

TRAINING MANUAL
THE
STEP - BY - STEP
DIAL SWITCHING SYSTEM
VOLUME II
SEQUENCE CHARTS & OPERATIONAL SKETCHES

THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY
OPERATING AND ENGINEERING DEPARTMENT
PLANT OPERATION DIVISION

3

THE NUMBER ONE STEP BY STEP DIAL SWITCHING SYSTEM

TRAINING MANUAL

VOLUME II

SEQUENCE CHARTS AND OPERATIONAL SKETCHES



THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY

OPERATION AND ENGINEERING DEPARTMENT

PLANT OPERATION DIVISION

For Training Purposes Only

Printed in U.S.A.

September 1952

VOLUME II

PREFACE

This provisional training material represents a preliminary step toward improving the "learning" literature for the the Number One Step-by-Step System.

The material is divided into two volumes.

Volume I contains a general description of the system, which should aid the learner in gaining a good understanding of the basic principles. The aim is to introduce the learner to the subject by explaining the fundamentals in simple non-technical language.

Volume II contains a series of typical circuit diagrams. These are drawn in the simplified style which is used in teaching the complex 'Common Control' switching systems now in current use. This method makes use of sequence charts and operational sketches, and this volume contains a chart and sketch for each of the typical circuits.

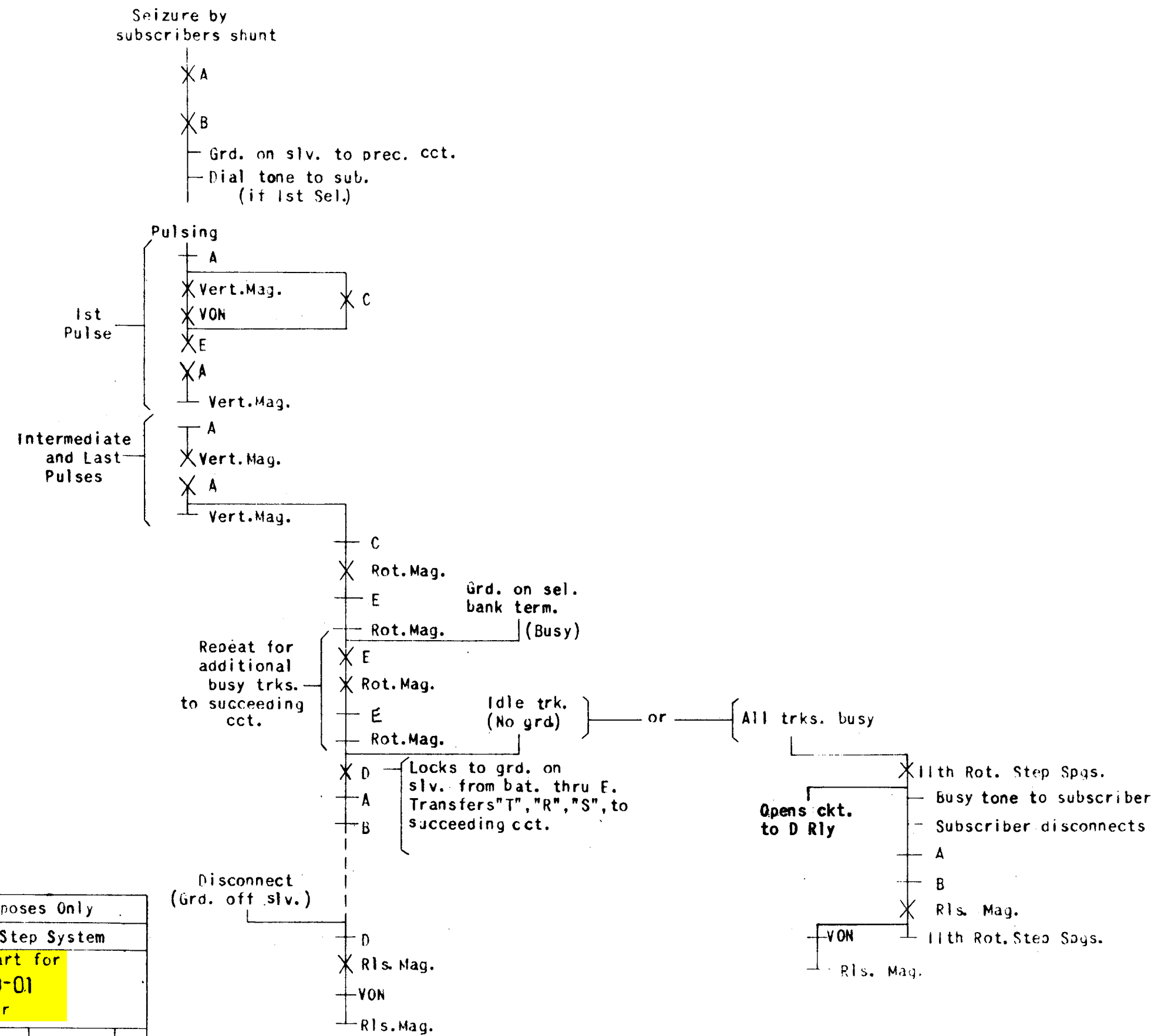
Since the drawings are intended to be used in the study of the Number One System in general, and do not necessarily conform to any particular office, it may be necessary to consider the regular Schematic Drawings (SD's) and Circuit Descriptions (CD's) when preparing learners to work in a specific office. Also, those employees who must make mechanical or electrical adjustments of the apparatus should have actual practice on typical switches. In this connection a review of the Bell System training film "The Step-by-Step Switch" will be found helpful.

Students should be cautioned that the particular circuits contained in this manual are intended to be used only as training aids, and are not necessarily applicable for maintenance.

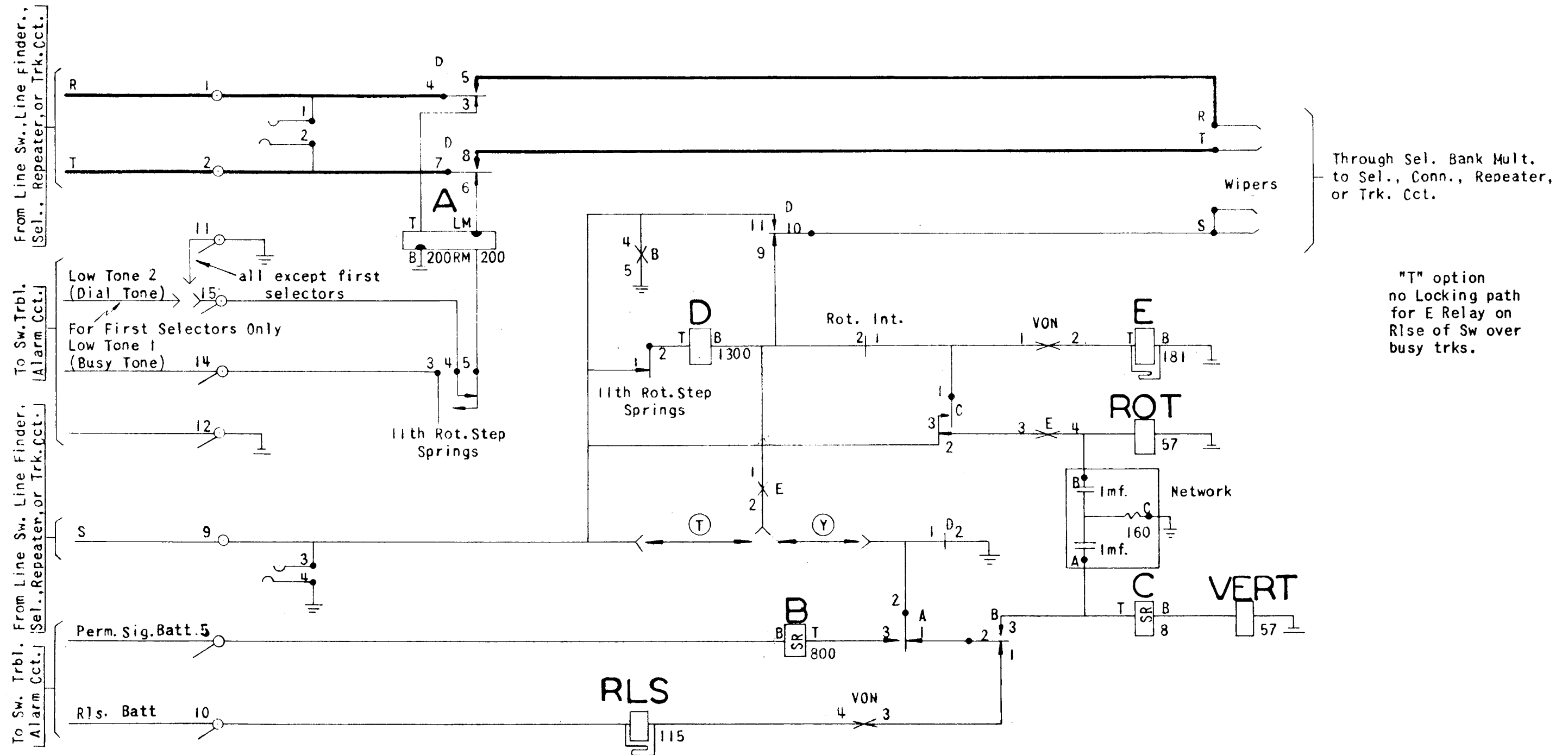
INDEX TO SEQUENCE CHARTS AND OPERATIONAL SKETCHES

TITLE	SD NUMBER	ISSUE	CHART NUMBER
Selector	SD-30200-01	22-D	1
Local Rotary Connector	SD-30215-01	19-D	2
2-Ring Combination Connector	SD-30220-01	28-B	3
1-Ring Combination Connector	SD-30228-01	27-B	4
Incoming Repeater, Pulse Correcting	SD-30537-01	11-B	5
Digit Absorbing Selector	SD-30976-01	5-B	6
Digit Absorbing Selector	SD-32183-01	4	6A*
Toll Rotary Connector	SD-31114-01	16-D	7
Toll Intermediate Selector	SD-31179-01	21-D	8
Toll Connector-10 Party Terminal Per Station	SD-31300-01	15-D	9
Test Distributor Control Circuit	SD-31401-01	6-D	10
Test Trunk Circuit	SD-90018-01	16-D	10
Interrupter Circuit & Transfer Key	SD-31501-01	5-D	11
Reverting Call Selector	SD-31647-01	10-D	11
Toll Transmission Selector	SD-31522-01	22-D	12
Local Connector-10 Party Terminal Per Station	SD-31526-01	19-D	13
Line Finder	SD-31530-01	20-D	14
Subscriber's Line Circuit	SD-32133-01	7-D	14
Line Finder Multiple Diagram			14A
Outgoing Repeater	SD-31779-01	12-D	15
Coin Box Trunk	SD-31592-02	14-B	16
Test Distributor	SD-32007-01	10-B	17
Recording Completing Trunk-3 Wire	SD-61605-01	12-D	18
Recording Completing Trunk-2 Wire Flat Rate	SD-32136-01	7-D	19
Recording Completing Trunk-2 Wire	SD-62426-01	10-D	19
Recording Completing Trunk-Coin Control (CDO)	SD-31123-01	18-D	20
Recording Completing Trunk-Coin Control (Toll)	SD-62429-01	16-D	20
Recording Completing Trunk-Coin Control	SD-62496-01	13-D	21

NOTE: General information concerning legends etc. on Sequence Charts and Operational Sketches will be found in B.S.P. A128.801.
* Added in May 1954



For Training Purposes Only			
Number 1 Step By Step System			
Sequence Chart for SD-30200-01 Selector			
9/2/52	R.A.Ditlow	Issue 22D	1



For Training Purposes Only

Number 1 Step By Step System

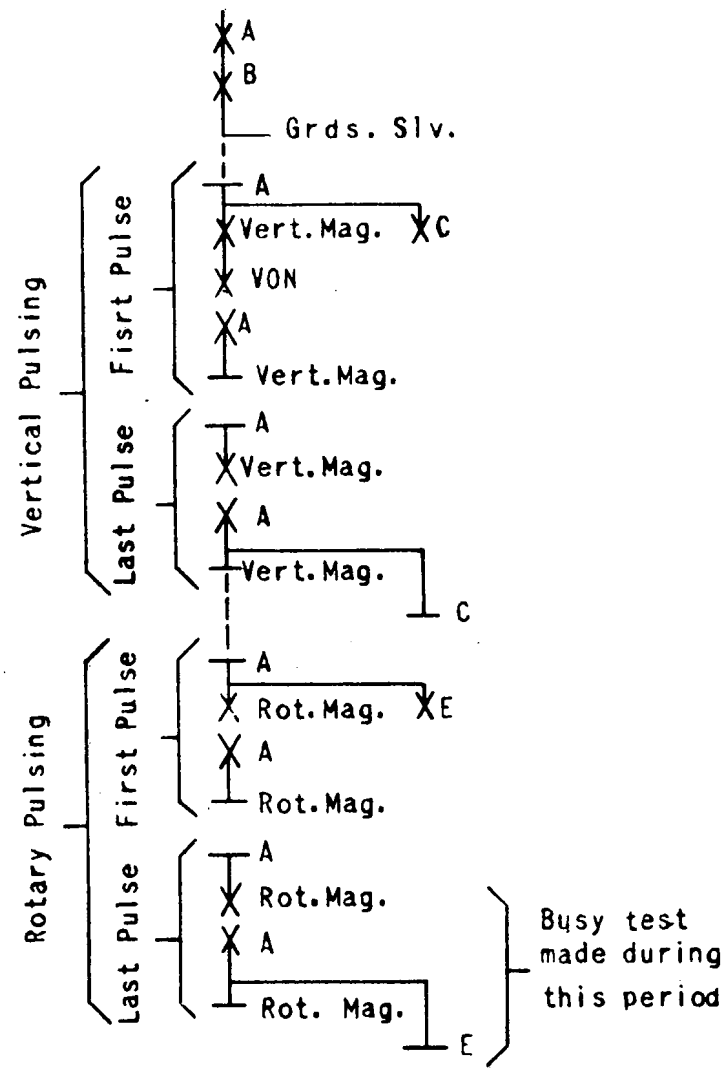
Operational Sketch for
SD-30200-01
Selector

