate and terminating amplifiers are given in Table I in B.S.P. AB22.330 and a continuation of that table is included in this addendum.

2.10 Transmission Testing Arrangements: The principal transmission tests required are those necessary to adjust the gains of the terminating and intermediate amplifiers. These amplifiers are lined up in the manner described in B.S.P. Section AB22.330. The alignment is accomplished by the use of a time announcement tone occurring at a specified time. The speech will vary in volume and so will the tone from announcement to announcement because of variation in the different strips of film and in the optical systems. However, the time signal tone which is repeated at two-minute intervals will be on the same strip of film, and hence, relatively constant in volume.

The following method of lineup can be used:

(a) Of the two Audichron units select the one having the highest volume of time signal

tone as compared to the speech volume measured on the volume indicator meter provided with the Audichron equipment, and place this machine in service.

(b) Adjust the volume control of the power amplifier associated with this machine so that the time signal tone following the minute announcement on either the odd or even minute (specify which) reads +2 on the volume indicator meter.

(c) The gains of the intermediate and terminating amplifiers in the outlying offices then should be checked and adjusted on the tone following the minute announcement either on the odd or even minute whichever has been specified. The gains are checked by readings on this particular tone taken with the rectifier-type meters of the 1A system in the manner described in B.S.P. Section AB22.330.

(d) When all checks and adjustments have been made in the outlying offices, then in the main bureau readjust the gain of the power amplifier associated with the Audichron machine which was in service during the test period. The volume indicator pointer should swing between +3 and -7 on the peaks of speech and tone if the machine has a db meter and between +1 and -10 on the peaks of speech and tone if the machine has a vu meter.

Note: During the testing period speech peaks may swing the pointer of the volume indicator off scale. This can produce distortion in the system, but this distortion should not be objectionable as far as a subscriber listening to the system is concerned. However, the testing period should be made as short as possible.

(C) Application to 1B Announcement System

2.11 General: When Audichron machines are applied to the 1B time announcement system the transmission controls of the 1B system are retained and the Audichron equipment is superimposed as an alternate announcement medium. Attached Drawing ES-887390 shows a transmission schematic of this arrangement and the Circuit Drawing is ES-95614-01. The trunk circuits at the bureau, the automatic volume indicator, the main distributing bus and the manual announcement facilities remain essentially unchanged from a transmission viewpoint. The Audichron equipment itself is a dual machine arrangement and has practically all of the features described for application with the 1A announcement system.

2.12 Circuit Arrangement: Referring to Drawing ES-887390, the output from the Audichron equipment is fed through contacts of the transfer relays to the main distributing bus. The transfer relays are represented here in schematic form to illustrate their functions. Actual relay operation is more complex and the actual circuit arrangement differs from that shown on the schematic. Across the output of the Audichron equipment is connected the clock synchronizing and radio comparator circuits for checking the accuracy of the time signal. Between the Audichron output and the transfer relays a pad is connected to reduce the announcement volume to that required for the normal operation of the volume indicators which check the speech level across the main distributing bus. When the transfer relays and the time tone signal relays are operated an 800-cycle constant level tone is sent over the system. This tone should be used for lining up the intermediate and terminating amplifiers. When the transfer relays are operated the announcement bus is transferred from the Audichron equipment to the voice announcement amplifiers and desk circuit and other announcements, such as baseball scores, etc., can be given over this channel. From a transmission viewpoint this arrangement is the same as that of the unmodified 1B system.

2.13 Monitoring: The operator's receiver which is shown connected through a pad when the transfer relays are normal is used to monitor the automatic time announcements. When the transfer relays are operated, this head receiver is connected through the transfer and time tone relays to the output of the time signal oscillator.

2.14 Volume Output and System Testing: During normal operation either with automatic announcements or voice announcements or with a combination of alternate automatic announcement and voice announcement, the speech and tone volume provided the subscriber will be approximately that of the unmodified 1B system. Amplifiers in outlying offices should be lined up on the constant level tone of the time bureau oscillator in a manner similar to that described in B.S.P. Section AB22.330. This tone is applied during any period of emergency voice operation or it can be applied during the interval of one announcement which is alternated with announcements from the Audichron machine.

