

TYPE F SIGNALING SYSTEM FU_ AND AUXILIARY UNITS SIGNALING COMPATIBILITY

1. GENERAL

auxiliary units of the type F signaling systems with various switching circuits.

1.01 This section furnishes information on the signaling compatibility of the FU_ and

1.0 THE FOLLOWING PARAGRAPHS AND CIRCUITS
HAVE BEEN ADDED OR REVISED.

GENERAL INFORMATION

1.0.1, 1.1, 3.2, 3.3, 3.4, 6.0

DETAILED CIRCUIT INFORMATION

1.05, 2.05, 4.0, 5.1.2, 5.4, 6.4, 7.0

COMPATIBILITY LISTING

SD25663	SD90257	ES6G108
SD25721	SD95459	
SD25736	SD95546	
SD25766	SD95560	
SD25909	SD95563	
SD26047	SD95564	
SD26282	SD95979	
SD27001	SD96544	
SD27012	SD99388	
SD27015	SD99419	
SD27148	SD99420	
SD31693	SD99435	
SD55379	SD99446	
SD55844	SD1A203	
SD55889	SD1A301	
SD56032	SD1B002	
SD56119	SD1B003	
SD56123	SD1B010	
SD56225	SD1B110	
SD64221	SD1C234	
SD66740	SD1C353	
SD66741	SD1C354	
SD68355	SD1E003	
SD68401	SD1E004	
SD68485	SD1G235	

DWG	CD	DATE	APPD
ISS	ISS	ISSUED	COR
2	2	5-18-72	RHG HRM

CONTENTS	PAGE INDEX	PAGE NO.	ISS.
INDEX SHEET		A1	2
GENERAL INFORMATION		B1-B 6	2
DETAILED CIRCUIT INFORMATION		C1-C 6	2
COMPATIBILITY LISTING		D1-D18	2

1N29
COMMON SYSTEMS

TYPE F SIGNALING SYSTEM
FU- AND AUXILIARY UNITS
SIGNALING COMPATIBILITY
WITH SWITCHING CIRCUITS

BELL TELEPHONE LABORATORIES,
INCORPORATED

AT&T CO STANDARD
SD-99421-08-A1
ISSUE 2

PRINTED IN U.S.A.

31 PAGES

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 APPLIES TO THE FU- SINGLE FREQUENCY (SF) SIGNALING CONVERTER AND THE AUXILIARY UNITS THAT ARE USED TO PROVIDE THE VARIOUS INTERFACES NEEDED IN TYPE F SIGNALING APPLICATIONS. TWO UNITS ARE REQUIRED PER CIRCUIT WITH THIS BAY ARRANGEMENT.

THE AUXILIARY UNITS COVERED IN THIS DRAWING ARE LISTED BELOW. MORE DETAILED INFORMATION ON THE UNITS MAY BE FOUND IN SECTION C.

FAA	900-OHM 2-WIRE E&M
FAB	600-OHM 2-WIRE E&M
FAC	900-OHM 2-WIRE E&M
FAD	600-OHM 2-WIRE E&M
FBA	4-WIRE E&M
FBB	4-WIRE E&M
FCA	LOOP ORIGINATING
FDA	LOOP TERMINATING
FDB	LOOP TERMINATING
FLA	900-OHM 2-WIRE CUSTOMER LINE, CENTRAL OFFICE END
FLB	600-OHM 2-WIRE CUSTOMER LINE, CENTRAL OFFICE END
FPA	4-WIRE CUSTOMER LINE, CENTRAL OFFICE END
FRA	4-WIRE CUSTOMER LINE, STATION END
FSA	900-OHM 2-WIRE CUSTOMER LINE, STATION END
FSB	600-OHM 2-WIRE CUSTOMER LINE, STATION END
FGA	900-OHM 2-WIRE DX
FHA	4-WIRE DX

WHERE A LARGE NUMBER OF FOUR WIRE E&M LEAD CIRCUITS ARE REQUIRED, CONSIDERATION SHOULD BE GIVEN TO PROVIDING A BAY OF FW- UNITS WHICH DO NOT REQUIRE AUXILIARIES. COMPATIBILITY OF THESE UNITS IS COVERED IN SD-99421-06 (BSP-179-100-306).

1.2 SECTION B OF THIS DRAWING DESCRIBES THE ABOVE MENTIONED TYPE F AUXILIARY SIGNALING UNITS AND CERTAIN OF THEIR CHARACTERISTICS WHICH ARE PERTINENT FROM A COMPATIBILITY STANDPOINT. SECTION C GIVES DETAILED SIGNALING COMPATIBILITY INFORMATION ON TYPE F SIGNALING UNITS WHEN WORKING WITH CERTAIN CLASSES OF SWITCHING CIRCUITS. SECTION D PROVIDES STILL MORE DETAILED INFORMATION IN THAT IT LISTS THE COMPATIBILITY RATING OF SWITCHING CIRCUITS WITH THESE SIGNALING UNITS.

1.3 SECTION D LISTS SWITCHING CIRCUIT NUMBERS FOLLOWED BY THE TYPE F SIGNALING UNIT CODES WITH WHICH THEY ARE COMPATIBLE. THE PREFERRED UNIT IS LISTED WHERE POSSIBLE. IN SOME CASES ANOTHER UNIT MAY BE SUBSTITUTED AS COVERED IN SECTION C. IN OTHER CASES A CATEGORY OF UNITS IS LISTED AND SECTION C MUST BE CONSULTED FOR THE PROPER CHOICE IN A SPECIFIC APPLICATION. WHERE SPECIAL PROVISIONS ARE REQUIRED 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. THE FU-SIGNALING CONVERTER IS NOT LISTED IN SECTION D BECAUSE IT IS ALWAYS REQUIRED.

GENERAL INFORMATION

2.0 DESCRIPTION OF F SIGNALING UNITS.

2.1 TYPE F 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 AND CUSTOMER LINE APPLICATIONS. WHEN PROPERLY CHOSEN, THESE SIGNALING UNITS PROVIDE A MEANS FOR CONVERTING LOCAL-EXCHANGE-AREA DC SIGNALING OR 20 HZ RINGING TO 2600 HZ SINGLE-FREQUENCY SIGNALS, USING THE NORMAL SPEECH TRANSMISSION PATH OF A CARRIER CHANNEL OR A METALLIC LINE FACILITY. IN GENERAL, SINGLE-FREQUENCY TONE-ON SIGNIFIES ON-HOOK. 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 SIGNALING 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 F SIGNALING CHARACTERISTICS.

FOR COMPATIBLE OPERATION OF TYPE F 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 REISSUED TO GIVE 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. EXISTING CIRCUITS WHICH DO NOT HAVE THIS FEATURE MAY BE MODIFIED ON A JOB BASIS BY APPLYING A 446F DIODE OR EQUIVALENT AROUND THE RELAY WINDING RATHER THAN REPLACING THE RELAY, PROVIDED THE 140 MS MINIMUM RELEASE TIME IS ACHIEVED.

GENERAL INFORMATION

3.1.2 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. IN SPITE OF THIS THESE TRUNK CIRCUITS ARE BEING 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.

3.1.3 ALTHOUGH SXS CIRCUITS PROVIDE AMPLE DISCONNECT TIME TO HOLD OVER FALSE ON-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.

3.2 SIGNALING DELAY

3.2.1 SIGNALING DELAY THROUGH AN SF SYSTEM IS THE TIME BETWEEN THE DC-INPUT CHANGE-OF-STATE AT ONE END AND THE DC-OUTPUT CHANGE-OF-STATE AT THE OTHER END. THE SIGNALING DELAY INCLUDES THE DELAY IN APPLYING TONE, THE TRANSIT TIME OF THE TRANSMISSION FACILITY AND THE RESPONSE TIME OF

THE SF UNIT TO PRESENCE OR ABSENCE OF TONE.

WITH FU- AND AUXILIARY UNITS THE DELAY FROM ON-HOOK TO OFF-HOOK IS 13 TO 35 MILLI-SECONDS FROM THE TIME THE DC-STATE IS CHANGED UNTIL SIGNALING TONE IS REMOVED + THE TRANSIT TIME OF THE FACILITY + 40 TO 65 MILLI-SECONDS RECOGNITION OF TONE REMOVAL AND CHANGING THE DC-STATE. A TOTAL OF 53 TO 100 MILLI-SECONDS + TRANSIT TIME.

THE DELAY FROM OFF-HOOK TO ON-HOOK IS 13 TO 35 MILLI-SECONDS FROM THE TIME THE DC-STATE IS CHANGED UNTIL TONE IS TRANSMITTED + THE TRANSIT TIME OF THE FACILITY + 30 TO 110 MILLI-SECONDS RECOGNITION OF TONE PRESENCE AND CHANGING THE DC-STATE. A TOTAL OF 43 TO 145 MILLI-SECONDS + TRANSIT TIME.

THE TIMES SHOWN ARE INCLUSIVE OF ALL AUXILIARY UNITS. WHERE MORE SPECIFIC INFORMATION IS REQUIRED FOR A PARTICULAR UNIT CONSULT THE SD OR CD FOR THAT UNIT.

