MODIFICATION OF FLAT RATE, MESSAGE RATE INDIVIDUAL AND PARTY EQUIPMENTS FOR NON-ZONE OVERTIME AND REMOTE CONTROL ZONE REGISTRATION EQUIPMENT DESIGN REQUIREMENTS PANEL SYSTEMS

1. GENERAL

Scope

1.01 This specification, together with the supplementary information listed herein, covers general engineering information and the equipment design requirements for the engineering, manufacture, and installation of modifications of existing flat rate, message rate individual, and message rate party equipment for non-zone overtime registration and remote control zone registration in panel offices.

1.02 This specification is reissued to incorporate previous appendix changes.

Capacity

1.03 The capacity of the present panel office line relay units, line finder frames, district selector and district test frames is not affected by the recommended modifications for non-zone overtime registration and remote control zone registration. The capacities of the additional frames specified in this specification and required when arranging an office for non-zone timing and remote control zone registration are as follows:

Timing Frame (required for non-zone overtime registration modification)	380 districts	(on first frame of a pair)
	460 districts	(on second frame of a pair)
2 Party Message Register Relay Frame (required when modifying party lines for either remote control zone registration or non-zone overtime)	400 lines	

Description

1.04 The arrangement for zone registration service furnished by the modifications outlined in this specification is established on the premise of trunking of calls requiring multiple operation of the subscriber register thru a tandem office. At the tandem office, which may be either a crossbar tandem or a panel system sender tandem office, the number of charges to be scored on the line registration is determined and battery pulses are sent to the district selector circuit, one pulse for each operation of the register. With the zone timing equipment in the centralized point and the register in the local office, the tandem office equipment will be arranged to transmit the necessary pulses on a simplex basis over the trunk to the calling subscriber district selector circuit in the originating office after conversation starts. A cold cathode vacuum tube is used in the district selector circuit to receive the pulses. The battery pulse from the tandem office fires the tube, allowing battery to flow from the cathode to the anode, thus establishing an operating path for a relay which is added in the district selector circuit. The operation of the relay, once for each pulse received over the trunk, scores the line register over the hunt lead to the line finder in the usual manner.

1.05 In general, the equipment to be added to each flat rate, message rate individual, or 2 party message rate district selector circuit for remote control zone registration consists of one R type relay, one 346A vacuum tube, one .5 mf condenser, and one 63 type resistance. In addition a 59 type resistance is required for all 2 party districts. It is essential for circuit reasons, that this equipment be mounted on the district frame and since mounting plate space for only the relay is available on a large number of frames, special details have been developed to mount the rest of the non-magnetic apparatus. One of these details accommodates the equipment for five circuits and is mounted on the rear of each group of five districts under the same screws that are used to mount the mounting plates for the first and last circuit in the group.

1.06 In addition to the equipment required for each district, mentioned in paragraph 1.04, one three position polar relay and one-half of a new 60 type resistance, are required for each 2 party line finder type

line circuit. This equipment which is mounted on the two party message register relay frame, requires positive 48 volt battery which must be added to the existing power plant. Line switch type MRI line circuits which have not been modified for local control zone registration will require the addition of one R type relay per line circuit connected into the circuit in the same manner as for local control zone registration. Line switch type MRI line circuits which have been modified for local control zone registration and the MRP type line switch line circuits will not require any changes.

1.07 The arrangement for non-zone overtime registration service, furnished in accordance with the modifications outlined herein, permits the scoring of the line register once at the start of the conversation and once for each overtime period during the conversation.

1.08 The equipment required for non-zone overtime registration consists of a "Z" cam per sequence switch and a 1A timer per district, and a 51A drive motor for each 20 districts plus one 59 resistance for each MRI district. The additional 59 type resistance is not required for non-zone overtime registration for MRP districts since the 59 resistance, that is added to each MRP district for remote control zone registration in these districts, is also used for non-zone overtime. The drive motor operates, on 22 volt a-c which is supplied to the motor thru a 1-1/3 ampere fuse. The timing equipment and the resistance required for MRI districts are mounted on a timing frame, the equipment arrangement for which is shown on ED-20883-01.

1.09 In offices modified for remote control zone registration traffic it will be necessary that the first talking selection position of the district circuit sequence switch be used for connecting to the line register on zone traffic, and the second talking position be used for non-zone overtime registration. In some offices this may require cross-connection changes on the pulse distributing or decoder frames, and equipping both talking selection relays in the decoder, subscriber sender and trouble indicator circuits.

