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PLAN DE ELECTRIFICACION
DE LA PROVINCIA DE LA RIOJA

ANTEPROYECTO DEFINTIVO

LINEA DE ALTA TENSION 132 KV

CHAMICAL - CHEPES - LUJAN

INFORME PARCIAL Nº 5

TOMO 1 FLUJO DE CARGAS

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INFORME PARCIAL Nº 5

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LINEA DE ALTA TENSION 132 KV

CHAMICAL - CHEPES - LUJAN

PROVINCIA DE LA RIOJA

-1994-

TOMO 1

FLUJO DE CARGAS

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INTRODUCCION

El C.F.I. se ha encargado del estudio del Anteproyecto Definitivo de Ingeniería de la LAT 132 que une las localidades de Chamical, Chepes y Luján en San Luis y las estaciones transformadoras de Chamical y Chepes en 132/33/13,3 kV. En Luján (San Luis) se realizará una estación transformadora en 500/132 kV cuyo proyecto original realizó Agua y Energía Eléctrica y del cual se tomaron las referencias para la ubicación del poste terminal.

La alimentación se realiza desde la LAT 500 kV que viene de Rio Tercero, (E.T. Almafuerte) y va a Gran Mendoza. Donde esta línea cruza la ruta 6 que va de Luján (S.L.) a San Juan, se ubica la ET 500 kV y el poste terminal de la LAT 132 kV.

La traza de la línea se detalla en al plano LAR-P-1001 LAR-P-1002. En el plano LAR-P-ET-1015 se detalla la ubicación del poste terminal.

Está previsto que la Estación Transformadora de Luján alimente con dos líneas de 132 kV a la ciudad de San Luis y otra de la misma tensión a la zona de Dolores y traslasierra (Córdoba).

Los Anteproyectos de las Estaciones Transformadoras de Chamical y Chepes ya fueron terminados y entregados a la Provincia de La Rioja.

Se realizó un estudio de mercado para verificar la viabilidad del proyecto. Se analizaron alternativas y se determinó elegir la traza más económica.

Su análisis eléctrico se realizó con estudio de flujo de cargas.

Esta línea tiene dos ventajas fundamentales:

* Permite la conexión sur con la red de 500 kV. Actualmente la Provincia está conectada a ese sistema por una línea de doble terna en 132 kV por su parte norte. Esta línea está, por otro lado, al borde de su prestación y además significa un vínculo débil en cuanto a su confiabilidad.

* Alimenta una zona muy necesitada, la del sur provincial, no solo de energía sino de un aporte mayor a la confiabilidad del servicio. Actualmente la zona está alimentada por una línea de 33 kV que requiere mucho mantenimiento.

Entre las alternativas estudiadas para el aprovisionamiento de energía se contempló la posibilidad de una conexión en 500 kV. a

la población de Patquía directamente de la ET 500 kV Recreo, ya que Patquía es el baricentro eléctrico de la provincia.

El costo de una línea de 500 kV es comparativa y proporcionalmente más económico que una de 132 kV.

Otro estudio es la conexión en 132 kV entre La Rioja y Nonogasta. Esta línea pasa por el Cerro del Velazco que significa una cierta dificultad pero seguramente es una alternativa muy conveniente para el futuro. Otra posibilidad es una conexión con San Juan en 132 kV por el aprovechamiento hidroeléctrico de Los Caracoles cuyo licitación fué anunciada en marzo de 1994.

Cabe señalar que esta incorporación de energía se puede realizar por la línea de 132 kV entre Nonogasta y Villa Unión cuya construcción está en un grado de avance del 85 %

En este contexto no hay soluciones únicas sino complementarias y en función de los recursos disponibles se irán escalando las mismas. Cabe destacar que a lo largo de este estudio se han producido modificaciones en el ordenamiento del suministro de energía nacional en una forma profunda como nunca en la historia del país con privatizaciones de la generación, transporte y distribución.

Las tarifas han cambiado, y el concepto de costo por nodo eléctrico produce un ordenamiento del consumo según pautas distintas de las vigentes hacia atras.

Por otro parte el país se está alineando en su actividad económica como socio participante del mercado sur con normativas sobre aranceles concertadas por el Gatt, ronda Uruguay y con sus socios del mercosur que afectan a toda la población creando nichos de oportunidad de negocios para los cuales la provincia debe estar preparada para aprovechar.

Cada decisión debe analizarse cuidadosamente para elegir la mejor en cada caso.

Como particularidades del proyecto surge que seria mas conveniente una tensión mayor como por ejemplo 220 kV, debido a la distancia que debe cubrir para un mejor comportamiento eléctrico.

Por otro lado debe haber acuerdos provinciales con Córdoba y San Luis la construcción de la ET Luján.

Por último cabe destacar que la línea puede realizarse hasta la ET Chepes mientras se avanza con la ET Luján lo que tendría un costo casi mitad.

De esta forma se potencia la confiabilidad hacia el sur y se puede hacer una inversión pautada al avance del proyecto de la ET Luján.

Este estudio se realiza en forma completa pero con nivel de detalle en la ingenieria menor al ideal debido a razones presupuestarias. El alcance es Anteproyecto Definitivo apto para licitar con Proyecto a cargo del Contratista.

El contenido de esta parte del trabajo es el siguiente:

TOMO I Flujo de Cargas.

TOMO II Traza de la línea.

TOMO III Cálculos técnicos. Memorias de Cálculo

TOMO IV Documentación Licitatoria

FLUJO DE CARGAS

El Flujo de cargas es un capitulo del cálculo de las líneas de alta tensión que permite conocer el comportamiento de línea eléctrica para una configuración definida por la topología de la red, las características físicas de la línea, generación y consumos determinados en los puntos que denominamos nodos. Se plantea de esta forma un sistema de ecuaciones simultáneas, no lineales, que se resuelven por métodos iterativos.

Se cargan datos a los nodos según la información disponible. Uno de ellos se deja sin datos (llamado swing) y el juego de iteraciones le asigna los resultados que satisfacen las leyes de Kirchoff y Norton, equilibrando el sistema.

Propósito

Es verificar el comportamiento de la línea en los aspectos eléctricos: caídas de tensión, pérdidas de potencia, etc. durante su vida útil, insertada en la zona cuyo mercado de demanda eléctrica se conoce y permite verificar su diseño para atender esa demanda.

Mercado

Los consumos históricos, más una serie de hipótesis y planteos sobre el crecimiento, consultas sobre las políticas provinciales acerca del planeamiento futuro, políticas de inversión, conforman un capítulo que fija en alternativas los rangos de crecimiento del mismo. La situación actual del mercado en conformidad con las pautas de acuerdos internacionales con nuestros socios del Mercosur, definen un contexto en el que se elaboran alternativas de crecimiento para un período suficientemente válido para la vida útil de la línea.

Las conclusiones del mercado han sido oportunamente estudiadas, consultadas con las autoridades provinciales, publicadas y enviadas a la Provincia de La Rioja(Informe Parcial IV de este trabajo). De allí se toman los datos que interesan a la continuación de los estudios.

Programas utilizados

El estudio de flujo de cargas es en definitiva la resolución de una matriz de tantas filas y columnas como incógnitas deben resolverse.

Las incógnitas pueden ser determinadas en función de los datos que se incorporan. Por ejemplo si se introducen potencia activa, tensión en un extremo y consumos en distintos nodos surgen como resultados las corrientes, las caídas de tensión, ángulos de potencia, potencia reactiva en el resto de la red.

Hay distintos programas según la forma de resolución. Se utiliza un método iterativo que, saliendo de valores estimados asignados

a las variables que va corrigiendo en función de que los resultados converjan a valores coincidentes.

Se utilizaron los siguientes programas: EMTP(ATP), FLUPROG (Fludern, desacople rápido).

Ambos programas tienen un comportamiento distinto: El EMTP (Electromagnetic Transient Program) es un programa muy grande para estudios eléctricos y una de sus aplicaciones se destina al flujo de cargas.

La carga de datos no siempre converge a una solución, si ello ocurre después de un número determinado de iteraciones envia una solución con los parámetros tal como quedaron en la última iteración, con las advertencias del caso.

El FLUPROG tiene un método más expeditivo por desacople rápido y siempre presenta su solución. Este programa fué gentilmente cedido por la Universidad de La Plata con autorización para su uso.

El flujo de cargas es una herramienta necesaria para tomar decisiones en cuanto a priorizar inversiones para llegar a optimizar satisfacciones del mercado con cuotas crecientes de inversión. Así por ejemplo no hay, a la fecha, confirmación sobre la construcción de la Estación Transformadora Luján, y necesita el acuerdo y aporte proporcional de los tres estados provinciales afectados.

Está más avanzado a la fecha el Proyecto de la Central Hidráulica de Los Caracoles en San Juan. Siendo probable una alimentación alternativa por esa Provincia a traves de Villa Unión. Por lo tanto es probable que la línea objeto de este estudio se justifique hecerla en dos etapas: Una hasta Chepes o Ulapes y la otra hasta Luján. Esto queda facultativo para las autoridades provinciales para administrar los préstamos que mayor tasa de retorno signifique priorizando la inversión.

ESTUDIO DE LOS CASOS

La denominación de los casos es puramente arbitraria, la asignación válida es la que figura no como título de cada caso sino la asignada en caracteres manuscritos, esto se debe a la conveniencia de relacionar los casos que en el estudio resulten interesantes. Muchos de los casos con numeración correlativa ha tenido que descartarse porque se han tomado como escalones para detectar tendencias, porque no son significativos, por divergencia o porque no aportan novedades.

Se incluyen corridas de elaboración, resolución, y transformación de los datos eléctricos. Los datos que alimentan cada programa tienen que tener un formato especial.

También se incluyen algunos de los cálculos de las bases de fundación de hormigón de los soportes, por método de Sulzberger.

Caso 100

Encabeza un gráfico 100 que es una representación topológica de la red; en ese gráfico, entre corchetes se vuelca el valor de

consumo en MW para cada nodo. Se adjunta la corrida en EMTP. Para este primer caso, se hará una descripción más detallada para conocer su mecánica, e interpretar sus resultados.

En la hoja 1 se ingresan los datos: RECRE, LARIO, 0.11, 0.22 son respectivamente nodo origen (Recreo), nodo destino (La Rioja) impedancia resistiva e inductiva. Así el resto.

En pag. 2 se vuelcan los nodos que generan tensión Luján y Recreo con valor de tensión en valores por unidad. Los valores de consumo en escala 100 MW = 1, y consumo reactivo de la misma forma, la tensión mínima, la máxima (.65 y 1.25). Para los nodos generadores el ángulo eléctrico THMIN Y THMAX.

Se inicia la iteración y se realizan 1048. Los primeros resultados arrojan el número del nodo, la magnitud de la tensión, la potencia real y reactiva.

Después se vuelcan los valores por cada rama progresiva multiplicados por un factor 1.41 que los transforma en valores pico, en coordenadas rectangulares, polares. Del mismo modo la corriente, la potencia activa y reactiva y las pérdidas.

Como último punto se vuelcan los valores eléctricos de los nodos con tensión conocida y aqui, igual que antes, los valores de tensión pico, rectangular, polar; corriente rectangular y polar y valores de potencia activa, reactiva, aparente y factor de potencia.

Se advierte por ejemplo la caída importante de la tensión en los nodos Nonogasta y Chilecito 1.06*1/1.41=0.75 que es inaceptable. Esto significa que deben corregirse valores de potencia activa y reactiva, compensando adecuadamente para evitar caídas tan importantes. Otros recurso son: cambiar la topología de la red, aumentar secciones, compensaciones capacitivas etc.

CASO 110

En este caso se supone una desconexión entre Patquía y Nonogasta y se admite una conexión entre La Rioja y Nonogasta.

Este resulta ser un caso interesante de estudio ya que evidencia la gran ventaja de la conexión "transVelazco".

Obsérvese que para VU.(Villa Unión) en el caso 100, con la conexión actual, la tensión es de 1.04/1.41=0.73. En el caso de estar conectados por la "transVelazco", la tensión es 1.16/1.41=0.82.

Este caso es de laboratorio, no tiene implementadas correcciones de ningún tipo pero sirve de evidencia como justificante de construcción futura de la línea de interconexión.

El terreno es dificultoso pero tiene un antecedente de una linea telegráfica tendida por ese camino que actuó durante mucho tiempo (30 a 40 anos).

CASO 130 y 200

Ilustra la preparación de datos para incluirlos en el programa de EMTP como datos elaborados según los requisitos de aceptación, en forma y sintaxis.

Son los que surgen de las configuración física y geográfica de la línea más los requisitos de energía y potencia de la zona que abastece. Es resultado del uso de una planilla electrónica u hoja de cálculo.

CASO 160

Se estudia en este caso mediante el uso del programa FLUPROG. Es una hipótesis de funcionamiento de alimentación de la línea sólo para las poblaciones del sur, centro y oeste.

CASO 250

Ilustra otro caso en EMTP de alimentación simplificada para verificar el funcionamiento del programa y asegurar convergencia, estudiar el juego de compensaciones. Que pueden ser correcciones de coseno fi mediante capacitores, o regulación de los pasos del transformador.

CASO 260

Esta es otra forma más completa, ilustra además un caso de rechazo de datos preliminares y advertencia de error, del que despues se recupera.

CASO 270

Este caso sirve para controlar la diferencia en caídas de tensión con el caso 260 porque es la línea con conexión actual y con cargas similares al anterior. Resultando una tensión 0.71 contra 0.82 la caída de tensión para V.Unión en valores en tanto por unidad. Con este caso se verifica la ventaja de funcionamiento de la conexión La Rioja- Nonogasta. Ver tambié caso 110.

CASO 300

Este caso ilustra una configuración en la que se supone generación en V.Unión y en Luján. Esta es una posibilidad que se da en la alternativa de alimentación de energía de la Central de Los Caracoles en San Juan.

CASO 310

Se vuelca aquí la salida de un programa que da los datos del cuadripolo Pi, las constantes A,B,C,D. El estudio es para líneas con parámetros distribuidos, o sea los valores reales de líneas de gran longitud. Se analiza el caso particular de la línea con sección 240 AlAc mm2 que fué la primer alternativa analizada.

CASO 320

Lo mismo que el caso anterior pero la sección AlAc en este caso de 150 mm2.

CASO 325

Lo mismo que el caso anterior pero con otras condiciones de transporte de energía.

CASO 330

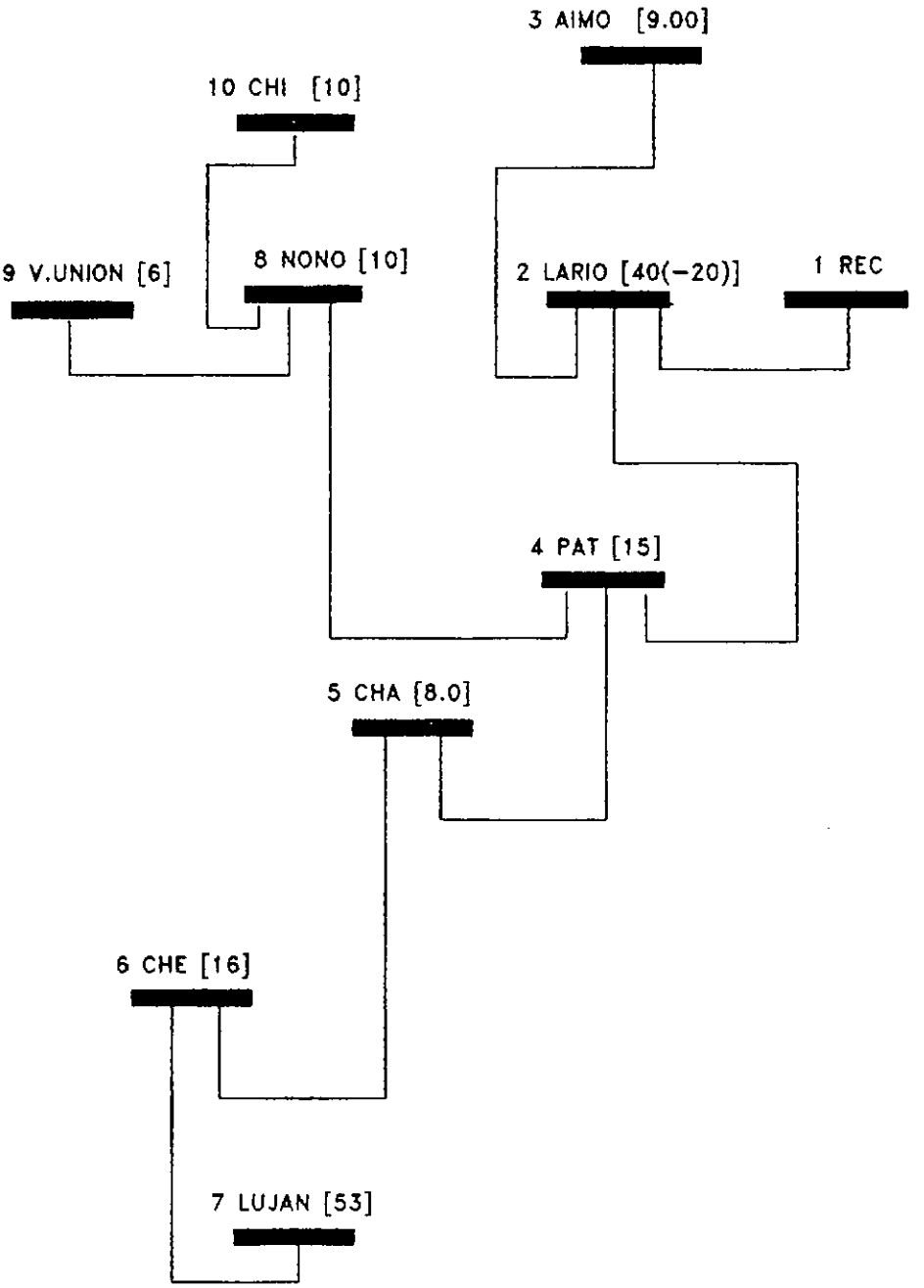
Esta es la salida de una corrida EMTP con linea de AlAc 150 mm2 con alimentación por Luján y Recreo.

CASO 340

Esta es la salida de una corrida EMTP con linea de AlAc 150 mm2 con alimentación por Luján, Recreo y por V.Unión. Esta es una alternativa viable para el futuro por lo tanto se incorpora para conocer su comportamiento.

Estos no son, como se dijo arriba, todos los casos estudiados. Esto haría muy voluminoso el estudio sin agregar más elementos de juicio.

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 100
CARGA MW [ ] AÑO 1993



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CASO 100 - 700-2

```
ternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
Date (dd-mth-yy) and time of day (hh.mm.ss) = 05-Apr-94  15.12.49    Name of disk plot file, if any, is  C:\4051512.pl4
r information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
otal length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM"  List Sizes follow :    752   900  1500   150  7500
  120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1930   300   450 12000     9  1200   252    4
```

escriptive interpretation of input data cards.	Input data card images are shown below, all 80 columns, character by character
	0 1 2 3 4 5 6 7 8
	01234567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card. KOMPAR = 1.	C data:C:\RIV\EMIN\PROBE2.DAT
omment card. KOMPAR = 1.	C DATA:C:\RIV\EMIN\PROBE2.DAT{-05-04-94 15:55:REIOMO Y AGREGO DATOS DE ARCH
omment card. KOMPAR = 1.	C RED 132 kV LA RIOJA; DATOS DE RED FLU132E.WG1 12-12-93}
omment card. KOMPAR = 1.	C (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC}
rase all of 0 cards in the punch buffer.	$ERASE
arker card preceding new EMTP data case.	BEGIN NEW DATA CASE
idth of time-step loop numbers. W=13 S=2	PRINTED NUMBER WIDTH, 13, 2, (Request maximum precision for 8 output columns
eclaration of desired EMTP load flow usage.	FIX SOURCE (An EMTP load flow will satisfy requested phasor power injections.
ew power frequency STATFR = 5.00000000E+01 Hz.	POWER FREQUENCY, 50.0,
omment card. KOMPAR = 1.	C MISCELANEA CARD SIGUE II B-1,II B-2
omment card. KOMPAR = 1.	C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card. KOMPAR = 1.	C DELTAT TMAX XOPT COPT EPSILN TOLMAT
isc. data. 2.000E-04 0.000E+00 5.000E+01	.000200 .000 50.50.(T-max = 0 means that no transient solution follows
omment card. KOMPAR = 1.	C IOUT IPLOT IDOUBL KSSOUT MAXOUT IPUN MEMSAV ICAT NERERG IPRSUP
omment card. KOMPAR = 1.	C 1-8 8-16 17-24 25-32 33-40 41-48 49-56 57-64 65-72
isc. data. 1 1 0 1 0 1 0 0 0 0	1 1 1 0 1
omment card. KOMPAR = 1.	C
omment card. KOMPAR = 1.	C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
omment card. KOMPAR = 1.	C BASE 100 MVA =1; BB=132 KV
omment card. KOMPAR = 1.	C SIGUE FORMATO RULE BOOK 4A-2
omment card. KOMPAR = 1.	C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card. KOMPAR = 1.	C BUS1 BUS2 BUS3 BUS4 RESIS XL XC OUTPUT OPTION
omment card. KOMPAR = 1.	C A6 A6 A6 A6 E6.2 E6.2 E6.2 II
omment card. KOMPAR = 1.	C 3-8 9-14 15-20 21-26 27-32 33-38 39-44 90
omment card. KOMPAR = 1.	C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUAL!!)
omment card. KOMPAR = 1.	C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
eries R-L-C. 1.100E-01 7.003E-04 0.000E+00	RECRE LARIO 0.11 0.22 4
eries R-L-C. 1.600E-01 9.549E-04 0.000E+00	LARIO AIMOG .16 .30 4
eries R-L-C. 8.000E-02 5.093E-04 0.000E+00	LARIO PATQU .08 .16 4
eries R-L-C. 8.000E-02 5.093E-04 0.000E+00	PATQU CHAMI .08 .16 4
eries R-L-C. 1.400E-01 8.276E-04 0.000E+00	PATQU NONOG .14 .26 4
eries R-L-C. 9.000E-02 8.913E-04 0.000E+00	CHAMI CHEPE .09 .28 4
eries R-L-C. 9.000E-02 8.594E-04 0.000E+00	CHEPE LUJAN .09 .27 4
eries R-L-C. 1.100E-01 6.685E-04 0.000E+00	NONOG YUNIO .11 .21 4
eries R-L-C. 1.000E-02 6.366E-05 0.000E+00	NONOG CHILE .01 .02 4
omment card. KOMPAR = 1.	C LARIO NONOG .08 .16 4
omment card. KOMPAR = 1.	C
omment card. KOMPAR = 1.	C
lank card ending branches. IBR, NTOT = 9 11	BLANK card ending branch cards.
lank card ending switches. KSWTCH = 0.	BLANK card ending switch cards.
omment card. KOMPAR = 1.	C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
omment card. KOMPAR = 1.	C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890

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mment card.   KOMPAR = 1.                     |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART    TSTOP
mment card.   KOMPAR = 1.                     |C I2 A6 I2   E10.6     E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
mment card.   KOMPAR = 1.                     |C  1-2 9-10 10-20   21-30      31-40    41-50      51-60     61-70     71-80
mment card.   KOMPAR = 1.                     |C
urce.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00 |14LUJAN          1.10       50.      15.0                                  -1.
urce.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00 |14RECRE          1.10       50.      15.0                                  -1.
mment card.   KOMPAR = 1.                     |C
mment card.   KOMPAR = 1.                     |C
ank card ends electric network sources.       |BLANK card terminating all EMTP source cards.
mment card.   KOMPAR = 1.                     |C               Next come power constraints of the load flow.   There will be one
mment card.   KOMPAR = 1.                     |C               for each non-slack generator.   So, 3 of them will apply to nodes
mment card.   KOMPAR = 1.                     |C               that have no  Type-14  source as required by the algorithm.   The
mment card.   KOMPAR = 1.                     |C               program will define these internally.  Yet, this is only possible
mment card.   KOMPAR = 1.                     |C               for  TMAX  non-positive (no transient continuation).   If data is
mment card.   KOMPAR = 1.                     |C               modified to make  TMAX > 0,  a  KILL = 40  error termination will
mment card.   KOMPAR = 1.                     |C               will result.  Yet,  the  transient simulation is possible  as  a
mment card.   KOMPAR = 1.                     |C               2nd simulation that replaces the power constraints  at load nodes
mment card.   KOMPAR = 1.                     |C               by constant-impedance loads.  Branch cards  for  these  will  be
mment card.   KOMPAR = 1.                     |C               punched by the present subcase,  and  the  transient continuation
mment card.   KOMPAR = 1.                     |C               will be illustrated by the following (4th of 4) subcase.
mment card.   KOMPAR = 1.                     |C          The following 4 cards would be used if peak rather then RMS input data.
mment card.   KOMPAR = 1.                     |C          Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
mment card.   KOMPAR = 1.                     |C          (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
mment card.   KOMPAR = 1.                     |C
mment card.   KOMPAR = 1.                     |C VALORES DE POTENCIA EN PU 1=100 MVA
mment card.   KOMPAR = 1.                     |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
mment card.   KOMPAR = 1.                     |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
mment card.   KOMPAR = 1.                     |C NKBUS1 BUS2  BUS3  PK or QK          QK or VK        VMIN      VMAX    THMIN THMAX
mment card.   KOMPAR = 1.                     |C 1-2 3-8 9-14 15-20  21-36             37-52           53-60     61-68  69-74  75-80
X.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00 |  LARIO                 -0.4000           -0.200     .65    1.25
X.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                 -0.080            -.034      .65    1.25
X.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00 |  PATOU                 -0.150            -.080      .65    1.25
X.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                 -0.10             -.061      .65    1.25
X.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00 |  VUNIO                 -.0600            -.02       .65    1.25
mment card.   KOMPAR = 1.                     |C LUJAN                          1.0         1.20                      -20.   40.
X.   8.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1RECRE                0.8                1.10                      -20.   15.
X.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                 -.16               -.09              1.5
X.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00 |  AIMOG                 -0.090            -0.04      .65    1.15
X.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00 |  CHILE                 -.1000             -.04              1.15
mment card.   KOMPAR = 1.                     |C    The following load-flow miscellaneous data card has two peculiarities.  The
mment card.   KOMPAR = 1.                     |C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
mment card.   KOMPAR = 1.                     |C    voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
mment card.   KOMPAR = 1.                     |C    (this  works  well  for  this problem whether RMS or peak values are used).
mment card.   KOMPAR = 1.                     |C          NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
mment card.   KOMPAR = 1.                     |C           10-16   17-24   25-32  33-40    41-48   50-56    57-64
= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =      9      11      19       0       0       0
ad flow iter.   1   2500   20   1   1.00E-02 |              1    2500      20       1     .01      0.2      2.5   1.414      2
ax del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0187 .0152 .0155 .0158 .0149 .0136 .0135 .0133 .0131 .0129 .0127 .0125 .0125
urce No.      1    -4    -4    -4    -4    -4    -4    -4    -9    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5     7
ax del-V:  .0128  .013 .0132 .0133 .0112 .0111 .0108 .0106 .0113 .0094 .0103 .0113 .0103 .0114 .0117 .0102 .0115 .0115 .0116 .0115
urce No.      7     7     7     7    -5     4    -5    -5    -9    -4    -4    -9    -4     4    -4    -9    -4     4    -4     4
ax del-V:  .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0115 .0116 .0115 .0116 .0115 .0115 .0115 .0115 .0115 .0115 .0115 .0115 .0115
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urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0115	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0113	.0113	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0112	.0112
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	-9
x del-V:	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.011	.011	.011	.011	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.0109	.0109	.0109	.0109	.0109	.0109
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0108	.0109	.0108	.0109
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0107	.0107	.0107	.0107
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0106
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0106	.0106	.0106	.0106
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105

