Appendix D

General Rules Governing the Creation of the HM 5.0 Distance Files

General Rules Governing the Creation of the HM 5.0 Distance Files

1) Three distances are computed for each wire center (WC). They include WC to tandem WC to OS tandem, and WC to STP locations.

2) The SLED is the official data source for computation of the distance files.

3) BOC WCs home on the nearest BOC tandems and BOC STPs in the same state and LATA. There are some cases where LATA boundaries cross state lines. In this case, BOC WCs will first attempt to home on a tandem or STP in the same state and LATA where the WC is physically located. However, if tandems or STPs do not exist in the same state as the WC, then the WC will home on the nearest BOC tandem and STP pair.

4) Independent WCs will home on the nearest independent tandems and independent STPs in the same state, when such tandem/STP facilities are available. When independent tandem/STP facilities are not available, independent WCs will home on the nearest BOC wire center. In cases where independent wire centers home on BOC wire centers (any of which always have tandem, OS tandem, and STP connectivity), the CLLI of the homed-on BOC wire center will be tracked. LATA boundaries are meaningless when making ICO distance computations.

5) The set of eligible BOC tandems will be the same set used to compute distances in HM 3.1, with the following adjustments: 1) non-ILEC tandems will be removed from the HM 3.1 list of tandems and STPs; and 2) in most cases, at least one BOC tandem/STP pair will be placed in each LATA (in HM 3.1 there were some LATAs without BOC tandems or STPs). The set of eligible independent tandems will consist of all existing independent tandems in the study state.

6) BOCs will be limited to one OS tandem per state in small states (determined by population) and two OS tandems in large states. The set of OS tandems will be hand-selected from the list of current OS tandem locations in the study state. Independent tandem distances will be computed based on the current locations of all independent OS tandems.

7) BOCs will be limited to a single STP pair per LATA. The set of independent STPs is the set of all independent STP pairs in the study state. Embedded STP *pairing* relationships will be maintained for BOCs and independent companies. Note that embedded STP *homing* relationships are not maintained. LATAs without any STP pairs will be assigned a hand-selected pair of wire centers to serve as the STPs. Hand-selection is rare and only occurs in a few areas (i.e., Alaska, Puerto Rico, etc.).

8) There are several cases that must be specifically addressed when creating the distance database. Although these cases are discussed in items 3 and 4 above, they are individually presented here for clarity. The same set of rules apply whether determining distances from WCs to tandems, OS tandems, or STPs. These cases are identified immediately below.

- Case 1: For BOC companies, WC is in the same LATA, same state, and has the same OCN as at least one tandem. The action in this case is to determine the path length to the nearest tandem in this state and LATA, with the same OCN.
- Case 2: For BOC companies, WC is in a different LATA than any BOC tandems in the state. In this case, determine the path length to the nearest BOC tandem in this state. If such a WC belongs to a different BOC than the predominant BOC in the state, the same rule applies.
- Case 3: For ICOs, the WC has a different OCN than any tandem in the state. The action in this case is to determine the path length to the nearest BOC wire center in this state and track the CLLI code of the homed-on BOC wire center.
- Case 4: For ICOs, the WC is in the same state and has the same OCN as at least one tandem. The action in this case is to determine the path length to the nearest tandem in this state with the same OCN.

9) Distances between facilities are computed as right angle runs.

10) WC to STP distances will be computed as the total distance from the WC to each STP in the pair.

11) In cases where one member of the STP pair lies outside of the study state, the distance to the one STP in the state will be doubled as a proxy for the out-of-state STP. Proxy STP pairs will only be used in cases where an actual STP pair is unavailable.

12) Tandem to tandem distances will be computed as a fully-interconnected mesh network of all tandems with the same OCN. BOC tandems will interconnect within LATA boundaries.

Distance File Contents

The following calculated and non-calculated information will be contained in the state-specific distance files:

Calculated Information

1) The WC to tandem homing arrangements that result from the application of the rules defined in this memo. This information is necessary when computing interoffice ring distances.

2) The WC to tandem distance.
3) The WC to STP (A-link) distance.
4) The WC to OS tandem distance.
5) The STP to STP (C-link) distance.
6) The number of tandems by company code.
7) The number of STP pairs by company code.
8) The tandem to tandem distance for a fully-interconnected mesh of tandems by company code.
9) The total tandem to STP (A-link) distance by company code.

Non-Calculated Information

Non calculated information include the NECA data that is necessary for interoffice ring calculations. These data are included for each CLLI in the study state.

1) Vertical coordinate
2) Horizontal Coordinate
3) NECA Company code

Additional Information

The distance file calculations require the following database fields, which are taken from the indicated source.

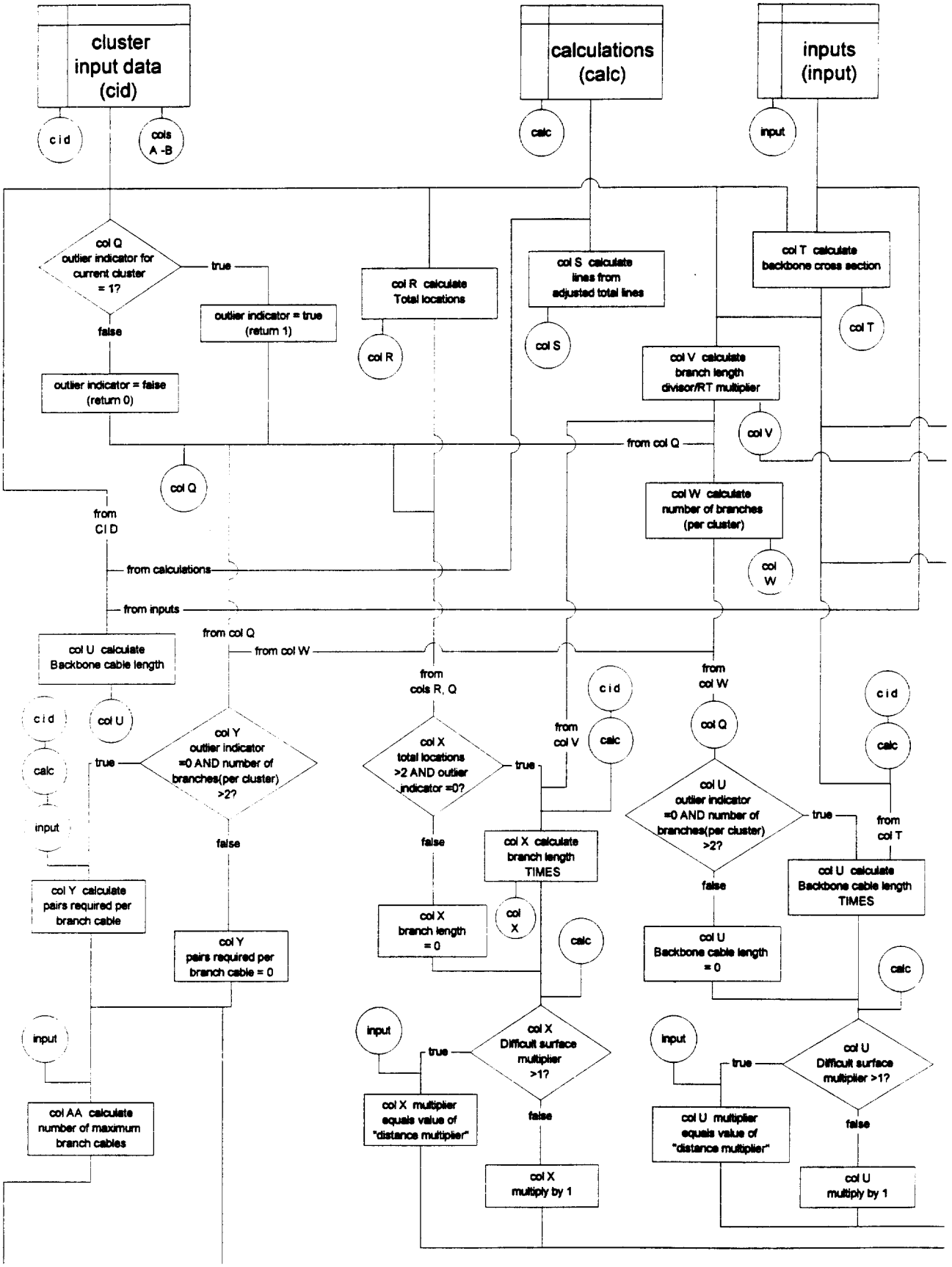
	Field	Source
-	LATA	SLED
-	OCN	SLED
-	CLLI	SLED
-	STATE	SLED
-	VERTICAL COORDS	SLED
-	HORIZONTAL COORDS	SLED
-	STP PAIRS	LERG
-	OS TANDEM INDICATOR	SLED
-	LOCAL TANDEM INDICATOR	SLED
-	STUDY STATE	USER INPUT
-	BOC OCN	USER INPUT

