

E-TYPE SIGNALING SYSTEM

SIGNALING COMPATIBILITY

1. GENERAL

1.01 This section furnishes information on the signaling compatibility of E-type signaling systems with various switching systems.

1.02 This section is reissued to include the latest compatibility information.

DWG	CD	DATE	APPD
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COMMON SYSTEMS

TYPE E SIGNALING SYSTEM
SIGNALING COMPATIBILITY
WITH SWITCHING CIRCUITS

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GENERAL INFORMATION

1.0 DESCRIPTION OF THIS DRAWING

1.0.1 VERTICAL LINES IN THE MARGIN ARE USED TO INDICATE CHANGES OR ADDITIONS IN THE TEXT SINCE THE LAST ISSUE OF THE DRAWING.

1.1 THE COMPATIBILITY INFORMATION IN THIS DRAWING HAS BEEN VERIFIED BY FIELD OR LABORATORY TESTS. OTHER ARRANGEMENTS ARE WORKABLE AND ARE IN ACTUAL USE. THESE LATTER ARRANGEMENTS AND OTHER PROPOSED ARRANGEMENTS WILL BE LISTED AS THEY ARE VERIFIED BY ANALYSIS OR LABORATORY TESTS.

1.2 THE COMPATIBILITY INFORMATION IN THIS DRAWING ASSUMES THAT THE TALK-OFF AND ANY NECESSARY SIGNALING MODIFICATIONS HAVE BEEN MADE IN THE SIGNALING UNITS. THESE IMPROVEMENTS HAVE BEEN MADE IF THE SIGNALING UNITS ARE MARKED WITH THE FOLLOWING SERIES NUMBERS OR HIGHER.

E1A-10, E1B-10, E2B-10, E3B-7,
E4B-20, E1C-10, E2C-10,
E1D-10, E2D-10, E3D-10,
E4D-20, E1E-10, E1F-10,
E1J-20, E2L-10, E2S-10,
E2SA-10, E2LA-10

IN ADDITION, THE E1A, E1B, E2B, E3B, E1C, E1D, E1E, AND E1F UNITS WHICH HAVE BEEN MODIFIED ARE STENCILED WITH THE COMPATIBILITY DESIGNATION K AS A MEANS TO IDENTIFY MODIFIED UNITS. OTHER BASIC CODES DO NOT REQUIRE THIS MARKING BECAUSE THEY ALL INCLUDE THE BASIC TALKOFF IMPROVEMENTS. WHERE SIGNALING COMPATIBILITY REQUIRES THE USE OF TYPE E SIGNALING UNITS WITH ADDITIONAL MODIFICATIONS, THE SERIES NUMBER OF THE REQUIRED SIGNALING UNIT AND THE COMPATIBILITY DESIGNATION WHERE APPLICABLE WILL BE LISTED IN SECTIONS B, C AND D IN ADDITION TO THE BASIC CODE.

1.3 SECTION B OF THIS DRAWING WILL DESCRIBE CERTAIN TYPE E SIGNALING UNITS AND CERTAIN OF THEIR SIGNALING CHARACTERISTICS. SECTION C WILL PROVIDE DETAILED SIGNALING COMPATIBILITY INFORMATION ON TYPE E SIGNALING UNITS WHEN WORKING WITH CERTAIN CLASSES OF SWITCHING CIRCUITS. SECTION D WILL PROVIDE STILL MORE DETAILED SIGNALING COMPATIBILITY INFORMATION IN THAT IT WILL LIST THE COMPATIBILITY RATING OF SWITCHING CIRCUITS WITH TYPE E SIGNALING UNITS ACCORDING TO SWITCHING CIRCUIT NUMBER AND TYPE E SIGNALING UNIT CODE.

1.4 SECTION D LISTS SWITCHING CIRCUITS FOLLOWED BY THE TYPE E SIGNALING UNITS WITH WHICH THEY ARE COMPATIBLE. THE STANDARD OR PREFERRED UNIT IS LISTED FIRST FOLLOWED BY THE OTHER UNITS WHICH WILL PROVIDE SATISFACTORY OPERATION. WHERE SPECIAL PROVISIONS ARE REQUIRED FOR COMPATIBLE OPERATION THESE ARE LISTED UNDER NOTES OR A REFERENCE IS MADE TO SECTION B OR C OF THIS DRAWING. IF NO UNITS ARE COMPATIBLE THE MAJOR REASONS ARE LISTED UNDER NOTES.

2.0 DESCRIPTION OF E-SIGNALING UNITS

2.1 TYPE E SINGLE-FREQUENCY SIGNALING IS APPLICABLE TO CENTRAL OFFICE TRUNKS, PBX TIE TRUNKS AND TIE LINES, AND PBX AND CENTRAL OFFICE LINES. UNITS ARE AVAILABLE FOR E+M LEAD, LOOP, OR REVERTIVE PULSE SIGNALING. WHEN PROPERLY CHOSEN, THESE SIGNALING UNITS PROVIDE A MEANS FOR CONVERTING LOCAL-EXCHANGE-AREA DC SIGNALING OR 20HZ (HERTZ OR CYCLES PER SECOND) RINGING TO SINGLE-FREQUENCY TONE, USUALLY 2600 HZ, USING THE NORMAL

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SPEECH TRANSMISSION PATH OF A CARRIER CHANNEL OR A VOICE-FREQUENCY LINE FACILITY. IN GENERAL, SINGLE-FREQUENCY TONE-ON SIGNIFIES ON-HOOK, BUT EXCEPTIONS WILL BE DESCRIBED. PARTIAL PULSE CORRECTION OF DIAL PULSE AND WINK SIGNALS IS ALSO PROVIDED BY CERTAIN OF THESE UNITS. CONVERSION FROM LOOP TO E+M OR E+M TO LOOP SIGNALING MAY ALSO BE ACCOMPLISHED BY USING THE PROPER SIGNALING UNITS. DIAL PULSING IS LIMITED TO DIALS OR SENDERS WITH A NOMINAL SPEED OF 10 PULSES PER SECOND.

2.2 A MISUNDERSTANDING SOMETIMES ARISES IN THE WORDS THAT ARE USED IN SD'S, CD'S AND BSP'S TO DESCRIBE TYPE E SIGNALING FUNCTIONS AS COMPARED WITH THOSE THAT DESCRIBE SWITCHING FUNCTIONS. FOR EXAMPLE, WHEN AN ON-HOOK SIGNAL IS PASSED FORWARD, THE SF SYSTEM SENDS TONE-ON WHICH OPERATES THE TERMINATING SF RECEIVER WHICH, IN TURN, RELEASES OR DISCONNECTS THE TERMINATING SWITCHING CIRCUIT; ALSO CONVERSELY. IN THIS DRAWING THE WORDS THAT ARE USED ARE THOSE THAT ARE MOST APPROPRIATE TO THE FUNCTION BEING DESCRIBED.

3.0 TYPE E SIGNALING CHARACTERISTICS.

FOR COMPATIBLE OPERATION OF TYPE E SIGNALING WITH SWITCHING EQUIPMENT, THE FOLLOWING CHARACTERISTICS AND REQUIREMENTS MUST BE CONSIDERED.

3.1 VOICE SIMULATION OF SF TONE (TALK-OFF)

3.1.1 VOICE SIMULATION OF SINGLE FREQUENCY TONE MAY CAUSE CLICKS, FALSE DISCONNECTS, OR FALSE RINGING SIGNALS. PROTECTION AGAINST TALK-OFF IS PROVIDED PARTLY BY GUARD ACTION IN THE SF RECEIVER AND PARTLY BY TIMING. THE TIMING THAT CAN BE PROVIDED IN THE SF UNIT IS LIMITED

BY THE NEED TO PASS DIAL PULSES AND RING-FORWARD SIGNALS. CONSEQUENTLY, THE DRAWINGS OF ALL STANDARD INCOMING TRUNK CIRCUITS (EXCEPT REVERTIVE PULSING CIRCUITS), AND ALL OUTGOING CAMA TRUNK CIRCUITS WHICH CAN BE DISCONNECTED BY AN ON-HOOK SIGNAL FROM THE TERMINATING END, HAVE BEEN MODIFIED TO PROVIDE A MINIMUM OF 140 MS DISCONNECT TIME TO ASSIST IN PREVENTING FALSE DISCONNECTS DUE TO TALK OFF. THIS LONG DISCONNECT TIME WAS ACHIEVED ON SOME CIRCUITS BY CHANGING THE DISCONNECT RELAY, ON OTHERS BY ADDING A DIODE ACROSS THE RELAY WINDING. ON EXISTING CIRCUITS A 446F OR SIMILAR DIODE MAY BE USED, RATHER THAN REPLACING THE RELAY, PROVIDED THE 140MS MINIMUM RELEASE TIME IS ACHIEVED.

3.1.2 THE E1D AND E3D UNITS HAVE LONG RECEIVER OPERATE TIMES AND CONSEQUENTLY PROVIDE A LONG DELAY BEFORE SIGNALING THE INCOMING SWITCHING CIRCUIT TO RELEASE. THESE UNITS WERE DESIGNED FOR USE WITH INSTALLED TRUNK CIRCUITS WHICH HAVE NOMINAL DISCONNECT TIMES OF 40 MS AND WHICH WILL NOT BE MODIFIED TO PROVIDE THE LONGER DISCONNECT TIMES. HOWEVER, SOME OF THESE UNITS MAY ALSO BE USED ON LONG DISCONNECT TIME TRUNK CIRCUITS. THE E1D AND E3D UNITS CANNOT PASS THE 100 PLUS-OR-MINUS 30 MS RING-FORWARD SIGNAL.

3.1.3 THE E1E/E1F REVERTIVE PULSE UNITS ALSO HAVE A LONG DISCONNECT TIME. THESE UNITS PERFORM SATISFACTORILY, FROM A TALK-OFF STANDPOINT, WITH FAST-DISCONNECT INCOMING TRUNK CIRCUITS HAVING RELEASE TIMES OF NOMINAL 40 MS. THE E1E/E1F UNITS ALSO ARE NOT ABLE TO PASS A RING-FORWARD SIGNAL.

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3.1.4 THE E1C AND E2C UNITS DO NOT PROVIDE ADEQUATE TALK-OFF PROTECTION FOR OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END EVEN THOUGH THE OUTGOING TRUNK CIRCUIT HAS A MINIMUM DISCONNECT TIME OF 140 MS. THE E3C, E4C AND E5C DO PROVIDE THIS PROTECTION AND ARE SATISFACTORY FOR SUCH APPLICATIONS.

3.1.5 ALTHOUGH SXS CIRCUITS PROVIDE AMPLE DISCONNECT TIME TO OVER-RIDE FALSE CN-HOOKS GENERATED BY VOICE-SIMULATED SIGNALS, ANY FALSE ON-HOOK GENERATED IN AN SF LINK BETWEEN SXS CIRCUITS WILL BE PASSED ALONG IMMEDIATELY. THUS, WHEN SXS IS USED AS A TANDEM TO ANY MACHINE SWITCHING OFFICE HAVING FAST DISCONNECT TRUNKS, THESE TRUNKS MUST ALSO BE MODIFIED TO BE SLOW DISCONNECT IF SF SIGNALING IS USED IN THE SXS LINK. SIMILARLY, FOR BUILT-UP TRUNKS HAVING E+M LINKS, A SLOW DISCONNECT TRUNK CIRCUIT MUST BE PROVIDED IN THE CONNECTING LOOP FACILITY EVEN THOUGH THE SF SIGNALING EQUIPMENT IS IN THE E+M LINKS.

3.1.6 ON NON-COIN E+M LEAD TYPE RECORDING-COMPLETING, TSP, TSPS, AND CONTROLLED-RING TOLL-SWITCHING TRUNKS, A WINK SIGNAL IS USED TO CONTROL RINGING TO THE CUSTOMER. WHEN SF SIGNALING IS USED ON THESE TRUNKS, A LOW PROBABILITY EXISTS THAT A VOICE SIMULATION OF THE SIGNALING TONE CAN CAUSE A FALSE RING DURING THE CALL.

THESE TRUNK CIRCUITS ARE RATED COMPATIBLE BECAUSE THE PROBABILITY OF A FALSE RING IS SO LOW THAT CIRCUIT MODIFICATIONS TO IMPROVE THE SITUATION ARE NOT CONSIDERED JUSTIFIED. HOWEVER, CONSIDERATION SHOULD BE GIVEN TO ASSIGNING THESE TRUNKS TO FACILITIES THAT DO NOT USE SF SIGNALING, WHEN SUCH FACILITIES ARE AVAILABLE.

3.2 VOICE INTERFERENCE WITH SF TONE DETECTION (TALK-DOWN)

3.2.1 DURING A 'FREE CALL' THE OPERATOR AT THE TERMINATING END DOES NOT PROVIDE ANSWER SUPERVISION. SHE, THEREFORE, SUPERIMPOSES HER SPEECH ON THE 2600-HZ TONE. THE ORIGINATING-END SIGNALING UNIT ASSUMES ITS BROADBAND STATE UNDER THESE CONDITIONS TO INSURE THAT HER SPEECH WILL HELP TO HOLD THE ORIGINATING-END RECEIVER OPERATED AND THEREBY PREVENT FALSE RELEASE OF THE ORIGINATING-END SF RECEIVER AND CLICKS TO THE CUSTOMER.

3.2.2 DELAYED-SEIZURE TYPE TOLL-CONNECTING TRUNKS HAVING OPERATOR ACCESS AND TERMINATING IN LOOP-TYPE SF UNITS SHOULD HAVE AN ORIGINATING SF UNIT WHICH PROVIDES A TRANSMISSION CUT DURING IDLE. THIS WILL PREVENT OPERATOR SPEECH, SUPERIMPOSED ON THE 2600 HZ TONE, FROM RELEASING THE TERMINATING SF UNIT AND THEREBY REGISTERING FALSE DIAL PULSES BEFORE THE ACTUAL DIAL PULSING BEGINS. LOOP-TYPE TERMINATING UNITS ARE VULNERABLE TO THIS EFFECT BECAUSE THEY DO NOT INTERPOSE A 2600 HZ FILTER AT THE INPUT TO THE SIGNALING RECEIVER WHEN RECEIVING 2600 HZ TONE.

3.3 TONE OR NOISE INTERFERENCE WITH SF TONE DETECTION

3.3.1 SHORTENING OR OBLITERATION OF DIAL PULSES DUE TO ORIGINATING-END RELAY TRANSIENTS. WHERE THE ORIGINATING-END RELAY EQUIPMENT RECEIVES PULSES OVER A METALLIC LOOP AND REPEATS THESE PULSES INTO THE TYPE E SIGNALING EQUIPMENT, THE BUILD-UP AND COLLAPSE OF THE LOOP CURRENT IN THE REPEATING OR HYBRID COIL MAY GENERATE TRANSIENT NOISE PULSES WHICH DEPRESS THE

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CARRIER GAIN IN COMPANDORED SYSTEMS AND RAISE THE GUARD LEVEL IN THE TERMINATING SF UNIT AT THE BEGINNING OF THE FIRST DIAL PULSE. DURING THE FIRST DIAL PULSE AND FOR THE DURATION OF THE DIAL PULSE TRAIN, THE OUTGOING TRUNK CIRCUIT, OR THE ORIGINATING SF UNIT OR THE TRANSMISSION PATH CUT CIRCUIT SD-99778-01 MUST TERMINATE THE TRANSMIT PAIR TO EXCLUDE FURTHER NOISE ORIGINATING IN THE DROP. IN ADDITION, WHEN E-TYPE SIGNALING IS USED ON COMPANDORED CARRIER SYSTEMS, THE COMPANDOR SHOULD GENERALLY BE OF THE DESIGN WHICH PROVIDES VARISTOR TRANSIENT VOLTAGE SUPPRESSION AND FAST RECOVERY FROM THE EFFECTS OF SWITCHING TRANSIENTS TO REDUCE THE EFFECT OF THAT PART OF THE FIRST PULSE TRANSIENT THAT PASSES BEFORE THE CUT TAKES PLACE. EVEN WITH THESE FEATURES, SOME RESIDUAL NOISE WILL BE TRANSMITTED ON THE FIRST DIAL PULSE. THE TYPE E SIGNALING COMPATIBILITY RECOMMENDATIONS IN THIS DRAWING TAKE INTO ACCOUNT THE RESIDUAL EFFECT OF THIS FIRST TRANSIENT.