1.10 Since the timing devices used for the non-zone overtime feature are mounted on 30-1/2" mounting plates, a standard bulb angle framework is used for this equipment rather than a channel framework of special length. Because the 30-1/2" mounting plate permits a better equipment arrangement as well as for the sake of uniformity, the same framework is used for the two party message register relay equipment. It is expected that these frames will be located between columns, near the equipment to be modified. In this location, there will be no alignment difficulties with respect to existing frames and the adjacent aisles will be somewhat wider than if panel frameworks 1'-3" wide were used. Where it is necessary to place these new frames in line with existing panel frames, suitable junction details shall be provided in accordance with ED-25529-01.

1.11 It will also be necessary to modify the district test frames to test equipments arranged for non-zone overtime and remote control zone registration. Since the circuit required for testing these features reuses the majority of the equipment required for testing the present local control zone registration feature, it will be necessary to add this equipment to those test frames that are not so equipped at the present time. In addition, it will be necessary to add approximately 30 relays, some miscellaneous apparatus consisting of 137 and 141 type condensers, resistances and two keys for the non-zone overtime and remote control zone registration features. All of this equipment can be mounted on the link type district selector test frames, but on the sender selector or line switch type frames, the additional relay equipment required for the non-zone overtime and remote control features must be mounted off the frame. In addition to the new apparatus required about five of the present relays in the link type test and about ten in each of the sender selector and line switch type test circuits, are replaced by those of different codes.

1.12 When additions are made to offices that are being changed or have already been changed for non-zone overtime or remote control zone registration or both, the added frames, if they are involved, shall be furnished with the circuits modified as outlined in this specification.

1.13 The equipment arrangements indicated in this specification shall be used for the various circuits as specified. Where, due to unusual job conditions, the equipment arrangement for an existing circuit differs from that indicated herein, the added apparatus for this modification shall be located in a manner similar to that shown for the usual arrangement.

1.14 Circuits may be encountered which are not included in the detailed information listed herein. The equipment modifications for these circuits shall be made in the same way as that used for similar circuits.

2. SUPPLEMENTARY INFORMATION

815-000-000 - Panel Systems Index
AA128.006 - List of General Equipment Requirement Sections
X-61200 - List of Engineering Requirement Specifications for Offices Having Ground on the Cut-Off Relays
X-61400 - List of Engineering Requirement Specifications for Offices Having Battery on the Cut-Off Relays
J86446 - 105D Power Plant
J97025 - Relay Rack Framework - Angle Type
Floor Plan Data - Section 4.2, Sheets 13 and 14
Power Data - Section 15.11, Sheet 6

3. DRAWINGS

Keysheets

SD-21300-01 - Panel Link Equipment - Battery on the Cut-Off Relay Offices
SD-21680-01 - Panel Link Equipment - Ground on the Cut-Off Relay Offices
ES-262532 - Sender Selector Equipment - 3 Digit Areas
ES-262647 - Sender Selector Equipment - 2 and 2-3 Digit Areas
ES-262829 - Rotary Link Equipment - 3 Digit Areas
ES-262849 - Rotary Link Equipment - 2 and 2-3 Digit Areas

Circuits

SD-80765-01 - 105A Power Plant Charge and Discharge Circuit

Framework

ED-20879-01 - Assembly Details for Modification of FR, MRI, and MRP, District Frames for Non-Zone Overtime and Remote Control Zone Registration
ED-25071-01 - Frame Assemblies
ED-20581-01 - Assembly of Link Type District Selector Test Frame
ED-25529-01 - Guard Rail Junction Details

Equipment

ED-20356-02 - Mounting Plate Equipment for Link Type District Selector Test Frame (ED-20359-02)
ED-20359-02 - Equipment for Link Type District Selector Test Frame - Test Groups on Non-Unit Basis
ED-20579-02 - Mounting Plate Equipment for Link Type District Selector Test Frame (ED-20583-01)
ED-20583-01 - Equipment for Link Type District Selector Test Frame
ED-20880-01 - Equipment Details for Modifications of FR, MRI, and MRP District Frames for Non-Zone
ED-20881-01 - Equipment for 2 Party Message Register Relay Frame
ED-20883-01 - Equipment for Timing Frame
ED-20893-01 - Mounting Plate Equipment for Link Type District Selector Test Frame (ES-373694)
ED-20894-01 - Equipment Details for Modifications of District Selector Test Frames
ED-21902-01 - Equipment for Test Battery Circuit
ES-373694 - Equipment for Link Type District Selector Test Frame - Test Groups on Non-Unit Basis