Appendix E

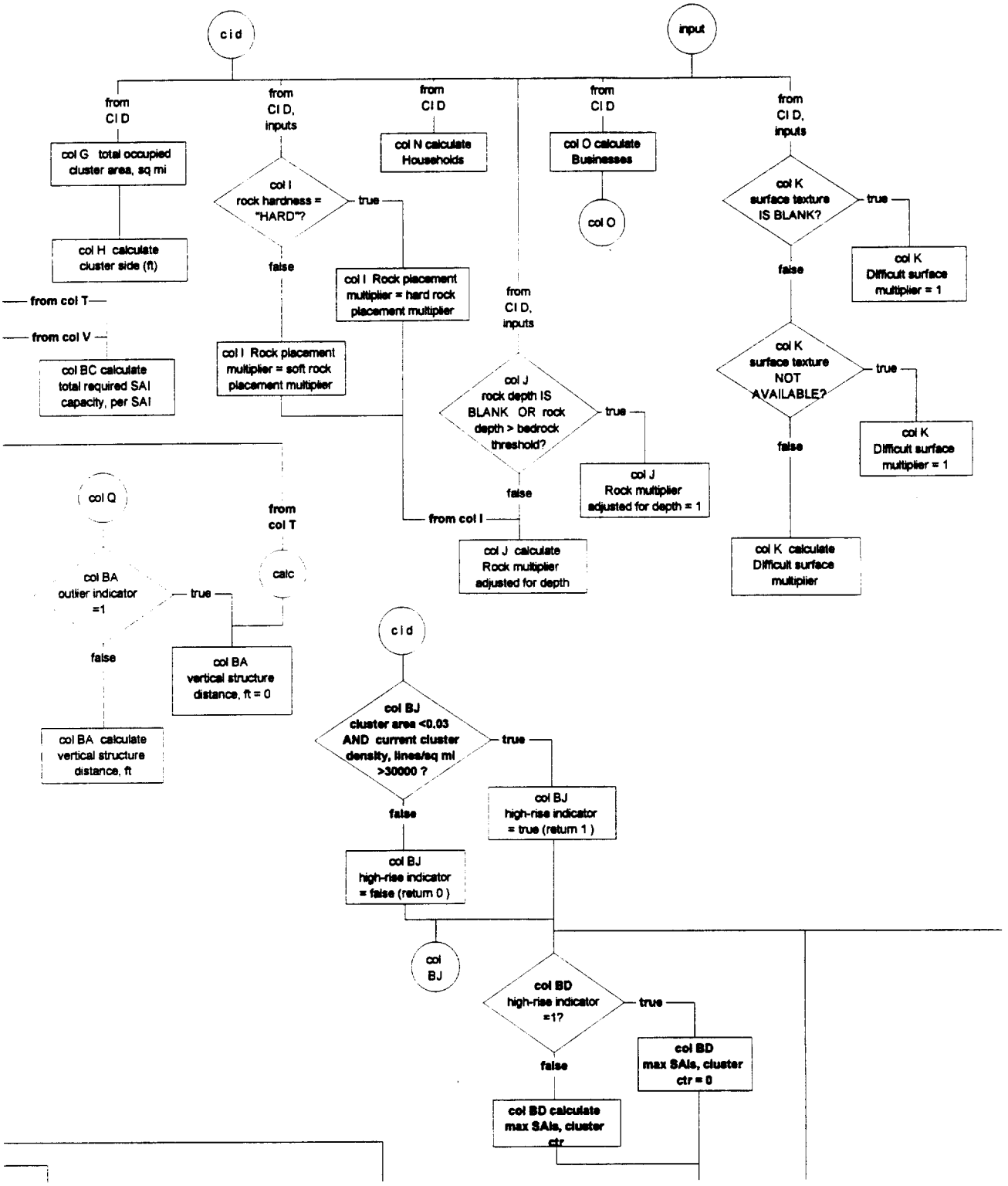
HM 5.0 Logic Modules Flow Charts

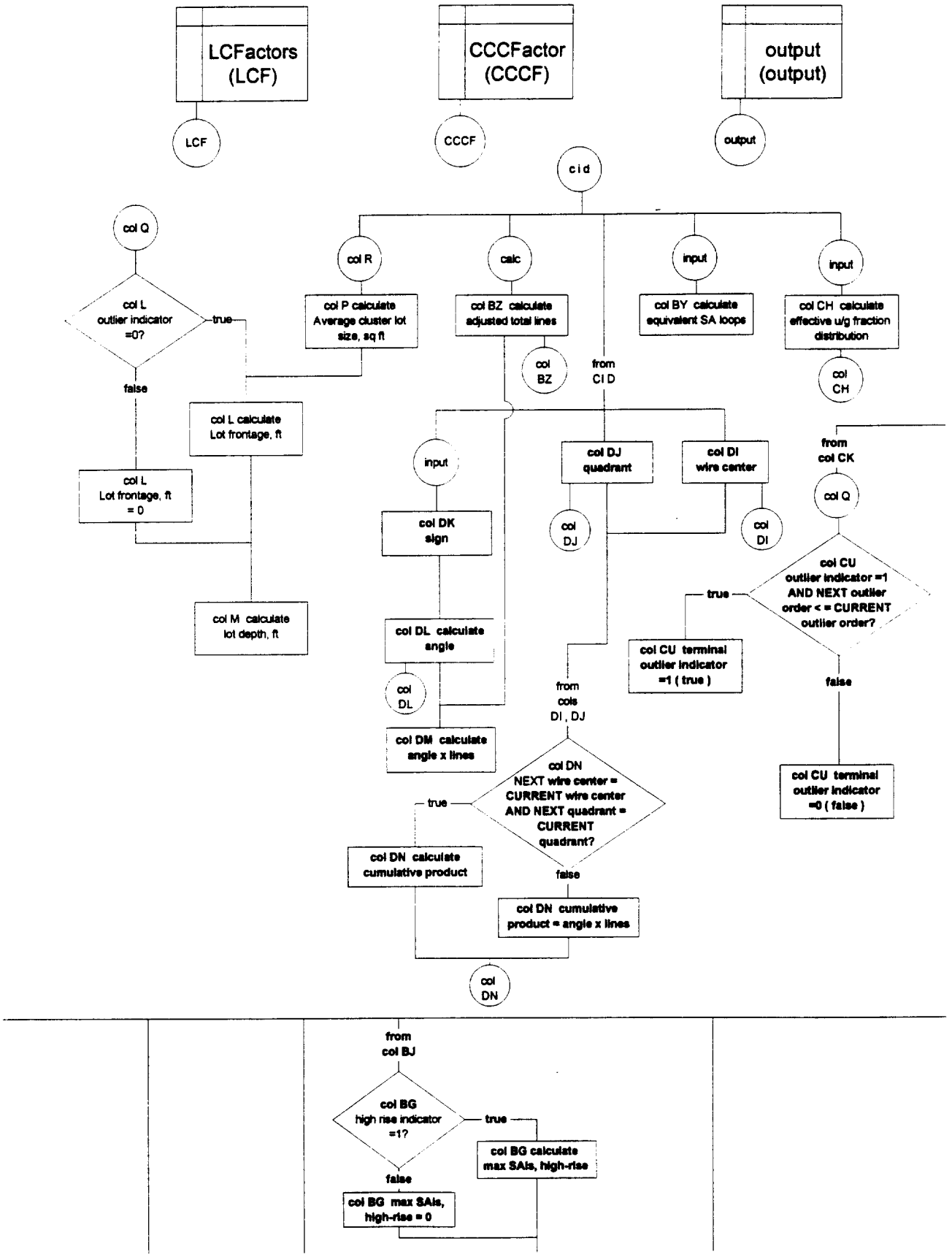
HM 5.0
Distribution Module
Flows

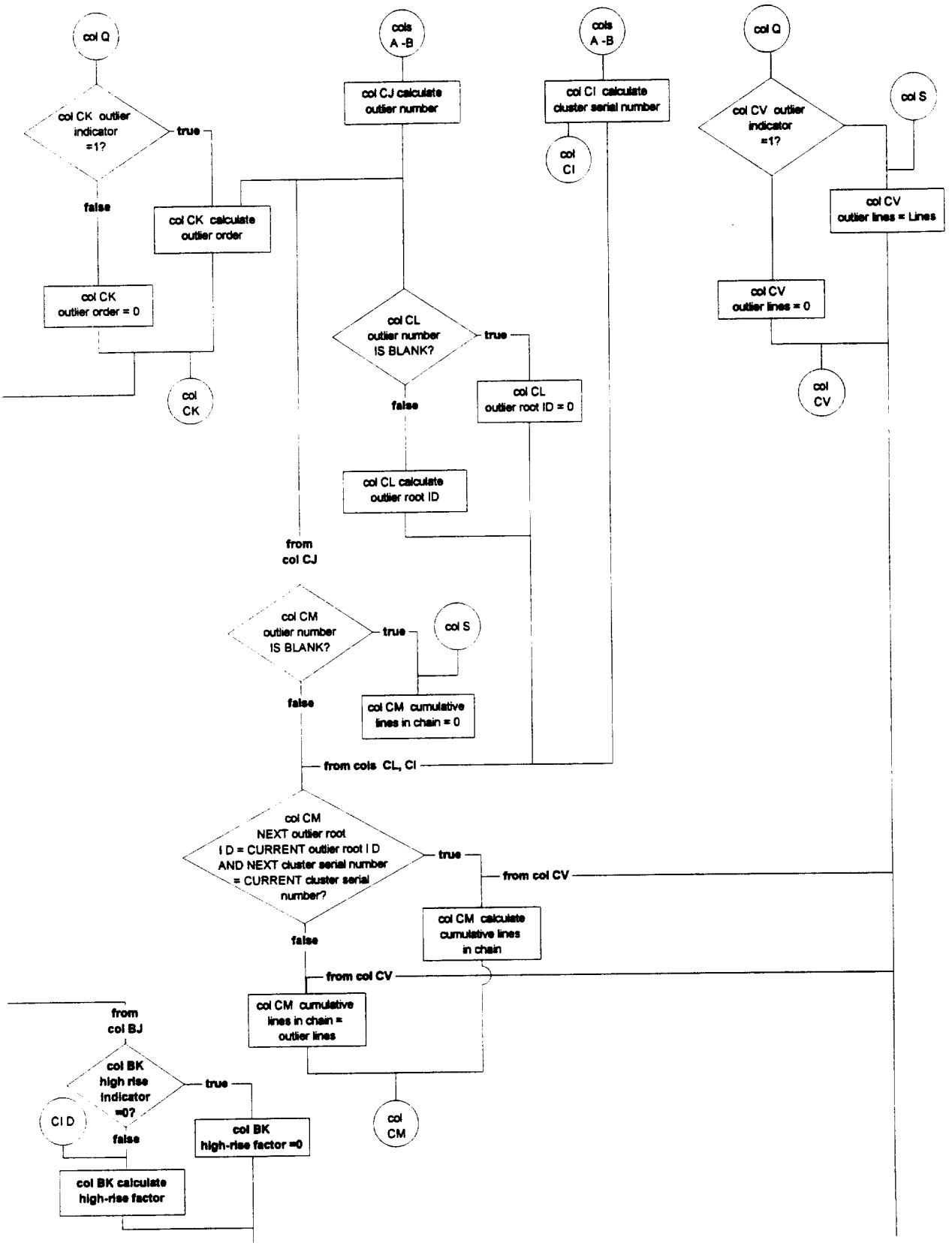
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