3.3.2 FALSE DIAL PULSES ARISING FROM START-DIAL SIGNALS

THE START-DIAL SIGNAL FROM TERMINATING SENDERS OR INCOMING REGISTERS IS A RETURN-TO-NORMAL BATTERY ON THE T+R LEADS. THIS RESTORAL OF THE TERMINATING TRUNK CONDUCTORS TO NORMAL BATTERY PRODUCES A TRANSIENT WHICH DELAYS THE 2600 HZ TONE-CUT IN THE ORIGINATING SF RECEIVER. WITH A LOOP SF UNIT AT THE ORIGINATING END, ASSOCIATED WITH A SENDER, THE RETURN LOSS MAY BE POOR. THE RESULTING 2600 HZ TONE REFLECTION COULD CAUSE THE TERMINATING SF UNIT TO OPERATE AND CAUSE THE TERMINATING SENDER OR INCOMING REGISTER TO SCORE A FALSE

PULSE. THIS TYPE OF FAILURE IS PREVENTED BY USING A TERMINATING SF UNIT WHICH DELAYS THE APPLICATION OF TONE TO ALLOW THE EFFECTS OF THE TRANSIENT TO SUBSIDE AND CUTS THE TRANSMIT PAIR TO PREVENT THE TRANSMISSION OF ANY FURTHER NOISE FROM THE DROP. ALL E+M UNITS HAVE THESE FEATURES. ADDITIONAL MARGIN IS PROVIDED IN ALL DIAL PULSE LOOP TERMINATING UNITS AND THE E4B E+M UNIT BY A PRECUT FEATURE WHICH CUTS THE TRANSMIT PAIR FOR A PERIOD PRIOR TO THE APPLICATION OF TONE.

3.3.3 FALSE STOP SIGNALS ARISING FROM MF TONES ON MF TRUNKS. WHEN THE MF REGISTER AT THE TERMINATING END IS READY TO RECEIVE MF PULSES IT CHANGES TO ON-HOOK. THE ON-HOOK SIGNAL CAUSES THE SF RECEIVER AT THE ORIGINATING END TO OPERATE AND TO ASSUME ITS BROADBAND STATE. THE MF TONES FROM THE ORIGINATING SENDER MAY ECHO IF THE INCOMING REGISTER IS IN A 2-WIRE OFFICE, DUE TO THE POOR TERMINATION AT THE TERMINATING END, BUT THEY WILL HELP TO HOLD THE ORIGINATING-END RECEIVER OPERATED, PROVIDED THE ORIGINATING-END RECEIVER HAS ACHIEVED ITS BROADBAND STATE. IF THE MF ECHO COMES BACK BEFORE THE ORIGINATING END HAS ACHIEVED ITS BROADBAND STATE THE ORIGINATING SF UNIT MAY RELEASE. SINCE AN E+M UNIT GENERALLY REQUIRES 200 MS TO ACHIEVE THIS BROADBAND STATE (OPERATE THE RG AND RELEASE THE G RELAYS), IT MUST NOT BE USED AT THE ORIGINATING END OF MF TRUNKS UNLESS THE TERMINATING-END UNIT HAS A TRANSMISSION-CUT FEATURE. ALL E+M UNITS HAVE A CUT CIRCUIT WHICH SATISFIES THIS REQUIREMENT. THE E1D LOOP UNIT DOES NOT HAVE A CUT CIRCUIT AND SHOULD ONLY BE USED WITH AN ORIGINATING E1C.

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3.3.4 FALSE STOP-DIAL SIGNALS ARISING FROM TRANSIENTS GENERATED BY INCOMING TRUNK PULSE REPEATING RELAYS AND SELECTORS.

WHEN DIAL PULSES ARE REPEATED BY THE TERMINATING SF UNIT INTO AN INCOMING RELAY CIRCUIT, TRANSIENTS GENERATED IN THE INCOMING RELAY CIRCUIT BY THE PULSE REPETITION MAY BE SENT BACK OVER THE TRANSMIT PAIR. THESE TRANSIENTS DECREASE THE TONE LEVEL THROUGH COMPANDORED CARRIER SYSTEMS AND INCREASE THE GUARD IN THE SF RECEIVER, TENDING TO RELEASE THE ORIGINATING SF RECEIVER AND GENERATING A FALSE STOP-DIAL SIGNAL.

TERMINATING-END UNITS WHICH PROVIDE A CROSS-CONTROL CUT TO BLOCK NOISE TRANSMISSION FROM THE DROP FOR A TIMED INTERVAL STARTING WITH THE ONSET OR TERMINATION OF SIGNALING TONE FROM THE ORIGINATING UNIT ARE NOT LIKELY TO PRODUCE THIS TROUBLE.

TO FURTHER INSURE AGAINST FAILURE, E+M UNITS USED AT THE ORIGINATING END OF DIAL PULSE TRUNKS SHOULD HAVE THE INCREASED HOLDOVER FEATURE. ALL E4B UNITS AND ALL E1A, E1B AND E2B UNITS WITH COMPATIBILITY DESIGNATION K HAVE THIS FEATURE. E3B UNITS WITH DASH NUMBERS 11, 12, 13, 14 AND 21 OR UNITS WITH COMPATIBILITY DESIGNATION KA ALSO HAVE THE FEATURE.

3.3.5 RETURN OF ANSWER SUPERVISION ON TEST LINES.

CERTAIN TEST LINES MAKE A CHANGE FROM ON-HOOK TO OFF-HOOK FOLLOWED IMMEDIATELY OR AFTER A TIME DELAY BY THE APPLICATION OF AN AUDIBLE TONE OF A FREQUENCY OTHER THAN 2600 HZ. WHILE RECEIVING 2600 HZ TONE, THE ORIGINATING-END SF UNIT ASSUMES ITS BROADBAND STATE. WITH AN E+M LEAD UNIT AT THE ORIGINATING END, IF THE AUDIBLE TONE FOLLOWS TOO SOON AFTER THE OFF-HOOK, THE SF UNIT WILL NOT HAVE ENOUGH TIME TO REMOVE THE BROADBAND STATE (RELEASE THE RG AND

OPERATE THE G RELAYS) AND IT MAY HOLD OPERATED FROM AUDIBLE TONE. A GUARANTEED MINIMUM DELAY OF 150 MS IS REQUIRED BETWEEN SENDING THE OFF-HOOK SIGNAL AND SENDING THE AUDIBLE TONE WHEN TERMINATING EIA, EIB OR EID UNITS ARE USED BECAUSE THEY DO NOT PROVIDE A TRANSMISSION PATH CUT CIRCUIT UNDER THESE CONDITIONS. ALL OTHER UNITS HAVE CUT CIRCUITS WHICH BLOCK THE TRANSMISSION PATH FOR A SUFFICIENT PERIOD TO PREVENT THIS TYPE OF TROUBLE. FOR UNIVERSAL COMPATIBILITY THE TONE SHOULD BE DELAYED 150 MS AND IT SHOULD BE ASSUMED THAT THE FIRST 50 MS MAY BE LOST.

THIS 150 MS DELAY BETWEEN THE OFF HOOK SUPERVISION AND THE APPLICATION OF TONE IN THE TEST LINE IS NOT SUFFICIENT TO ALLOW FOR SUPERVISORY DELAY IN THE INCOMING TRUNK CIRCUIT OF A LOCAL OFFICE WHERE RINGING MUST BE TRIPPED. THEREFORE LOCAL OFFICE TEST LINE CIRCUITS REQUIRE A DELAY OF 300 MS FOR UNIVERSAL COMPATIBILITY.

3.3.6 TONE AND FLASH

TONE AND FLASH IS THE REPETITIVE ALTERNATION OF OFF-HOOK AND ON-HOOK SWITCHING SIGNALS FROM THE TERMINATING END ACCOMPANIED BY AUDIBLE TONE DURING THE ON-HOOK INTERVALS. SINCE MOST SF UNITS TEMPORARILY CUT THE TRANSMIT PATH DURING SUCH FLASHING, THE AUDIBLE TONE SIGNALS MAY BE SHORTENED OR OBLITERATED. IN THE CASE OF THE E1D UNIT WHERE THERE IS NO CUT, THE PRESENCE OF THE AUDIBLE TONE SIMULTANEOUSLY WITH THE 2600 HZ TONE MAY PREVENT THE ORIGINATING-END SF RECEIVER FROM DETECTING THE 2600 HZ ON-HOOK SIGNAL CAUSING A FALSE CHARGE. THEREFORE, FOR PROPER OPERATION OF ALL SF UNITS, FLASH MUST BE REMOVED FROM CUSTOMER AND CIRCUIT BUSY SIGNALS.

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3.3.7 INBAND COIN CONTROL.

IN CERTAIN APPLICATIONS, SUCH AS INBAND COIN CONTROL, AN ON-HOOK WINK IS SENT TOWARD THE SF UNIT AND THIS IS FOLLOWED BY SPECIAL TONES. WITH THE E+M LEAD UNITS HAVING G RELAYS AT THE ORIGINATING END, THE SPECIAL TONE CAN BE APPLIED IMMEDIATELY AFTER THE WINK SINCE THESE UNITS DO NOT ASSUME THE BROADBAND STATE DURING A WINK LESS THAN 210 MS IN DURATION. HOWEVER, IF THE TONE IS APPLIED IMMEDIATELY AFTER THE WINK ITS DURATION WILL BE SHORTENED BY THE CUT TIME OF THE SF UNIT AT THE END FROM WHICH THE TONE IS SENT.

3.4 COMPATIBILITY OF LEADS

3.4.1 COMPATIBILITY MUST BE ASSURED BETWEEN THE SIGNAL LEADS OF THE SF UNITS AND THE SWITCHING EQUIPMENT. THAT IS, THESE LEADS MUST HAVE THE PROPER POLARITY, VOLTAGE, AND RESISTANCE AND EACH CIRCUIT MUST PROVIDE THE SIGNALS NEEDED BY THE OTHER WITH PROPER TIMING AND IN PROPER SEQUENCE.

3.4.2 ALL LOOP TYPE E SIGNALING

UNITS WORK ONLY WITH SWITCHING CIRCUITS THAT CAN PROVIDE BATTERY ON THE RING CONDUCTOR FOR ON-HOOK POLARITY. THESE POLARITY REQUIREMENTS ARE GENERALLY MET IN THE MAJOR SWITCHING SYSTEMS. IN A FEW CASES WHERE THE TRUNK CIRCUIT CANNOT PROVIDE THE PROPER POLARITY BY MEANS OF STANDARD WIRING OPTIONS, IT MAY BE NECESSARY TO REVERSE THE T AND R LEADS ON A JOB BASIS.

3.5 DISCONNECT GUARD TIME.

ADEQUATE DISCONNECT GUARD TIME IS PROVIDED IN ALL SYSTEMS AT THE ORIGINATING END OF A TRUNK TO ASSURE RELEASE OF THE TERMINATING END OF

THE TRUNK BEFORE A NEW SEIZURE IS MADE AT THE ORIGINATING END. THE GUARD TIME WHICH IS SO PROVIDED ALLOWS FOR TRUNK DISCONNECT TIMES OF 140 TO 495 MS EXCEPT IN THE CASE OF THE E1F UNIT. IN THIS LATTER CASE ONLY FAST DISCONNECT TRUNKS (NOMINAL 40 MS) SHOULD BE USED TO AVOID DOUBLE SEIZURES AT THE ORIGINATING END.

3.6 RING-FORWARD DISTORTION.

THE E+M AND SOME LOOP TYPE UNITS WILL PASS RING-FORWARD SIGNALS OF 100 PLUS-OR-MINUS 30 MS IN LENGTH. THESE UNITS WILL NOT DISTORT RING-FORWARD SIGNALS SENT TOWARD AN OFF-HOOK. WHEN SIGNALING TOWARD AN ON-HOOK, THESE RING-FORWARD SIGNALS ARE SHORTENED ABOUT 15 MS BY THE PULSE CORRECTION OF THE RECEIVER. THIS DISTORTION MUST BE TAKEN INTO CONSIDERATION PARTICULARLY WHERE LINKS ARE OPERATED IN TANDEM OR WHERE RING-FORWARD SIGNALS ARE BELOW THE NOMINAL 100 MS.

3.7 SHORT SEIZURE TIME BEFORE OUTPULSING.

DIAL-PULSE ORIGINATING E+M LEAD UNITS OPERATING FROM CROSSBAR NO. 5 OR CROSSBAR TANDEM SENDERS AND WORKING TO A TERMINATING OFFICE WITHOUT A DELAY DIAL SIGNAL MUST HAVE THE REDUCED HIGH-LEVEL, HL, RELAY OPERATE TIME FEATURE PROVIDED BY THE E3B-22 UNIT OR ITS EQUIVALENT. THIS RESTRICTION IS NECESSARY TO INSURE THAT THE SENDER WILL NOT START OUTPULSING BEFORE THE HL RELAY CAN OPERATE TO APPLY HIGH-LEVEL TONE. IF THE HL RELAY HAS NOT OPERATED, THE DIAL PULSES WILL BE TRANSMITTED WITH LOW-LEVEL TONE.

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3.8 TRUNK PUMPING

3.8.1 THE E1D, E2D, E3D, AND E5D DO NOT HAVE FULL DUPLEX SIGNALING CAPABILITIES. THEY ALWAYS SEND ON-HOOK TOWARD THE ORIGINATING END WHEN ON-HOOK IS RECEIVED FROM THE ORIGINATING END REGARDLESS OF THE STATE OF THE ASSOCIATED INCOMING TRUNK CIRCUIT. THESE UNITS SHOULD NOT BE USED WITH STEP-BY-STEP OUTGOING REPEATER SD-31147-01, WHICH MOMENTARILY GOES ON-HOOK WHEN ANSWER SUPERVISION IS RECEIVED, BECAUSE PUMPING WILL RESULT. THIS LIMITATION APPLIES EVEN WHEN THE REPEATER IS USED AT THE ORIGINATING END OF AN INCOMING TRUNK TO A STEP-BY-STEP TANDEM OFFICE AND THE SF LINK IS ON AN OUTGOING TRUNK FROM THE TANDEM OFFICE. THE E4D UNIT HAS FULL DUPLEX SIGNALING AND SHOULD BE USED IN THESE APPLICATIONS.

SOME OTHER LOOP CIRCUIT ARRANGEMENTS ALSO RESULT IN PUMPING AT TIMES, WITH AN ORIGINATING E2C OR E4C AND A TERMINATING E2D OR E5D. WHERE THIS OCCURS, THE SUBSTITUTION OF AN E5C FOR THE E2C OR E4C, OR AN E4D FOR THE E2D OR E5D WILL USUALLY ELIMINATE THE PROBLEM.

3.9 E+M TO LOOP CONVERSION

LOOP-TYPE INCOMING TRUNK CIRCUITS SUCH AS SD-26070-01 ARE FREQUENTLY USED WITH AN E+M TRUNK CIRCUIT AT THE DISTANT END. E+M TO LOOP CONVERSION IS ACCOMPLISHED BY AN AUXILIARY TRUNK CIRCUIT WHICH IMMEDIATELY PRECEDES THE INCOMING TRUNK CIRCUIT. WHEN THIS ARRANGEMENT IS USED WITH A DELAY-DIAL OPTION, THE INCOMING TRUNK CIRCUIT RETURNS OFF-HOOK SUPERVISION WHEN NORMAL BUT THIS OFF-HOOK IS NOT PASSED THROUGH THE AUXILIARY UNTIL THE TRUNK IS SEIZED AT THE ORIGINATING

END. THIS IS REQUIRED TO PREVENT THE NORMAL OFF-HOOK OF THE INCOMING TRUNK CIRCUIT FROM HOLDING THE OUTGOING TRUNK CIRCUIT IN A CROSSBAR NO. 4 OFFICE PERMANENTLY BUSY. A SIMILAR ARRANGEMENT CAN BE PROVIDED WITH SF SIGNALING BY USING AN E+M UNIT AT THE ORIGINATING END AND A LOOP UNIT AT THE TERMINATING END. THE AUXILIARY TRUNK CIRCUIT IS NOT REQUIRED BECAUSE E+M TO LOOP CONVERSION IS ACCOMPLISHED WITHIN THE SF LINK. HOWEVER, IF THE DELAY DIAL OPTION IS USED AND THE ORIGINATING OFFICE IS CROSSBAR NO. 4, THE LOOP TERMINATING SF UNIT MUST PROVIDE THE BLOCKING FEATURE OF THE AUXILIARY TRUNK CIRCUIT. THEREFORE, THE E4D WHICH HAS FULL DUPLEX SIGNALING SHOULD NOT BE USED WHEN THE ORIGINATING OFFICE IS CROSSBAR NO. 4 AND THE TERMINATING OFFICE IS CROSSBAR NO. 5 OR CROSSBAR NO. 1. THE E5D IS THE STANDARD UNIT FOR THIS APPLICATION

3.10 GLARE DETECTION

TWO WAY E+M TRUNKS ALWAYS HAVE THE POSSIBILITY OF SIMULTANEOUS SEIZURES AT BOTH ENDS. WHEN SF SIGNALING IS USED, THE PROBABILITY OF SUCH AN OCCURANCE IS INCREASED BECAUSE OF THE DELAY IN TRANSMITTING A SIGNAL THROUGH THE SYSTEM. SOME CROSSBAR NO.5 OFFICES HAVE A GLARE DETECTION FEATURE WHICH CAN BE USED TO MINIMIZE THIS UNGUARDED INTERVAL, PROVIDED THE ROUND TRIP DELAY THROUGH THE SIGNALING SYSTEM EXCEEDS 100 MILLISECONDS. THIS FEATURE, WHEN AVAILABLE, SHOULD BE USED WITH SF SIGNALING BECAUSE THE ROUND TRIP TIME ALWAYS EXCEEDS THIS VALUE.