3.3 AVAILABILITY OF TRANSMISSION PATH.

3.3.1 CUT CIRCUITS WITHIN THE TYPE F SIGNALING UNITS ARE USED TO CUT AND TERMINATE THE TRANSMITTING TRANSMISSION PATH WHEN BOTH ENDS ARE ON-HOOK AND ALSO MOMENTARILY AFTER ANY CHANGE IN SIGNALING STATE. THE DURATION OF THIS CUT MUST BE CONSIDERED WHEN TONES ARE SENT FROM THE SWITCHING EQUIPMENT AFTER A CHANGE IN SIGNALING STATE.

AUDIBLE TONE WITH FLASH CANNOT BE SENT THROUGH TYPE F SIGNALING SYSTEMS. THE FLASH WILL BE REPRODUCED BUT THE TONE WILL EITHER BE SHORTENED OR ELIMINATED. STANDARD MF PULSING IS NOT AFFECTED BY THESE CUT CIRCUITS BECAUSE THE SIGNALING DELAY OF THE SF SYSTEM PLUS THE TIME REQUIRED TO ATTACH A REGISTER IS IN EXCESS OF THE CUT TIMING.

GENERAL INFORMATION

3.3.2 E & M UNITS

THE FAA, FAB, FAC, FAD, FBA AND FBB SIGNALING UNITS HAVE THE TRANSMITTING TRANSMISSION PATH CONTINUOUSLY CUT WHEN BOTH ENDS ARE ON-HOOK.

WHEN THE NEAR END GOES OFF-HOOK (BATTERY ON M LEAD), THE NEAR-END CUT IS REMOVED IN 90 TO 160 MS AND THE FAR-END CUT IS REMOVED IN 400 TO 750 MS. IF THE FAR END GOES OFF-HOOK DURING THIS LONG 400 TO 750 MS INTERVAL, THE LONG TIMING INTERVAL IS TERMINATED AT ONCE AND THE CUT IS REMOVED AFTER AN ADDITIONAL 90 TO 160 MS INTERVAL.

IF BOTH ENDS ARE OFF-HOOK AND THE NEAR-END GOES ON-HOOK, THE TRANSMITTING TRANSMISSION PATH AT THE NEAR-END IS CUT AND THEN REESTABLISHED IN 400 TO 750 MS.

IF THE FAR-END IS OFF-HOOK, AND THE NEAR-END CHANGES FROM ON-HOOK TO OFF-HOOK, THE TRANSMITTING TRANSMISSION PATH WILL BE CUT AND THEN REESTABLISHED IN 90 TO 160 MS.

3.3.3 LOOP ORIGINATING UNITS

THE FCA UNIT HAS THE TRANSMITTING TRANSMISSION PATH CONTINUOUSLY CUT AS LONG AS AN ON-HOOK SIGNAL (LOOP OPEN OR HIGH RESISTANCE) IS RECEIVED FROM THE CENTRAL OFFICE, REGARDLESS OF THE CONDITION OF THE DISTANT END SF UNIT. WHEN AN OFF-HOOK (LOOP CLOSURE OR LOW RESISTANCE) IS RECEIVED, THE CUT IS REMOVED IN 90 TO 160 MS.

3.3.4 LOOP TERMINATING UNITS

THE FDA AND FDB UNITS HAVE THE TRANSMITTING TRANSMISSION PATH CONTINUOUSLY CUT WHEN BOTH THE NEAR-END IS ON-HOOK (BATTERY ON RING) AND THE FAR-END IS ON-HOOK (2600 HZ TONE-

ON). WHEN THE NEAR-END GOES OFF-HOOK (REVERSE BATTERY), THE TRANSMITTING TRANSMISSION PATH AT THE NEAR-END IS REESTABLISHED IN 90 TO 160 MS.

AGAIN, ASSUMING BOTH ENDS ARE ON-HOOK, IF THE FAR-END GOES OFF-HOOK (TONE-OFF), THE NEAR-END TRANSMITTING TRANSMISSION PATH IS REESTABLISHED IN 400 TO 750 MS. IF THE NEAR-END GOES OFF-HOOK DURING THIS INTERVAL, THE LONG 400 TO 750 MS INTERVAL IS TERMINATED AT ONCE AND THE CUT IS REMOVED AFTER AN ADDITIONAL 90 TO 160 MS INTERVAL.

IF BOTH ENDS ARE OFF-HOOK, AND THE NEAR-END GOES ON-HOOK, THE TRANSMITTING TRANSMISSION PATH AT THE NEAR-END IS CUT AND THEN REESTABLISHED IN 400 TO 750 MS.

IF THE FAR-END IS OFF-HOOK, AND THE NEAR-END CHANGES FROM ON-HOOK TO OFF-HOOK, THE TRANSMITTING TRANSMISSION PATH WILL BE CUT AND THEN REESTABLISHED IN 90 TO 160 MS.

3.3.5 CUSTOMER LINE UNITS. STATION END

THE FSA, FSB AND FRA HAVE THEIR TRANSMITTING TRANSMISSION PATHS CUT AS LONG AS THE STATION IS ON-HOOK. WHEN THE STATION GOES OFF-HOOK THE TRANSMITTING TRANSMISSION PATH IS ESTABLISHED IN 90 TO 160 MS.

3.3.6 CUSTOMER LINE UNITS. CENTRAL OFFICE OR PBX LINE CIRCUIT END

THE FLA, FLB AND FPA HAVE THEIR TRANSMITTING TRANSMISSION PATHS CUT WHEN 20 HZ. RINGING IS APPLIED, THE DISTANT END IS ON-HOOK (NEAR END RECEIVING TONE), PULSE CORRECTOR TIMING CIRCUITS ARE IN OPERATION (DIAL PULSING) OR THE TIP IS OPEN TOWARD THE CENTRAL OFFICE

GENERAL INFORMATION

(GROUND START MODE).

WHEN THE DISTANT END GOES OFF-HOOK (TONE REMOVED) THE NEAR END TRANSMITTING TRANSMISSION PATH IS ESTABLISHED IN 90 TO 160 MS PROVIDED NONE OF THE OTHER CONDITIONS MENTIONED ABOVE ARE IN EFFECT.

3.4 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 RMB SCREW SWITCH ON THE FD- UNIT SHOULD BE CLOSED (TURNED DOWN).

4.0 COMPATIBILITY OF LEADS.

4.1 COMPATIBILITY MUST BE ASSURED BETWEEN THE SIGNALING 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 IN PROPER TIMING AND IN PROPER SEQUENCE.

4.2 ALL LOOP TYPE F 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.

5.0 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 OCCURRENCE 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.

GENERAL INFORMATION

6.0 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.

7.0 COMPATIBILITY OF TYPE F SF
UNITS WITH OTHER TYPE F OR E
SF UNITS

7.1 IN ADDITION TO ASSURING THE SIGNALING COMPATIBILITY OF THE SIGNALING UNIT AT EACH END OF THE TRUNK WITH ITS CONNECTING SWITCHING CIRCUITS, IT IS NECESSARY THAT THE SIGNALING UNITS AT EACH END BE COMPATIBLE WITH EACH OTHER. FOR COMPATIBILITY OF TYPE E UNITS WITH EACH OTHER SEE SD-98151-01. FOR COMPATIBILITY OF TYPE F UNITS WITH EACH OTHER OR WITH TYPE E UNITS SEE CD-1C240-02.

DETAILED CIRCUIT INFORMATION

1.0 E&M UNITS, TWO-WIRE (TYPE FA-)

1.0.1 TWO-WIRE E&M UNITS ARE PROVIDED FOR USE IN TWO-WIRE SWITCHING OFFICES ON TWO-WAY TRUNKS OR WHERE SPECIAL REQUIREMENTS FORCE THE USE OF E&M SIGNALING ON ONE-WAY TRUNKS. MANY TWO-WIRE ONE-WAY TRUNKS CAN BE PROVIDED MORE ECONOMICALLY WITH LOOP UNITS.

1.0.2 ALL TWO-WIRE E&M UNITS ARE EQUIVALENT FROM A SIGNALING STANDPOINT; THEREFORE, TRANSMISSION CONSIDERATIONS WILL CONTROL THE PROPER CHOICE OF UNITS.

1.0.3 M-LEAD PULSE CORRECTION IS NOT REQUIRED FOR DIAL-PULSING BECAUSE OF THE WIDE INPUT CAPABILITY OF THE UNITS. THE M-LEAD RESISTANCE SHOULD NOT EXCEED 1000 OHMS.

1.0.4 THE NEED FOR PULSE CORRECTION ON THE E-LEAD IS DEPENDENT ON THE REQUIREMENTS OF THE PARTICULAR SWITCHING SYSTEM. THE SAME RULES SHOULD BE APPLIED THAT WOULD BE USED IF SF SIGNALING WERE NOT INVOLVED. THE E-LEAD RESISTANCE LIMIT IS DEPENDENT ON THE CONNECTING CIRCUIT.