2.15 Volume Indicator: In general, the speech volume output either from the automatic machine or from the voice announcement desk circuit should be adjusted according to the in-

dications given by the high and low lamp volume indicator circuit which is bridged across the main distributing bus. The speech volume from the Audichron machine should be adjusted so that as few high and low lamps are obtained as possible. During the period the operator is giving voice announcements she must adjust her talking volume with the aid of the variable pad in the desk circuit so as to keep the volume indicator lamps out.

2.16 Low Volume Alarm: When the announcement volume on the main distributing bus drops about 20 db below the normal volume, it is indicated by the low volume indicator bridged across the distributing bus. Failure of the Audichron machines will bring in an alarm.

3. VOLUME INDICATOR CIRCUITS FOR TIME ANNOUNCEMENT DESK NO. 1B

(A) General

3.01 Volume indicator circuit SD-96127-01 shows by means of lamps when the speech volume, as measured across the output of the transmitting amplifier, is within specified limits. The purpose of this indicator is to help the announcer speak so that a satisfactory volume will be provided the subscribers who are connected to the time announcement system.

3.02 Volume indicator circuit SD-96286-01 indicates to the maintenance force by means of lamps and alarms when the speech volume at the distributing point, where the announcement trunk circuits are connected to the desk circuit, is too low to provide adequate speech or time signal volume to subscribers. The purpose of this indicator is to call attention immediately to low speech volume or to low signal tone that may be caused by an equipment failure in the desk circuit.

(B) Transmission Features

3.03 General: Drawing ES-813593 shows the transmission schematic of one desk circuit with the volume indicator and low volume indicator connected. When this desk circuit is in operation contacts of the (C) relay will be closed and the speech of an announcement made into the 635A transmitter will be amplified and will appear across the distributing bus. After the announcement has been completed the (TN) relay will be operated and the time signal voltage, which is under the control of a clock circuit, will appear across the distributing bus.

During the announcement period the volume indicator circuit SD-96127-01 checks the speech volume. If the volume is below the lower limit

for a complete announcement a lamp mounted in the turret will light. If the volume is above the upper limit another lamp in the turret will flash. If the volume has been kept within the limits no lamp will be lighted. During the speech period the low volume indicator alarm circuit SD-96286-01 also checks the volume. If at the end of the announcement the speech volume on the distributing bus has not come up to the level for which the device has been adjusted an alarm will be sounded and an out-of-service lamp associated with the channel in use will light. This lamp indicates to the operator that the desk circuit in service should not be used and that a transfer should be made to the other desk circuit. During the tone period the low volume indicator alarm circuit also checks the level on the bus. If this level is below the limit an alarm is sounded and an indication is given to the announcing operator that the other desk circuit should be used.

3.04 Volume Requirements: With 0.6 volt impressed across the bus a satisfactory speech volume will be delivered to the distributing system. The volume indicator circuit SD-96127-01 checks speech volumes with respect to this 0.6 volt. Indication is given when the volume is more than 3 db below and 3 db above this reference value.

The low volume indicator alarm circuit SD-96286-01 checks the speech and tone as measured across the distributing bus with respect to the same reference value, 0.6 volt. The action of the checking circuit on speech is such that when the volume, as measured with a standard volume indicator, is higher than the limit of about 20 db below 0.6 volt the device will check and no alarm will be given.

Under normal conditions of operation the respective calibrations of these two volume indicators should not change more than 1 db.

3.05 Operation: Each of the volume indicator circuits SD-96127-01 and SD-96286-01 consists of an amplifier and rectifier terminated in a gas tube circuit and a relay train. The gas tube circuit controls the operation of the relays which, in turn, are used to operate the signal lamps and the alarms. The operation of the relay train is under the additional control of the announcement clock circuit which determines the time intervals during which the control relays are allowed to operate.