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3.11 SATELLITE TRANSMISSION
FACILITIES

USE OF A SATELLITE LINK IN THE TRANSMISSION FACILITY REQUIRES INCREASED TRUNK GUARD TIME AND ANTI-PUMPING FEATURES IN THE TRUNK CIRCUIT BECAUSE OF THE LONG PROPAGATION TIME IN THE SATELLITE LINK. TRUNK CIRCUIT OPTIONS PROVIDING THESE FEATURES MUST BE USED WHEN THERE IS A SATELLITE LINK IN THE TRANSMISSION FACILITY.

4.0 COMPATIBILITY OF TYPE E SF UNITS WITH OTHER TYPE E SF UNITS.

4.1 IN ADDITION TO ASSURING THE SIGNALING COMPATIBILITY OF THE E SIGNALING UNIT AT EACH END OF THE TRUNK WITH ITS CONNECTING SWITCHING CIRCUITS, IT IS NECESSARY THAT THE E SIGNALING UNITS AT EACH END BE COMPATIBLE WITH EACH OTHER. THE FOLLOWING RULES APPLY.

4.1.1 THE E1E AND E1F REVERTIVE PULSE UNITS ARE ONLY COMPATIBLE WITH EACH OTHER.

4.1.2 ALL E+M UNITS ARE COMPATIBLE WITH ALL OTHER E+M UNITS.

4.1.3 ALL LOOP ORIGINATING UNITS ARE COMPATIBLE WITH ALL LOOP TERMINATING UNITS.

4.1.4 ALL E+M UNITS ARE COMPATIBLE WITH ALL LOOP TERMINATING UNITS EXCEPT THE E1D AND IN SOME CASES THE E4D. SEE SECTION 3.9.

4.1.5 ALL LOOP ORIGINATING UNITS ARE COMPATIBLE WITH ALL E+M UNITS.

4.1.6 ALL CUSTOMER LINE UNITS, STATION END, ARE COMPATIBLE WITH ALL CUSTOMER LINE UNITS, CENTRAL OFFICE OR PBX LINE CIRCUIT END.

DETAILED CIRCUIT INFORMATION

1.0 E+M LEAD UNITS E1A, E1B, E2B,
E3B, E4B

1.1 AT ORIGINATING END

1.1.1 ALL DIAL-PULSE ORIGINATING E+M UNITS REQUIRE M-LEAD PULSE CORRECTOR, SD-99766-01, WHEN THE DIAL PULSES ORIGINATE FROM CUSTOMERS DIALS WITHOUT ADEQUATE PULSE CORRECTION. THE M-LEAD PULSE CORRECTOR IS NOT REQUIRED IF THE DIAL PULSES ORIGINATE FROM SENDERS WITH LOOP OPTION, OR FROM SENDERS DIRECTLY AS M-LEAD PULSES, OR FROM OPERATORS DIALS, UNLESS THE PULSES HAVE BEEN REPEATED BY TWO OR MORE TRUNK CIRCUITS WITHOUT ADEQUATE PULSE CORRECTION.

OUTGOING TRUNK CIRCUIT SD-31795-01, FIG. 2, (PULSE CORRECTION OPTION) DOES NOT PROVIDE ADEQUATE PULSE CORRECTION FOR E+M SF UNITS AND REQUIRES THE USE OF THE M-LEAD PULSE CORRECTOR.

WHEN PULSING FROM A SENDER INTO A TRUNK CIRCUIT WHICH REPEATS PULSES ON THE M LEAD, THE LOOP PULSING OPTION IN THE SENDER SHOULD NORMALLY BE USED. WHERE IT IS ESSENTIAL THAT BATTERY AND GROUND PULSING BE USED ON SPLIT TRUNK GROUPS BECAUSE SOME OF THE TRUNKS ARE ON LOOP PHYSICAL FACILITIES AN M-LEAD PULSE CORRECTOR IS REQUIRED ON THOSE TRUNKS WHICH USE E+M TYPE SF.

WHEN PULSING DIRECTLY FROM E+M PBX TRUNK OR TIE TRUNK CIRCUITS AN M-LEAD PULSE CORRECTOR IS NOT REQUIRED PROVIDED ALL OF THE PBX STATIONS HAVE MODERN DIALS (6-TYPE OR HIGHER) WITH A SPEED RANGE OF 8 TO 11 PULSES PER SECOND AND A PERCENT BREAK RANGE OF 58 TO 64 PERCENT AND NO MORE THAN THREE RINGERS ARE USED ON ANY STATION.

1.1.2 DIAL-PULSE ORIGINATING E+M LEAD UNITS OPERATING FROM CROSSBAR NO. 5 OR CROSSBAR TANDEM SENDERS AND WORKING WITHOUT A DELAY-DIAL SIGNAL REQUIRE FAST OPERATION OF THE HIGH-LEVEL HL RELAY. THIS FEATURE IS PROVIDED BY THE FOLLOWING UNITS E1A-12 OR HIGHER, E1B-12 OR HIGHER, E2B-12 OR HIGHER, E3B-15, -16, -17, -18, -22, OR HIGHER, AND E4B. ALL E1A AND E1B UNITS WITH COMPATIBILITY DESIGNATION K OR KD HAVE THIS FEATURE. E2B AND E3B UNITS, WITH THIS FEATURE, HAVE COMPATIBILITY DESIGNATION KA.

1.1.3 ALL DIAL-PULSE ORIGINATING E+M LEAD UNITS REQUIRE A TRANSMISSION-CUT CIRCUIT DURING DIAL-PULSING. THIS FEATURE IS PROVIDED IN ALL E+M LEAD UNITS EXCEPT E1A AND E1B. WHEN USING EITHER OF THESE LATTER UNITS, TRANSMISSION PATH CUT CIRCUIT SD-99778-01 IS REQUIRED. THE SF UNITS MUST BE E1A-13 OR HIGHER, OR E1B-13 OR HIGHER. USE OPTION Z OF SD-99778-01 WITH E1A-13 OR HIGHER AND OPTION Y WITH E1B-13 OR HIGHER. E1A AND E1B UNITS MODIFIED FOR USE WITH THE EXTERNAL CUT CIRCUITS HAVE COMPATIBILITY DESIGNATION KD.

ALL DIAL PULSE ORIGINATING E+M LEAD UNITS ALSO REQUIRE THE IMPROVED HOLDOVER FEATURE. THIS IS PROVIDED IN ALL E4B UNITS. E1A AND E1B UNITS WITH COMPATIBILITY DESIGNATION K OR KD. E2B UNITS WITH COMPATIBILITY DESIGNATION KA. E3B UNITS WITH DASH NUMBERS 11, 12, 13, 14, 21 OR UNITS WITH COMPATIBILITY DESIGNATION KA.

1.1.4 ALL E+M LEAD UNITS ARE COMPATIBLE FOR MF PULSING. HOWEVER, ORIGINATING E+M LEAD UNITS OPERATING WITH CROSSBAR NO. 5 OR CROSSBAR TANDEM SENDERS, REQUIRE THE TERMINATING SF UNIT TO HAVE A TIMED TRANS-

DETAILED CIRCUIT INFORMATION

MISSION CUT WHEN THE ORIGINATING SF UNIT RESPONDS TO THE START-DIAL SIGNAL, IN ORDER TO AVOID FALSE STOP SIGNALS. ALL E+M UNITS PROVIDE SUCH A CUT. ALL LOOP UNITS EXCEPT THE E1D UNIT PROVIDE SUCH A CUT. THE COMBINATION OF AN ORIGINATING E+M UNIT AND A TERMINATING E1D UNIT SHOULD THEREFORE, NOT BE USED.

1.2.5 THE DIAL-PULSE RECEIVING CIRCUIT MUST PRESENT AN ON-HOOK (GROUND ON M-LEAD) TO THE TYPE E E+M SIGNALING UNIT DURING DIAL-PULSING. THIS REQUIREMENT IS GENERALLY MET IN SWITCHING SYSTEMS BUT IT MUST BE CONSIDERED IN SOME PBX TIE-TRUNK AND TRUNK APPLICATIONS. TYPE F SIGNALING UNITS DO NOT HAVE THIS LIMITATION.

1.2 AT TERMINATING END

1.2.1 ALL E+M UNITS ARE COMPATIBLE FOR MF PULSING BUT REQUIRE SLOW-DISCONNECT INCOMING TRUNK CIRCUITS.

1.2.2 ALL E+M LEAD UNITS ARE COMPATIBLE FOR DIAL PULSING WHEN THE DIAL PULSES ORIGINATE FROM SENDERS OR OPERATORS. NO PULSE CORRECTION IS REQUIRED IN THE STEP-BY-STEP INCOMING TRUNK CIRCUIT FOR SUCH DIAL PULSES.

1.2.3 ALL E+M LEAD UNITS ARE COMPATIBLE FOR ALL DIAL-PULSING BUT REQUIRE PULSE CORRECTION IN THE INCOMING TRUNK CIRCUIT FOR STEP-BY-STEP WHEN THE PULSING ORIGINATES FROM CUSTOMER DIALS. AN M LEAD PULSE CORRECTOR AT THE ORIGINATING END DOES NOT OBTIATE THE NEED FOR THIS INCOMING TRUNK PULSE CORRECTION.

1.2.4 DIAL PULSE RECEIVING CIRCUITS GENERALLY PROVIDE CONTACT PROTECTION ON THE E LEAD. WHERE SUCH PROTECTION IS PROVIDED ON AN OPTIONAL BASIS AND IT IS REQUIRED TO PREVENT DAMAGE TO COMPONENTS IN THE SF UNIT, THE REQUIRED OPTION IS SHOWN IN SECTION D.

2.0 ORIGINATING LOOP-TRUNK UNITS

2.0.1 ALL ORIGINATING LOOP-TRUNK UNITS ARE LIMITED TO 2240 OHMS EXTERNAL CIRCUIT LOOP FOR SUPERVISION. DIAL-PULSE UNITS ARE LIMITED TO A 1500 OHMS CONDUCTOR LOOP FOR LOOP PULSING AND 2400 OHMS CONDUCTOR LOOP FOR BATTERY AND GROUND PULSING.

2.1 E1C UNIT

2.1.1 COMPATIBLE FOR MF PULSING TRUNKS.

2.1.2 NOT COMPATIBLE FOR DIAL-PULSE TRUNKS EXCEPT ON AN INTERIM BASIS WITH SENDERS WHICH HAVE OUTPUT LIMITS OF 9.5 TO 10.5 PULSES PER SECOND AND 59.5 TO 68 PERCENT-BREAK. THIS USE IS NOT RECOMMENDED ON A PERMANENT BASIS BECAUSE OF THE DIFFICULTY IN MAINTAINING THE SENDERS TO THESE READJUST REQUIREMENTS.

2.1.3 NOT COMPATIBLE WITH OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END. SUCH AS OUTGOING TRUNK CIRCUITS TO CAMA.

DETAILED CIRCUIT INFORMATION

2.2 E2C UNIT

- 2.2.1 COMPATIBLE WITH DIAL-PULSE ARRANGEMENTS.
- 2.2.2 NOT COMPATIBLE WITH MF PULSING ARRANGEMENTS.
- 2.2.3 NOT COMPATIBLE WITH OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END. SUCH AS OUTGOING TRUNK CIRCUITS TO CAMA.
- 2.2.4 THE USE OF AN E2C UNIT ELIMINATES THE NEED FOR AN OUTGOING REPEATER ON STEP-BY-STEP OUTGOING TRUNKS BECAUSE THE E2C SUPPLIES BOTH PULSE CORRECTION AND A SLEEVE HOLDING GROUND.
- 2.2.5 IN SOME APPLICATIONS WHERE THE E2C UNIT IS EXPOSED TO HIGH LONGITUDINAL A.C. VOLTAGES IT HAS BEEN FOUND THAT THE DIODE USED IN SERIES WITH THE A RELAY CAUSES IMPROPER OPERATION. WHERE THIS CONDITION EXISTS THE DIODE MAY BE STRAPPED OUT. UNITS THAT HAVE BEEN MODIFIED TO REMOVE THE DIODE ARE DESIGNATED -11, -17, -18, -22, OR -23.

2.3 E3C UNIT

- 2.3.1 NOT COMPATIBLE WITH DIAL-PULSE ARRANGEMENTS.
- 2.3.2 COMPATIBLE WITH MF PULSING ARRANGEMENTS.
- 2.3.3 COMPATIBLE WITH OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END.

2.4 E4C UNIT

- 2.4.1 COMPATIBLE WITH DIAL-PULSE ARRANGEMENTS
- 2.4.2 COMPATIBLE WITH MF PULSING ARRANGEMENTS
- 2.4.3 COMPATIBLE WITH OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END.
- 2.4.4 THE USE OF AN E4C UNIT ELIMINATES THE NEED FOR AN OUTGOING REPEATER ON STEP-BY-STEP OUTGOING TRUNKS BECAUSE THE E4C SUPPLIES BOTH PULSE CORRECTION AND A SLEEVE HOLDING GROUND.
- 2.4.5 IN SOME APPLICATIONS WHERE THE E4C UNIT IS EXPOSED TO HIGH LONGITUDINAL A.C. VOLTAGES IT HAS BEEN FOUND THAT THE DIODE USED IN SERIES WITH THE A RELAY CAUSES IMPROPER OPERATION. WHERE THIS CONDITION EXISTS THE DIODE MAY BE STRAPPED OUT. UNITS THAT HAVE BEEN MODIFIED TO REMOVE THE DIODE ARE DESIGNATED -22 OR -23.

2.5 E5C UNIT

- 2.5.1 COMPATIBLE WITH DIAL-PULSE ARRANGEMENTS
- 2.5.2 COMPATIBLE WITH MF PULSING ARRANGEMENTS
- 2.5.3 COMPATIBLE WITH OUTGOING TRUNK CIRCUITS WHICH CAN BE DISCONNECTED FROM THE TERMINATING END.

DETAILED CIRCUIT INFORMATION

2.5.4 THE USE OF AN E5C UNIT
ELIMINATES THE NEED FOR AN
OUTGOING REPEATOR ON STEP-BY-STEP
OUTGOING TRUNKS BECAUSE THE E5C
SUPPLIES BOTH PULSE CORRECTION
AND A SLEEVE HOLDING GROUND.

2.5.5 THE E5C IS SIMILAR TO THE E4C
WITH THE IMPROVED IMMUNITY TO
LONGITUDINAL A.C. VOLTAGES AS DES-
CRIBED IN 2.4.5. THE E5C ALSO HAS
IMPROVED IMMUNITY TO TRUNK PUMPING.

3.0 TERMINATING LOOP-TRUNK UNITS

3.0.1 ALL TERMINATING LOOP-TRUNK
UNITS ARE LIMITED TO 1040
OHMS EXTERNAL CIRCUIT LOOP FOR
SUPERVISION. THIS RESTRICTION
APPLIES TO BOTH MF AND DP OPERATION.
ALL COMPENSATING RESISTANCE SHOULD
BE REMOVED FROM THE ASSOCIATED
INCOMING TRUNK CIRCUIT OR SELECTOR.

3.0.2 CROSSBAR DP INCOMING TRUNK
CIRCUITS FROM SXS (BY-LINK)
MAY USE EITHER LONG OR SHORT RANGE
A RELAYS PROVIDED THE ABOVE
LIMITATION IS MET.