1.0.5 TERMINATING END DIAL PULSE UNITS REQUIRE THE PROVISION OF A CONTACT PROTECTION OR PULSE SHAPING NETWORK ON THE E LEAD OF THE ASSOCIATED TRUNK CIRCUIT IN ORDER TO ASSURE ADEQUATE CONTACT LIFE ON THE MINIATURE WIRE SPRING RELAY USED IN THE TYPE F SYSTEM. MOST DIAL PULSE RECEIVING TRUNK CIRCUITS PROVIDE SUCH PROTECTION. WHERE IT IS PROVIDED ON AN OPTIONAL BASIS THE SPECIFIC OPTION REQUIRED IS SHOWN IN SECTION D.

1.0.6 ALL TWO-WIRE E&M UNITS INCLUDE A CARRIER GROUP ALARM TRUNK CONDITIONING FEATURE.

1.1 FAA

1.1.1 THE FAA IS A 900-OHM TWO-WIRE E&M UNIT FOR USE IN TWO-WIRE SWITCHING OFFICES WHERE E&M SIGNALING IS REQUIRED.

1.1.2 THE FAA UNIT CAN ONLY BE BALANCED WHEN USED WITH TRUNK CIRCUITS THAT HAVE NO CAPACITOR ON THE A&B LEADS. CROSSBAR NO. 5 AND CROSSBAR TANDEM TRUNK CIRCUITS ARE USUALLY IN THIS CATEGORY.

1.2 FAB

1.2.1 THE FAB IS A 600-OHM TWO-WIRE E&M UNIT FOR USE IN TWO-WIRE SWITCHING OFFICES WHERE E&M SIGNALING IS REQUIRED.

1.2.2 THE FAB CAN ONLY BE BALANCED WHEN USED WITH TRUNK CIRCUITS THAT HAVE NO CAPACITOR ON THE A&B LEADS.

1.3 FAC

1.3.1 THE FAC IS A 900-OHM TWO-WIRE E&M UNIT FOR GENERAL USE IN TWO-WIRE SWITCHING OFFICES WHERE E&M SIGNALING IS REQUIRED.

1.3.2 THE FAC PROVIDES SCREW-SWITCH OPTICNS TO ACHIEVE BALANCE WITH 0,1 OR 4 MFD ON THE TRUNK CIRCUIT A&B LEADS.

1.4 FAD

1.4.1 THE FAD IS A 600-OHM TWO-WIRE E&M UNIT FOR GENERAL USE WHERE 600-OHM E&M SIGNALING IS REQUIRED.

1.4.2 THE FAD PROVIDES SCREW-SWITCH OPTIONS TO ACHIEVE BALANCE WITH 0 OR 1 MFD ON THE TRUNK CIRCUIT A&B LEADS.

DETAILED CIRCUIT INFORMATION

2.0 E&M UNITS, FOUR-WIRE (TYPE FB-)

2.0.1 FOUR-WIRE E&M UNITS ARE PROVIDED FOR USE WHERE AN EXTERNAL TERM SET IS REQUIRED, A FOUR-WIRE EXTENSION IS DESIRED OR IN FOUR-WIRE SWITCHING OFFICES. A MORE ECONOMICAL ARRANGEMENT IN SOME CASES WOULD BE THE USE OF AN FWA AS COVERED IN GENERAL SECTION 1.1

2.0.2 ALL FOUR-WIRE E&M UNITS ARE EQUIVALENT FROM A SIGNALING STANDPOINT.

2.0.3 M-LEAD PULSE CORRECTION IS NOT REQUIRED FOR DIAL-PULSING BECAUSE OF THE WIDE INPUT CAPABILITY OF THE UNITS. THE M-LEAD RESISTANCE SHOULD NOT EXCEED 1000 OHMS.

2.0.4 THE NEED FOR PULSE CORRECTION ON THE E-LEAD IS DEPENDENT ON THE REQUIREMENTS OF THE PARTICULAR SWITCHING SYSTEM. THE SAME RULES SHOULD BE APPLIED THAT WOULD BE USED IF SF SIGNALING WERE NOT INVOLVED. THE E-LEAD RESISTANCE LIMIT IS DEPENDENT ON THE CONNECTING CIRCUIT.

2.0.5 TERMINATING END DIAL PULSE UNITS REQUIRE THE PROVISION OF A CONTACT PROTECTION OR PULSE SHAPING NETWORK ON THE E LEAD OF THE ASSOCIATED TRUNK CIRCUIT IN ORDER TO ASSURE ADEQUATE CONTACT LIFE ON THE MINIATURE WIRE SPRING RELAY USED IN THE TYPE F SYSTEM. MOST DIAL PULSE RECEIVING TRUNK CIRCUITS PROVIDE SUCH PROTECTION. WHERE IT IS PROVIDED ON AN OPTIONAL BASIS THE SPECIFIC OPTION REQUIRED IS SHOWN IN SECTION D.

2.1 FBA

2.1.1 THE FBA IS A FOUR-WIRE E&M UNIT WHICH DOES NOT INCLUDE A CARRIER GROUP ALARM TRUNK CONDITIONING FEATURE.

2.2 FBB

2.2.1 THE FBB IS EQUIVALENT TO THE FBA, EXCEPT THAT IT DOES INCLUDE A CARRIER GROUP ALARM TRUNK CONDITIONING FEATURE.

3.0 LOOP ORIGINATING UNITS (TYPE FC-)

3.0.1 ALL ORIGINATING LOOP-TRUNK UNITS ARE LIMITED TO 2500 OHMS EXTERNAL CIRCUIT LOOP FOR SUPERVISION. DIAL-PULSE UNITS ARE LIMITED TO 1500 OHMS CONDUCTOR LOOP FOR LOOP PULSING AND 2400 OHMS CONDUCTOR LOOP FOR BATTERY AND GROUND PULSING.

3.1 FCA

3.1.1 THE FCA IS THE STANDARD UNIT FOR THE ORIGINATING END OF ONE-WAY LOOP TYPE LOCAL AND TOLL CONNECTING TRUNKS. IT IS SATISFACTORY FOR BOTH MF AND DP APPLICATIONS. IN SXS OFFICES, IT ELIMINATES THE NEED FOR AN OUTGOING REPEATER BECAUSE THE FCA SUPPLIES BOTH PULSE-SHAPING AND A SLEEVE HOLDING GROUND.

THE FCA WILL PROVIDE APPROPRIATE SLEEVE AND MAKE BUSY LEADS TO THE TRUNK CIRCUIT FOR CGA FUNCTIONS WHEN PROPER OPTION SELECTIONS HAVE BEEN MADE BY MEANS OF THE SCREW-SWITCH OPTIONS ON THE FACE OF THE UNIT.

DETAILED CIRCUIT INFORMATION

4.0 LOOP TERMINATING UNITS.

4.0.1 ALL TERMINATING LOOP-TRUNK UNITS ARE LIMITED TO 1600 OHMS EXTERNAL CIRCUIT LOOP FOR SUPERVISION WHEN THE BUILDING OUT RESISTOR (BOR) IS SHORTED (BOR SCREW TURNED DOWN). WITH THE BOR IN THE CIRCUIT THE EXTERNAL CIRCUIT LOOP SHOULD NOT EXCEED 1100 OHMS.

4.0.2 CROSSBAR DP INCOMING TRUNK CIRCUITS FROM SXS (BY-LINK) SHOULD NORMALLY BE EQUIPPED WITH A SHORT RANGE A RELAY (AJ136 OR AJ34). LONG RANGE A RELAYS (AJ115 OR AJ29) MAY BE USED HOWEVER PROVIDED THE EXTERNAL CIRCUIT LOOP LIMIT OF THE FD- UNIT IS NOT EXCEEDED AND THE OPTION IN THE TRUNK CIRCUIT THAT PROVIDES A DIODE IN SERIES WITH THE A RELAY WINDING IS USED.

4.1 FDA

4.1.1 THE FDA IS THE STANDARD UNIT FOR THE TERMINATING END OF MF TRUNKS. DP TRUNKS TERMINATING IN COMMON CONTROL OFFICES MAY ALSO USE THE FDA UNIT PROVIDED THE CONDUCTOR LOOP BETWEEN THE FDA AND THE INCOMING TRUNK CIRCUIT DOES NOT EXCEED 100 OHMS.

4.1.2 IN MF APPLICATIONS THE BUILDING OUT RESISTANCE (BOR) SHOULD BE SHORTED (BOR SCREW TURNED DOWN) WHEN THE CONDUCTOR LOOP BETWEEN THE FDA AND THE INCOMING TRUNK CIRCUIT EXCEEDS 500 OHMS OR WHEN REQUIRED TO PREVENT THE EXTERNAL CIRCUIT RESISTANCE LIMIT FROM BEING EXCEEDED.

IN DP APPLICATIONS THE BOR OF THE FDA SHOULD BE IN THE CIRCUIT.