(C) Maintenance Features

3.06 Tube Check: The vacuum tubes used in these volume indicators are the 290A, the 292A,

and the 338A or their equivalent. The chance of tube failure in this service should be small if these tubes are replaced every six months either by new tubes or by tubes which have been checked in a vacuum tube test set. Experience may indicate that a shorter or a longer interval is desirable.

The filament current, which should be between 0. and 0.53 amperes, should be measured by inserting a plug connected to a milliammeter into the (F) jack. If the measured current is not within these limits the ballast lamp should be replaced. If the filament should sag so that there appears to be danger of its shorting on itself the lamp should be replaced. In case the ballast lamp fails and a replacement is not readily available, the (ST) key may be operated to the "START" position and the device used temporarily with the key in that position.

3.07 Calibration of Volume Indicators: The volume indicators per SD-96127-01 and SD-96286-01 are calibrated in the following manner, using a 1000-cycle oscillator capable of delivering 1 milliwatt of power to a 600-ohm load. Connect the oscillator to the (TST) jack on the indicator panel. If the vacuum tubes of the indicator under test are not energized operate the (ST) key to the "START" position, the first operated position, for about 30 seconds and then operate the key to the "ON" position. Next operate the (TST) key. The "M" lead on the (T1) input transformer should be connected to a terminal so that when the (A) potentiometer dial is turned, the (TST) lamp will be extinguished. This adjustment can be rechecked by momentarily releasing the (TST) key and operating it again. Once the "M" lead has been connected properly it should not be necessary to change the tap on the (T1) input transformer for subsequent calibrations of that installation. The approximate point to which the (A) potentiometer should be adjusted at all times is that at which the (TST) lamp is just extinguished when the potentiometer dial is turned. The (TST) lamp is extinguished when the (3) vacuum tube discharges and operates the (N) and (N1) relays.

In case difficulty is experienced in calibration or in case the setting of the (A) potentiometer has to be changed more than $\frac{1}{2}$ turn from the setting determined by the previous calibration, the vacuum tubes should be changed. If the trouble cannot be cleared by replacing vacuum tubes, the 130-volt and the 48-volt supply should be measured. These voltages should be between 125 and 135 volts and between 45 and 50 volts, respectively.

3.08 Check of Alarms of Circuit SD-96286-01:

The complete alarm circuit of SD-96286-01 should be checked at least once a month unless experience indicates otherwise. A method is suggested below which has the advantage of testing all alarms under normal operating conditions.

Before the test of the alarm circuit is made, the operating force should be notified that the out-of-service lamp mounted in the turret is going to light for the desk circuit in service and that about two minutes after the operator has transferred to the adjacent position the out-of-service lamp for this second desk circuit will light. The operator will then transfer back to the desk circuit she was using at the beginning of the test and normal operation can be resumed.

The test can be made at the volume indicator panel using the procedure outlined below: (While this test is being made the time announcement should be monitored in the normal manner at the control panel so that the man making the test hears the announcement and the time signal.)

(a) A dummy plug is inserted in the (TST) jack of the indicator panel to remove the device from service and the (ST) key operated to the "NORMAL" position to open the filament circuit.

(b) A period of at least two minutes should be allowed after the (ST) key has been operated to the "NORMAL" position before the test is made in order to allow the vacuum tubes to become completely deenergized.

(c) About one or two seconds after the time signal of an announcement is heard in the monitoring receiver the dummy plug is removed from the (TST) jack. The low volume indicator and alarm circuit is thereby placed in service with the vacuum tubes deenergized and an alarm should be brought in on the following announcement for both speech and tone.

(d) The (SA) and (TA) lamps mounted on the panel should light if desk circuit "A" is in use. The (SB) and (TB) lamps should light if desk circuit "B" is in use. At the same time the out-of-service lamp in the turret will light for the desk circuit in use and the operator will transfer to the other position.

(e) As the transfer stated above is made, the "RLS" key should be operated and the dummy plug should be inserted again in the (TST) jack.

(f) About two minutes should be allowed the operator during which time she can announce normally.

(g) The dummy plug can be removed and the second desk circuit tested in like manner.