3.1 E1D UNIT

3.1.1 SUITABLE FOR MF BUT NOT DIAL-
PULSING. USE ONLY WITH E1C
ORIGINATING UNITS. THE E1D-10, -11,
-20, OR -21 SHOULD BE USED ONLY WITH
FAST DISCONNECT-TIME TRUNK CIRCUITS.
E1D-12 OR -22 CAN BE USED WITH
EITHER SLOW OR FAST DISCONNECT-TIME
TRUNK CIRCUITS BUT THEIR USE WILL
INCREASE THE OUTGOING SENDER HOLDING
TIME. UNITS WITH COMPATIBILITY
DESIGNATION K ARE FOR USE ON
FAST DISCONNECT TRUNK CIRCUITS
ONLY. THOSE WITH COMPATIBILITY
DESIGNATION KC MAY BE USED WITH
EITHER FAST OR SLOW DISCONNECT
TRUNK CIRCUITS.

3.1.2 NOT COMPATIBLE WITH TRUNK
CIRCUITS WHICH REQUIRE A RE-
VERSE MAKE BUSY FEATURE.

3.2 E2D UNIT

3.2.1 SUITABLE FOR MF PULSING.
SHOULD BE USED WITH SLOW DIS-
CONNECT-TIME TRUNK CIRCUITS ONLY.

3.2.2 SUITABLE FOR ALL DIAL PULSING
APPLICATIONS. PULSE CORRECTION
IN THE INCOMING TRUNK CIRCUIT IS NOT
REQUIRED FOR SXS, IF THE LOOP
LIMITATION BETWEEN THE SF UNIT AND
THE SUCCEEDING CIRCUIT, AS DESCRIBED
IN 3.2.3, IS OBSERVED. WHEN PULSING
INTO COMMON CONTROL OFFICES THE
1040 OHM EXTERNAL CIRCUIT LOOP
SUPERVISORY LIMIT OF THE E2D IS
CONTROLLING RATHER THAN PULSING.
SHOULD BE USED WITH SLOW DISCONNECT-
TIME TRUNK CIRCUITS ONLY.

3.2.3 THE E2D UNIT USES 1400/1400
OHM BATTERY AND GROUND PUL-
SING WHICH SUPPLIES LESS ENERGY
TO THE PULSING RELAY THAN CONVEN-
TIONAL LOOP PULSING. THE CONDUCT-
TOR LOOP RANGE BETWEEN THE E2D
AND THE INCOMING TRUNK OR SELECTOR
MUST THEREFORE BE RESTRICTED FOR
PULSING INTO STEP-BY-STEP. WITH
STEP-BY-STEP SELECTORS WHICH USE A
221A RELAY SUCH AS SD-30200-01
THE LOOP BETWEEN THE E2D AND THE
SELECTOR SHOULD NOT EXCEED 50 OHMS.
WITH TOLL TRANSMISSION SELECTORS,
SUCH AS SD-31723-01, THE LONG-
RANGE OPTION (221FAF RELAY) IS
PREFERRED AND WILL PROVIDE A CON-
DUCTOR LOOP RANGE OF 0 TO 600 OHMS.
THE 221 FAE RELAY MAY BE USED WITH
THE ADJUSTMENT SPECIFIED FOR A 1200-
OHM LOOP BUT THE LOOP BETWEEN THE
E2D AND THE SELECTOR SHOULD NOT
EXCEED 50 OHMS.

OTHER SELECTORS OR INCOMING
REPEATERS REQUIRE SIMILAR LOOP LIM-
ITATIONS DEPENDENT ON THE TYPE OF A

DETAILED CIRCUIT INFORMATION

RELAY USED. THE 221 FAC RELAY IS ELECTRICALLY EQUIVALENT TO THE 221 FAF AND THE SAME LIMITATIONS APPLY. THE 221 R RELAY (OPTIONAL ON SD-31346-01 AND SD-31454-01) SHOULD NOT BE USED. ON CIRCUITS SUCH AS SD-64482-01 WITH 280 TYPE A RELAYS THE LOOP BETWEEN THE SF UNIT AND THE INCOMING TRUNK CIRCUIT SHOULD NOT EXCEED 50 OHMS. THE BIAS RESISTANCE SHOULD BE ADJUSTED FOR A 1200 OHM LOOP RESISTANCE AND A PERCENT BREAK INPUT OF 49 TO 72 PERCENT.

THE LOOP LIMITATIONS NOTED ABOVE MAY BE INCREASED BY 600 OHMS PROVIDED THE PULSING ORIGINATES IN SENDERS IN THE SAME BUILDING AS THE ORIGINATING SF UNIT AND THE 1040 OHM EXTERNAL CIRCUIT LOOP SUPERVISORY LIMIT OF THE E2D IS NOT EXCEEDED.

3.2.4 AN E2D ON AN INCOMING TRUNK TO A TANDEM OFFICE, MAY BE USED TO PULSE A LOOP OUTGOING REPEATER IN THE SAME BUILDING WHICH IN TURN PULSES SELECTORS IN A DISTANT OFFICE. NO PULSE CORRECTION IS REQUIRED WITH THIS ARRANGEMENT.

3.2.5 NOT COMPATIBLE WITH TRUNK CIRCUITS WHICH REQUIRE A REVERSE MAKE BUSY FEATURE OR WHERE FULL DUPLEX SIGNALING IS REQUIRED. AN E4D MUST BE USED.

3.2.6 NOT COMPATIBLE WITH ARRANGEMENTS WHERE STEP-BY-STEP OUTGOING REPEATER SD-31147-01 PRECEDES THE SF LINK. AN E4D MUST BE USED.

3.3 E3D UNIT

3.3.1 SUITABLE FOR MF BUT NOT DIAL-PULSING. SUITABLE FOR USE ON AN A+M BASIS WITH EXISTING FAST DISCONNECT-TIME TRUNK CIRCUITS WHICH HAVE NOT BEEN MODIFIED TO PROVIDE THE SLOW DISCONNECT-TIME

FEATURE. CAN ALSO BE USED WITH SLOW DISCONNECT-TIME TRUNK CIRCUITS. THIS UNIT IS NOT RECOMMENDED FOR GENERAL USE BECAUSE IT INCREASES THE OUTGOING SENDER HOLDING TIME.

3.3.2 NOT COMPATIBLE WITH TRUNK CIRCUITS WHICH REQUIRE A REVERSE MAKE BUSY FEATURE.

3.4 E4D UNIT

3.4.1 THE E4D IS SIMILAR TO AND HAS THE SAME SUPERVISORY AND PULSING RANGES AS THE E2D. IT MAY BE USED WITH TRUNK CIRCUITS WHICH REQUIRE A REVERSE MAKE BUSY FEATURE OR WHERE FULL DUPLEX SIGNALING IS REQUIRED. THE ASSOCIATED INCOMING TRUNK CIRCUIT OR SELECTOR A RELAY MUST HAVE A RELEASE VALUE OF AT LEAST 1.7 MA.

3.4.2 THE E4D SHOULD NOT BE USED ON TRUNKS FROM CROSSBAR NO. 4 TO CROSSBAR NO. 5 OR CROSSBAR NO. 1. THE E5D IS THE PREFERRED UNIT FOR THIS APPLICATION. SEE SECT. B 3.9.

3.5 E5D UNIT

3.5.1 THE E5D IS SIMILAR TO AND HAS THE SAME SUPERVISORY AND PULSING RANGES AS THE E2D. IT ALSO HAS TRANSMISSION IMPROVEMENTS. IT IS THE PREFERRED UNIT FOR TRUNKS FROM CROSSBAR NO. 4 TO CROSSBAR NO. 5 OR CROSSBAR NO. 1. SEE SECT. B 3.9.

DETAILED CIRCUIT INFORMATION

- 4.0 REVERTIVE PULSE E1E/E1F UNITS
- 4.1 ALL VERSIONS OF PANEL, CROSS-BAR, AND ESS NO. 1 ORIGINATING REVERTIVE-PULSING SENDERS ARE COMPATIBLE.
- 4.2 PANEL GROUND-CUTOFF DIRECT INCOMING SELECTORS ARE NOT COMPATIBLE BECAUSE THEIR RANGE IS LIMITED TO 1488 OHMS EXTERNAL CIRCUIT RESISTANCE AND THE RESISTANCE PRESENTED BY THE E1F UNIT IS APPROXIMATELY 2300 OHMS.
- 4.3 PANEL GROUND-CUTOFF REPEATING INCOMING SELECTORS ARE COMPATIBLE WHEN EQUIPPED WITH A MODIFICATION DESIGNED FOR USE WITH E1F UNITS. A TYPICAL SELECTOR CIRCUIT SHOWING THIS TERMINATION IS SD-21949-01, FIGURE E. THE BALANCED VERSIONS USING THE 280 DG RELAY FOR THE L RELAY ARE NOT USABLE BECAUSE THE L RELAY WILL NOT RELEASE ON THE 38,000-OHM RELEASE CONDITIONS PRESENTED BY THE E1F. OTHER OPTIONAL TERMINATIONS ARE NOT USABLE BECAUSE OF EXCESSIVE L RELAY RELEASE TIME.
- 4.4 PANEL BATTERY-CUTOFF SHORT-RANGE INCOMING SELECTORS ARE NOT COMPATIBLE BECAUSE THEIR RANGE IS LIMITED TO 1830-OHM EXTERNAL CIRCUIT RESISTANCE AND THE RESISTANCE PRESENTED BY THE E1F UNIT IS APPROXIMATELY 2300 OHMS. PANEL BATTERY-CUTOFF LONG-RANGE INCOMING SELECTORS USING N-TYPE L RELAYS ARE COMPATIBLE.
- 4.5 ALL CROSSBAR AND ESS NO. 1 TERMINATING REVERTIVE PULSE CIRCUITS ARE COMPATIBLE INCLUDING BALANCED, UNBALANCED AND WIRE-SPRING VERSIONS.
- 4.6 THE USE OF PHYSICAL LINE FACILITIES IN CONJUNCTION WITH E1E/E1F SIGNALING UNITS IS NOT RECOMMENDED FOR PANEL INCOMING SELECTORS BECAUSE OF THE PROPAGATION TIME DELAY INTRODUCED BY LOADED CABLE. SUFFICIENT MARGINS ARE AVAILABLE IN CROSSBAR-TYPE INCOMING CIRCUITS TO PERMIT THE USE OF THESE LOADED FACILITIES OVER A RANGE OF UP TO 50 MILES.
- 4.7 THE INCOMING CIRCUITS USED WITH E1F UNITS MUST BE EQUIPPED WITH FAST RELEASE (NOMINAL 40 MS) DISCONNECT RELAYS.
- 4.8 WHEN PANEL BATTERY-CUTOFF INCOMING SELECTORS PER SD-21115-01, -05, OR SD-21116-01, ARE USED WITH E1F UNITS, SEPARATORS PER KS-7246 SHOULD BE APPLIED TO THE D RELAY, CODE R1590 OR R1351, TO INSURE A FAST RELEASE ON DISCONNECT. WHEN THE SEPARATORS ARE APPLIED, NO CHANGE IN THE CURRENT FLOW REQUIREMENTS FOR THE RELAY IS NECESSARY.
- 4.9 THE INCOMING TRUNK A RELAY SUCH AS IN SD-25517-01 MUST HAVE AT LEAST A 1.7 MA RELEASE REQUIREMENT IN ORDER TO RELEASE AGAINST THE 38,000-OHM RELEASE CONDITION PRESENTED BY THE E1F UNIT.
- 4.10 INCOMING TRUNK CIRCUIT OR INCOMING SELECTOR LOOP COMPENSATION SHOULD NOT BE USED SINCE THE LOOP PRESENTED BY THE E1F UNIT IS 2300 OHMS.

DETAILED CIRCUIT INFORMATION

4.11 WHERE REVERTIVE PULSE SIGNALING IS USED THE LAST REVERTIVE SELECTION IS FOLLOWED BY AN INCOMING ADVANCE SIGNAL. THE E1E/E1F USE THIS SIGNAL TO CUT THROUGH THE TRANSMISSION PATH FOR TALKING. INCOMING ADVANCE IS ALWAYS SUPPLIED ON REVERTIVE PULSE CALLS BETWEEN LOCAL OFFICES. X-BAR TANDEM ALSO PROVIDES INCOMING ADVANCE IF A FULL COMPLEMENT OF REVERTIVE PULSE DIGITS ARE USED, EVEN IF THE CALL IS COMPLETED ON A DIAL PULSE BASIS BEYOND X-BAR TANDEM. WHERE ONLY TWO REVERTIVE PULSE DIGITS (OFFICE BRUSH AND OFFICE GROUP) ARE USED, X-BAR TANDEM COMPLETES ON A STRAIGHT FORWARD BASIS AND NO INCOMING ADVANCE IS FURNISHED. THE E1E/E1F WILL NOT CUT THROUGH FOR TALKING. THEREFORE, THREE DIGIT CALLS, SUCH AS 911, CAN NOT BE COMPLETED THROUGH X-BAR TANDEM WHEN THE FACILITIES BETWEEN THE ORIGINATING LOCAL OFFICE AND X-BAR TANDEM USE E1E/E1F REVERTIVE PULSE UNITS. TRANSMISSION TESTS TO X-BAR TANDEM MAY BE MADE BY USING A FULL COMPLEMENT OF REVERTIVE PULSES AND ARRANGING X-BAR TANDEM TO COMPLETE TO THE TEST JACK ON A DIAL PULSE BASIS.

4.12 THE E1E UNIT REQUIRES A SLEEVE LEAD WHICH IS GROUNDED ON SEIZURE AND OPENED ON DISCONNECT FOR PROPER OPERATION. THIS ASSURES THAT THE CIRCUIT IS ALWAYS IN ITS NORMAL CONDITION WHEN SEIZED. ALL ELECTROMECHANICAL SYSTEMS SUPPLY SUCH A LEAD. IN THE CASE OF ESS NO. 1, A SIGNAL DISTRIBUTOR APPLIQUE CIRCUIT, SUCH AS SD-1A146-01, MUST BE USED.

DETAILED CIRCUIT INFORMATION

5.0 CUSTOMER-LINES, PBX TRUNKS
AND PBX OFF-PREMISES STATIONS.
STATION END.

5.1 E1R UNIT

5.1.1 THE E1R UNIT IS COMPATIBLE
FOR CUSTOMER LINES, LOOP START
OR GROUND START PBX TRUNKS AND PBX
OFF-PREMISES STATIONS.

5.1.2 THE E1R MAY BE USED EITHER
WITH A LOCAL TERM SET AND A
TWO WIRE EXTENSION OR A FOUR WIRE
EXTENSION WITH THE A AND B LEADS
SIMPLEXED ON THE FOUR WIRE CIRCUIT.
THE EXTERNAL CIRCUIT RESISTANCE
INCLUDING THE SIMPLEXED RESISTANCE
OF THE A AND B LEADS, IF ANY, SHOULD
NOT EXCEED 1800 OHMS. IF THIS RE-
SISTANCE IS LESS THAN 600 OHMS THE
BUILDING OUT RESISTANCE (BOR) IN THE
UNIT SHOULD BE CUT IN.

5.1.3 A TERM SET WHICH PROVIDES
SIMPLEX INDUCTORS SHOULD BE
USED. THE SIMPLEX INDUCTORS SHOULD
BE CUT INTO THE A + B LEADS WHETHER
THE TERM SET IS LOCAL OR REMOTELY
LOCATED.

5.1.4 WHEN THE SIGNALING IS VIA E+M
LEADS, THE RESISTANCE OF THE
M LEAD SHOULD NOT BE OVER 1000 OHMS.
THE E LEAD RESISTANCE LIMIT IS DE-
PENDENT ON THE CONNECTING CIRCUIT.
A CONTACT PROTECTION NETWORK IS
REQUIRED ON THE E LEAD OF THE CON-
NECTING CIRCUIT.

5.1.5 THE E1R CANNOT BE USED ON TWO
PARTY OR MULTI-PARTY LINES.

5.2 E2S

5.2.1 THE E2S IS COMPATIBLE FOR
CUSTOMER-LINE USE, INCLUDING
LOOP START PBX TRUNKS AND PBX OFF-
PREMISES STATIONS.

5.2.2 THE EXTERNAL CIRCUIT RESIS-
TANCE SHOULD NOT EXCEED 1500
OHMS.

5.2.3 THE E2S CANNOT BE USED ON TWO
PARTY OR MULTI-PARTY LINES.
NO MORE THAN 3 C4A RINGERS SHOULD
BE USED ON THE STATION LOOP.