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urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0104 .0105 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0105 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
urce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
x del-V:  .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103
ource No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V: .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0103 .0103
ource No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V: .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
ource No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V: .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
ource No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V: .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0102 .0103 .0102
ource No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4     4
ax del-V: .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102
ource No.    -4     4    -4     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0103 .0102 .0103 .0102 .0103
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0102 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0102 .0104 .0102 .0104 .0102 .0104 .0102 .0104 .0102 .0104 .0101 .0104
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0101 .0104 .0101 .0104 .0101 .0104 .0101 .0104   .01 .0105   .01 .0105   .01 .0105   .01 .0105 .0099 .0105 .0099 .0105
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0099 .0105 .0099 .0105 .0099 .0105 .0099 .0105 .0099 .0105 .0099 .0105 .0099 .0105   .01 .0105   .01 .0105   .01 .0105
ource No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V:   .01 .0105   .01 .0105   .01 .0105   .01 .0106   .01 .0106   .01 .0105 .0099 .0104 .0098 .0103 .0096 .0101 .0094 .0098
ource No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V: .0091 .0094 .0088 .0091 .0084 .0086 .0079 .0082 .0075 .0077  .007 .0072 .0065 .0067 .0059 .0062 .0054 .0056 .0049 .0051
ource No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4     9     4
ax del-V: .0045 .0046  .004 .0042 .0036 .0037 .0032 .0033 .0028 .0029 .0025 .0025 .0022 .0022 .0019 .0019 .0016 .0016 .0014 .0014
ource No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V: .0012 .0012  .001 1.E-3 .9E-3 .8E-3 .7E-3 .7E-3
ource No.     9     4     9     4     9     4     9     4
xit the load flow iteration loop with counter  NEKITE = 1048.   If no warning on the preceding line,  convergence was attained.
Row  Node  Name    Voltage magnit     Degrees      Real power F    Reactive power
  3     3  LARIO   9.03095820E-01     2.81941  -4.03220938E-01  -2.01118971E-01
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4	6	CHAMI	8.92148054E-01	3.81992	-8.11722435E-02	-3.54636234E-02
5	5	PATQU	8.52596333E-01	1.47386	-1.51310901E-01	-8.11924027E-02
6	7	MONOG	7.55086210E-01	-2.92695	-1.08753601E-01	-7.63559025E-02
7	10	VUNIQ	7.38849166E-01	-3.96111	-6.01768724E-02	-2.38321913E-02
2	2	RECRE	1.10000000E+00	9.02719	7.95027448E-01	6.13694372E-01
8	8	CHEPE	9.72179851E-01	9.05299	-1.60217557E-01	-9.06666367E-02
9	4	AIMOG	8.71505735E-01	1.26612	-9.30610913E-02	-4.11698788E-02
10	11	CHILE	7.52241020E-01	-3.08961	-9.30108620E-02	-3.32825663E-02

nusoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
ECRE		1.5363782760361	1.5556349186104	1.1332327372933	1.2912223859794	.7950274483O178	.0916990387529?
		.244011870458	9.0244988	-.61890129518&4	-28.6406245	.61369437241158	0.1833981
	LARIO	1.2755643899932	1.2771083813261	-1.133232737293	1.2912223859794	-.7033284095488	
		.06277981072376	2.8176688	.61890129518444	151.3593755	-.430296294905&	
ARIO		1.2755643899932	1.2771083813261	.15245771331815	.16513862425238	.09524275247453	.0021816512176
		.06277981072376	2.8176688	-.0634618851735	-22.5599565	.0452604936173	0.0040706
	AIMOG	1.2321325903103	1.2324327016873	-.1524577133181	.16513862425238	-.0930610912569	
		.02719639835607	1.2644628	.06346188517347	157.4000435	-.0411698788343	
ARIO		1.2755643899932	1.2771083813261	.33459648140368	.43114403872619	.20486471882004	.00743540728517
		.06277981072376	2.8176688	-.2719014100026	-39.0781669	.18391682997982	0.0148708
	PATQU	1.2052924458805	1.2056909480758	-.3345964814037	.43114403872619	-.1974293115349	
		.03099648649938	1.4731499	.27190141000261	140.9018331	-.1690460134095	
ATQU		1.2052924458805	1.2056909480758	-.3989777803711	.4211890624396	-.2383506512603	.00709500905275
		.03099648649938	1.4731499	.13497020615318	161.3098340	-.0875227408444	0.0141920
	CHAMI	1.2589059016147	1.2616077964478	.39897778037108	.4211890624396	.24544665031205	
		.0840353147065	3.8192824	-.1349702081532	-18.6901660	.10171475894983	
ATQU		1.2052924458805	1.2056909480758	.47920024641766	.55434578515984	.28446906158253	.02151094746671
		.03099648649938	1.4731499	-.2786868733144	-30.1808540	.17537635357022	0.0397487
	MONOG	1.0657458243203	1.0671424809421	-.4792002464177	.55434578515984	-.2627581141159	
		-.0545794153052	-2.9316939	.27868687331435	149.8191460	-.135427451132	
CHAMI		1.2589059016147	1.2616077964478	-.5311174043656	.56159562650557	-.3266189037828	.01419253414696
		.0840353147065	3.8192824	.18249369986434	161.0371089	-.1271783823093	0.0441546
	CHEPE	1.3577047039696	1.3748301822891	.53111740436556	.56159562650557	.34081143792976	
		.21632375494106	9.0528704	-.1824936998643	-18.9628911	.18133293298877	
CHEPE		1.3577047039696	1.3748301822891	-.7820397865097	.82933854700719	-.5010289946853	.03095110914984
		.21632375494106	9.0528704	.27607281261993	160.3561364	-.2719995697316	0.0928533

LUJAN	1.5026279441629	1.5556349186104	.78203978650968	.82933854700719	.5319801038361	
	.40262794416288	15.0000000	-.2760728126199	-19.4438636	.36485289718116	
NOG	1.0657458243203	1.0671424809421	.11177527823698	.12390774389819	.06102129445152	.844422094839E-3
	-.0545794153052	-2.9316939	-.0534735090768	-25.5665426	.02544426983929	3.0416121
VUNIO	1.0422211068081	1.0447168823453	-.111775278237	.12390774389819	-.0601768723566	
	-.0721701377365	-3.9612074	.05347350907678	154.4334574	-.0238321912945	
NOG	1.0657458243203	1.0671424809421	.17118872721111	.18566435569345	.09318321822373	.172356264838E-3
	-.0545794153052	-2.9316939	-.0718726140536	-22.7748228	.03662727883632	0.0003447
CHILE	1.0625964847671	1.0641394641784	-.1711887272111	.18566435569345	-.0930108619589	
	-.0572844637089	-3.0859223	.07187261405365	157.2251772	-.0332825663066	

Total network loss P-loss by summing injections = 1.760834854316E-01

lution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed sult applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the sociated power factor.

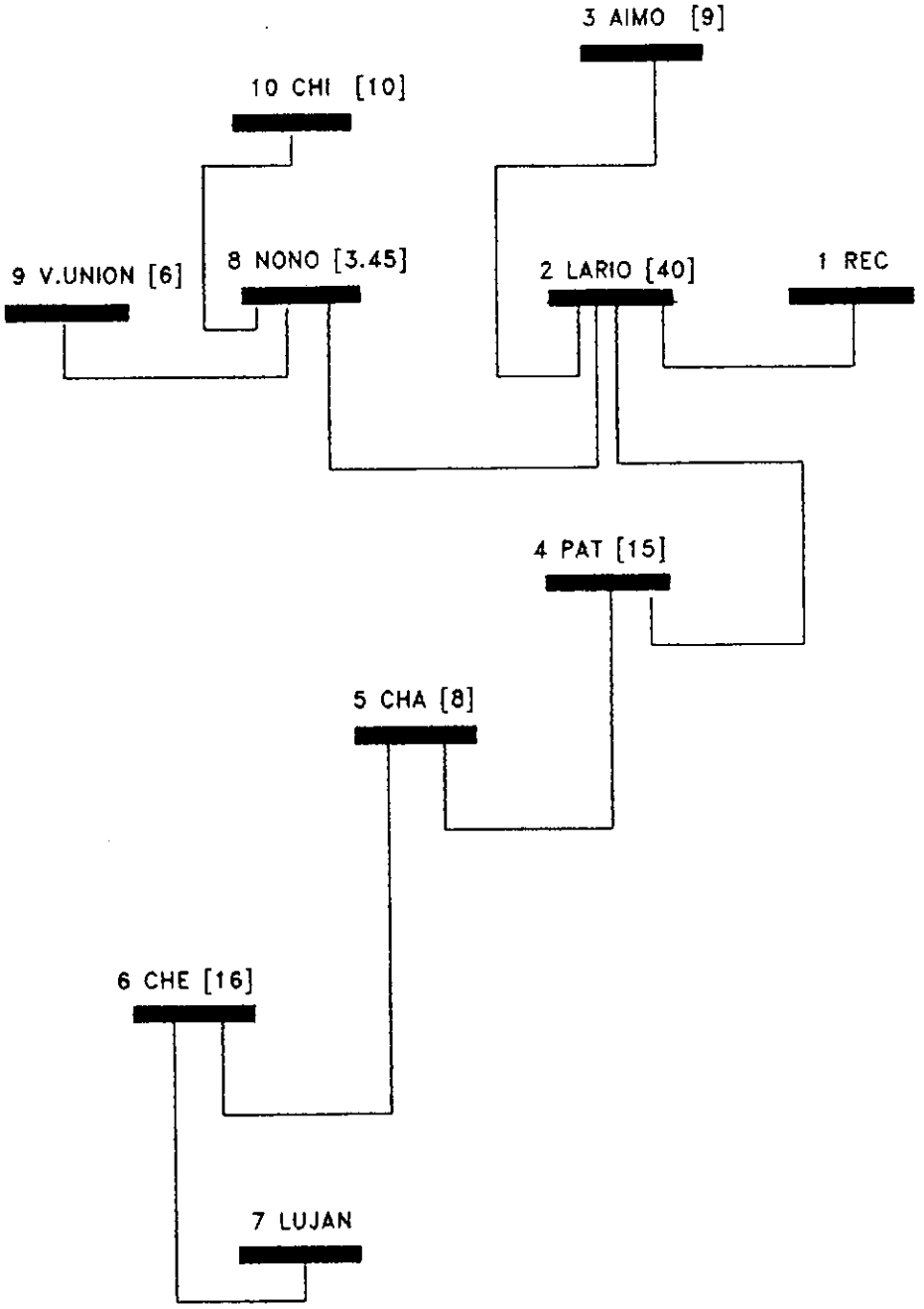
Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.5363782760361	1.5556349186104	1.1332327372933	1.2912223859794	.79502744830178	1.0043353156605
	.244011870458	9.0244988	-.6189012951844	-28.6406245	.61369437241158	0.7915956
LARIO	1.2755643899932	1.2771083813261	-.6461785425715	.70564899654756	-.4032209382542	.45039512388262
	.06277981072376	2.8176688	.28353800000836	156.3085165	-.2011189713085	-0.8948631
AINOG	1.2321325903103	1.2324327016873	-.1524577133181	.16513862425238	-.0930610912569	.10176112042014
	.02719639835607	1.2644628	.06346198517347	157.4000435	-.0411698788343	-0.9145054
PATQU	1.2052924458805	1.2056909480758	-.2543740133571	.28484634569	-.1513109012127	.17171835976194
	.03099648643938	1.4731499	.12818474484143	153.2554450	-.0811924026837	-0.8811574
CHAMI	1.2588059016147	1.2616077964478	-.1321396239945	.14042564756419	-.0811722434697	.08259104589411
	.0840353147065	3.8192824	.04752349171116	160.2190796	-.0354636233595	-0.9163613
NONOG	1.0657458243203	1.0671424809421	-.1962362409696	.24904226134701	-.1087536014406	.13288178831664
	-.0545794153052	-2.9316939	.15334075018392	141.9956135	-.0763559024564	-0.8184237
CHEPE	1.3577047039696	1.3748301822891	-.2509223821441	.26780420498007	-.1602175567565	.18409265197527
	.21652375494106	9.0528704	.09357911275559	159.5474766	-.0906666367429	-0.8703094
LUJAN	1.5026279441629	1.5556349186104	.78203978650968	.82933854700719	.5319801038361	.6450740015537
	.40262794416288	15.0000000	-.2760728126199	-19.4438636	.36485289718116	0.6246807
VUNIO	1.0422211068081	1.0447168823453	-.111775278237	.12390774389819	-.0601768723566	.06472425595189
	-.0721701377365	-3.9612074	.05347350907678	154.4334574	-.0238321912945	-0.5297422
CHILE	1.0625964847671	1.0641394641784	-.1711887272111	.18566435569345	-.0930108619589	.09879633899233
	-.0572844637089	-3.0859223	.07187261405365	157.2251772	-.0332825663066	-0.3415352

```
ment card.   KOMPAR = 1.                    !C
ment card.   KOMPAR = 1.                    !C
ment card.   KOMPAR = 1.                    !C
uest for flushing of punch buffer.          !$PUNCH      ( Flush punched cards; R-L branches for equivalent impedance loads

isting of 80-column card images now being flushed from punch buffer follows.
================================================================================
456789012345678901234567890123456789012345678901234567890123456789012345678901
================================================================================
======(  End of LUNIT7 punched cards as flushed by  $PUNCH  request  )========
nk card ending node names for voltage output.  !BLANK card ending requests for output variables

ective branch outputs follow (for column-80 keyed branches only).  Any request for branch current output automatically will be
mented to include branch voltage.  But the converse is not true (a request for voltage only will not produce current output).
rom    To      (========  Branch voltage  Vkm  =  Vk - Vm  =========)      (======  Branch current  Ikm  from  K to M  ======)
as K   bus M    Magnitude      Degrees       Real part      Imag part      Magnitude      Degrees       Real part      Imag part
CRE  LARIO  3.1759871E-01   34.794324  2.6081389E-01  1.8123206E-01   1.2912224E+00  -28.640624  1.1332327E+00 -6.1890130E-01
RIO  AIMOG  5.6147132E-02   39.327557  4.3431800E-02  3.5583412E-02   1.6513862E-01  -22.599957  1.5245771E-01 -6.3461885E-02
RIO  PATGU  7.7125390E-02   24.336782  7.0271944E-02  3.1783324E-02   4.3114404E-01  -39.098167  3.3459648E-01 -2.7190141E-01
TGU  CHAMI  7.5344590E-02 -135.255217 -5.3513456E-02 -5.3038828E-02   4.2118906E-01  161.309834 -3.7897778E-01  1.3497021E-01
TGU  NONOG  1.6369635E-01   31.518390  1.3954662E-01  8.5575902E-02   5.5434579E-01  -30.180854  4.7920025E-01 -2.7868687E-01
AMI  CHEPE  1.6517023E-01 -126.781780 -9.8898802E-02 -1.3228844E-01   5.6159563E-01  161.037109 -5.3111740E-01  1.8249370E-01
EPE  LUJAN  2.3603389E-01 -127.878812 -1.4492324E-01 -1.8630419E-01   8.2933855E-01  160.556136 -7.8203979E-01  2.7607281E-01
NOG  VUNIO  2.9374238E-02   36.787482  2.3524718E-02  1.7590722E-02   1.2390774E-01  -25.566543  1.1177528E-01 -5.3477509E-02
NOG  CHILE  4.1515812E-03   40.660126  3.1493396E-03  2.7050484E-03   1.8566436E-01  -22.774823  1.7118873E-01 -7.1872614E-02
tual List Sizes for the preceding solution follow.       05-Apr-94  15.13.23
 Size  1-10:    11     9     9     2 -9999     0 -9999 -9999     0     0
 Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     9    23     0
 Size 21-29:     0 -9999     9 -9999 -9999 -9999 -9999 -9999 -9999
conds for overlays  1-5  :    23.680     0.000    23.680  --- (CP; I/O; tot)
conds for overlays  6-11 :    10.387     0.000    10.387
conds for overlays 12-15 :     0.000     0.000     0.000
conds for time-step loop :     0.000     0.000     0.000
conds after DELTAT-loop  :     0.383     0.000     0.383
                          ----------------------------
                 Totals  :    34.449     0.000    34.449
```

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 110
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

```
DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 11:20:RETOMO Y AGREGO DATOS DE ARCH
RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
 *CASO*110; LINEA*CHAMI[5], CHEP[6] Y CHEP[60, LUJ[7] EN 240 MM2
RASE                                                    "
GIN NEW DATA CASE
INTED NUMBER WIDTH, 13, 2,   ( Request maximum precision for 8 output columns
X SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
WER FREQUENCY, 50.0,
MISCELANEA CARD SIGUE II B-1,II B-2
345678901234567890123456789012345678901234567890123456789012345678901234567890
DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
000200    .000     50.50.( T-max = 0  means that no transient solution follows
IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
 1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
     1       1              1       0       1

CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
BASE 100 MVA =1; UB=132 KV
SIGUE FORMATO RULE BOOK 4A-2
345678901234567890123456789012345678901234567890123456789012345678901234567890
BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
 A6    A6    A6     A6  E6.2  E6.2  E6.2       II
  3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
RECRE LARIO              0.11  0.22                                          4
LARIO AINOG               .16   .30                                          4
LARIO PATQU               .08   .16                                          4
PATQU CHAMI               .08   .16                                          4
PATQU NONOG               .14   .26                                          4
CHAMI CHEPE               .11   .35                                          4
CHEPE LUJAN              .105   .34                                          4
NONOG VUNIO               .11   .21                                          4
NONOG CHILE               .01   .02                                          4
LARIO NONOG               .08   .16                                          4


LANK card ending branch cards.
LANK card ending switch cards.
SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
345678901234567890123456789012345678901234567890123456789012345678901234567890
NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
I2 A6 I2   E10.6    E10.6     E10.6  E10.6       E10.6     E10.6     E10.6
 1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80

LUJAN         1.10       50.      15.0                          -1.
RECRE         1.10       50.      15.0                          -1.


LANK card terminating all EMTP source cards.
            Next come power constraints of the load flow.  There will be one
            for each non-slack generator.  So, 3 of them will apply to nodes
```

that have no Type-14 source as required by the algoritha. The program will define these internally. Yet, this is only possible for TMAX non-positive (no transient continuation). If data is modified to make TMAX > 0, a KILL = 40 error termination will will result. Yet, the transient simulation is possible as a 2nd simulation that replaces the power constraints at load nodes by constant-impedance loads. Branch cards for these will be punched by the present subcase, and the transient continuation will be illustrated by the following (4th of 4) subcase.

The following 4 cards would be used if peak rather than RMS input data. Note that average of Vmin & Vmax = 0.5 (1.0 + 1.828428) = 1.414212 (power constraints RED, BLUE, and YELLOW), and 1.4709 = 1.414 * 1.02

```
VALORES DE POTENCIA EN PU 1=100 MVA
PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
NKBUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN    VMAX    THMIN THMAX
1-2 3-8 9-14 15-20  21-36          37-52         53-60   61-68   69-74  75-80
LARIO                -0.4000          -0.200      .65    1.25
CHAMI                -0.080           -.034       .65    1.25
PATBU                -0.150           -.080       .65    1.25
NONOG                -0.10            -.061       .65    1.25
YUNIO                -.0600           -.02        .65    1.25
LUJAN                      1.0          1.20                    -20.   40.
RECRE                0.8              1.10                    -20.   15.
CHEPE                -.16             -.09            1.5
AIMOG               -0.090           -0.04        .65    1.15
CHILE                -.1000           -.04            1.15
```