9/2/52

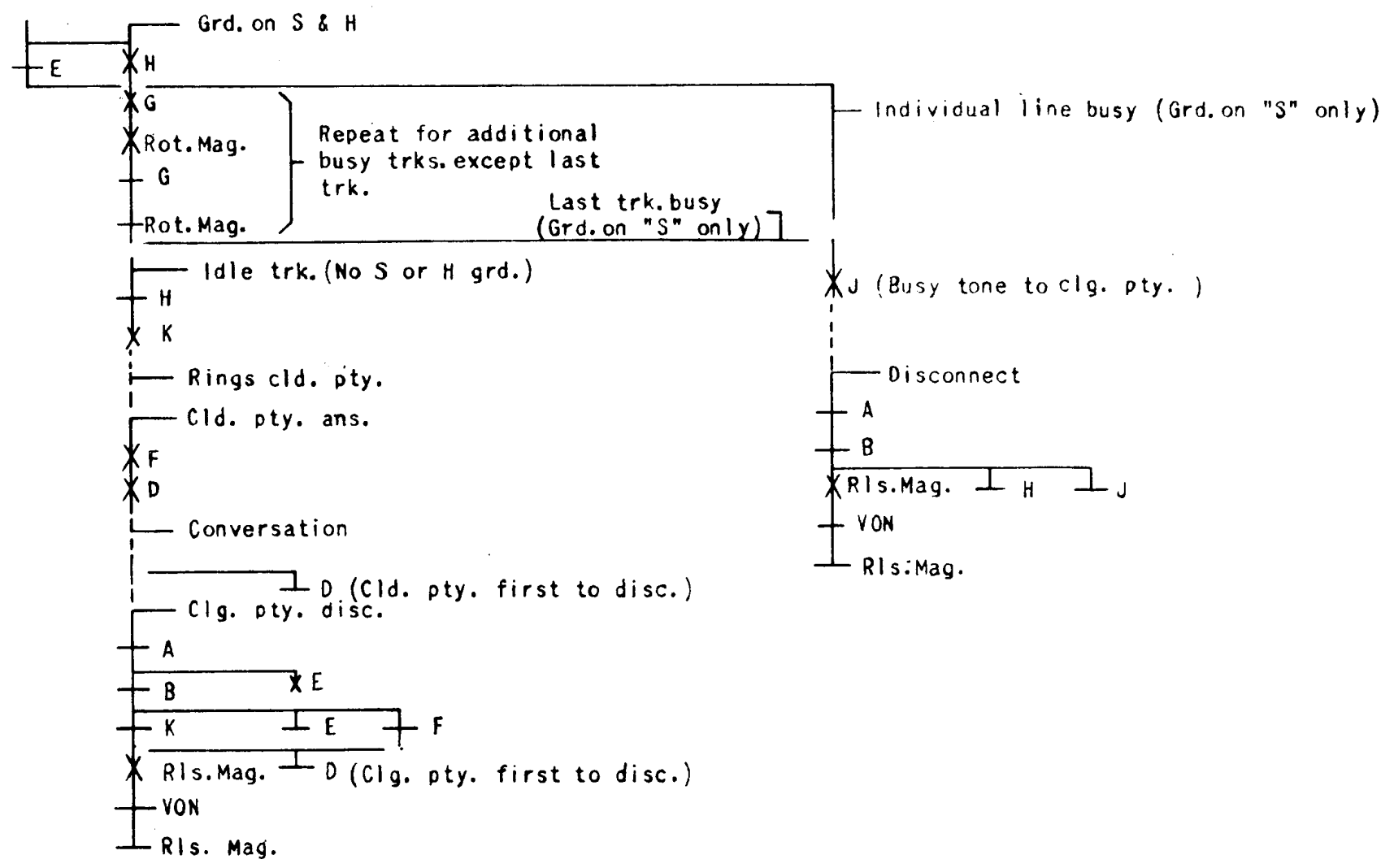
R.A. Dittlow

Issue 22-0 1

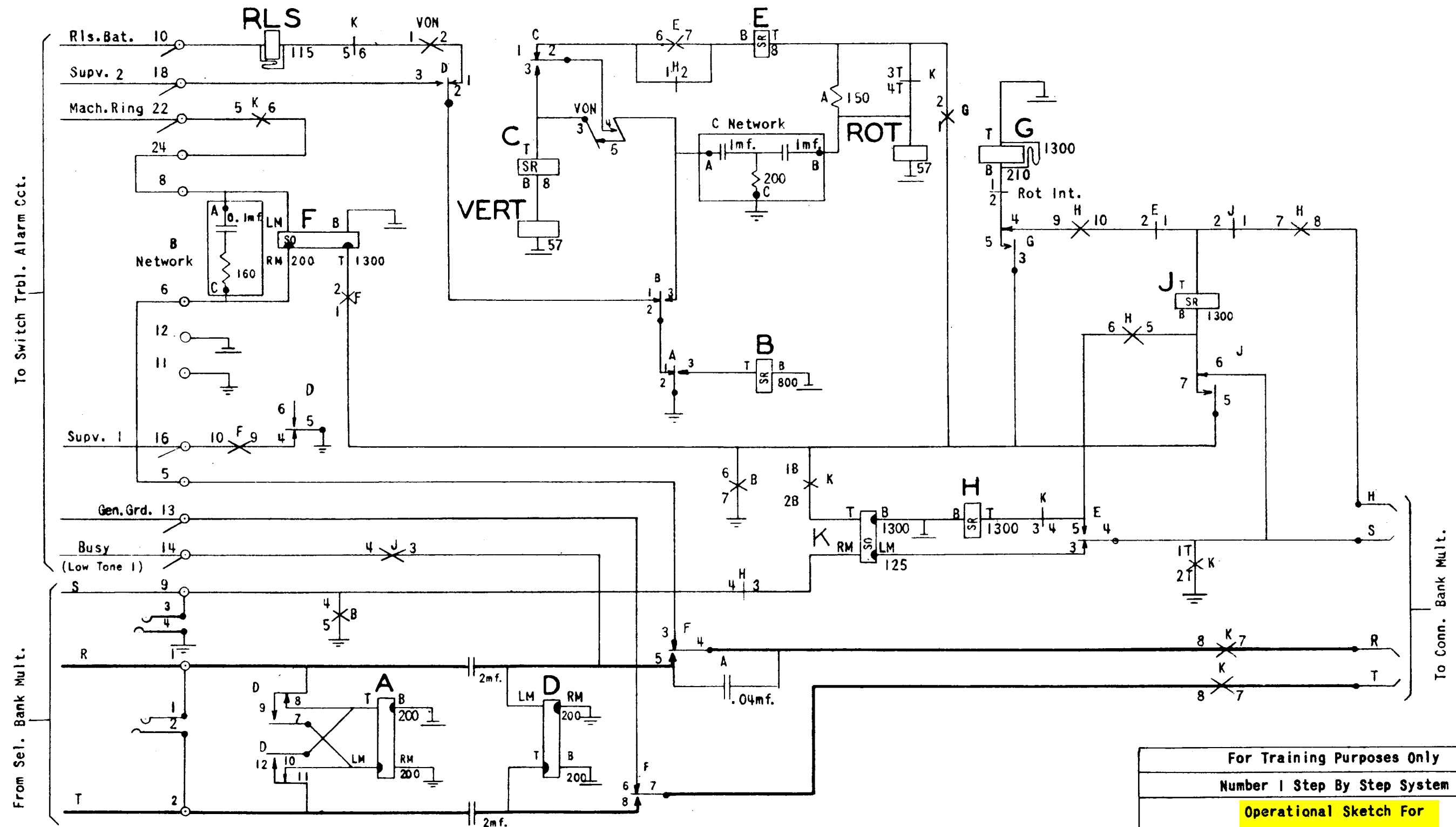
Seizure by
subscriber shunt



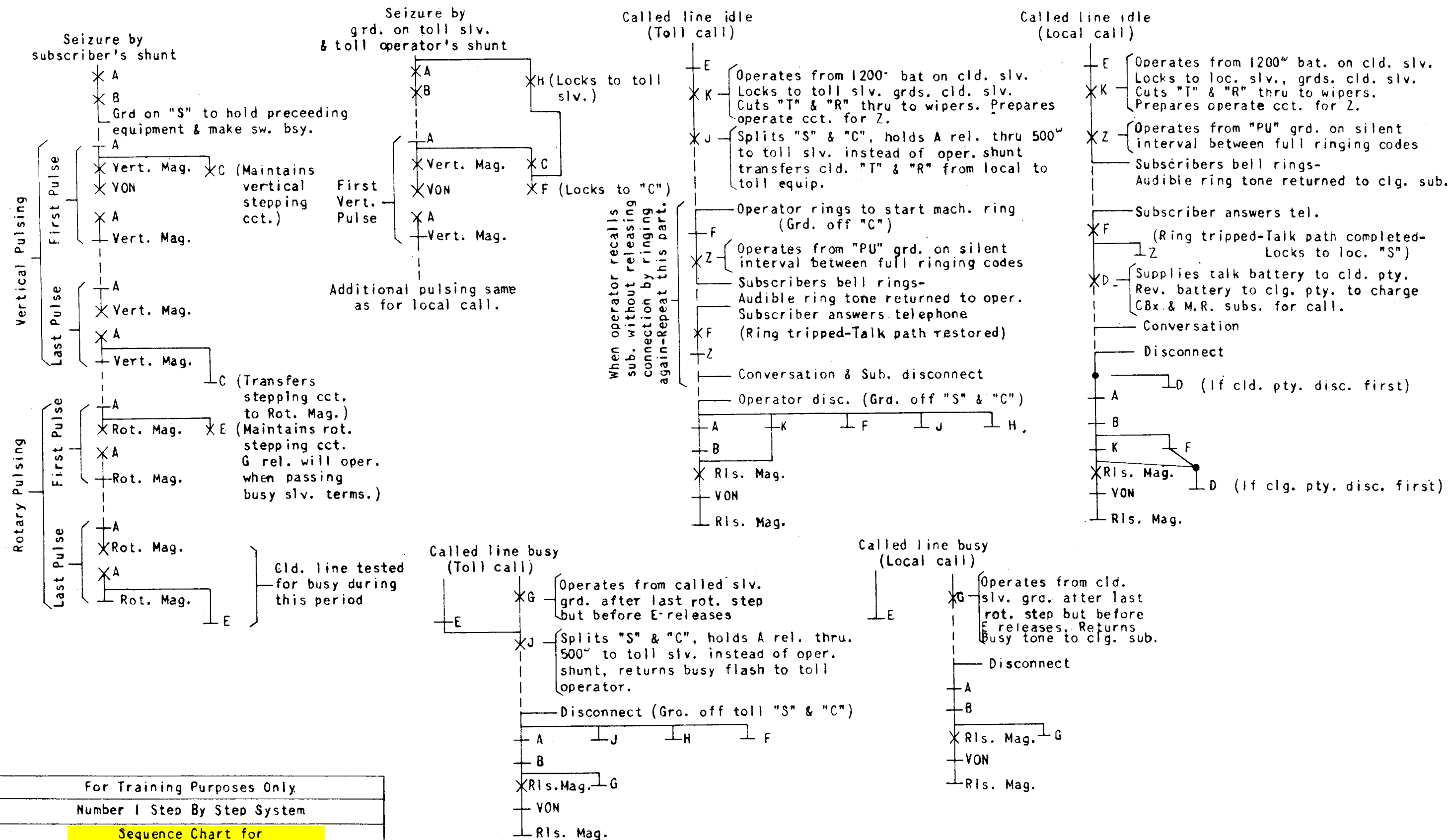
Rotary hunting and
idle line seizure



For Training Purposes Only			
Number 1 Step By Step System			
Sequence Chart for SD-30215-01 Local Rotary Connector			
9/2/52	R.A.Ditlow	Issue 19 D	2



For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch For			
SD-30215-01			
Local Rotary Connector			
9/2/52	R.A.Ditlow	Issue 19-D	2



For Training Purposes Only

Number 1 Step By Step System

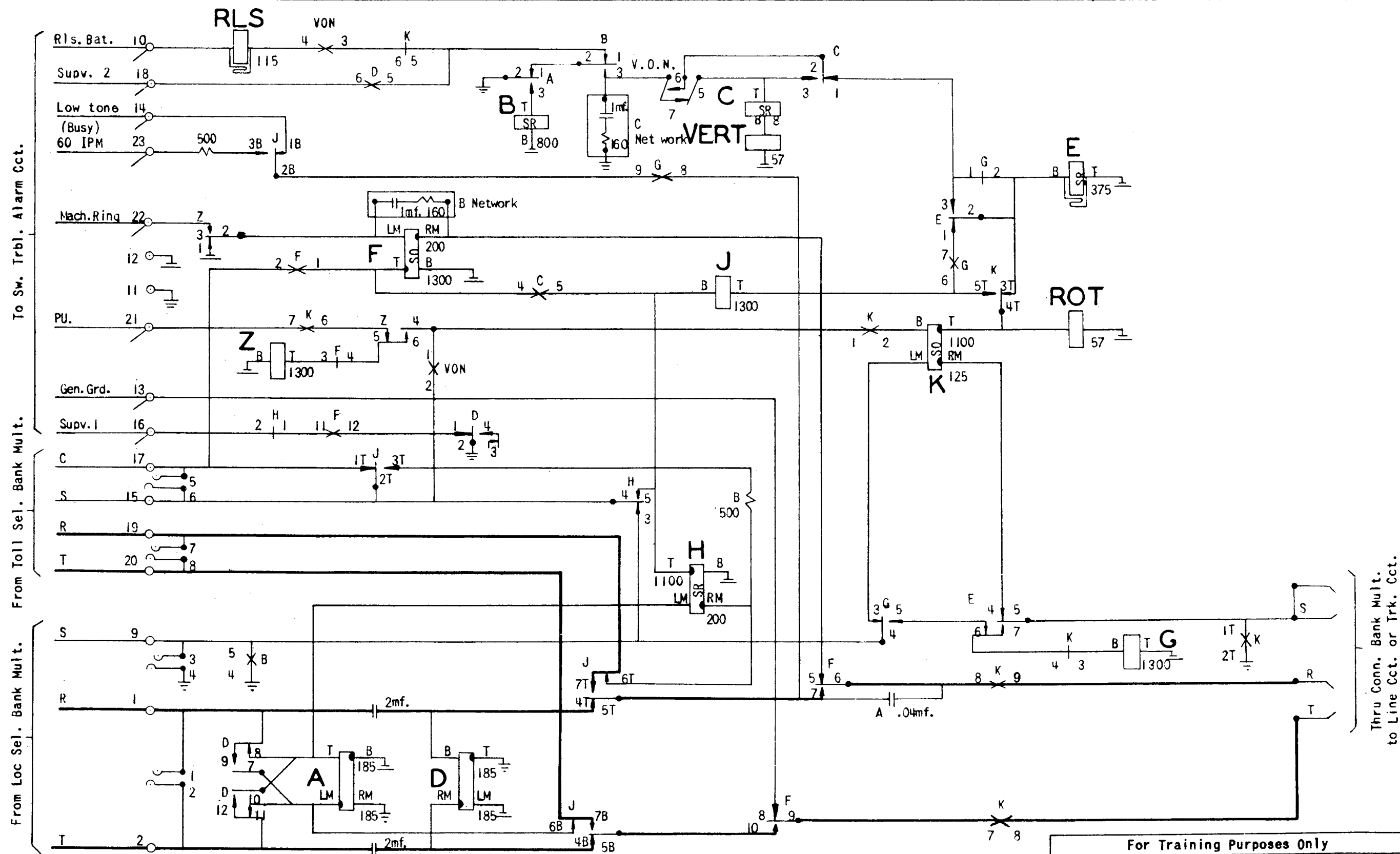
Sequence Chart for
SD-30220-01
2 Ring Combination Connector

9/2/52

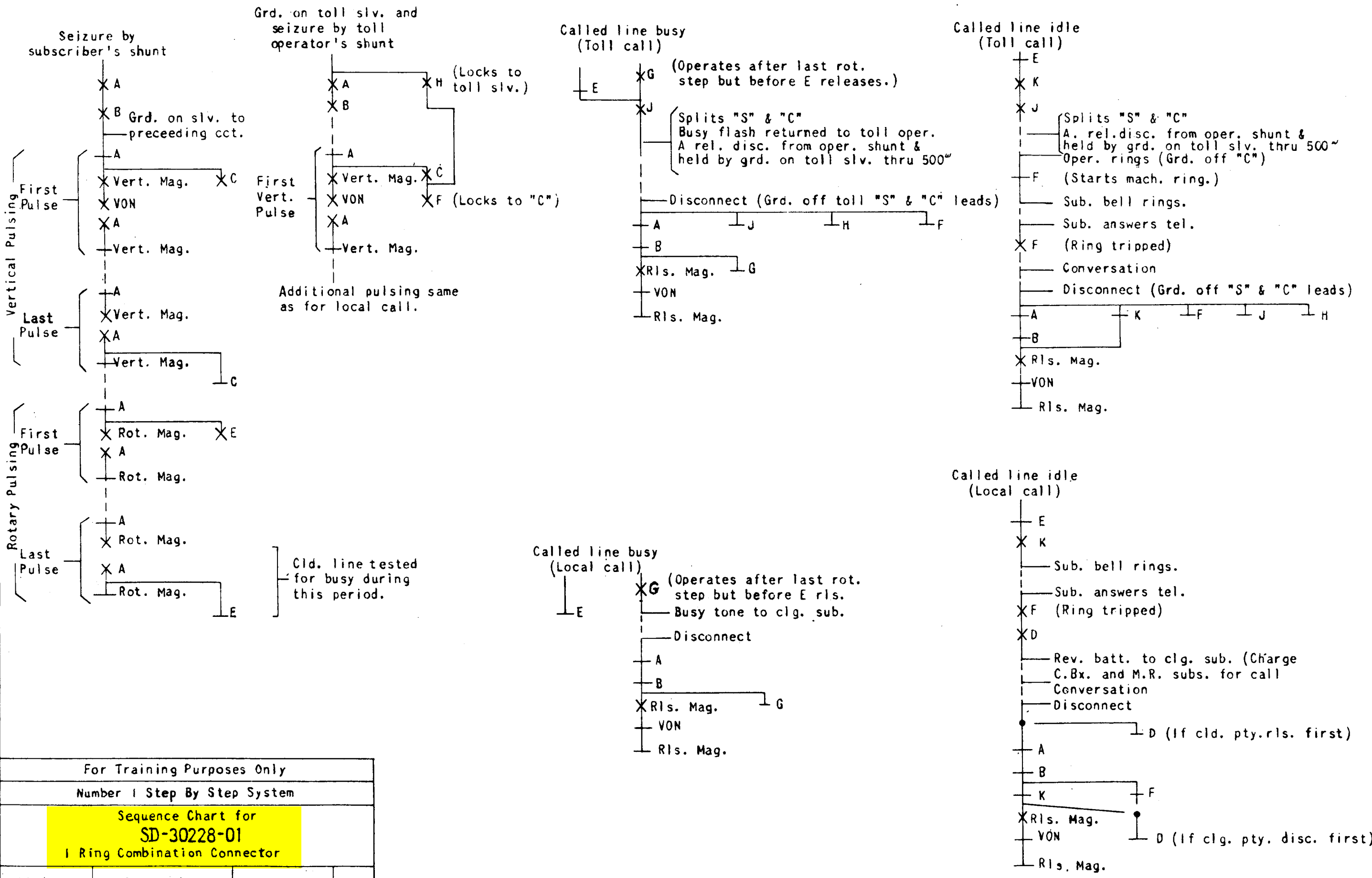
R.A.Ditlow

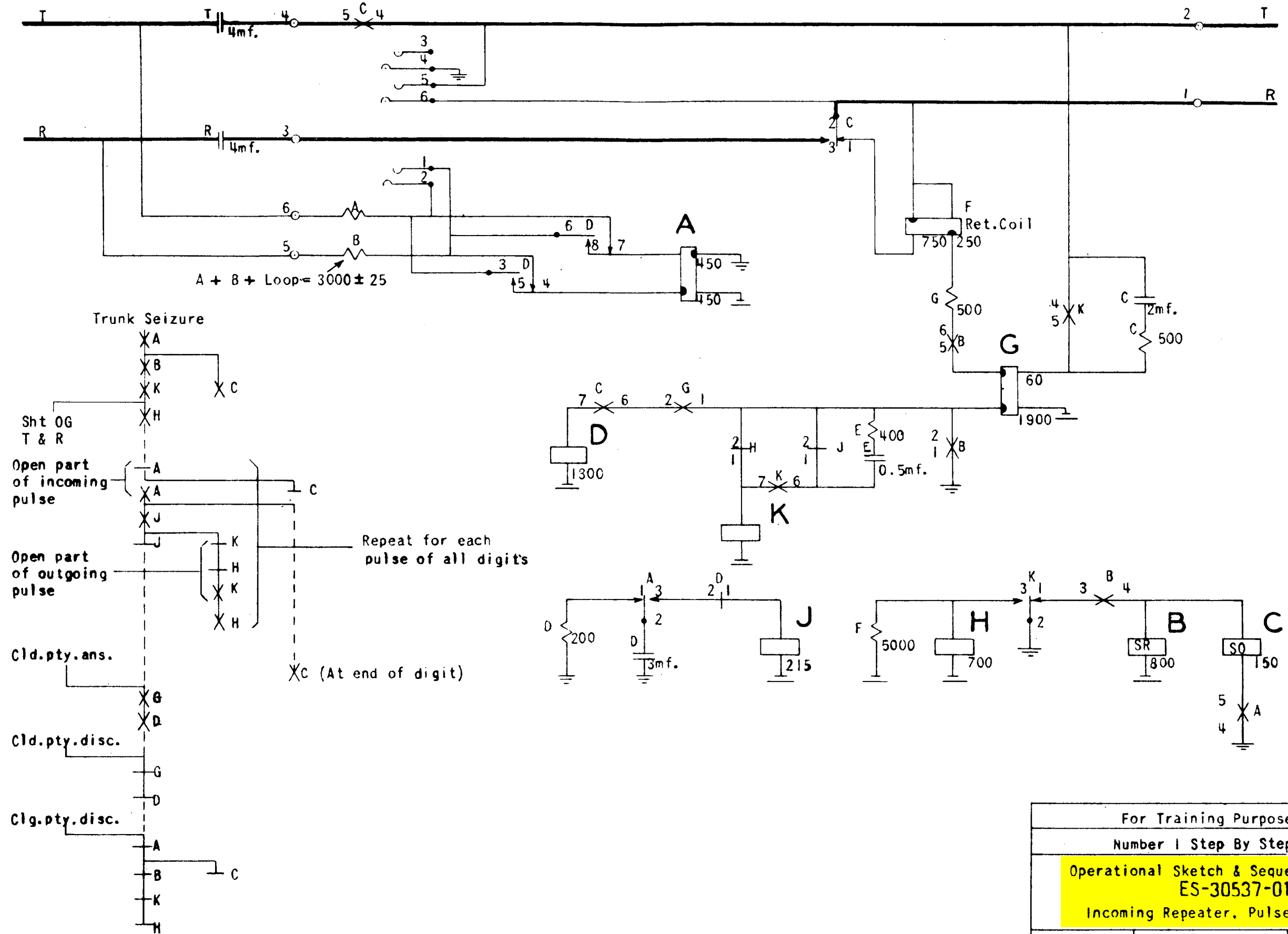
Issue 28 B

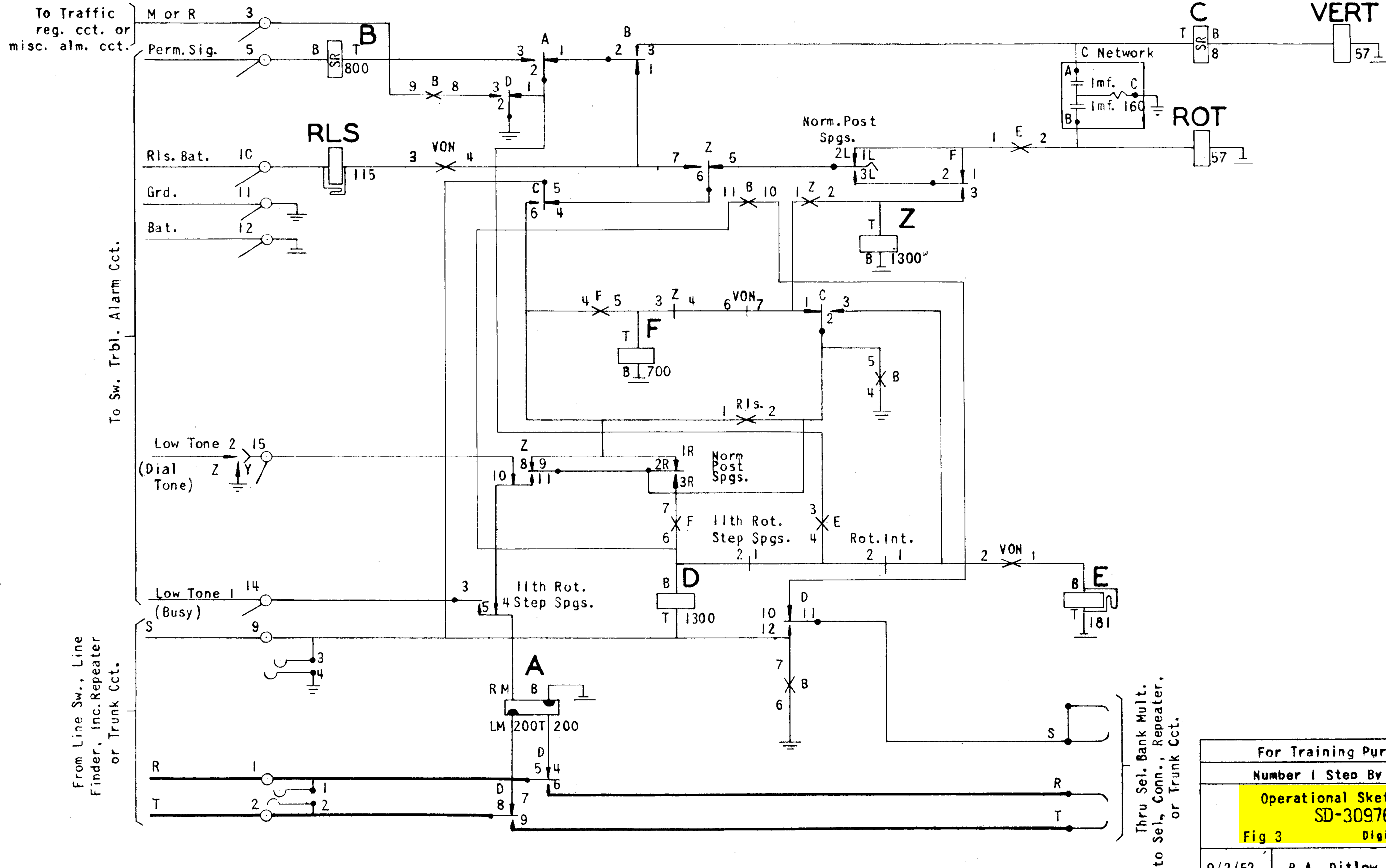
3



For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch For			
SD-30220-01			
2 Ring Combination Connector			
9/2/52	R.A.Ditlow	Issue 28 B	3