5.2.4 THE E2S IN CONJUNCTION WITH
THE E2SA AUXILIARY UNIT MAY
BE USED ON GROUND START LINES OR
PBX TRUNKS WITH THE SAME LOOP LIMIT-
ATIONS AS THE E2S WHEN USED ALONE.

5.3 E4B OR E3B

5.3.1 THE E4B OR E3B IN CONJUNCTION
WITH DIAL LONG LINE CIRCUIT
SD-96252-01 AND AN EXTERNAL TERM
SET MAY BE USED ON CUSTOMER LINES,
LOOP START PBX TRUNKS AND PBX OFF-
PREMISES STATIONS. AN M LEAD PULSE
CORRECTOR IS NOT REQUIRED WITH THIS
ARRANGEMENT.

5.3.2 MODERN DIALS (6-TYPE OR HIGH-
ER) WITH A SPEED RANGE OF 8 TO
11 PULSES PER SECOND AND PERCENT
BREAK RANGE OF 58 TO 64 PERCENT
SHOULD BE USED.

DETAILED CIRCUIT INFORMATION

5.3.3 THE EXTERNAL CIRCUIT RESISTANCE ON THE STATION END OF SD-96252-01 SHOULD NOT EXCEED 3000 OHMS AND THE LEAK RESISTANCE ON THIS LOOP SHOULD BE MAINTAINED TO A MINIMUM OF 30K OHMS.

5.3.4 THE RECEIVE T1 AND R1 LEADS OF THE 4-WIRE TERM SET MUST BE CONNECTED TO THE SHORTING LEADS PROVIDED BY THE DIAL LONG LINE CIRCUIT IN THE IDLE CONDITION. THE RESISTANCE OF THESE LEADS SHOULD NOT EXCEED 25 OHMS.

5.3.5 THE OPTION THAT PROVIDES A DIODE SHUNT ON THE E RELAY OF DIAL LONG LINE CIRCUIT SD-96252-01 SHOULD NORMALLY BE USED. THIS PROVIDES ADDITIONAL DELAY IN THE APPLICATION OF RINGING AND THEREFORE MINIMIZES THE POSSIBILITY OF FALSE RINGS DUE TO VOICE SIMULATION OF THE SIGNALING TONE. THE RINGING INTERVAL IS OF COURSE SHORTENED BY THE TOTAL DELAY IN THE SYSTEM, INCLUDING THAT ADDED BY THE DIODE. THIS IS NOT SERIOUS PROVIDED THAT A STANDARD TWO SECOND RINGING INTERVAL IS USED. IN THOSE CASES WHERE THE NUMBER ASSIGNMENT IS SUCH THAT ONE HALF SECOND CODE RINGING IS USED IT MAY BE NECESSARY TO REMOVE THE DIODE AND TOLERATE THE HIGHER PROBABILITY OF FALSE RINGS.

5.3.6 THIS ARRANGEMENT CANNOT BE USED ON TWO PARTY OR MULTI-PARTY LINES. NO MORE THAN 3 C4A RINGERS SHOULD BE USED ON THE STATION LOOP.

6.0 CUSTOMER-LINES, PBX TRUNKS AND PBX OFF-PREMISES STATIONS. CENTRAL OFFICE OR PBX LINE CIRCUIT END.

6.1 E1P UNIT

6.1.1 THE E1P UNIT IS COMPATIBLE FOR CUSTOMER-LINES, LOOP START OR GROUND START PBX TRUNKS AND PBX OFF-PREMISES STATIONS.

6.1.2 THE E1P UNIT MAY BE USED EITHER WITH A LOCAL TERM SET AND A TWO WIRE EXTENSION OR A FOUR WIRE EXTENSION WITH THE A AND B LEADS SIMPLEXED ON THE FOUR WIRE CIRCUIT. THE MAXIMUM LOOP RESISTANCE OF THE A AND B LEADS INCLUDING THE SIMPLEXED RESISTANCE OF THE A AND B LEADS, IF ANY, BUT EXCLUDING THE RESISTANCE OF THE SIMPLEX INDUCTORS AND TERM SET SHOULD NOT EXCEED 1200 OHMS OR THE LOOP LIMIT OF THE SWITCHING EQUIPMENT INVOLVED, WHICHEVER IS LESS. IF THE LOOP RESISTANCE IS LESS THAN 520 OHMS THE BUILDING OUT RESISTANCE (BOR) IN THE UNIT SHOULD BE CUT IN. THE LEAK RESISTANCE ON THIS LOOP SHOULD BE MAINTAINED TO 30K OHMS MINIMUM.

6.1.3 A TERM SET WHICH PROVIDES SIMPLEX INDUCTORS SHOULD BE USED. THE SIMPLEX INDUCTORS SHOULD BE CUT INTO THE A + B LEADS WHETHER THE TERM SET IS LOCAL OR REMOTELY LOCATED.

DETAILED CIRCUIT INFORMATION

6.1.4 IN CASES WHERE THE RESISTANCE LIMIT OF THE A+B LEADS IS EXCEEDED, E+M LEAD SIGNALING MAY BE USED WITH A CIRCUIT SUCH AS SD-96251-01 AT THE DISTANT END OF THE INTERVENING E+M LINK. WITH THIS ARRANGEMENT GROUND START OPERATION CAN NOT BE USED. THE RESISTANCE OF THE M LEAD MAY NOT BE OVER 1000 OHMS THE E LEAD RESISTANCE LIMIT IS DEPENDENT ON THE CONNECTING CIRCUIT. A CONTACT PROTECTION NETWORK IS REQUIRED ON THE E LEAD OF THE CONNECTING CIRCUIT.

6.1.5 THE E1P CANNOT BE USED ON TWO PARTY OR MULTI-PARTY LINES.

6.1.6 THE 60 HERTZ LONGITUDINAL VOLTAGE ON EITHER A TWO WIRE OR FOUR WIRE EXTENSION MUST NOT EXCEED 10 VOLTS AS MEASURED WITH THE CONDUCTORS TIED TOGETHER AND GROUNDED THROUGH A 500 OHM RESISTOR. WHERE THIS VOLTAGE IS EXCEEDED A DIAL LONG LINE CIRCUIT SUCH AS SD-96555-01 MAY BE USED FOR ISOLATION.

6.2 E2L UNIT

6.2.1 THE E2L UNIT IS COMPATIBLE FOR CUSTOMER LINE USE, INCLUDING LOOP START PBX TRUNKS.

6.2.2 AT THE STATION END MODERN DIALS (6-TYPE OR HIGHER) WITH A SPEED RANGE OF 8 TO 11 PULSES PER SECOND AND A PERCENT BREAK RANGE OF 58 TO 64 PERCENT SHOULD BE USED.

6.2.3 THE E2L CANNOT BE USED ON TWO PARTY OR MULTI-PARTY LINES.

6.2.4 WHEN THE E2L IS USED WITH COMMON CONTROL OFFICES, THE LOOP RESISTANCE BETWEEN THE E2L AND THE SWITCHING EQUIPMENT SHOULD NOT EXCEED 1200 OHMS OR THE LOOP LIMIT OF THE OFFICE INVOLVED, WHICHEVER IS LESS AND THE LEAK RESISTANCE SHOULD BE MAINTAINED TO 30K OHMS MINIMUM.

6.2.5 WHEN THE E2L IS USED WITH STEP-BY-STEP OFFICES WITH AN E1R AT THE STATION END, THE LOOP RESISTANCE BETWEEN THE E2L AND THE SERVING CENTRAL OFFICE SHOULD NOT EXCEED 600 OHMS AND THE LEAK RESISTANCE SHOULD BE MAINTAINED TO 30K OHMS MINIMUM. THIS RANGE MAY BE EXTENDED TO 1200 OHMS BY PROVIDING DIAL LONG LINE CIRCUIT SD-96555-01 OR SD-96234-01 IN THE CENTRAL OFFICE WHERE THE LINE CIRCUIT APPEARS. USE 10K OHMS BIAS RESISTANCE IN THE DIAL LONG LINE CIRCUIT FOR THIS APPLICATION.

6.2.6 WHEN THE E2L IS USED WITH STEP-BY-STEP OFFICES WITH AN E4B OR E3B AT THE STATION END, THE LOOP RESISTANCE BETWEEN THE E2L AND THE SERVING CENTRAL OFFICE SHOULD NOT EXCEED 600 OHMS AND THE LEAK RESISTANCE SHOULD BE MAINTAINED TO A MINIMUM OF 30K OHMS. THIS RANGE MAY BE EXTENDED TO 1200 OHMS BY PROVIDING DIAL LONG LINE CIRCUIT SD-96555-01 OR SD-96234-01 IN THE CENTRAL OFFICE WHERE THE LINE CIRCUIT APPEARS. IN THIS APPLICATION, USE 10K OHMS BIAS RESISTANCE IN THE DIAL LONG LINE CIRCUIT.

DETAILED CIRCUIT INFORMATION

6.2.7 WHEN THE E2L IS USED WITH STEP BY STEP OFFICES AND AN E2S AT THE STATION END, THE 1500 OHM LOOP CAPABILITY OF THE E2S MAY ONLY BE ACHIEVED IF THE E2L IS IN THE SAME BUILDING AS THE SWITCHING EQUIPMENT. LOOP RANGE AT THE E2L END MAY BE INCREASED BY LIMITING THE EXTERNAL CIRCUIT RESISTANCE AT THE E2S END TO LESS THAN 1000 OHMS. IN THIS CASE, THE SUM OF THE EXTERNAL CIRCUIT RESISTANCE AT THE E2S END AND THE CONDUCTOR LOOP RESISTANCE AT THE E2L END SHOULD NOT EXCEED 1000 OHMS. ADDITIONAL LOOP RANGE MAY BE ACHIEVED AT THE E2L END BY PROVIDING DIAL LONG LINE CIRCUIT SD-96555-01 OR SD-96234-01 IN THE CENTRAL OFFICE WHERE THE LINE CIRCUIT APPEARS. IN THIS CASE THE FULL 1500 OHM RANGE AT THE E2S END CAN BE USED AND A 1200 OHM CONDUCTOR LOOP CAN BE USED BETWEEN THE E2L AND THE DIAL LONG LINE CIRCUIT. USE 10K OHMS BIAS RESISTANCE IN THE DIAL LONG LINE CIRCUIT FOR THIS APPLICATION.

6.2.8 THE E2L MAY BE USED ON PBX OFF-PREMISES STATIONS WITHIN THE LOOP LIMITS SPECIFIED ABOVE. IN THIS CASE THE TYPE OF SERVING CENTRAL OFFICE MUST BE CONSIDERED AND THE LOOP LIMIT MUST INCLUDE NOT ONLY THE LOOP BETWEEN THE E2L AND THE PBX BUT ALSO THE PBX TO CENTRAL OFFICE TRUNK LOOP.

6.2.9 THE E2L IN CONJUNCTION WITH THE E2LA AUXILIARY UNIT IS COMPATIBLE FOR GROUND START OPERATION WITHIN THE LIMITS SPECIFIED ABOVE.

6.2.10 THE E2L DOES NOT PROVIDE A BALANCED TERMINATION TO THE TWO WIRE LINE DUE TO THE RINGING DETECTOR CIRCUITRY. IF A HIGH LONGITUDINAL NOISE LEVEL IS PRESENT ON THE CABLE BETWEEN THE E2L AND THE SWITCHING EQUIPMENT IT MAY BE NECESSARY TO PROVIDE A DIAL LONG LINE CIRCUIT BETWEEN THE E2L AND THE CABLE PAIR TO ISOLATE THE UNBALANCE FROM THE NOISE SOURCE. THE ADDITION OF SUCH A DIAL LONG LINE CIRCUIT DOES NOT AFFECT THE LOOP RANGES DESCRIBED ABOVE. FROM A SIGNALING STANDPOINT A DIAL LONG LINE CIRCUIT IS REQUIRED IF THE 60 HERTZ LONGITUDINAL VOLTAGE EXCEEDS 5 VOLTS MEASURED WITH THE CONDUCTORS TIED TOGETHER AND GROUNDED THROUGH A 500 OHM RESISTOR.



SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
ES-20139-02	E1F	FIG L REQUIRED
ES-20292-01	E1F	FIG K REQUIRED
ES-20293-01	E1F	FIG H REQUIRED
ES-20545-01	NO	WET-DRY SUPV
SD-20746-01	E3C, E5C, E4C	REVERSE TIP AND RING
ES-21030-01	E1E	NOT COMP WITH REM ZONE REG
SD-21031-01	E1E	
SD-21031-02	E1E	
SD-21032-02	E1E	
SD-21032-03	E1E	NOT COMP WITH REM ZONE REG
SD-21036-01	NO	SEE SECT C 4.2
SD-21043-01	NO	SEE SECT C 4.2
SD-21053-01	NO	SEE SECT C 4.2
SD-21053-02	NO	HIGH-LOW SUPV
SD-21115-01	E1F	SEE SECT C 4.4, 4.8
SD-21115-03	NO	HIGH-LOW SUPV
SD-21115-05	E1F	SEE SECT C 4.4, 4.8
SD-21115-07	NO	HIGH-LOW SUPV
SD-21116-01	E1F	SEE SECT C 4.4, 4.8
SD-21116-03	NO	HIGH-LOW SUPV
SD-21130-01	NO	WET DRY SUPV 20HZ RING
SD-21339-01	NO	20HZ RING
SD-21349-01	NO	WET-DRY SUPV 20HZ RING
SD-21364-01	NO	WET-DRY SUPV
SD-21370-01	NO	SEE SECT C 4.2
SD-21441-01	E3C, E5C, E4C, E1C, E2C	REVERSE TIP AND RING
SD-21451-01	NO	WET-DRY SUPV
SD-21504-01	NO	WET-DRY SUPV 20HZ RING
SD-21504-02	NO	WET-DRY SUPV 20HZ RING
SD-21504-03	NO	20HZ RING
SD-21504-04	NO	20HZ RING
SD-21504-05	NO	WET-DRY SUPV 20HZ RING
SD-21504-06	NO	WET-DRY SUPV 20HZ RING
SD-21505-01	NO	20HZ RING
SD-21505-02	NO	WET-DRY SUPV 20HZ RING
SD-21505-03	NO	WET-DRY SUPV 20HZ RING
SD-21542-01	NO	WET-DRY SUPV +110-48 COIN
SD-21544-01	NO	WET-DRY SUPV
SD-21545-01	NO	WET-DRY SUPV
SD-21560-01	E3C, E5C, E4C	FOR USE WITH AIC AND FIG G ONLY
SD-21572-01	E3C, E5C, E4C, E1C, E2C	REVERSE TIP AND RING
SD-21578-01	E1F	SEE SECT C 4.4, 4.8
SD-21600-01	NO	3 WIRE
SD-21627-01	E1E	NOT COMP WITH REM ZONE REG
SD-21628-01	E1E	
SD-21630-01	E1E	NOT COMP WITH REM ZONE REG

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-21821-01	E1E	NOT COMP WITH REM ZONE REG
SD-21822-01	E1E	
SD-21823-01	NO	WET-DRY SUPV 20HZ RING
SD-21859-01	NO	20HZ RING
SD-21917-01	NO	SEE SECT C 4.2
SD-21918-01	NO	SEE SECT C 4.2 20HZ RING
SD-21946-01	NO	SEE SECT C 3.2.2-DISC TIME
SD-21949-01	E1F	FIG E REQUIRED
SD-21972-01	E3C, E5C, E4C	REVERSE TIP AND RING
SD-21974-01	NO	PCI PULSING
SD-21981-01	NO	+130-48 VOLT COIN CONTROL
SD-21982-01	NO	+130-48 VOLT RING BACK
SD-25020-01	E1E	
SD-25022-01 RP	E1F	SEE SECT C 4.7
SD-25022-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-25022-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25024-01	NO	3 WIRE
SD-25119-01	NO	WET DRY SUPV
SD-25120-01	E1P, E2L	
SD-25124-01	NO	WET-DRY SUPV 20HZ RING
SD-25127-01	E1E	
SD-25210-01	E1E	
SD-25218-01	NO	WET-DRY SUPV 20HZ RING
SD-25259-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25259-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-25259-01 RP	E1F	SEE SECT C 4.7
SD-25292-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25292-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25292-01 RP	E1F	SEE SECT C 4.7
SD-25295-01 MF	E5D, E4D, E2C, E3D, E1D	SEE SECT C 3.0
SD-25295-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-25295-01 RP	E1F	SEE SECT C 4.7
SD-25302-01	NO	20HZ RING
SD-25303-01	NO	3 WIRE
SD-25304-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25304-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25304-01 RP	E1F	SEE SECT C 4.7
SD-25305-01 RP	E1F	
SD-25329-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25329-01 RP	E1F	
SD-25351-01	NO	3 WIRE
SD-25356-01	NO	THROUGH SUPV
SD-25357-01	NO	REM ZONE REG
SD-25420-01 RP	E1F	VERIFICATION ONLY SEE SECT C 4.7
SD-25420-01 MF	E4D, E5D, E3D, E2D, E1D	VERIFICATION ONLY SEE SECT C 3.0
SD-25420-01 DP	E4D, E5D, E2D	VERIFICATION ONLY SEE SECT C 3.0