4.1.3 THE RMB SCREW SWITCH OF THE FDA SHOULD BE OPEN UNLESS THE ORIGINATION IS AN E+M TRUNK CIRCUIT IN A CROSSBAR NO. 4 OFFICE AS COVERED IN SECT. B 3.4.

4.2 FDB

4.2.1 THE FDB IS THE STANDARD LOOP TERMINATING UNIT WHERE THE TERMINATING OFFICE IS SXS OR WHERE REQUIRED IN BY-LINK APPLICATIONS WHEN THE CONDUCTOR LOOP EXCEEDS 100 OHMS. THE FDB INCLUDES A PULSE CORRECTOR BUT IS OTHERWISE THE EQUIVALENT OF THE FDA. IT MAY THEREFORE BE USED IN PLACE OF THE FDA IN ALL APPLICATIONS.

4.2.2 THE BUILDING OUT RESISTANCE (BOR) SHOULD BE SHORTED (BOR SCREW TURNED DOWN) WHEN THE CONDUCTOR LOOP BETWEEN THE FDB AND THE INCOMING TRUNK CIRCUIT EXCEEDS 500 OHMS OR WHEN REQUIRED TO PREVENT THE EXTERNAL CIRCUIT RESISTANCE LIMIT FROM BEING EXCEEDED.

4.2.3 THE RMB SCREW SWITCH OF THE FDB SHOULD BE OPEN UNLESS THE ORIGINATION IS AN E+M TRUNK CIRCUIT IN A CROSSBAR NO. 4 OFFICE AS COVERED IN SECT. B 3.4.

DETAILED CIRCUIT INFORMATION

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

5.1 FRA

5.1.1 THE FRA IS A 4-WIRE UNIT FOR
USE ON CUSTOMER LINES, LOOP-
START OR GROUND-START PBX TRUNKS AND
PBX OFF-PREMISES STATIONS.

5.1.2 THE FRA UNIT IS
INTENDED PRIMARILY FOR FOUR-
WIRE EXTENSIONS WITH THE A AND B
LEADS SIMPLEXED ON THE FOUR-WIRE
CIRCUIT BUT ALSO MAY BE USED WITH
A LOCAL TERM SET AND A TWO-WIRE
EXTENSION.
THE EXTERNAL CIRCUIT RESISTANCE
INCLUDING THE SIMPLEXED RESISTANCE
OF THE A AND B LEADS, IF ANY, SHOULD
NOT EXCEED 1600 OHMS.

5.1.3 A TERM SET WHICH PROVIDES
SIMPLEX INDUCTORS SHOULD BE
USED. THE SIMPLEX INDUCTORS SHOULD
BE USED IN 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.

GROUND START OPERATION CANNOT
BE USED WITH E&M SIGNALING.

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

5.2 FSA

5.2.1 THE FSA IS EQUIVALENT TO THE
FRA EXCEPT THAT IT INCLUDES A
TERM SET TO MATCH A 900-OHM 2-WIRE
LINE.

5.3 FSB

5.3.1 THE FSB IS EQUIVALENT TO THE
FRA EXCEPT THAT IT INCLUDES A
TERM SET TO MATCH A 600-OHM 2-WIRE
LINE.

5.4 FA- OR FB-

5.4.1 THE FA- OR FB- IN CONJUNCTION
WITH DIAL LONG LINE CIRCUIT
SD-96252-01 MAY BE USED AT THE STA-
TION END OF A CUSTOMER-LINE, LOOP
START PBX TRUNK OR PBX OFF-PREMISES
STATION WITH ANY OF THE APPROVED
UNITS AT THE OTHER END.

5.4.2 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.

5.4.3 THE LOOP RESISTANCE BETWEEN
THE DIAL LONG LINE CIRCUIT,
SD-96252-01 AND THE STATION SHOULD
NOT EXCEED 3000 OHMS AND THE LEAK
RESISTANCE ON THIS LOOP SHOULD BE
MAINTAINED TO A MINIMUM OF 30K OHMS.

5.4.4 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 CIR-
CUIT IN THE IDLE CONDITION. THE RE-
SISTANCE OF THESE LEADS SHOULD NOT
EXCEED 25 OHMS.

DETAILED CIRCUIT INFORMATION

5.4.5 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.

5.4.6 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.

5.4.7 WHEN AN FWA IS USED WITH THE E2L OR E1P AT THE OTHER END, THE LOOP LIMITS AT THAT END ARE THOSE SHOWN FOR THE E2L OR E1P WHEN USED WITH AN E4B. SEE SD-99421-04 (BSP-179-100-304).

5.4.8 NO M LEAD PULSE CORRECTOR IS REQUIRED WITH THIS ARRANGEMENT

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

6.1 FPA

6.1.1 THE FPA IS A 4-WIRE UNIT FOR USE ON CUSTOMER LINES, LOOP-START OR GROUND-START PBX TRUNKS AND PBX OFF-PREMISES STATIONS.

6.1.2 THE FPA 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 USED EXCEPT ON PBX OFF-PREMISES STATIONS WHERE THE ADDITIONAL RESISTANCE WOULD CAUSE PBX TRUNK OR STATION RANGES TO BE EXCEEDED. 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 FPA CANNOT BE USED ON TWO PARTY OR MULTI-PARTY LINES.

6.2 FLA

6.2.1 THE FLA IS EQUIVALENT TO THE FPA EXCEPT THAT IT INCLUDES A TERM SET TO MATCH A 900-OHM 2-WIRE LINE.

6.3 FLB

6.3.1 THE FLB IS EQUIVALENT TO THE FPA EXCEPT THAT IT INCLUDES A TERM SET TO MATCH A 600-OHM 2-WIRE LINE.

6.4 FA- OR FB-

6.4.1 THE FA- OR FB- IN CONJUNCTION WITH DIAL LONG LINE CIRCUIT SD-96251-01 MAY BE USED ON CUSTOMER-LINES, LOOP START PBX TRUNKS OR PBX OFF-PREMISES STATIONS WITH EITHER AN E4B, E3B, FWA, FA- OR FB- AT THE OTHER END.

6.4.2 THE LOOP LIMIT BETWEEN THE DIAL LONG LINE CIRCUIT AND THE SWITCHING EQUIPMENT IS DEPENDENT ON THE ASSOCIATED SWITCHING EQUIPMENT.

6.4.3 THIS ARRANGEMENT CANNOT BE USED ON TWO PARTY OR MULTI-PARTY LINES.

7.0 DX SIGNALING UNITS

7.1 FGA

7.1.1 THE FGA DIRECTLY CONVERTS SF SIGNALING TO DX OBTAINING THE NEED FOR A DX CIRCUIT SUCH AS SD-95488-01. DIRECT CONNECTION CAN BE MADE TO A 2-WIRE 900 OHM CABLE FACILITY. THE DISTANT END OF THE CABLE PAIR IS THEN EQUIPPED WITH A CONVENTIONAL DX CIRCUIT TO REESTABLISH THE E AND M LEADS.