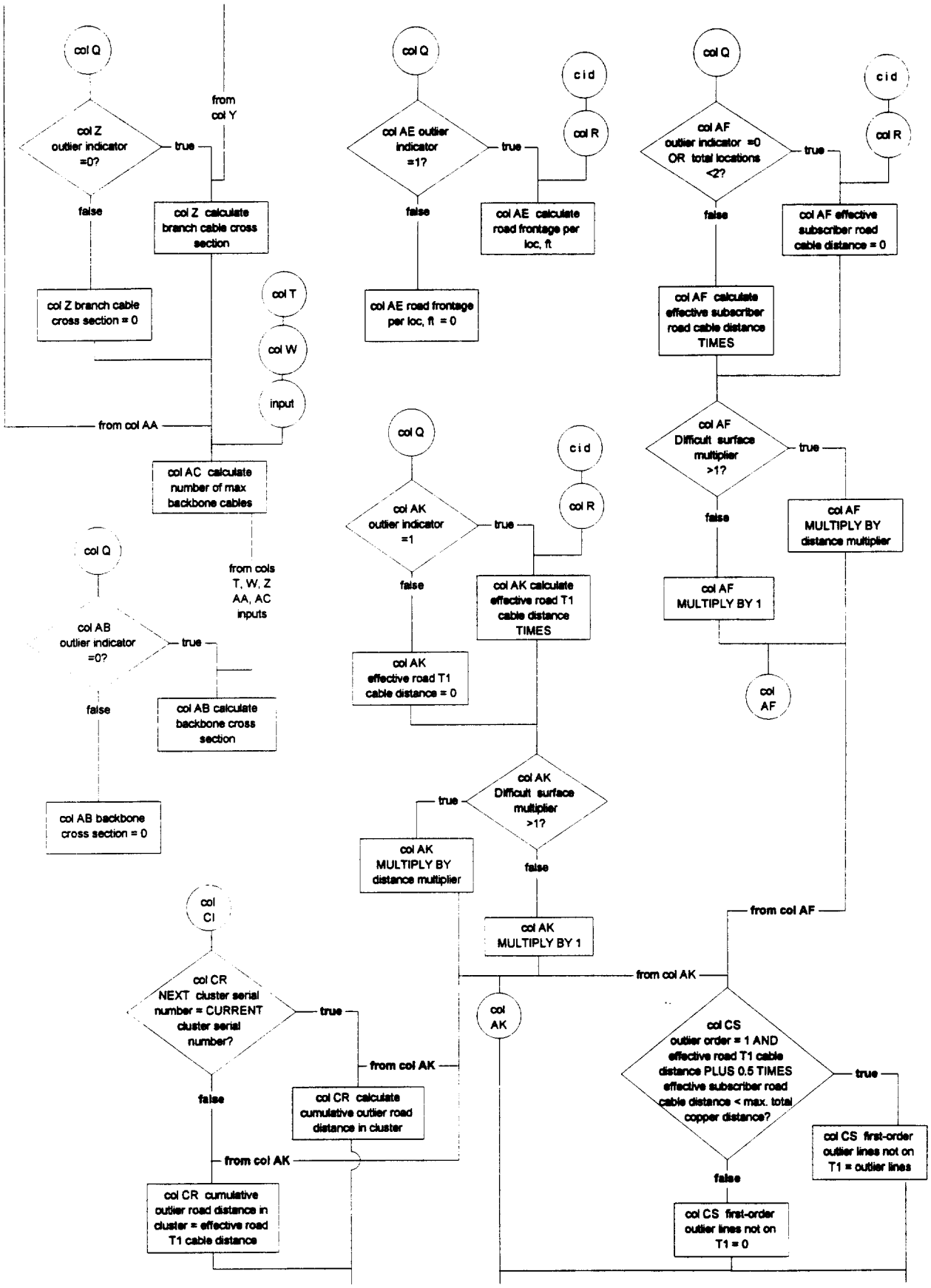

cluster input data (cid)
calculations (calc)
inputs (input)
cid
cols A -B
calc
input
col Q outlier indicator for current cluster = 1?
true
false
outlier indicator = true (return 1)
outlier indicator = false (return 0)
col Q
col R calculate Total locations
col R
col S calculate lines from adjusted total lines
col S
col T calculate backbone cross section
col T
col V calculate branch length divisor/RT multiplier
col V
from col Q
col W calculate number of branches (per cluster)
col W
from CID
from calculations
from inputs
from col Q
from col W
col U calculate Backbone cable length
col U
col Y outlier indicator =0 AND number of branches(per cluster) >2?
col Y calculate pairs required per branch cable
col Y pairs required per branch cable = 0
col AA calculate number of maximum branch cables
from cols R, Q
col X total locations >2 AND outlier indicator =0?
col X calculate branch length TIMES
col X branch length = 0
col X
from col V
col X Difficult surface multiplier >1?
col X multiplier equals value of "distance multiplier"
col X multiply by 1
from col W
col U outlier indicator =0 AND number of branches(per cluster) >2?
col U Backbone cable length = 0
from col T
col U calculate Backbone cable length TIMES
col U Difficult surface multiplier >1?
col U multiplier equals value of "distance multiplier"
col U multiply by 1

Distribution Module

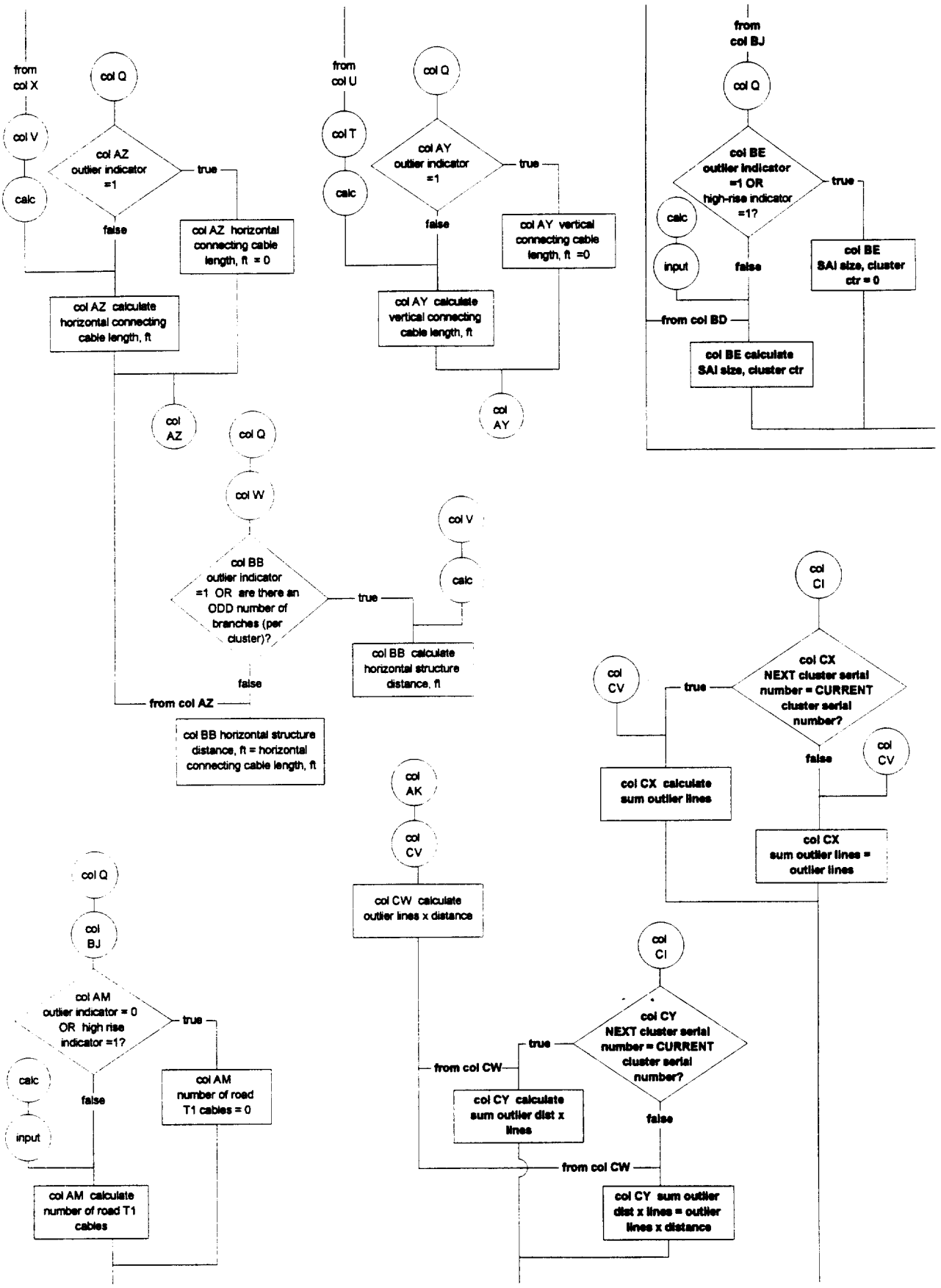


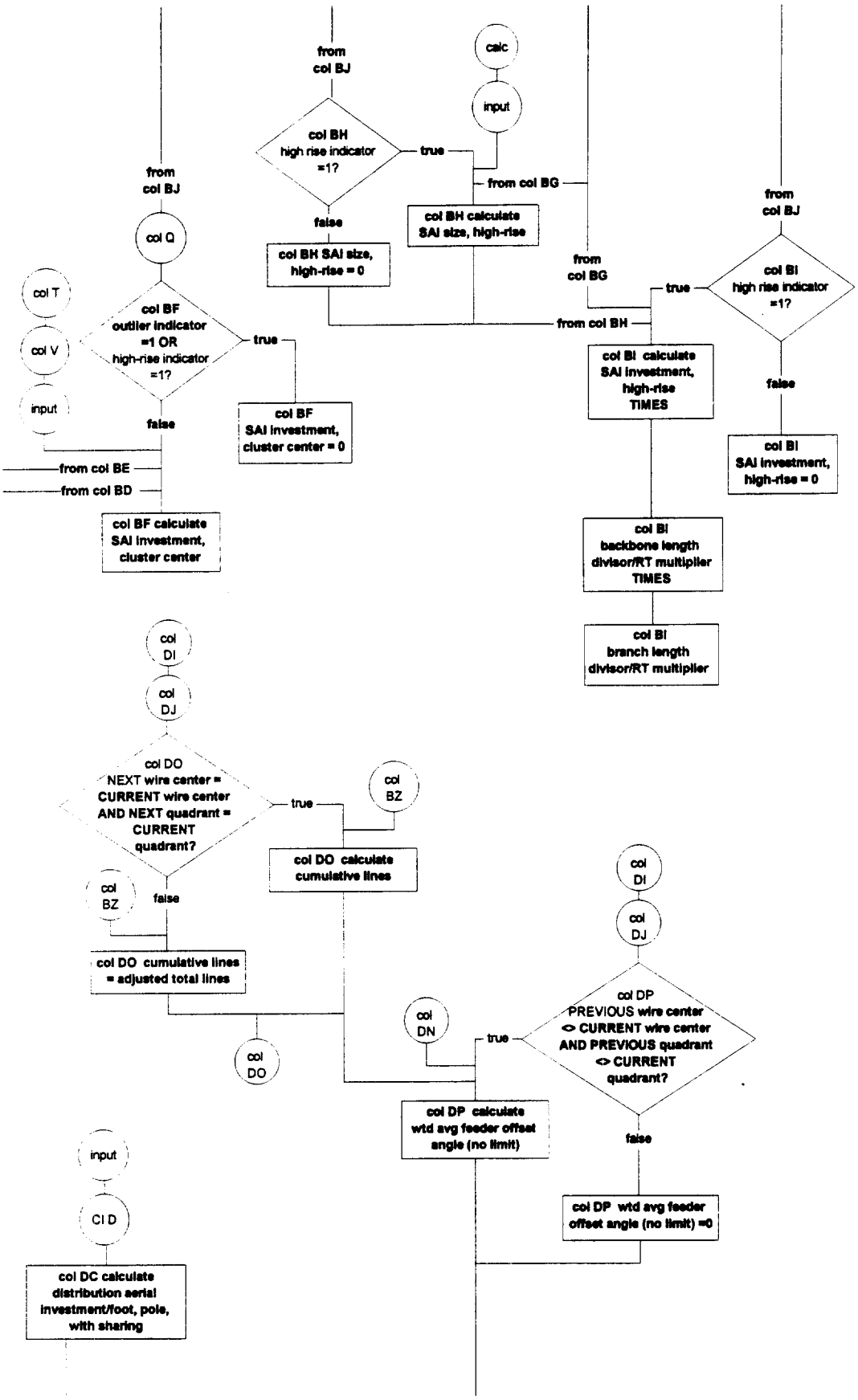

LCFactors (LCF)
CCCFactor (CCCF)
output (output)
LCF
CCCF
output
cid
col Q
col R
calc
input
input
col L outlier indicator =0?
true
false
col P calculate Average cluster lot size, sq ft
col BZ calculate adjusted total lines
col BY calculate equivalent SA loops
col CH calculate effective u/g fraction distribution
col BZ
from CID
col CH
col L calculate Lot frontage, ft
col L Lot frontage, ft = 0
input
col DJ quadrant
col DI wire center
from col CK
col Q
col DK sign
col DJ
col DI
col CU outlier indicator =1 AND NEXT outlier order < = CURRENT outlier order?
true
col M calculate lot depth, ft
col DL calculate angle
col CU terminal outlier indicator =1 (true)
false
col DL
from cols DI , DJ
col DM calculate angle x lines
col DN NEXT wire center = CURRENT wire center AND NEXT quadrant = CURRENT quadrant?
col CU terminal outlier indicator =0 (false)
true
col DN calculate cumulative product
false
col DN cumulative product = angle x lines
col DN
from col BJ
col BG high rise indicator =1?
true
col BG calculate max SAIs, high-rise
false
col BG max SAIs, high-rise = 0


col Q
col CK outlier indicator =1?
true
false
col CK calculate outlier order
col CK outlier order = 0
col CK
cols A -B
col CJ calculate outlier number
col CL outlier number IS BLANK?
true
false
col CL outlier root ID = 0
col CL calculate outlier root ID
from col CJ
col CM outlier number IS BLANK?
true
col S
false
col CM cumulative lines in chain = 0
from cols CL, CI
col CM NEXT outlier root I D = CURRENT outlier root I D AND NEXT cluster serial number = CURRENT cluster serial number?
true
from col CV
col CM calculate cumulative lines in chain
false
from col CV
col CM cumulative lines in chain = outlier lines
col CM
cols A -B
col CI calculate cluster serial number
col CI
col Q
col CV outlier indicator =1?
col S
col CV outlier lines = Lines
col CV outlier lines = 0
col CV
from col BJ
col BK high rise indicator =0?
true
false
CI D
col BK high-rise factor =0
col BK calculate high-rise factor