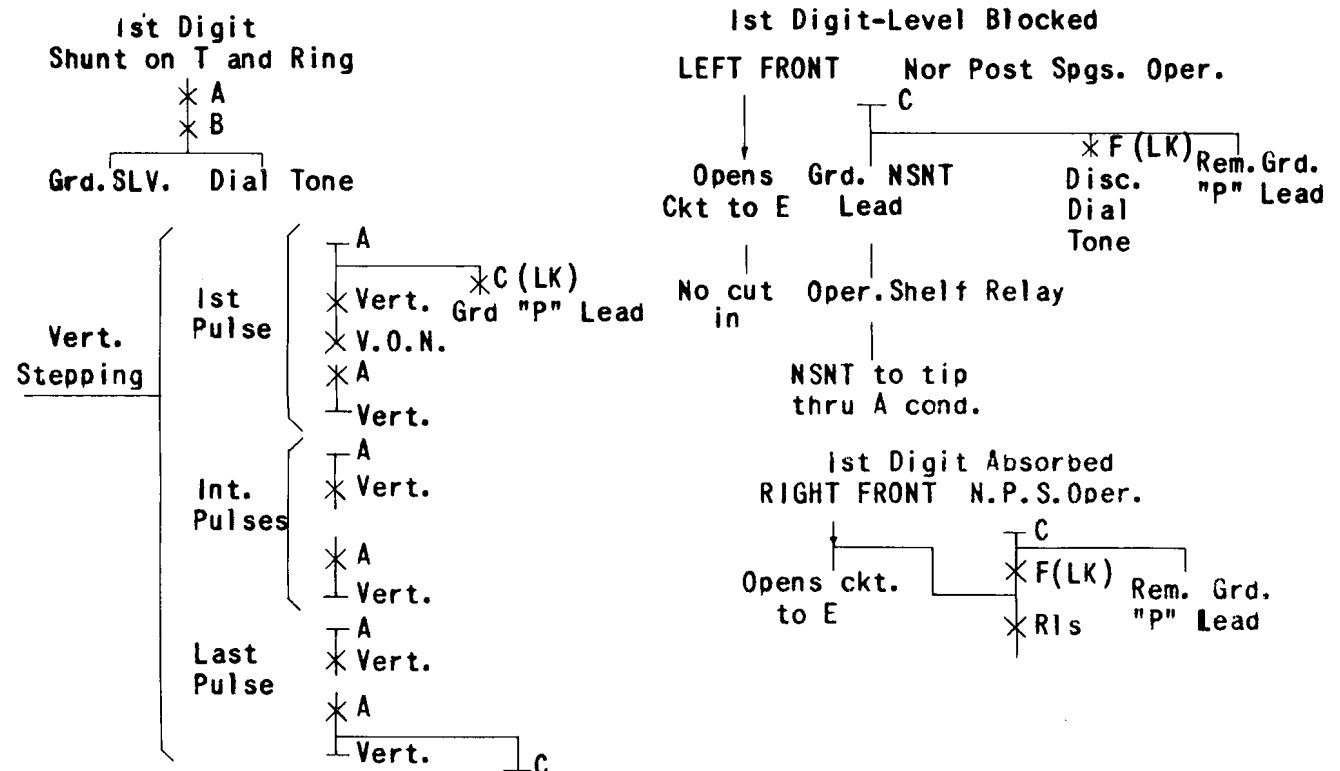




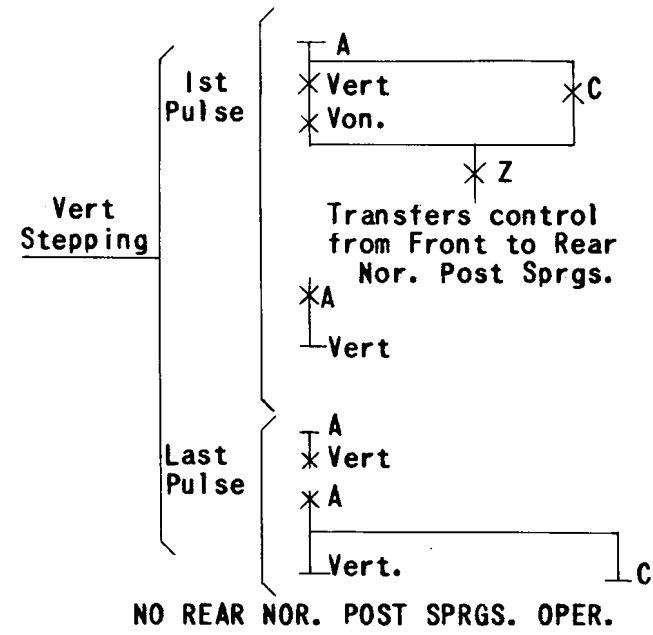


Thru Sel. Bank Mult.
to Sel. Conn., Repeater,
or Trunk Cct.

For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch For SD-30976-01			
Fig 3 Digit Absorbing Selector			
9/2/52	R.A. Ditlow	Issue 8 D	6



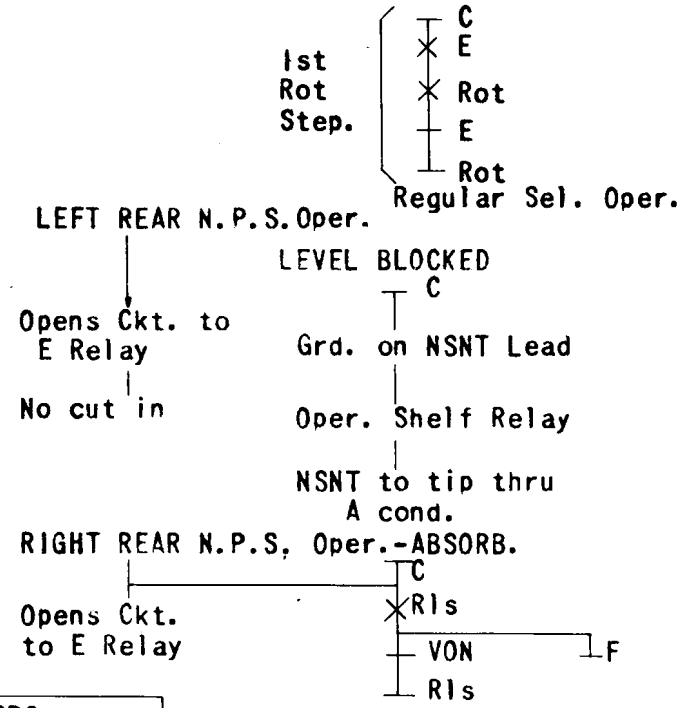
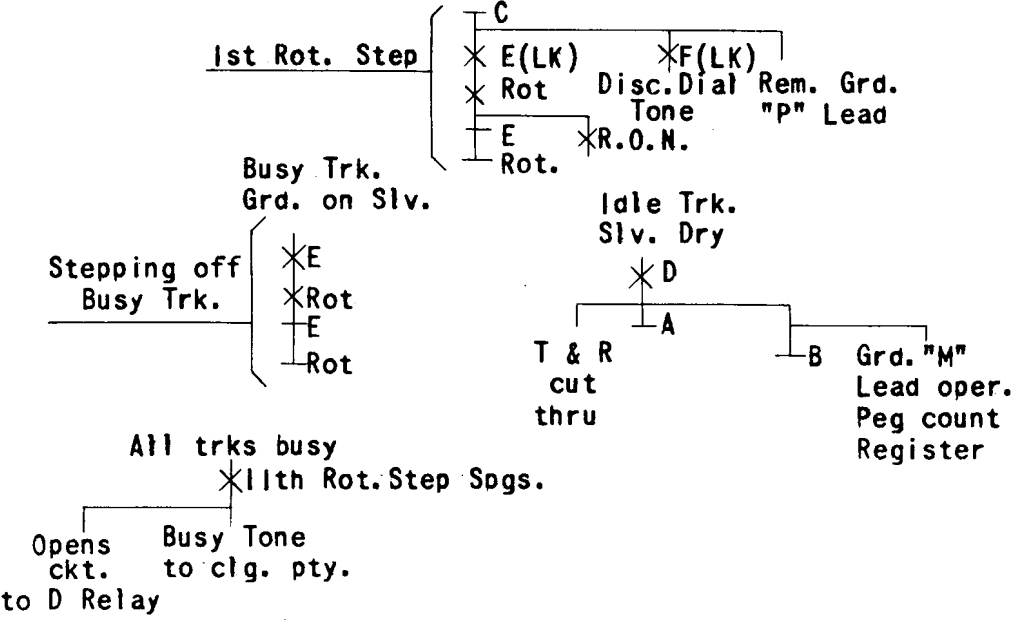
2nd Digit (1st digit was Absorbed)
A, B, F Relays are oper.



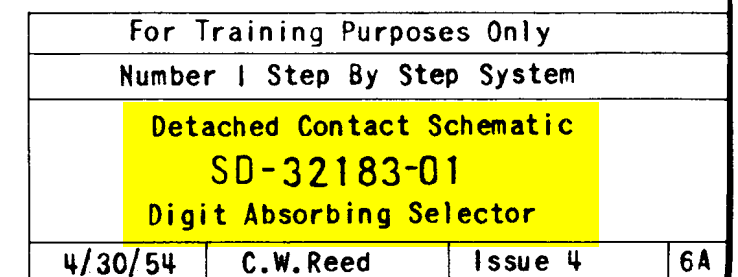
3rd Digit (1st & 2nd digits Absorbed)
A, B, Z Relays are oper.
F Relay normal.

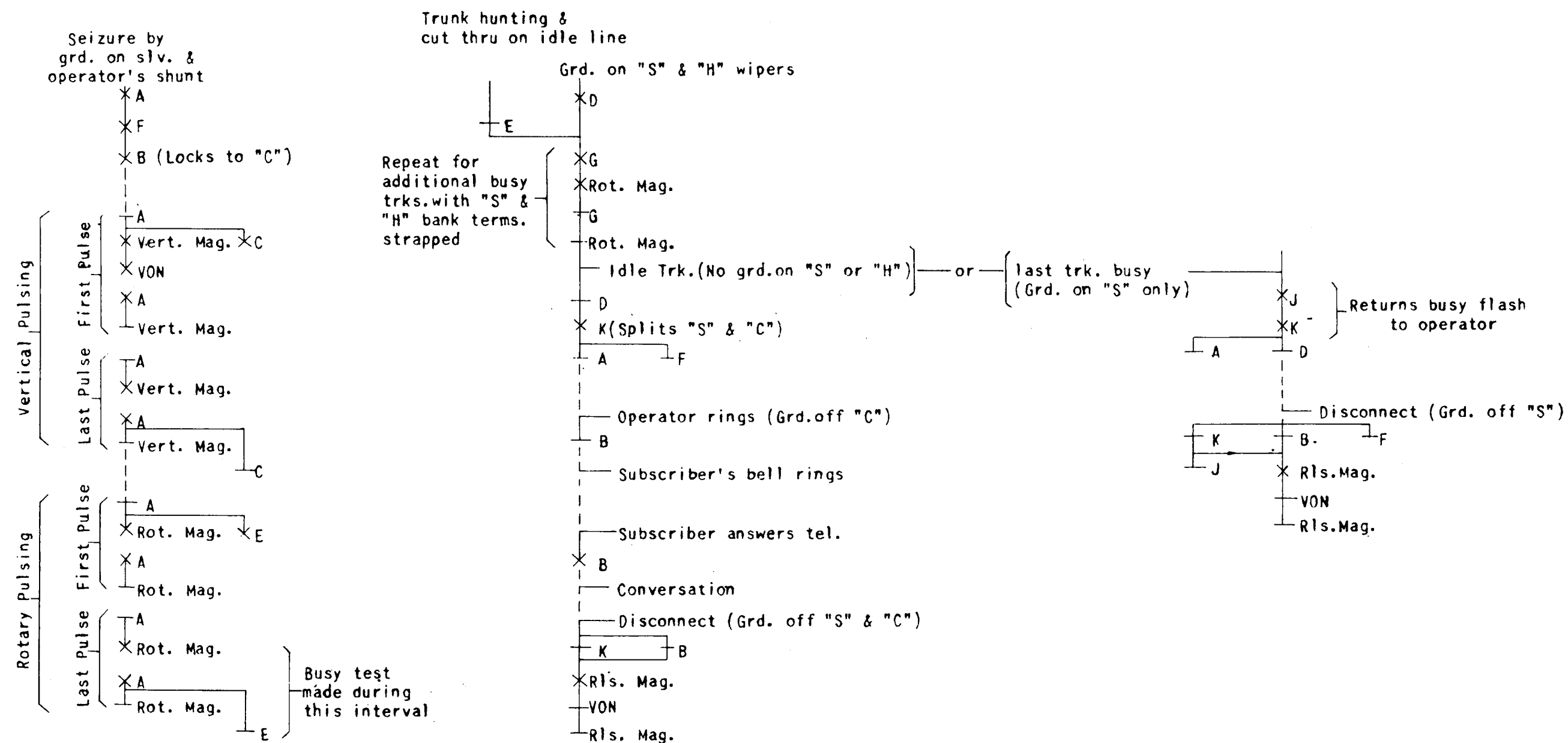
Regular Sel. operation on all Lev. regard less of Nor. Post Sprg. operation.

NO FRONT Normal Post Spgs. Oper.
1st Digit - Regular Sel. oper.



ON LEVELS REQUIRING	ON	N.P. SPGS. ADJUST TO OPER.	N.P. SPG. CONTROL RELAYS
DIGIT ABSORBING	1st DIGIT 2nd DIGIT	R F R R	F OPER F & Z OPER
BLOCKING	1st DIGIT 2nd DIGIT	L F L R	F OPER F & Z OPER
NO BLOCKING OR ABSORBING	3rd DIGIT	N.P. SPGS. INEFFECTIVE	F NOR. Z OPER.





For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For

SD-31114-01

Toll Rotary Connector

9/2/52

R.A. Ditlow

Issue 16 D

7

Seizure
grd. on S & C leads
shunt by operator's trk.

X A

X B

Pulsing

First Pulse {
+ A
X Vert. Mag. X C
X VON
X E
+ A
+ Vert. Mag.

Last Pulse {
+ A
X Vert. Mag.
+ A
+ Vert. Mag.

+ C
X Rot. Mag.
+ E Grd. on slv. bank term.
+ Rot. Mag. (Busy trk.)

Repeat for additional
busy trks. to succeed-
ing cct.

{
X E
X Rot Mag.
+ E No grd. on slv. bank term.
+ Rot Mag. (Idle trk.)

or { All trks. busy

+ F Locks to grd. on slv.
+ A from bat. thru E
+ B Transfers "T", "R", "S", "C",
to succeeding cct.

+ Disconnect (Grd. off slv.)

+ F
X Rls. Mag.
+ VON
+ Rls. Mag.

Splits "S" & "C" → X F 11th Rot. Step Spgs.

+ A
+ B Busy flash to oper.

+ Disconnect (Grd. off slv.)

+ F
X Rls. Mag.
+ VON 11th Rot. Step Spgs..
+ Rls. Mag.