7.2 FHA

7.2.1 THE FHA PERFORMS THE SAME FUNCTIONS AS THE FGA EXCEPT IT IS ARRANGED TO INTERFACE WITH A 4-WIRE CABLE FACILITY.

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
ES-20139-02	NO	REVERTIVE PULSING
ES-20292-01	NO	REVERTIVE PULSING
ES-20293-01	NO	REVERTIVE PULSING
ES-20545-01	NO	WET-DRY SUPV
SD-20746-01	FCA	REVERSE TIP AND RING
ES-21030-01	NO	REVERTIVE PULSING
SD-21031-01	NO	REVERTIVE PULSING
SD-21031-02	NO	REVERTIVE PULSING
SD-21032-02	NO	REVERTIVE PULSING
SD-21032-03	NO	REVERTIVE PULSING
SD-21036-01	NO	REVERTIVE PULSING
SD-21043-01	NO	REVERTIVE PULSING
SD-21053-01	NO	REVERTIVE PULSING
SD-21053-02	NO	REVERTIVE PULSING
SD-21115-01	NO	REVERTIVE PULSING
SD-21115-03	NO	REVERTIVE PULSING
SD-21115-05	NO	REVERTIVE PULSING
SD-21115-07	NO	REVERTIVE PULSING
SD-21116-01	NO	REVERTIVE PULSING
SD-21116-03	NO	REVERTIVE PULSING
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	REVERTIVE PULSING
SD-21441-01	FCA	REVERSE TIP AND RING
SD-21451-01	NO	WET-DRY SUPV
SD-21504-01	NO	REVERTIVE PULSING
SD-21504-02	NO	WET-DRY SUPV 20HZ RING
SD-21504-03	NO	20HZ RING
SD-21504-04	NO	REVERTIVE PULSING
SD-21504-05	NO	REVERTIVE PULSING
SD-21504-06	NO	WET-DRY SUPV 20HZ RING
SD-21505-01	NO	REVERTIVE PULSING
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	FCA	FOR USE WITH AIC AND FIG G ONLY
SD-21572-01	FCA	REVERSE TIP AND RING
SD-21578-01	NO	REVERTIVE PULSING
SD-21600-01	NO	3 WIRE
SD-21627-01	NO	REVERTIVE PULSING
SD-21628-01	NO	REVERTIVE PULSING
SD-21630-01	NO	REVERTIVE PULSING
SD-21821-01	NO	REVERTIVE PULSING
SD-21822-01	NO	REVERTIVE PULSING
SD-21823-01	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-21859-01	NO	20HZ RING
SD-21917-01	NO	REVERTIVE PULSING
SD-21918-01	NO	REVERTIVE PULSING
SD-21946-01	NO	FAST DISCONNECT
SD-21949-01	NO	REVERTIVE PULSING
SD-21972-01	FCA	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	NO	REVERTIVE PULSING
SD-25022-01	FDA	MF OR DP ONLY
SD-25024-01	NO	3 WIRE
SD-25119-01	NO	WET DRY SUPV
SD-25120-01	FP- OR FL-	
SD-25124-01	NO	WET-DRY SUPV 20HZ RING
SD-25127-01	NO	REVERTIVE PULSING
SD-25210-01	NO	REVERTIVE PULSING
SD-25218-01	NO	WET-DRY SUPV 20HZ RING
SD-25259-01	FDA	MF OR DP ONLY
SD-25292-01	FDA	MF OR DP ONLY
SD-25295-01	FDA	MF OR DP ONLY
SD-25302-01	NO	20HZ RING
SD-25303-01	NO	3 WIRE
SD-25304-01	FDA	MF OR DP ONLY
SD-25305-01	NO	REVERTIVE PULSING
SD-25329-01	FDA	MF ONLY
SD-25351-01	NO	3 WIRE
SD-25356-01	NO	THROUGH SUPV
SD-25357-01	NO	REVERTIVE PULSING
SD-25420-01	FDA	VERIFICATION AND MF OR DP ONLY
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	FDA	MF OR DP ONLY
SD-25519-01	NO	SX RING
SD-25520-01	NO	PCI PULSING
SD-25552-01	FDA	
SD-25578-02	FCA	MF OR DP ONLY
SD-25581-01	FDA	
SD-25582-01	FDA	MF OR DP ONLY
SD-25583-01	FDA	MF OR DP ONLY
SD-25655-01	FA-	SEE SECT C 1.0
SD-25663-01	FDA	VERIFICATION ONLY
SD-25665-01	NO	SX RING
SD-25666-01	NO	3 WIRE
SD-25667-01	FA-	SEE SECT C 1.0
SD-25689-01	FCA	
SD-25690-01	FCA	

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-25694-02	FCA	MF OR DP ONLY
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	FCA	DP ONLY
SD-25721-01	NO	REQUIRES METALLIC PATH
SD-25736-01	NO	REQUIRES METALLIC PATH
SD-25739-01	FCA	MF OR DP ONLY
SD-25739-02	FCA	MF OR DP ONLY
SD-25739-03	FCA	MF OR DP ONLY
SD-25739-04	FCA	MF OR DP ONLY
SD-25766-01	NO	REQUIRES METALLIC PATH
SD-25768-01	FA-	SEE SECT C 1.0
SD-25816-01	FCA	
SD-25823-01	FCA	MF OR DP ONLY
SD-25823-02	FCA	MF OR DP ONLY
SD-25832-01	NO	FAST DISCONNECT
SD-25833-01	FDA	MF OR DP ONLY
SD-25842-02	FA-	SEE SECT C 1.0
SD-25843-01	FA-	SEE SECT C 1.0
SD-25844-01	FA-	SEE SECT C 1.0
SD-25845-01	FA-	SEE SECT C 1.0
SD-25846-02	FA-	SEE SECT C 1.0
SD-25847-01	FA-	SEE SECT C 1.0
SD-25849-01	FCA	MF OR DP ONLY
SD-25850-01	NO	3 WIRE
SD-25851-01	NO	RINGDOWN TRUNK
SD-25853-01	FA-	SEE SECT C 1.0
SD-25868-01	NO	REVERTIVE PULSING
SD-25875-01	FDA	MF OR DP ONLY
SD-25887-01	FDA	MF OR DP ONLY, NOT COMP WITH RERING OR OR DISTANT MB CKT
SD-25889-01	NO	WET-DRY SUPV
SD-25893-01	FDA	MF OR DP ONLY
SD-25895-01	FA-	SEE SECT C 1.0
SD-25902-01	NO	WET-DRY SUPV
SD-25905-01	FA-	SEE SECT C 1.0
SD-25909-01	FA-	SEE SECT C 1.0
SD-25910-01	NO	SX RING
SD-25911-01	NO	SX RING
SD-25913-01	FCA	MF OR DP ONLY
SD-25913-02	FCA	MF OR DP ONLY
SD-25923-01	NO	+110-48 VOLT COIN WET-DRY SUPV
SD-25925-01	FCA	
SD-25926-01	NO	WET-DRY SUPV
SD-25928-01	FP- OR FL-	
SD-25934-01	NO	SX RING
SD-25943-01	NO	REV BAT SIG ON PHANTOM

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-25956-01	NC	PCI PULSING
SD-26047-01 LP	NC	HIGH-LOW SUPV
SD-26047-01 E+M	FA-	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 SEE SECT. C 1.0
SD-26070-01	FDA	MF OR DP ONLY
SD-26071-01	FDA	MF OR DP ONLY
SD-26073-01 LP	FDA	MF OR DP AND VERIFICATION ONLY
SD-26073-01 E&M	FA-	SEE SECT C 1.0
SD-26074-01 LP	NO	SX RING
SD-26074-01 E&M	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-26077-01	FDA	
SD-26078-01	FCA	MF OR DP ONLY
SD-26079-01	FDA	MF OR DP ONLY
SD-26083-01 E&M	NO	ON HOOK TONE RINGING
SD-26083-01 LP	NO	SX RING 3RD WIRE COIN
SD-26085-01	FCA	MF OR DP ONLY
SD-26086-01	FCA	MF OR DP ONLY
SD-26087-01	FCA	MF OR DP ONLY
SD-26090-01	NO	WET-DRY SUPV
SD-26091-01	NO	WET-DRY SUPV +110-48COIN
SD-26094-01	FA-	SEE SECT C 1.0
SD-26095-01	NO	WET-DRY SUPV
SD-26096-01	FA-	SEE SECT C 1.0
SD-26098-01	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-26099-01	FA-	SEE SECT C 1.0
SD-26100-01	FDA	
SD-26101-01 LP	FDA	
SD-26101-01 E&M	FA-	SEE SECT C 1.0
SD-26104-01 LP	FDA	
SD-26104-01 E&M	FA-	SEE SECT C 1.0
SD-26108-01	NO	WET-DRY SUPV SX SIG
SD-26110-01	FA-	SEE SECT C 1.0
SD-26116-01	FCA	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	FA-	SEE SECT C 1.0
SD-26123-01 LP	FDA	
SD-26123-01 E&M	FA-	SEE SECT C 1.0
SD-26126-01	FA-	SEE SECT C 1.0
SD-26127-01	FCA	
SD-26144-01	FCA	
SD-26148-01	FCA	
SD-26149-01	NO	SX RING 3RD WIRE COIN