Wiring and Cabling

ED-20781-06 - Local Cable for District Selector Frame - Arranged for Non-Zone Overtime and Remote Control Zone Registration
ED-20882-01 - Switchboard Cabling and Grounding of 2 Party Message Register Relay Frame
ED-20884-01 - Switchboard Cabling and Grounding of Equipment on Timing Frame

District Selector Circuits

Note: The district selector circuits listed in the following table have been changed to provide for the non-zone overtime and remote control zone registration features. The locations for the equipment on the district frame are as indicated in the Table of Equipment shown on ED-20880-01.

Circuit & Type	Present Mounting Plate Arrangement Similar To	ED-20880-01 Location of (SX) Rel.	ED-20880-01 Loc. of Other App. Remote Cont. (See Notes 1.05 & 1.08)	ED-20880-01 Loc. of Other App. Non-Zone (See Notes 1.05 & 1.08)	Remarks
ES-207199 (SS - MRI)	ED-20880-01, Fig. 9	Pos. 1,3,5, 7, or 9	Fig. 9	Fig. 20	3 new plates are required for added equipment which will be mounted five ckts. per plate
	T-430434, Fig. 3 & 4	Pos. 5			
	T-430734, Fig. 1 & 2	Pos. 1			
	T-442490, Fig. 1,2,&3	Pos. 5			
	T-442490, Fig. 7	Pos. 1			
	T-458097, Fig. 2	Pos. 5			
	T-458268, Fig. 2	Pos. 5			
	T-505572, Fig. 1	Pos. 5			
	T-509015, Fig. 2	Pos. 1			
ES-207706 (SS - MRI) (LSW)	T-430408, Fig. 4 & 5	Pos. 5	Fig. 11		
	T-430434, Fig. 3 & 4	Pos. 5			
	T-430920, Fig. 1 & 2	Pos. 8			
	T-458268, Fig. 2	Pos. 5			
	T-505572, Fig. 1	Pos. 5			
	T-505675, Fig. 1 & 2	Pos. 1			
	T-509015, Fig. 5	Pos. 1			

Circuit & Type	Present Mounting Plate Arrangement Similar To	ED-20880-01 Location of (SX) Rel.	ED-20880-01 Loc. of Other App. Remote Cont. (See Notes 1.05 & 1.08)	ED-20880-01 Loc. of Other App. Non-Zone (See Notes 1.05 & 1.08)	Remarks
ES-207869 (SS - MRP) (LSW)	T-430920, Fig. 1 & 2	Pos. 8	Fig. 8 Fig. 12	Fig. 20	The (CG) relay shall be mounted in Pos. 9 on this plate which must be drilled for it. The (CG1) relay shall be mounted at the top of the frame as shown in Fig. 8 of ED-20880-01
ES-226614 (SS - MRP)	T-458097, Fig. 5	Pos. 10	Fig. 11		
	T-505579, Fig. 1	Pos. 10			
	T-509015, Fig. 4	Pos. 10			
ES-240071 (SS - MRI)	ED-20880-01, Fig. A	Pos. 2	Fig. 10 or 11	Fig. 19 or 20	
	C-75-4021	Pos. 1			
	ED-20267-10, Fig. 10	Pos. 1			
	T-430920, Fig. 9	Pos. 8			
	T-503433, Fig. 1	Pos. 5			
	T-503433, Fig. 3	Pos. 5			
	T-503433, Fig. 5	Pos. 10			
	T-503433, Fig. 9	Pos. 5			
ES-240081 (SS - MRP)	ED-20880-01, Fig. 4	Pos. 1-5	Fig. 4		
	T-503433, Fig. 8	Pos. 1-15 Fig. 8	Fig. 10 or 11		See Note 5.03
	T-430920, Fig. 1 & 2	Pos. 8			
	T-503433, Fig. 2	Pos. 10			
	T-503433, Fig. 15	Pos. 10			
ES-20086-01 (RL - MRI)	H-572-165	Pos. 7	Fig. 10	Fig. 19	Pos. 7 must be drilled for the (SX) relay
ES-20129-01 (RL - MRI)	C-475-70 H-572-155	Pos. 7	Fig. 10 & G		Pos. 7 must be drilled for the (SX) relay. See Note 5.05
ES-20251-01 (RL - MRI)	C-475-70	Pos. 7	Fig. 10		
ES-20253-01 (RL - MRP)	C-475-65	Pos. 15	Fig. 10		See Note 5.02
ES-20640-01 (SS - MRP)	ED-20880-01, Fig. A	Pos. 2	Fig. 11	Fig. 20	See Note 5.04
	ED-20880-01, Fig. B	Pos. 1			See Note 5.02
	T-458268, Fig. 2A	Pos. 1			
ES-20641-01 (PL - MRP)	H-572-260, Fig. 6 & 10	Fig. 7 Pos. 1-15	Fig. 10	Fig. 19	See Note 5.03
	H-572-260, Fig. 9	Pos. 15	Fig. 10	-	See Note 5.02
ES-21030-01 (PL - MRI)	ED-20880-01, Fig. 1	Pos. 1-5	Fig. 1	Fig. 19 or 20	
	ED-20880-01, Fig. 3	Pos. 5	Fig. 3		
	ED-20880-01, Fig. 6	Pos. 1-5	Fig. 6		
	ED-20880-01, Fig. C	Pos. 1	Fig. 10 or 11		On 19" or 23" plates mount (SX) relay adjacent to left of (SC) Rel.
	ED-20880-01, Fig. D	Pos. 7			This pos. must be drilled for this relay.
	ED-20880-01, Fig. E	Pos. 8			This pos. must be drilled for this relay
	ED-20880-01, Fig. F	Pos. 8			This pos. must be drilled for this relay
	H-475-70	Pos. 7			
	H-475-82	Pos. 1			
	ED-20267-01, Fig. 10	Pos. 1			
	T-503433, Fig. 2	Pos. 10			