The following load-flow miscellaneous data card has two peculiarities. The use of VSCALE = 1.414 is the special flag requesting RMS rather than peak voltages. The use of KTAPER = 0 ensures constant acceleration factors (this works well for this problem whether RMS or peak values are used).

```
     NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
      10-16   17-24   25-32   33-40   41-48   50-56   57-64
          1    2500      20       1     .01     0.2     2.5   1.414       2
```

```
PUNCH        ( Flush punched cards: R-L branches for equivalent impedance loads
BLANK card ending requests for output variables
BLANK card ending plot cards
BEGIN NEW DATA CASE
```

```
 Path: C:\ATP
 File: AP61125 .SAL   40.173 .a.. 06-04-94 11:24:40          Page 1

ternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
ate (dd-mth-yy) and time of day (hh.mm.ss) = 06-Apr-94  11.24.05    Name of disk plot file, if any, is  C:44061124.pl4
r information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
tal length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM"  List Sizes follow :    752   900  1500   150  7500
 120  2100  5250   225   480   150   150 15000     60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252    4
-------------------------------------------------+--------------------------------------------------------------------------------
scriptive interpretation of input data cards.    |  Input data card images are shown below, all 80 columns, character by character
                                                 0         1         2         3         4         5         6         7         8
                                                 01234567890123456789012345678901234567890123456789012345678901234567890123456789 0
-------------------------------------------------+--------------------------------------------------------------------------------
mment card.   KOMPAR = 1.                        |C data:C:\RIV\EMIN\PROBE4.DAT
mment card.   KOMPAR = 1.                        |C DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 11:20;RETOMO Y AGREGO DATOS DE ARCH
mment card.   KOMPAR = 1.                        |C RED 132 KV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93}
mment card.   KOMPAR = 1.                        |C   CASO 110; LINEA CHAMI[3], CHEP(6) Y CHEP(50, LUJ[7] EN 240 MHZ
ase all of  0   cards in the punch buffer.       |$ERASE
rker card preceding new EMTP data case.          |BEGIN NEW DATA CASE
dth of time-step loop numbers.  W=13   S=2       |PRINTED NUMBER WIDTH, 13, 2,   { Request maximum precision for 8 output columns
claration of desired EMTP load flow usage.       |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
w power frequency  STATFR = 5.00000000E+01  Hz.  |POWER FREQUENCY, 50.0,
mment card.   KOMPAR = 1.                        |C MISCELANEA CARD SIGUE II B-1,II B-2
mment card.   KOMPAR = 1.                        |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
mment card.   KOMPAR = 1.                        |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
sc. data.     2.000E-04   0.000E+00   5.000E+01  | .000200     .000       50.50.{ T-max = 0  means that no transient solution follows
mment card.   KOMPAR = 1.                        |C IOUT    IPLOT  IDOUBL    KSSOUT   MAXOUT  IPUN    MEMSAV    ICAT  NENERG   IPRSUP
mment card.   KOMPAR = 1.                        |C  1-8     8-16  17-24      25-32    33-40   41-48     49-56     57-64  65-72
sc. data.       1   1  0  1  0  1  0  0  0  0    |       1         1                  1        0        1
mment card.   KOMPAR = 1.                        |C
mment card.   KOMPAR = 1.                        |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
mment card.   KOMPAR = 1.                        |C BASE 100 MVA =1; UB=132 KV
mment card.   KOMPAR = 1.                        |C SIGUE FORMATO RULE BOOK 4A-2
mment card.   KOMPAR = 1.                        |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
mment card.   KOMPAR = 1.                        |C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
mment card.   KOMPAR = 1.                        |C  A6    A6    A6     A6  E6.2  E6.2  E6.2        I1
mment card.   KOMPAR = 1.                        |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44       80
mment card.   KOMPAR = 1.                        |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
mment card.   KOMPAR = 1.                        |C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
ries R-L-C.   1.100E-01  7.003E-04  0.000E+00    |  RECRE LARIO              0.11  0.22                                        4
ries R-L-C.   1.600E-01  9.549E-04  0.000E+00    |  LARIO AIMOG               .16   .30                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00    |  LARIO PATQU               .08   .16                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00    |  PATQU CHAMI               .08   .16                                        4
mment card.   KOMPAR = 1.                        |C PATQU NONOG               .14   .26                                        4
ries R-L-C.   1.100E-01  1.114E-03  0.000E+00    |  CHAMI CHEPE               .11   .35                                        4
ries R-L-C.   1.050E-01  1.082E-03  0.000E+00    |  CHEPE LUJAN              .105   .34                                        4
ries R-L-C.   1.100E-01  6.685E-04  0.000E+00    |  NONOG VUNIO               .11   .21                                        4
ries R-L-C.   1.000E-02  6.366E-05  0.000E+00    |  NONOG CHILE               .01   .02                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00    |  LARIO NONOG               .08   .16                                        4
mment card.   KOMPAR = 1.                        |C
mment card.   KOMPAR = 1.                        |C
ank card ending branches.  IBR, NTOT = 9  11     |BLANK card ending branch cards.
ank card ending switches.   KSWITCH = 0.         |BLANK card ending switch cards.
mment card.   KOMPAR = 1.                        |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
mment card.   KOMPAR = 1.                        |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
```

```
mment card.   KOMPAR = 1.                              |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1      TIME-1    TSTART    TSTOP
mment card.   KOMPAR = 1.                              |C I2 A6 I2   E10.6     E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
mment card.   KOMPAR = 1.                              |C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
mment card.   KOMPAR = 1.                              |C
urce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00         |14LUJAN          1.10        50.       15.0                              -1.
urce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00         |14RECRE          1.10        50.       15.0                              -1.
mment card.   KOMPAR = 1.                              |C
mment card.   KOMPAR = 1.                              |C
ank card ends electric network sources.                |BLANK card terminating all EMTP source cards.
mment card.   KOMPAR = 1.                              |C                Next come power constraints of the load flow.  There will be one
mment card.   KOMPAR = 1.                              |C                for each non-slack generator.  So, 3 of them will apply to nodes
mment card.   KOMPAR = 1.                              |C                that have no  Type-14  source as required by the algorithm.  The
mment card.   KOMPAR = 1.                              |C                program will define these internally.  Yet, this is only possible
mment card.   KOMPAR = 1.                              |C                for  TMAX  non-positive (no transient continuation).  If data is
mment card.   KOMPAR = 1.                              |C                modified to make  TMAX > 0,  a  KILL = 40  error termination will
mment card.   KOMPAR = 1.                              |C                will result.  Yet,  the  transient simulation is possible  as  a
mment card.   KOMPAR = 1.                              |C                2nd simulation that replaces the power constraints  at load nodes
mment card.   KOMPAR = 1.                              |C                by constant-impedance loads.  Branch cards  for  these  will  be
mment card.   KOMPAR = 1.                              |C                punched by the present subcase,  and  the  transient continuation
mment card.   KOMPAR = 1.                              |C                will be illustrated by the following (4th of 4) subcase.
mment card.   KOMPAR = 1.                              |C          The following 4 cards would be used if peak rather than RMS input data.
mment card.   KOMPAR = 1.                              |C          Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
mment card.   KOMPAR = 1.                              |C          (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
mment card.   KOMPAR = 1.                              |C
mment card.   KOMPAR = 1.                              |C VALORES DE POTENCIA EN PU 1=100 MVA
mment card.   KOMPAR = 1.                              |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4:10-6
mment card.   KOMPAR = 1.                              |C 34567890123456789012345678901234567890123456789012345678901234567890
mment card.   KOMPAR = 1.                              |C NKBUS1 BUS2  BUS3  PK or QK          QK or VK         VMIN     VMAX    THMIN THMAX
mment card.   KOMPAR = 1.                              |C 1-2 3-8 9-14 15-20  21-36             37-52            53-60    61-68  69-74  75-80
X.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00 |  LARIO                   -0.4000           -0.200      .65    1.25
X.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                   -0.080             -.034      .65    1.25
X.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00 |  PATGU                   -0.150             -.080      .65    1.25
X.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                   -0.10              -.061      .65    1.25
X.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00 |  VUNIO                   -.0600             -.02       .65    1.25
mment card.   KOMPAR = 1.                      |C LUJAN                              1.0            1.20                      -20.    40.
X.   8.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1RECRE                   0.8                1.10                      -20.    15.
X.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                   -.16               -.09               1.5
X.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00 |  AIMOG                   -0.090            -0.04       .65    1.15
X.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00 |  CHILE                   -.1000             -.04               1.15
mment card.   KOMPAR = 1.                              |C    The following load-flow miscellaneous data card has two peculiarities.  The
mment card.   KOMPAR = 1.                              |C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
mment card.   KOMPAR = 1.                              |C    voltages.  The use of  KTAPER = 0  ensures constant acceleration factors
mment card.   KOMPAR = 1.                              |C    (this  works  well  for  this problem whether RMS or peak values are used).
mment card.   KOMPAR = 1.                              |C          NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
mment card.   KOMPAR = 1.                              |C           10-16   17-24   25-32   33-40   41-48   50-56   57-64
= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =        9       11      19       0       0       0
ad flow iter.   1   2500    20    1    1.00E-02  |               1    2500      20       1      .01      0.2      2.5   1.414        2
x del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0149 .0152 .0149 .0137 .0136 .0134 .0133 .0131 .0129 .0127 .0125 .0124 .0126
urce No.      1    -4    -4    -4    -4    -4    -4    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5    -5     7     7
x del-V:  .0128  .013 .0131 .0112 .0111 .0109 .0106 .0105 .0108 .0106 .0108 .0115 .0116 .0105 .0115 .0117 .0113 .0102 .0113 .0107
urce No.      7     7     7    -5    -5     4    -5     9     4     4     9    -9    -4    -4    -9    -4    -4     9    -9    -4
x del-V:  .0114 .0108 .0113 .0105 .0114 .0107 .0113 .0102 .0113 .0103  .011 .0117 .0117 .0124 .0102 .0111 .0118  .012 .0135 .0105
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rce No.	-4	4	-9	-4	-4	4	-9	-4	-4	9	-9	-4	4	-4	9	-9	-4	-9	-4	9
del-V:	.0116	.0118	.0115	.0106	.0115	.0109	.0116	.0113	.0115	.011	.0116	.0112	.0115	.011	.0116	.0112	.0115	.011	.0116	.0111
rce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0115	.011	.0116	.011	.0116	.0109	.0116	.011	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0109
rce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0116	.0108	.0116	.0108	.0116	.0108	.0116	.0107	.0116	.0108	.0116	.0107	.0116	.0107	.0116	.0106	.0116	.0107	.0117	.0106
rce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0116	.0106	.0117	.0106	.0116	.0106	.0117	.0105	.0116	.0106	.0117	.0105	.0116	.0105	.0117	.0104	.0116	.0105	.0117	.0104
rce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	9
del-V:	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104
rce No.	-9	-4	-4	9	-9	-4	-4	9	-9	-9	-4	9	-9	-9	-4	9	-9	-9	-4	9
del-V:	.0116	.0103	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0103	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0103	.0117	.0104
rce No.	-9	4	-4	9	-9	-9	-4	9	-9	4	-4	9	-9	-9	-4	9	-9	4	-4	9
del-V:	.0116	.0104	.0116	.0104	.0115	.0093	.0112	.0118	.0121	.0121	.0119	.012	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121
rce No.	-9	4	-4	9	-9	-4	-4	-9	-4	-9	9	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.012	.0122	.012	.0122	.012	.0122	.012	.0121	.012	.0121	.012
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.0119	.0121	.0119	.0121	.0119	.0121	.0119	.012	.0119	.012	.0119
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0118	.012	.0118	.012	.0118	.012	.0118	.012	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0117
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0117	.0119	.0117	.0119	.0117	.0119	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
rce No.	-4	4	-4	4	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0116	.0118	.0116	.0118	.0116	.0118	.0116
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114

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urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0114	.0114	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0113	.0113	.0113	.0113	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	4
ax del-V:	.0113	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
ax del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0112	.0112
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0113	.0112	.0113
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115	.0117	.0115	.0117

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urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0114	.0117	.0114	.0117	.0114	.0117	.0113	.0117	.0113	.0117	.0113	.0117	.0112	.0117	.0112	.0117	.0112	.0117	.0112	.0117
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0112	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0112	.0116	.0111	.0114	.0108	.0111	.0104	.0107	.01	.0102	.0095	.0096	.0089	.009	.0083	.0084	.0077	.0077	.007	.0071
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0063	.0064	.0057	.0057	.005	.0051	.0044	.0045	.0038	.0039	.0033	.0034	.0028	.0029	.0024	.0024	.002	.002	.0017	.0017
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
x del-V:	.0014	.0014	.0012	.0012	.9E-3	.9E-3	.8E-3	.8E-3	.6E-3											
urce No.	9	4	9	4	9	4	9	4	9											

it the load flow iteration loop with counter NEXITE = 1209. If no warning on the preceding line, convergence was attained.

ow	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	3	LARIO	8.89348959E-01	-3.80873	-4.04020805E-01	-2.03048523E-01
4	6	CHAMI	9.05428079E-01	0.16103	-8.18270015E-02	-3.56048400E-02
5	5	PATQU	8.82701351E-01	-2.49285	-1.52497678E-01	-8.17911190E-02
6	9	MONOG	8.33623352E-01	-6.21261	-9.08492987E-02	-5.03486506E-02
7	10	YUNIO	8.24732153E-01	-7.03372	-6.01987321E-02	-2.43593172E-02
2	2	RECRE	1.10000000E+00	2.04657	7.92761431E-01	6.78039071E-01
8	7	CHEPE	9.70934254E-01	7.05285	-1.60428259E-01	-9.08059684E-02
9	4	AIMOG	8.57252277E-01	-5.40203	-9.32589514E-02	-4.23486528E-02
10	11	CHILE	8.36738430E-01	-6.33785	-1.09194030E-01	-5.54031841E-02

nusoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
RECRE		1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.79276143126438	.09892796894204
	7	.05547026886898	2.0434654	-.8348229693001	-38.4964972	.67803907148634	0.1378859
	LARIO	1.2555232988362	1.2583049528123	-1.0496480231554	1.3411526246414	-.6938334613223	
		-.0836217696019	-3.8104500	.83482296930006	141.5035028	-.4901831316023	
LARIO		1.2555232988362	1.2583049528123	.14659910010062	.16898272912901	.09554336445337	.00228441301951
		-.0836217696019	-3.8104500	-.0840468811918	-29.8261026	.04663192719174	0.0042633
	AIMOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912901	-.0932589514339	
		-.1141540097252	-5.4034244	.08404681191799	150.1738374	-.0423486527802	
LARIO		1.2555232988362	1.2583049528123	-.1298428897114	.17513153600272	-.0765966062631	.00122684219611
		-.0836217696019	-3.8104500	-.1175239502998	-137.8309909	.07920587499028	0.0024537
	PATQU	1.2471068979652	1.2482515700127	.12984288971139	.17513153600272	.0778234484592	
		-.0534449912241	-2.4539194	.11752395029979	42.1490091	-.0767521905581	
PATQU		1.2471068979652	1.2482515700127	-.3683458960794	.36911828709613	-.2303211266575	.00544993239475
		-.0534449912241	-2.4539194	.02386651860333	176.2927727	-.0050089283586	0.0108999
	CHAMI	1.280393212628	1.2803982203692	.36834589607941	.36911828709613	.2357710592523	

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		.00358103066031	0.1602456	-.0238665186033	-3.7072273	-.01593879316811	
CHAMI		1.280393212628	1.2803982203692	-.4963158669284	.50258338703058	-.3175980607765	.013892453330556
		.00358103066031	0.1602456	.07912408706717	170.9419692	-.0515436331864	0.0442033
	CHEPE	1.3626813884637	1.3730704490764	.49631586692843	.50258338703058	.33149051412705	
		.16858793450787	7.0526702	-.0791240870672	-7.0530308	.09574689384728	
CHEPE		1.3626813884637	1.3730704490764	-.7444658766525	.76631843595364	-.4919187729672	.030830307127333
		.16858793450787	7.0526702	.18169893720791	166.2841848	-.1865328622466	0.0998315
	LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631843595364	.52274908009457	
		.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294465	
NONOG		1.1794668861286	1.1864257688768	.09734877138892	.11137362356051	.0608809567174I	.6822246213?E-3
		-.1283120009229	-6.2086848	-.0541045352449	-29.0644457	.0256617460332?	0.0013024
	YUNIO	1.1573965688744	1.1661731111915	-.0973487713889	.11137362356051	-.060198732096	
		-.1428037440376	-7.0338096	.0541045352449	150.9355543	-.0243593172106	
NONOG		1.1794668861286	1.1864257688768	.17317293983299	.20706021017633	.10940839783566	.21436965319E-3
		-.1283120009229	-6.2086848	-.1135123175?8	-33.2442449	.0558319234303?	0.0004287
	CHILE	1.1754649098797	1.1827022669092	-.1731729889833	.20706021017633	-.1091940301825	
		-.1306403375443	-6.3417867	.11351231752795	146.7557551	-.0554031841239	
LARIO		1.2555232988362	1.2583049528123	.41359218837384	.49313394138363	.27086589862674	.009727243361?4
		-.0836217696019	-3.8104500	-.2685564852355	-32.9967432	.15129680679071	0.0194545
	NONOG	1.1794668861286	1.1864257688768	-.4135921883738	.49313394138363	-.2611386552649	
		-.1283120009229	-6.2086848	.26855648523554	147.0032568	-.131842320067	

Total network loss P-loss by summing injections = 1.6323575566?E-01

olution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed esult applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "F.P." is the ssociated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
REGRE	1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.77276143126438	1.0431719270391
	.05547026886898	2.0434654	-.8348229693001	-38.4964972	.6780390714B634	0.7599529
LARIO	1.2555232988362	1.2583049528123	-.6192996243711	.71870369019806	-.4040208045053	.43217420649034
	-.0836217696019	-3.8104500	.36469572184674	149.5068440	-.2030485226295	-0.8935070
AINOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912901	-.0932589514339	.10242382737838
	-.1141540097252	-5.4034244	.08404681191799	150.1738974	-.0423486527802	-0.9105201
PATOU	1.2471068979652	1.2482515700127	-.2365030063?8	.27726332022687	-.1524976783783	.17304718739007
	-.0534449912241	-2.4539194	.14137046390312	149.3394914	-.0817911189967	-0.8812491
CHAMI	1.280393212628	1.2803982203692	-.127769770849	.13939050294634	-.0818270015242	.09923767575443

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	.00358103066031	0.1602456	.05525756846384	156.6452622	-.0356048399983	-0.9169558
CHEPE	1.3626813884637	1.3730704470764	-.2481500097241	.26851448230485	-.1604282588402	.1843446340093
	.1685879450787	7.0526702	.10257485014074	157.5418424	-.0908059683994	-0.8702626
LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631643395364	.52274908009457	.5760558588722
	.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294465	0.8770136
NONOG	1.1794668861286	1.1864257688768	-.1430704271519	.17509413618719	-.0908492987118	.1038880975758
	-.1283120009229	-6.2086948	.10093963246268	144.7361099	-.0503486506035	-0.8746603
VUNIO	1.1573965688744	1.166173111915	-.0973487713889	.11137362356051	-.060198732096	.0649404625664
	-.1428037440376	-7.0338096	.0541045352449	159.9355543	-.0243593172106	-0.4269834
CHILE	1.1754649078797	1.1827022669092	-.173172989833	.20706021017632	-.1091940301825	.1224452898112
	-.1306403375443	-6.3417867	.11351231752795	146.7557551	-.0554031841235	-0.8717781

```
omment card.   KOMPAR = 1.                    $C
omment card.   KOMPAR = 1.                    $C
omment card.   KOMPAR = 1.                    $C
equest for flushing of punch buffer.          $PUNCH       ( Flush punched cards: R-L branches for equivalent impedance loads

 listing of 80-column card images now being flushed from punch buffer follows.
================================================================================
23456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
================================================================================
========  End of LUNIT7 punched cards as flushed by  $PUNCH  request  ========
lank card ending node names for voltage output.  $BLANK card ending requests for output variables

elective branch outputs follow (for column-80 keyed branches only).  Any request for branch current output automatically will be
ugmented to include branch voltage.  But the converse is not true (a request for voltage only will not produce current output).
```

From bus K	To bus M	(======== Branch voltage Vkm = Vk - Vm ========) Magnitude	Degrees	Real part	Imag part	(====== Branch current Ikm from K to M ======) Magnitude	Degrees	Real part	Imag part
ECRE	LARIO	3.2987993E-01	24.938452	2.9912234E-01	1.3909204E-01	1.3411526E+00	-38.496497	1.0496480E+00	-8.3452297E-01
ARIO	AIMOG	5.7454128E-02	32.101411	4.8669900E-02	3.0532240E-02	1.6898273E-01	-29.826103	1.4659910E-01	-8.4046812E-02
ARIO	PATQU	3.1328482E-02	-74.416042	8.4164009E-03	-3.0176778E-02	1.7513154E-01	-137.850991	-1.2984239E-01	-1.1752395E-01
ATQU	CHAMI	6.6029887E-02	-120.272278	-3.3286315E-02	-5.7026022E-02	3.6911823E-01	176.292773	-3.6834590E-01	2.3966319E-02
HAMI	CHEPE	1.8438715E-01	-116.505219	-8.2283176E-02	-1.6500670E-01	5.0258339E-01	170.941969	-4.9631587E-01	7.9124037E-02
HEPE	LUJAN	2.7268987E-01	-120.877734	-1.3994656E-01	-2.3404001E-01	7.6631844E-01	166.284185	-7.4446588E-01	1.8169694E-01
ONOG	VUNIO	2.6402832E-02	33.289579	2.2070317E-02	1.4491743E-02	1.1137362E-01	-29.064446	9.7348771E-02	-5.4104535E-02
ONOG	CHILE	4.6300071E-03	30.190704	4.0019762E-03	2.3283366E-03	2.0706021E-01	-33.244245	1.7317299E-01	-1.1351232E-01
ARIO	NONOG	8.8214481E-02	30.438206	7.6056413E-02	4.4690231E-02	4.9313394E-01	-32.996743	4.1359219E-01	-2.6855649E-01

```
ctual List Sizes for the preceding solution follow.       06-Apr-94  11.24.40
  Size  1-10:    11     9     9     2 -9999     0 -9999 -9999     0     0
  Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     9    23     0
  Size 21-29:     0 -9999     9 -9999 -9999 -9999 -9999 -9999 -9999
econds for overlays  1-5  :    23.461     0.000    23.461  --- (CP; I/O; tot)
econds for overlays  6-11 :    11.375     0.000    11.375
econds for overlays 12-15 :     0.000     0.000     0.000
econds for time-step loop :     0.000     0.000     0.000
econds after DELTAT-loop  :     0.328     0.000     0.328
                           ----------------------------
```

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Totals :	35.164	0.000	35.164

CASO 130

C:\RIV\FLULAP\

flu132e.wq1[2-12-93]

	BARRA / CIRCUITO	ENERGIA [GWH] ANO1991	ANO1991*
Arauco	3	1.623E+01	1.8E+01
Capital	2	1.443E+02	1.6E+02
Castro Barros	3	1.830E+00	2.0E+00
Chilecito	10	4.439E+01	4.9E+01
Famatina	10	2.341E+00	2.6E+00
Gen.Penaloza	5	9.300E-01	1.0E+00
G.Belgrano	5	2.450E+00	2.7E+00
G.F.Guiroga	5	6.700E-01	7.4E-01
G.Lamadrid	9	4.880E-01	5.4E-01
G.Lavalle	9	3.400E+00	3.7E+00
G.Ocampo	5	1.925E+00	2.1E+00
G.S.Martin	6	1.010E+00	1.1E+00
G.Sarmiento	9	8.380E-01	9.2E-01
Gob.Gordillo	5	5.975E+00	6.6E+00
Independencia	4	6.010E-01	6.6E-01
R.V.Penaloza	6	3.751E+00	4.1E+00
Sanagasta	2	7.170E-01	7.9E-01
S.B.de los Sauces	3	1.177E+00	1.3E+00
Total La Rioja		2.331E+02	2.6E+02

*[INCLUYE PERDIDAS] FUENTE :EPELAR 1993

DATOS ACTIVOS

VALORES DE CRECIMIENTO EN NODOS [TAS. AN.AC.= 5%]

LOCALIDAD	BARRA	1991 GWH ENERGIA	1993	1995	2000	2005	2010	2013
RECREO	1	0.000E+00						
LA RIOJA	2	1.596E+02	1.759E+02	1.9E+02	2.48E+02	3.159E+02	4.03E+02	5.15E+02
AIMOGASTA	3	2.116E+01	2.333E+01	2.6E+01	3.28E+01	4.190E+01	5.35E+01	6.82E+01
PATQUIA	4	6.611E-01	7.289E-01	8.0E-01	1.03E+00	1.309E+00	1.67E+00	2.13E+00
CHAMICAL	5	1.315E+01	1.449E+01	1.6E+01	2.04E+01	2.603E+01	3.32E+01	4.24E+01
CHEPES	6	5.237E+00	5.774E+00	6.4E+00	8.12E+00	1.037E+01	1.32E+01	1.69E+01
LUJAN	7	0.000E+00	0.000E+00	0.0E+00	0.00E+00	0.000E+00	0.00E+00	0.00E+00
NONOGASTA	8	1.000E+01	1.103E+01	1.2E+01	1.55E+01	1.980E+01	2.53E+01	3.23E+01
V.UNION	9	5.199E+00	5.731E+00	6.3E+00	8.06E+00	1.029E+01	1.31E+01	1.68E+01
CHILECITO	10	4.140E+01	4.565E+01	5.0E+01	6.42E+01	8.198E+01	1.05E+02	1.34E+02
TOTAL		2.564E+02	2.826E+02	3.1E+02	3.98E+02	5.076E+02	6.48E+02	8.27E+02

R[OHM]= RO[OHM*mm^2/m] Ro(Al)=1/37= 2.70E-02
d12[m]= 5.200E+00 Ro(Cu)=1/52= 1.92E-02
d13[m]= 3.310E+00 Seccion [mm^2]= 1.50E+02
d23[m]= 6.160E+00 React.induc.[ohm/k 4.23E-01
Cap.a t.[mf/km]= 1.04E-03
VALORES ELECTRICOS Suc.[2*pi*50*f47] 3.28E-01 µmho/km/f
ojo revisar suceptancia L[mHy/km]Xl[ohm/km]
1.35E-03 4.231E-01

DE	A	DIST[KM]	R [OHM]	XL [J O]	Sucep µmho/km/	XC[-j OHM]	R (1/1)	XI(1/1)	XC (1/1)
1	2	185.00	16.67	39.14	9.6E+02	1.93E-01	0.10	0.22	1.11E-03
2	3	130.00	23.42	55.00	7.4E+00	1.36E-01	0.13	0.32	7.79E-04
2	4	69.00	12.43	29.19	1.4E+01	7.20E-02	0.07	0.17	4.13E-04

falta Patquia Nonogasta

4	5	68.00	12.25	28.77	1.4E+01	7.10E-02	0.07	0.17	4.07E-04
5	6	158.00	28.47	66.85	6.1E+00	1.65E-01	0.16	0.38	9.47E-04
A	8	114	20.54	48.23	8.4E+00	1.19E-01	0.12	0.28	6.83E-04
6	7	151.00	27.21	63.89	6.3E+00	1.58E-01	0.16	0.37	9.05E-04
8	9	92.00	16.58	38.93	1.0E+01	9.60E-02	0.10	0.22	5.51E-04
8	10	13.00	2.34	5.50	7.4E+01	1.36E-02	0.01	0.03	7.79E-05

LA LINEA ENTRE RECREO Y LA RIOJA ES DOBLE TERNA

TENSION BASE: 132 [KV]; POTENCA BASE: 100 [MVA]

IMPEDANCIA BASE=((TENSION BASE[kv])^2)/POTENCIA BASE [MVA]

ZB[OHM]= 1.742E+02

ANO 1991
VALORES VOLCADOS A BASE ELEGIDA [MVA] 1.0E+02

LOCALIDAD	BARRA	ACAR	REACAR	CAREST	ACTGEN	REMAX	REMIN	T
RECREO	1	0.000E+00	0.000E+00		1.40E+02			
LA RIOJA	2	1.596E+02	4.787E+01		1.15E+02			
AIMOGASTA	3	2.116E+01	6.348E+00			0.000E+00	1.800E+00	*
PATQUIA	4	6.611E-01	1.983E-01					
CHAMICAL	5	1.315E+01	3.944E+00		3.40E-01			
CHEPES	6	5.237E+00	1.571E+00					
LUJAN	7	0.000E+00	0.000E+00					
NONOGASTA	8	1.000E+01	3.000E+00					
V.UNION	9	5.199E+00	1.560E+00		5.35E+00			
CHILECITO	10	4.140E+01	1.242E+01		2.95E+00	8.850E-01	8.000E-01	

LOCALIDAD	BARRA	ENERGIA GWH	FAC.UTIL. [HORAS]	C.MAX MW
RECREO	1	0.000E+00		
LA RIOJA	2	1.596E+02	3000	53.19
AIMOGASTA	3	2.116E+01	4200	5.04
PATQUIA	4	6.611E-01	3200	0.21
CHAMICAL	5	1.315E+01	3200	4.11
CHEPES	6	5.237E+00	3200	1.64
LUJAN	7	0.000E+00		
NONOGASTA	8	1.000E+01	3200	3.13
V.UNION	9	5.199E+00	3400	1.53
CHILECITO	10	4.140E+01	3600	11.50
TOTAL		2.564E+02		

VALORES DE CRECIMIENTO EN NODOS [TAS. AN.AC.= 5%]
DATOS ACTIVOS

1993	1995	2000	2005	2010	2013
1.76E+02	1.939E+02	2.475E+02	3.159E+02	4.0E+02	5.15E+02
2.33E+01	2.572E+01	3.283E+01	4.190E+01	5.3E+01	6.82E+01
7.29E-01	8.036E-01	1.026E+00	1.309E+00	1.7E+00	2.13E+00

1.45E+01 1.598E+01 2.039E+01 2.603E+01 3.3E+01 4.24E+01
5.77E+00 6.366E+00 8.124E+00 1.037E+01 1.3E+01 1.69E+01
0.00E+00 0.000E+00 0.000E+00 0.000E+00 0.0E+00 0.00E+00
1.10E+01 1.216E+01 1.551E+01 1.980E+01 2.5E+01 3.23E+01
5.73E+00 6.319E+00 8.065E+00 1.029E+01 1.3E+01 1.68E+01
4.56E+01 5.033E+01 6.423E+01 8.198E+01 1.0E+02 1.34E+02
2.83E+02 3.116E+02 3.977E+02 5.076E+02 6.5E+02 8.27E+02

ASIGNACION DE FACTOR DE UTILIZACION A CADA NODO

BARRA	ENERGIA GWH	FAC.UTIL. [HORAS]	C.MAX MW
1	0.000E+00		
2	1.596E+02	3000	53.19
3	2.116E+01	4200	5.04
4	6.611E-01	3200	0.21
5	1.315E+01	3200	4.11
6	5.237E+00	3200	1.64
7	0.000E+00		0.00
8	1.000E+01	3200	3.13
9	5.199E+00	3400	1.53
10	4.140E+01	3600	11.50
	2.564E+02		

1991

1.000E+02

BARRA	ACAR	REACAR	CAREST	ACTGEN	REMAX
1		0.00		139.57	
2	53.19	15.96		114.57	
3	5.04	1.51			0.00
4	0.21	0.06			
5	4.11	1.23		0.34	
6	1.64	0.49			
7	0.00	0.00			
8	3.13	0.94			
9	1.53	0.46		5.35	
10	11.50	3.45		2.95	0.89
TOTAL					

VALOR DE LA SUCEPTANCIA EXPRESADA EN MVAR

Cap.a t.[mf/km]= 1.04E-03
Suc.[2*pi*50*f47] 3.28E-01 µmho/km/f
Suc[mvaR]=U^2*2*@pi*50*C[µF](f166)

DE	A	DIST[KM]	R [OHM]	XL [J Ω]	CAP µF	Suc MVAr
1	2	185.00	16.67	39.14	1.9E-01	5.29E+05
2	3	130.00	23.42	55.00	1.4E-01	3.71E+05
2	4	69.00	12.43	29.19	7.2E-02	1.97E+05
4	5	68.00	12.25	28.77	7.1E-02	1.94E+05

5	6	158.00	28.47	66.85	1.6E-01	4.51E+05
5	8	114	20.54	48.23	1.2E-01	3.26E+05
6	7	151.00	27.21	63.89	1.6E-01	4.31E+05
8	9	92.00	16.58	38.93	9.6E-02	2.63E+05
8	10	13.00	2.34	5.50	1.4E-02	3.71E+04

DATOS ELABORADOS PARA EMTP
LOS DATOS DE RAMA DEBEN PRESENTARSE EN TANTO POR UNO COMO
RESISTENCIA INDUCTANCIA Y CAPACIDAD

VALOR DE LA SUCEPTANCIA EXPRESADA EN MVAR
Cap.a t.[mf/km]= 1.04E-03
Suc.[2*pi*50*f47] 3.28E-01 µmho/km/f

DE	A	DIST[KM]	R [OHM] 1/1	XL [J Ω] X1 1/1	CAP ΩC*Km1/1
1	2	185.00	0.10	0.22	3.5E-01
2	3	130.00	0.13	0.32	2.4E-01
2	4	69.00	0.07	0.17	1.3E-01
4	5	68.00	0.07	0.17	1.3E-01
5	6	158.00	0.16	0.38	3.0E-01
5	8	114	0.12	0.28	2.1E-01
6	7	151.00	0.16	0.37	2.8E-01
8	9	92.00	0.10	0.22	1.7E-01
8	10	13.00	0.01	0.03	2.4E-02

Cap.a t.[mf/km]= 1,04E-03
Suc.[2*pi*50*f47] 3,28E-01 µmho/km/f
Suc[mvaR]=U^2*2*@pi*50*C[µF](f166)

DE	A	DIST[KM]	R [OHM]	XL [J O	CAP µF	Suc MVAr
1	2	185,00	19,43	38,67	1,93E-01	5,286E+05
2	3	130,00	23,42	55,00	1,36E-01	3,715E+05
2	4	69,00	12,43	29,19	7,20E-02	1,972E+05
4	5	68,00	12,25	28,77	7,10E-02	1,943E+05
5	6	158,00	28,47	66,85	1,65E-01	4,515E+05
4	8	114	20,54	48,23	1,19E-01	3,257E+05
6	7	151,00	27,21	63,89	1,58E-01	4,315E+05
8	9	92,00	16,58	38,93	9,60E-02	2,629E+05
8	10	13,00	2,34	5,50	1,36E-02	3,715E+04

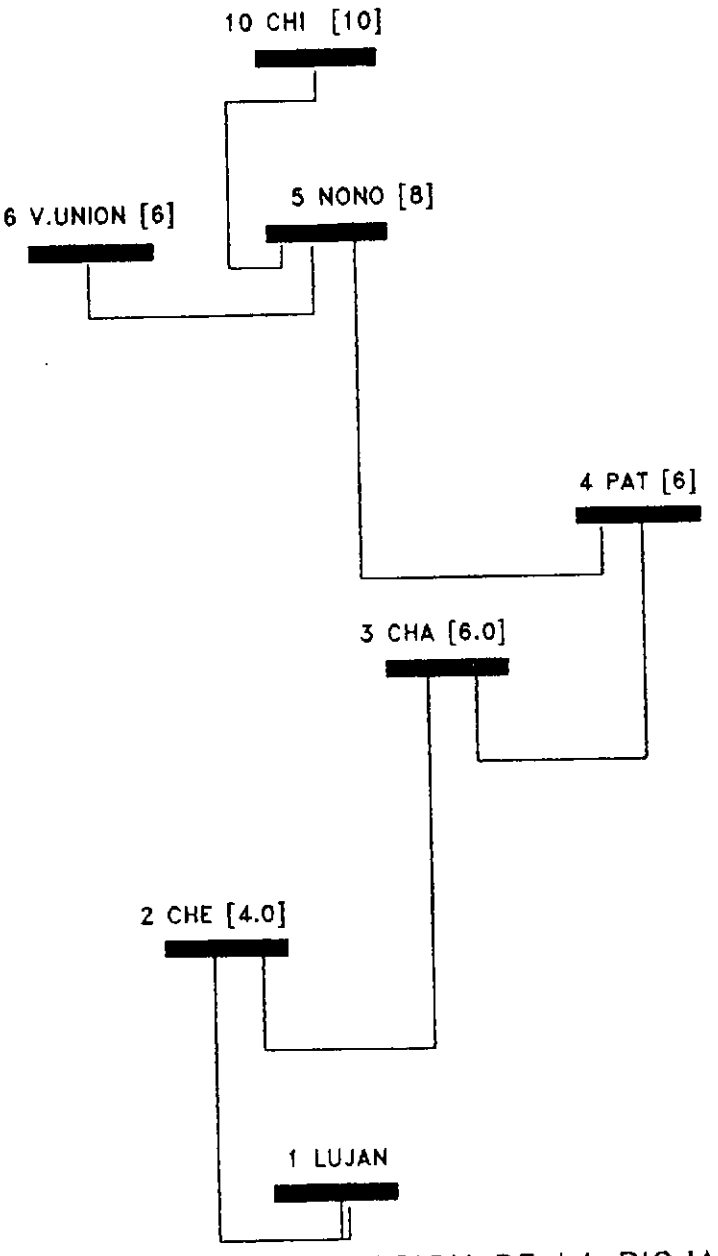
LA IMPEDANCIA RECREO-LA RIOJA ES DOBLE TERNA SU VALOR ES:
z [OHM/KM]= 0.105 + j 0.209
DATOS ELABORADOS PARA EMTP
LOS DATOS DE RAMA DEBEN PRESENTARSE EN TANTO POR UNO COMO
RESISTENCIA INDUCTANCIA Y CAPACIDAD

VALOR DE LA SUCEPTANCIA EXPRESADA EN MVAR

Cap.a t.[mf/km]= 1,04E-03
Suc.[2*pi*50*f47] 3,28E-01 µmho/km/f

DE	A	DIST[KM]	R [OHM] 1/1	XL [J O X1 1/1	CAP ΩC*Km1/1
1	2	185,00	0,10	0,22	3,48E-01
2	3	130,00	0,13	0,32	2,45E-01
2	4	69,00	0,07	0,17	1,30E-01
4	5	68,00	0,07	0,17	1,28E-01
5	6	158,00	0,16	0,38	2,97E-01
4	8	114	0,12	0,28	2,15E-01
6	7	151,00	0,16	0,37	2,84E-01
8	9	92,00	0,10	0,22	1,73E-01
8	10	13,00	0,01	0,03	2,45E-02

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 160
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

CASO 160

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(TARJETA CODIGO 2. TITULO)
EMA LA RIOJA - CASO:.FLUJO132-V.UNION LUJAN  5/04/93-11:07
(TARJETA CODIGO 1. TITULO)
IGURACION 1 - POTENCIA GENERADA  35 MW - X TRANSFORMADORES
 (LOTE MISCELANEO)
0.   20   .00001        1 0 0 0
NODOS
 002 LUJAN        1.1      35.0 10.0 7.0 20.0
   0 CHEPES                                      4.0  3.0
   0 CHAMICAL                                    6.0  0.1  10.0
   0 PATQUIA                                     6.0  2.9
   0 NONOGASTA                                   8.0  6.0
   1 V.UNION        1.1      20.0 15.0 4.0 18.0  6.0  4.0

(DATOS DE RAMAS EN %)
 00  002 0 0 11.71 24.21 00.000 1.02 .700 1.20
 00  003 0 0 11.47823.73 0.0    1.1
 00  004 0 0  6.82514.11
 00  005 0 0 11.19 23.13
 00  006 0 0  9.82420.31

 (ORDENA EJECUCION DE LOS CALCULOS)
```