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-26152-01	FDA	NOT COMP WITH RERING
SD-26183-01	FDA	
SD-26201-01	NO	REVERTIVE PULSING
SD-26204-01	FDA	MF OR DP ONLY
SD-26209-01	FCA	REVERSE TIP AND RING
SD-26210-01	NO	PCI PULSING
SD-26257-01	FDA	MF OR DP ONLY
SD-26282-01	FDA	
ES-26289-01	FR- OR FS-	NO TOLL DIVERSION FEATURE
SD-27000-01	FA-	SEE SECT C 1.0
SD-27001-01	NO	REQUIRES DC PATH
SD-27003-01	FA-	SEE SECT C 1.0
SD-27008-01	FA-	SEE SECT C 1.0 K OPTION REQ.
SD-27009-01	FA-	SEE SECT C 1.0
SD-27010-01	FDA	Z OPTION NOT COMP
SD-27012-01	NO	REQUIRES DC PATH
SD-27015-01	FDA	
SD-27016-01	NO	REV BAT SIG ON PHANTOM
SD-27036-01	FA-	SEE SECT C 1.0
SD-27043-01	NO	3 WIRE TRK
SD-27044-01	FA-	SEE SECT C 1.0
SD-27051-01	FA-	SEE SECT C 1.0
SD-27061-01	FDA	
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	FA-	SEE SECT B 3.1.2
		SEE SECT C 1.0
SD-27082-01	FA-	SEE SECT B 3.1.2
		SEE SECT C 1.0
SD-27083-01	NO	+130-48 OR REV BAT RING
SD-27084-01	FA-	SEE SECT B 3.1.2
		SEE SECT C 1.0
SD-27092-01 LP	FDA	
SD-27092-01 E&M	FA-	SEE SECT C 1.0
SD-27097-01	NO	+130-48 VOLT RING
SD-27103-01	FA-	SEE SECT C 1.0
SD-27104-01 LP	NO	+130-48 COIN
SD-27104-01 E&M	FA-	SEE SECT C 1.0
SD-27148-01	FDA	
SD-27516-01	SEE NOTES	FOR TWO-WIRE STATION USE FP-, Z, B AND V OPTIONS AND FS- AT DISTANT END. FOR FOUR-WIRE STATION USE FB- WITH FB- PLUS SD-27517-01 AT DISTANT END.
SD-27517-01	FB-	
SD-27546-01	NO	+130-48 VOLT RING
SD-27550-01	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-27551-01	FA-	SEE SECT C 1.0
SD-27554-01	NO	+130-48 RING
SD-27555-01	NO	+130-48 RING
SD-27580-01	FDA	MF OR DP ONLY
SD-27581-01	FDA	
SD-27593-01	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-27611-01	FA-	SEE SECT C 1.0
SD-27617-01	FCA	
SD-27669-01	FA-	SEE SECT C 1.0
SD-27686-01	FDA	MF OR DP ONLY
SD-27687-01	FDA	
SD-27711-01	FB-	SEE SECT C 2.0
SD-27721-01	NO	3 WIRE TRK
SD-27723-01	NO	CUT CKT PREVENTS PASSAGE OF INBAND TONES
SD-27729-01	FCA	
SD-27735-01	FB-	USE FWB OR E1J FOR AUTOVON SEE SECT C 2.0
SD-27738-01	FB-	SEE SECT C 2.0
SD-27744-01	FB-	SEE SECT C 2.0
SD-27750-01	FCA	
SD-27751-01	FA-	SEE SECT C 1.0
SD-27752-01	FCA	
SD-27753-01	NO	2WAY LOOP TRK
SD-27798-01	FDA	NOT COMP WITH CONTR RING
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	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-27814-01 LP	NO	+130-48 VOLT COIN
SD-27814-01 E&M	FA-	SEE SECT C 1.0
SD-27815-01 LP	NO	+130-48 VOLT RING
SD-27815-01 E&M	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-27816-01 LP	NO	+130-48 VOLT COIN
SD-27816-01 E&M	FA-	SEE SECT C 1.0
SD-27829-01	FCA	OPTION W MUST BE USED WHEN CLASS TONE IS REQUIRED
SD-27830-01 LP	FDA	REV BAT OPTION ONLY
SD-27830-01 E&M	FA-	REQUIRES APP FIG 6 + T WIRING REQUIRES APP FIG 6 SEE SECT C 1.0
SD-27836-01	FA-	SEE SECT C 1.0
SD-27838-01	FA-	SEE SECT C 1.0
SD-27843-01	FB-	SEE SECT C 2.0
SD-27844-01	FB-	SEE SECT C 2.0
SD-27851-01	NO	3-WIRE LINE
SD-27858-01	FA-	SEE SECT C 1.0

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-27877-01	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-27892-01	FA-	SEE SECT C 1.0
SD-27893-01	FCA	
SD-27912-01	FA-	SEE SECT C 1.0
SD-27913-01	FA-	SEE SECT C 1.0
SD-27927-01 LP	FDA	
SD-27927-01 E&M	FA-	SEE SECT C 1.0
SD-27928-01 LP	FDA	
SD-27928-01 E&M	FA-	SEE SECT C 1.0
SD-27929-01 LP	FCA	
SD-27929-01 E&M	FA-	SEE SECT C 1.0
SD-27933-01	FA-	SEE SECT C 1.0
SD-27942-01	FA-	SEE SECT C 1.0
SD-27945-01	FA-	SEE SECT C 1.0
SD-27946-01	FA-	SEE SECT C 1.0
SD-27963-01	FCA	
SD-27964-01	FA-	SEE SECT C 1.0
SD-30200-01	FDB	
SD-30205-01	FCA	SEE SECT C 3.0
SD-30214-01	FCA	
SD-30503-01	NO	WET-DRY SUPV
SD-30855-01	NO	MAKE BUSY CKT
SD-30865-01	FDB	
SD-30868-01	FCA	
SD-30974-01	FDB	
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	FCA	SEE SECT C 3.0
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	FDB	
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 SEE SECT C 2.0
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	FDB	
SD-31540-01	NO	WET-DRY SUPV
SD-31542-01	FDB	PULSE CORR REPT NOT REQ WITH FDB
SD-31588-01	NO	HIGH-LOW SUPV

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-31602-01	NO	2WAY LOOP TRK
SD-31609-01	FCA	SEE SECT C 3.0
SD-31648-01 OGT	FCA	SEE SECT C 3.0
SD-31648-01 IT	FDB	PULSE CORR REPT NOT REQ WITH FDB
SD-31658-01	NO	2WAY LOOP TRK
SD-31670-01	FDB	
SD-31674-01	NO	2WAY LOOP TRK
SD-31683-01	FDB	
SD-31692-01	FCA	SEE SECT C 3.0
SD-31693-01	FCA	SEE SECT C 3.0
SD-31703-01	NO	WET-DRY SUPV, 20 HZ RING
SD-31709-01	FDB	
SD-31712-01	FDB	
SD-31723-01	FDB	
SD-31726-01	FA-	WHEN FIG B IS USED M OPTION IS REQ. SEE SECT C 1.0
SD-31744-01	FDB	
SD-31747-01	FDB	
SD-31749-01	FA-	SEE SECT C 1.0 ZE OPTION REQ.
SD-31775-01	FA-	SEE SECT C 1.0 ZO OPTION REQ.
SD-31779-01	FCA	SEE SECT C 3.0
SD-31795-01	FA-	SEE SECT C 1.0
SD-31840-01	FCA	
SD-31841-01	FDB	NOT COMP WITH SX RING
SD-31856-01	FDB	
SD-31865-01	FA-	SEE SECT C 1.0
SD-31867-01	FA-	SEE SECT C 1.0 E OPTION REQ.
SD-31874-01	FDB	
SD-31885-01	FA-	SEE SECT C 1.0 F OPTION REQ.
SD-31887-01	FA-	SEE SECT B 3.1.2 SEE SECT C 1.0
SD-31888-01	FA-	SEE SECT C 1.0
SD-31902-01	NO	WET-DRY SUPV
SD-31925-01	NO	WET-DRY SUPV
SD-31929-01 OGT	FCA	SEE SECT C 3.0
SD-31929-01 IT	FDB	PULSE CORR REPT NOT REQ WITH FDB
SD-31965-01	NO	WET-DRY SUPV, REV BAT SIGNAL
SD-32007-01	FDB	VERIFICATION ONLY
SD-32008-01 OGT	FCA	SEE SECT C 3.0
SD-32008-01 IT	FDB	
SD-32042-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-32061-01 LP	FDB	
SD-32061-01 E&M	FA- OR FB-	
SD-32067-01	NO	CUSTOMER LINE SF UNITS CAN NOT PASS REV BATT
SD-32087-01	FCA	SEE SECT C 3.0
SD-32136-01	NO	WET-DRY SUPV, 20 HZ RING
SD-32167-01	FCA	SEE SECT C 3.0
SD-32168-01	NO	WET-DRY SUPV, 20 HZ RING
SD-32170-01	NO	WET-DRY SUPV

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-32178-01	NO	WET-DRY SUPV
SD-32183-01	FDB	
SD-32184-01	OGT FCA	SEE SECT C 3.0
SD-32184-01	IT FDB	PULSE CORR REPT NOT REQ WITH FDB
SD-32199-01	FCA	USE N OPTION, OMIT V & W OPTS.
SD-32204-01	FCA	
SD-32240-01	FCA	
SD-32241-01	FA-	SEE SECT C 1.0
SD-32244-01	FA-	SEE SECT C 1.0
SD-32245-01	FCA	
SD-32255-01	LP FDA	
SD-32255-01	E&M FA-	SEE SECT C 1.0
SD-32256-01	LP FDA	
SD-32256-01	E&M FA-	SEE SECT C 1.0
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	FA-	SEE SECT C 1.0
SD-32311-01	FA-	SEE SECT C 1.0
SD-32312-01	FA-	SEE SECT C 1.0
SD-32342-01	LP NO	+130-48 RING, REV MAKE BUSY
SD-32342-01	E&M FA-	SEE SECT B 3.1.2, C 1.0
SD-32344-01	LP NO	+130-48 COIN
SD-32344-01	E&M FA-	SEE SECT C 1.0
SD-32346-01	FCA	
SD-32367-01	LP FCA	NOT COMPATIBLE 0 + TRAFFIC +130-48 RING
SD-32367-01	E&M FA-	SEE SECT B 3.1.2, C 1.0
SD-32508-01	LP NO	+130-48 RING
SD-32508-01	E&M FA-	SEE SECT B 3.1.2, C 1.0
SD-32532-01	LP FCA	
SD-32532-01	E&M FA-	SEE SECT C 1.0
SD-33017-01	FDB	
SD-33018-01	FDB	
SD-33019-01	FDB	
SD-55109-01	FA-	SEE SECT C 1.0
SD-55113-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-55151-01	LP FCA	
SD-55151-01	E&M FA-	SEE SECT C 1.0
SD-55158-01	LP FDA	
SD-55158-01	E&M FA-	SEE SECT C 1.0
SD-55184-01	NO	WET-DRY SUPV
SD-55213-01	NO	HIGH-LOW SUPV
SD-55224-01	FCA	NOT COMP WITH CONTROLLED RING
SD-55255-01	LP FCA	
SD-55255-01	E&M FA-	SEE SECT C 1.0
SD-55256-01	LP FCA	
SD-55256-01	E&M FA-	SEE SECT C 1.0
SD-55275-01	FA-	SEE SECT C 1.0