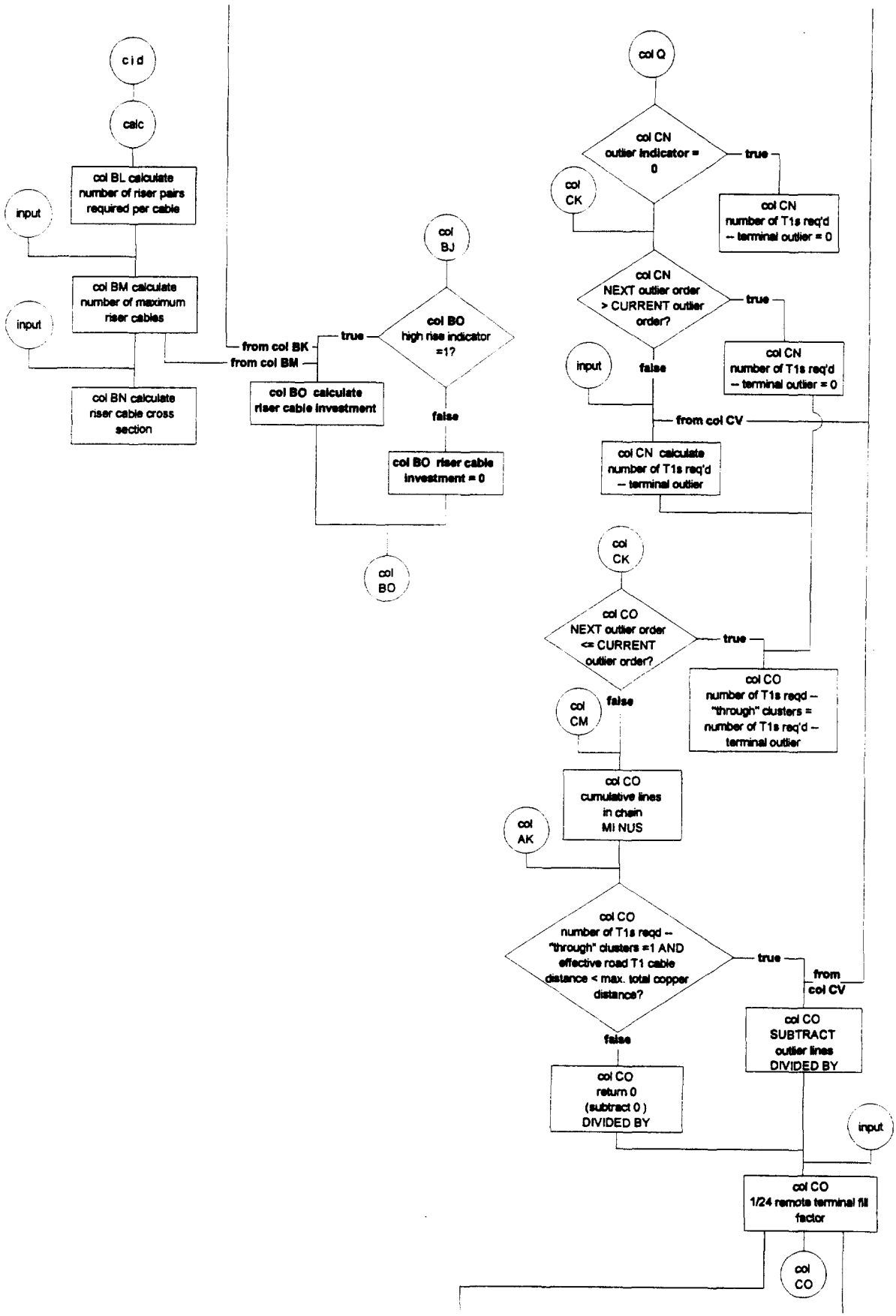

col Q
col Z outlier indicator =0?
true
false
from col Y
col Z calculate branch cable cross section
col Z branch cable cross section = 0
col T
col W
input
from col AA
col AC calculate number of max backbone cables
from cols T, W, Z AA, AC inputs
col Q
col AB outlier indicator =0?
true
false
col AB calculate backbone cross section
col AB backbone cross section = 0
col Q
col AE outlier indicator =1?
true
false
cid
col R
col AE calculate road frontage per loc, ft
col AE road frontage per loc, ft = 0
col Q
col AK outlier indicator =1
true
false
cid
col R
col AK calculate effective road T1 cable distance TIMES
col AK effective road T1 cable distance = 0
col AK Difficult surface multiplier >1?
true
false
col AK MULTIPLY BY distance multiplier
col AK MULTIPLY BY 1
col AK
col Q
col AF outlier indicator =0 OR total locations <2?
true
false
cid
col R
col AF effective subscriber road cable distance = 0
col AF calculate effective subscriber road cable distance TIMES
col AF Difficult surface multiplier >1?
true
false
col AF MULTIPLY BY distance multiplier
col AF MULTIPLY BY 1
col AF
from col AF
from col AK
col CI
col CR NEXT cluster serial number = CURRENT cluster serial number?
true
false
from col AK
col CR calculate cumulative outlier road distance in cluster
from col AK
col CR cumulative outlier road distance in cluster = effective road T1 cable distance
col CS outlier order = 1 AND effective road T1 cable distance PLUS 0.5 TIMES effective subscriber road cable distance < max. total copper distance?
true
false
col CS first-order outlier lines not on T1 = outlier lines
col CS first-order outlier lines not on T1 = 0