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-25428-01	NO	WET-DRY SUPV
SD-25446-01	NO	SX OR 20HZ RING 3RD WIRE COIN
SD-25462-01	NO	SX OR 20HZ RING 3RD WIRE COIN
SD-25503-01	NO	2 WAY TRUNK
SD-25517-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0 USE ADJ B ON A RELAY
SD-25517-01 DP	E5D, E4D, E2D	SEE SECT C 3.0 USE ADJ B ON A RELAY
SD-25517-01 RP	E1F	SEE SECT C 4.7, 4.9
SD-25519-01	NO	SX RING
SD-25520-01	NO	PCI PULSING
SD-25552-01	E4D, E2D	SEE SECT C 3.0
SD-25578-02 MF	E3C, E5C, E4C, E1C	
SD-25578-02 DP	E5C, E4C, E2C	
SD-25578-02 RP	E1E	
SD-25581-01	E4D, E2D	SEE SECT C 3.0
SD-25582-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25582-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25582-01 RP	E1F	SEE SECT C 4.7
SD-25583-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25583-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25583-01 RP	E1F	SEE SECT C 4.7
SD-25655-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1
SD-25663-01	E4D, E5D, E3D, E2D, E1D	VERIFICATION ONLY SEE SECT. C 3.0
SD-25665-01	NO	SX RING
SD-25666-01	NO	3 WIRE
SD-25667-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.2, 1.1.3
SD-25689-01	E3C, E5C, E4C, E2C, E1C	
SD-25690-01	E3C, E5C, E4C, E2C, E1C	
SD-25694-02 MF	E3C, E5C, E4C, E1C	
SD-25694-02 DP	E5C, E4C, E2C	
SD-25694-02 RP	E1E	
SD-25696-01	NO	WET-DRY SUPV
SD-25698-01	NO	WET-DRY SUPV
SD-25708-01	NO	NEEDS METALLIC CKT FOR TEST
SD-25708-02	NO	NEEDS METALLIC CKT FOR TEST
SD-25708-03	NO	NEEDS METALLIC CKT FOR TEST
SD-25711-01 DP	E5C, E4C, E2C	
SD-25711-01 RP	E1E	
SD-25721-01	NO	REQUIRES METALLIC PATH
SD-25736-01	NO	REQUIRES METALLIC PATH
SD-25739-01 DP	E5C, E4C, E2C	
SD-25739-01 MF	E3C, E5C, E4C, E1C	
SD-25739-01 RP	E1E	
SD-25739-02 DP	E5C, E4C, E2C	
SD-25739-02 MF	E3C, E5C, E4C, E1C	
SD-25739-02 RP	E1E	
SD-25739-03 DP	E5C, E4C, E2C	
SD-25739-03 MF	E3C, E5C, E4C, E1C	

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-25739-03 RP	E1E	
SD-25739-04 DP	E5C, E4C, E2C	
SD-25739-04 MF	E3C, E5C, E4C, E1C	
SD-25739-04 RP	E1E	
SD-25766-01	NO	REQUIRES METALLIC PATH
SD-25768-01	E4B, E3B, E2B, E1B	
SD-25816-01	E5C, E4C	
SD-25823-01 DP	E5C, E4C-E2C	
SD-25823-01 MF	E3C, E5C, E4C, E1C	
SD-25823-01 RP	E1E	
SD-25823-02 DP	E5C, E4C, E2C	
SD-25823-02 MF	E3C, E5C, E4C, E1C	
SD-25823-02 RP	E1E	
SD-25832-01 RP	E1F	
SD-25832-01 DP	NO	SEE SECT C 3.2.2-DISC TIME
SD-25832-01 MF	NO	SEE SECT C 3.2.1
SD-25833-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25833-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25833-01 RP	E1F	SEE SECT C 4.7
SD-25842-02	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.2, 1.1.3
SD-25843-01	E4B, E3B, E2B, E1B, E1A	
SD-25844-01	E4B, E3B, E2B, E1B	
SD-25845-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-25846-02	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-25847-01	E4B, E3B, E2B, E1B	
SD-25849-01 RP	E1E	
SD-25849-01 DP	E5C, E4C, E2C	
SD-25849-01 MF	E3C, E5C, E4C, E1C	
SD-25850-01	NO	3 WIRE
SD-25851-01	NO	RINGDOWN TRUNK
SD-25853-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-25868-01	E1E	
SD-25875-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25875-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-25875-01 RP	E1F	SEE SECT C 4.7
SD-25887-01 RP	E1F	SEE SECT C 4.7
SD-25887-01 DP	E5D, E4D, E2D	NOT COMP WITH RERING NOT COMP WITH DIST MB CKT SEE SECT C 3.0
SD-25887-01 MF	E5D, E4D, E2D, E3D, E1D	NOT COMP WITH RERING SEE SECT C 3.0
SD-25889-01	NO	WET-DRY SUPV
SD-25893-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-25893-01 DP	E4D, E2D	SEE SECT C 3.0
SD-25893-01 RP	E1F	SEE SECT C 4.7
SD-25895-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-25902-01	NO	WET-DRY SUPV
SD-25905-01	E4B, E3B, E2B, E1B	
SD-25909-01	E4B, E3B, E2B, E1B	
SD-25910-01	NO	SX RING

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-25911-01	NO	SX RING
SD-25913-01 DP	E5C, E4C, E2C	
SD-25913-01 MF	E3C, E5C, E4C, E1C	
SD-25913-01 RP	E1E	
SD-25913-02 DP	E5C, E4C, E2C	
SD-25913-02 MF	E3C, E5C, E4C, E1C	
SD-25913-02 RP	E1E	
SD-25923-01	NO	+110-48 VOLT COIN WET-DRY SUPV
SD-25925-01	E3C, E5C, E4C, E2C, E1C	
SD-25926-01	NO	WET DRY SUPV
SD-25928-01	E1P, E2L	
SD-25934-01	NO	SX RING
SD-25943-01	NO	REV BAT SIG ON PHANTOM
SD-25956-01	NO	PCI PULSING
SD-26047-01 LP	NO	HIGH-LOW SUPV
SD-26047-01 E+M	E4B, E3B, E2B	WHEN WORKING WITH SD-96482 AND N OPTION IS USED (STANDARD WIRING PRIOR TO ISSUE 13D) TRANSPOSE E+M LEADS OF TALK AND KP PATHS
SD-26070-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26070-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-26070-01 RP	EIF	SEE SECT C 4.7
SD-26071-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26071-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-26071-01 RP	E1F	SEE SECT C 4.7
SD-26073-01 E+M	E4B, E3B, E2B, E1B, E1A	
SD-26073-01 LPMF	E4L, E5D, E3D, E2D, E1D	VERIFICATION ONLY SEE SECT. C 3.0
SD-26073-01 LPDP	E4L, E5D, E2D	VERIFICATION ONLY SEE SECT. C 3.0
SD-26074-01 LP	NO	SX RING
SD-26074-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-26077-01	E4D, E2D	SEE SECT C 3.0
SD-26078-01 MF	E3C, E5C, E4C, E1C	
SD-26078-01 DP	E5C, E4C, E2C	
SD-26078-01 RP	E1E	
SD-26079-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26079-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-26079-01 RP	E1F	SEE SECT C 4.7
SD-26083-01 E+M	NO	ON HOOK TONE RINGING
SD-26083-01 LP	NO	SX RING 3RD WIRE COIN
SD-26085-01 MF	E3C, E5C, E4C, E1C	
SD-26085-01 DP	E5C, E4C, E2C	
SD-26085-01 RP	E1E	
SD-26086-01 MF	E3C, E5C, E4C, E1C	
SD-26086-01 DP	E5C, E4C, E2C	
SD-26086-01 RP	E1E	
SD-26087-01 MF	E3C, E5C, E4C, E1C	
SD-26087-01 RP	E1E	

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-26087-01 DP	E5C, E4C, E2C	
SD-26090-01	NO	WET-DRY SUPV
SD-26091-01	NO	WET-DRY SUPV +110-48COIN
SD-26094-01	E4B, E3B, E2B, E1B, E1A	
SD-26095-01	NO	WET-DRY SUPV
SD-26096-01	E4B, E3B, E2B, E1B, E1A	
SD-26098-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-26099-01	E4B, E3B, E2B, E1B	
SD-26100-01	E4D	SEE SECT C 3.0
SD-26101-01 E+M	E4B, E3B, E2B, E1B	
SD-26101-01 LP	E4D	SEE SECT C 3.0
SD-26104-01 E+M	E4B, E3B, E2B, E1B	
SD-26104-01 LP	E4D	SEE SECT C 3.0
SD-26108-01	NO	WET-DRY SUPV SX SIG
SD-26110-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.2, 1.1.3
SD-26116-01	E5C, E4C, E3C, E2C, E1C	REFER TO ASSOCIATED OGT CKT
SD-26117-01	NO	SX COIN SIG
SD-26122-01 LP	NO	WET-DRY SUPV SX SIG
SD-26122-01 E+M	E4B, E3B, E2B, E1B, E1A	
SD-26123-01 LPDP	E4D, E5D, E2D	SEE SECT C 3.0
SD-26123-01 LPMF	E4D, E5D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26123-01 E+M	E4B, E3B, E2B, E1B	
SD-26126-01	E4B, E3B, E2B, E1B, E1A	
SD-26127-01	E5C, E4C, E2C	
SD-26144-01	E3C, E5C, E4C, E2C, E1C	
SD-26148-01	E3C, E5C, E4C, E2C, E1C	
SD-26149-01	NO	SX RING 3RD WIRE COIN
SD-26152-01 MF	E4D, E2D, E3D, E1D	NOT COMP WITH RERING SEE SECT C 3.0
SD-26152-01 DP	E4D, E2D	NOT COMP WITH RERING SEE SECT C 3.0
SD-26183-01	E4D, E2D	SEE SECT C 3.0
SD-26201-01	E1E	
SD-26204-01 MF	E5D, E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26204-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-26204-01 RP	E1F	SEE SECT C 4.7
SD-26209-01	E3C, E5C, E4C	REVERSE TIP AND RING
SD-26210-01	NO	PCI PULSING
SD-26257-01 RP	E1F	SEE SECT C 4.7
SD-26257-01 MF	E4D, E5D, E2D, E3D, E1D	SEE SECT C 3.0
SD-26257-01 DP	E4D, E5D, E2D	SEE SECT C 3.0
SD-26282-01	E4D, E5D, E2D	SEE SECT C 3.0
ES-26289-01	E1R, E2S+ E2SA	TOLL DIVERSION FEATURE NOT PROVIDED
SD-27000-01	E4B, E3B, E2B, E1B	
SD-27001-01	NO	REQUIRES DC PATH
SD-27003-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-27008-01	E4B, E3B, E2B, E1B, E1A	
SD-27009-01	E4B, E3B, E2B, E1B, E1A	

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-27010-01	E4D	SEE SECT C 3.0 REQUIRES T OPTION
SD-27012-01	NO	REQUIRES DC PATH
SD27015-01	E4D	SEE SECT C 3.0
SD-27016-01	NO	REV BAT SIG ON PHANTOM
SD-27036-01	E4B, E3B, E2B, E1B	
SD-27043-01	NO	3 WIRE TRK
SD-27044-01	E4B, E3B, E2B, E1B	
SD-27051-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.2, 1.1.3
SD-27061-01	E4D	SEE SECT C 3.0
SD-27067-01	NO	REV BAT RING
SD-27079-01	NO	+130-48 VOLT RING
SD-27080-01	NO	+130-48 RING OR COIN
SD-27081-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27082-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27083-01	NO	+130-48 OR REV BAT RING
SD-27084-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27092-01 LP	E4D	
SD-27092-01 E+M	E4B, E3B, E2B, E1B, E1A	
SD-27097-01	NO	+130-48 VOLT RING
SD-27103-01	E4B, E3B, E2B, E1B	
SD-27104-01 LP	NO	+130-48 COIN
SD-27104-01 E+M	E4B, E3B, E2B, E1B	
SD-27148-01 MF	E4D, E5D, E2D, E3D, E1D	SEE SECT. C 3.0
SD-27148-01 DP	E4D, E5D, E2D	SEE SECT. C 3.0
SD-27516-01	SEE NOTES	FOR TWO WIRE STATION USE E1P, Z, B AND V OPTIONS AND E1R OR E2S AT DISTANT END. FOR FOUR WIRE STATIONS USE E4B OR E3B WITH E4B OR E3B PLUS SD-27517-01 AT DIST- ANT END.
SD-27517-01	E4B, E3B	
SD-27546-01	NO	+130-48 VOLT RING
SD-27550-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27551-01	E4B, E3B, E2B, E1B	
SD-27554-01	NO	+130-48 RING
SD-27555-01	NO	+130-48 RING
SD-27580-01 MF	E4D, E2D, E3D, E1D	SEE SECT C 3.0
SD-27580-01 DP	E4D, E2D	SEE SECT C 3.0
SD-27580-01 RP	NO	SLOW DISC SEE SECT C 4.7
SD-27581-01	E4D, E2D	SEE SECT C 3.0
SD-27593-01	E4B, E3B	SEE SECT B 3.1.6
SD-27611-01 MF	E4B, E3B, E2B, E1B, E1A	
SD-27611-01 DP	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.2, 1.1.3
SD-27617-01	E5C, E4C, E2C	
SD-27669-01	E4B, E3B, E2B	
SD-27686-01 MF	E5D, E4D, E3D, E2D, E1D	SEE SECT C 3.0
SD-27686-01 DP	E5D, E4D, E2D	SEE SECT C 3.0
SD-27686-01 RP	NO	SEE SECT C 4.7

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-27687-01	E4D, E2D	
SD-27711-01	E4B, E3B, E2B	
SD-27721-01	NO	3 WIRE TRK
SD-27723-01	NO	CUT CKT PREVENTS PASSAGE OF INBAND TONES
SD-27729-01	E3C, E5C, E4C	
SD-27735-01	E1J	
SD-27738-01	E4B, E3B, E2B	
SD-27744-01	E4B, E3B, E2B	
SD-27750-01	E3C, E5C, E4C	
SD-27751-01	E4B, E3B	
SD-27752-01	E5C, E4C	
SD-27753-01	NO	2WAY LOOP TRK
SD-27798-01 DP	E4D, E2D, E5D	NOT COMP WITH CONTROLLED RING, SEE SECT C 3.0
SD-27798-01 MF	E4D, E2D, E5D, E3D, E1D	NOT COMP WITH CONTROLLED RING, SEE SECT C 3.0
SD-27802-01	NO	CUT CKT PREVENTS PASSAGE OF INBAND TONES
SD-27813-01 LP	NO	+130-48 VOLT RING
SD-27813-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27814-01 LP	NO	+130-48 VOLT COIN
SD-27814-01 E+M	E4B, E3B, E2B, E1B	
SD-27815-01 LP	NO	+130-48 VOLT RING
SD-27815-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27816-01 LP	NO	+130-48 VOLT COIN
SD-27816-01 E+M	E4B, E3B, E2B, E1B	
SD-27829-01	E3C, E5C, E4C	OPTION W MUST BE USED WHEN CLASS TONE IS REQUIRED
SD-27830-01 LP	E4D, E5D, E2D, E3D, E1D	REV BAT OPTION ONLY REQUIRES APP FIG 6 + T WIRING REQUIRES APP FIG 6
SD-27830-01 E+M	E4B, E3B, E2B, E1B	
SD-27836-01	E4B, E3B, E2B	
SD-27838-01	E4B, E3B, E2B	
SD-27843-01	E4B, E3B, E2B	
SD-27844-01	E4B, E3B, E2B	
SD-27851-01	NO	3-WIRE LINE
SD-27858-01	E4B, E3B, E2B	
SD-27877-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-27892-01	E4B, E3B, E2B	
SD-27893-01	E3C, E5C, E4C	
SD-27912-01	E4B, E3B, E2B	
SD-27913-01	E4B, E3B, E2B	
SD-27927-01 LP	E4D	
SD-27927-01 E+M	E4B, E3B, E2B	
SD-27928-01 LP	E4D	
SD-27928-01 LP	E4B, E3B, E2B	
SD-27929-01 LP	E3C, E5C, E4C	
SD-27929-01 E+M	E4B, E3B, E2B	
SD-27933-01	E4B, E3B	
SD-99421-04-D 8	ISS 8	