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-55291-01	FCA	COMP WITH DP, REVBAT SUPV AND NO RINGING START SIGNAL
SD-55301-01	FCA	NOT COMP WITH CONT RING
SD-55346-01	FCA	NOT COMP WITH WET DRY SUPV NOT COMP WITH CONTROLLED RING
SD-55358-01	FA-	SEE SECT C 1.0
SD-55379-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-55380-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-55381-01	FA-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 1.0
SD-55386-01	FA-	USE OPTION ZN OR ZP IF CONTROLLED RING IS REQUIRED SEE SECT B 3.1.2, C 1.0
SD-55776-01	NO	WET-DRY SUPV
SD-55778-01	NO	HIGH-LOW SUPV
SD-55844-01	NO	REQUIRES METALLIC PATH
SD-55852-01	FA-	SEE SECT C 1.0
SD-55872-01	NO	WET-DRY SUPV
SD-55875-01	NO	WET-DRY SUPV +110-48V COIN
SD-55879-01	FCA	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	FA-	SEE SECT C 1.0
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	FA-	USE G OPTION, SEE SECT C 1.0
SD-56105-01	FCA	NOT COMP WITH CONTROLLED RING OR WET-DRY SUPV
SD-56109-01	FA-	USE ZD OPTION, SEE SECT C 1.0
SD-56119-01	NO	REQUIRES METALLIC PATH
SD-56121-01	NO	WET-DRY SUPV
SD-56123-01	NO	REQUIRES METALLIC PATH
SD-56128-01	FCA	DP ONLY. NOT COMP WITH CONT RING OR WET-DRY SUPV
SD-56131-01	FA-	SEE SECT C 1.0
SD-56133-01	FA-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 1.0
SD-56146-01	NO	SX RING
SD-56153-01	FCA	
SD-56154-01	FA-	SEE SECT C 1.0
SD-56159-01	FA-	SEE SECT C 1.0
SD-56163-01	FA-	REQUIRES FIG 5 OR M+H OPTION SEE SECT C 1.0
SD-56199-01	NO	20 HZ APPLIED TO T+R
SD-56209-01	NO	SX SIG ON PHANTOM

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
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	FA-	REQUIRES ZA WIRING
		SEE SECT C 1.0
SD-56314-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-56355-01	NO	SX RING
SD-56358-01	NO	WET-DRY SUPV DIST END
		20HZ RING
		SX SIGNALING
SD-56371-01	NO	
SD-56389-01	FP- OR FL-	
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	FA-	SEE SECT C 1.0
SD-56434-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-56435-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-56475-01	FA-	SEE SECT C 1.0
SD-56477-01	FA-	SEE SECT C 1.0
SD-56478-01	FA-	SEE SECT C 1.0
SD-56479-01	FA-	SEE SECT C 1.0
SD-56480-01	FCA	
SD-56481-01	FA-	SEE SECT C 1.0
SD-56482-01	FCA	
SD-56483-01	FA-	SEE SECT C 1.0
SD-56487-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-56488-01	FA-	SEE SECT B 3.1.2, C 1.0
SD-56492-01	NO	HIGH-LOW SUPV
SD-56496-01	FDA	
SD-56501-01	FP- OR FL-	
SD-56507-01	FA-	SEE SECT C 1.0
SD-56509-01	FA-	SEE SECT C 1.0
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 FCA. MF OR DP ONLY.
SD-56525-01 E&M	FA-	SEE SECT B 3.1.2, C 1.0
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

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
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	FA-	SEE SECT C 1.0
SD-64474-01	FA-	SEE SECT C 1.0
SD-64482-01	FDB	
SD-64538-01	FA-	USE ZX OPTION, SEE SECT C 1.0
SD-64539-01	NO	WET-DRY SUPV
SD-64571-01	NO	WET-DRY SUPV DIST END
SD-64590-01	FA-	SEE SECT C 1.0
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	FR- OR FS-	X OPTION NOT COMP.
SD-64824-01	FA-	SEE SECT C 1.0
SD-64832-01	FCA	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	FA-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 1.0
ES-65625-01	FA-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 1.0
ES-65669-01	FA-	REQUIRES TYPE F AT DIST END
SD-65718-01	FB-	OPTION UP REQUIRED SEE SECT C 2.0
SD-65718-02	FB-	OPTION ZY REQUIRED SEE SECT C 2.0
SD-65755-01	NO	2 WAY TIE TRK
SD-65788-01	NO	3 WIRE
SD-65978-01	FDA	REVERSE T+R
SD-66065-01	NO	2 WAY TIE TRK
SD-66241-01	NO	2 WAY TIE TRK
SD-66298-01	FCA	
SD-66470-01	NO	RINGDOWN TIE TRUNK
SD-66578-01	NO	RINGDOWN TRK
SD-66592-01	FR- OR FS-	
SD-66740-01	FDA	
SD-66741-01	FDA	
SD-66777-01	FDA	WITH REV BAT OPTION
SD-66777-01	FR- OR FS-	WITH HIGH-LOW OPTION
SD-66896-01	FA-	SEE SECT C 1.0
SD-68097-01	FDA	FIG B
SD-68097-01	FCA	FIG C

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-68102-01	FB-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 2.0
SD-68135-01	FB-	SEE SECT C 2.0
SD-68154-01	FB-	SEE SECT C 2.0
SD-68230-01	FB-	SEE SECT C 2.0
SD-68231-01	FB-	SEE SECT C 2.0
SD-68232-01	FB-	SEE SECT C 2.0
SD-68233-01	FB-	SEE SECT C 2.0
SD-68239-01	NO	SX RING
SD-68240-01	NO	WET-DRY SUPV, 20HZ RING
SD-68242-01	FCA	REV BAT SUPV ONLY
SD-68259-01	FB-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 2.0
SD-68260-01	NO	RING DOWN
SD-68289-01	NO	REV BAT SIG ON PHANTOM
SD-68290-01	NO	SX SIGNALING
SD-68308-01	FB-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 2.0
SD-68309-01	NO	REV BAT SUP ON PHANTOM
SD-68312-01	FB-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 2.0
SD-68315-01	NO	20 HZ RING
SD-68318-01	NO	20 HZ RING
SD-68325-01	FCA	REQUIRES FIG A NOT COMP WITH RERING
SD-68326-01	FCA	DP AND REVBAT SUPV ONLY
SD-68331-01	NO	SX RING
SD-68332-01	NO	WET-DRY SUPV
SD-68355-01	FB-	SEE SECT C 2.0
SD-68357-01	NO	SX RING
SD-68358-01	NO	SX RING
SD-68401-01	NO	REQUIRES DC PATH
SD-68479-01	FB-	SEE SECT C 2.0
SD-68480-01	FDA	
SD-68482-01	FDA	
SD-68485-01	NO	REQUIRES DC PATH
SD-68513-01	FB-	SEE SECT C 2.0
SD-68514-01	FB-	SEE SECT C 2.0
SD-68527-01 LP	NO	20 HZ RING
SD-68527-01 E&M	NO	SX RING ON TRANS PAIR
SD-68529-01	FB-	Q OPTION REQUIRED SEE SECT C 2.0
SD-68537-01	FB-	SEE SECT C 2.0

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-68579-01	FB-	SEE SECT C 2.0
SD-68581-01	FB-	SEE SECT C 2.0
SD-68582-01	FB-	SEE SECT C 2.0
SD-68595-01	FB-	SEE SECT C 2.0
SD-68596-01	FB-	SEE SECT C 2.0
SD-68962-01	FCA	REQUIRES R OPTION
SD-68966-01	NO	REV BAT SIG ON PHANTOM
SD-90000-01	FDA	REV BAT SUPV AND -48V BAT REQUIRED
SD-90070-01	FP- OR FL-	
SD-90257-01	NO	24VOLT REVBATT SUPV.
SD-90275-01	NO	WET-DRY SUPV
SD-90434-01	FDA	FIG 1 AND 1A OR 1C REVERSE TIP AND RING FOR USE ON PHANTOM GROUP
SD-90439-01	NO	HIGH-LOW SUPV
SD-90451-01	NO	REQUIRES METALIC CKT
SD-90506-01	NO	24VOLT REV BAT SUPV
SD-90527-01	NO	
SD-90566-01	FDA	
SD-90647-01	NO	PCI PULSING
SD-95037-01	FCA	
SD-95060-01	FA-	USE B OPTION FOR RERING SEE SECT C 1.0 SEE SECT C 1.0
SD-95061-01	FA-	
SD-95095-01	FA- OR FB-	
SD-95405-01	NO	BAT AND GRD SIGNALING
SD-95413-01	NO	GRD START TRK
SD-95425-01	FCA	
SD-95426-01	NO	HIGH-LOW SUPV
SD-95436-01	NO	SX RING
SD-95443-01	FB-	4 WIRE END, SEE SECT C 2.0
SD-95459-01	FCA	
SD-95462-01	NO	USES 24V REV-BAT SUPV
SD-95467-01	FCA	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	FA- OR FB-	SEE SECT C 1.0, 2.0
SD-95495-01	NO	WET-DRY SUPV
SD-95513-01	FDA	OK WITH REV-BAT OR NO SUPV
SD-95530-01	NO	REQUIRES DC PATH
SD-95542-01	FCA	REQUIRES Y WIRING
SD-95543-01	FDA	B+G SIG OPTIONS ONLY
SD-95546-01	FCA	
SD-95560-01	FCA	FIG 6 ONLY, FIG 5 NOT COMP WET-DRY SUPV
SD-95563-01	NO	REQUIRES DC PATH
SD-95564-01	NO	REQUIRES DC PATH