For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For

SD-31179-01

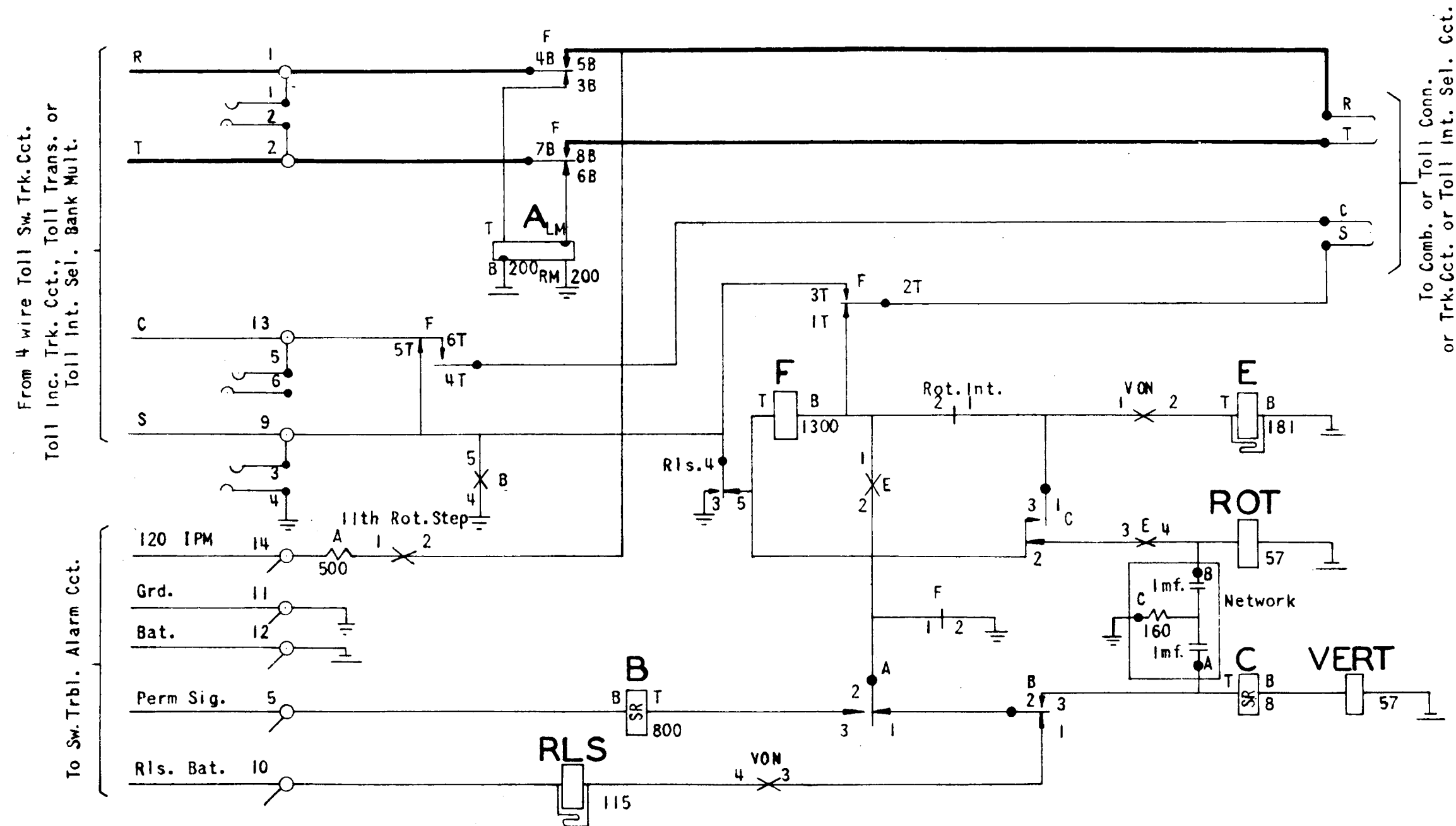
Toll Intermediate Selector

9/2/52

R.A.Ditlow

Issue 21 D

8



For Training Purposes Only

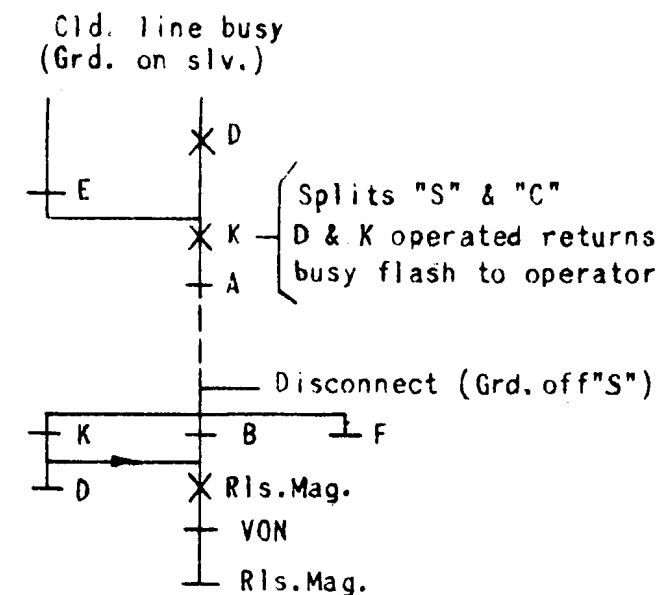
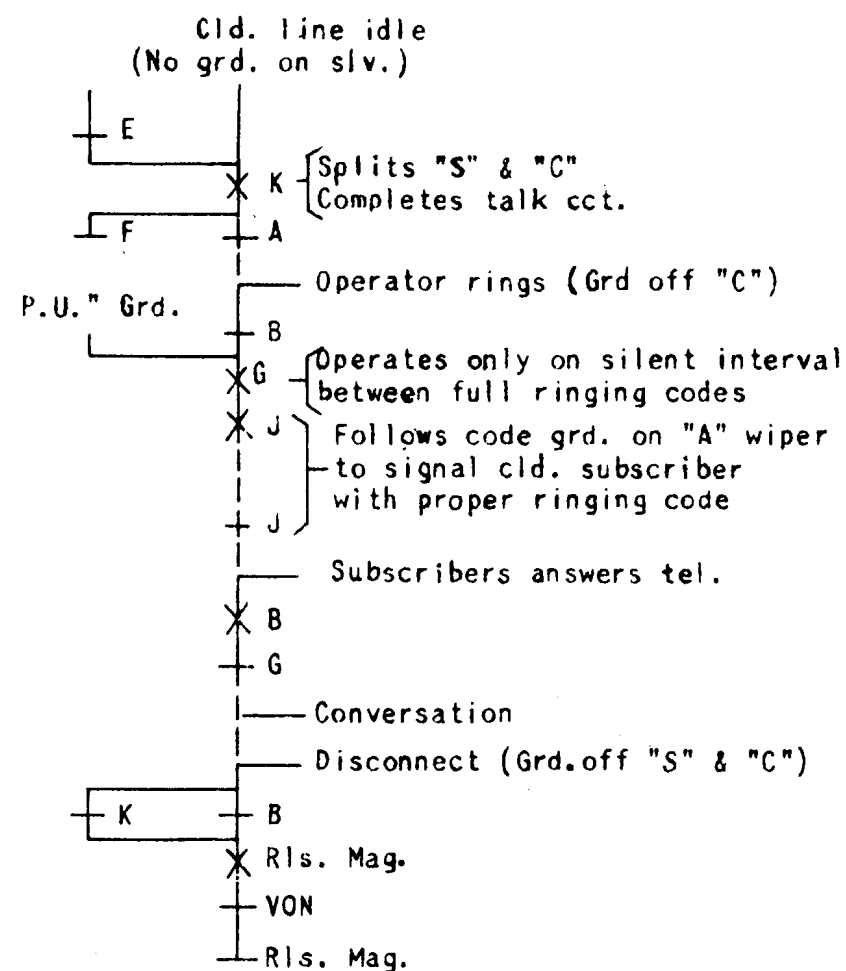
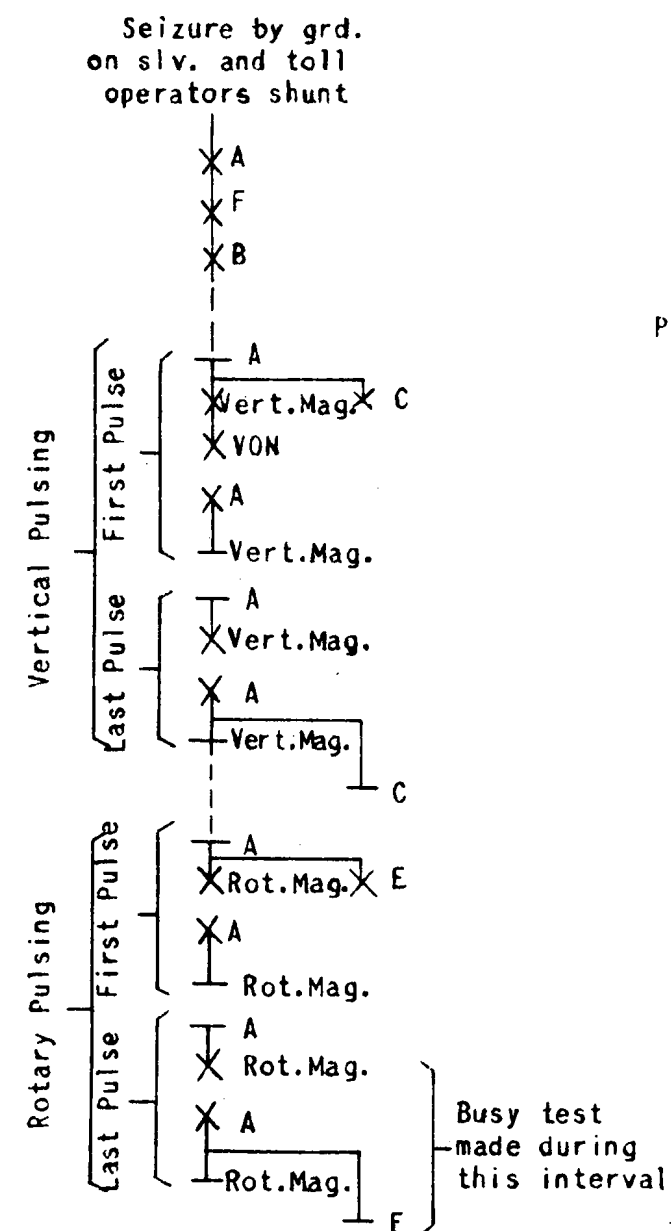
Number 1 Step By Step System

Operational Sketch For
SD-31179-01
Toll Intermediate Selector

9/2/53

R.A.Ditlow

Issue 21 D 8



For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For

SD-31300-01

Toll Connector

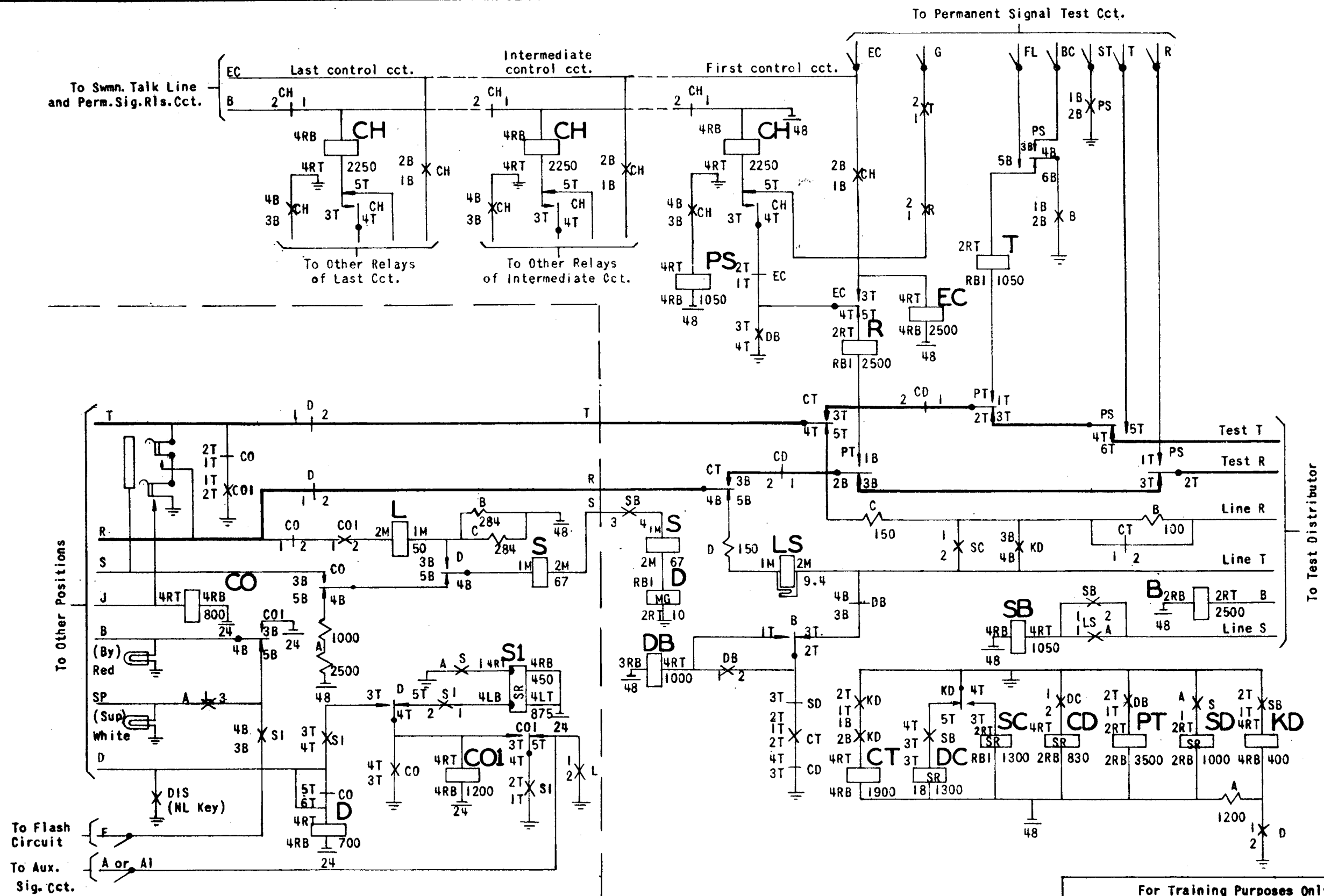
10 Party Terminal Per Station

9/2/52

R.A. Ditlow

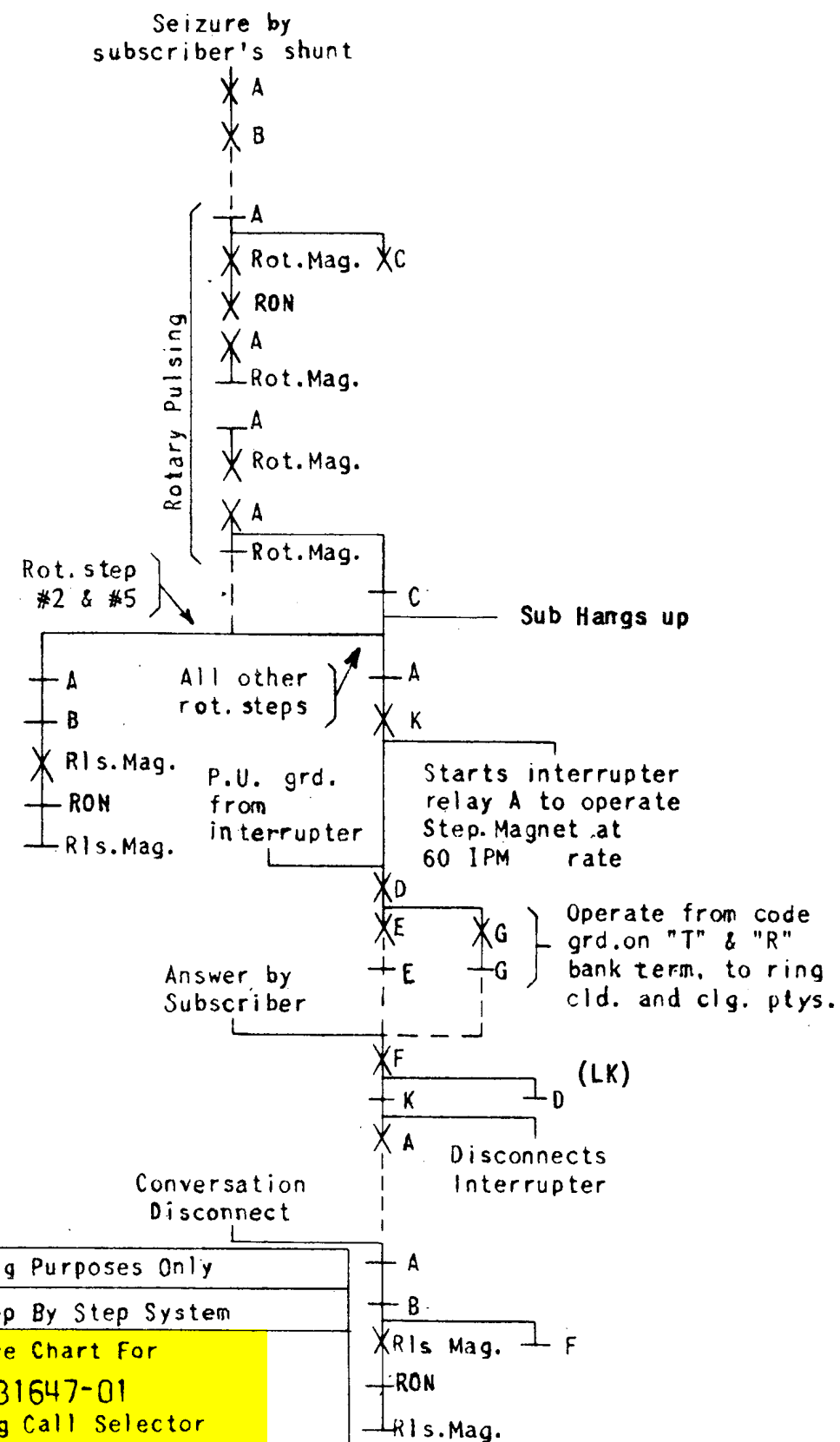
Issue 15D

9



For Training Purposes Only		
Number 1 Step By Step System		
Operational Sketch For		
SD-90018-01		
Test Trunk Circuit		
SD-31401-01		
Test Distributor Control Circuit		
9/2/52	R.A. Dittlow	Issue 16D & 6D 10.

LOCAL TEST DESK #14



Code Grd.

Rotary Brushes on Bank Term.

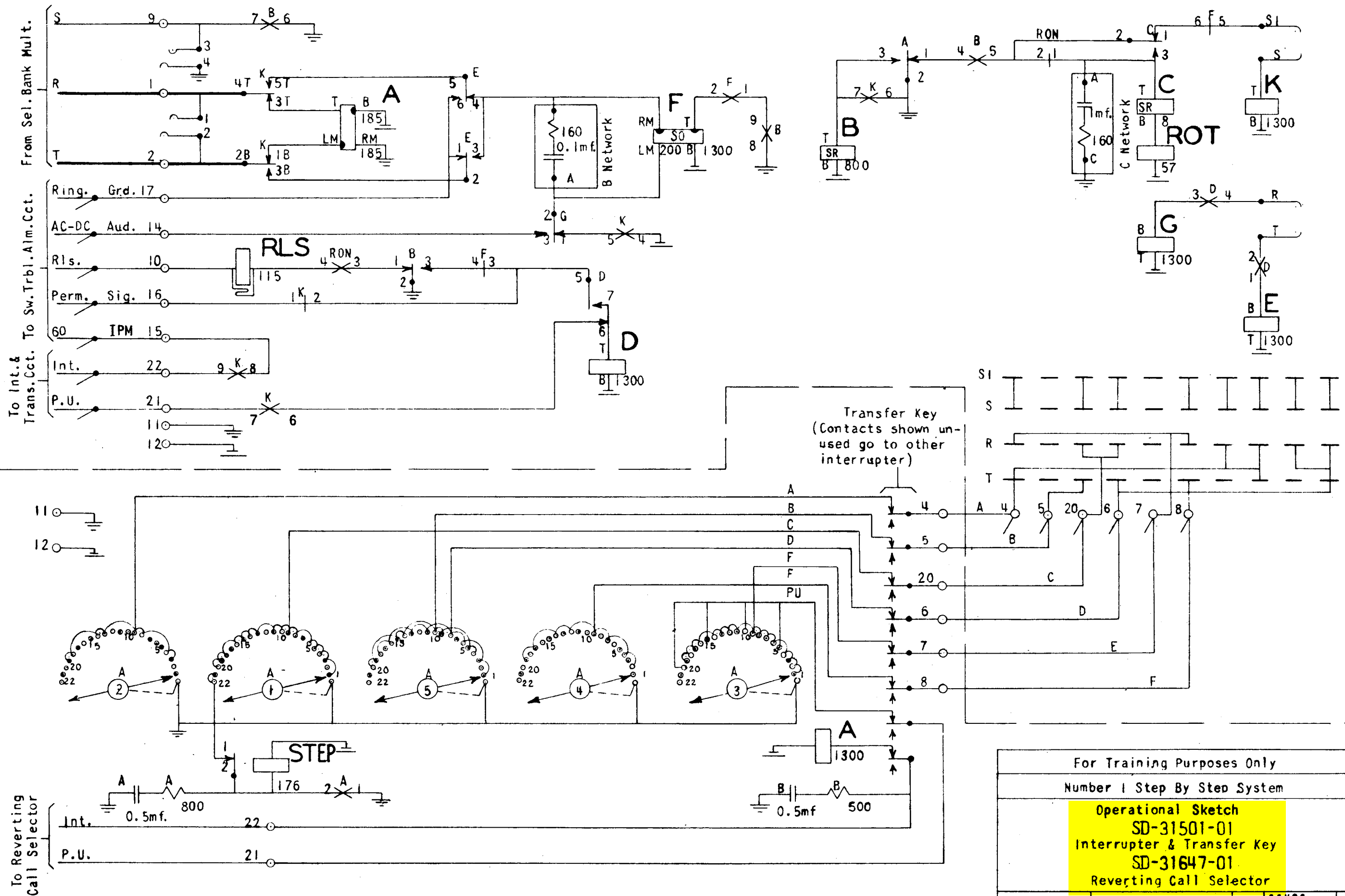
	1	2	3	4	5	6	7	8	9	10	
1 T											E
1 R											G
3 T											E
3 R											G
4 T											
4 R											
6 T											
6 R											
7 T											
7 R											
8 T											
8 R											
9 T											
9 R											
0 T											
0 R											
PU											

Selector Bank Term.

Ringing Codes

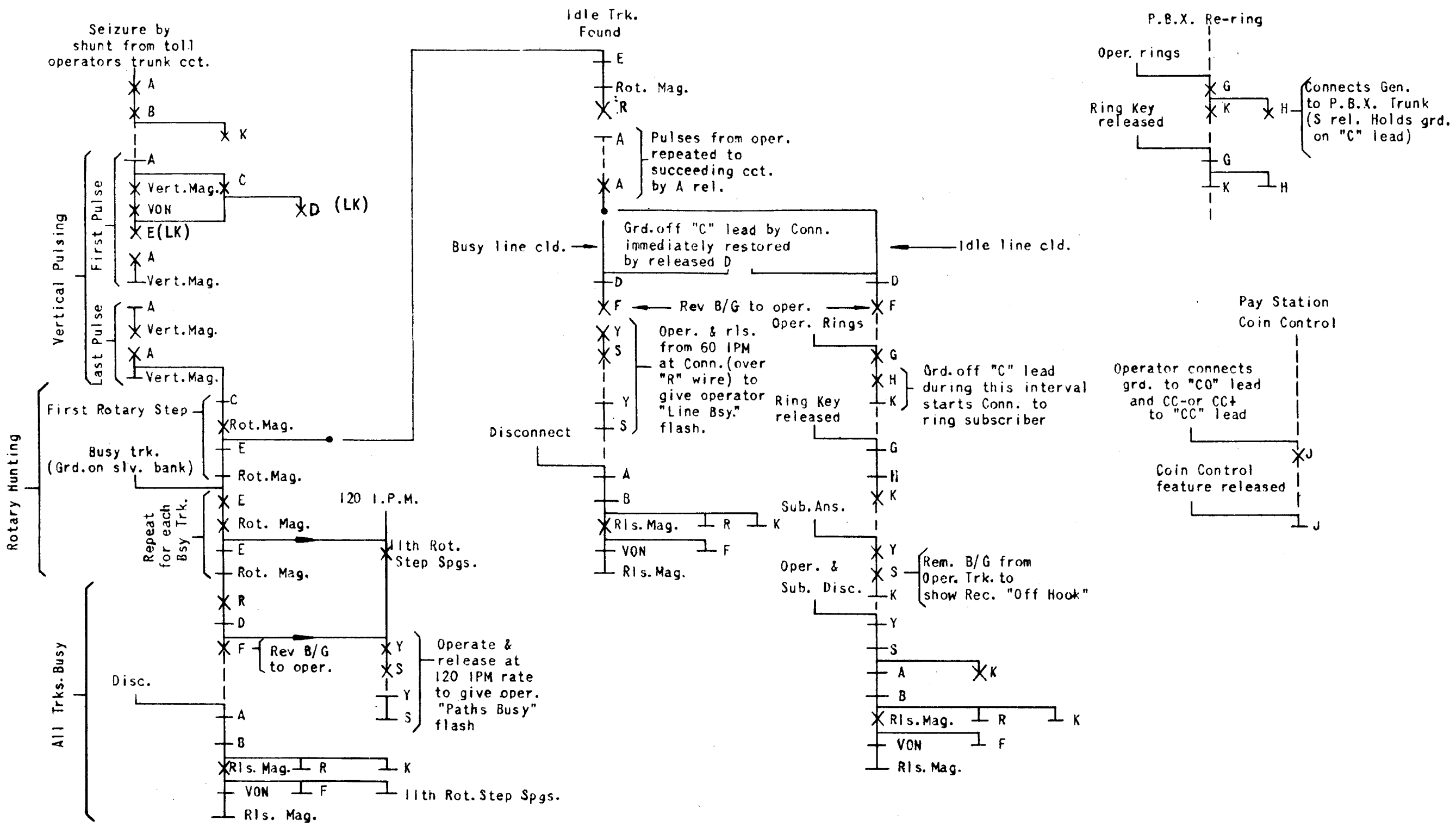
	1	2	3	4	5	6	7	8	9	10	
1 T											
1 R											
3 T											
3 R											
4 T											
4 R											
6 T											
6 R											
7 T											
7 R											
8 T											
8 R											
9 T											
9 R											
10 T											
10 R											
PU											

Selector Bank Term.