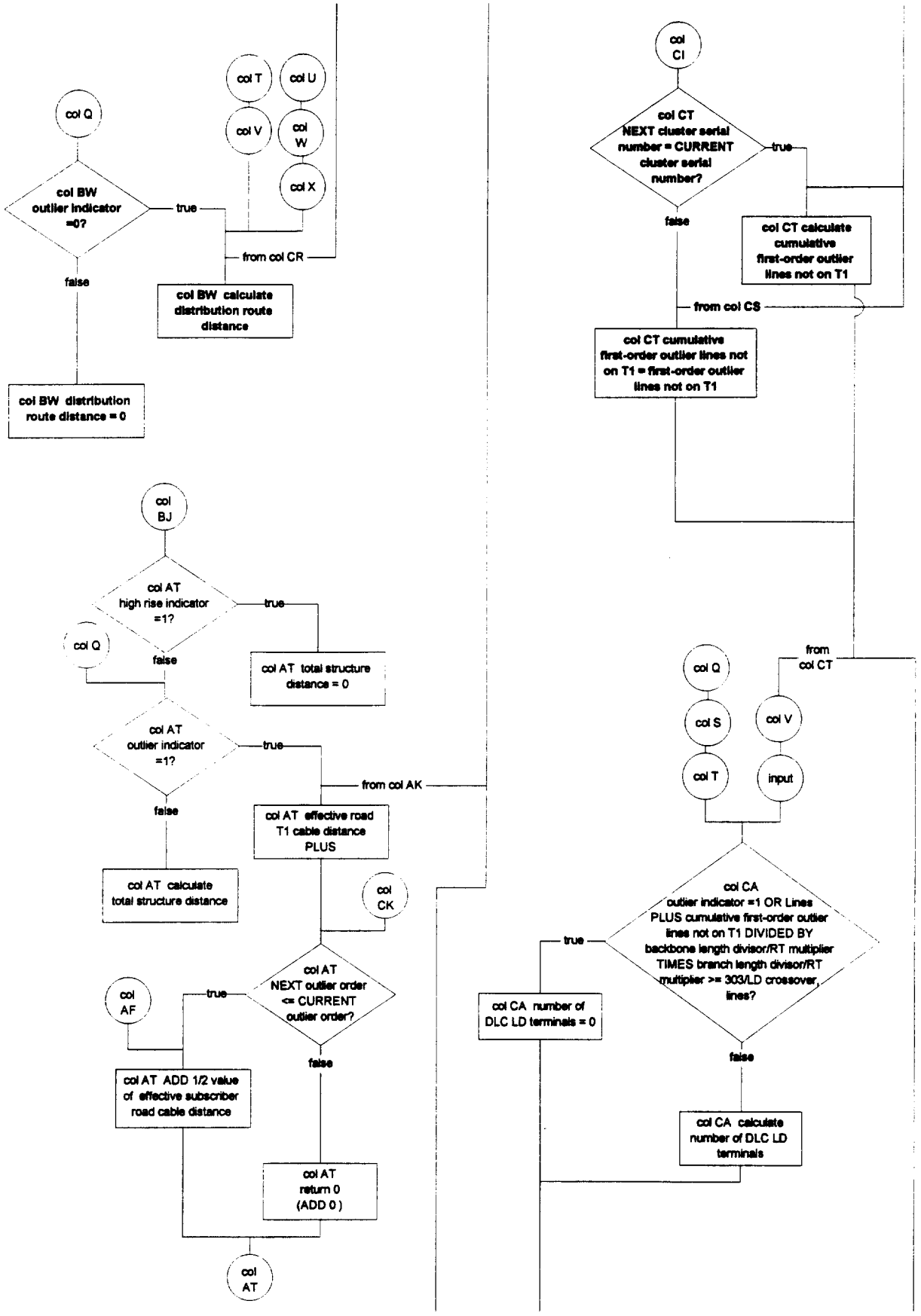
S

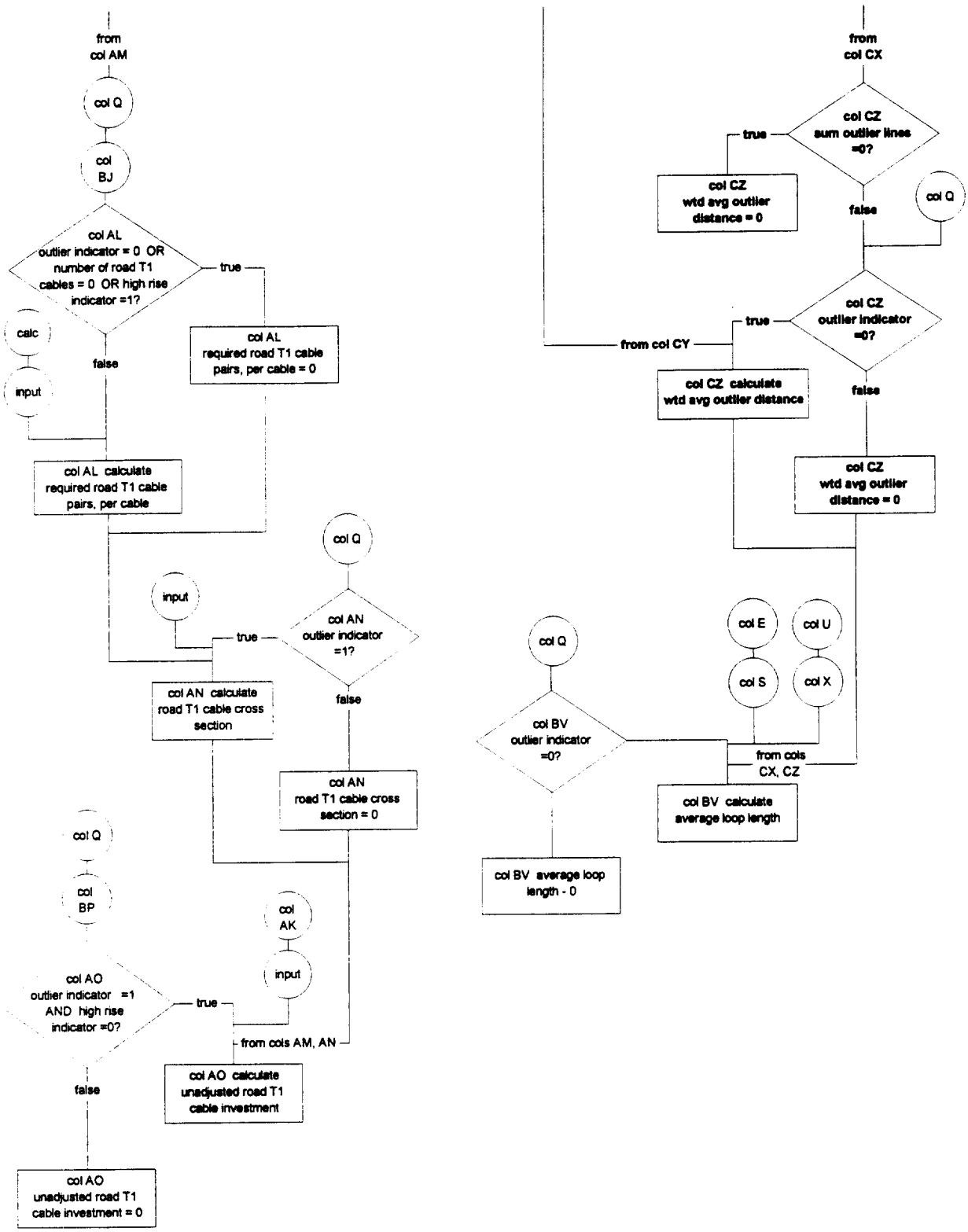

from col X
col Q
col V
calc
col AZ outlier indicator =1
true
false
col AZ horizontal connecting cable length, ft = 0
col AZ calculate horizontal connecting cable length, ft
col AZ
from col U
col Q
col T
calc
col AY outlier indicator =1
true
false
col AY vertical connecting cable length, ft =0
col AY calculate vertical connecting cable length, ft
col AY
from col BJ
col Q
col BE outlier indicator =1 OR high-rise indicator =1?
true
calc
input
false
col BE SAI size, cluster ctr = 0
from col BD
col BE calculate SAI size, cluster ctr
col Q
col W
col BB outlier indicator =1 OR are there an ODD number of branches (per cluster)?
true
col V
calc
col BB calculate horizontal structure distance, ft
false
from col AZ
col BB horizontal structure distance, ft = horizontal connecting cable length, ft
col CI
col CV
col CX NEXT cluster serial number = CURRENT cluster serial number?
true
false
col CV
col CX calculate sum outlier lines
col CX sum outlier lines = outlier lines
col AK
col CV
col CW calculate outlier lines x distance
col Q
col BJ
col AM outlier indicator = 0 OR high rise indicator =1?
true
calc
input
false
col AM number of road T1 cables = 0
col AM calculate number of road T1 cables
from col CW
col CI
col CY NEXT cluster serial number = CURRENT cluster serial number?
true
false
col CY calculate sum outlier dist x lines
from col CW
col CY sum outlier dist x lines = outlier lines x distance

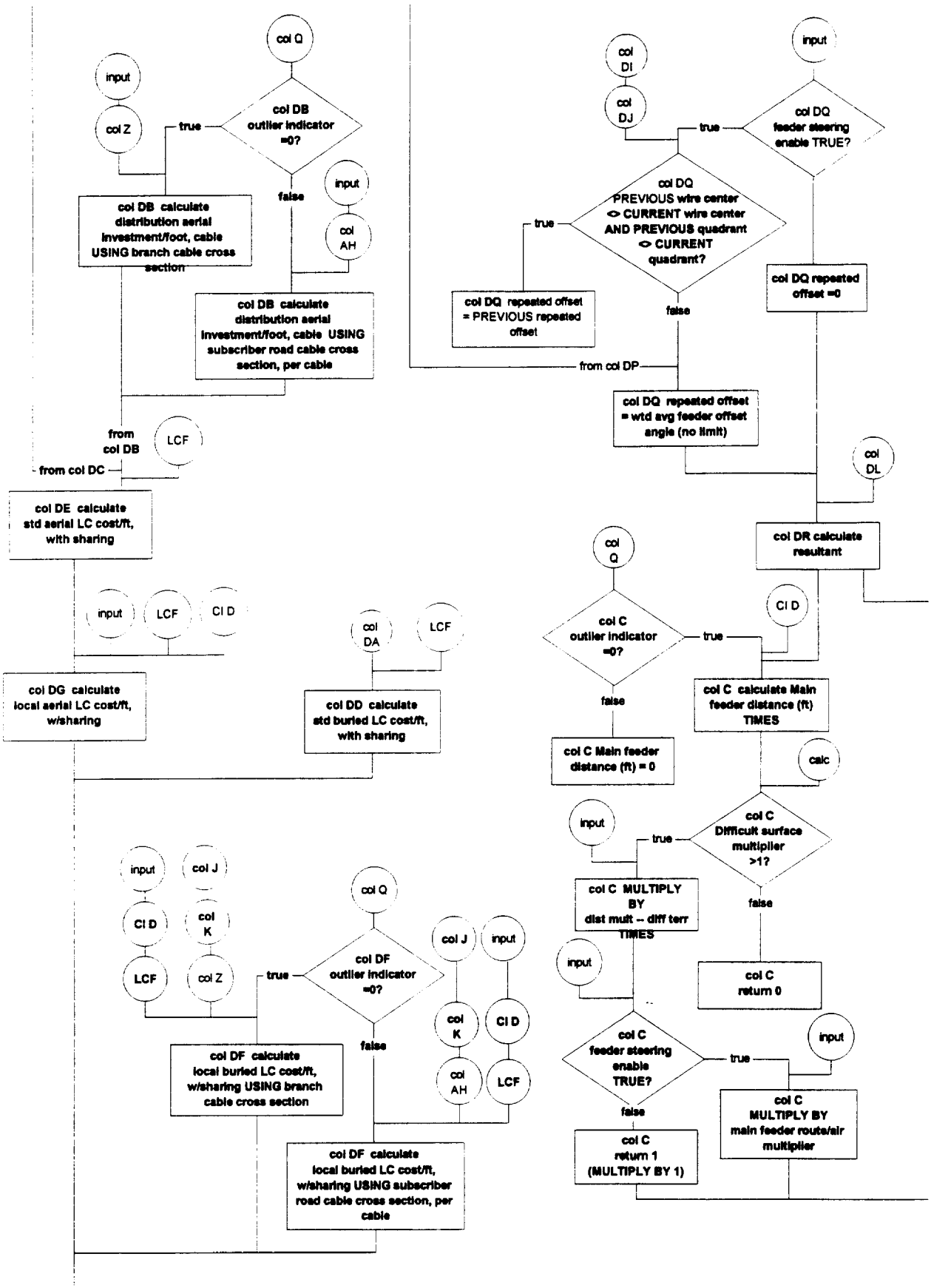

from col BJ
col BH high rise indicator =1?
true
false
calc
input
from col BG
col BH calculate SAI size, high-rise
col BH SAI size, high-rise = 0
from col BJ
col Q
col T
col V
input
col BF outlier indicator =1 OR high-rise indicator =1?
true
false
col BF SAI investment, cluster center = 0
from col BE
from col BD
col BF calculate SAI investment, cluster center
from col BG
from col BH
true
col BI high rise indicator =1?
false
col BI calculate SAI investment, high-rise TIMES
col BI SAI investment, high-rise = 0
from col BJ
col BI backbone length divisor/RT multiplier TIMES
col BI branch length divisor/RT multiplier
col DI
col DJ
col DO NEXT wire center = CURRENT wire center AND NEXT quadrant = CURRENT quadrant?
true
false
col BZ
col DO calculate cumulative lines
col BZ
col DO cumulative lines = adjusted total lines
col DO
col DN
col DI
col DJ
col DP PREVIOUS wire center <> CURRENT wire center AND PREVIOUS quadrant <> CURRENT quadrant?
true
false
col DP calculate wtd avg feeder offset angle (no limit)
col DP wtd avg feeder offset angle (no limit) =0
input
CI D
col DC calculate distribution aerial investment/foot, pole, with sharing