(h) After this second desk circuit has been checked and as the operator makes the transfer back to the position she was using at the start of the test the dummy plug should be inserted again in the (TST) jack, thereby removing the indicator from service.

(i) The (RLS) key should be operated, thereby releasing the alarms and all lamps on the panel that are lighted except the (TST) lamp which remains lighted under the control of the (TST) jack.

(j) The (ST) key is operated to the "START" position for 30 seconds and then to the "ON" position. Thus, with the vacuum tubes energized, the indicator can be placed back in service by removing the dummy plug from the (TST) jack and normal operation can be resumed.

4. EQUALIZATION OF TRUNKS

4.01 Noted below are adjustments of equalizers at intermediate and terminal amplifiers for a number of types of trunk facilities not previously included in Table I of this section.

TABLE I

(Continued)

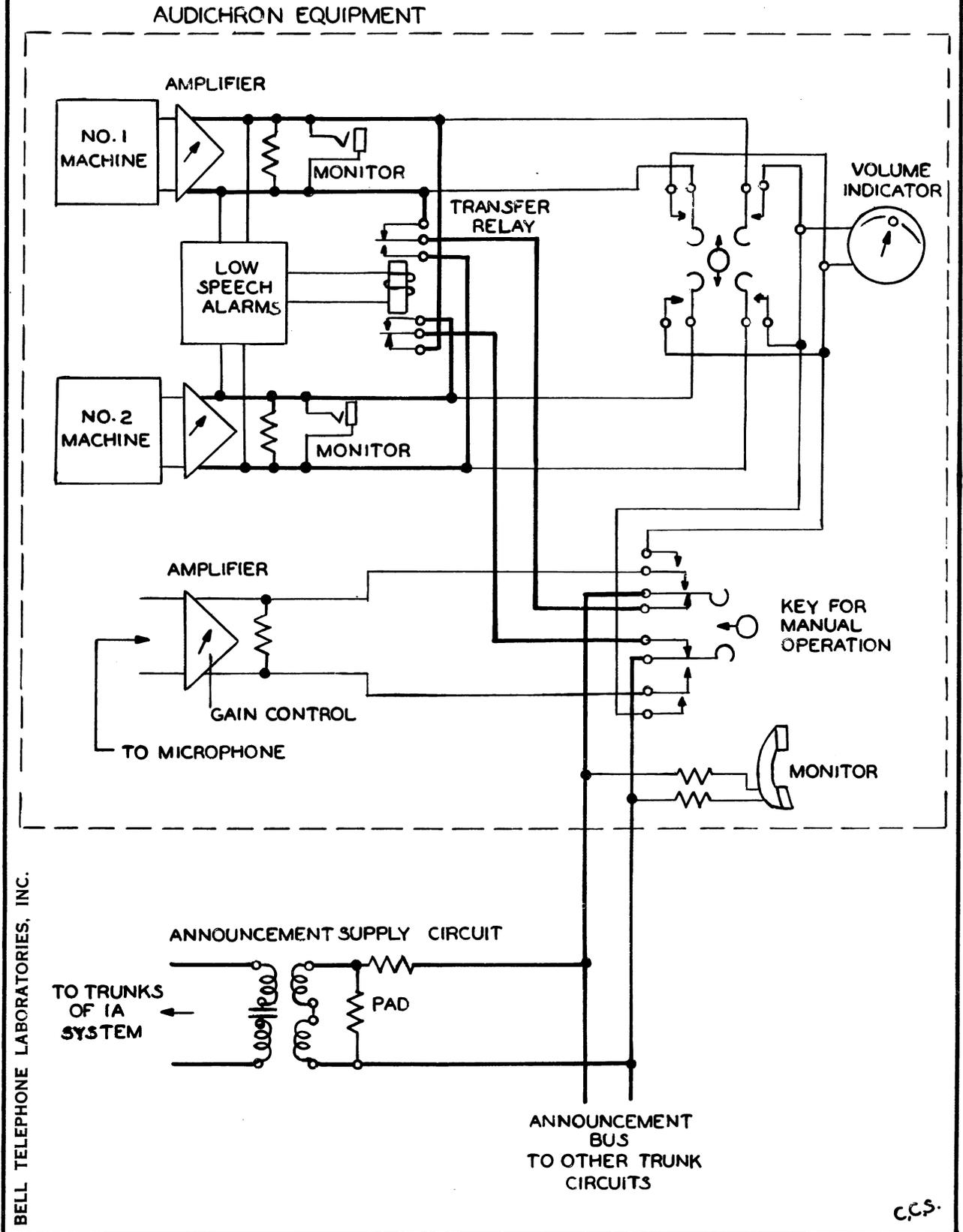
TIME ANNOUNCEMENT SYSTEM
ADJUSTMENT OF EQUALIZERS OF AMPLIFIERS

Inter-Amplifier Circuit			Connection of Equalizer Leads*					
Type of Circuit	Ranges of Length in Thousands of Feet	Strap S	Terminals of 82-H Retard Coil				Terminal of 208-M Input Trans.	Terminal of (102F) Vacuum Tube Socket
			V	W	X	Y	N	
24 ASM B-88	All	Closed	Open	Open	Open	Open	-	P