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-27942-01	E4B, E3B	
SD-27945-01	E4B, E3B, E2B	
SD-27946-01	E4B, E3B, E2B	
SD-27963-01	E3C, E5C, E4C	
SD-27964-01	E4B, E3B	
SD-30200-01	E4D, E2D, E4D	SEE SECT C 3.0
SD-30205-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-30214-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-30503-01	NO	WET DRY SUPV
SD-30855-01	NO	MAKE BUSY CKT
SD-30865-01	E4D, E5D	SEE SECT C 3.0.1
SD-30868-01	E5C, E4C, E2C	
SD-30974-01	E4D, E2D, E5D	SEE SECT C 3.0
SD-30990-01	NO	WET DRY, REV BAT, SX SUPV
SD-30991-01	NO	WET DRY, REV BAT SUPV
SD-31123-01	NO	20 HZ RING, WET DRY SUPV
SD-31127-01	NO	WET DRY SUPV
SD-31147-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4 SEE SECT B 3.8
SD-31180-01	NO	WET DRY SUPV, 20 HZ RING
SD-31188-01	NO	WET DRY SUPV
SD-31225-01	NO	REQUIRES DC PATH
SD-31233-01	NO	WET DRY SUPV
SD-31241-01	E4D, E2D	SEE SECT C 3.0
SD-31242-01	NO	WET DRY SUPV, 20 HZ RING
SD-31314-01	NO	SX COIN CONTROL, 20 HZ RING
SD-31315-01	NO	WET DRY SUPV, +110-24 COIN
SD-31375-01	NO	WET DRY SUPV, 20 HZ RING
SD-31410-01	NO	WET DRY SUPV, REV BATT SIGNAL
SD-31428-01	NO	REQUIRES 3800 OHM TRK LOOP
SD-31432-01	NO	WET DRY SUPV, 20 HZ RING
SD-31449-01	NO	2WAY LP TRK, 20 HZ RING
SD-31522-01	NO	WET DRY SUPV, 20 HZ RING
SD-31532-01	E4D, E2D	SEE SECT C 3.0
SD-31540-01	NO	WET DRY SUPV
SD-31542-01	E4D, E2D	SEE SECT C 3.0
SD-31588-01	NO	HIGH LOW SUPV
SD-31602-01	NO	2WAY LOOP TRK
SD-31609-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-31648-01 OGT	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-31648-01 IT	E4D, E2D	SEE SECT C 3.0
SD-31658-01	NO	2WAY LOOP TRK
SD-31670-01	E4D	SEE SECT C 3.0
SD-31674-01	NO	2WAY LOOP TRK
SD-31683-01	E4D	SEE SECT C 3.0
SD-31692-01	E3C, E5C, E4C, E2C, E1C	
SD-31693-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-31703-01	NO	WET DRY SUPV, 20 HZ RING
SD-31709-01	E4D	SEE SECT C 3.0
SD-31712-01	E4D	

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-31723-01	E4D, E2D	SEE SECT C 3.0
SD-31726-01	E4B, E3B, E2B, E1B, E1A	FIG B REQUIRED
SD-31744-01	E4D, E2D	SEE SECT C 3.0
SD-31747-01	E4D	
SD-31749-01	E4B, E3B, E2B, E1B, E1A	
SD-31775-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1, 1.2 REQUIRES ZO OPTION
SD-31779-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-31795-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.1, 1.1.3 REQUIRES ZG OPTION
SD-31840-01	E3C, E5C, E4C, E2C, E1C	
SD-31841-01	E4D, E2D	NOT COMP WITH SX RING
SD-31856-01	E4D, E2D	SEE SECT C 3.0
SD-31865-01	E4B, E3B, E2B, E1B	
SD-31867-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.1, 1.1.3 REQUIRES E OPTION
SD-31874-01	E4D	SEE SECT C 3.0
SD-31885-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.3
SD-31887-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-31888-01	E4B, E3B, E2B, E1B	
SD-31902-01	NO	WET DRY SUPV
SD-31925-01	NO	WET DRY SUPV
SD-31929-01 OGT	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-31929-01 IT	E4D, E2D	SEE SECT C 3.0
SD-31965-01	NO	WET DRY SUPV, REV BAT SIGNAL VERIFICATION ONLY
SD-32007-01	E4D, E2D, E5D	
SD-32008-01 OGT	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-32008-01 IT	E4D, E2D	SEE SECT C 3.0
SD-32042-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-32061-01 LP	E4D, E2D	SEE SECT C 3.0
SD-32061-01 E+M	E4B, E3B, E2B, E1B, E1A	
SD-32067-01	NO	CUSTOMER LINE SF UNITS CAN NOT PASS REV BATT
SD-32087-01	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-32136-01	NO	WET DRY SUPV, 20 HZ RING
SD-32167-01	E3C, E5C, E4C, E2C, E1C	
SD-32168-01	NO	WET DRY SUPV, 20 HZ RING
SD-32170-01	NO	WET DRY SUPV
SD-32178-01	NO	WET DRY SUPV
SD-32183-01	E4D, E5D, E2D	SEE SECT C 3.0
SD-32184-01 OGT	E5C, E4C, E2C	SEE SECT C 2.2.4, 2.4.4, 2.5.4
SD-32184-01 IT	E4D, E2D	SEE SECT C 3.0
SD-32199-01	E5C, E4C	REQUIRES N OPTION
SD-32204-01	E5C, E4C, E2C	
SD-32240-01	E5C, E4C	
SD-32241-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.1, 1.1.3
SD-32244-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.1.1, 1.1.3
SD-32245-01	E5C, E4C	
SD-32255-01 LP	E4D	SEE SECT C 3.0
SD-32255-01 E+M	E4B, E3B, E2B, E1B	
SD-99421-04-D10	ISS 8	

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-32256-01 LP	E4D	SEE SECT C 3.0
SD-32256-01 E+M	E4B, E3B, E2B, E1B	
SD-32288-01	SEE NOTES	COMPATIBILITY DEPENDS ON ASSOCIATED TRK CKT
SD-32289-01	SEE NOTES	COMPATIBILITY DEPENDS ON ASSOCIATED TRK CKT
SD-32309-01	E4B, E3B, E2B, E1B, E1A	
SD-32311-01	E4B, E3B, E2B, E1B, E1A	
SD-32312-01	E4B, E3B, E2B, E1B, E1A	
SD-32342-01 LP	NO	+130-48 RING, REV MAKE BUSY
SD-32342-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1
SD-32344-01 LP	NO	+130-48 COIN
SD-32344-01 E+M	E4B, E3B, E2B, E1B	SEE SECT C 1.1
SD-32346-01	E5C, E4C, E2C	
SD-32367-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1
SD-32367-01 MFLP	E3C, E5C, E4C	NOT COMPATIBLE 0 + TRAFFIC +130-48 RING
SD-32367-01 DPLP	E5C, E4C	NOT COMPATIBLE 0 + TRAFFIC +130-48 RING
SD-32508-01 LP	NO	+130-48 RING
SD-32508-01 E+M	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1
SD-32532-01 LP	E3C, E5C, E4C	
SD-32532-01 E+M	E4B, E3B, E2B	
SD-33017-01	E4D, E2D	SEE SECT C 3.0
SD-33018-01	E4D, E2D	SEE SECT C 3.0
SD-33019-01	E4D, E2D	SEE SECT C 3.0
SD-55109-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.3
SD-55113-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-55151-01 LP	E5C, E4C	
SD-55151-01 E+M	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.3
SD-55158-01 LP	E4D	SEE SECT C 3.0
SD-55158-01 E+M	E4B, E3B, E2B, E1B	
SD-55184-01	NO	WET DRY SUPV
SD-55213-01	NO	HIGH LOW SUPV
SD-55224-01	E3C, E5C, E4C, E1C	NOT COMP WITH CONTROLLED RING
SD-55255-01 LP	E5C, E4C	
SD-55255-01 E+M	E4B-E3B-E2B-E1B	SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-55256-01 LP	E5C, E4C	
SD-55256-01 E+M	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-55275-01	E4B, E3B	
SD-55291-01 RP	E1E	COMP WITH REV BAT SUPV AND NO RINGING START SIGNAL
SD-55291-01 DP	E5C, E4C, E2C	COMP WITH REV BAT SUPV AND NO RINGING START SIGNAL
SD-55301-01	E5C, E4C, E2C	NOT COMP WITH RING START SIG
SD-55346-01	E5C, E4C, E2C	NOT COMP WITH WET DRY SUPV NOT COMP WITH CONTROLLED RING
SD-55358-01	E4B, E3B, E2B, E1B	
SD-55379-01	E4B, E3B, E2B	SEE SECT. B 3.1.6, C1.1
SD-55380-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-55381-01	E4B, E3B, E2B, E1B	NOT COMP WITH RERING WINK TOO SHORT
SD-55386-01	E4B, E3B	USE OPTION ZN OR ZP IF CONTROLLED RING IS REQUIRED SEE SECT B 3.1.6
SD-55776-01	NO	WET DRY SUPV
SD-55778-01	NO	HIGH-LOW SUPV
SD-55844-01	NO	REQUIRES METALLIC PATH
SD-55852-01	E4B, E3B, E2B, E1B	
SD-55872-01	NO	WET DRY SUPV
SD-55875-01	NO	WET DRY SUPV +110-48V COIN
SD-55879-01	E3C, E5C, E4C, E1C	CONT RING OR USE AS TEST TRK NOT COMP
SD-55889-01	NO	REQUIRES METALLIC PATH
SD-55952-01	NO	WET-DRY SUPV DIST END
SD-56010-01	E4B, E3B, E2B, E1B	
SD-56032-01	NO	REQUIRES METALLIC PATH
SD-56045-01	NO	SX RING
SD-56055-01	NO	SX SIG ON PHANTOM
SD-56056-01	NO	SX SIG ON PHANTOM
SD-56062-01	E4B, E3B, E2B, E1B	REQUIRES G OPTION
SD-56105-01	E5C, E4C, E2C	NOT COMP WITH CONTROLLED RING OR WET-DRY SUPV
SD-56109-01	E4B, E3B, E2B, E1B	ZD OPTION REQUIRED
SD-56119-01	NO	REQUIRES METALLIC PATH
SD-56121-01	NO	WET-DRY SUPV
SD-56123-01	NO	REQUIRES METALLIC PATH
SD-56128-01 RP	E1E	NOT COMP WITH CONTROLLED RING OR WET-DRY SUPV
SD-56128-01 DP	E5C, E4C, E2C	NOT COMP WITH CONTROLLED RING OR WET-DRY SUPV
SD-56131-01	E4B, E3B, E2B, E1B, E1A	
SD-56133-01	NO	NOT COMP WITH RERING WINK TOO SHORT
SD-56146-01	NO	SX RING
SD-56153-01	E5C, E4C	
SD-56154-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-56159-01	E4B, E3B, E2B, E1B	
SD-56163-01	E4B, E3B, E2B, E1B, E1A	REQUIRES FIG 5 OR M+H OPTION
SD-56199-01	NO	20 HZ APPLIED TO T+R
SD-56209-01	NO	SX SIG ON PHANTOM
SD-56210-01	NO	SX SIG ON PHANTOM
SD-56225-01	NO	REQUIRES DC PATH
SD-56241-01	NO	WET DRY SUPV DIST END
SD-56257-01	E4B, E3B, E2B, E1B	REQUIRES ZA WIRING SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-56314-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1
SD-56355-01	NO	SX RING
SD-56358-01	NO	WET DRY SUPV DIST END 20HZ RING

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-56371-01	NO	SX SIGNALING
SD-56389-01	E1P, E2L	
SD-56413-01	NO	ON HOOK TONE RINGING
SD-56414-01	NO	ON HOOK TONE RINGING
SD-56415-01	NO	ON HOOK TONE RINGING
SD-56416-01	NO	ON HOOK TONE RINGING
SD-56420-01	NO	ON HOOK TONE RINGING
SD-56421-01	NO	ON HOOK TONE RINGING
SD-56422-01	NO	ON HOOK TONE RINGING
SD-56423-01	NO	ON HOOK TONE RINGING
SD-56424-01	E4B, E3B, E2B, E1B	
SD-56434-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6, C 1.1
SD-56435-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-56475-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1, 1.2
SD-56477-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1, 1.2
SD-56478-01	E4B, E3B, E2B, E1B	
SD-56479-01	E4B, E3B, E2B, E1B	
SD-56480-01	E5C, E4C, E2C	SEE SECT C 2.0
SD-56481-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1
SD-56482-01	E3C, E5C, E4C, E1C	
SD-56483-01	E4B, E3B, E2B, E1B	
SD-56487-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-56488-01	E4B, E3B, E2B, E1B	SEE SECT B 3.1.6
SD-56492-01	NO	HIGH-LOW SUPV
SD-56496-01	E4D	
SD-56501-01	E1P, E2L+E2LA	
SD-56507-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1
SD-56509-01	E4B, E3B, E2B	
SD-56525-01 LP	SEE NOTES	2WAY TRUNK NOT COMP. RECORDING COMPLETING NOT COMP BECAUSE OF SX OR 20HZ RING. TOLL SWITCH NOT COMP WITH SX OR 20HZ RING. TOLL SWITCH WITHOUT RING WITH HIGH LOW SUPV MAY BE USED WITH E4C OR E2C FOR DP, E3C, E4C, E2C OR E1C FOR MF, E1E FOR RP.
SD-56525-01 E+M	E4B, E3B, E2B, E1B	SEE SECT C 1.1, B 3.1.6
SD-62085-01	NO	3 WIRE TRK
SD-62209-01	NO	HIGH LOW SUPV
SD-62285-01	NO	3 WIRE TRK
SD-62409-01	NO	20HZ RING
SD-62423-01	NO	WET DRY SUPV DIST END
SD-62496-01	NO	3 WIRE TRK
SD-62533-01	NO	RINGDOWN TRUNK
SD-62611-01	NO	WET DRY SUPV DIST END
SD-64221-01	NO	HIGH-LOW SUPV.
SD-64472-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-64474-01	E4B, E3B, E2B, E1B	SEE SECT 1.1.1, 1.1.2, 1.1.3

ATTACHMENT TO
SEC. 179-100-304

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-64482-01	E4D, E2D	SEE SECT C 3.0
SD-64538-01	E4B, E3B, E2B, E1B	REQUIRES ZX OPTION SEE SECT C 1.1.3, 1.1.2, 1.1.3
SD-64539-01	NO	WET-DRY SUPV
SD-64571-01	NO	WET DRY SUPV DIST END
SD-64590-01	E4B, E3B, E2B, E1B	
SD-64626-01	NO	HIGH LOW SUPV
SD-64697-01	NO	20 HZ APPLIED TO T+R
SD-64698-01	NO	OFF HOOK RING
SD-64767-01	E1R, E2S, E1S	X OPTION NOT COMP.
SD-64824-01	E4B, E3B, E2B, E1B	SEE SECT C 1.2.2, 1.2.3
SD-64832-01	E5C, E4C, E2C	NOT COMP WITH WET-DRY SUPV OR CONTROLLED RING
SD-65531-01	NO	2 WAY TIE TRUNK
SD-65535-01	NO	2 WAY TIE TRUNK
ES-65602-01	NO	E-TYPE SIGNALING UNITS CAN NOT PULSE INTO AN OFF HOOK CIRCUIT AT OTHER END HAS TOO SHORT A WINK TO START RINGING
ES-65625-01	NO	CIRCUIT AT OTHER END HAS TOO SHORT A WINK TO START RINGING.
SD-65718-01	E4B, E3B, E2B	SEE SECT C 1.1, 1.2.5
SD-65718-02	E4B, E3B, E2B	SEE SECT C 1.1, 1.2.5
SD-65755-01	NO	2 WAY TIE TRK
SD-65788-01	NO	3 WIRE
SD-65978-01	E4D, E5D	REVERSE T+R
SD-66065-01	NO	2 WAY TIE TRK
SD-66241-01	NO	2 WAY TIE TRK
SD-66298-01	E5C, E4C, E2C	
SD-66470-01	NO	RINGDOWN TIE TRUNK
SD-66578-01	NO	RINGDOWN TRK
SD-66592-01	E1R, E2S	
SD-66740-01	E4D	SEE SECT C 3.0
SD-66741-01	E4D	SEE SECT C 3.0
SD-66777-01	E4D	WITH REV BAT OPTION WITH HIGH-LOW OPTION
SD-66896-01	E1R, E2S+E2SA E4B, E3B, E2B	
SD-68097-01	E4D	FIG B
SD-68097-01	E5C, E4C, E3C	FIG C
SD-68102-01	NO	WINK RING TOO SHORT
SD-68135-01	E4B, E3B, E2B, E1B	
SD-68154-01	E4B, E3B, E2B	
SD-68230-01	E4B, E3B, E2B, E1B	
SD-68231-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.3
SD-68232-01	E4B, E3B, E2B, E1B	SEE SECT C 1.1.3
SD-68233-01	E4B, E3B, E2B, E1B	
SD-68239-01	NO	SX RING
SD-68240-01	NO	WET-DRY SUPV, 20HZ RING