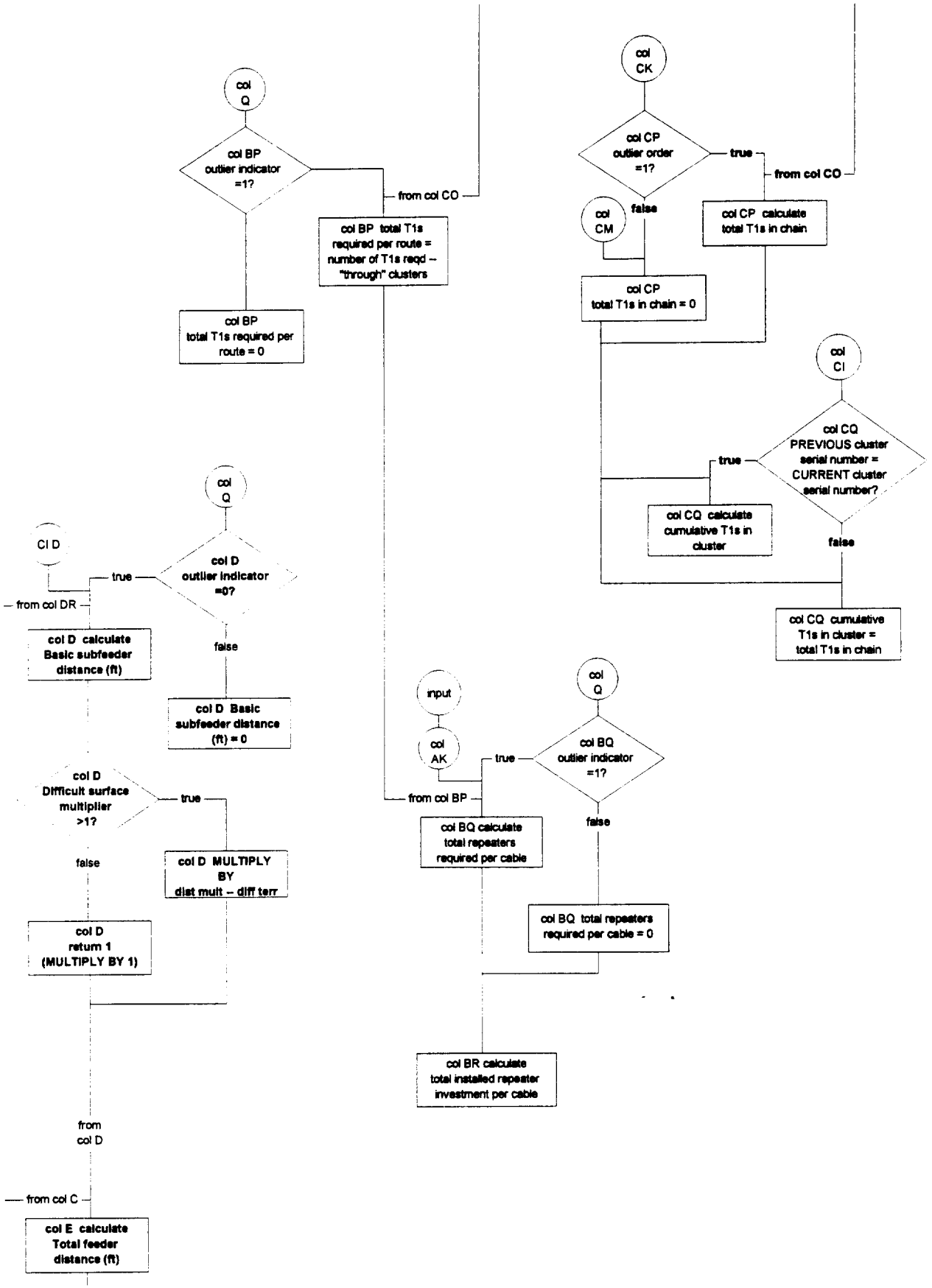
7

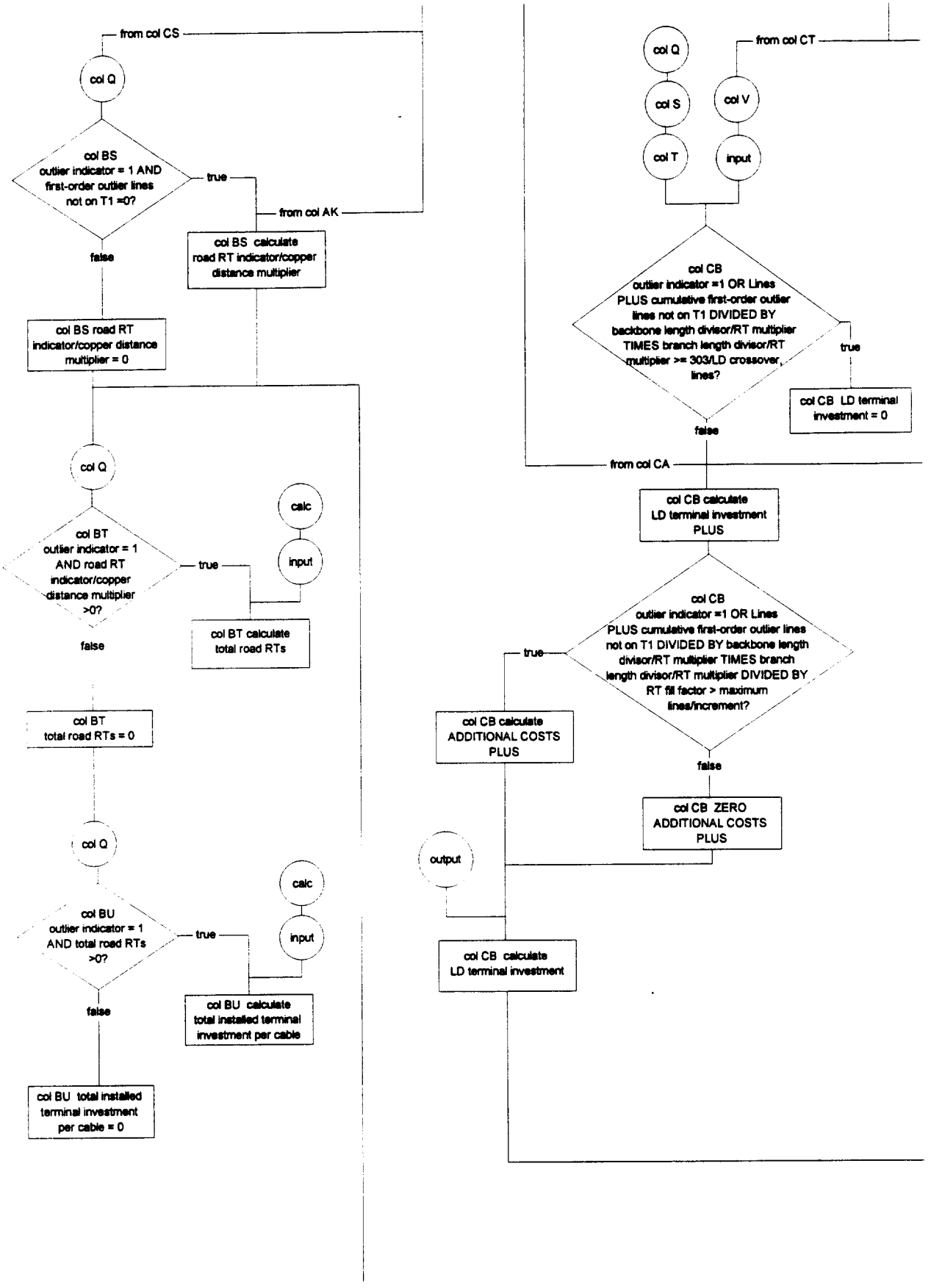

c i d
calc
input
col BL calculate number of riser pairs required per cable
input
col BM calculate number of maximum riser cables
col BN calculate riser cable cross section
from col BK
from col BM
true
col BO calculate riser cable investment
col BJ
col BO high rise indicator =1?
false
col BO riser cable investment = 0
col BO
col Q
col CN outlier indicator = 0
true
col CN number of T1s req'd -- terminal outlier = 0
col CK
col CN NEXT outlier order > CURRENT outlier order?
true
col CN number of T1s req'd -- terminal outlier = 0
input
false
from col CV
col CN calculate number of T1s req'd -- terminal outlier
col CK
col CO NEXT outlier order <= CURRENT outlier order?
true
col CO number of T1s reqd -- "through" clusters = number of T1s req'd -- terminal outlier
col CM
false
col CO cumulative lines in chain MI NUS
col AK
col CO number of T1s reqd -- "through" clusters =1 AND effective road T1 cable distance < max. total copper distance?
true
from col CV
col CO SUBTRACT outlier lines DIVIDED BY
false
col CO return 0 (subtract 0) DIVIDED BY
input
col CO 1/24 remote terminal fill factor
col CO

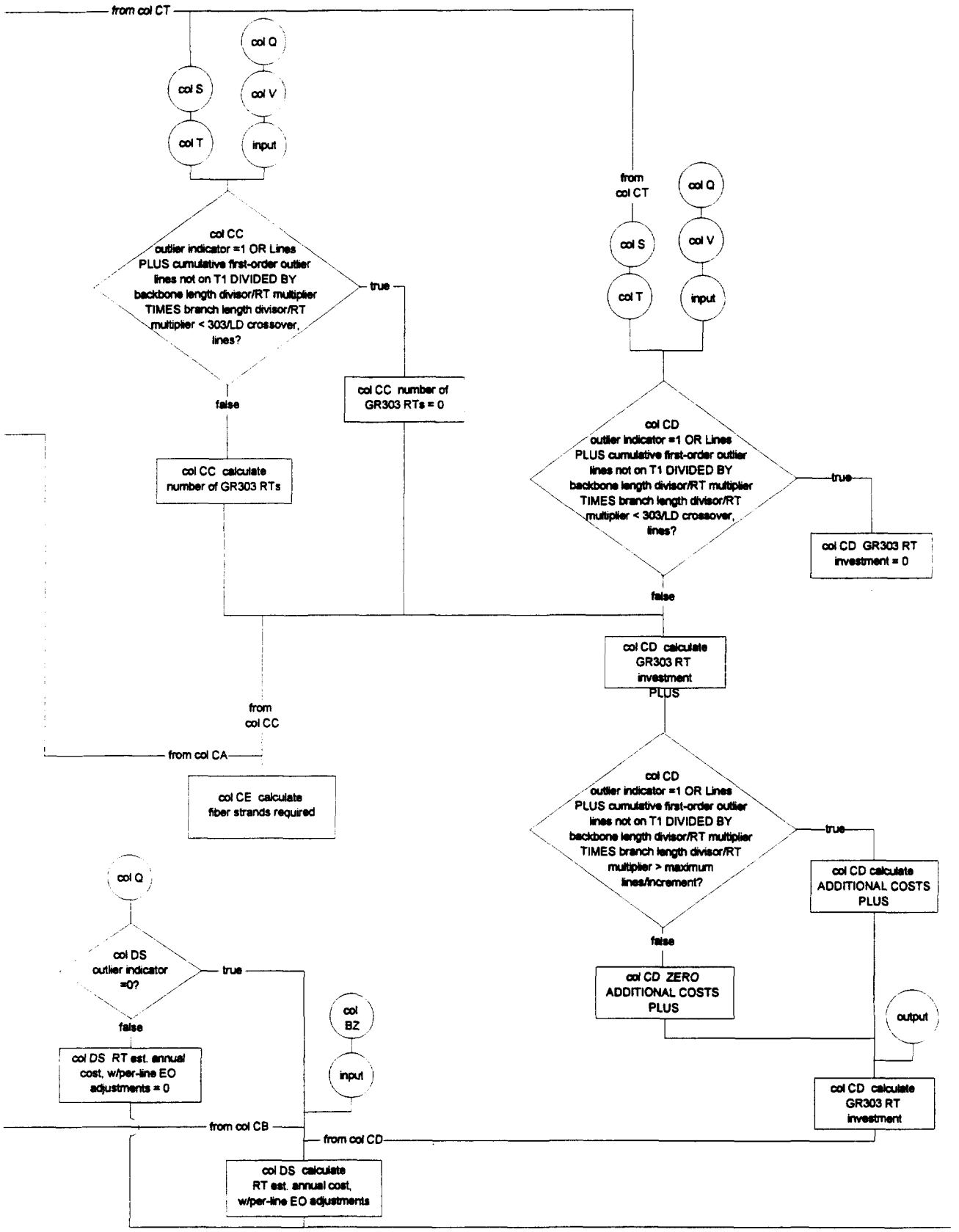

col Q
col BW outlier indicator =0?
true
false
col T
col U
col V
col W
col X
from col CR
col BW calculate distribution route distance
col BW distribution route distance = 0
col BJ
col AT high rise indicator =1?
true
false
col Q
col AT total structure distance = 0
col AT outlier indicator =1?
true
false
from col AK
col AT effective road T1 cable distance PLUS
col AT calculate total structure distance
col CK
col AT NEXT outlier order <= CURRENT outlier order?
true
false
col AF
col AT ADD 1/2 value of effective subscriber road cable distance
col AT return 0 (ADD 0)
col AT
col CI
col CT NEXT cluster serial number = CURRENT cluster serial number?
true
false
col CT calculate cumulative first-order outlier lines not on T1
from col CS
col CT cumulative first-order outlier lines not on T1 = first-order outlier lines not on T1
from col CT
col Q
col S
col V
col T
input
col CA outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier >= 303/LD crossover lines?
true
false
col CA number of DLC LD terminals = 0
col CA calculate number of DLC LD terminals