" " D-88	All	Closed	Open	Open	Open	Open	-	P
" " H-88	All	Closed	Open	Open	Open	Open	-	P
" " M-88	30-55	Open	2	5	2	4	12	-
22 BSA B-88	15-80	Closed	Open	Open	Open	Open	-	P
	80-120	Open	Open	Open	1	2	12	-
" " D-88	20-60	Closed	Open	Open	Open	Open	-	P
	60-100	Open	Open	Open	1	2	12	-
19 CNB B-88	20-80	Closed	Open	Open	Open	Open	-	P
	80-150	Open	Open	Open	1	2	12	-
	150-240	Open	Open	Open	2	3	12	-
" " D-88	20-60	Closed	Open	Open	Open	Open	-	P
	60-100	Open	Open	Open	1	2	12	-
	100-190	Open	Open	Open	2	3	12	-
" " H-88	30-60	Closed	Open	Open	Open	Open	-	P
	60-120	Open	Open	Open	1	2	12	-
	120-170	Open	Open	Open	2	3	12	-
" " B-135	60-100	Open	Open	Open	1	2	12	-
	100-260	Open	Open	Open	2	4	12	-
" " D-175	60-120	Open	1	4	2	4	12	-
	120-180	Open	1	4	2	8	12	-
	180-250	Open	1	3	1	3	12	-
19 DNB B-88	20-100	Closed	Open	Open	Open	Open	-	P
	100-250	Open	Open	Open	1	2	12	-
" " D-88	20-60	Closed	Open	Open	Open	Open	-	P
	60-100	Open	Open	Open	1	2	12	-
	100-200	Open	Open	Open	2	3	12	-
" " H-88	30-100	Closed	Open	Open	Open	Open	-	P
	100-190	Open	Open	Open	1	2	12	-
" " B-135	60-150	Open	Open	Open	1	2	12	-
	150-260	Open	Open	Open	2	3	12	-
" " B-175	60-100	Open	Open	Open	1	2	12	-
	100-220	Open	Open	Open	2	4	12	-
	220-330	Open	Open	Open	2	6	12	-
" " D-175	60-130	Open	Open	Open	2	6	12	-
	130-200	Open	Open	Open	1	8	12	-
	200-280	Open	2	5	2	7	12	-