Circuit & Type	Present Mounting Plate Arrangement Similar To	ED-20880-01 Location of (SX) Rel.	ED-20880-01 Loc. of Other App. Remote Cont. (See Notes 1.05 & 1.08)	ED-20880-01 Loc. of Other App. Non-Zone (See Notes 1.05 & 1.08)	Remarks
ES-21032-01 (PL - MRP)	ED-20880-01, Fig. 5	Pos. 1-5	Fig. 5		
ES-21032-03 (PL - MRP)	ED-20880-01, Fig. 5 J27503 C-1 Sk-E	Pos. 1-5 Pos. 15	Fig. 5 Fig. 10		See Note 5.02
SD-21077-01 (PL - MRI)	ED-20880-01, Fig. 1	Pos. 1-5	Fig. 1		
	ED-20880-01, Fig. 2	Pos. 1	Fig. 2		
	ED-20880-01, Fig. 3	Pos. 5	Fig. 3		
	ED-20880-01, Fig. C	Pos. 1			On 19" or 23" plates, mount (SX) relay adjacent to left of (SC) Relay
	ED-20880-01, Fig. D	Pos. 7			On 19" or 23" plates, mount (SX) relay adjacent to right of (D) Relay
	C-475-82	Pos. 1	Fig. 10		
SD-21079-01 (PL - MRP)	T-21079-11 Sk-E	Pos. 15		Fig. 19	See Note 5.02
SD-21079-03 (PL - MRP)	T-21079-11 Sk-E	Pos. 15			See Note 5.02
SD-21627-01 (PL - MRI)	ED-20880-01, Fig. 1	Pos. 1-5	Fig. 1		
	ED-20880-01, Fig. 2	Pos. 1	Fig. 2		
	ED-20880-01, Fig. 3	Pos. 5	Fig. 3		
	ED-20880-01, Fig. C	Pos. 1			On 19" or 23" plates, mount (SX) relay adjacent & to left of (SC) Relay
	ED-20880-01, Fig. D	Pos. 7	Fig. 10		On 19" or 23" plates, mount (SX) relay adjacent & to right of (D) Relay
	C-475-82	Pos. 1			
SD-21630-01 (PL - MRP)	ED-20880-01, Fig. 23	Pos. 7	Fig. 23		
SD-21726-01 (PL - MRP)	J27501 C-5 Sk-E	Pos. 15	Fig. 10		See Note 5.02
ES-21755-01 (SS - MRI)	T-503433, Fig. 3	Pos. 1-15 Fig. 7	Fig. 11	Fig. 20	See Note 5.03
ES-21757-01 (SS - MRI)	T-442490, Fig. 3 T-458268, Fig. 2	Pos. 5 Pos. 5			
ES-21759-01 (PL - MRI)	ED-20880-01, Fig. 2	Pos. 1	Fig. 2	Fig. 19	
SD-21821-01 (PL - MRP)	J27501 C-6 Sk-E	Pos. 15	Fig. 10	Fig. 19	See Note 5.02