ISTEMA LA RIOJA - CASO:.FLUJ0132-V.UNION LUJAN 5/04/93-11:07
ONFIGURACION 1 - POTENCIA GENERADA 35 MW - X TRANSFORMADORES PAGINA 1

POTENCIA BASE MVA . 100.0
NUMERO MAXIMO DE ITERACIONES 20
TOLERANCIA DE LA CONVERGENCIA .00001000

CONFIGURACION 1 - POTENCIA GENERADA 35 MW - X TRANSFORMADORES PAGINA 2

DATOS DE LAS BARRAS

NUMERO	NOMBRE	TIPO	TENSION PU	POTENCIA GENERADA MW	POTENCIA GENERADA MVAR	POTENCIA CONSUMIDA MW	POTENCIA CONSUMIDA MVAR	SHUNT MVAR
1	LUJAN	2	1.1000	35.00	10.00	.00	.00	.00
2	CHEPES	0	1.0000	.00	.00	4.00	3.00	.00
3	CHAMICAL	0	1.0000	.00	.00	6.00	.10	10.00
4	PATQUIA	0	1.0000	.00	.00	6.00	2.90	.00
5	NONOGASTA	0	1.0000	.00	.00	8.00	6.00	.00
6	V.UNION	1	1.1000	20.00	15.00	6.00	4.00	.00

CONFIGURACION 1 - POTENCIA GENERADA 35 MW - X TRANSFORMADORES PAGINA 3

DATOS DE LAS RAMAS

DE BARRA NUMERO	DE BARRA NOMBRE	A BARRA NUMERO	A BARRA NOMBRE	NUMERO CIRC. NUM. CKT	RESISTENCIA PU	REACTANCIA PU	SUCEPTANCIA PU	TAP EN FASE PU
1	LUJAN	2	CHEPES	0	.1171	.2421	.0000	1.0200
2	CHEPES	3	CHAMICAL	0	.1148	.2373	.0000	1.1000
3	CHAMICAL	4	PATQUIA	0	.0683	.1411	.0000	
4	PATQUIA	5	NONOGASTA	0	.1119	.2313	.0000	
5	NONOGASTA	6	V.UNION	0	.0982	.2031	.0000	

CONFIGURACION 1 - POTENCIA GENERADA 35 MW - X TRANSFORMADORES PAGINA 4

INFORMACIONES CON RESPECTO AL SISTEMA

TOTAL DE BARRAS	6
TOTAL DE RAMAS ENTRE BARRAS	5
NUMERO DE RAMAS COMO LT	3
NUMERO DE TRAFOS.CON TAP	2
NUMERO DE TRAFOS.SIN TAP	0
NUMERO DE REACTORES DE BARRA	0
NUMERO DE CAPACITORES DE BARRA	1
NUMERO DE GENERADORES	2
NUMERO DE BARRAS (PQ)	4

BARRAS CON RESIDUOS ARRIBA DE LA TOLERANCIA

ITERACION	BARRAS CON RESIDUOS DE POTENCIA ACTIVA Y REACTIVA ARRIBA DE LA TOLERANCIA DE .000010 - MAXIMO DE 22 BARRAS
1	2 3 4 5 6
	2 3 4 5
2	2 3 4 5 6
	2 3 4 5
3	2 3 4 5 6
	2 3 4 5
4	2 3 4 5 6
	2 3 4 5

3 4 5

6

NUMERO DE ITERACIONES PARA LA CONVERGENCIA 6 ITERACIONES

PERDIDAS TOTALES ACTIVAS 1.65
PERDIDAS TOTALES REACTIVAS 2.29

*** LA BARRA SWING ES LA 1 LUJAN

IDENTIFICACION BARRA EMISORA NUMERO	NOMBRE	TENSION MODULO P.U.	ANGULO GRADOS	GENERACION POTENCIA MW	GEN. MVAR	CARGA POTENCIA MW	CONSUM. MVAR	ELEMENTO SHUNT MVAR	IDENTIFICACION BARRA RECEPTORA NUMERO	NOMBRE	POTENCIA TRANSMITIDA MW	MVAR	TAP EN FASE P.U.
1	LUJAN	1.1000	.00	14.87	-12.06	.00	.00		2	CHEPES	14.87	-12.06	1.0200
2	CHEPES	1.0941	-1.99	.00	.00	4.00	3.00		1	LUJAN	-14.64	12.62	
									3	CHAMICAL	23.18	-15.62	1.1000
3	CHAMICAL	1.0246	-3.91	.00	.00	6.00	.10	10.50	2	CHEPES	-22.27	16.32	
									4	PATQUIA	.50	-5.92	
4	PATQUIA	1.0324	-4.17	.00	.00	6.00	2.90		3	CHAMICAL	-.48	5.97	
									5	NONOGASTA	-5.52	-8.87	
5	NONOGASTA	1.0583	-4.02	.00	.00	8.00	6.00		4	PATQUIA	5.64	9.11	
									6	V.UNION	-13.64	-15.11	
6	V.UNION	1.1000	-3.39	20.00	19.86	6.00	4.00		5	NONOGASTA	14.00	15.86	
	VALORES TOTALES			34.87	7.79	30.00	16.00						

PERDIDAS ACTIVAS Y REACTIVAS DE LAS LINEAS Y TRANSFOMADORES

IDENTIFICACION DE LA LINEA Y TRAFO BARRA EMISORA NUMERO	NOMBRE	BARRA RECEPTORA NUMERO	NOMBRE	REACTIVO GEN. MVAR	REACTIVO CONSUMIDO MVAR	PERDIDAS REACTIVAS MVAR	PERDIDAS ACTIVAS MW
1	LUJAN	2	CHEPES	.00	.56	.56	.24
2	CHEPES	3	CHAMICAL	.00	.70	.70	.91
3	CHAMICAL	4	PATQUIA	.00	.05	.05	.02
4	PATQUIA	5	NONOGASTA	.00	.24	.24	.11
5	NONOGASTA	6	V.UNION	.00	.75	.75	.36
		VALORES TOTALES		.00	2.29	2.29	1.65

200-1

CASO 200

flu132e.wq1[2-12-93]

BARRA	CIRCUITO	ENERGIA [GWH] ANO1991	ANO1991*
Arauco	3	1.623E+01	1.8E+01
Capital	2	1.443E+02	1.6E+02
Castro Barros	3	1.830E+00	2.0E+00
Chilecito	10	4.439E+01	4.9E+01
Famatina	10	2.341E+00	2.6E+00

en.Penaloza	5	9.300E-01	1.0E+00
.Belgrano	5	2.450E+00	2.7E+00
.F.Quiroga	5	6.700E-01	7.4E-01
.Lamadrid	9	4.880E-01	5.4E-01
.Lavalle	9	3.400E+00	3.7E+00
.Ocampo	5	1.925E+00	2.1E+00
.S.Martin	6	1.010E+00	1.1E+00
.Sarmiento	9	8.380E-01	9.2E-01
Bob.Bordillo	5	5.975E+00	6.6E+00
Independencia	4	6.010E-01	6.6E-01
R.V.Penaloza	6	3.751E+00	4.1E+00
Sanagasta	2	7.170E-01	7.9E-01
G.B.de los Sauces	3	1.177E+00	1.3E+00
Total La Rioja		2.331E+02	2.6E+02
*[INCLUYE PERDIDAS]		FUENTE :EPELAR 1993	

DATOS ACTIVOS

VALORES DE CRECIMIENTO EN NODOS [TAS. AN.AC.= 5%]

		1991	1993	1995	2000	2005	2010	2013
		GWH						
LOCALIDAD	BARRA	ENERGIA						
RECREO	1	0.000E+00						
LA RIOJA	2	1.596E+02	1.759E+02	1.9E+02	2.48E+02	3.159E+02	4.03E+02	5.15E+02
AIMOGASTA	3	2.116E+01	2.333E+01	2.6E+01	3.28E+01	4.190E+01	5.35E+01	6.82E+01
PATQUIA	4	6.611E-01	7.289E-01	8.0E-01	1.03E+00	1.309E+00	1.67E+00	2.13E+00
CHAMICAL	5	1.315E+01	1.449E+01	1.6E+01	2.04E+01	2.603E+01	3.32E+01	4.24E+01
CHEPES	6	5.237E+00	5.774E+00	6.4E+00	8.12E+00	1.037E+01	1.32E+01	1.69E+01
LUJAN	7	0.000E+00	0.000E+00	0.0E+00	0.00E+00	0.000E+00	0.00E+00	0.00E+00
NONOGASTA	8	1.000E+01	1.103E+01	1.2E+01	1.55E+01	1.980E+01	2.53E+01	3.23E+01
V.UNION	9	5.199E+00	5.731E+00	6.3E+00	8.06E+00	1.029E+01	1.31E+01	1.68E+01
CHILECITO	10	4.140E+01	4.565E+01	5.0E+01	6.42E+01	8.198E+01	1.05E+02	1.34E+02
TOTAL		2.564E+02	2.826E+02	3.1E+02	3.98E+02	5.076E+02	6.48E+02	8.27E+02

R[OHM]= RO[OHM*mm^2/m]		Ro(Al)=1/37=	2.70E-02
d12[m]=	5.200E+00	Ro(Cu)=1/52=	1.92E-02
d13[m]=	3.310E+00	Seccion [mm^2]=	1.50E+02
d23[m]=	6.160E+00	React.induc.[ohm/k	4.23E-01
		Cap.a t.[mf/km]=	1.04E-03
VALORES ELECTRICOS		Suc.[2*pi*50*f47]	3.28E-01 µmho/km/f
	ojo revisar suceptancia	L[mHy/km]X1[ohm/km]	
		1.35E-03	4.231E-01

DE	A	DIST[KM]	R [OHM]	XL [J O	Sucep µmho/km/	XC[-j OHM	R (1/1)	X1(1/1)	XC (1/1)
1	2	185.00	16.67	39.14	9.6E+02	1.93E-01	0.10	0.22	1.11E-03
2	3	130.00	23.42	55.00	7.4E+00	1.36E-01	0.13	0.32	7.79E-04
2	4	69.00	12.43	29.19	1.4E+01	7.20E-02	0.07	0.17	4.13E-04
4	5	68.00	12.25	28.77	1.4E+01	7.10E-02	0.07	0.17	4.07E-04
5	6	158.00	28.47	66.85	6.1E+00	1.65E-01	0.16	0.38	9.47E-04
5	8	114	20.54	48.23	8.4E+00	1.19E-01	0.12	0.28	6.83E-04
6	7	151.00	27.21	63.89	6.3E+00	1.58E-01	0.16	0.37	9.05E-04
8	9	92.00	16.58	38.93	1.0E+01	9.60E-02	0.10	0.22	5.51E-04
8	10	13.00	2.34	5.50	7.4E+01	1.36E-02	0.01	0.03	7.79E-05

LA LINEA ENTRE RECREO Y LA RIOJA ES DOBLE TERNA

TENSION BASE: 132 [KV]; POTENCA BASE: 100 [MVA]

IMPEDANCIA BASE=((TENSION BASE[kv])^2)/POTENCIA BASE [MVA]

ZB[OHM]= 1.742E+02

ANO 1991
VALORES VOLCADOS A BASE ELEGIDA [MVA] 1.0E+02

LOCALIDAD	BARRA	ACAR	REACAR	CAREST	ACTGEN	REMAX	REMIN	T
RECREO	1	0.000E+00	0.000E+00		1.40E+02			
LA RIOJA	2	1.596E+02	4.787E+01		1.15E+02			
AIMOGASTA	3	2.116E+01	6.348E+00			0.000E+00	1.800E+00	*
PATQUIA	4	6.611E-01	1.983E-01					
CHAMICAL	5	1.315E+01	3.944E+00		3.40E-01			
CHEPES	6	5.237E+00	1.571E+00					
LUJAN	7	0.000E+00	0.000E+00					
NONOGASTA	8	1.000E+01	3.000E+00					
V.UNION	9	5.199E+00	1.560E+00		5.35E+00			
CHILECITO	10	4.140E+01	1.242E+01		2.95E+00	8.850E-01	8.000E-01	

LOCALIDAD	BARRA	ENERGIA GWH	FAC.UTIL. [HORAS]	C.MAX MW
RECREO	1	0.000E+00		
LA RIOJA	2	1.596E+02	3000	53.19
AIMOGASTA	3	2.116E+01	4200	5.04
PATQUIA	4	6.611E-01	3200	0.21
CHAMICAL	5	1.315E+01	3200	4.11
CHEPES	6	5.237E+00	3200	1.64
LUJAN	7	0.000E+00		
NONOGASTA	8	1.000E+01	3200	3.13
V.UNION	9	5.199E+00	3400	1.53
CHILECITO	10	4.140E+01	3600	11.50
TOTAL		2.564E+02		

VALORES DE CRECIMIENTO EN NODOS [TAS. AN.AC.= 5%]
DATOS ACTIVOS

1993	1995	2000	2005	2010	2013
1.76E+02	1.939E+02	2.475E+02	3.159E+02	4.0E+02	5.15E+02
2.33E+01	2.572E+01	3.283E+01	4.190E+01	5.3E+01	6.82E+01
7.29E-01	8.036E-01	1.026E+00	1.309E+00	1.7E+00	2.13E+00
1.45E+01	1.598E+01	2.039E+01	2.603E+01	3.3E+01	4.24E+01
5.77E+00	6.366E+00	8.124E+00	1.037E+01	1.3E+01	1.69E+01
0.00E+00	0.000E+00	0.000E+00	0.000E+00	0.0E+00	0.00E+00
1.10E+01	1.216E+01	1.551E+01	1.980E+01	2.5E+01	3.23E+01
5.73E+00	6.319E+00	8.065E+00	1.029E+01	1.3E+01	1.68E+01
4.56E+01	5.033E+01	6.423E+01	8.198E+01	1.0E+02	1.34E+02
2.83E+02	3.116E+02	3.977E+02	5.076E+02	6.5E+02	8.27E+02

ASIGNACION DE FACTOR DE UTILIZACION A CADA NODO

BARRA	ENERGIA GWH	FAC.UTIL. (HORAS)	C.MAX MW
1	0.000E+00		
2	1.596E+02	3000	53.19
3	2.116E+01	4200	5.04
4	6.611E-01	3200	0.21
5	1.315E+01	3200	4.11
6	5.237E+00	3200	1.64
7	0.000E+00		0.00
8	1.000E+01	3200	3.13
9	5.199E+00	3400	1.53
10	4.140E+01	3600	11.50
	2.564E+02		

1991

1.000E+02

BARRA	ACAR	REACAR	CAREST	ACTGEN	REMAX
1		0.00		139.57	
2	53.19	15.96		114.57	
3	5.04	1.51			0.00
4	0.21	0.06			
5	4.11	1.23		0.34	
6	1.64	0.49			
7	0.00	0.00			
8	3.13	0.94			
9	1.53	0.46		5.35	
10	11.50	3.45		2.95	0.89
TOTAL					

VALOR DE LA SUCEPTANCIA EXPRESADA EN MVAR

Cap.a t.[mf/km]= 1.04E-03
Suc.[2*pi*50*f47] 3.28E-01 µmho/km/f
Suc[mvaR]=U^2*2*@pi*50*C[µF](f166)

DE	A	DIST[KM]	R [OHM]	XL [J O	CAP µF	Suc MVAr
1	2	185.00	16.67	39.14	1.9E-01	5.29E+05
2	3	130.00	23.42	55.00	1.4E-01	3.71E+05
2	4	69.00	12.43	29.19	7.2E-02	1.97E+05
4	5	68.00	12.25	28.77	7.1E-02	1.94E+05
5	6	158.00	28.47	66.85	1.6E-01	4.51E+05
5	8	114	20.54	48.23	1.2E-01	3.26E+05
6	7	151.00	27.21	63.89	1.6E-01	4.31E+05
8	9	92.00	16.58	38.93	9.6E-02	2.63E+05
8	10	13.00	2.34	5.50	1.4E-02	3.71E+04

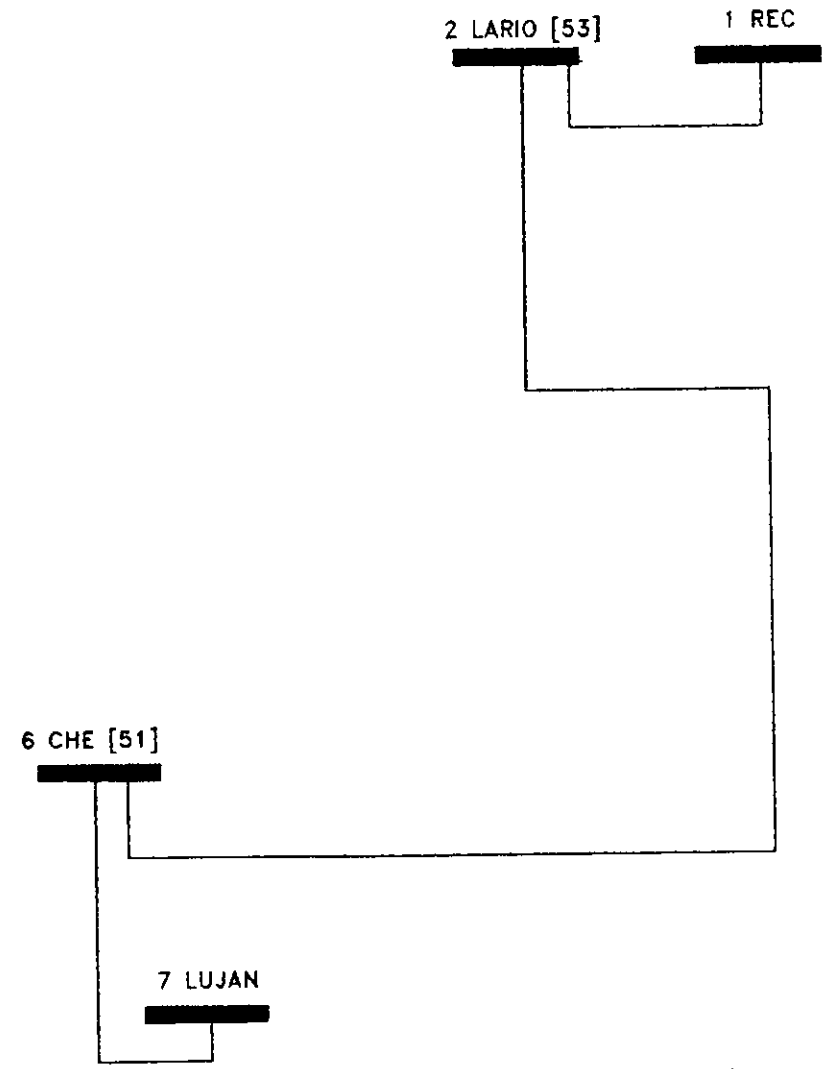
DATOS ELABORADOS PARA EMTP

LOS DATOS DE RAMA DEBEN PRESENTARSE EN TANTO POR UNO COMO
RESISTENCIA INDUCTANCIA Y CAPACIDAD

VALOR DE LA SUCEPTANCIA EXPRESADA EN MVAR
Cap.a t.[mf/km]= 1.04E-03
Suc.[2*pi*50*f47] 3.28E-01 µmho/km/f

DE	A	DIST[KM]	R [OHM] 1/1	XL [J O] X1 1/1	CAP QC*Km1/1
1	2	185.00	0.10	0.22	3.5E-01
2	3	130.00	0.13	0.32	2.4E-01
2	4	69.00	0.07	0.17	1.3E-01
4	5	68.00	0.07	0.17	1.3E-01
5	6	158.00	0.16	0.38	3.0E-01
5	8	114	0.12	0.28	2.1E-01
6	7	151.00	0.16	0.37	2.8E-01
8	9	92.00	0.10	0.22	1.7E-01
8	10	13.00	0.01	0.03	2.4E-02