* Drawings SD-90400-01 and SD-90400-02

Attached:
Drawings ES-887389
887390
813593

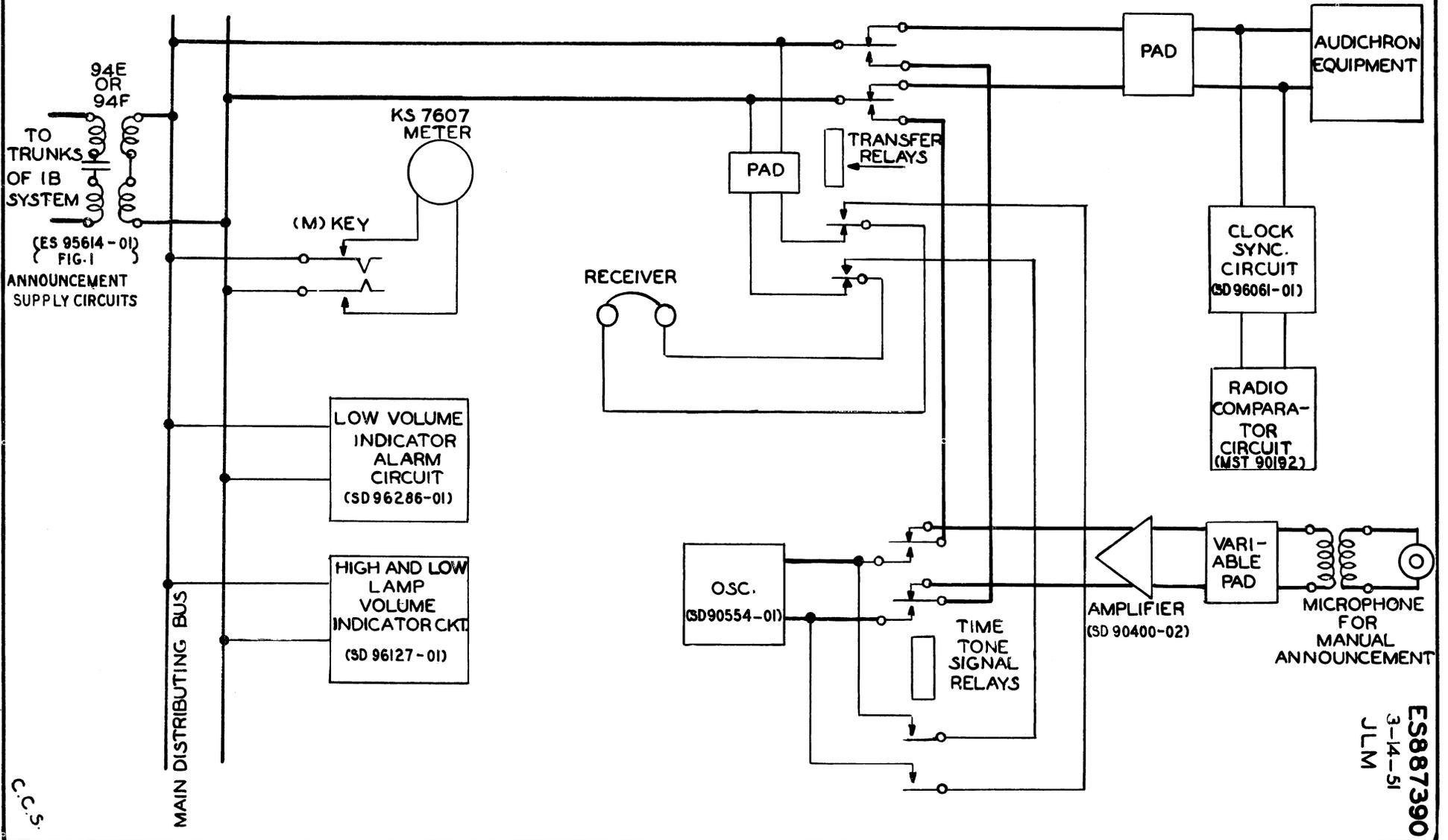
TIME ANNOUNCEMENT SYSTEM 1A WITH AUDICHRON MACHINES TRANSMISSION SCHEMATIC



BELL TELEPHONE LABORATORIES, INC.

BELL TELEPHONE LABORATORIES, INC.