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-95565-01	NO	SX OR 20HZ RING
SD-95566-01	NO	SX OR 20HZ RING
SD-95569-01 LP	FDA	
SD-95569-01 E&M	FA-	SEE SECT C 1.0
SD-95585-01	FDA	FIGS C,D OR E REV T AND R FOR FIGS D OR E
SD-95615-01	NO	HIGH-LOW SUPV
ES-95668-01	FA-	REQ. TYPE F AT DIST END WINK RING TOO SHORT FOR TYPE E SEE SECT C 1.0
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	FDA	
SD-95789-01	NO	REQUIRES METALIC CKT
SD-95846-01	FA-	SEE SECT C 1.0
SD-95850-01	FA-	SEE SECT C 1.0
SD-95974-01	FA-	SEE SECT C 1.0
SD-95976-01	FA-	SEE SECT C 1.0
SD-95979-01	FCA OR FSA,FRA	PROPER CHOICE DEPENDS ON SF UNIT AND CIRCUIT AT DISTANT END.
SD-96169-01	NO	HIGH-LOW SUPV
SD-96189-01	FDA	
SD-96209-01	NO	WET-DRY SUPV
SD-96210-01	NO	WET-DRY SUPV
SD-96250-01	NO	WET-DRY SUPV
SD-96251-01	FA-	SEE SECT C 1.0
SD-96252-01	FA-	SEE SECT C 1.0
SD-96283-01	FCA	
SD-96301-01	NO	2 WAY LOOP TRK
SD-96352-01	NO	HIGH-LOW OR 24V REV BAT SUPV
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	FCA	
SD-96398-01 E&M	FA-	SEE SECT C 1.0
SD-96412-01	NO	HIGH-LOW SUPV
SD-96459-01	FCA	
SD-96467-01	FCA	FIGS 3,9 AND 14
SD-96469-01	NO	SX RING

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

CKT. NUMBER AND TYPE OF PULSING	COMPATIBILITY	NOTES
SD-96481-01 LP	NO	HIGH-LOW SUPV 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 SEE SECT. C 1.0
SD-96481-01 E+M	FA-	
SD-96482-01 LP	NO	HIGH-LOW SUPV WHEN N OPTION IS USED (STANDARD WIRING PRIOR TO ISSUE 2D) TRANSPOSE E+M LEADS OF TALK AND KP PATHS SEE SECT. C 1.0
SD-96482-01 E+M	FA-	
SD-96487-01	FA-	SEE SECT C 1.0
SD-96488-01	FA-	SEE SECT C 1.0
SD-96544-01	NO	REQUIRES DC PATH
SD-98061-01	NO	SX RING
SD-99378-01	FDA	
SD-99388-01	FCA	OPTION Y REQUIRED
SD-99415-01	FA-	SEE SECT C 1.0
SD-99419-01	FA-	REQUIRES T OPTION SEE SECT C 1.0
SD-99420-01	FA-	REQUIRES SD-95061-01
SD-99435-01	FA-	REQUIRES OPTION Z IN SD-1C004-01 OR SD-1C234-01 SEE SECT C 1.0
SD-99446-01	FA-	REQUIRES OPTION YI IN SD-1E007-01, SEE SECT C 1.0
SD-1A163-01	FA-	SEE SECT C 1.0
SD-1A165-01	FCA	MF OR DP ONLY
SD-1A166-01	FDA	
SD-1A166-02	FDA	
SD-1A167-01	FA-	SEE SECT C 1.0
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 + CCIN
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	FDA	
SD-1A198-01	NO	REQ DC PATH
SD-1A203-01	FCA	
SD-1A220-01	FDA	
SD-1A236-01	FB-	SEE SECT C 2.0
SD-1A237-01	FB-	SEE SECT C 2.0
SD-1A238-01	NO	TWO-WAY LOOP
SD-1A239-01	NO	FOUR-WIRE LOOP
SD-1A241-01	FR- OR FS-	
SD-1A248-01	NO	FOUR-WIRE LOOP

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-1A254-01	NO	REQ DC PATH
SD-1A264-01	NO	TWO-WAY LOOP
SD-1A266-01	FDA	
SD-1A301-01	NO	SX SIGNALING, USE SD-99435-01
SD-1B002-01	FDA	COMP WITH WINK RINGBACK OR INBAND COIN AND RINGBACK ONLY
SD-1B003-01	FDA	COMP WITH WINK RINGBACK OR INBAND COIN AND RINGBACK ONLY
SD-1B004-01	FA-	SEE SECT C 1.0
SD-1B005-01	FA-	SEE SECT C 1.0
SD-1B006-01	FB-	SEE SECT C 2.0
SD-1B007-01	FB-	SEE SECT C 2.0
SD-1B010-01	FCA	Z OPTION REQ.
SD-1B016-01 LP	NO	HIGH-LOW SUPV
SD-1B016-01 E&M	FA-	TWO CHANNELS REQ., SEE SECT C 1.0
SD-1B102-01 LP	FDA	INCOMING PART
SD-1B102-01 LP	FCA	OUTGOING PART
SD-1B102-01 E&M	FA-	TWO CHANNELS REQ., SEE SECT C 1.0
SD-1B103-01 LP	FCA	TWO CHANNELS REQUIRED
SD-1B103-01 E&M	FA-	TWO CHANNELS REQ., SEE SECT C 1.0
SD-1B110-01	FA-	SEE SECT C 1.0
SD-1B154-01 OGT	FCA	
SD-1B154-01 IT	NO	HIGH-LOW SUPV
SD-1B183-01	NO	HIGH-LOW SUPV
SD-1B185-01 OGT	NO	REV BAT SUPV
SD-1B185-01 IT	FDA	USE S-197 CIRCUIT PACK
SD-1B186-01	NO	REV BAT SUPV
SD-1B188-01 IT	NO	SX SUPV
SD-1B191-01 OGT	FCA	
SD-1B191-01 IT	NO	HIGH-LOW SUPV
SD-1B193-01 OGT	FCA	
SD-1B193-01 IT	NO	HIGH-LOW SUPV
SD-1B197-01	FCA	
SD-1B198-01	FCA	
SD-1B250-01 OGT	FCA	
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	FA-	SEE SECT C 1.0
SD-1C354-01	FA-	SEE SECT C 1.0
SD-1E003-01	FDA	
SD-1E004-01	FDA	
SD-1E007-01	NO	SX SIGNALING, USE SD-99446-01
SD-1E213-01	FR- OR FS-	
SD-1E240-01	FDA	
SD-1G235-01	FB-	REQ. W OR Y WIRING, SEE SECT C 2.0

ATTACHMENT TO
SEC. 179-100-308

SWITCHING CIRCUIT COMPATIBILITY LIST

<u>CKT. NUMBER AND TYPE OF PULSING</u>	<u>COMPATIBILITY</u>	<u>NOTES</u>
SD-2A014-01	FB-	USE E1J OR FWB FOR AUTOVON INTER- OFFICE TRUNKS, SEE SECT C 2.0
SD-2H103-01	FCA	
SD-2H104-01	FDA	
SD-2H107-01	NO	WET-DRY SUP
SD-2H109-01	NO	SLEEVE SUPV.
SD-2H110-01	FDA	
SD-2H111-01	FDA	
SD-2H112-01	FA-	SEE SECT C 1.0
SD-2H113-01	NO	SX SIGNALS
SD-2H141-01	NO	REQ SLEEVE LEAD
SD-2H144-01	FCA	
SD-2H147-01	NO	WET-DRY SUPV
SD-2H149-01	FDA	
SD-2H151-01	NO	+130 -130 SIG
SD-5E028-01	FB-	SEE SECT C 2.0
SD-5E041-01	FB-	SEE SECT C 2.0
SD-5E046-01	FDA	
SD-5E047-01	FDA	
ES-6G108-01	FA-	FOR ASSOCIATED AUDIO FAC.