For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch			
SD-31501-01			
Interrupter & Transfer Key			
SD-31647-01			
Reverting Call Selector			
9/2/52	R.A. Ditlow	Issues	11

Seizure by
shunt from toll
operators trunk cct.



For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For
SD-31522-01
Toll Transmission Selector

9/2/52

R.A. Ditlow

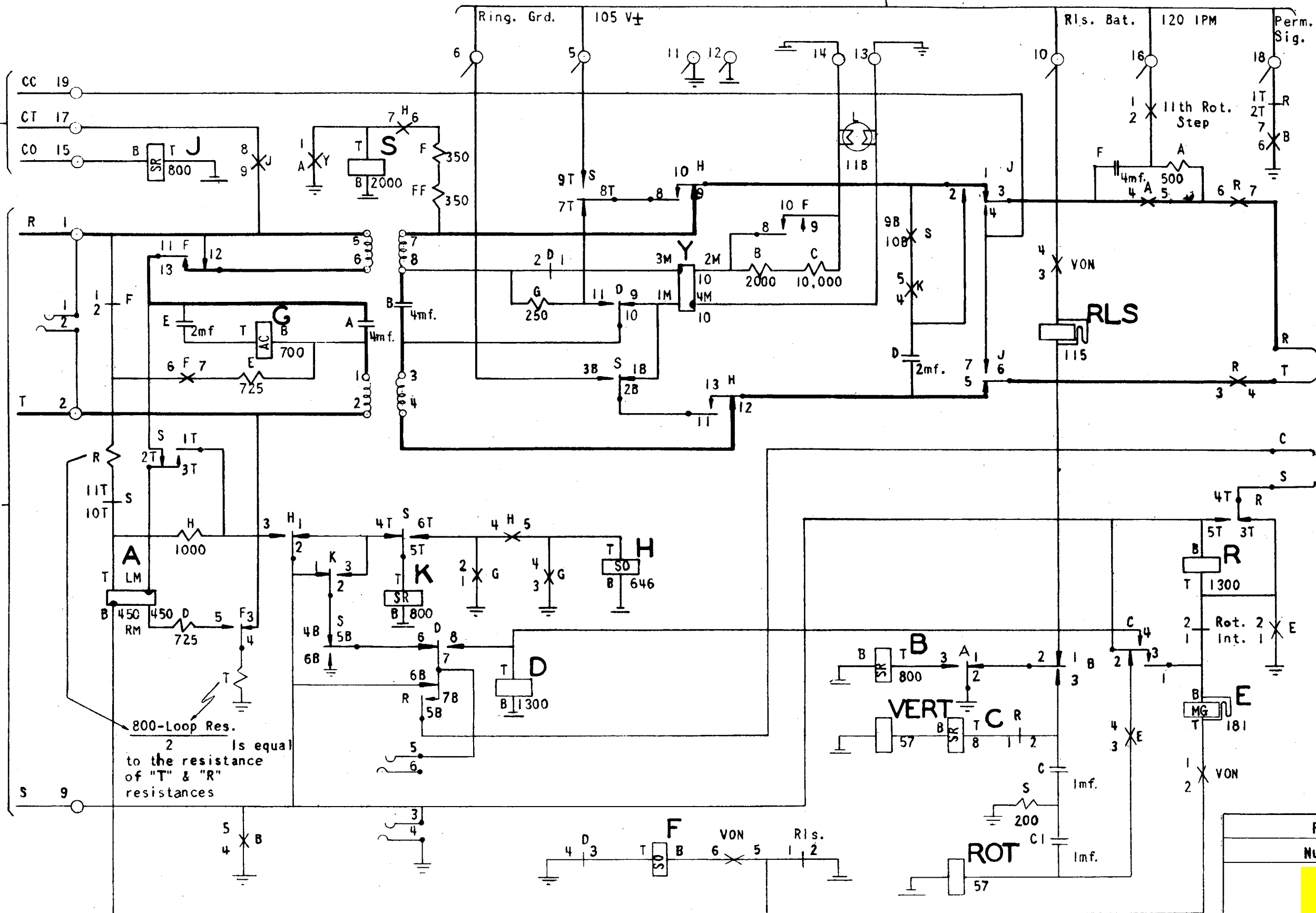
Issue 22-D

12

To Sw. Trbl.. Alm. Cct.

To Control Cct.

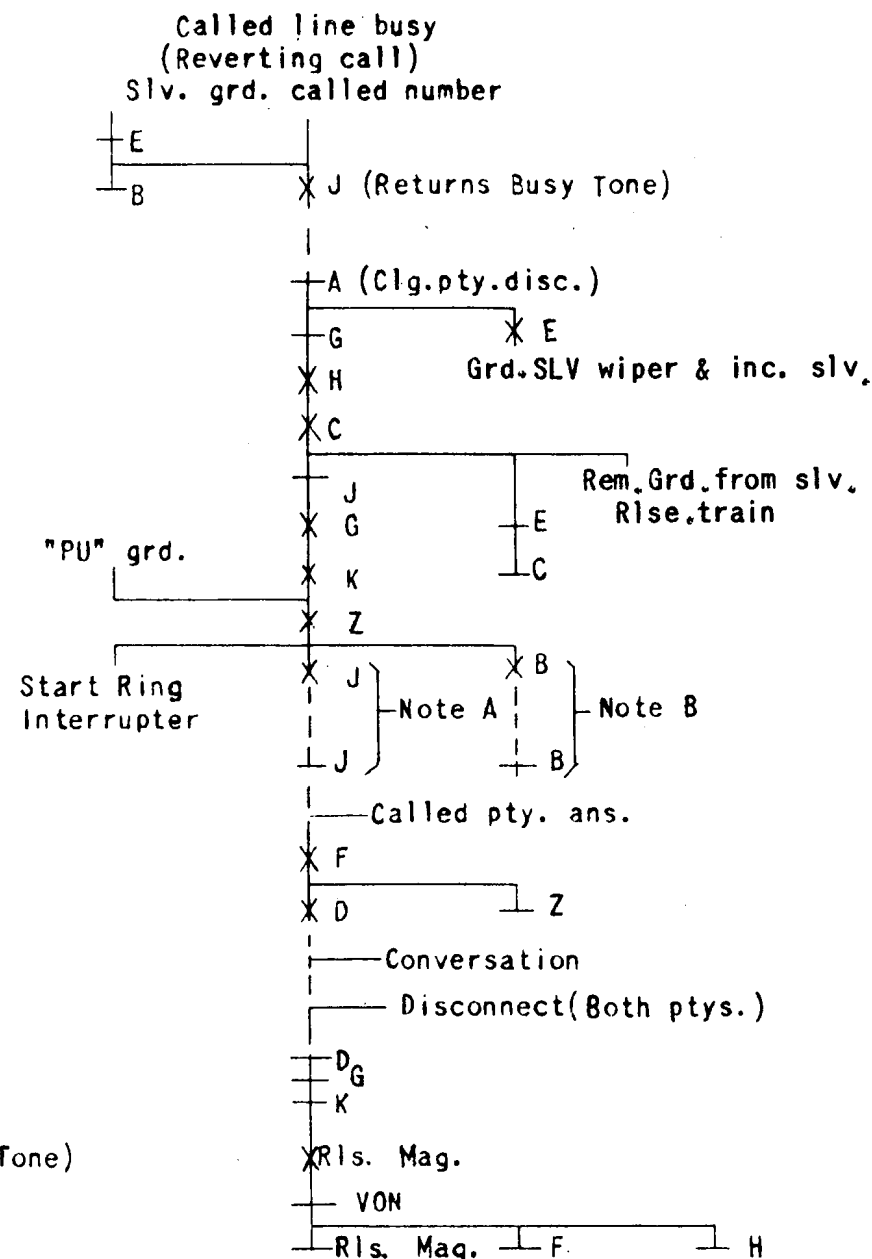
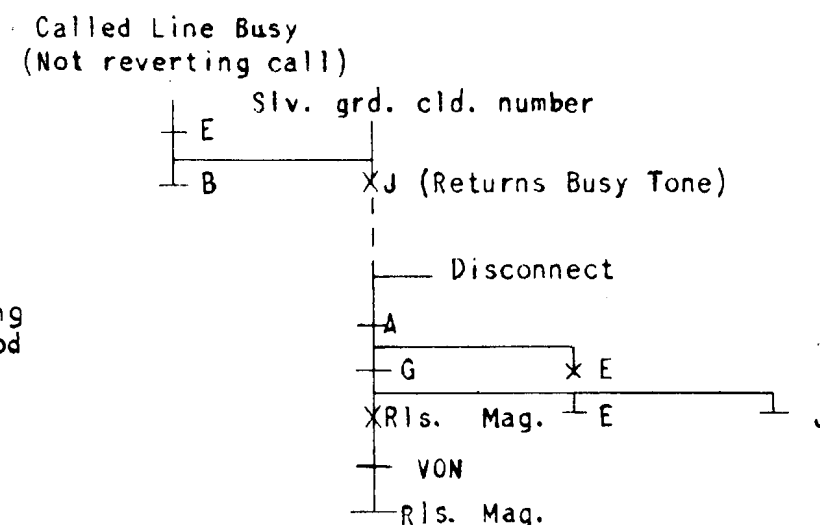
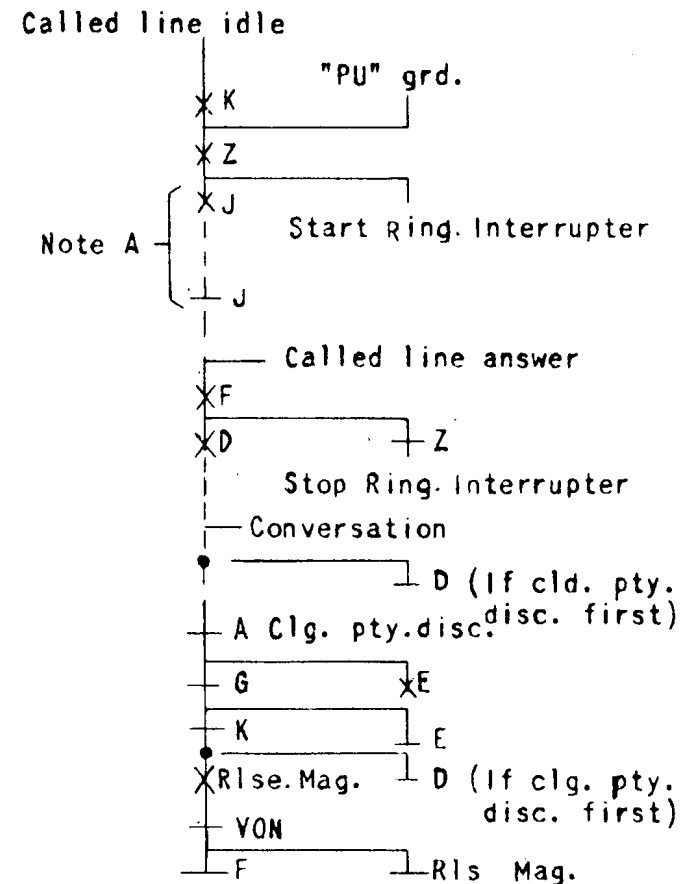
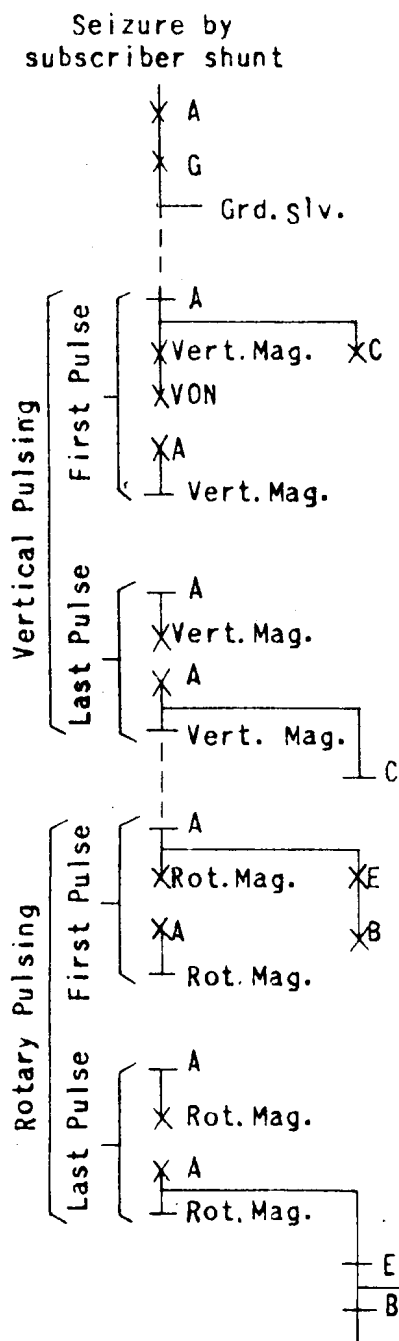
From Swbd. Trunk Cct.



To Toll-Int. Sel. or Comb. Cona.
or Toll Conn. or Trk. Cct.

800-Loop Res.
2 Is equal
to the resistance
of "T" & "R"
resistances

For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch For SD-31522-01			
Toll Transmission Selector			
9/2/52	R.A. Ditlow	Issue 22-D	12



Note A

The J Rel. follows a code grd. from the Ringing Interrupter which is cross connected to the "A" bank mult. term. of the called party. This causes the proper ringing code to be sent to the called party.

Note B

The B Rel. operates twice per code ring from timed grd. on "RS". This provides a signal to the clg. pty. that is connected on the "Reversed Side" from the cld. pty.

For Training Purposes Only

Number 1 Step By Step System

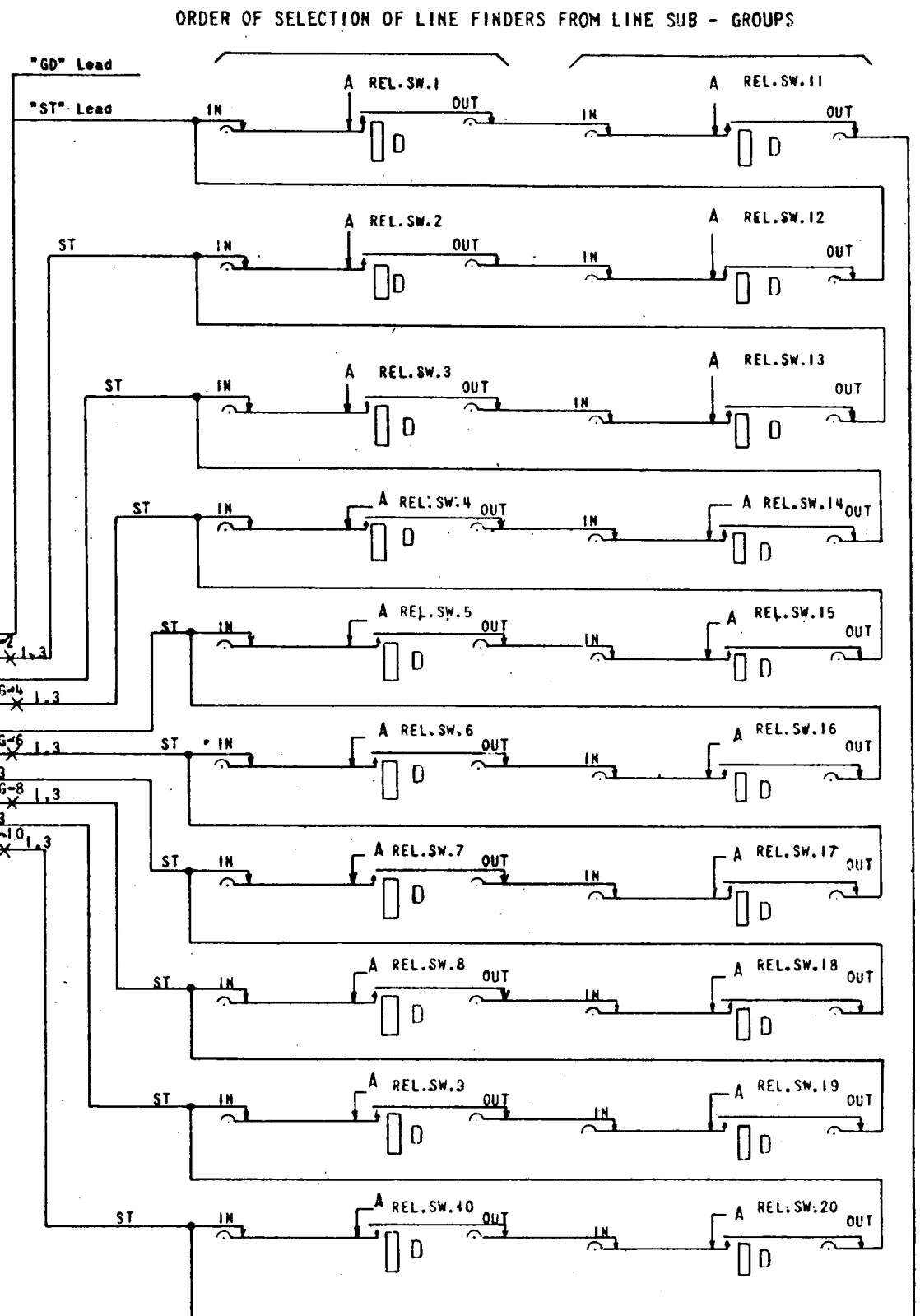
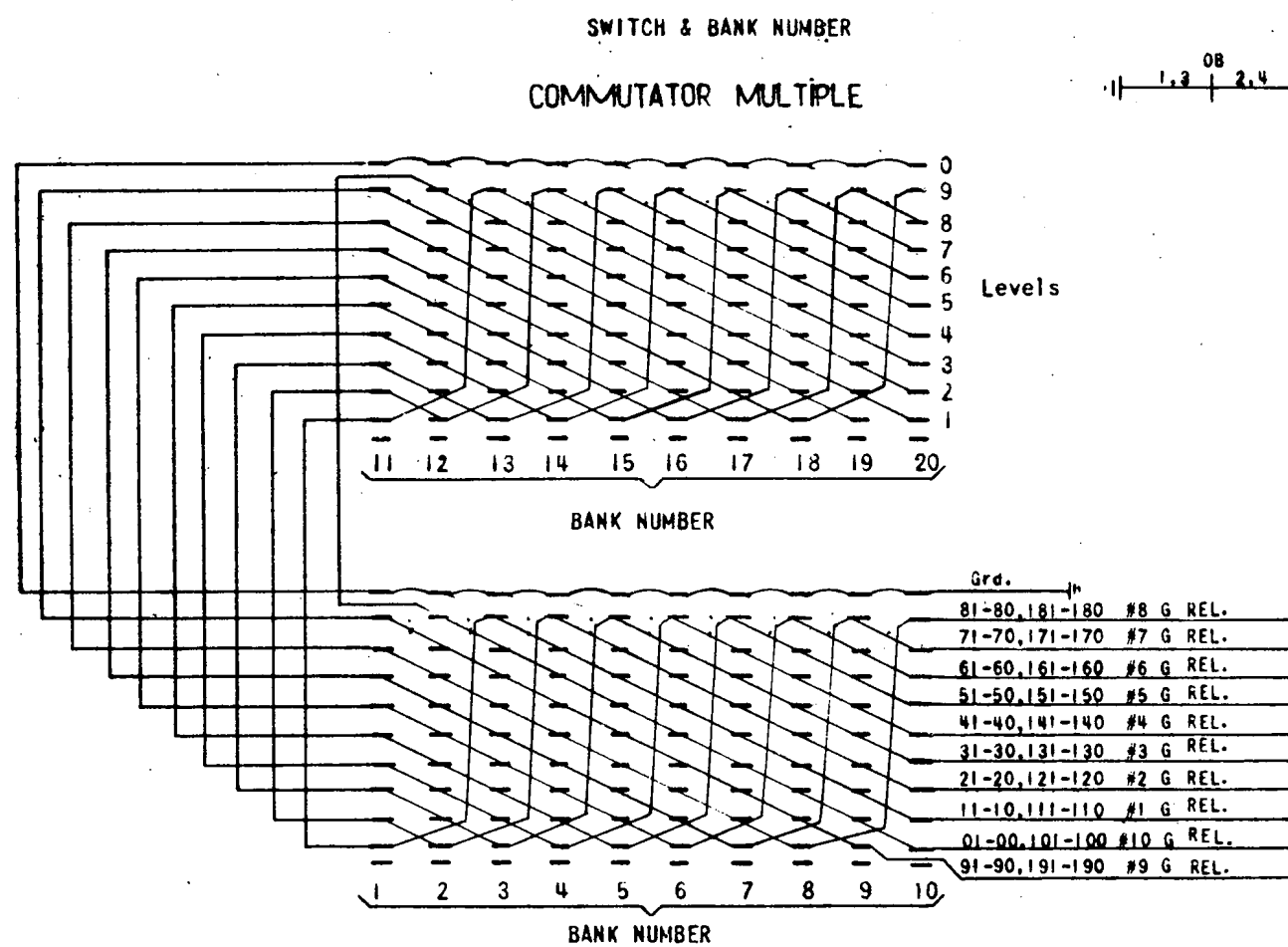
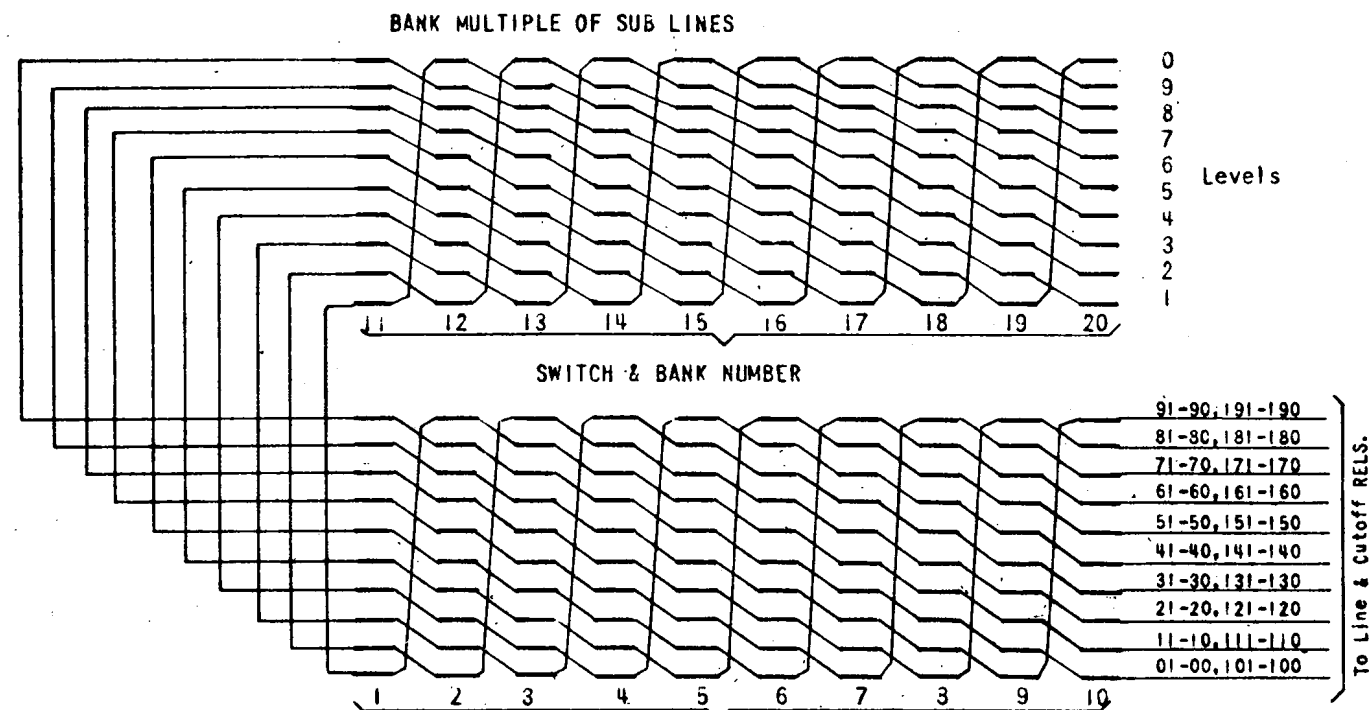
Sequence Chart For
SD-31526-01
10 Party Terminal Per Station
Local Connector