4. EQUIPMENT

ED-25071-01 - Framework for 2 Party Message Register Relay Frame

Group 1 - Framework for 2 party message register relay frame (See notes A, B, and 5.24)

ED-25071-01 - Framework for Timing Frame

Group 1 - Framework for timing frame (See note B)

Notes

A. The first and each alternate message register relay frame shall be equipped with one test battery jack (BAT) per Fig. 1, one test battery jack (+48V) per Fig. 2, one single wire tie line jack (P) per Fig. 3, one set of test terminals per Fig. 4, one pair of (TEL) jacks per Fig. 6, and one pair of tie line jacks (T) and (T1) per Fig. 7 on SD-21919-01.

B. There is no local cable wiring on these frames since all wiring to the equipment is carried direct to the equipment in switchboard cable.

5. GENERAL NOTES

5.01 All of the additional equipment required for the modification of flat rate, message rate individual, and 2 party message rate district circuits for remote control zone registration shall be located on the district frame as shown on ED-20880-01. In a large majority of the cases, the R type relay (SX) can be located in a spare relay position on the selector circuit mounting plate or on a spare mounting plate with the other added equipment. Where mounting plate space is not available, the non-magnetic apparatus shall be located on mounting adapters which have been made available for mounting this equipment on the rear of each group of five district circuits.

5.02 In modifying MRP district selector circuits for remote control zone registration, the added R type relay designated (SX) shall in general be mounted in the position made vacant by the (G) relay which will be removed as a part of this change.

5.03 Where MRI district selector circuits have been converted for MRP operation and the (G) relay is mounted on the relay rack or where there is no available position on the selector circuit mounting plate it will be necessary to locate the (SX) relay on mounting plates either above the relay bay or above the commutators as indicated opposite the particular circuit in the Table of Equipment on ED-20880-01.

5.04 In modifying ES-20640-01 or similar circuits for remote control zone registration, it will be found that in some of the older offices the (G) relay which is to be removed, is on the line finder frame and the (SL) relay which is ordinarily with the line finder frame equipment is located on the district selector circuit mounting plate. Since there is no other spare position available on this mounting plate it will be necessary to relocate the (SL) relay in the position left vacant by the (G) relay in order to create a spare position on the district frame for the new (SX) relay.

5.05 In modifying ES-20129-01, for remote control zone registration, the present 90B type condensers designated (A1) shall be replaced by five 137C condensers. One unit of each of these condensers shall be rewired as the (A1) condensers and the other used for the new 2 mf condenser designated (R1).

5.06 In modifying district frames where there are both MRP and MRI district selectors, all districts should be treated as MRP districts and modified accordingly, leaving the resistance position unequipped in the case of the MRI circuits.

5.07 When FR, MRI, or MRP district selector circuits are modified for remote control zone registration, it will be necessary to change the translator or decoder cross-connections to provide a routing through the tandem office.

5.08 Where 2 party message rate district selectors are modified for remote control zone registration and the 59D resistance designated (R1) is mounting on mounting details per ED-20879-01, the battery terminal of this resistance shall be covered with sleeving which shall completely cover the soldered connection and the terminal.

5.09 The leads from the (R1) resistances on 2 party message rate district selectors to the positive battery bus bar on the fuse board shall, in general, be run from the district terminal strip to the fuse board in code 1450, switchboard cable or as required, one cable per side of each district frame. However, where no terminal punchings are available for these leads, this cable shall be butted at the top of the frame and the leads superimposed on the frame local cable.

5.10 The additional wiring required for the modification of district selector circuits for remote control zone registration shall be superimposed on the existing cable forms.

5.11 Where the non-magnetic apparatus is mounted on adapters, it shall be wired with standard 22 gauge wire. The wires required for connections between this apparatus and apparatus on the selector circuit mounting plates shall be furnished with the supplementary local cable.

5.12 Where all of the added apparatus is located on mounting plates it shall be wired with 22 gauge wire in the standard manner.

5.13 There are three leads between each MRI and four between each MRP district selector circuit and its associated timing unit on the timing frame. These leads shall be run in switchboard cable, one cable per side of frame direct from the timers to terminal strips on the district frame. The "H" lead in each case shall be terminated on the switchboard cable side of the present punching on which the "Hunt" lead from the line finder frame terminates. On most frames this terminal is designated "H". However on some older frames, it may be a numbered terminal.