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 250
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

caso 2bc   caso ampliado   CHE - LUJAN   Kb - 40250-2

```
Path: C:\AIP
File: PROBE10'SAL - 21.567 .a.. 29-03-94 16:19:20        Page 1

lternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
Date (dd-mth-yy) and time of day (hh.mm.ss) = 29-Mar-94  16.18.56    Name of disk plot file, if any, is  C:43291618.pl4
or information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.   Last major program update:  Oct. 1990
otal length of "LABCOM" tables =  444863   INTEGER words.   "VARDIM"  List Sizes follow :    752   900  1500   150  7500
  120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252    4
--------------------------------------------------------+--------------------------------------------------------------------------------
escriptive interpretation of input data cards.          |  Input data card images are shown below, all 80 columns, character by character
                                                        0         1         2         3         4         5         6         7         8
                                                        01234567890123456789012345678901234567890123456789012345678901234567890123456789
--------------------------------------------------------+--------------------------------------------------------------------------------
omment card.   KOMPAR = 1.                              |C data:C:\RIV\EMIN\PROBE1.DAT
omment card.   KOMPAR = 1.                              |C DATA:C:\RIV\EMIN\PRUEB3.DAT(-14-02-94 09:10:RETOMO Y AGREGO DATOS DE ARCH
omment card.   KOMPAR = 1.                              |C RED 132 KV LA RIOJA: DATOS DE RED FLU132E.W01 12-12-93)
omment card.   KOMPAR = 1.                              |C   (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC)
rase all of  0   cards in the punch buffer.             |$ERASE
arker card preceding new EMTP data case.                |BEGIN NEW DATA CASE
idth of time-step loop numbers.  W=13   S=2             |PRINTED NUMBER WIDTH, 13, 2,    { Request maximum precision for 8 output columns
eclaration of desired EMTP load flow usage.             |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
ew power frequency  STATFR = 5.00000000E+01  Hz.        |POWER FREQUENCY, 50.0,
Comment card.   KOMPAR = 1.                             |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
Comment card.   KOMPAR = 1.                             |C DELTAT    TMAX    XOPT COPT   EPSILN  TOLMAT
isc. data.      2.000E-04   0.000E+00   5.000E+01       | .000200     .000      50.50.{ T-max = 0  means that no transient solution follows
Comment card.   KOMPAR = 1.                             |C IOUT    IPLOT  IDOUBL    KSSOUT   MAXOUT  IPUN    MEMSAV   ICAT  NENERG   IPRSUP
Comment card.   KOMPAR = 1.                             |C  1-8     8-16  17-24      25-32   33-40   41-48    49-56    57-64  65-72
isc. data.       1   1  0  1  0  1  0  0  0  0          |        1        1                  1        0        1
Comment card.   KOMPAR = 1.                             |C
Comment card.   KOMPAR = 1.                             |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
Comment card.   KOMPAR = 1.                             |C BASE 100 MVA =1: UB=132 KV
Comment card.   KOMPAR = 1.                             |C SIGUE FORMATO RULE BOOK 4A-2
Comment card.   KOMPAR = 1.                             |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
Comment card.   KOMPAR = 1.                             |C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC     OUTPUT OPTION
Comment card.   KOMPAR = 1.                             |C  A6    A6    A6     A6  E6.2  E6.2  E6.2        I1
Comment card.   KOMPAR = 1.                             |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44       80
Comment card.   KOMPAR = 1.                             |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
Comment card.   KOMPAR = 1.                             |C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
Series R-L-C.   1.000E-01  7.003E-04  0.000E+00         |  RECRE LARIO                0.1   .22                                     4
Comment card.   KOMPAR = 1.                             |C LARIO AIMOG                .13   .32                                     4
Comment card.   KOMPAR = 1.                             |C LARIO PATQU                .07   .17                                     4
Comment card.   KOMPAR = 1.                             |C PATQU CHANI                .07   .17                                     4
Comment card.   KOMPAR = 1.                             |C PATQU NONOG                .12   .28                                     4
Series R-L-C.   8.000E-02  1.210E-03  0.000E+00         |  LARIO CHEPE                .08   .38                                     4
Series R-L-C.   8.000E-02  1.178E-03  0.000E+00         |  CHEPE LUJAN                .08   .37                                     4
Comment card.   KOMPAR = 1.                             |C NONOG VUNIO                .1    .22                                     4
Comment card.   KOMPAR = 1.                             |C NONOG CHILE                .01   .03                                     4
Comment card.   KOMPAR = 1.                             |C
Comment card.   KOMPAR = 1.                             |C
Comment card.   KOMPAR = 1.                             |C
Blank card ending branches.  IBR, NTOT = 3  5           |BLANK card ending branch cards.
Blank card ending switches.   KSWTCH = 0.               |BLANK card ending switch cards.
Comment card.   KOMPAR = 1.                             |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
Comment card.   KOMPAR = 1.                             |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
Comment card.   KOMPAR = 1.                             |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
```

```
Comment card.   KOMPAR = 1.                        !C I2 A6 I2   E10.6    E10.6     E10.6  E10.6     E10.6     E10.6     E10.6
Comment card.   KOMPAR = 1.                        !C  1-2 9-10 10-20   21-30     31-40    41-50     51-60     61-70     71-80
Comment card.   KOMPAR = 1.                        !C
Source.   1.10E+00  5.00E+01  2.00E+01 -1.00E+00 "!14LUJAN        1.10       50.      20.0                          -1.
Source.   1.05E+00  5.00E+01  1.00E+01 -1.00E+00 !14RECRE        1.05       50.      10.0                          -1.
Comment card.   KOMPAR = 1.                        !C
Comment card.   KOMPAR = 1.                        !C
Blank card ends electric network sources.          !BLANK card terminating all EMTP source cards.
Comment card.   KOMPAR = 1.                        !C            Next come power constraints of the load flow.  There will be on
Comment card.   KOMPAR = 1.                        !C            for each non-slack generator.  So, 3 of them will apply to node
Comment card.   KOMPAR = 1.                        !C            that have no Type-14 source as required by the algorithm.  Th
Comment card.   KOMPAR = 1.                        !C            program will define these internally.  Yet, this is only possibl
Comment card.   KOMPAR = 1.                        !C            for TMAX non-positive (no transient continuation).  If data w
Comment card.   KOMPAR = 1.                        !C            modified to make TMAX > 0, a KILL = 40 error termination wil
Comment card.   KOMPAR = 1.                        !C            will result.  Yet, the transient simulation is possible as
Comment card.   KOMPAR = 1.                        !C            2nd simulation that replaces the power constraints at load node
Comment card.   KOMPAR = 1.                        !C            by constant-impedance loads.  Branch cards for these will b
Comment card.   KOMPAR = 1.                        !C            punched by the present subcase, and the transient continuatio
Comment card.   KOMPAR = 1.                        !C            will be illustrated by the following (4th of 4) subcase.
Comment card.   KOMPAR = 1.                        !C       The following 4 cards would be used if peak rather than RMS input data
Comment card.   KOMPAR = 1.                        !C       Note that average of Vmin & Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.41421
Comment card.   KOMPAR = 1.                        !C       (power constraints RED, BLUE, and YELLOW), and 1.4708 = 1.414 * 1.0
Comment card.   KOMPAR = 1.                        !C
Comment card.   KOMPAR = 1.                        !C VALORES DE POTENCIA EN PU 1=100 MVA
Comment card.   KOMPAR = 1.                        !C 345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
Comment card.   KOMPAR = 1.                        !C NKBUS1 BUS2  BUS3  FK or QK      QK or VK      VMIN    VMAX    TMIN TMA
Comment card.   KOMPAR = 1.                        !C 1-2 3-8 9-14 15-20  21-36        37-52         53-60   61-68   69-74  75-
FIX.  -5.164E-01 -3.150E-01  8.500E-01  1.150E+00 !  CHEFE              -0.5164          -0.315      .85    1.15
Comment card.   KOMPAR = 1.                        !C CHAMI              -0.041           -.04        .85    1.15
Comment card.   KOMPAR = 1.                        !C PATQU              -0.021            .10        .85    1.15
Comment card.   KOMPAR = 1.                        !C NONOG              -0.0313          -.02        .85    1.15
Comment card.   KOMPAR = 1.                        !C VUNIO              -.0153           -.01        .85    1.15
Comment card.   KOMPAR = 1.                        !C LUJAN                    1.9         1.20                    -20.   20
FIX.  1.000E+00  1.020E+00  0.000E+00  1.000E+19 ! 1RECRE              1.0               1.02                    -20.   20
Comment card.   KOMPAR = 1.                        !C RECRE              1.1              -.05          1.5
FIX.  -1.532E+00  8.500E-01  8.500E-01  1.150E+00 !  LARIO             -1.532            0.85      .85    1.15
Comment card.   KOMPAR = 1.                        !C AIMOG              -.08             -.025     .85    1.15
Comment card.   KOMPAR = 1.                        !C CHILE              -.1151           -.10          1.15
Comment card.   KOMPAR = 1.                        !C    The following load-flow miscellaneous data card has two peculiarities.  T
Comment card.   KOMPAR = 1.                        !C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than pe
Comment card.   KOMPAR = 1.                        !C    voltages.  The use of  KTAPER = 0  ensures constant acceleration facto
Comment card.   KOMPAR = 1.                        !C    (this  works  well  for  this problem whether RMS or peak values are used
Comment card.   KOMPAR = 1.                        !C         NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAP
Comment card.   KOMPAR = 1.                        !C          10-16   17-24   25-32   33-40   41-48   50-56   57-64
 <= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =       9       5       7       0       0       0
Load flow iter.   1   1000   20    1    1.00E-02 !              1    1000      20       1      .01     0.2     2.5   1.414
Max del-V:  .0432 .0254 .0251 .0208 .0158 .0124 .0103 .0089 .0078 .0071 .0067 .0068 .0068 .0067 .0066 .0065 .0064 .0063 .0062 .00
Source No.     -2    -3    -3    -3    -3    -3    -3    -3    -3    -3    -2    -2    -2    -2    -2    -2    -2    -2    -2
Max del-V:   .006 .0059 .0058 .0057 .0056 .0055 .0054 .0053 .0053 .0052 .0051  .005  .005 .0049 .0049 .0048 .0047 .0047 .0046 .00
Source No.     -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2
Max del-V:  .0045 .0044 .0044 .0043 .0043 .0042 .0042 .0041 .0041  .004  .004 .0039 .0039 .0038 .0038 .0037 .0037 .0037 .0036 .00
Source No.     -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2    -2
```

ax del-V:	.0035	.0035	.0035	.0034	.0034	.0034	.0033	.0033	.0032	.0032	.0032	.0031	.0031	.0031	.003	.003	.003	.0029	.0029	.0029
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0029	.0028	.0028	.0028	.0027	.0027	.0027	.0027	.0026	.0026	.0026	.0025	.0025	.0025	.0025	.0024	.0024	.0024	.0024	.0023
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0023	.0023	.0023	.0023	.0022	.0022	.0022	.0022	.0022	.0021	.0021	.0021	.0021	.0021	.002	.002	.002	.002	.002	.0019
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0019	.0019	.0019	.0019	.0019	.0018	.0018	.0018	.0018	.0018	.0018	.0017	.0017	.0017	.0017	.0017	.0017	.0016	.0016	.0016
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0016	.0016	.0016	.0016	.0015	.0015	.0015	.0015	.0015	.0015	.0015	.0015	.0014	.0014	.0014	.0014	.0014	.0014	.0014	.0014
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0013	.0013	.0013	.0013	.0013	.0013	.0013	.0013	.0013	.0012	.0012	.0012	.0012	.0012	.0012	.0012	.0012	.0012	.0012	.0012
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.001	.001	.001	.001	.001	.001	1.E-3	1.E-3	1.E-3
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	1.E-3	1.E-3	1.E-3	1.E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.8E-3	.8E-3
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3
ource No.	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
ax del-V:	.6E-3	.6E-3	.6E-3	.6E-3																
ource No.	-2	-2	-2	-2																

Exit the load flow iteration loop with counter NEKITE = 264. If no warning on the preceding line, convergence was attained.

Row	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	4	CHEPE	8.51020729E-01	-7.28808	-5.09141849E-01	-3.13251897E-01
2	2	RECRE	1.02000000E+00	-13.01490	1.01529871E+00	-8.80866837E-02
4	3	LARIO	9.66585905E-01	-26.63249	-1.51801594E+00	8.50444661E-01

Sinusoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" is printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
RECRE		1.4055836948592	1.4424978336206	1.399124311889	1.4129833635385	1.015298711256	.09982609928187
		-.3242444706482	-12.9899339	-.1974161733945	-8.0314041	-.0880866837274	0.2196174
	LARIO	1.2222397055235	1.3670382881027	-1.399124311889	1.4129833635385	-.9154726119742	
		-.6123102019243	-26.6096744	.19741617339446	171.9685959	.30770410214737	
LARIO		1.2222397055235	1.3670382881027	-1.143816027338	1.1864209370084	-.6025433270133	.05630378559088
		-.6123102019243	-26.6096744	-.3150865521984	-164.5987370	.5427407587185	0.2674430
	CHEPE	1.1940120978752	1.2037054723679	1.1438160273382	1.1864209370084	.6588471126042	
		-.1524531873599	-7.2762378	.31508655219844	15.4012630	-.2752977771619	
CHEPE		1.1940120978752	1.2037054723679	-1.916914449274	1.941712704843	-1.167988761525	.15080222912595
		-.1524531873599	-7.2762378	.30933351307555	170.8331736	-.0385541196011	0.6974959
	LUJAN	1.4618186536551	1.5556349186104	1.9169144492744	1.941712704843	1.3187988906514	
		.53205847782555	20.0000000	-.3093335130755	-9.1668264	.7360500418086	

Total network loss P-loss by summing injections = 3.0693981399B7E-01

Path: C:\ATP
File: PROBE10 .SAL 21.567 .a.. 29-03-94 16:19:20 Page 4

Solution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed result applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the associated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.4055836948592	1.4424978336206	1.399124311889	1.4129833635385	1.015298711256	1.0191127204231
	-.3242444706482	-12.9899339	-.1974161733945	-8.0314041	-.0880866837274	0.9962575
LARIO	1.2222397055235	1.3670382881027	-2.542940339227	2.5456613849679	-1.518015938987	1.7400082908979
	-.6123102019243	-26.6096744	-.117670378804	-177.3506220	.85044466086595	-0.8724188
CHEPE	1.1940120978752	1.2037054723679	-.7730984219362	.99377139620592	-.5091418487213	.59810403394789
	-.1524531873599	-7.2762378	.62442006527398	141.0727068	-.313851896763	-0.8512597
LUJAN	1.4618186536551	1.5556349186104	1.9169144492744	1.941712704843	1.3187988906514	1.5102780427816
	.53205847782555	20.0000000	-.3093335130755	-9.1668264	.73605004180861	0.8732044

Comment card. KOMPAR = 1. !C
Comment card. KOMPAR = 1. !C
Comment card. KOMPAR = 1. !C
Request for flushing of punch buffer. !$PUNCH (Flush punched cards: R-L branches for equivelent impedance loads

A listing of 80-column card images now being flushed from punch buffer follows.

```
================================================================================
12345678901234567890123456789012345678901234567890123456789012345678901234567890
================================================================================
```

=========(End of LUNIT7 punched cards as flushed by $PUNCH request)========
Blank card ending node names for voltage output. !BLANK card ending requests for output variables

Selective branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be augmented to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

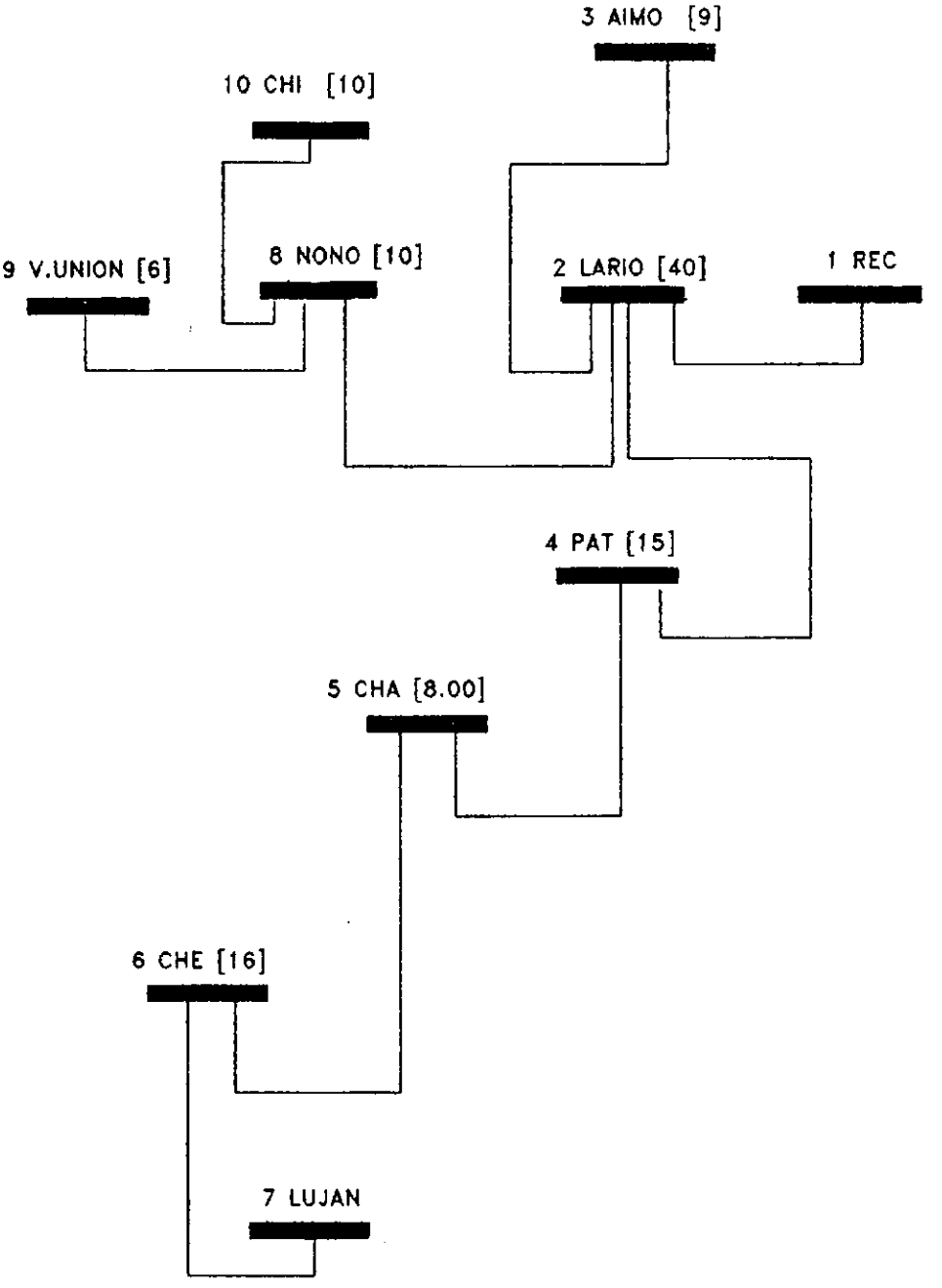
From bus K	To bus M	(======== Branch voltage Vkm = Vk - Vm ========) Magnitude	Degrees	Real part	Imag part	(====== Branch current Ikm from K to M ======) Magnitude	Degrees	Real part	Imag part
RECRE	LARIO	3.4146286E-01	57.524641	1.8334399E-01	2.8806573E-01	1.4129834E+00	-8.031404	1.3991243E+00	-1.9741617E-01
LARIO	CHEPE	4.6072255E-01	-86.487395	2.8227608E-02	-4.5985701E-01	1.1864209E+00	-164.598737	-1.1438160E+00	-3.1508655E-01
CHEPE	LUJAN	7.3503508E-01	-111.367295	-2.6780656E-01	-6.8451167E-01	1.9417127E+00	170.833174	-1.9169144E+00	3.0933351E-01

Actual List Sizes for the preceding solution follow. 29-Mar-94 16.19.20

```
   Size  1-10:     5     3     3     2 -9999     0 -9999 -9999     0     0
   Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     3    23     0
   Size 21-29:     0 -9999     3 -9999 -9999 -9999 -9999 -9999 -9999
```

Seconds for overlays 1-5 :	18.133	0.000	18.133 --- (CP: I/O; tot)
Seconds for overlays 6-11 :	5.824	0.000	5.824
Seconds for overlays 12-15 :	0.000	0.000	0.000
Seconds for time-step loop :	0.000	0.000	0.000
Seconds after DELTAT-loop :	0.328	0.000	0.328
Totals :	24.285	0.000	24.285

CIRCUITO PARA FLUJO DE CARGAS 132 kV – LA RIOJA
CASO 260
CARGA MW [ ] AÑO 1993

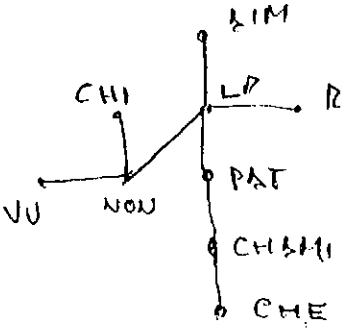


ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

CASO 260

260-2
45

```
DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 10:05;RETOMO Y AGREGO DATOS DE ARCH
RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
  (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC)
CASO 110; LINEA CHAMICAL[5] CHEPES[6] Y CHEPES[6] LUJAN[7] EN 240 MM2
SE ELIMINA CONEXION PATQUIA NONOGASTA Y SE AGREGA LA RIOJA NONOGASTA
ERASE
EGIN NEW DATA CASE
RINTED NUMBER WIDTH, 13, 2,    { Request maximum precision for 8 output columns
IX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
OWER FREQUENCY, 50.0,
 MISCELANEA CARD SIGUE II B-1,II B-2
 345678901234567890123456789012345678901234567890123456789012345678901234567890
 DELTAT    TMAX     XOPT COPT   EPSILN  TOLMAT
.000200     .000     50.50.{ T-max = 0  means that no transient solution follows
 IOUT    IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
C  1-8     8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
       1       1               1       0       1
C
C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
C BASE 100 MVA =1; UB=132 KV
C SIGUE FORMATO RULE BOOK 4A-2
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C BUS1  BUS2  BUS3   BUS4 RESIS XL     XC     OUTPUT OPTION
C  A6     A6     A6     A6  E6.2  E6.2  E6.2       II
C   3-8   9-14 15-20 21-26 27-32 33-38 39-44      80
C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
  RECRE LARIO               0.11  0.22                                      4
  LARIO AIMOG                .16   .30                                      4
  LARIO PATQU                .08   .16                                      4
  PATQU CHAMI                .08   .16                                      4
C PATQU NONOG                .14   .26                                      4
  CHAMI CHEPE                .11   .35                                      4
  CHEPE LUJAN               .105   .34                                      4
  NONOG VUNIO                .11   .21                                      4
  NONOG CHILE                .01   .02                                      4
  LARIO NONOG                .08   .16                                      4
C
C
BLANK card ending branch cards.
BLANK card ending switch cards.
C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART    TSTOP
C I2 A6 I2   E10.6    E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
C
14LUJAN        1.10       50.      15.0                          -1.
14RECRE        1.10       50.      15.0                          -1.
C
C
BLANK card terminating all EMTP source cards.
```



Next come power constraints of the load flow. There will be one for each non-slack generator. So, 3 of them will apply to nodes that have no Type-14 source as required by the algorithm. The program will define these internally. Yet, this is only possible for TMAX non-positive (no transient continuation). If data is modified to make TMAX > 0, a KILL = 40 error termination will will result. Yet, the transient simulation is possible as a 2nd simulation that replaces the power constraints at load nodes by constant-impedance loads. Branch cards for these will be punched by the present subcase, and the transient continuation will be illustrated by the following (4th of 4) subcase.