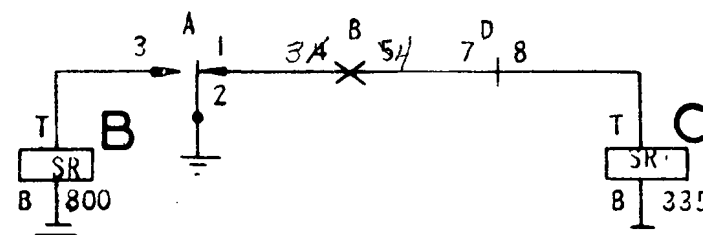
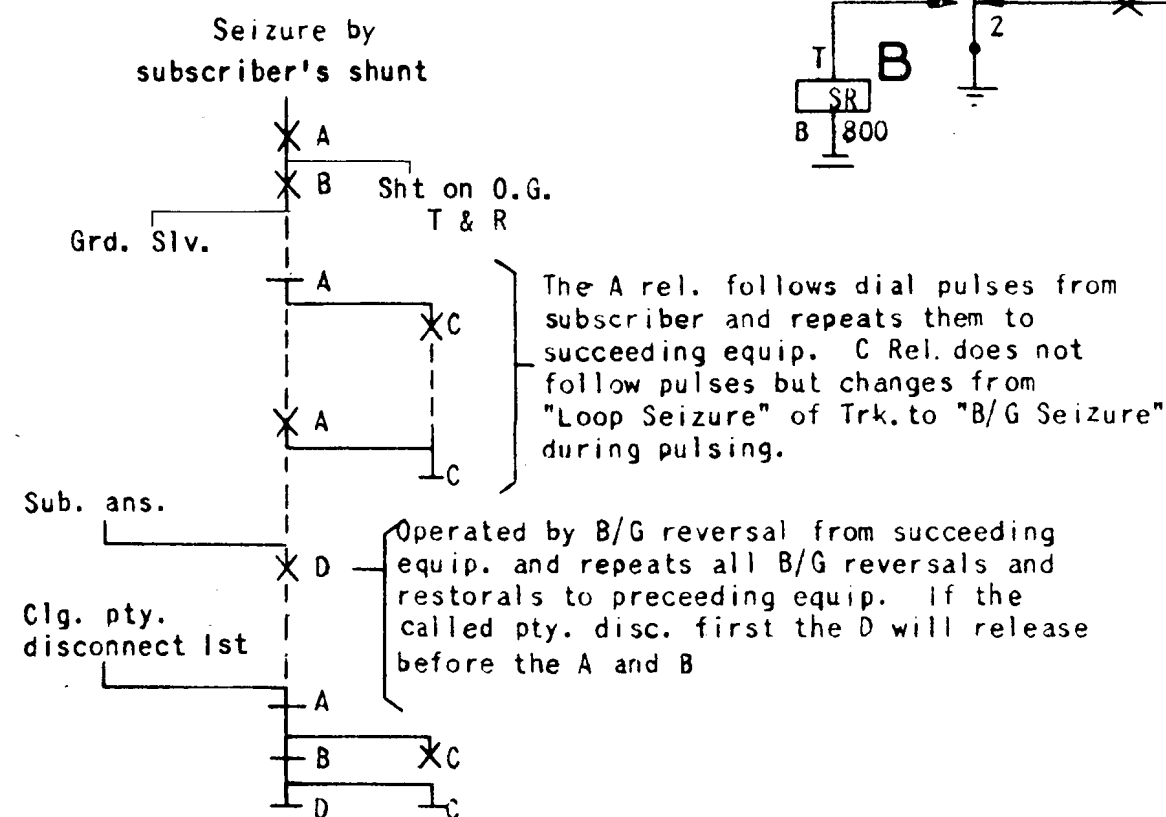
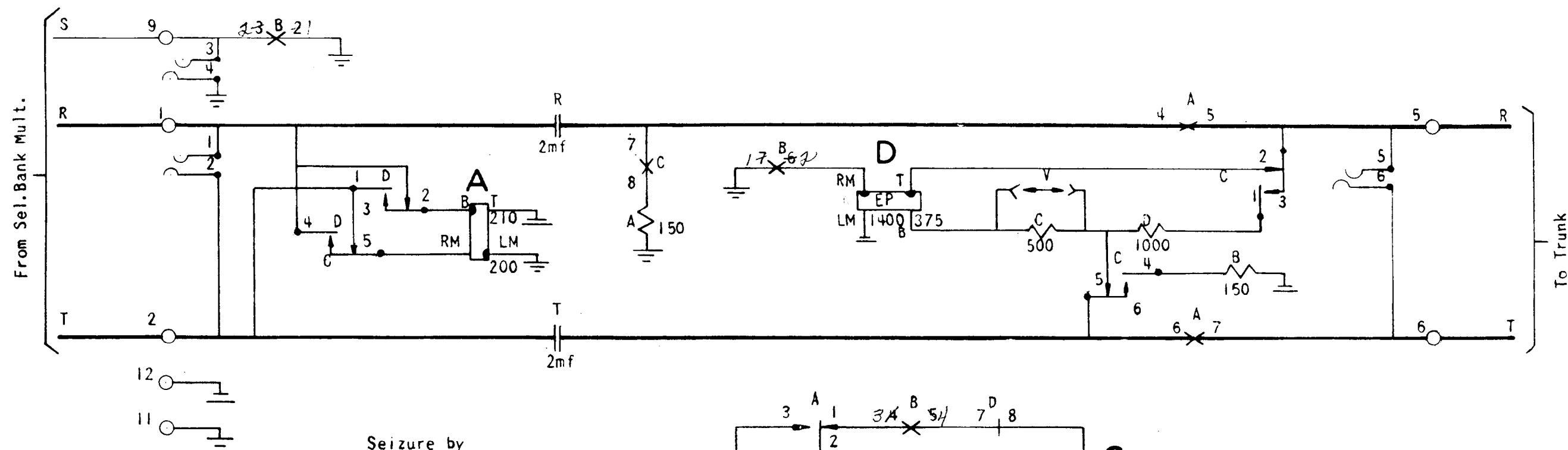
9/2/52

R.A.Ditlow

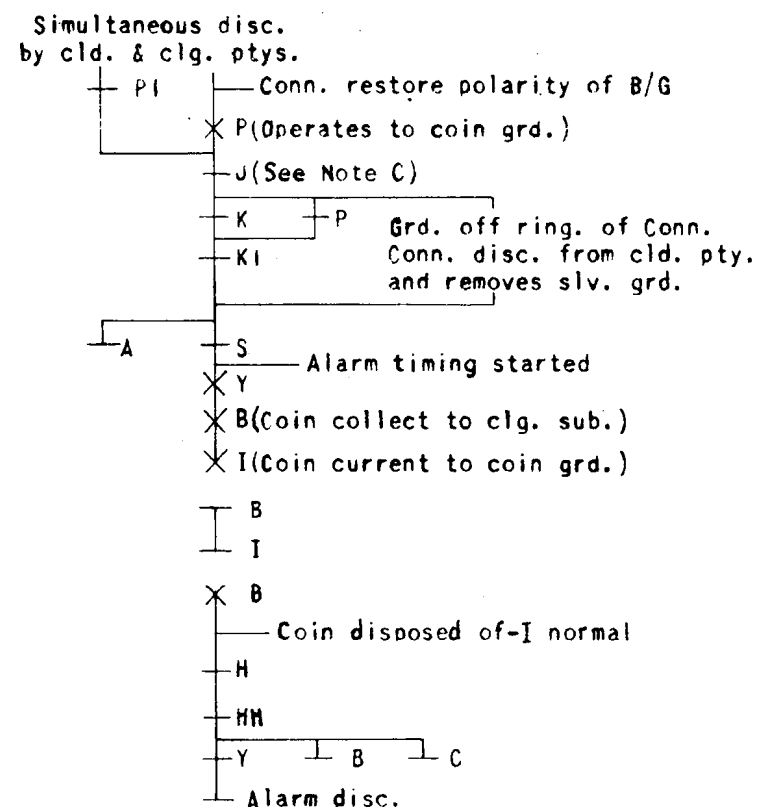
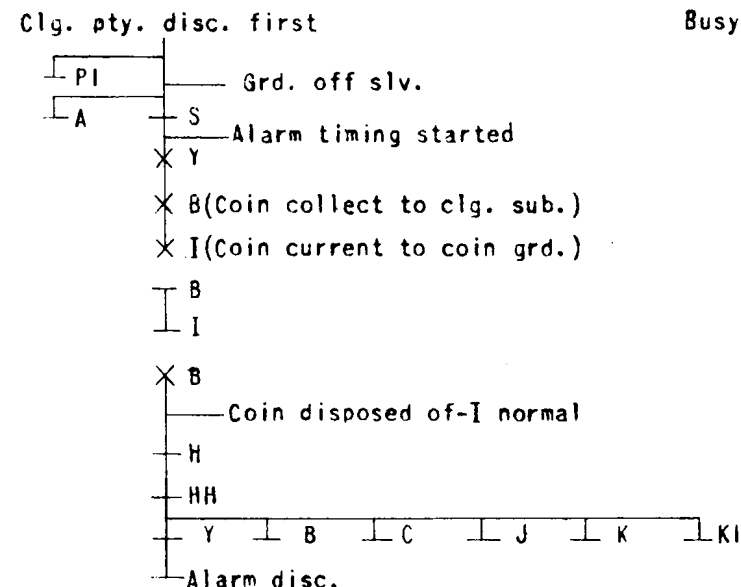
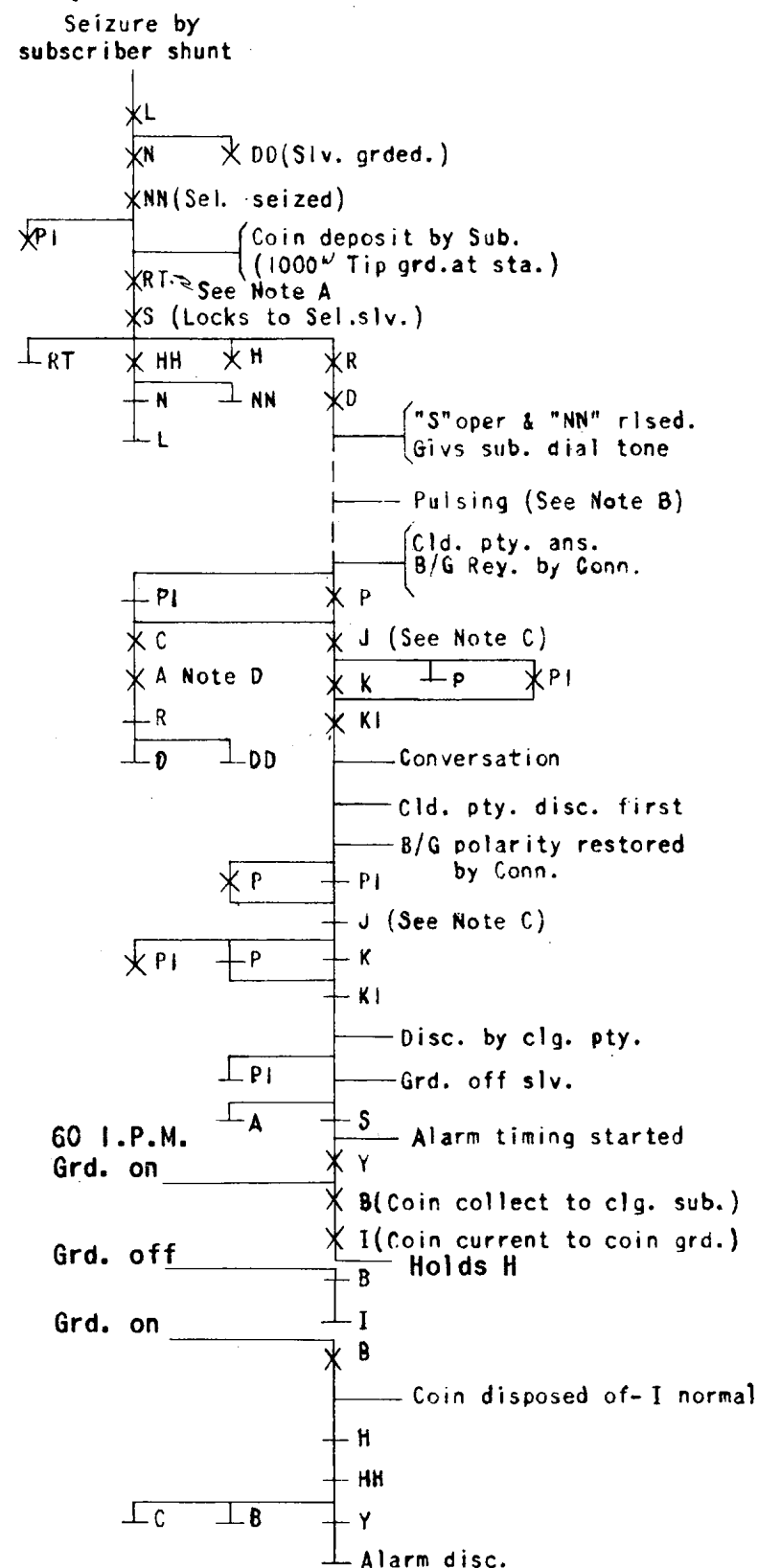
Issue 19-D

13



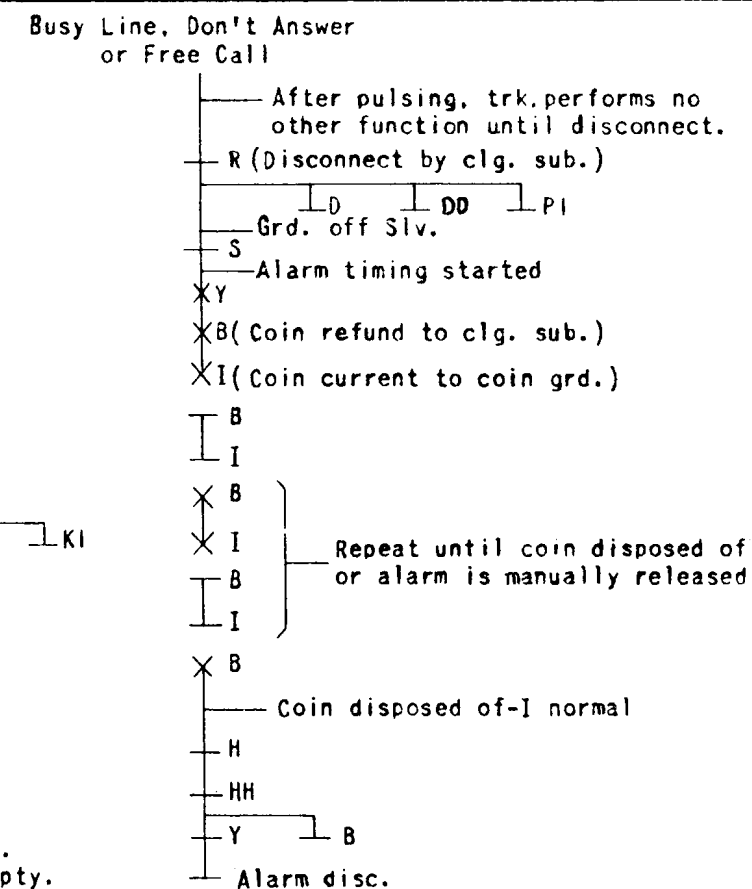


For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch & Sequence Chart For SD-31779-01 Outgoing Repeater Circuit			
9/2/52	R.A.Ditlow	Issue 12 D	15



Note D

The "A" rel. disconnects the bridged apparatus and series condensers and connects the Sub. straight through the trk. This improves transmission and provides better line balance to reduce noise.



Note A

The "BT" rel. where furnished will not operate from normal 1000 ohm Coin Grd. BT rel. will operate with RT if subscriber uses solid grd. on tip to avoid coin deposit. If BT operates call can proceed no further as S will be prevented from operating.

Note B

"R" rel. repeats sub. pulses to Selector. During pulsing D & DD will release on about the second pulse of each digit (to remove interaction between incoming and outgoing pulses through A & B condensers) and reoperate at end of digit.

Note C

The "J" rel. will operate and release as the polarity of battery & grd. on the T & R is reversed and restored by the succeeding ckt. This maintains the coin grd. on the grounded side of the line. If the coin grd. was allowed on the battery side of the line the call would lock to it when the polarity is reversed. The purpose of the Batt. reversal is to signal the trk. that the call shall be charged for. This is accomplished when the "C" rel. operates & locks. J Rlse by sht. ckt.