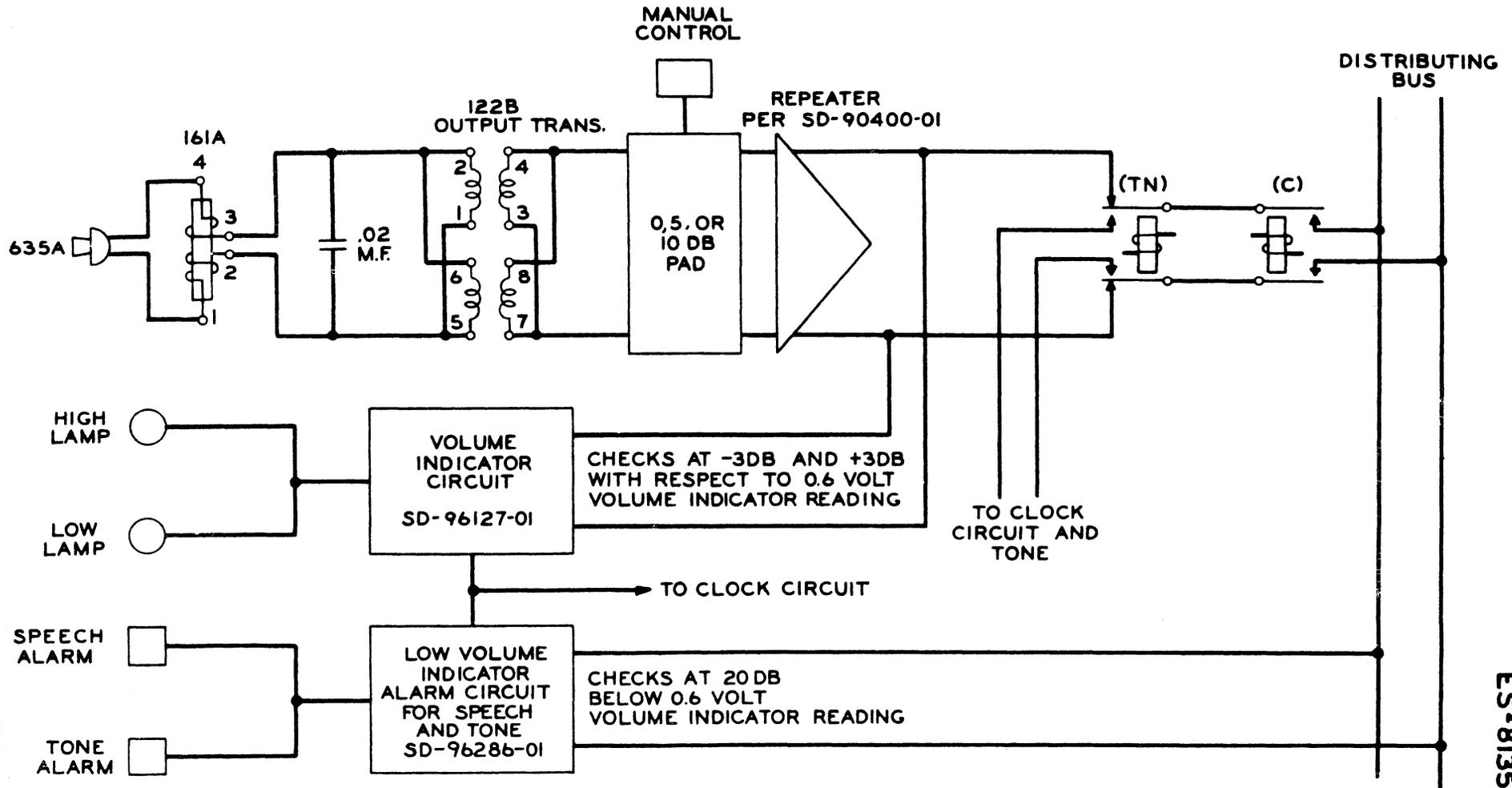
TIME ANNOUNCEMENT SYSTEM IB WITH AUDICHRON MACHINES TRANSMISSION SCHEMATIC



C.C.S.

ANNOUNCEMENT DESK NO. 1B TRANSMISSION SCHEMATIC

ES-813593
J.L.M. 6-7-40
J.L.M. 11-27-40



ES-813593