The following 4 cards would be used if peak rather than RMS input data. Note that average of Vmin & Vmax = 0.5 (1.0 + 1.828428) = 1.414212 (power constraints RED, BLUE, and YELLOW), and 1.4708 = 1.414 * 1.02

```
VALORES DE POTENCIA EN PU 1=100 MVA
PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
NKBUS1 BUS2  BUS3  PK or PK        QK or VK       VMIN     VMAX    THMIN THMAX
 1-2 3-8 9-14 15-20  21-36          37-52         53-60    61-68  69-74  75-80
 LARIO                -0.4000          -0.200      .65    1.25
 CHAMI                -0.080            -.034      .65    1.25
 PATQU                -0.150            -.080      .65    1.25
 NONOG                -0.10             -.061      .65    1.25
 VUNIO                -.0600            -.02       .65    1.25
 LUJAN                      1.0           1.20                -20.   40.
1RECRE                0.8               1.10                -20.   15.
 CHEPE                -.16              -.09             1.5
 AIMOG               -0.090           -0.04        .65    1.15
 CHILE                -.1000            -.04             1.15
```

The following load-flow miscellaneous data card has two peculiarities. The use of VSCALE = 1.414 is the special flag requesting RMS rather than peak voltages. The use of KTAPER = 0 ensures constant acceleration factors (this works well for this problem whether RMS or peak values are used).

```
     NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
      10-16   17-24   25-32   33-40   41-48   50-56   57-64
          1    2500      20       1     .01     0.2     2.5   1.414       2
```

```
PUNCH       ( Flush punched cards: R-L branches for equivalent impedance loads
BLANK card ending requests for output variables
BLANK card ending plot cards
BEGIN NEW DATA CASE
```

Path: C:\ATP
File: AP61032 .SAL 44.367 06-04-94 10:33:36 Page 1

```
ternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
Date (dd-mth-yy) and time of day (hh.mm.ss) = 06-Apr-94  10.32.55    Name of disk plot file, if any, is  C:44061032.pl4
r information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.   Last major program update:  Oct. 1990
tal length of "LABCOM" tables =  444863   INTEGER words.   "VARDIM"  List Sizes follow :    752   900  1500   150  7500
 120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252     4
-------------------------------------------------+------------------------------------------------------------------------------
escriptive interpretation of input data cards.   |  Input data card images are shown below, all 80 columns, character by character
                                                 0         1         2         3         4         5         6         7         8
                                                 012345678901234567890123456789012345678901234567890123456789012345678901234567890
-------------------------------------------------+------------------------------------------------------------------------------
omment card.   KOMPAR = 1.                       |C data:C:\RIV\EMIN\PROBE4.DAT
omment card.   KOMPAR = 1.                       |C DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 10:05;RETOMO Y AGREGO DATOS DE ARCH
omment card.   KOMPAR = 1.                       |C RED 132 kV LA RIOJA: DATOS DE RED FLU132E.W01 12-12-93)
omment card.   KOMPAR = 1.                       |C   (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC)
omment card.   KOMPAR = 1.                       |C CASO 110; LINEA CHAMICAL(5) CHEPES(6) Y CHEPES(6) LUJAN(7) EN 240 MM2
omment card.   KOMPAR = 1.                       |C SE ELIMINA CONEXION PATQUIA NONOGASTA Y SE AGREGA LA RIOJA NONOGASTA
rase all of  0   cards in the punch buffer.      |$ERASE

--------------------------------------------------------------------------------------------------------------------------------
ROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/
ROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/
--------------------------------------------------------------------------------------------------------------------------------
ou lose, fella.   The EMTP logic has detected an error condition, and is now going to terminate program execution.  The following
essage summarizes the circumstances leading to this situation.  Where an otherwise-unidentified data card is referred to, or where
he "last" card is mentioned, it is the most recently read card of the input data that is meant.  The 80-column image of this card
 generally the last one printed out prior to this termination message.  But possibly this last-read card has not yet been
isplayed, so a copy follows:
'$ERASE
          KILL code number                 Overlay number                 Nearby statement number
                22                               1                              2843
LL = 22.   The last-read data card is not recognized as either a comment card or a special-request card that can precede
iscellaneous data cards.  Hence, it is taken to be the floating-point miscellaneous data card.  But the presence of an alphabetical
etter other than "E" on the card makes it illegal as a miscellaneous data card, too.  Try again.
--------------------------------------------------------------------------------------------------------------------------------
ROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/
ROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/ERROR/
--------------------------------------------------------------------------------------------------------------------------------

ctual List Sizes for the preceding solution follow.      06-Apr-94  10.33.21
 Size  1-10: -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
 Size 11-20: -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
 Size 21-29: -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999 -9999
otal case timing (CP, I/O, tot), sec:     26.266     0.000    26.266

lternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
Date (dd-mth-yy) and time of day (hh.mm.ss) = 06-Apr-94  10.33.22    Name of disk plot file, if any, is  C:44061033.pl4
or information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.   Last major program update:  Oct. 1990
otal length of "LABCOM" tables =  444863   INTEGER words.   "VARDIM"  List Sizes follow :    752   900  1500   150  7500
 120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252     4
-------------------------------------------------+------------------------------------------------------------------------------
escriptive interpretation of input data cards.   |  Input data card images are shown below, all 80 columns, character by character
                                                 0         1         2         3         4         5         6         7         8
```

Path: C:\ATP
File: AP61032 .SAL   44.367 .a.., 06-04-94 10:33:36   Page 2

```
                                                       0123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
-------------------------------------------------------+-------------------------------------------------------------------------------------
ker card preceding new EMTP data case.                 |BEGIN NEW DATA CASE
th of time-step loop numbers.  W=13   S=2              |PRINTED NUMBER WIDTH, 13, 2,    ( Request maximum precision for 8 output columns
claration of desired EMTP load flow usage.             |FIX SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
 power frequency  STATFR = 5.00000000E+01  Hz.         |POWER FREQUENCY, 50.0,
ment card.    KOMPAR = 1.                              |C MISCELANEA CARD SIGUE II B-1,II B-2
ment card.    KOMPAR = 1.                              |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.    KOMPAR = 1.                              |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
sc. data.     2.000E-04   0.000E+00   5.000E+01        | .000200     .000      50.50.( T-max = 0  means that no transient solution follows
ment card.    KOMPAR = 1.                              |C IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
ment card.    KOMPAR = 1.                              |C  1-8    8-16  17-24     25-32    33-40   41-48    49-56    57-64  65-72
sc. data.      1   1  0  1  0  1  0  0  0  0           |       1        1                  1        0        1
ment card.    KOMPAR = 1.                              |C
ment card.    KOMPAR = 1.                              |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
ment card.    KOMPAR = 1.                              |C BASE 100 MVA =1; UB=132 KV
ment card.    KOMPAR = 1.                              |C SIGUE FORMATO RULE BOOK 4A-2
ment card.    KOMPAR = 1.                              |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.    KOMPAR = 1.                              |C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC     OUTPUT OPTION
ment card.    KOMPAR = 1.                              |C  A6    A6    A6     A6  E6.2  E6.2  E6.2         I1
ment card.    KOMPAR = 1.                              |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44        80
ment card.    KOMPAR = 1.                              |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
ment card.    KOMPAR = 1.                              |C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
ries R-L-C.   1.100E-01  7.003E-04  0.000E+00          |  RECRE LARIO              0.11  0.22                                        4
ries R-L-C.   1.600E-01  9.549E-04  0.000E+00          |  LARIO AIMOG               .16   .30                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00          |  LARIO PATOU               .08   .16                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00          |  PATOU CHAMI               .08   .16                                        4
ment card.    KOMPAR = 1.                              |C PATOU NONOG               .14   .26                                        4
ries R-L-C.   1.100E-01  1.114E-03  0.000E+00          |  CHAMI CHEPE               .11   .35                                        4
ries R-L-C.   1.050E-01  1.082E-03  0.000E+00          |  CHEPE LUJAN              .105   .34                                        4
ries R-L-C.   1.100E-01  6.685E-04  0.000E+00          |  NONOG VUNIO               .11   .21                                        4
ries R-L-C.   1.000E-02  6.366E-05  0.000E+00          |  NONOG CHILE               .01   .02                                        4
ries R-L-C.   8.000E-02  5.093E-04  0.000E+00          |  LARIO NONOG               .08   .16                                        4
ment card.    KOMPAR = 1.                              |C
ment card.    KOMPAR = 1.                              |C
ank card ending branches.  IBR, NTOT = 9  11           |BLANK card ending branch cards.
ank card ending switches.   KSWTCH = 0.                |BLANK card ending switch cards.
ment card.    KOMPAR = 1.                              |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
ment card.    KOMPAR = 1.                              |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.    KOMPAR = 1.                              |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
ment card.    KOMPAR = 1.                              |C I2 A6 I2   E10.6     E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
ment card.    KOMPAR = 1.                              |C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
ment card.    KOMPAR = 1.                              |C
urce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00         |14LUJAN         1.10        50.       15.0                          -1.
urce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00         |14RECRE         1.10        50.       15.0                          -1.
ment card.    KOMPAR = 1.                              |C
ment card.    KOMPAR = 1.                              |C
lank card ends electric network sources.               |BLANK card terminating all EMTP source cards.
mment card.   KOMPAR = 1.                              |C               Next come power constraints of the load flow.   There will be one
mment card.   KOMPAR = 1.                              |C               for each non-slack generator.   So, 3 of them will apply to nodes
mment card.   KOMPAR = 1.                              |C               that have no  Type-14  source as required by the algorithm.   The
mment card.   KOMPAR = 1.                              |C               program will define these internally.  Yet, this is only possible
```

```
mment card.   KOMPAR = 1.                       |C          for  TMAX  non-positive (no transient continuation).  If data is
mment card.   KOMPAR = 1.                       |C          modified to make  TMAX > 0,  a  KILL = 40  error termination will
mment card.   KOMPAR = 1.                       |C          will result.   Yet,  the  transient simulation is possible  as  a
mment card.   KOMPAR = 1.                       |C          2nd simulation that replaces the power constraints  at load nodes
mment card.   KOMPAR = 1.                       |C          by constant-impedance loads.  Branch cards  for  these  will  be
mment card.   KOMPAR = 1.                       |C          punched by the present subcase,  and  the  transient continuation
mment card.   KOMPAR = 1.                       |C          will be illustrated by the following (4th of 4) subcase.
mment card.   KOMPAR = 1.                       |C       The following 4 cards would be used if peak rather than RMS input data.
mment card.   KOMPAR = 1.                       |C       Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
mment card.   KOMPAR = 1.                       |C       (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
mment card.   KOMPAR = 1.                       |C
mment card.   KOMPAR = 1.                       |C VALORES DE POTENCIA EN PU 1=100 MVA
mment card.   KOMPAR = 1.                       |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
mment card.   KOMPAR = 1.                       |C 3456789012345678901234567890123456789012345678901234567890123456789012345678
mment card.   KOMPAR = 1.                       |C NKBUS1 BUS2  BUS3  PK or QK          QK or VK         VMIN     VMAX    THMIN THMAX
mment card.   KOMPAR = 1.                       |C 1-2 3-8 9-14 15-20  21-36            37-52           53-60    61-68  69-74  75-80
X.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00 |  LARIO                  -0.4000          -0.200     .65    1.25
X.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                  -0.080           -.034      .65    1.25
X.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00 |  PATQU                  -0.150           -.080      .65    1.25
X.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                  -0.10            -.061      .65    1.25
X.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00 |  VUNIO                  -.0600           -.02       .65    1.25
mment card.   KOMPAR = 1.                       |C LUJAN                           1.0          1.20                   -20.   40.
X.   8.000E-01  1.100E+00  0.000E+00 -1.000E+19 | 1RECRE                 0.8               1.10                      -20.   15.
X.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                  -.16             -.09               1.5
X.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00 |  AIMOG                  -0.090           -0.04      .65    1.15
X.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00 |  CHILE                  -.1000           -.04               1.15
mment card.   KOMPAR = 1.                       |C    The following load-flow miscellaneous data card has two peculiarities.  The
mment card.   KOMPAR = 1.                       |C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
mment card.   KOMPAR = 1.                       |C    voltages.  The use of   KTAPER = 0   ensures constant acceleration factors
mment card.   KOMPAR = 1.                       |C    (this  works  well  for  this problem whether RMS or peak values are used).
mment card.   KOMPAR = 1.                       |C         NNNOUT  NITERA  NFLOUT  NFRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
mment card.   KOMPAR = 1.                       |C          10-16   17-24   25-32  33-40   41-48   50-56    57-64
= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =       9      11     19      0      0      0
ad flow iter.  1   2500   20    1    1.00E-02 |             1    2500     20       1     .01     0.2     2.5   1.414      2
x del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0149 .0152 .0149 .0137 .0136 .0134 .0133 .0131 .0129 .0127 .0125 .0124 .0126
urce No.      1    -4    -4    -4    -4    -4    -4    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5    -5     7     7
x del-V:  .0128  .013 .0131 .0112 .0111 .0109 .0106 .0105 .0108 .0105 .0108 .0115 .0116 .0105 .0115 .0117 .0113 .0102 .0113 .0107
urce No.      7     7     7    -5    -5     4    -5     9     4     4     9    -9    -4    -4    -9    -4    -4     9    -9    -4
x del-V:  .0114 .0108 .0113 .0105 .0114 .0107 .0113 .0102 .0113 .0103  .011 .0117 .0119 .0124 .0102 .0111 .0118  .012 .0135 .0105
urce No.     -4     4    -9    -4    -4     4    -9    -4    -4     9    -9    -4     4    -4     9    -9    -4    -9    -4     9
x del-V:  .0116 .0118 .0115 .0106 .0115 .0109 .0116 .0113 .0115  .011 .0116 .0112 .0115  .011 .0116 .0112 .0115  .011 .0116 .0111
urce No.     -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4
x del-V:  .0115  .011 .0116  .011 .0116 .0109 .0116  .011 .0116 .0109 .0116 .0109 .0116 .0109 .0116 .0109 .0116 .0109 .0116 .0108
urce No.     -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4
x del-V:  .0116 .0108 .0116 .0108 .0116 .0108 .0116 .0107 .0116 .0108 .0116 .0107 .0116 .0107 .0116 .0106 .0116 .0107 .0117 .0105
urce No.     -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4
x del-V:  .0116 .0106 .0117 .0106 .0116 .0106 .0117 .0105 .0116 .0106 .0117 .0105 .0116 .0105 .0117 .0104 .0116 .0105 .0117 .0104
urce No.     -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     4    -9    -4    -4     9
x del-V:  .0116 .0104 .0117 .0104 .0116 .0104 .0117 .0104 .0116 .0104 .0117 .0104 .0116 .0104 .0117 .0104 .0116 .0104 .0117 .0104
urce No.     -9    -4    -4     9    -9    -4    -4     9    -9    -9    -4     9    -9    -9    -4     9    -9    -9    -4     9
x del-V:  .0116 .0103 .0117 .0104 .0116 .0104 .0117 .0104 .0116 .0103 .0117 .0104 .0116 .0104 .0117 .0104 .0116 .0103 .0117 .0104
urce No.     -9     4    -4     9    -9    -9    -4     9    -9     4    -4     9    -9    -9    -4     9    -9     4    -4     9
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x del-V:	.0116	.0104	.0116	.0104	.0115	.0093	.0112	.0118	.0121	.0121	.0119	.012	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121
urce No.	-9	4	-4	9	-9	-4	-4	-9	-4	-9	9	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.012	.0122	.012	.0122	.012	.0122	.012	.0121	.012	.0121	.012
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.0119	.0121	.0119	.0121	.0119	.0121	.0119	.012	.0119	.012	.0119
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0118	.012	.0118	.012	.0118	.012	.0118	.012	.0118
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0117
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x del-V:	.0119	.0117	.0119	.0117	.0119	.0117	.0119	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
urce No.	-4	4	-4	4	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
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urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
x del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116
urce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0116	.0115	.0116	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0114	.0114	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113
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ax del-V:	.0113	.0113	.0113	.0113	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	4

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urce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
x del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
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urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0113	.0112	.0113
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
urce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
x del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115	.0117	.0115	.0117
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
ax del-V:	.0114	.0117	.0114	.0117	.0114	.0117	.0113	.0117	.0113	.0117	.0113	.0117	.0112	.0117	.0112	.0117	.0112	.0117	.0112	.0117
ource No.	9	4	9	4	9	4	9	4	9	4	9	4	-4	4	-4	4	-4	4	-4	4
ax del-V:	.0112	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0119	.0113	.0118	.0113	.0119	.0113	.0118
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
ax del-V:	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
ax del-V:	.0112	.0116	.0111	.0114	.0108	.0111	.0104	.0107	.01	.0102	.0095	.0096	.0089	.009	.0083	.0084	.0077	.0077	.007	.0071
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
ax del-V:	.0063	.0064	.0057	.0057	.005	.0051	.0044	.0045	.0038	.0039	.0033	.0034	.0028	.0029	.0024	.0024	.002	.002	.0017	.0017
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
ax del-V:	.0014	.0014	.0012	.0012	.9E-3	.9E-3	.8E-3	.8E-3	.6E-3											
ource No.	9	4	9	4	9	4	9	4	9											

t the load flow iteration loop with counter NEKITE = 1209. If no warning on the preceding line, convergence was attained.

ow	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	3	LARIO	8.89848959E-01	-3.80873	-4.04020805E-01	-2.03048523E-01
4	6	CHAMI	9.05428079E-01	0.16103	-8.18270015E-02	-3.56048400E-02
5	5	PATQU	8.82701351E-01	-2.45285	-1.52497678E-01	-8.17911190E-02
6	9	MONOG	8.38623352E-01	-6.21261	-9.08492987E-02	-5.03486506E-02
7	10	VUNIO	8.24732158E-01	-7.03372	-6.01987321E-02	-2.43593172E-02
2	2	RECRE	1.10000000E+00	2.04657	7.92761431E-01	6.78039071E-01
8	7	CHEPE	9.70934254E-01	7.05285	-1.60428259E-01	-9.08059684E-02
9	4	AIMOG	8.57252277E-01	-5.40203	-9.32589514E-02	-4.23486528E-02
10	11	CHILE	8.36738430E-01	-6.33785	-1.09194030E-01	-5.54031841E-02

nusoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus X	Bus N	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
ECRE		1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.79276143126432	.09892796994204
		.05547026886898	2.0434654	-.8348229693001	-38.4964972	.67803907148634	0.1978559
	LARIO	1.2555232988362	1.2583049528123	-1.049648023154	1.3411526246414	-.6938334613223	
		-.0836217696019	-3.8104500	.83482296930006	141.5035028	-.4801831316023	
ARIO		1.2555232988362	1.2583049528123	.14659910010062	.16898272912901	.09554336445337	.00228441301951
		-.0836217696019	-3.8104500	-.084046811918	-29.9261026	.04663192719174	0.0042833
	AIMOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912901	-.0932589514339	
		-.1141540097252	-5.4034244	.08404681191799	150.1738974	-.0423486527802	
ARIO		1.2555232988362	1.2583049528123	-.1298428897114	.17513153600272	-.0765966062631	.00122824219611
		-.0836217696019	-3.8104500	-.1175239502998	-137.8509909	.07920587499028	0.0024537
	PATQU	1.2471068979652	1.2482515700127	.12984288971139	.17513153600272	.0778234484572	
		-.0534449712241	-2.4539194	.11752395029979	42.1490091	-.0767521905981	
ATQU		1.2471068979652	1.2482515700127	-.3683458960794	.36911828709613	-.2303211268575	.00544953239475
		-.0534449712241	-2.4539194	.02386651860333	176.2927727	-.0050389283986	0.0108999
	CHAMI	1.2803932126288	1.2803982203692	.36834589607941	.36911828709613	.2357710592523	
		.00358103066031	0.1602456	-.0238665186033	-3.7072273	.01593879318811	
CHAMI		1.2803932126288	1.2803982203692	-.4963158669284	.50256338703058	-.3175980607765	.01389245335055
		.00358103066031	0.1602456	.07912408706717	170.9419692	-.0515436331864	0.0442033
	CHEPE	1.3626813884637	1.3730704490764	.49631586692843	.50256338703058	.3314950141270 5	
		.16858793450787	7.0526702	-.0791240870672	-9.0580308	.09574699384728	
CHEPE		1.3626813884637	1.3730704490764	-.7444658766525	.76631843595364	-.4919187729672	.03083030712733
		.16858793450787	7.0526702	.18169893720791	166.2041848	-.1865528622466	0.0993315
	LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631843595364	.52274908009457	
		.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294465	

ONOG	1.1794668861286	1.1864257688768	.09734877138892	.11137362356051	.06088075671741	.682224621J7E-3
	-.1283120009229	-6.2086848	-.0541045352449	-29.0644457	.02566174603322	0.0013024
VUNIO	1.1573965688744	1.1661731111915	-.09734877138889	.11137362356051	-.060198732096	
	-.1428037440376	-7.0338096	.0541045352449	150.9355543	-.0243593172106	
NONOG	1.1794668861286	1.1864257688768	.17317298983299	.20706021017633	.10940839983566	.21436955317E-3
	-.1283120009229	-6.2086848	-.113512317528	-33.2442449	.05583192343033	0.0004287
CHILE	1.1754649098797	1.1827022669092	-.173172989833	.20706021017633	-.1091940301925	
	-.1306403375443	-6.3417867	.11351231752795	146.7557551	-.0554031841239	
LARIO	1.2555232988362	1.2583049528123	.41359218837384	.49313394128363	.27086583862674	.039727243361B4
	-.0836217696019	-3.8104500	-.2685564852355	-32.5967432	.15129680679071	0.0194543
NONOG	1.1794668861286	1.1864257688768	-.4135921883738	.49313394128363	-.2611386552647	
	-.1283120009229	-6.2086848	.26855648523354	147.4032568	-.1318423200G7	

Total network loss P-loss by summing injections = 1.6323575566G7E-01

olution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed esult applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the ssociated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.77276143126438	1.0431719270371
	.05547026886898	2.0434654	-.8348229693001	-38.4764972	.6760390714B634	0.7399528
LARIO	1.2555232988362	1.2583049528123	-.6192996243911	.7187036901980G	-.4040208045053	.45217420649034
	-.0836217696019	-3.8104500	.36469572184674	149.5068440	-.2030485226295	-0.8975079
AIMOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912701	-.0932589514339	.10242382737838
	-.1141540097252	-5.4034244	.08404681191799	150.1738974	-.0423486527802	-0.9105201
PATQU	1.2471068979652	1.2482515700127	-.238503006368	.27726332022687	-.1524976783983	.17304718739007
	-.0534447912241	-2.4539194	.14139046890312	149.3354914	-.0817911189967	-0.8812491
CHAMI	1.280393212628	1.2803982203692	-.127969970849	.13939050294634	-.0818270015242	.08923767575443
	.00358103066031	0.1602456	.05525756846384	156.6452622	-.0356048399983	-0.9169559
CHEPE	1.3626813884637	1.3730704490764	-.2481500097241	.26851448230485	-.1604282588402	.18434465040093
	.16858793450787	7.0526702	.10257485014074	157.5418424	-.0908059683994	-0.8702626
LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631843595364	.52274908009457	.5960558568722
	.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294485	0.8770136
NONOG	1.1794668861286	1.1864257688768	-.1430704271519	.17509413618719	-.0908492987118	.10386209757585
	-.1283120009229	-6.2086848	.10093963246268	144.7961099	-.0503486566035	-0.8746603
VUNIO	1.1573965688744	1.1661731111915	-.09734877138889	.11137362356051	-.060198732096	.06494045259B4
	-.1428037440376	-7.0338096	.0541045352449	150.9355543	-.0243593172106	-0.9269834

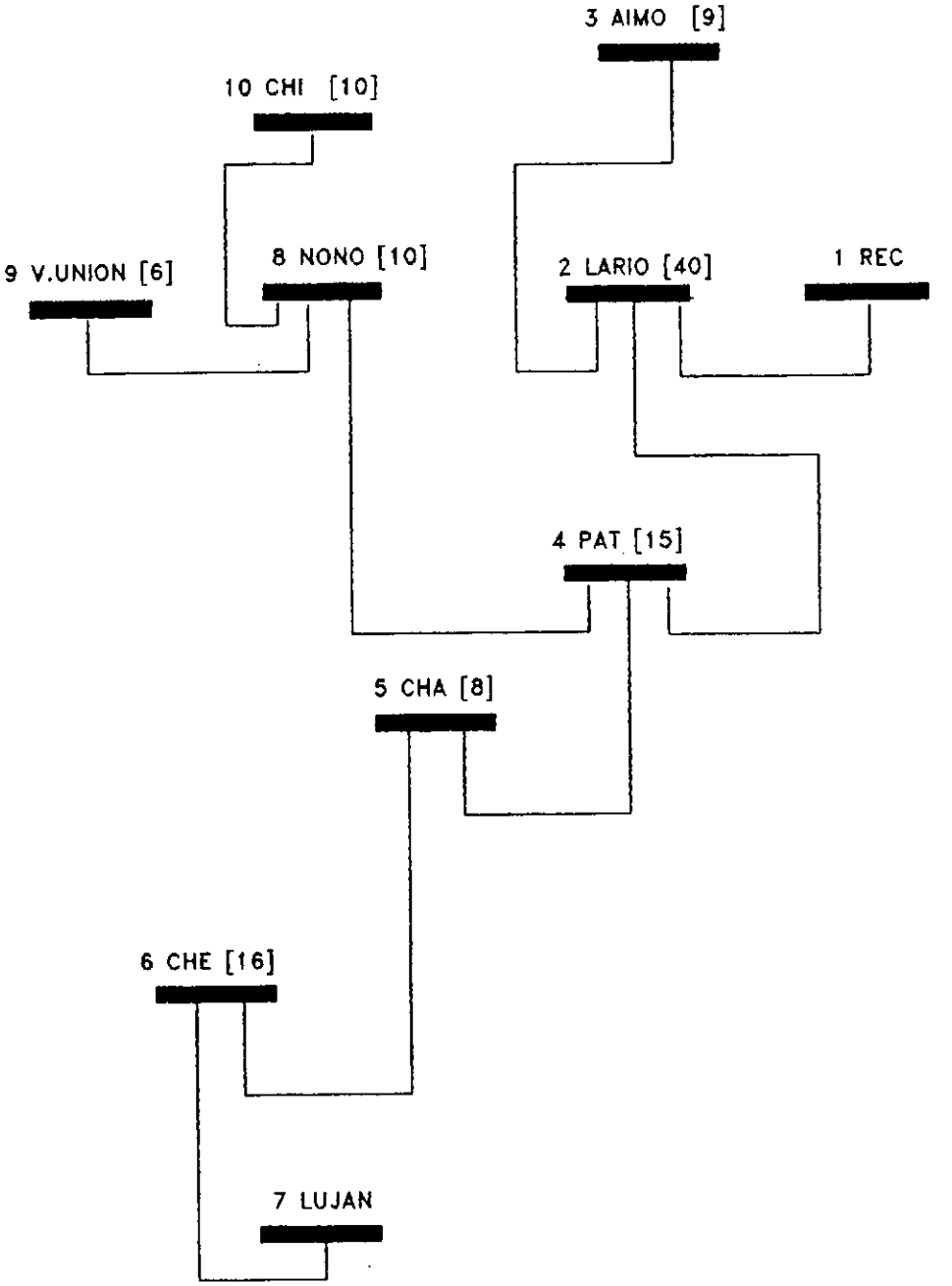
```
          CHILE   1.1754649098797  1.1827022669092      -.173172989833  .20706021017632      .1091940301825  .12244528999112
                  -.1306403375443      -6.3417867      .11351231752795     146.7557551      -.0554031841239      -0.8917781

mment card.   KOMPAR = 1.                          !C
mment card.   KOMPAR = 1.                          !C
mment card.   KOMPAR = 1.                          !C
quest for flushing of punch buffer.                !$PUNCH       ( Flush punched cards; R-L branches for equivalent impedance loads

 listing of 80-column card images now being flushed from punch buffer follows.
================================================================================
23456789012345678901234567890123456789012345678901234567890123456789012345678
================================================================================
========( End of LUNIT7 punched cards as flushed by $PUNCH request )========
lank card ending node names for voltage output.  !BLANK card ending requests for output variables

elective branch outputs follow (for column-80 keyed branches only).  Any request for branch current output automatically will be
ugmented to include branch voltage.  But the converse is not true (a request for voltage only will not produce current output).
From    To      (========  Branch voltage  Vkm  =  Vk - Vm  =========)      (======  Branch current  Ikm  from  K to M  ======)
ous K   bus M    Magnitude      Degrees       Real part      Imag part      Magnitude      Degrees       Real part      Imag part
ECRE  LARIO  3.2987993E-01   24.938452  2.7912234E-01  1.3909204E-01   1.3411526E+00  -38.496497  1.0496480E+00 -8.3492297E-01
ARIO  AIMOG  5.7454128E-02   32.101411  4.8669900E-02  3.0532240E-02   1.6898273E-01  -29.326103  1.4689910E-01 -8.4046812E-02
ARIO  PATGU  3.1328482E-02  -74.416042  8.4164009E-03 -3.0176778E-02   1.7513154E-01 -137.350991 -1.2984283E-01 -1.1752395E-01
ATGU  CHAMI  6.6029887E-02 -120.272278 -3.3286315E-02 -5.7026022E-02   3.6911829E-01  176.292773 -3.6834590E-01  2.3866519E-02
HAMI  CHEPE  1.8438715E-01 -116.505219 -8.2288176E-02 -1.6500690E-01   5.0258339E-01  170.941967 -4.9631587E-01  7.9124087E-02
HEPE  LUJAN  2.7268987E-01 -120.877734 -1.3994656E-01 -2.3404001E-01   7.6631844E-01  166.284185 -7.4446588E-01  1.8169894E-01
GNOG  VUNIO  2.6402832E-02   33.289579  2.2070317E-02  1.4491743E-02   1.1137362E-01  -29.064446  9.7348771E-02 -5.4104535E-02
ONOG  CHILE  4.6300071E-03   30.190704  4.0019762E-03  2.3283366E-03   2.0706021E-01  -33.244245  1.7317299E-01 -1.1351232E-01
ARIO  NONOG  8.8214481E-02   30.438206  7.6056413E-02  4.4690231E-02   4.9313394E-01  -32.996743  4.1559219E-01 -2.6855649E-01
ctual List Sizes for the preceding solution follow.      06-Apr-94  10.33.36
  Size  1-10:    11     9     9     2 -9999     0 -9999 -9999     0     0
  Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     9    23     0
  Size 21-29:     0 -9999     9 -9999 -9999 -9999 -9999 -9999 -9999
econds for overlays  1-5  :     3.133     0.000     3.133  --- (CP: I/O; tot)
econds for overlays  6-11 :    11.043     0.000    11.043
econds for overlays 12-15 :     0.000     0.000     0.000
econds for time-step loop :     0.000     0.000     0.000
econds after DELTAT-loop  :     0.109     0.000     0.109
                           ------------------------------
                  Totals  :    14.285     0.000    14.285
```

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 270
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

2706-2

CASO 270