For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For

SD-31592-021

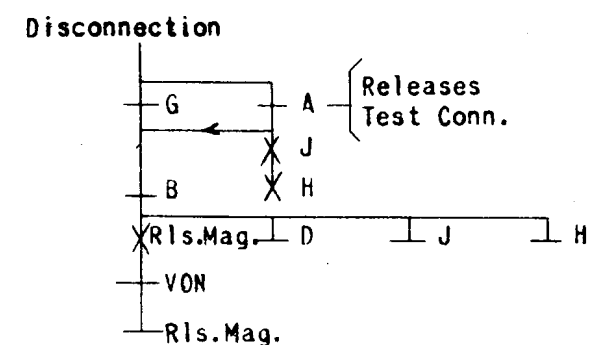
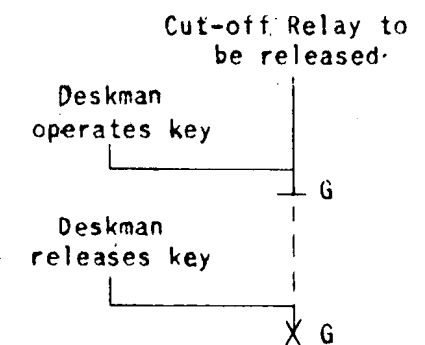
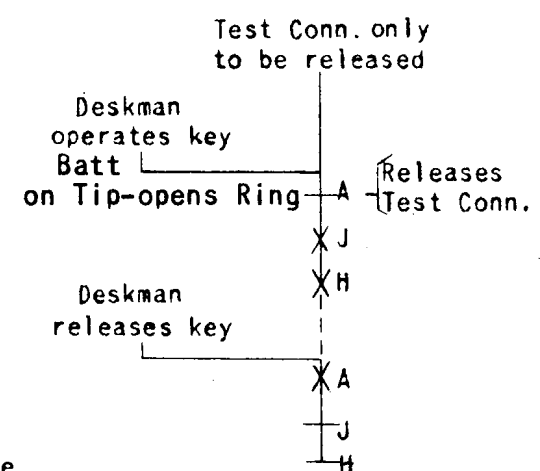
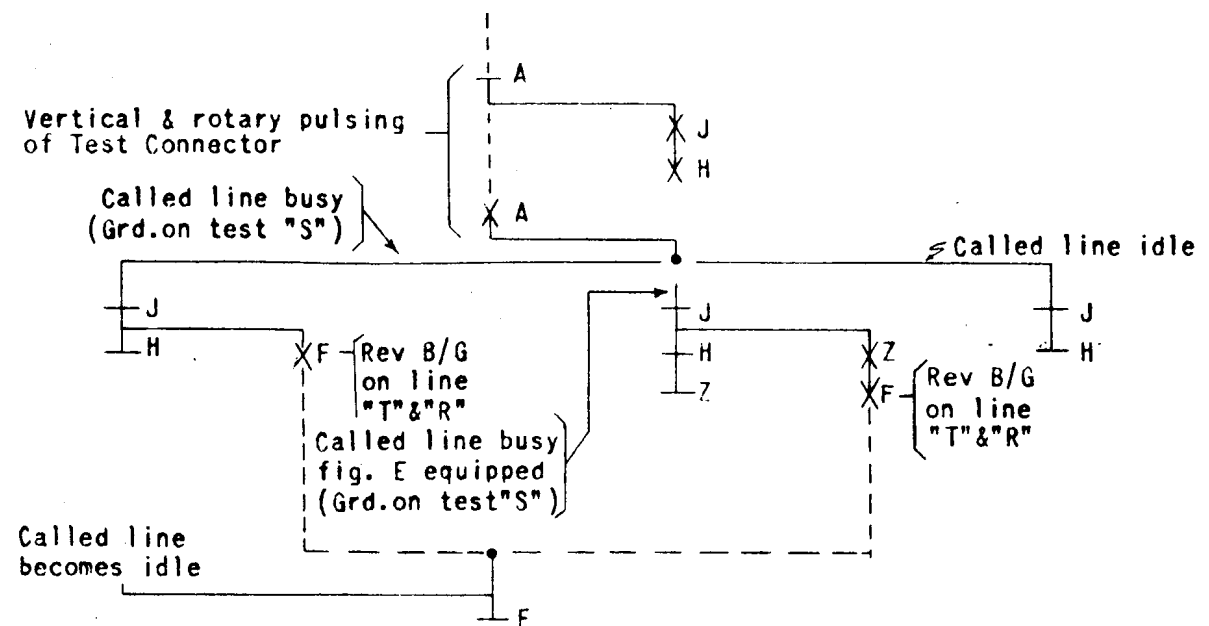
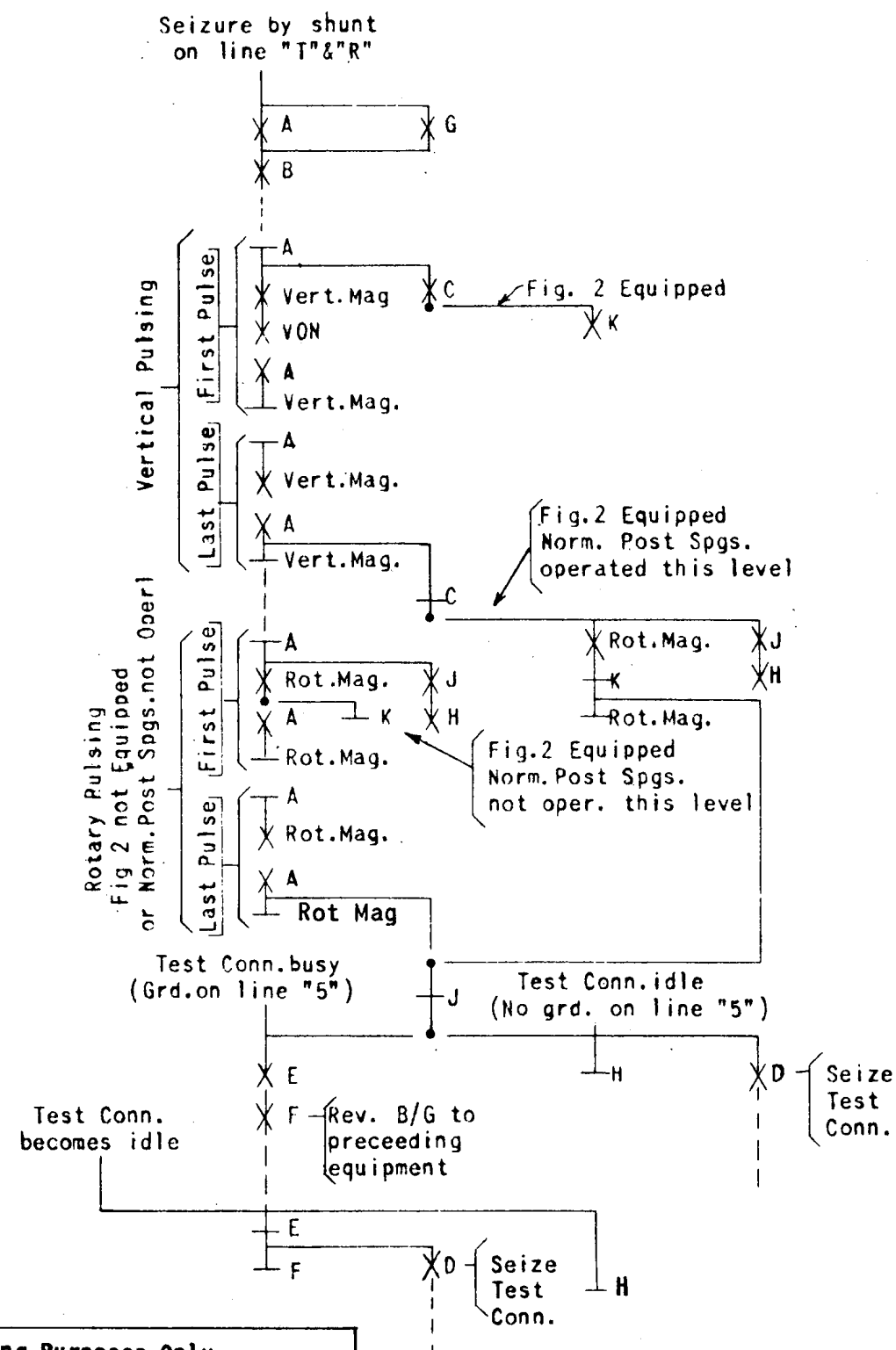
Coin Box Trunk

9/2/52

R.A. Ditlow

Issue 12-D

16



For Training Purposes Only

Number 1 Step By Step System

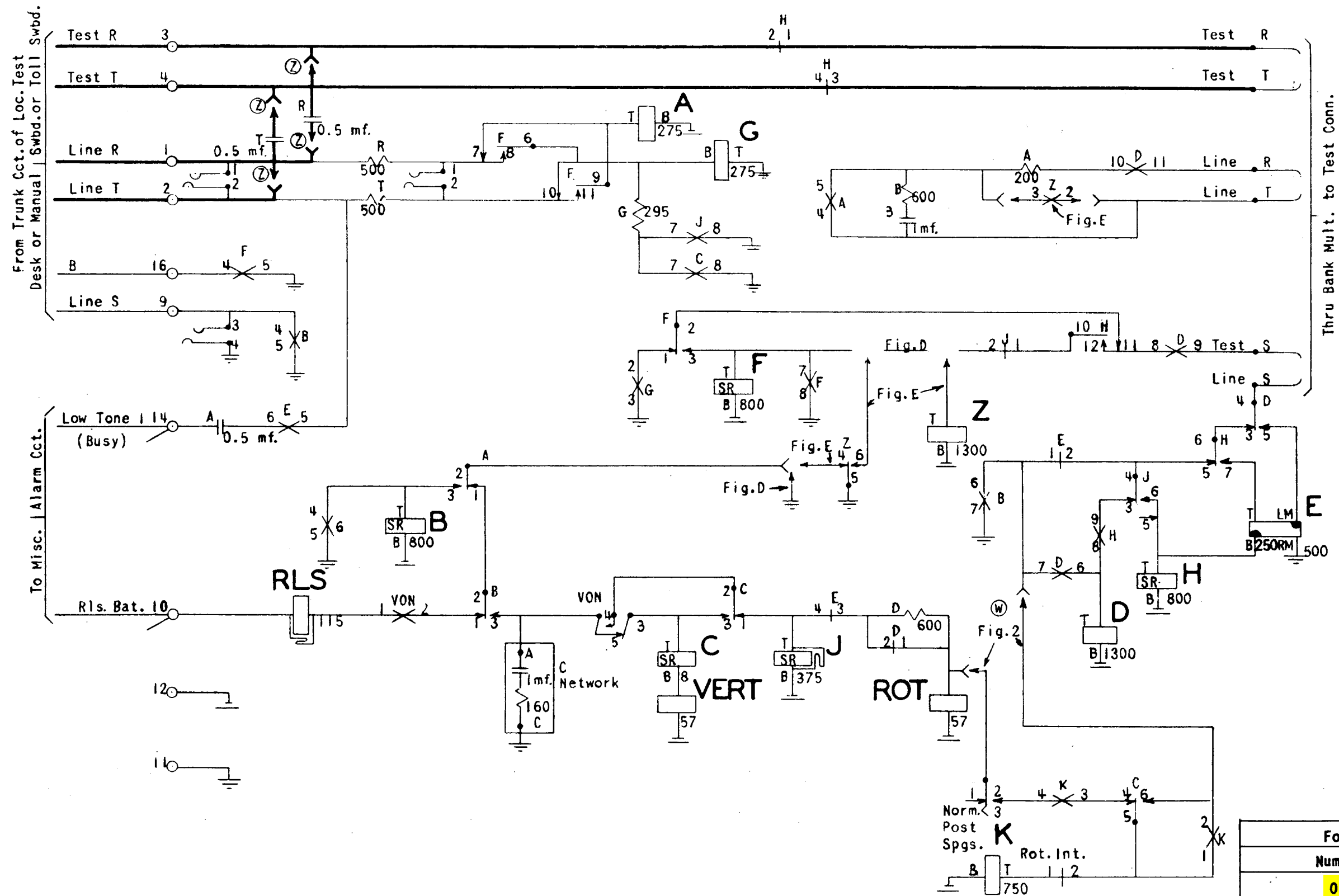
Sequence Chart For
SD-32007-01
Test Distributor

9/2/52

R.A. Ditlow

Issue 10-B

17

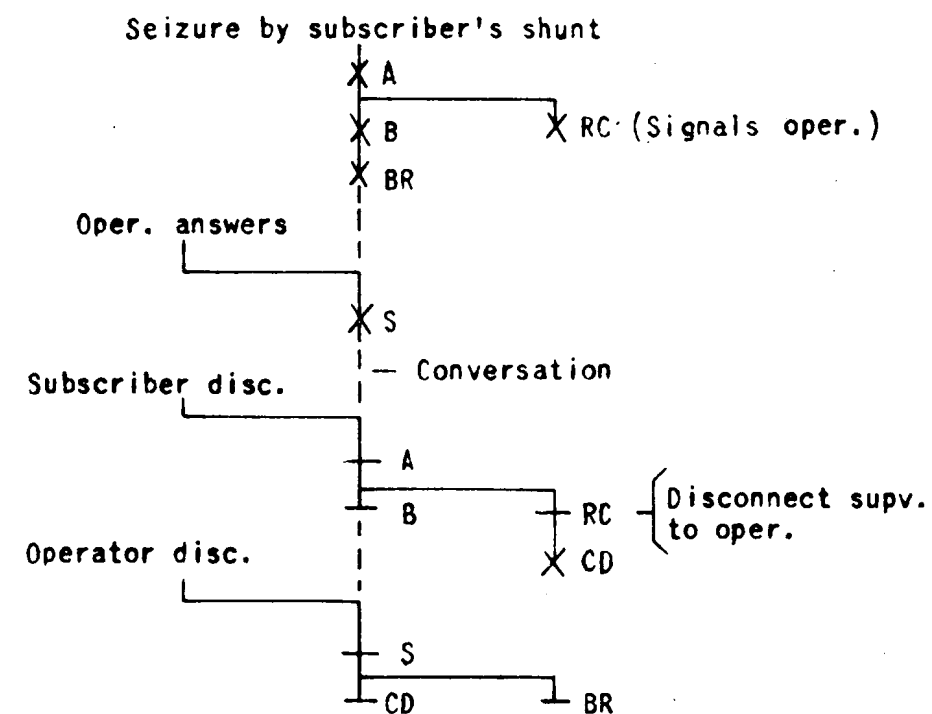
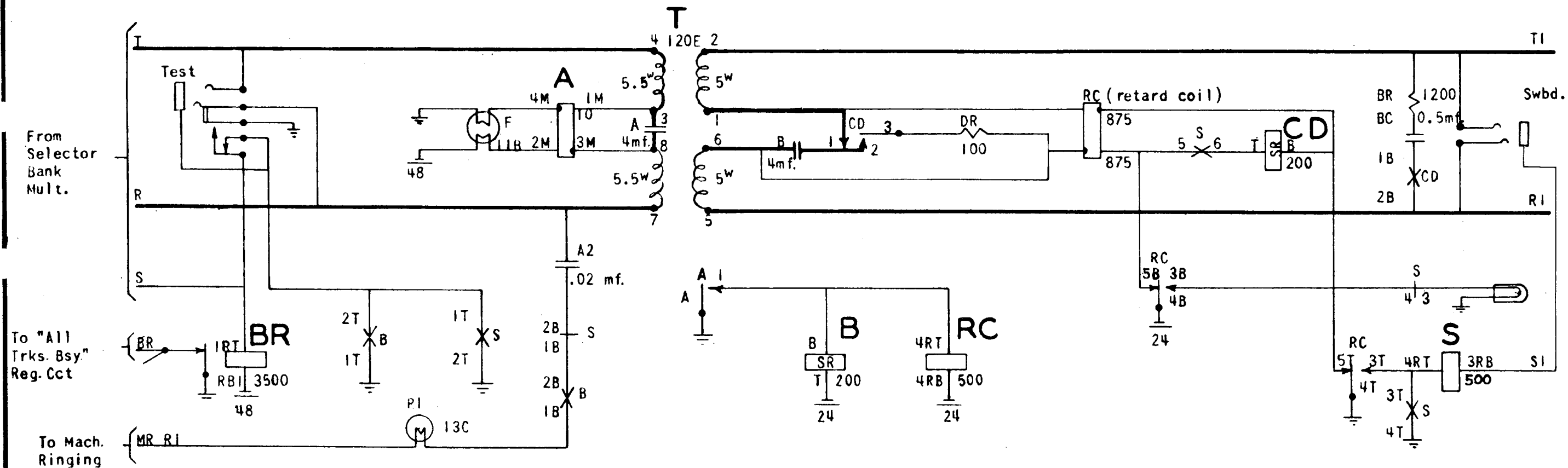


For Training Purposes Only
 Number 1 Step By Step System
 Operational Sketch For
 SD-32007-01
 Test Distributor