5.14 The additional terminal strips required for the leads described in paragraph 5.13 shall be designated and located as shown in Figs. 13-22 on ED-20880-01. On district frames constructed similar to T-505743, it will be necessary to make one

drilling per side of each frame for the terminal strip mounting detail. In general on modern type district frames constructed similar to ED-20177-01 the additional terminal strips can be mounted without additional drillings on the frame. However, it will be necessary to replace or supplement the present terminal strip mounting details for the terminal strips designated "C" and "E" on ED-20178-01, with new details per Fig. 6, 7 or 9, 10 or 11 on ED-20879-01. Fig. 7 and 10 or 11 are used only on the end frames in the lineup where because of interference, it will be necessary to replace the present end guard support by these new details which serve both as terminal strip mountings and end guard supports. Figs. 10 or 11 are used on old type frames where the end guards are of welded construction. When these two details are used, it will be necessary to provide four drillings per side of each end frame.

5.15 In offices modified for non-zone overtime registration, the timing frames, required for use with the district selectors shall be located on the same floor as the district frames. These new frames shall be located as close to the district frames as possible in order to keep the conductor length between frames within the limits specified on the circuit drawings. The 22 volt a-c supply and the fuses for the motors of the timer drives shall be located on the first frame of a pair of timer frames in accordance with ED-20883-01.

5.16 When providing either remote control registration or non-zone overtime registration on line finger type jobs, it is necessary to arrange both the district selectors and line circuits so that the subscriber register can be operated during the talking interval. On party service the present method of connecting the "H" or charging lead to the register of the proper party consists of releasing or holding operated the (CO) relay depending on the party to be charged. Since this method is only applicable when charging occurs after disconnect, the modification outlined herein, involving a polarized relay operated by positive or negative battery from the district, will permit conversion of the party line circuits to allow for the charging during conversation. These added polar relays are located on standard bulb angle framework and are connected into the district and line circuits, as shown on the cross-connections on the various line circuits. This change in method of scoring the subscriber register is fundamental and it is recognized that during the period of conversion some time will elapse during which no charging will be accomplished as the subscriber register will be removed from service to prevent false charging during circuit modification. It is recommended that the following procedure be followed for making the conversion in order to permit its being accomplished during the interval between peak load conditions and thus keep to a minimum the time the register is not connected to the line circuit. As the first step in preparation, install the 2 party message register relay equipment with associated cabling to the line circuit and distributing frame, at the same time providing the wiring changes necessary in the district selector circuits. When making the changeover, any 2 party line group may be cut-over independent of any others in the office. It will be necessary, however, to cut over all of the districts, serving a line group, as well as all of the lines in the line group at the same time. As the first step in the cut-over, all charging should be stopped by opening the battery for the charge lead at the contact of the (G) relay in all of the districts in a line group. The connection of the new polar relays into the line circuits may then be proceeded with and districts may be removed from service in order to have the necessary wiring changes made. Some districts must of course be left in service in the line group to handle traffic during the period of conversion. When converted, the districts may be tested and restored to service to permit changing those left to handle calls during the period of modification. When the changed districts are replaced in service, before a complete line group is connected and ready for service on the new charging basis, the operating path to the polar relay shall be left open at the relay contact in the district circuit thru which is supplied either the positive or negative battery, in order to prevent false charging on any line on which conversion has not been completed. After the conversion of all the lines and districts in a line group this connection can be made and service provided on the new method of operation. On some link type districts the cam changes involved may be made prior to the changing of the district if desired. However, in all other districts the cam changes shall be made at the same time as the remainder of the modifications.

5.17 When providing either remote control registration or non-zone overtime registration in line switch offices it will be necessary to add an "R" type relay in the MRI line circuit ES-207698 in accordance with SD-21525-01. MRI line circuits which provide local control zone registration traffic (SD-21525-01) and the MRP line circuit SD-207869 will not require any change.