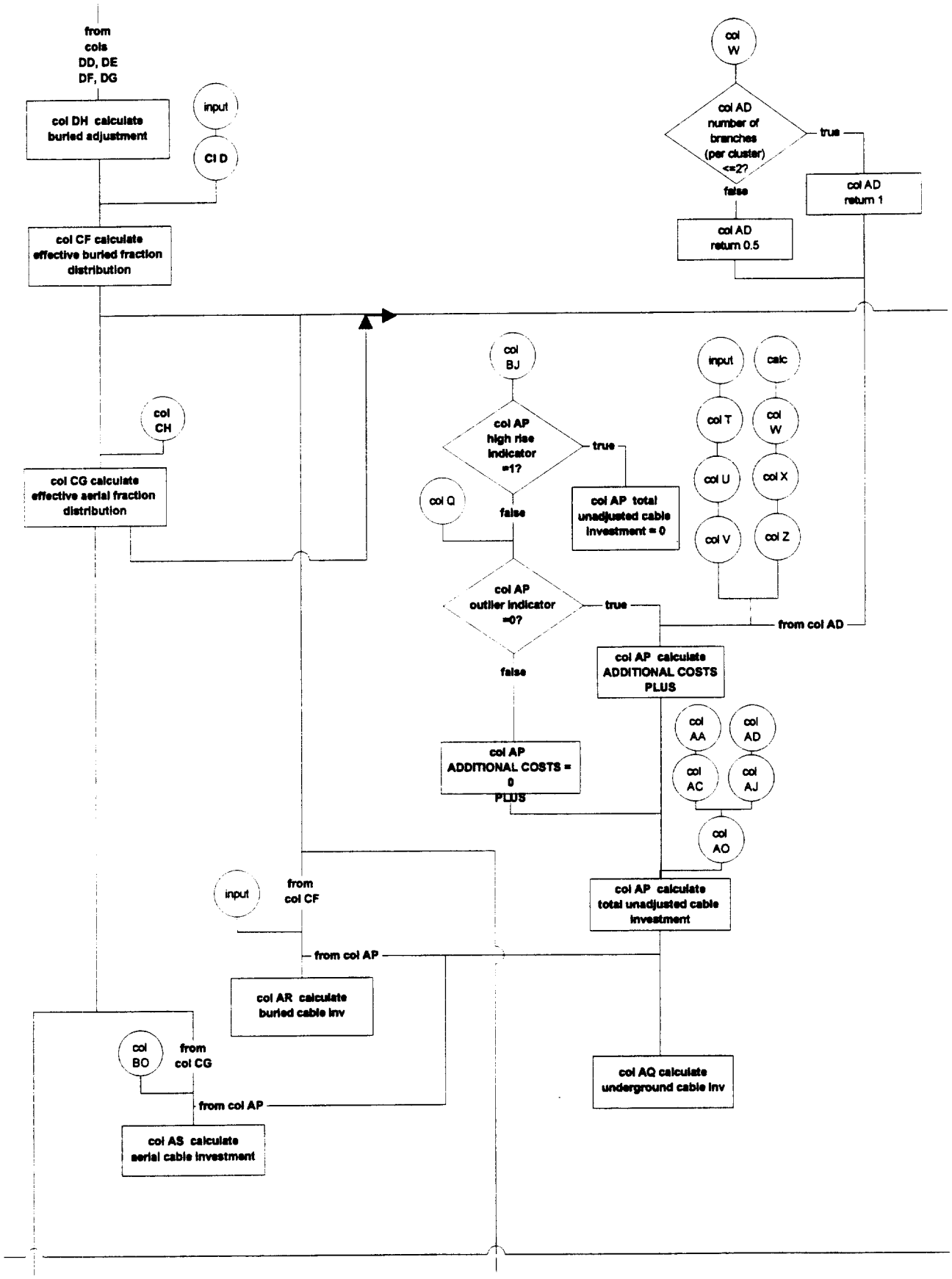

from col AM
col Q
col BJ
col AL outlier indicator = 0 OR number of road T1 cables = 0 OR high rise indicator =1?
true
false
calc
input
col AL required road T1 cable pairs, per cable = 0
col AL calculate required road T1 cable pairs, per cable
col Q
input
col AN outlier indicator =1?
true
false
col AN calculate road T1 cable cross section
col AN road T1 cable cross section = 0
col Q
col BP
col AK
input
col AO outlier indicator =1 AND high rise indicator =0?
true
false
from cols AM, AN
col AO calculate unadjusted road T1 cable investment
col AO unadjusted road T1 cable investment = 0
from col CX
col CZ sum outlier lines =0?
true
false
col CZ wtd avg outlier distance = 0
col Q
from col CY
col CZ outlier indicator =0?
true
false
col CZ calculate wtd avg outlier distance
col CZ wtd avg outlier distance = 0
col Q
col BV outlier indicator =0?
col E
col U
col S
col X
from cols CX, CZ
col BV calculate average loop length
col BV average loop length - 0

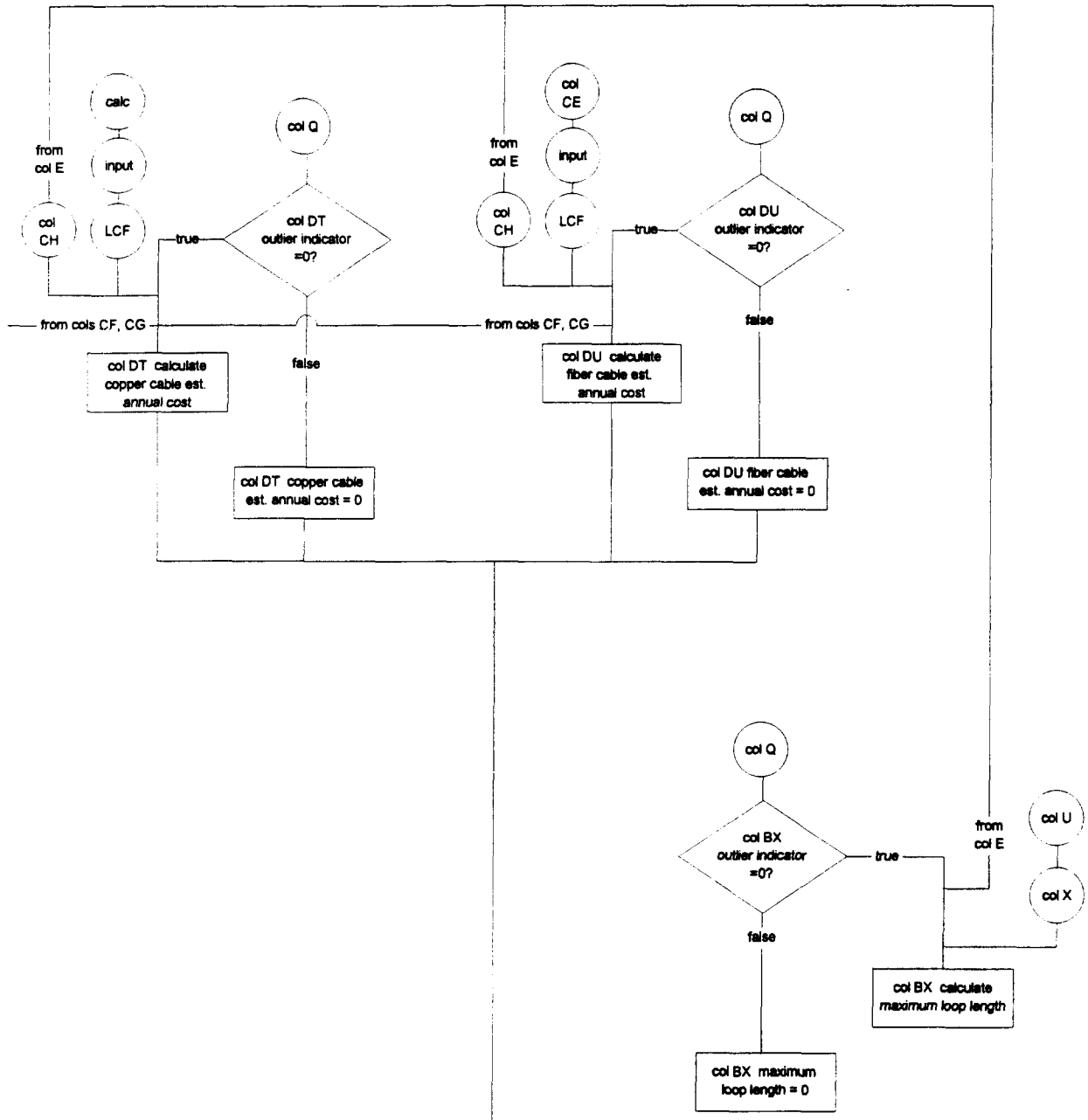

col Q
input
col Z
true
col DB outlier indicator =0?
false
input
col AH
col DB calculate distribution aerial investment/foot, cable USING branch cable cross section
col DB calculate distribution aerial investment/foot, cable USING subscriber road cable cross section, per cable
from col DB
LCF
from col DC
col DE calculate std aerial LC cost/ft, with sharing
input
LCF
CI D
col DG calculate local aerial LC cost/ft, w/sharing
col DA
LCF
col DD calculate std buried LC cost/ft, with sharing
input
col J
CI D
col K
LCF
col Z
col Q
true
col DF outlier indicator =0?
false
col J
input
col K
CI D
col AH
LCF
col DF calculate local buried LC cost/ft, w/sharing USING branch cable cross section
col DF calculate local buried LC cost/ft, w/sharing USING subscriber road cable cross section, per cable
col DI
col DJ
true
input
col DQ feeder steering enable TRUE?
true
col DQ PREVIOUS wire center <> CURRENT wire center AND PREVIOUS quadrant <> CURRENT quadrant?
false
col DQ repeated offset = PREVIOUS repeated offset
col DQ repeated offset =0
from col DP
col DQ repeated offset = wtd avg feeder offset angle (no limit)
col DL
col DR calculate resultant
col Q
col C outlier indicator =0?
true
CI D
false
col C calculate Main feeder distance (ft) TIMES
col C Main feeder distance (ft) = 0
calc
input
true
col C Difficult surface multiplier >1?
false
col C MULTIPLY BY dist mult -- diff terr TIMES
input
col C return 0
input
col C feeder steering enable TRUE?
true
false
col C MULTIPLY BY main feeder route/air multiplier
col C return 1 (MULTIPLY BY 1)