```
DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 10:05;RETOMO Y AGREGO DATOS DE ARCH
RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
 -CASO=105; LINEA CHAMI[5], CHEP[6] Y CHEP[60, LUJ[7] EN 240 MM2
ERASE
EGIN NEW DATA CASE
RINTED NUMBER WIDTH, 13, 2,   ( Request maximum precision for 8 output columns
X SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
OWER FREQUENCY, 50.0,
 MISCELANEA CARD SIGUE II B-1,II B-2
3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
 DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
,000200    .000     50.50,( T-max = 0  means that no transient solution follows
 IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
  1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
     1       1              1       0       1

 CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
 BASE 100 MVA =1; UB=132 KV
 SIGUE FORMATO RULE BOOK 4A-2
3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
 BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
  A6    A6    A6     A6  E6.2  E6.2  E6.2       11
   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
 LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
 EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
 RECRE LARIO              0.11  0.22                                          4
 LARIO AINOG               .16   .30                                          4
 LARIO PATQU               .08   .16                                          4
 PATQU CHAMI               .08   .16                                          4
 PATQU NONOG               .14   .26                                          4
 CHAMI CHEPE               .11   .35                                          4
 CHEPE LUJAN              .105   .34                                          4
 NONOG YUNIO               .11   .21                                          4
 NONOG CHILE               .01   .02                                          4
 LARIO NONOG               .08   .16                                          4


BLANK card ending branch cards.
BLANK card ending switch cards.
C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
C 3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
C  I2 A6 I2   E10.6    E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
C
14LUJAN         1.10       50.      15.0                              -1.
14RECRE         1.10       50.      15.0                              -1.
C
C
BLANK card terminating all EMTP source cards.
C             Next come power constraints of the load flow.  There will be one
C             for each non-slack generator.  So, 3 of them will apply to nodes
```

that have no Type-14 source as required by the algorithm. The program will define these internally. Yet, this is only possible for TMAX non-positive (no transient continuation). If data is modified to make TMAX > 0, a KILL = 40 error termination will will result. Yet, the transient simulation is possible as a 2nd simulation that replaces the power constraints at load nodes by constant-impedance loads. Branch cards for these will be punched by the present subcase, and the transient continuation will be illustrated by the following (4th of 4) subcase.

The following 4 cards would be used if peak rather than RMS input data. Note that average of Vmin & Vmax = 0.5 (1.0 + 1.828428) = 1.414212 (power constraints RED, BLUE, and YELLOW), and 1.4708 = 1.414 * 1.02

```
VALORES DE POTENCIA EN PU 1=100 MVA
PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
3456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
NKBUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN    VMAX    THMIN THMAX
1-2 3-8 9-14 15-20  21-36          37-52         53-60   61-68   69-74  75-80
LARIO                -0.4000          -0.200      .65    1.25
CHAMI                -0.080            -.034      .65    1.25
PATGU                -0.150            -.080      .65    1.25
NONOG                -0.10             -.061      .65    1.25
YUNIO                -.0600            -.02       .65    1.25
LUJAN                      1.0          1.20                    -20.   40.
1RECRE               0.8                1.10                    -20.   15.
CHEPE                -.16               -.09            1.5
AIMOG               -0.090            -0.04       .65    1.15
CHILE                -.1000            -.04            1.15
```

The following load-flow miscellaneous data card has two peculiarities. The use of VSCALE = 1.414 is the special flag requesting RMS rather than peak voltages. The use of KTAPER = 0 ensures constant acceleration factors (this works well for this problem whether RMS or peak values are used).

```
    NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
     10-16   17-24   25-32   33-40   41-48   50-56   57-64
         1    2500      20       1     .01     0.2     2.5   1.414       2
```

```
PUNCH        ( Flush punched cards: R-L branches for equivalent impedance loads
LANK card ending requests for output variables
LANK card ending plot cards
EGIN NEW DATA CASE
```

```
Path: C:\ATP
File: AP61100 .SAL   37.465 .a.. 06-04-94 11:00:56        Page 1

lternative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
Date (dd-mth-yy) and time of day (hh.mm.ss) = 06-Apr-94  11.00.16    Name of disk plot file, if any, is  C:\4406l100.pl4
or information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
otal length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM"  List Sizes follow :    752   900  1500   150  7500
  120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1760   300   450 12000     9  1200   252    4
-----------------------------------------------+-----------------------------------------------------------------------------------
escriptive interpretation of input data cards.  |  Input data card images are shown below, all 80 columns, character by character
                                                0        1         2         3         4         5         6         7         8
                                                01234567890123456789012345678901234567890123456789012345678901234567890123456789012345678890
-----------------------------------------------+-----------------------------------------------------------------------------------
omment card.   KOMPAR = 1.                      |C data:C:\RIV\EMIN\PRORE3.DAT
omment card.   KOMPAR = 1.                      |C DATA:C:\RIV\EMIN\PRORE3.DAT(-06-04-94 10:05:RETOMO Y AGREGO DATOS DE ARCH
omment card.   KOMPAR = 1.                      |C RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
omment card.   KOMPAR = 1.                      |C   CASO 105: LINEA CHAMI(5), CHEP(6) Y CHEP(60, LUJ(7] EN 240 MM2
rase all of  0   cards in the punch buffer.     |$ERASE
arker card preceding new EMTP data case.        |BEGIN NEW DATA CASE
idth of time-step loop numbers.  W=13   S=2     |PRINTED NUMBER WIDTH, 13, 2,   { Request maximum precision for 8 output columns
eclaration of desired EMTP load flow usage.     |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
ew power frequency  STATFR = 5.00000000E+01  Hz. |POWER FREQUENCY, 50.0,
omment card.   KOMPAR = 1.                      |C MISCELANEA CARD SIGUE II B-1,II B-2
omment card.   KOMPAR = 1.                      |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card.   KOMPAR = 1.                      |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
isc. data.     2.000E-04   0.000E+00   5.000E+01 | .000200    .000     50.50.( T-max = 0  means that no transient solution follows
comment card.  KOMPAR = 1.                      |C IOUT   IPLOT  IDOUBL  KSSOUT   MAXOUT  IPUN   MSAV   ICAT  NENERG   IPRSUP
omment card.   KOMPAR = 1.                      |C  1-8    8-16  17-24     25-32   33-40   41-48   49-56    57-64  65-72
isc. data.      1    1  0  1  0  1  0  0  0  0 |       1       1               1       0       1
omment card.   KOMPAR = 1.                      |C
omment card.   KOMPAR = 1.                      |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
omment card.   KOMPAR = 1.                      |C BASE 100 MVA =1: UB=132 KV
omment card.   KOMPAR = 1.                      |C SIGUE FORMATO RULE BOOK 4A-2
omment card.   KOMPAR = 1.                      |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card.   KOMPAR = 1.                      |C BUS1  BUS2  BUS3   BUS4 RESIS VL    XC     OUTPUT OPTION
omment card.   KOMPAR = 1.                      |C  A6    A6    A6     A6  E6.2  E6.2  E6.2        11
omment card.   KOMPAR = 1.                      |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
omment card.   KOMPAR = 1.                      |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
omment card.   KOMPAR = 1.                      |C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
eries R-L-C.   1.100E-01  7.003E-04  0.000E+00 |  RECRE LARIO              0.11  0.22                                          4
eries R-L-C.   1.600E-01  9.549E-04  0.000E+00 |  LARIO AIMOG               .16   .30                                          4
eries R-L-C.   8.000E-02  5.093E-04  0.000E+00 |  LARIO PATQU               .08   .15                                          4
eries R-L-C.   8.000E-02  5.093E-04  0.000E+00 |  PATQU CHAMI               .08   .16                                          4
eries R-L-C.   1.400E-01  8.276E-04  0.000E+00 |  PATQU NONOG               .14   .26                                          4
eries R-L-C.   1.100E-01  1.114E-03  0.000E+00 |  CHAMI CHEPE               .11   .35                                          4
eries R-L-C.   1.050E-01  1.082E-03  0.000E+00 |  CHEPE LUJAN              .105   .34                                          4
eries R-L-C.   1.100E-01  6.685E-04  0.000E+00 |  NONOG VUNIO               .11   .21                                          4
eries R-L-C.   1.000E-02  6.366E-05  0.000E+00 |  NONOG CHILE               .01   .02                                          4
Comment card.  KOMPAR = 1.                      |C LARIO NONOG               .09   .16                                          4
Comment card.  KOMPAR = 1.                      |C
Comment card.  KOMPAR = 1.                      |C
Blank card ending branches.  IBR, NTOT = 9  11  |BLANK card ending branch cards.
Blank card ending switches.   KSWTCH = 0.       |BLANK card ending switch cards.
Comment card.  KOMPAR = 1.                      |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
Comment card.  KOMPAR = 1.                      |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
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omment card.   KOMPAR = 1.                          !C NAME  IV AMPLITUDE FREQUENCY PHASE    A1      TIME-1    TSTART    TSTOP
omment card.   KOMPAR = 1.                          !C I2 A6 I2   E10.6    E10.6     E10.6  E10.6     E10.6     E10.6     E10.6
omment card.   KOMPAR = 1.                          !C  1-2 9-10 10-20   21-30     31-40    41-50     51-60     61-70     71-80
omment card.   KOMPAR = 1.                          !C
ource.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00      !14LUJAN        1.10       50.      15.0                          -1.
ource.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00      !14RECRE        1.10       50.      15.0                          -1.
omment card.   KOMPAR = 1.                          !C
omment card.   KOMPAR = 1.                          !C
lank card ends electric network sources.            !BLANK card terminating all EMTP source cards.
omment card.   KOMPAR = 1.                          !C            Next come power constraints of the load flow.  There will be one
omment card.   KOMPAR = 1.                          !C            for each non-slack generator.  So, 3 of them will apply to nodes
omment card.   KOMPAR = 1.                          !C            that have no  Type-14  source as required by the algorithm.  The
omment card.   KOMPAR = 1.                          !C            program will define these internally.  Yet, this is only possible
omment card.   KOMPAR = 1.                          !C            for  TMAX  non-positive (no transient continuation).  If data is
omment card.   KOMPAR = 1.                          !C            modified to make  TMAX > 0,  a  KILL = 40  error termination will
omment card.   KOMPAR = 1.                          !C            will result.  Yet,  the  transient simulation is possible  as  a
omment card.   KOMPAR = 1.                          !C            2nd simulation that replaces the power constraints  at load nodes
omment card.   KOMPAR = 1.                          !C            by constant-impedance loads.  Branch cards  for  these  will  be
omment card.   KOMPAR = 1.                          !C            punched by the present subcase,  and  the  transient continuation
omment card.   KOMPAR = 1.                          !C            will be illustrated by the following (4th of 4) subcase.
omment card.   KOMPAR = 1.                          !C       The following 4 cards would be used if peak rather than RMS input data.
omment card.   KOMPAR = 1.                          !C       Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
omment card.   KOMPAR = 1.                          !C       (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
omment card.   KOMPAR = 1.                          !C
omment card.   KOMPAR = 1.                          !C VALORES DE POTENCIA EN PU 1=100 MVA
omment card.   KOMPAR = 1.                          !C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
omment card.   KOMPAR = 1.                          !C 345678901234567890123456789012345678901234567890123456789012345678901234567890
omment card.   KOMPAR = 1.                          !C NKBUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN     VMAX     THMIN THMAX
omment card.   KOMPAR = 1.                          !C 1-2 3-8 9-14 15-20  21-36         37-52          53-60    61-68    69-74 75-80
IX.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00   ;  LARIO                -0.4000          -0.200      .65    1.25
IX.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00   ;  CHAMI                -0.080           -.034       .65    1.25
IX.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00   ;  PATQU                -0.150           -.080       .65    1.25
IX.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00   ;  NONOG                -0.10            -.061       .65    1.25
IX.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00   ;  VUNIO                -.0600           -.02        .65    1.25
omment card.   KOMPAR = 1.                          !C LUJAN                      1.0          1.20                      -20.   40.
IX.   8.000E-01  1.100E+00  0.000E+00  1.000E+19   ;  1RECRE                0.8              1.10                      -20.   15.
IX.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00   ;  CHEPE                 -.16             -.09              1.5
IX.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00   ;  AIMOG                -0.090           -0.04       .65    1.15
IX.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00   ;  CHILE                 -.1000           -.04              1.15
omment card.   KOMPAR = 1.                          !C   The following load-flow miscellaneous data card has two peculiarities.  The
omment card.   KOMPAR = 1.                          !C   use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
omment card.   KOMPAR = 1.                          !C   voltages.  The use of  KTAPER = 0  ensures constant acceleration factors
omment card.   KOMPAR = 1.                          !C   (this  works  well  for  this problem whether RMS or peak values are used).
omment card.   KOMPAR = 1.                          !C        NNNOUT  NITERA  NFLOUT  NPRINT  BALCHK  CFITEV  CFITEA  VSCALE  KTAPER
omment card.   KOMPAR = 1.                          !C         10-16   17-24   25-32   33-40   41-48   50-56    57-64
<= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =      9      11      19       0       0       0
oad flow iter.   1   2500   20    1    1.00E-02     !              1    2500      20       1     .01     0.2     2.5   1.414       2
lax del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0187 .0152 .0155 .0158 .0149 .0136 .0135 .0133 .0131 .0129 .0127 .0125 .0126
ource No.      1    -4    -4    -4    -4    -4    -4    -4    -9    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5     7
lax del-V:  .0128  .013 .0132 .0115 .0113 .0111 .0108 .0106 .0114 .0091 .0061 .0107 .0115 .0116 .0118 .0117 .0118 .0117 .0118 .0117
ource No.      7     7     7    -5    -5    -5    -5    -4    -9    -4    -9    -9    -4    -9    -4    -9    -4    -9    -4     4
lax del-V:  .0118 .0117 .0118 .0117 .0117 .0117 .0117 .0116 .0117 .0116 .0117 .0116 .0117 .0116 .0117 .0116 .0117 .0116 .0117 .0116
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ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0117	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0115	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
x del-V:	.0115	.0114	.0115	.0114	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
ource No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
ax del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0114	.0113	.0114	.0113	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0112	.0112	.0112	.0112	.0111	.0112	.0111	.0112	.0111	
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0112	.0111	.0112	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0111	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.0109	.011	.0109	.011	.0109	.011	.0109
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.011	.0109	.011	.0109	.011	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0108	.0108	.0108	.0108
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0109	.0108	.0108	.0108	.0107	.0108	.0107	.0108	.0107
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0106
ource No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
ax del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106

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ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0105 .0107 .0106 .0107 .0106 .0107 .0106
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0107 .0106 .0106 .0106 .0106 .0106
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0106 .0105 .0106 .0105 .0106 .0105 .0106 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0103 .0104 .0103 .0104 .0103
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103
ource No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
ax del-V:  .0104 .0103 .0104 .0103 .0103 .0103 .0103 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0102 .0103 .0101 .0103
ource No.     -4    -9    -4    -9    -4     4    -4     4    -4     4     9     4     9     4     9     4     9     4     9     4
ax del-V:  .0101 .0103 .0101 .0103 .0101 .0103 .0101 .0103 .0101 .0103   .01 .0103   .01 .0103   .01 .0103   .01 .0103   .01 .0103
ource No.     -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V:    .01 .0103   .01 .0103   .01 .0103   .01 .0103   .01 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103
ource No.     -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V:  .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0098 .0102 .0097   .01 .0095 .0097 .0092 .0094
ource No.     -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V:  .0089 .0091 .0085 .0086  .008 .0082 .0076 .0077 .0071 .0072 .0065 .0067  .006 .0061 .0055 .0056  .005 .0051 .0044 .0046
ource No.     -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
ax del-V:   .004 .0041 .0035 .0036 .0031 .0032 .0027 .0028 .0024 .0024 .0021 .0021 .0018 .0018 .0015 .0015 .0013 .0013 .0011 .0011
ource No.     -4     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
ax del-V:  .9E-3 .9E-3 .8E-3 .8E-3 .7E-3
ource No.      9     4     9     4     9
Exit the load flow iteration loop with counter  NEKITE = 1005.   If no warning on the preceding line,  convergence was attained.
 Row  Node  Name    Voltage magnit    Degrees     Real power P    Reactive power
   3     3  LARIO   8.91087643E-01   -1.34554  -4.00118202E-01  -2.00746833E-01
   4     6  CHAMI   8.64222944E-01    0.12963  -7.94935718E-02  -3.51116285E-02
   5     5  PATGU   8.31979085E-01   -2.51643  -1.49960473E-01  -8.20822973E-02
   6     7  NONOS   7.32871828E-01   -7.08308  -9.05975424E-02  -5.23509353E-02
   7    10  VUNIO   7.16999396E-01   -8.15415  -5.95701921E-02  -2.39812397E-02
```

2	2	RECRE	1.10000000E+00	4.63294	7.98768580E-01	6.69557164E-01
8	8	CHEPE	9.50362035E-01	7.15804	-1.59535586E-01	-9.05454993E-02
9	4	AIMOG	8.59787951E-01	-2.87351	-8.98815151E-02	-4.08658418E-02
10	11	CHILE	7.30691633E-01	-7.24435	-1.66425229E-01	-5.36579748E-02

nusoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
ECRE		1.5505536006569	1.5556349186104	1.0931005410641	1.3400000246314	.73876857954054	.09875800363067
		.12563252560574	4.6322315	-.775068560282	-35.3387433	.66955716430803	0.1775169
	LARIO	1.2597974578778	1.2601449616631	-1.093100541064	1.3400000246314	-.7000105759039	
		-.0295920517973	-1.3456036	.77506856028199	144.6612567	-.4720411570467	
LARIO		1.2597974578778	1.2601449616631	.14429094845753	.16241059897591	.09199169128486	.00211017621278
		-.0295920517973	-1.3456036	-.0745474671129	-27.3229961	.04482242216768	0.0039566
	AIMOG	1.2143466659907	1.21587538013	-.1442909484575	.16241059897591	-.0898815150721	
		-.0609517415965	-2.8734375	.07454746711286	152.6770039	-.0408658417707	
LARIO		1.2597974578778	1.2601449616631	.32143143161863	.48792543981625	.20790068308829	.0075228493928
		-.0295920517973	-1.3456036	-.3670872778883	-48.7337434	.22647190196463	0.0190457
	PATOU	1.1753489788861	1.1764834754783	-.3214314316186	.48792543981625	-.1983778336955	
		-.0516540986253	-2.5164089	.36708727788835	131.2062566	-.207426203179	
PATOU		1.1753489788861	1.1764834754783	-.3890795686029	.40119339593382	-.2311791298593	.00643824563764
		-.0516540986253	-2.5164089	.09784288546805	165.8343687	-.0474509905562	0.0128765
	CHAMI	1.2221302060493	1.222133347919	.38907956860287	.40119339593382	.23761737549693	
		.00277120151376	0.1299190	-.09784288546805	-14.1156313	.0603274818335	
PATOU		1.1753489788861	1.1764834754783	.4619533240093	.55875435745091	.27959649101614	.02185445023793
		-.0516540986253	-2.5164089	-.3143335146101	-34.2331066	.17277489643461	0.0405869
	NONOG	1.0289487997262	1.0368495752427	-.4619533240093	.55875435745091	-.2577420407762	
		-.1277552708223	-7.0776776	.3143335146101	145.7668934	-.1322080602779	
CHAMI		1.2221302060493	1.222133347919	-.5192993741817	.54194013661458	-.3171109473143	.01615345114206
		.00277120151376	0.1299190	.15500732772467	163.3799938	-.0954391102916	0.0513973
	CHEPE	1.3335057019129	1.3439811723955	.519299374181683	.54194013661459	.3332643984564	
		.16747517642763	7.1583066	-.1550073277247	-16.6200062	.14683445483448	
CHEPE		1.3335057019129	1.3439811723955	-.7716468032872	.81398999997068	-.4927999847231	.03478543528019
		.16747517642763	7.1583066	.25911567030842	161.4381708	-.2373819541658	0.1126386
	LOJAN	1.5026279441629	1.5556349186104	.77164680328716	.81398999997068	.52759542000229	
		.40262794416288	15.0000000	-.2591156703084	-18.5618292	.35002050650165	

NONOG		1.0289487997262	1.0368495752427	.1096200358704	.12668337551698	.060452869329	.88267726978E-3
		-.1277552708223	-7.0776776	-.0634990186393	-30.0821990	.02566635082125	0.0016851
	VUNIO	1.0035559018662	1.0138047051426	-.1096200358704	.12668337551698	-.0595701920592	
		-.1437905863047	-8.1539065	.06349901863926	149.9178010	-.0239812396698	
NONOG		1.0289487997262	1.0368495752427	.19135183090538	.23082447914671	.10669162905523	.26639770087E-3
		-.1277552708223	-7.0776776	-.1290907315903	-34.0045874	.05419077417296	0.0005328
	CHILE	1.0244534667853	1.0327055507524	-.1913518309054	.23082447914671	-.1064252293544	
		-.1302914001245	-7.2480439	.12909073159026	145.9954126	-.0536579747712	

Total network loss P-loss by summing injections = 1.9077168850476-01

Solution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed result applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the associated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.5505536006569	1.5556349186104	1.0931005410641	1.3400000246314	.79876857954054	1.0422754146277
	.12563252560574	4.6322315	-.775069560282	-35.3387433	.66955716430903	0.7663700
LARIO	1.2597974578778	1.2601449616631	-.627378160988	.71047974359396	-.4001182015367	.4476537346268
	-.0295520517973	-1.3456036	.33343381528079	152.0106144	-.2007468329124	-0.8938118
AINOG	1.2143466659907	1.21587538013	-.1442909484575	.16241059897591	-.0898815150721	.09873552438349
	-.0609517415965	-2.8734375	.07454746711286	152.6770039	-.0408658417707	-0.9103260
PATQU	1.1753489788861	1.1764834754783	-.2485576762122	.29062048967274	-.1499604725386	.17035510186769
	-.0516540986253	-2.5164089	.15059664874629	148.7890776	-.0820822973033	-0.8771921
CHAMI	1.2221302060493	1.222133347919	-.1302198055788	.14221452536043	-.0794935718174	.08690255700073
	.00277120151376	0.1299190	.05716444225662	156.2992828	-.0351116284581	-0.9147438
NONOG	1.0289487997262	1.0368495752427	-.1609814572335	.2018330343095	-.090597542394	.10463524794687
	-.1277552708223	-7.0776776	.12174376438057	142.9012579	-.0523509352837	-0.8658415
CHEPE	1.3335057019129	1.3439811723955	-.2523474291055	.27297943507099	-.1595355862667	.18343961059329
	.16747517642763	7.1583066	.10410834258375	157.5809366	-.0905454993313	-0.8696900
LUJAN	1.5026279441629	1.5556349186104	.77164680328716	.8139899997068	.52758542000329	.63313563347178
	.40262794416288	15.0000000	-.2591156703084	-18.5618292	.35002050650165	0.8332897
VUNIO	1.0035558018662	1.0138047051426	-.1096200358704	.12668337551698	-.0595701920592	.06421610108123
	-.1437905863047	-8.1539065	.06349901863926	149.9178010	-.0239812396698	-0.9276520
CHILE	1.0244534667853	1.0327055507524	-.1913518309054	.23082447914671	-.1064252293544	.11918686043217
	-.1302914001245	-7.2480439	.12909073159026	145.9954126	-.0536579747712	-0.8929275

Comment card. KOMPAR = 1. !C
Comment card. KOMPAR = 1. !C
Comment card. KOMPAR = 1. !C

equest for flushing of punch buffer. ¦$PUNCH (Flush punched cards: R-L branches for equivalent impedance loads

listing of 80-column card images now being flushed from punch buffer follows.