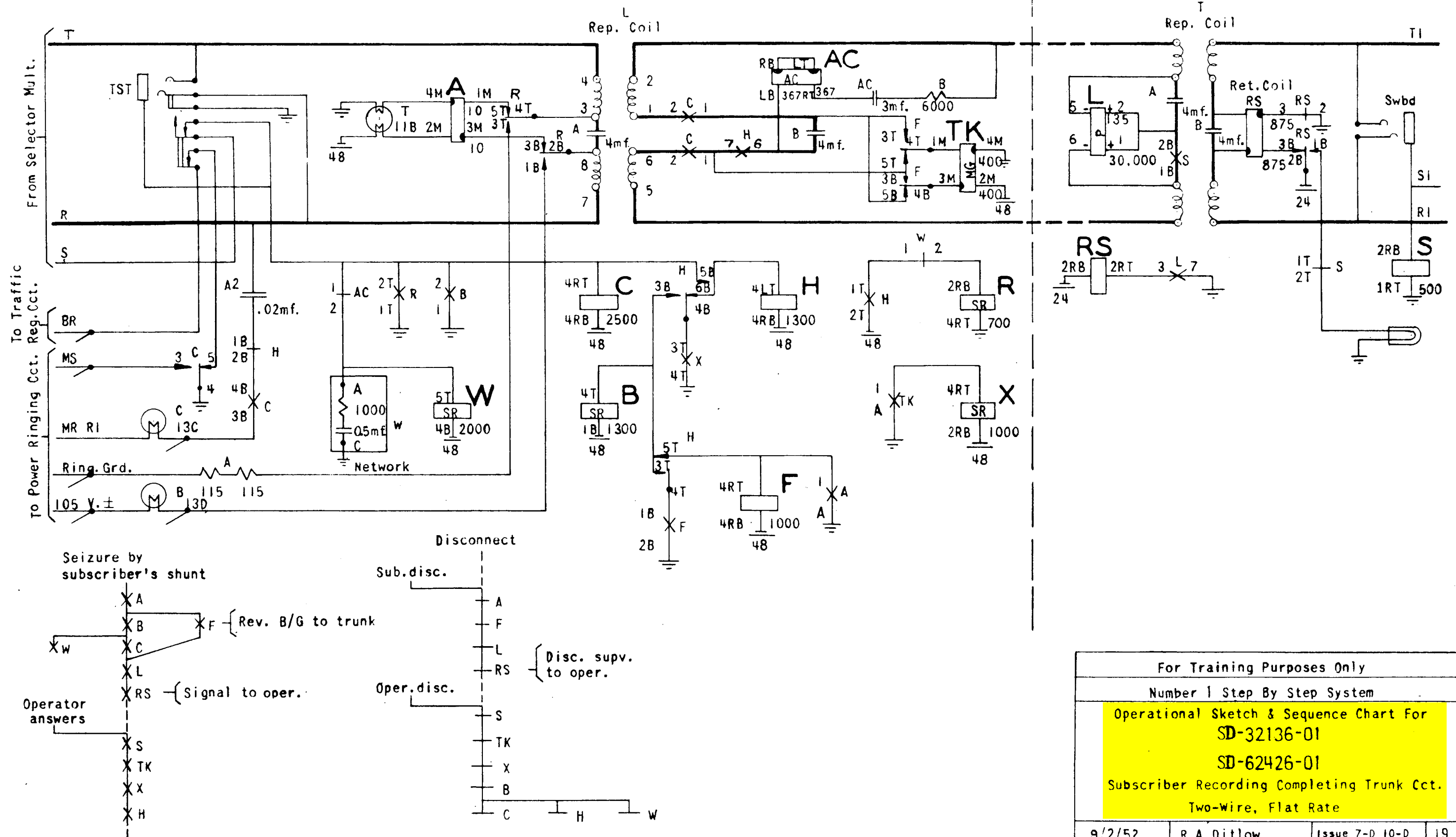
9/2/52

R.A. Ditlow

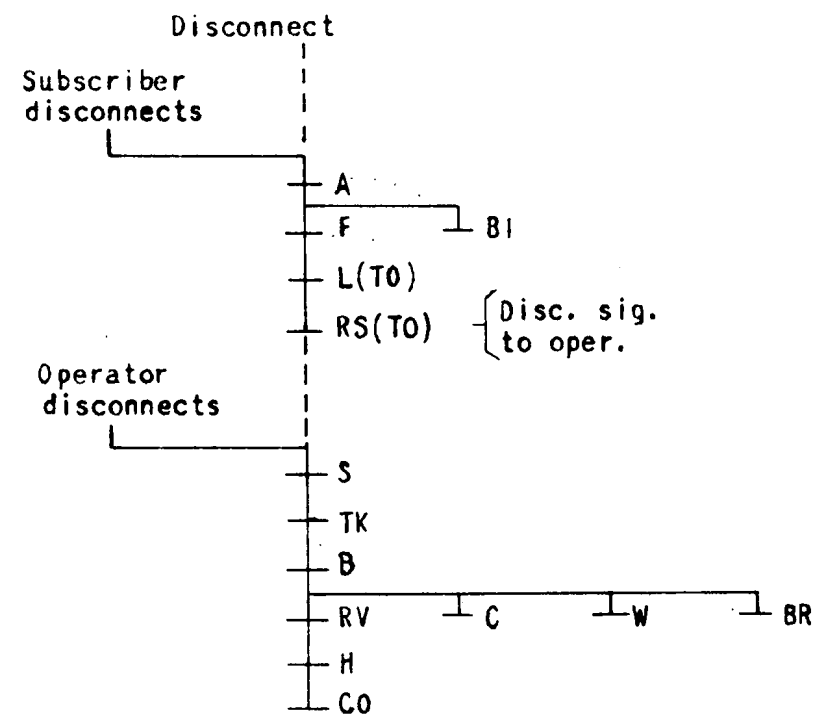
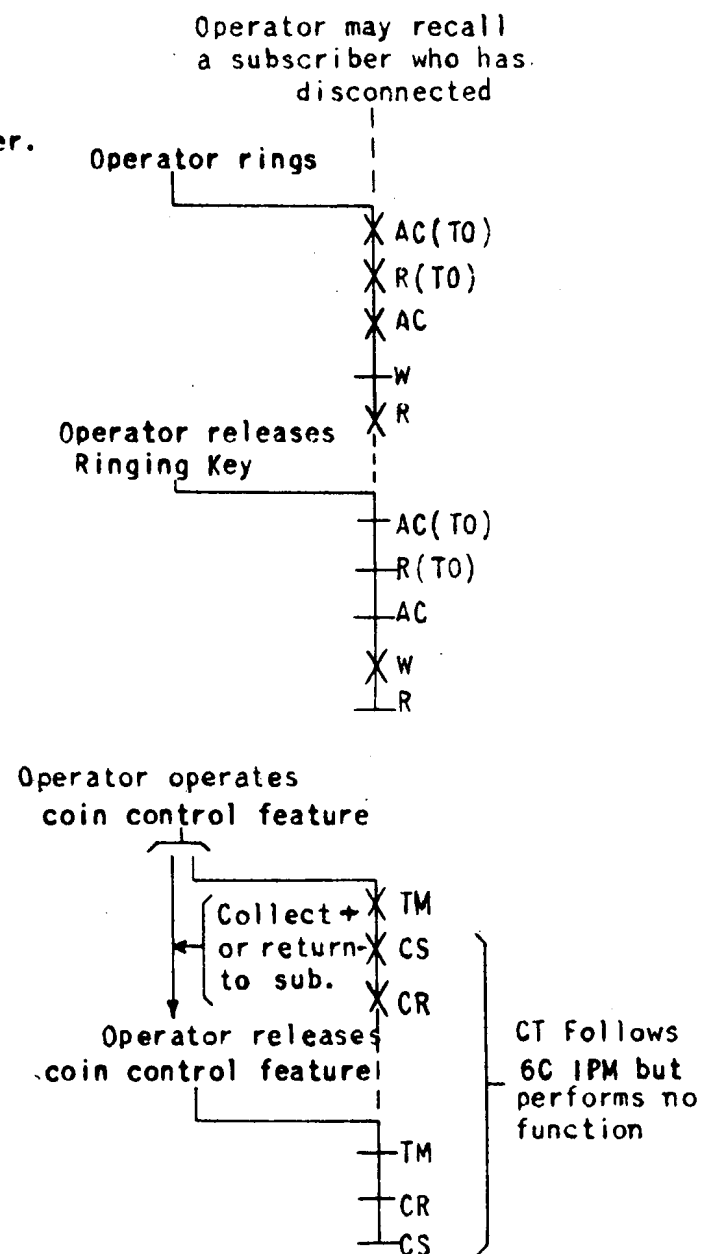
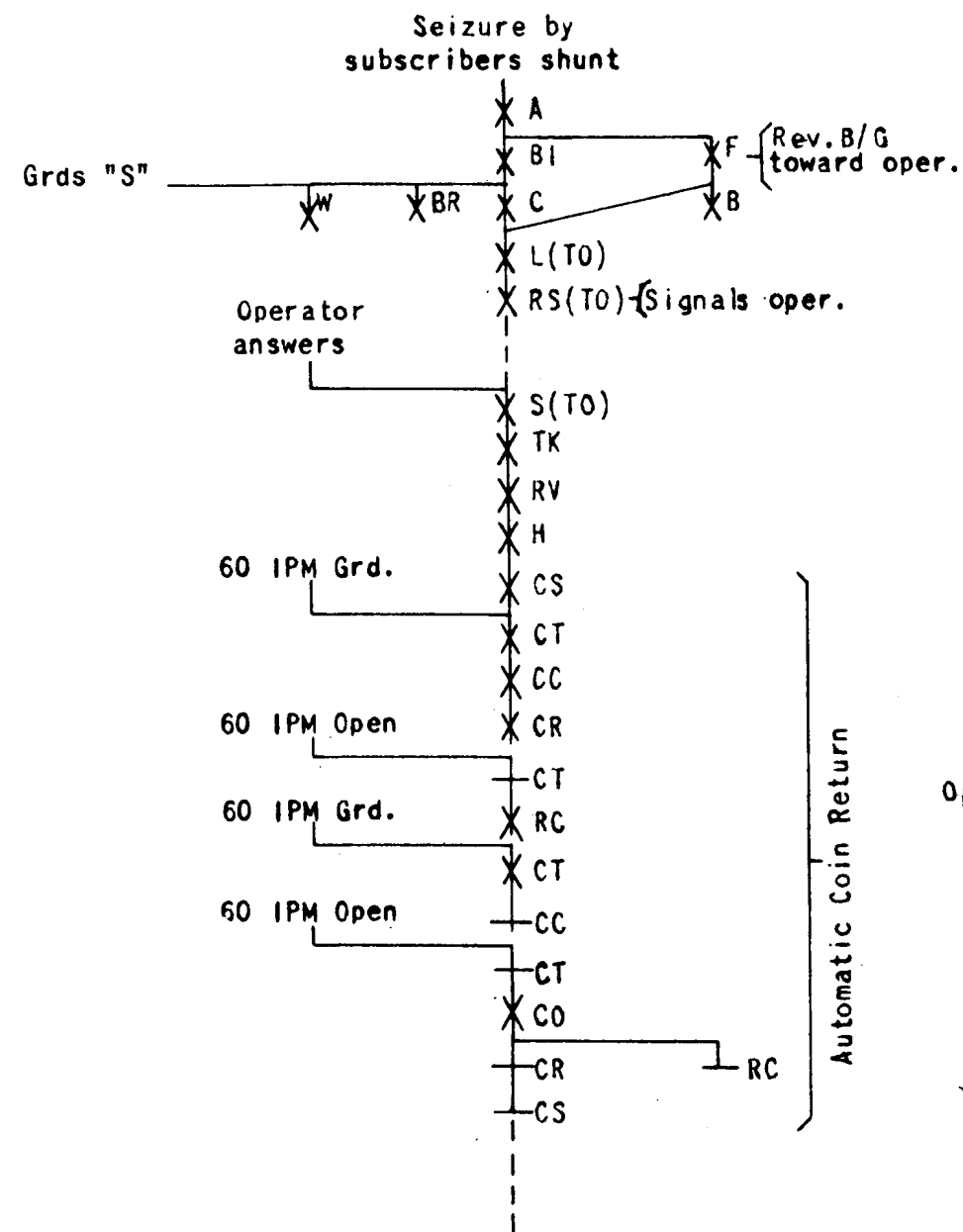
Issue 10-B 17



For Training Purposes Only		
Number 1 Step By Step System		
Operational Sketch & Sequence Chart For SD-61605-01		
Recording Completing Trunk Three wire		
9/2/52	R.A.Ditlow	Issue 12 D 18



For Training Purposes Only			
Number 1 Step By Step System			
Operational Sketch & Sequence Chart For			
SD-32136-01			
SD-62426-01			
Subscriber Recording Completing Trunk Cct.			
Two-Wire, Flat Rate			
9/2/52	R.A. Ditlow	Issue 7-D 10-D	19



For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For
Local Office

SD-31123-01

Toll Office

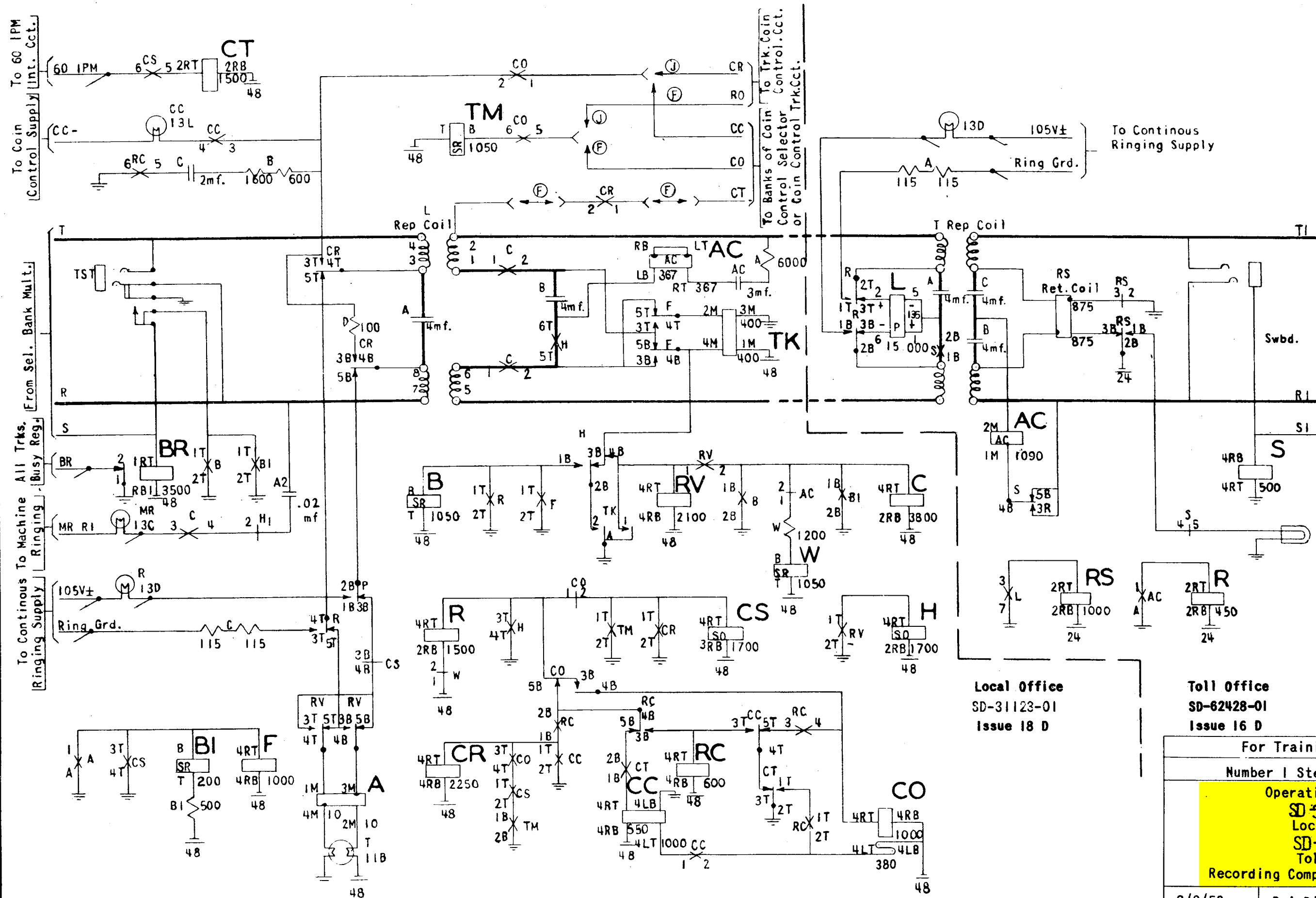
SD-62428-01(TO)

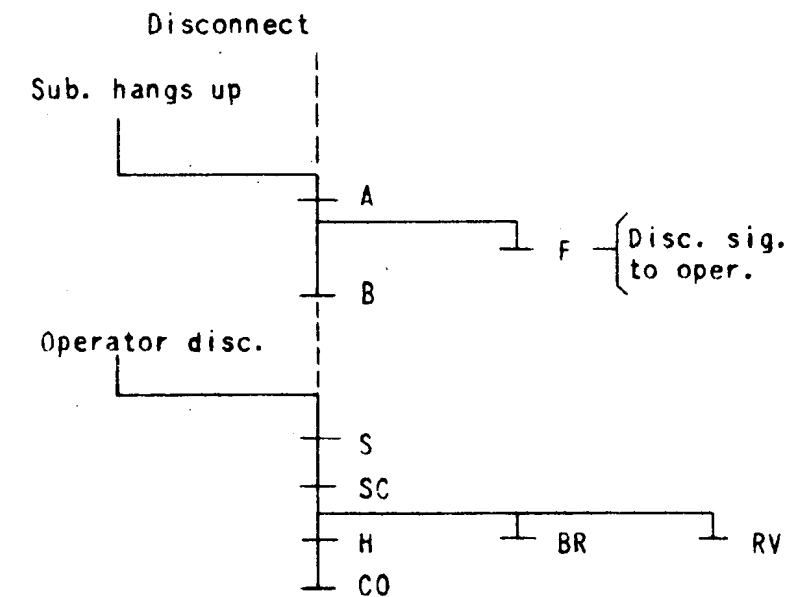
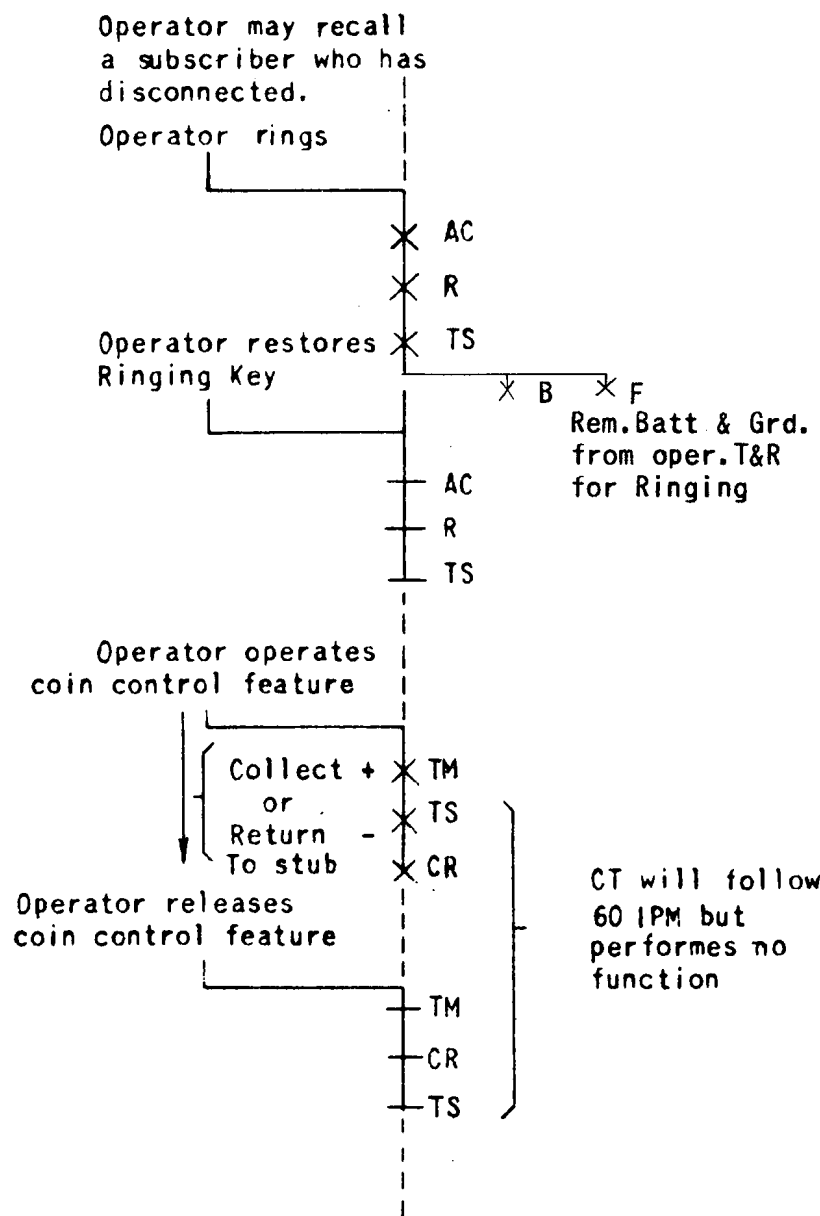
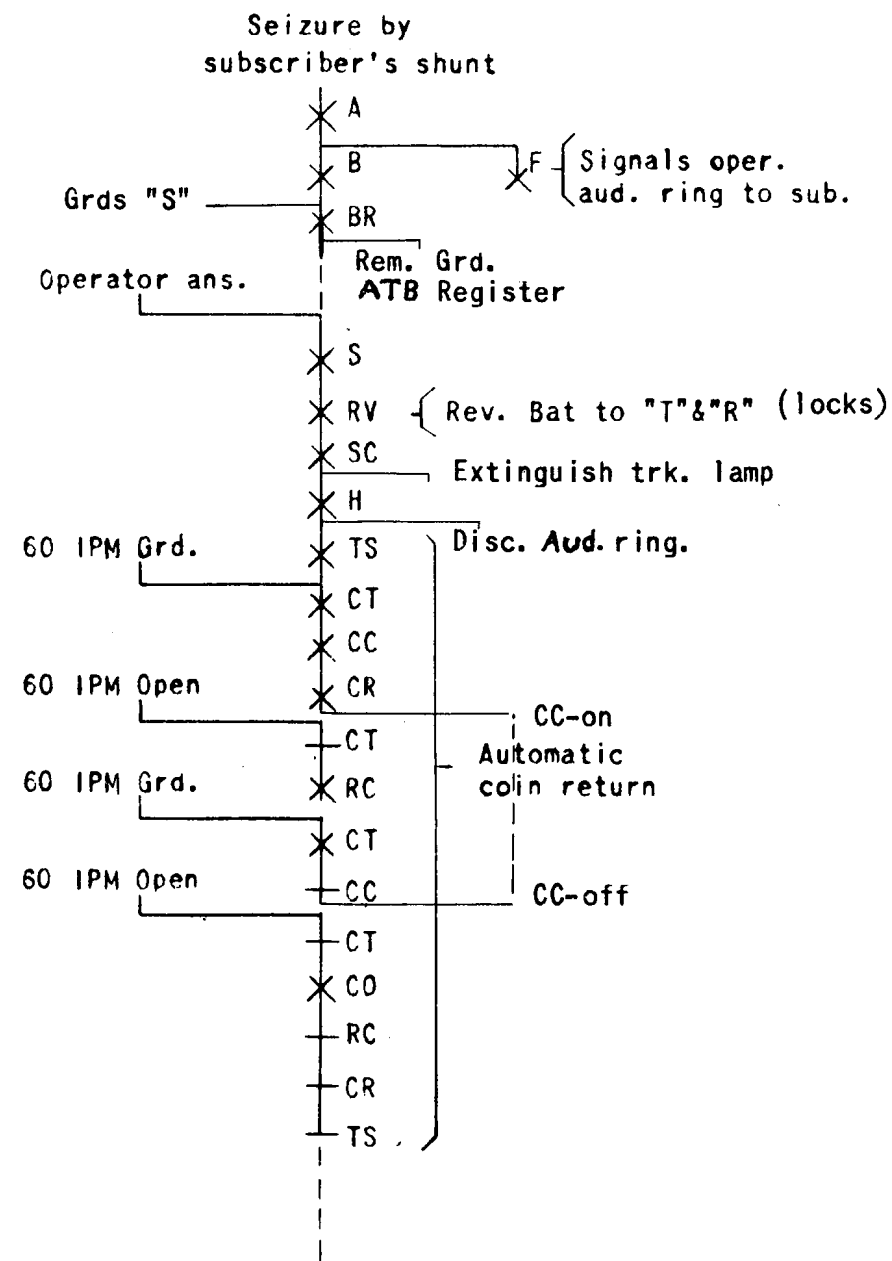
Recording Completing Trunk
Two Wire

9/2/52

R.A.Ditlow

Issue 18-D 16-D 20





CC Relay provides indirect control of CR
CT will oper. in ckt. when we do not want to oper. CR

For Training Purposes Only

Number 1 Step By Step System

Sequence Chart For
SD-62496-01

Subscriber Recording Completing Trunk
Coin Control

9/2/52

R.A. Ditlow

Issue 13 D

21