5.18 Offices modified for either remote control zone registration or non-zone overtime registration, having party districts, will require positive 48 volt battery for use between the district circuit and the polar relay on the two party message register relay frame. To obtain this +48V. battery a 105A power plant shall be furnished and located in the power room. The equipment units to be provided with the 105A power plant shall consist of one J86579B, List 4 and one J86579C, List 1. This arrangement will provide a plant of sufficient size to

care for the maximum number of party districts expected in one building. The wiring of the power plant shall be modified by the installer as shown on SD-80765-01. The rectifier provided with J86579B, List 4 is for operation from 105-125 volt, 50-60 cycle, service. In the event that only 190-250 volt power service is available the power plant can be ordered per "J86579B List 4 except that the rectifier shall be for operation from 190-250 volt service." The leads and conduit for connecting the power plant to the fuse cabinet as well as the distribution leads shall be as ordered by the telephone company. The wiring from the 105A power plant to the distribution fuse panel on the miscellaneous fuse bay that is on the floor with the district frames, shall agree with SD-80765-01. One fuse is provided on the misc. fuse bay for each 5 party districts and cabled to the district frames in accordance with paragraph 5.09.

5.19 In order to select the proper talking selection referred to in paragraph 1.09, cross-connection changes may be required on the pulse distributing frame in translator type offices or on the decoder frames in decoder type offices. On decoder frames where Fig. A of SD-21277-01 is furnished, "W" apparatus, consisting of the (TSA) and (TSB) relays, shall be equipped if they have not been provided. On decoder frames, which have been wired for but not equipped for local control zone registration per Fig. B of SD-21277-01, equipment similar to that shown in Fig. A, less "X" apparatus, shall be provided and the present "Z0" and "Z1" terminals redesignated "RB" and "TS", respectively. All decoder frames should be equipped per issue 13-AR of SD-21277-01 which provides for the addition of two R type relays designated (X1) and (X2) and two leads designated "X1" and "X2" to the decoder test circuit. If issue 13-AR has been applied on decoder frames which have been wired and equipped for local control zone registration, no other changes will be required, but instructions should be issued that the "Z0" and "Z1" terminals should be used for the first and second talking selections, respectively. Decoder test frames shall be modified in accordance with issue 13-AR of SD-21188-01. This change consists of adding five E or R type relays; changing one E type; adding four 19 type resistances and one 2 type lamp for the purpose of testing the ability of the (X1) and (X2) relays in the decoder circuit to operate and lock.

5.20 Sender selector type subscriber senders such as ES-240067 will require no change. Decoder type senders such as SD-21193-01 will require the equipment of the (TS1) relay if it is not already provided. Link non-decoder senders such as SD-20011-01 that are not wired and equipped for local control zone registration will require the addition of a (TS1) relay.

5.21 The trouble indicator frame will require the addition of a (TSB) or (ZCB) relay and lamp depending on which is equipped in the decoder circuit. The decoder test frame will require no change.

5.22 Under one arrangement of line circuit and (P) relay connections, it will be necessary to make connection at the HIDF to make tests of the registers. Because of the extra three terminals on the HIDF blocks, that are used for intercepting service, the present standard test plug can not be used. If this arrangement of line circuit connections is used, it will be necessary to provide test plugs with a wider throat in order to span the extra terminals. If and when this condition is encountered, it should be referred to the Bell Telephone Laboratories at which time a new test plug will be developed.

5.23 There are two arrangements of line circuit and (P) relay connections shown on the various line circuits where the winding (M) lead of the (P) relay is wired to the IDF. If and when either of these two arrangements is used and it is desired to make tests of the (P) relays at the IDF, the matter should be referred to the Bell Telephone Laboratories at which time a (+48V) test battery supply jack will be added to the miscellaneous circuit for the IDF.

5.24 When two party message rate equipment is modified for remote control zone registration, a jack (P) per Fig. 18 and a jack (+48V) per Fig. 19 on SD-21271-01 shall be provided at the message register rack for connection to the tie line and test jacks that are provided at the two party message register relay frame. These jacks shall be located as shown on ED-90558-01. One test battery supply circuit per Fig. 5 on SD-21919-01 shall be provided per office and located on the miscellaneous fuse board.

5.25 The cabling between the 2 party message register relay equipment on the relay frame and the distributing frame or line relay equipment also the cabling between the timing equipment on the timing frame and the district selector frame shall be as shown on the cabling drawings listed herein.

5.26 When the link, sender selector or line switch type district selector equipments are modified for non-zone overtime and remote control zone registration, it will also be necessary to modify the associated district selector test frame to test this equipment. In offices where the test frame is not equipped for local control zone registration, it will be necessary to provide this equipment in addition to that required for non-zone overtime and remote control zone registration. The two link type district selector test circuits SD-20240-01 and SD-20240-02 have been replaced by a new circuit SD-20240-03, and since this new circuit includes in the main figure all of the present standard features shown optional on

SD-20240-01 and -02 plus a circuit for testing non-zone overtime and remote control zone registration equipments, it will be necessary to bring the test frame up to issue 44 of SD-20240-01 or issue 40 of SD-20240-02 when adding non-zone overtime and remote control zone registration. The sender selector and line switch district selector test circuit SD-21438-01 and SD-21517-01 respectively, have been reissued to add this feature and test frames wired and equipped per ES-239515 or ES-226323 and ES-239517 shall be brought into agreement with these two circuits.