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-68242-01 DP	E5C, E4C, E2C	REV BAT SUPV ONLY
SD-68242-01 MF	E3C, E5C, E4C, E1C	REV BAT SUPV ONLY
SD-68259-01 MF	NO	WINK RING TOO SHORT
SD-68260-01	NO	RING DOWN
SD-68289-01	NO	REV BAT SIG ON PHANTOM
SD-68290-01	NO	SX SIGNALING
SD-68308-01	NO	WINK RING TOO SHORT
SD-68309-01	NO	REV BAT SUP ON PHANTOM
SD-68312-01	NO	WINK RING TOO SHORT
SD-68315-01	NO	20 HZ RING
SD-68318-01	NO	20 HZ RING
SD-68325-01	E3C, E5C, E4C	REQUIRES FIG A NOT COMP WITH RERING
SD-68326-01 RP	E1E	REV BAT SUP ONLY
SD-68326-01 DP	E5C, E4C	REV BAT SUP ONLY
SD-68331-01	NO	SX RING
SD-68332-01	NO	WET-DRY SUPV
SD-68355-01	E4B, E3B	
SD-68357-01	NO	SX RING
SD-68358-01	NO	SX RING
SD-68401-01	NO	REQUIRES DC PATH
SD-68479-01	E4B, E3B, E2B	
SD-68480-01	E4D	
SD-68482-01	E4D	
SD-68485-01	NO	REQUIRES DC PATH
SD-68513-01	E4B, E3B, E2B, E1B	
SD-68514-01	E4B, E3B, E2B	
SD-68527-01 LP	NO	20 HZ RING
SD-68527-01 E+M	NO	SX RING ON TRANS PAIR
SD-68529-01	E4B, E3B	Q OPTION REQUIRED
SD-68537-01	E4B, E3B, E2B	
SD-68579-01	E4B, E3B, E2B	SEE SECT C 1.1.3
SD-68581-01	E4B, E3B, E2B	
SD-68582-01	E4B, E3B, E2B	SEE SECT C 1.1.3
SD-68595-01	E4B, E3B, E2B	
SD-68596-01	E4B, E3B, E2B	
SD-68962-01 DP	E5C, E4C, E2C	REQUIRES R OPTION
SD-68962-01 MF	E5C, E4C, E3C, E1C	REQUIRES R OPTION
SD-68966-01	NO	REV BAT SIG ON PHANTOM
SD-90000-01	E4D, E2D, E3D, E1D	REV BAT SUPV AND -48V BAT REQUIRED
SD-90070-01	E1P, E2L	
SD-90257-01	NO	24VOLT REVBATT SUPV.
SD-90275-01	NO	WET-DRY SUPV
SD-90434-01	E4D, E2D, E3D, E1D	FIG 1 AND 1A OR 1C REVERSE TIP AND RING
SD-90439-01	NO	FOR USE ON PHANTOM GROUP
SD-90451-01	NO	HIGH-LOW SUPV
SD-90506-01	NO	REQUIRES METALIC CKT

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-90527-01	NO	24VOLT REV BAT SUPV
SD-90566-01	E4D, E5D, E3D, E2D, E1D	
SD-90647-01	NO	PCI PULSING
SD-95037-01	E3C, E5C, E4C, E2C, E1C	
SD-95060-01	E4B, E3B, E2B, E1B, E1A	USE B OPTION FOR RERING SEE SECT C 1.1
SD-95061-01	E4B, E3B, E2B, E1B, E1A	SEE SECT C 1.2
SD-95095-01	E4B, E3B, E2B, E1B, E1A	
SD-95405-01	NO	BAT AND GRD SIGNALING
SD-95413-01	NO	GRD START TRK
SD-95425-01	E3C, E5C, E4C, E1C	
SD-95426-01	NO	HIGH-LOW SUPV
SD-95436-01	NO	SX RING
SD-95443-01	E4B, E3B, E2B, E1B	4 WIRE END
SD-95459-01	E3C, E5C, E4C, E2C, E1C	
SD-95462-01	NO	USES 24V REV-BAT SUP
SD-95467-01	E3C, E2C, E1C	FIG B ONLY
SD-95470-01	NO	WET-DRY SUPV
SD-95471-01	NO	SX OR 20HZ RING
SD-95475-01	NO	SX OR 20HZ RING
SD-95487-01	NO	SIGNAL CKT
SD-95488-01	E4B, E3B, E2B, E1B, E1A	
SD-95495-01	NO	WET-DRY SUPV
SD-95513-01	E4D, E5D, E3D, E2D, E1D	E4D ONLY WITH FIG S (AIS WITH REV MAKE BUSY)
SD-95530-01	NO	REQUIRES DC PATH
SD-95542-01	E3C, E5C, E4C, E2C, E1C	REQUIRES Y WIRING
SD-95543-01	E4D, E5D, E3D, E2D, E1D	B+G SIG OPTIONS ONLY
SD-95546-01	E3C, E5C, E4C, E2C, E1C	
SD-95560-01	E3C, E4C	FIG 6 ONLY, FIG 5 NOT COMP WET-DRY SUPV
SD-95563-01	NO	REQUIRES DC PATH
SD-95564-01	NO	REQUIRES DC PATH
SD-95565-01	NO	SX OR 20HZ RING
SD-95566-01	NO	SX OR 20HZ RING
SD-95569-01 E+M	E4B, E3B, E2B, E1B, E1A	
SD-95569-01 LP	E4D, E5D, E3D, E2D, E1D	
SD-95585-01	E4D, E5D, E3D, E2D, E1D	FIGS C, D OR E REV T AND R FOR FIGS D OR E
SD-95615-01	NO	HIGH-LOW SUPV
ES-95668-01	NO	E-TYPE SIGNALING UNITS CAN NOT PULSE INTO AN OFF-HOOK
SD-95673-01	NO	HIGH-LOW SUPV
SD-95691-01	NO	WET-DRY SUPV
SD-95731-01	NO	3 WIRE
SD-95740-01	NO	REQUIRES METALIC CKT
SD-95744-01	NO	2 WAY LOOP TRK
SD-95745-01	NO	WET-DRY SUPV
SD-95777-01	E4D, E5D, E3D, E2D, E1D	
SD-95789-01	NO	REQUIRES METALIC CKT

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-95846-01	E4B, E3B, E2B, E1B, E1A	
SD-95850-01	E4B, E3B, E2B, E1B, E1A	
SD-95974-01	E4B, E3B, E2B, E1B, E1A	
SD-95976-01	E4B, E3B, E2B, E1B, E1A	
SD-95979-01	E1R, E2S OR E3C, E5C, E4C, E2C, E1C	PROPER CHOICE DEPENDS ON SF UNIT AND CIRCUIT AT DISTANT END.
SD-96169-01	NO	HIGH-LOW SUPV
SD-96189-01	E4D, E5D, E3D, E2D, E1D	
SD-96209-01	NO	WET-DRY SUPV
SD-96210-01	NO	WET-DRY SUPV
SD-96250-01	NO	WET-DRY SUPV
SD-96251-01	E1P	SEE SECT C 6.1.4
SD-96252-01	E4B, E3B	SEE SECT C 5.2
SD-96283-01	E3C, E5C, E4C	
SD-96301-01	NO	2 WAY LOOP TRK
SD-96352-01	NO	HIGH-LOW OR 24V REV BAT SUP
SD-96365-01	NO	WET-DRY SUPV, SX COIN
SD-96366-01	NO	PCI PULSING
SD-96384-01		COMP DEPENDS ON ASSOCIATED TRUNK CKTS
SD-96394-01	NO	RINGDOWN TRK
SD-96398-01 LP	E5C, E4C, E2C	
SD-96398-01 E+M	E4B, E3B, E2B, E1B	SEE SECT C 1.1.1, 1.1.2, 1.1.3
SD-96412-01	NO	HIGH-LOW SUPV
SD-96459-01	E5C, E4C, E2C	
SD-96467-01	E3C, E5C, E4C, E2C, E1C	FIGS 3, 9 AND 14
SD-96469-01	NO	SX RING
SD-96481-01 LP	NO	HIGH-LOW SUPV
SD-96481-01 E+M	E4B, E3B, E2B	WHEN WORKING WITH SD-96482 AND T OPTION IS USED (STANDARD WIRING PRIOR TO ISSUE 4D) TRANSPOSE E+M LEADS OF TALK AND KP PATHS
SD-96482-01 LP	NO	HIGH-LOW SUPV
SD-96482-01 E+M	E4B, E3B, E2B	WHEN N OPTION IS USED (STANDARD WIRING PRIOR TO ISSUE 2D) TRANSPOSE E+M LEADS OF TALK AND KP PATHS
SD-96487-01	E4B, E3B, E2B, E1B, E1A	
SD-96488-01	E4B, E3B, E2B, E1B, E1A	
SD-96544-01	NO	REQUIRES DC PATH
SD-98061-01	NO	SX RING
SD-99378-01	E4D	SEE SECT C 3.0
SD-99388-01	E3C, E5C, E4C, E2C, E1C	OPTION Y REQUIRED
SD-99415-01	E4B, E3B, E2B, E1B, E1A	
SD-99419-01	E4B, E3B	REQUIRES T OPTION
SD-99420-01	E4B	REQUIRES SD-95061-01

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-99435-01	E4B, E3B, E2B	REQUIRES OPTION Z IN SD-1C004-01 OR SD-1C234-01
SD-99446-01	E4B, E3B, E2B	REQUIRES OPTION YI IN SD-1E007-01
SD-1A163-01	E4B, E3B, E2B	
SD-1A165-01 DP	E5C, E4C, E2C	
SD-1A165-01 MF	E3C, E5C, E4C, E2C, E1C	
SD-1A165-01 RP	E1E	SEE SECT C 4.12
SD-1A166-01	E4D	
SD-1A166-02	E4D	
SD-1A167-01	E4B, E3B, E2B	SEE SECT C 1.1.3
SD-1A169-01	NO	WET-DRY SUPV
SD-1A177-01	NO	WET DRY + SX SUPV
SD-1A184-01	NO	SX RING + 3RD WIRE COIN
SD-1A185-01	NO	DC RING + COIN
SD-1A186-01	NO	REQ DC PATH FOR TEST
SD-1A187-01	NO	3 WIRE TRK
SD-1A190-01	NO	WET DRY SUPV
SD-1A192-01	E4D	
SD-1A198-01	NO	REQ DC PATH
SD-1A203-01	E3C, E4C	
SD-1A220-01	E4D	
SD-1A236-01	E4B, E3B, E2B, E1B	
SD-1A237-01	E4B, E3B, E2B	SEE SECT. C 1.1.3
SD-1A238-01	NO	TWO WAY LOOP
SD-1A239-01	NO	4 WIRE LOOP
SD-1A241-01	E1R, E2S+E2SA	
SD-1A248-01	NO	4 WIRE LOOP
SD-1A254-01	NO	REQ DC PATH
SD-1A264-01	NO	TWO WAY LOOP
SD-1A266-01	E4D, E5D, E2D, E3D, E1D	SEE SECT C 3.0
SD-1A301-01	NO	SX SIGNALING, USE SD-99435-01
SD-1B002-01	E4D	COMP WITH WINK RINGBACK ONLY
SD-1B003-01	E4D	COMP WITH WINK RINGBACK ONLY
SD-1B004-01	E4B, E3B, E2B	REQUIRES E+M LEAD APPLIQUE
SD-1B005-01	E4B, E3B, E2B	REQUIRES E+M LEAD APPLIQUE
SD-1B006-01	E4B, E3B, E2B	REQUIRES E+M LEAD APPLIQUE
SD-1B007-01	E4B, E3B, E2B	REQUIRES E+M LEAD APPLIQUE
SD-1B010-01	E3C, E5C, E4C, E2C, E1C	Z OPTION REQ.
SD-1B016-01 LP	NO	HIGH-LOW SUPV
SD-1B016-01 E+M	E4B, E3B, E2B	REQUIRES E+M LEAD APPLIQUE TWO CHANNELS REQUIRED
SD-1B102-01 LP	E4D	INCOMING PART
SD-1B102-01 LP	E3C, E5C, E4C	OUTGOING PART
SD-1B102-01 E+M	E4B, E3B, E2B	TWO CHANNELS REQUIRED
SD-1B103-01 LP	E3C, E5C, E4C	TWO CHANNELS REQUIRED
SD-1B103-01 E+M	E4B, E3B, E2B	TWO CHANNELS REQUIRED
SD-1B110-01	E4B, E3B, E2B, E1B	
SD-1B154-01 OGT	E3C, E5C, E4C, E1C	
SD-1B154-01 IT	NO	HIGH-LOW SUPV

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-1B183-01	NO	HIGH LOW SUPV
SD-1B185-01 OGT	NO	REV BAT SUPV
SD-1B185-01 IT	E4D	E2D MAY BE USED WHERE REV MB IS NOT REQ USE S-197 CIRCUIT PACK SEE SECT C 3.0
SD-1B186-01	NO	REV BAT SUPV
SD-1B188-01 IT	NO	SX SUPV
SD-1B191-01 OGT	E3C, E5C, E4C	
SD-1B191-01 IT	NO	HIGH-LOW SUPV
SD-1B193-01 OGT	E3C, E5C, E4C, E1C	
SD-1B193-01 IT	NO	HIGH-LOW SUPV
SD-1B197-01	E3C, E5C, E4C, E1C	
SD-1B198-01	E3C, E5C, E4C, E1C	
SD-1B250-01 OGT	E3C, E5C, E4C, E1C	
SD-1B250-01 IT	NO	HIGH LOW SUPV
SD-1C004-01	NO	SX SIGNALING, USE SD-99435-01
SD-1C234-01	NO	SX SIGNALING, USE SD-99435-01
SD-1C353-01	NO	E-TYPE SIGNALING UNITS CAN NOT PULSE INTO AN OFFHOOK
SD-1C354-01	E4B, E3B	REQUIRES F-TYPE AT DIST END
SD-1E003-01	E4D	SEE SECT C 3.0
SD-1E004-01	E4D	SEE SECT C 3.0
SD-1E007-01	NO	SX SIGNALING, USE SD-99446-01
SD-1E213-01	E1R, E2S+ E2SA	
SD-1E240-01	E4D, E5D, E2D	
SD-1G235-01	E4B, E3B, E2B	REQUIRES W OR Y WIRING
SD-2A014-01	E4B, E3B, E2B	SEE SECT C 1.1.3 USE E1J FOR AUTOVON INTEROFFICE TRKS
SD-2H103-01 MF	E3C, E5C, E4C, E1C	
SD-2H103-01 DP	E5C, E4C, E2C	
SD-2H104-01 MF	E4D, E2D, E5D, E1D	SEE SECT C 3.0
SD-2H104-01 DP	E4C, E2D, E5D	SEE SECT C 3.0
SD-2H107-01	NO	WET DRY SUP
SD-2H109-01	NO	SLEEVE SUP
SD-2H110-01	E4D	SEE SECT C 3.0
SD-2H111-01	E4D, E5D, E2D	SEE SECT C 3.0
SD-2H112-01	E4B, E3B	
SD-2H113-01	NO	SX SIGNALS
SD-2H141-01	NO	REQ SLEEVE LEAD
SD-2H144-01	E3C, E5C, E4C	
SD-2H147-01	NO	WET-DRY SUPV
SD-2H149-01	E4D, E5D	
SD-2H151-01	NO	+130 -130 SIG
SD-5E028-01	E4B, E3B, E2B	
SD-5E041-01	E4B, E3B, E2B	E+M OPTION ONLY
SD-5E046-01	E4D	
SD-5E047-01	E4D	
ES-6G108-01	E4B, E3B	FOR ASSOCIATED AUDIO FAC.