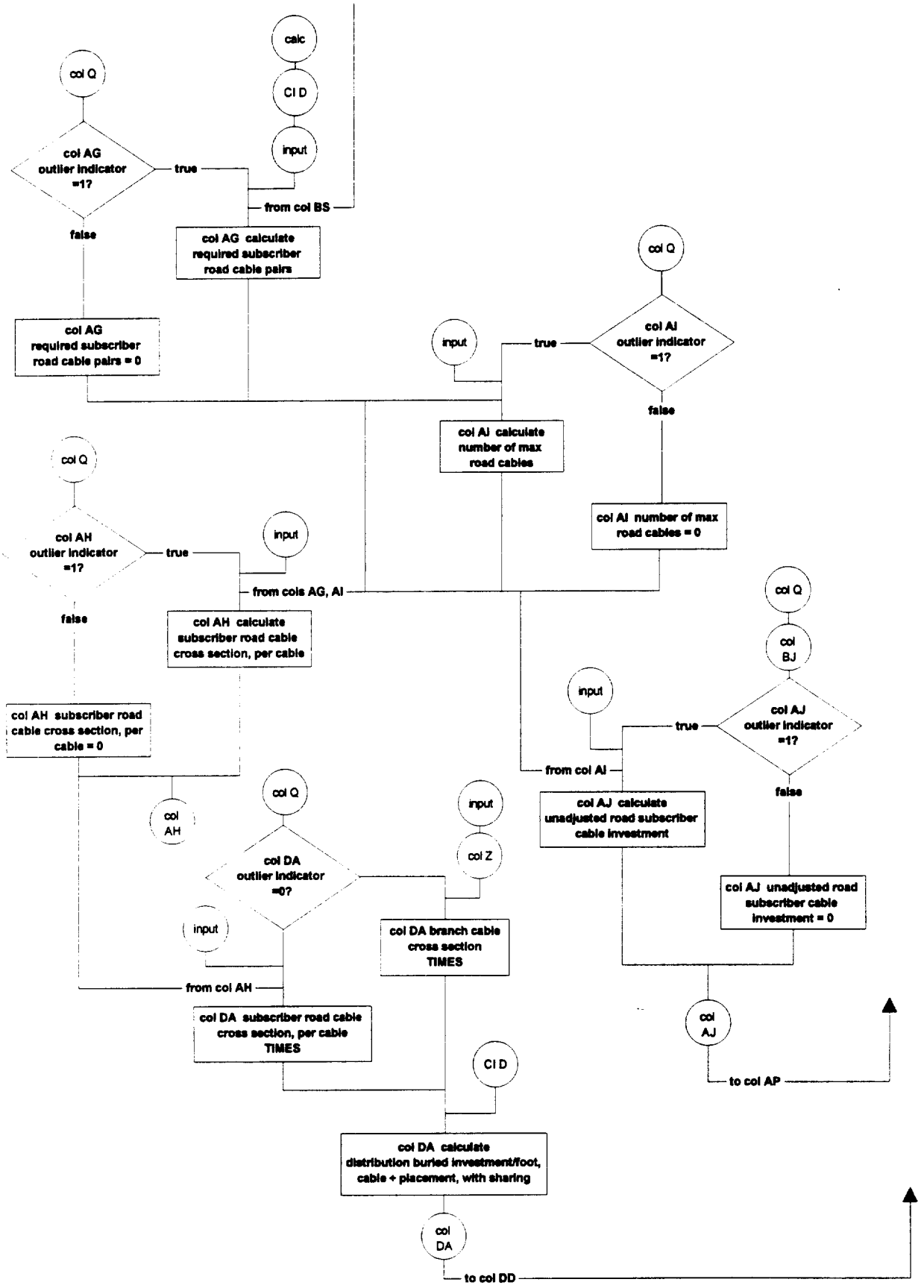

col Q
col BP outlier indicator =1?
from col CO
col BP total T1s required per route = number of T1s reqd -- "through" clusters
col BP total T1s required per route = 0
col CK
col CP outlier order =1?
true
from col CO
false
col CM
col CP calculate total T1s in chain
col CP total T1s in chain = 0
col CI
col CQ PREVIOUS cluster serial number = CURRENT cluster serial number?
true
col CQ calculate cumulative T1s in cluster
false
col CQ cumulative T1s in cluster = total T1s in chain
col Q
CI D
col D outlier indicator =0?
true
from col DR
col D calculate Basic subfeeder distance (ft)
false
col D Basic subfeeder distance (ft) = 0
col D Difficult surface multiplier >1?
true
false
col D MULTIPLY BY dist mult -- diff terr
col D return 1 (MULTIPLY BY 1)
from col D
from col C
col E calculate Total feeder distance (ft)
input
col AK
col Q
col BQ outlier indicator =1?
true
from col BP
col BQ calculate total repeaters required per cable
false
col BQ total repeaters required per cable = 0
col BR calculate total installed repeater investment per cable

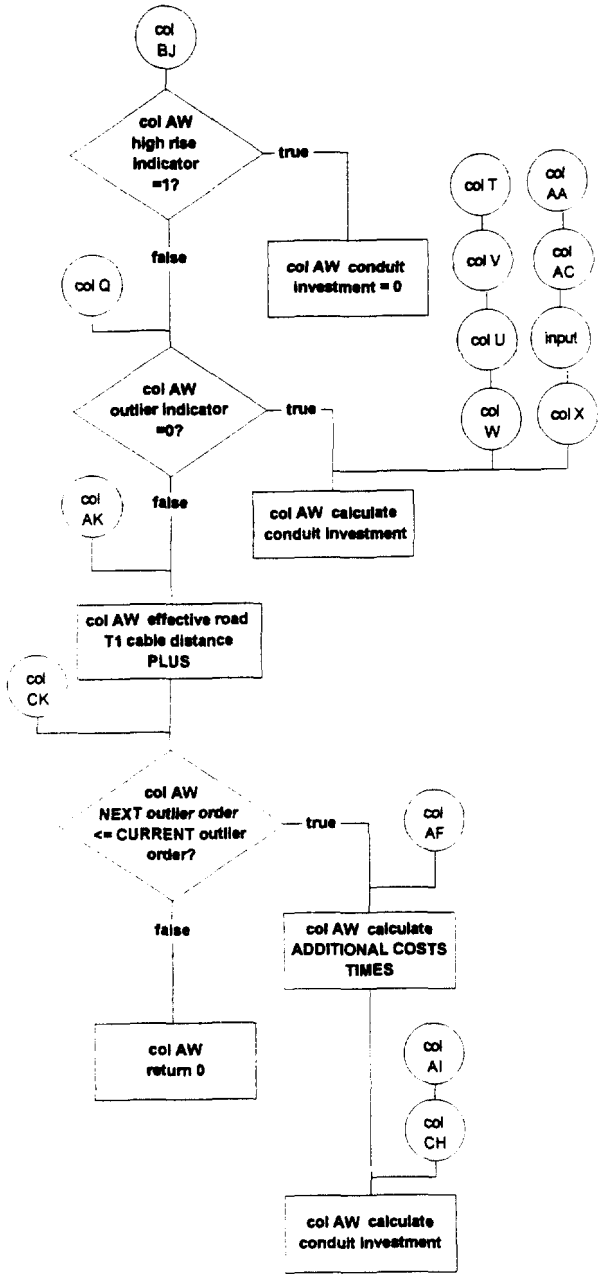

from col CS
col Q
col BS
outlier indicator = 1 AND first-order outlier lines not on T1 =0?
true
from col AK
false
col BS calculate road RT indicator/copper distance multiplier
col BS road RT indicator/copper distance multiplier = 0
col Q
col BT
outlier indicator = 1 AND road RT indicator/copper distance multiplier >0?
true
calc
input
col BT calculate total road RTs
false
col BT total road RTs = 0
col Q
col BU
outlier indicator = 1 AND total road RTs >0?
true
calc
input
col BU calculate total installed terminal investment per cable
false
col BU total installed terminal investment per cable = 0
col Q
col S
col T
from col CT
col V
input
col CB
outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier >= 303/LD crossover, lines?
true
col CB LD terminal investment = 0
false
from col CA
col CB calculate LD terminal investment PLUS
col CB
outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier DIVIDED BY RT fill factor > maximum lines/increment?
true
col CB calculate ADDITIONAL COSTS PLUS
false
col CB ZERO ADDITIONAL COSTS PLUS
output
col CB calculate LD terminal investment

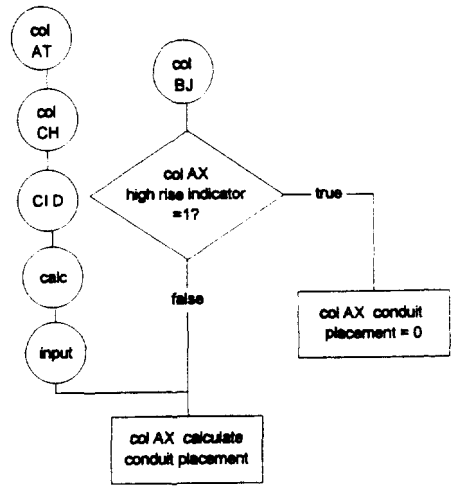

from col CT
col Q
col S
col V
col T
input
col CC
outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier < 303/LD crossover, lines?
true
false
col CC number of GR303 RTs = 0
col CC calculate number of GR303 RTs
from col CT
col Q
col S
col V
col T
input
col CD
outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier < 303/LD crossover, lines?
true
col CD GR303 RT investment = 0
false
col CD calculate GR303 RT investment PLUS
from col CC
from col CA
col CE calculate fiber strands required
col CD
outlier indicator =1 OR Lines PLUS cumulative first-order outlier lines not on T1 DIVIDED BY backbone length divisor/RT multiplier TIMES branch length divisor/RT multiplier > maximum lines/increment?
true
col CD calculate ADDITIONAL COSTS PLUS
false
col CD ZERO ADDITIONAL COSTS PLUS
output
col CD calculate GR303 RT investment
col Q
col DS
outlier indicator =0?
true
false
col DS RT est. annual cost, w/per-line EO adjustments = 0
col BZ
input
from col CB
from col CD
col DS calculate RT est. annual cost, w/per-line EO adjustments


from cols DD, DE DF, DG
col DH calculate buried adjustment
input
CI D
col CF calculate effective buried fraction distribution
col CH
col CG calculate effective aerial fraction distribution
col W
col AD number of branches (per cluster) <=2?
true
false
col AD return 1
col AD return 0.5
col BJ
col AP high rise indicator =1?
true
col AP total unadjusted cable investment = 0
col Q
false
col AP outlier indicator =0?
true
false
from col AD
input
calc
col T
col W
col U
col X
col V
col Z
col AP calculate ADDITIONAL COSTS PLUS
col AP ADDITIONAL COSTS = 0 PLUS
col AA
col AD
col AC
col AJ
col AO
col AP calculate total unadjusted cable investment
input
from col CF
from col AP
col AR calculate buried cable inv
col BO
from col CG
from col AP
col AS calculate aerial cable investment
col AQ calculate underground cable inv


calc
input
LCF
from col E
col CH
col Q
true
col DT outlier indicator =0?
from cols CF, CG
false
col DT calculate copper cable est. annual cost
col DT copper cable est. annual cost = 0
col CE
input
LCF
from col E
col CH
col Q
true
col DU outlier indicator =0?
from cols CF, CG
false
col DU calculate fiber cable est. annual cost
col DU fiber cable est. annual cost = 0
col Q
col BX outlier indicator =0?
true
from col E
col U
col X
false
col BX calculate maximum loop length
col BX maximum loop length = 0


calc
Cl D
input
col Q
col AG outlier indicator =1?
true
false
from col BS
col AG calculate required subscriber road cable pairs
col AG required subscriber road cable pairs = 0
col Q
col AI outlier indicator =1?
input
true
false
col AI calculate number of max road cables
col AI number of max road cables = 0
col Q
col AH outlier indicator =1?
input
true
false
from cols AG, AI
col AH calculate subscriber road cable cross section, per cable
col AH subscriber road cable cross section, per cable = 0
col AH
col Q
col BJ
input
col AJ outlier indicator =1?
true
false
from col AI
col AJ calculate unadjusted road subscriber cable investment
col AJ unadjusted road subscriber cable investment = 0
col AJ
to col AP
col Q
col DA outlier indicator =0?
input
input
col Z
col DA branch cable cross section TIMES
from col AH
col DA subscriber road cable cross section, per cable TIMES
Cl D
col DA calculate distribution buried investment/foot, cable + placement, with sharing
col DA
to col DD


col BJ
col AW high rise indicator =1?
true
col AW conduit investment = 0
false
col Q
col AW outlier indicator =0?
true
col T
col AA
col V
col AC
col U
input
col W
col X
col AW calculate conduit investment
col AK
false
col AW effective road T1 cable distance PLUS
col CK
col AW NEXT outlier order <= CURRENT outlier order?
true
col AF
col AW calculate ADDITIONAL COSTS TIMES
false
col AW return 0
col AI
col CH
col AW calculate conduit investment


col AT
col CH
CI D
calc
input
col BJ
col AX high rise indicator =1?
true
col AX conduit placement = 0
false
col AX calculate conduit placement