5.27 From an equipment standpoint, there are two types of link district test frames to be modified namely: those with test groups on a unit basis and those with test groups on a non-unit basis. All of the additional equipment required for the modification of these frames shall be located on the frame as shown on ED-20583-01, ED-20359-02 and ES-373694. In order to accomplish this it has been necessary to make some changes in the location of existing apparatus. This will also result in bringing all similar type frames into agreement which will be a decided aid to the maintenance force. In the case of the latest type frame per ED-20583-01, a mounting plate, equipped with non-magnetic apparatus has been located on adapters in the spare sequence switch position. It will be necessary, therefore, to provide four drillings for these adapters on this type frame.

5.28 The sender selector and line switch district selector test circuits, SD-21438-01, and SD-21517-01 have been reissued to add the feature for testing non-zone overtime and remote control zone registration. When modifying these frames, it will be necessary to locate on the miscellaneous relay rack, the relay portion of the additional apparatus required for non-zone overtime and remote control zone registration. On a few jobs, where one district selector test frame serves two units and a second set of exercise test equipment is mounted on the frame it will even be necessary to locate the relay portion of the equipment required for local control zone registration on the relay rack. The equipment arrangements for the modification of sender selector and line switch district selector test frames shall be as shown on ED-20894-01.

5.29 The standard arrangement for timing message registers is furnished as a part of the main figure on link district test circuit SD-20240-03. However, on the sender selector and line switch test circuits SD-21438-01 and SD-21517-01, this feature is shown in optional lettered figures, one of which is rated "Mfr. Disc." It is essential for the proper operation of the district test circuit that the standard arrangement be provided when modifying these frames for non-zone overtime and remote control zone registration.

5.30 A new test feature for the district (CS) relay has been included as a part of SD-20240-03 but has been added as a separate improvement on SD-21438-01. The new (CS) relay test together with the "D" adjustment for both new and existing district selectors is recommended as an improvement which considerably reduces maintenance effort. In order for the district selector test circuit to function properly, however, all district selector circuits which it serves must have the same adjustment on the (CS) relay.

5.31 When link type district selector test circuits per SD-20240-01 or SD-20240-02 are modified to agree with SD-20240-03 before all (CS) relays of districts, served by the test frame are provided with the "D" adjustment, it will be necessary to temporarily arrange the test frame so that those districts, whose (CS) relays have not been readjusted may be tested without having the test circuit block itself on the CS test. This can be done by temporarily installing a 92B key in the lead between the RL and RL1 resistances. This key may be mounted in the spare lamp position on the test frame fuse panel or in any other convenient place that may be available.

5.32 The additional wiring required for the modification of district selector test frames for non-zone overtime and remote control zone registration shall be superimposed on the existing cable forms. In the case of sender selector and line switch test frames, the leads between the test frames and the apparatus mounted on the miscellaneous relay rack shall be run in switchboard cable code as required.

5.33 In offices where the district selector test frame is required to test remote control zone registration equipment, it will be

necessary to provide an additional set of interrupter contacts, designated (RCC). They shall be located on the miscellaneous interrupter frame as shown on ED-21666-01.

5.34 In addition to the equipment required for the modification of the district test frame itself, a new circuit, SD-21902-01, has been issued to provide test battery for a maximum of six district test circuits. Its function is to provide battery pulses for firing the 346A vacuum tube in each district when the remote control zone registration feature is under test. The equipment for this circuit shall be mounted on the miscellaneous relay rack as shown on ED-21902-01. The leads between this equipment and the district selector test frame shall be run in code 1450 switchboard cable.

5.35 It will be noted that a 12 type resistance lamp is specified in the ringing supply lead shown in Fig. 2 of SD-21902-01. The 12 type lamp is used in preference to a 13 type, because it may be mounted in a 46A lamp socket, which permits it to be easily removed when the 45 volt battery in this lead is being measured. This protects the maintenance force against possible injury and the meter against possible damage in case an accidental ground should be placed in the measuring circuit.

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