```
1234567890123456789012345678901234567890123456789012345678901234567890123456789
```

========(End of LUNIT7 punched cards as flushed by $PUNCH request)=======
lank card ending node names for voltage output. ¦BLANK card ending requests for output variables

elective branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be ugmented to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

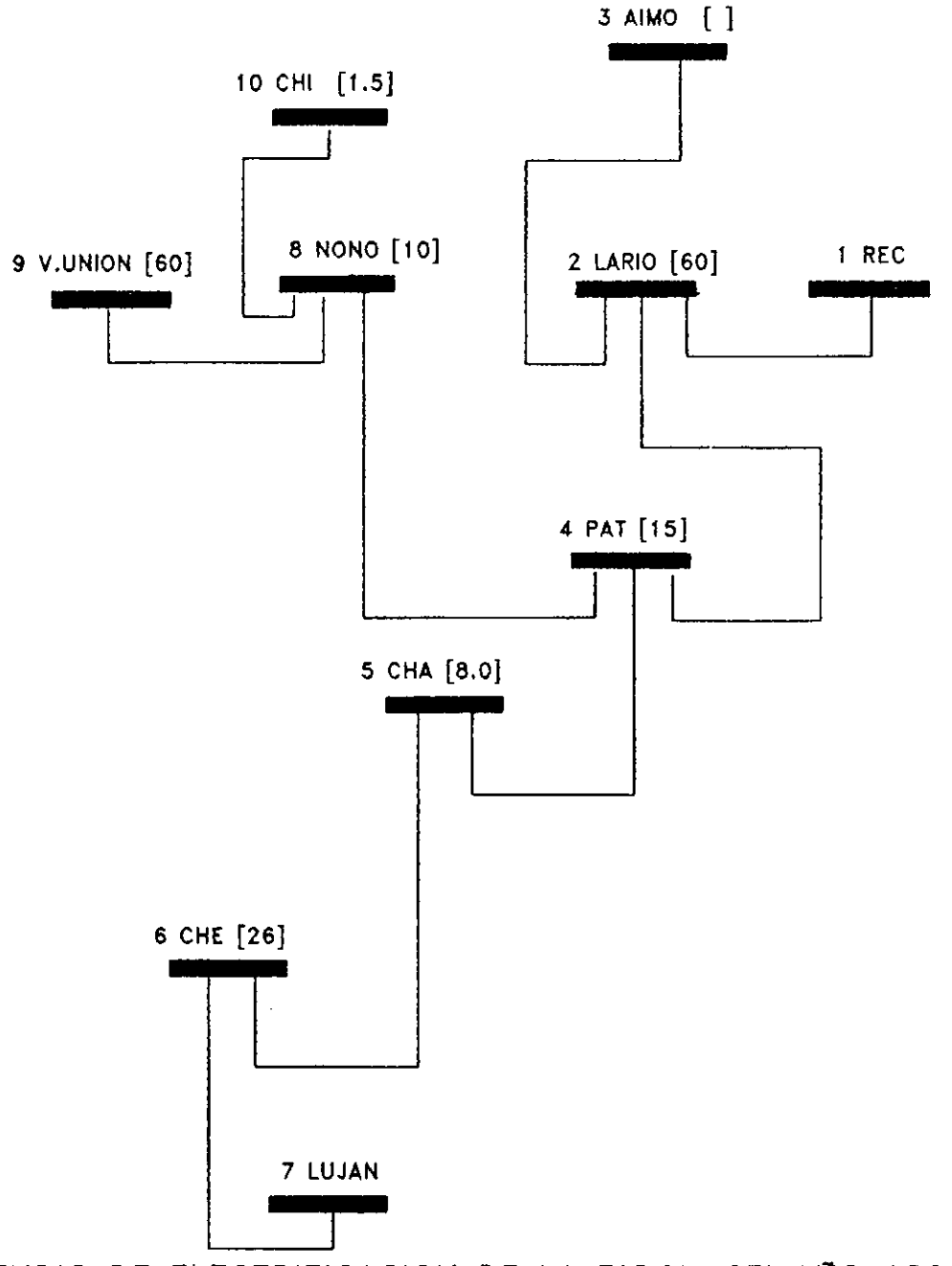
From bus K	To bus M	(======== Branch voltage Vkm = Vk - Vm ========) Magnitude	Degrees	Real part	Imag part	(====== Branch current Ikm from k to M ======) Magnitude	Degrees	Real part	Imag part
ECRE	LARIO	3.2959643E-01	28.096206	2.9075614E-01	1.5522458E-01	1.3400000E+00	-35.338743	1.0931005E+00	-7.7506856E-01
ARIO	AIMOG	5.5219604E-02	34.604517	4.5450792E-02	3.1359690E-02	1.6241060E-01	-27.322996	1.4429095E-01	-7.4547467E-02
ARIO	PATQU	8.7282756E-02	14.641205	8.4448479E-02	2.2062047E-02	4.8792544E-01	-48.793743	3.2143143E-01	-3.6709728E-01
ATQU	CHAMI	7.1767656E-02	-130.680683	-4.6781227E-02	-5.4425300E-02	4.0119340E-01	165.884369	-3.8907957E-01	9.7842835E-02
ATQU	NONOG	1.6499818E-01	27.466138	1.4640018E-01	7.6101172E-02	5.5875436E-01	-34.233107	4.6195332E-01	-3.1433351E-01
HAMI	CHEPE	1.9882631E-01	-124.067195	-1.1137550E-01	-1.6470397E-01	5.4194014E-01	163.379994	-5.1929937E-01	1.5500733E-01
HEPE	LUJAN	2.8965351E-01	-125.723748	-1.6912224E-01	-2.3515277E-01	8.1399000E-01	161.438171	-7.7164680E-01	2.3911567E-01
ONOG	VUNIO	3.0032244E-02	32.271826	2.5392998E-02	1.6035315E-02	1.2668338E-01	-30.082199	1.0962004E-01	-6.3499019E-02
ONOG	CHILE	5.1613923E-03	29.430361	4.4953329E-03	2.5361293E-03	2.3082448E-01	-34.004587	1.9135183E-01	-1.2909073E-01

ctual List Sizes for the preceding solution follow. 06-Apr-94 11.00.56

```
  Size  1-10:    11     9     9     2 -9999     0 -9999 -9999     0     0
  Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     9    23     0
  Size 21-29:     0 -9999     9 -9999 -9999 -9999 -9999 -9999 -9999
```

Seconds for overlays 1-5 :	30.168	0.000	30.168 --- (CP: I/O; tot)
Seconds for overlays 6-11 :	10.164	0.000	10.164
Seconds for overlays 12-15 :	0.000	0.000	0.000
Seconds for time-step loop :	0.000	0.000	0.000
Seconds after DELTAT-loop :	0.383	0.000	0.383
Totals :	40.715	0.000	40.715

CIRCUITO PARA FLUJO DE CARGAS 132 kV – LA RIOJA CASO 280 CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

CASO 280 - 266 -

```
DATA:C:\RIV\EMIN\PROBE2.DAT(-05-04-94 15:55;RETOMO Y AGREGO DATOS DE ARCH
RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
  (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC)
ERASE
EGIN NEW DATA CASE
RINTED NUMBER WIDTH, 13, 2,    { Request maximum precision for 8 output columns
IX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
OWER FREQUENCY, 50.0,
 MISCELANEA CARD SIGUE II B-1,II B-2
 345678901234567890123456789012345678901234567890123456789012345678901234567890
 DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
.000200    .000     50.50.{ T-max = 0  means that no transient solution follows
 IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NERERG   IPRSUP
  1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
     1       1              1       0       1

 CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
 BASE 100 MVA =1; UB=132 KV
 SIGUE FORMATO RULE BOOK 4A-2
 345678901234567890123456789012345678901234567890123456789012345678901234567890
 BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
  A6    A6    A6     A6  E6.2  E6.2  E6.2       II
   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
 LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
 EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
 RECRE LARIO              0.11  0.22                                        4
 LARIO AIMOG               .16   .30                                        4
 LARIO PATQU               .08   .16                                        4
 PATQU CHAMI               .08   .16                                        4
 PATQU NONOG               .14   .26                                        4
 CHAMI CHEPE               .09   .28                                        4
 CHEPE LUJAN               .09   .27                                        4
 NONOG YUNIO               .11   .21                                        4
 NONOG CHILE               .01   .02                                        4



LANK card ending branch cards.
LANK card ending switch cards.
 SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
 345678901234567890123456789012345678901234567890123456789012345678901234567890
 NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
 I2 A6 I2   E10.6    E10.6     E10.6  E10.6       E10.6     E10.6     E10.6
  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80

4LUJAN         1.10       50.      15.0                          -1.
4RECRE         1.10       50.      15.0                          -1.


LANK card terminating all EMTP source cards.
             Next come power constraints of the load flow.  There will be one
             for each non-slack generator.  So, 3 of them will apply to nodes
```

280-83 -

```
        that have no  Type-14  source as required by the algorithm.   The
        program will define these internally.  Yet, this is only possible
        for  TMAX  non-positive (no transient continuation).   If data is
        modified to make  TMAX > 0,  a  KILL = 40  error termination will
        will result.   Yet,  the  transient simulation is possible  as  a
        2nd simulation that replaces the power constraints  at load nodes
        by constant-impedance loads.   Branch cards  for  these  will  be
        punched by the present subcase,  and  the  transient continuation
        will be illustrated by the following (4th of 4) subcase.
    The following 4 cards would be used if peak rather than RMS input data.
    Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
    (power constraints  RED, BLUE, and YELLOW), and  1.4708 = 1.414 * 1.02

VALORES DE POTENCIA EN PU 1=100 MVA
PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
345678901234567890123456789012345678901234567890123456789012345678901234567890
NKBUS1 BUS2  BUS3  PK or QK        QK or VK        VMIN     VMAX    THMIN THMAX
1-2 3-8 9-14 15-20  21-36           37-52           53-60    61-68  69-74  75-80
LARIO                    -0.6000            -0.100      .65    1.25
CHAMI                    -0.080              -.034      .65    1.25
PATOU                    -0.150              -.089      .65    1.25
NONOG                    -0.10               -.061      .65    1.25
VUNIO                    -.0600              -.02       .65    1.25
LUJAN                            1.0         1.20                      -20.   40.
1RECRE                   0.8                 1.10                      -20.   15.
CHEPE                    -.26                -.09              1.5
AIMOG                    -0.050   ↗ 0.09    (-0.01)     .65    1.15
CHILE                    -.0151   ↗ 0.1      -.01              1.15
   The following load-flow miscellaneous data card has two peculiarities.  The
   use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
   voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
   (this  works  well  for  this problem whether RMS or peak values are used).
       NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
        10-16   17-24   25-32  33-40   41-48   50-56   57-64
            1    2500      20      1     .01     0.2     2.5   1.414       2


PUNCH        { Flush punched cards: R-L branches for equivalent impedance loads
LANK card ending requests for output variables
LANK card ending plot cards
EGIN NEW DATA CASE
```

```
ernative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
te (dd-mth-yy) and time of day (hh.mm.ss) = 04-May-94  15.55.48    Name of disk plot file, if any, is  C:45041555.pl4
 information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
al length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM" List Sizes follow :    752   900  1500   150  7500
120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252    4
-----------------------------------------------+-----------------------------------------------------------------------------
criptive interpretation of input data cards.   ;  Input data card images are shown below, all 80 columns, character by character
                                               0        1         2         3         4         5         6         7         8
                                               01234567890123456789012345678901234567890123456789012345678901234567890123456789
-----------------------------------------------+-----------------------------------------------------------------------------
ment card.   KOMPAR = 1.                       ;C data:C:\RIV\EMIN\PROBE2.DAT
ment card.   KOMPAR = 1.                       ;C DATA:C:\RIV\EMIN\PROBE2.DAT(-05-04-94 15:55;RETOMO Y AGREGO DATOS DE ARCH
ment card.   KOMPAR = 1.                       ;C RED 132 kV LA RIOJA; DATOS DE RED FLU132E.W01 12-12-93)
ment card.   KOMPAR = 1.                       ;C   (SE AGREGAN LOS DATOS DE RESTRICCIONES Y RAMAS COMPLETAS +XC)
se all of  0   cards in the punch buffer.      ;$ERASE
ker card preceding new EMTP data case.         ;BEGIN NEW DATA CASE
th of time-step loop numbers.  W=13   S=2      ;PRINTED NUMBER WIDTH, 13, 2,    ( Request maximun precision for 8 output columns
laration of desired EMTP load flow usage.      ;FIX SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
 power frequency  STATFR = 5.00000000E+01  Hz. ;POWER FREQUENCY, 50.0,
ment card.   KOMPAR = 1.                       ;C MISCELANEA CARD SIGUE II B-1,II B-2
ment card.   KOMPAR = 1.                       ;C 34567890123456789012345678901234567890123456789012345678901234567890123456789
ment card.   KOMPAR = 1.                       ;C DELTAT   TMAX    XOPT COPT   EPSILN  IOLMAT
c. data.     2.000E-04   0.000E+00   5.000E+01 ; .000200    .00     50.50.( T-max = 0  means that no transient solution follows
ment card.   KOMPAR = 1.                       ;C IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MENSAV   ICAT  NERERR   IPRSUP
ment card.   KOMPAR = 1.                       ;C  1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
c. data.      1    1  0  1  0  1  0  0  0  0   ;       1       1               1       0       1
ment card.   KOMPAR = 1.                       ;C
ment card.   KOMPAR = 1.                       ;C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
ment card.   KOMPAR = 1.                       ;C BASE 100 MVA =1; UB=132 KV
ment card.   KOMPAR = 1.                       ;C SIGUE FORMATO RULE BOOK 44-2
ment card.   KOMPAR = 1.                       ;C 34567890123456789012345678901234567890123456789012345678901234567890123456789
ment card.   KOMPAR = 1.                       ;C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
ment card.   KOMPAR = 1.                       ;C  A6    A6    A6     A6  E6.2  E6.2  E6.2       II
ment card.   KOMPAR = 1.                       ;C   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
ment card.   KOMPAR = 1.                       ;C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
ment card.   KOMPAR = 1.                       ;C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
ies R-L-C.   1.100E-01  7.003E-04  0.000E+00   ;  RECRE LARIO               0.11  0.22                                          4
ies R-L-C.   1.600E-01  9.549E-04  0.000E+00   ;  LARIO AIMOG               .16   .30                                           4
ies R-L-C.   8.000E-02  5.093E-04  0.000E+00   ;  LARIO FATOU               .08   .16                                           4
ies R-L-C.   8.000E-02  5.093E-04  0.000E+00   ;  FATOU CHAMI               .08   .16                                           4
ies R-L-C.   1.400E-01  8.276E-04  0.000E+00   ;  FATOU NONOG               .14   .26                                           4
ies R-L-C.   9.000E-02  8.913E-04  0.000E+00   ;  CHAMI CHEPE               .09   .28                                           4
ies R-L-C.   9.000E-02  8.594E-04  0.000E+00   ;  CHEPE LUJAN               .09   .27                                           4
ies R-L-C.   1.100E-01  6.685E-04  0.000E+00   ;  NONOG VUNIO               .11   .21                                           4
ies R-L-C.   1.000E-02  6.366E-05  0.000E+00   ;  NONOG CHILE               .01   .02                                           4
ment card.   KOMPAR = 1.                       ;C
ment card.   KOMPAR = 1.                       ;C
ment card.   KOMPAR = 1.                       ;C
nk card ending branches.  IBR, NTOT = 9  11    ;BLANK card ending branch cards.
nk card ending switches.   KSWTCH = 0.         ;BLANK card ending switch cards.
ment card.   KOMPAR = 1.                       ;C SOURCE CARD SIGUE FORMATO RULE BOOK V11-4
ment card.   KOMPAR = 1.                       ;C 345678901234567890123456789012345678901234567890123456789012345678901234567890
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280-5

```
ment card.   KOMPAR = 1.                          |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1          TIME-1    TSTART     TSTOP
ment card.   KOMPAR = 1.                          |C I2 A6 I2   E10.6     E10.6     E10.6  E10.6        E10.6     E10.6     E10.6
ment card.   KOMPAR = 1.                          |C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
ment card.   KOMPAR = 1.                          |C
rce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00     |14LUJAN         1.10        50.      15.0                                -1.
rce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00     |14RECRE         1.10        50.      15.0                                -1.
ment card.   KOMPAR = 1.                          |C
ment card.   KOMPAR = 1.                          |C
nk card ends electric network sources.            |BLANK card terminating all EMTP source cards.
ment card.   KOMPAR = 1.                          |C             Next come power constraints of the load flow.   There will be one
ment card.   KOMPAR = 1.                          |C             for each non-slack generator.   So, 3 of them will apply to nodes
ment card.   KOMPAR = 1.                          |C             that have no  Type-14  source as required by the algorithm.   The
ment card.   KOMPAR = 1.                          |C             program will define these internally.  Yet, this is only possible
ment card.   KOMPAR = 1.                          |C             for  TMAX  non-positive (no transient continuation).   If data is
ment card.   KOMPAR = 1.                          |C             modified to make  TMAX > 0,  a  KILL = 40  error termination will
ment card.   KOMPAR = 1.                          |C             will result.   Yet,  the  transient simulation is possible  as  a
ment card.   KOMPAR = 1.                          |C             2nd simulation that replaces the power constraints  at load nodes
ment card.   KOMPAR = 1.                          |C             by constant-impedance loads.   Branch cards  for  these  will  be
ment card.   KOMPAR = 1.                          |C             punched by the present subcase,  and  the  transient continuation
ment card.   KOMPAR = 1.                          |C             will be illustrated by the following (4th of 4) subcase.
ment card.   KOMPAR = 1.                          |C         The following 4 cards would be used if peak rather than RMS input data.
ment card.   KOMPAR = 1.                          |C         Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
ment card.   KOMPAR = 1.                          |C         (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
ment card.   KOMPAR = 1.                          |C
ment card.   KOMPAR = 1.                          |C VALORES DE POTENCIA EN PU 1=100 MVA
ment card.   KOMPAR = 1.                          |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
ment card.   KOMPAR = 1.                          |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.   KOMPAR = 1.                          |C NKBUS1 BUS2  BUS3  PK or QK          QK or VK        VMIN      VMAX     THMIN THMAX
ment card.   KOMPAR = 1.                          |C 1-2 3-8 9-14 15-20  21-36              37-52         53-60     61-68  69-74  75-80
.  -6.000E-01 -1.000E-01  6.500E-01  1.250E+00 |  LARIO                    -0.6000         -0.100      .65    1.25
.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                    -0.080          -.034       .65    1.25
.  -1.500E-01 -8.900E-02  6.500E-01  1.250E+00 |  PATGU                    -0.150          -.089       .65    1.25
.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                    -0.10           -.061       .65    1.25
.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00 |  VUNIO                    -.0600          -.02        .65    1.25
ment card.   KOMPAR = 1.                          |C LUJAN                         1.0       1.20                     -20.   40.
.   8.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1RECRE                    0.8              1.10                     -20.   15.
.  -2.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                    -.26            -.09               1.5
.  -5.000E-02 -1.000E-02  6.500E-01  1.150E+00 |  AIMOG                   -0.050          -0.01        .65    1.15
.  -1.510E-02 -1.000E-02  0.000E+00  1.150E+00 |  CHILE                    -.0151          -.01               1.15
ment card.   KOMPAR = 1.                          |C    The following load-flow miscellaneous data card has two peculiarities.  The
ment card.   KOMPAR = 1.                          |C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
ment card.   KOMPAR = 1.                          |C    voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
ment card.   KOMPAR = 1.                          |C    (this  works  well  for  this problem whether RMS or peak values are used).
ment card.   KOMPAR = 1.                          |C           NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
ment card.   KOMPAR = 1.                          |C            10-16   17-24   25-32  33-40   41-48   50-56    57-64
= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =       9      11      19       0       0       0
ad flow iter.   1   2500   20    1    1.00E-02  |              1    2500      20       1     .01     0.2     2.5   1.414      2
 del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0168 .0151 .0155 .0158 .0137 .0136 .0134 .0133 .0131 .0129 .0127 .0126 .0127
rce No.     -4    -4    -4    -4    -4    -4    -4    -4    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5     7     7
 del-V:  .0129 .0131 .0132 .0134 .0112 .0111 .0107 .0109 .0114 .0114 .0115 .0113 .0114 .0116 .0116 .0116 .0116 .0116 .0116 .0116
rce No.      7     7     7     7    -5     4    -5    -4     4     9     4     9     4    -4     4    -4     4    -4     4    -4
 del-V:  .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0115 .0116 .0115 .0115 .0115 .0115 .0115 .0115 .0115 .0115 .0115 .0115
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rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4
del-V:	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0113	.0114	
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4
del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113	.0113	.0113	.0113
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
rce No.	4	-4	4	-4	4	-4	4	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0112	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0111	.0112	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.011	.0111	.011	.0111	.011	.0111	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.0109	.011	.0109	.011	.0109	.011
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0109	.011	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0108	.0109	.0108	.0109
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0108	.0109	.0108	.0109	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0107	.0107	.0108	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0107	.0107	.0107	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0106	.0106	.0106

rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	4	-4
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
rce No.	4	-4	4	-4	4	-4	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0107	.0106	.0107	.0106	.0107	.0106
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0107	.0106	.0107	.0106	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0107	.0107	.0107	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0108	.0108	.0108	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0109	.0108	.0109	.0108	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.011	.0109	.011	.0109	.011
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.011	.011	.011	.011	.011
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.011	.011	.011	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.0111
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0113
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0113	.0113	.0113	.0113	.0113	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0114	.0114	.0114	.0114	.0114
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0112	.0114	.0112	.0114	.0112	.0114	.0111	.0114	.0111	.0114	.0111
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.0114	.0111	.0114	.011	.0115	.011	.0115	.011	.0115	.011	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109

rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	-4	4	-4
del-V:	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109	.0115	.0109
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4
del-V:	.0114	.0107	.0112	.0105	.011	.0102	.0106	.0099	.0102	.0095	.0098	.009	.0093	.0085	.0087	.0079	.0081	.0073	.0075	.0067
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4
del-V:	.0069	.0061	.0063	.0055	.0057	.005	.0051	.0045	.0046	.004	.0041	.0035	.0036	.0031	.0031	.0027	.0027	.0023	.0023	.002
rce No.	4	-4	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9
del-V:	.002	.0017	.0017	.0014	.0014	.0012	.0012	.001	1.E-3	.9E-3	.8E-3	.7E-3	.7E-3	.6E-3						
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9						

t the load flow iteration loop with counter NEKITE = 1174. If no warning on the preceding line, convergence was attained.

w	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	3	LARIO	9.28771724E-01	-3.83021	-6.05297249E-01	-1.01333027E-01
4	6	CHAMI	9.14067560E-01	0.03602	-8.15944246E-02	-3.57953410E-02
5	5	PATQU	8.86450424E-01	-3.18287	-1.52856024E-01	-9.18227729E-02
6	7	NONOG	8.22849857E-01	-5.52740	-9.12444236E-02	-5.47409171E-02
7	10	VUNIO	8.08473882E-01	-6.34608	-5.88287661E-02	-2.55332895E-02
2	2	RECRE	1.10000000E+00	2.92279	7.92189169E-01	4.92476038E-01
8	8	CHEPE	9.73986618E-01	6.49806	-2.60334271E-01	-9.09189807E-02
9	4	AIMOG	9.15201725E-01	-4.82378	-5.52645254E-02	-1.15109735E-02
0	11	CHILE	8.22617728E-01	-5.53551	-2.07005901E-02	-2.41525877E-02

usoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
ECRE		1.5536161614004	1.5556349186104	1.0494008279247	1.1992396542782	.79218916938257	.07907966616163
		.07922640365088	2.9192602	-.5804598614411	-28.9484975	.49247603768196	0.1581993
	LARIO	1.3104809008116	1.3134182445395	-1.049400827925	1.1992396542782	-.7130895032209	
		-.087791193734	-3.8326086	.58045986144113	151.0515025	-.3342767053587	
ARIO		1.3104809008116	1.3134182445395	.08360269342548	.08723493994648	.05587332020479	.60579477982-3
		-.087791193734	-3.8326086	-.0249103269637	-16.5919947	.01265246372923	0.0011415
	AIMOG	1.2896313717649	1.2942199628116	-.0936026934855	.08723493994648	-.055264525425	
		-.1088863494655	-4.8261593	.02491032696372	163.4080053	-.0115109735171	
ARIO		1.3104809008116	1.3134182445395	.05646056469127	.34463773413971	.05191893361155	.00475100671172
		-.087791193734	-3.8326086	-.3399814295336	-80.5709683	.22029121483062	0.0095029
	PATQU	1.251567026911	1.2535022354234	-.0564605646913	.34463773413971	-.0471679268998	
		-.0696263697219	-3.1841597	.33998142953358	99.4290317	-.2107892014072	
ATQU		1.251567026911	1.2535022354234	-.4547027359239	.4556342768678	-.2855592605933	.00330410377027
		-.0696263697219	-3.1841597	.02912071771365	176.3355869	-.0023936146427	0.0166082
	CHAMI	1.2926025606191	1.2926028059651	.45470273592391	.4556342768678	.29386336436361	
		.79641060879E-3	0.0353016	-.0291207177137	-3.6644131	.01900182218323	
ATQU		1.251567026911	1.2535022354234	.27579124346107	.34620391711193	.17987116315175	.00838995580B8
		-.0696263697219	-3.1841597	-.2092755910589	-37.1919118	.12136004311169	0.0155814

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NONOG	1.1585445991511	1.1639489231261	-.2757912434611	.34620381711193	-.1714811673429	
	-.1120335102736	-5.5234387	.20927559105894	142.8080882	-.1057786223239	
AMI	1.2926025606191	1.2926028059651	-.5809850915891	.58708750148939	-.3754577889268	.015510228048823
	.79641060879E-3	0.0353016	.08442732572258	171.7317461	-.0547971632035	0.0462540
CHEPE	1.3685310100644	1.3773793035386	.58098509158911	.58708750148939	.39096801697498	
	.15587373193871	6.4979053	-.0844278257226	-8.2682539	.1030512060202	
EPE	1.3685310100644	1.3773793035386	-.97151063419	.98676193849956	-.6513022876653	.043816466054721
	.15587373193871	6.4979053	.1728184334125	169.9133747	-.1939701867025	0.1314494
LUJAN	1.5026279441629	1.5556349186104	.97151063419	.98676193849956	.69511874821349	
	.40262794416288	15.0000000	-.1728184334125	-10.0866253	.32541956834418	
NOG	1.1585445991511	1.1639489231261	.0973581085134	.11220268729644	.0595211854585	.69241736701E-3
	-.1120335102736	-5.5234387	-.0557749203786	-29.8077129	.02685518106116	0.0013219
VUNIO	1.1361224739351	1.1431259548501	-.0973581085134	.11220268729644	-.0588287660915	
	-.1263434718197	-6.3455540	.05577492037857	150.1922871	-.0255332895423	
NOG	1.1585445991511	1.1639489231261	.03143047689324	.05471416913656	.02071555828354	.14968201522E-4
	-.1120335102736	-5.5234387	-.0447857725909	-54.9389746	.02418252414906	0.0000299
CHILE	1.1573345789303	1.1627619568094	-.0314304768932	.05471416913656	-.020700590082	
	-.1122142620855	-5.5380430	.04478577259094	125.0610252	-.024152587746	

Total network loss P-loss by summing injections = 1.6118764333962E-01

ution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed sult applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the sociated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.5536161614004	1.5556349186104	1.0494008279247	1.1992396542782	.79218916938257	.93278954098873
	.07922640365088	2.9192602	-.5804598614411	-28.9484975	.49247603768196	0.8492689
LARIO	1.3104809008116	1.3134182445395	-.909337569748	.93453968541962	-.6052972494046	.61372073653819
	-.087791193734	-3.9326086	.21556810494384	166.6636157	-.1013330267988	-0.9862747
AIMOG	1.2896313717649	1.2942199628116	-.0836026934855	.08723493994648	-.055264525425	.0564506003667
	-.1088863494655	-4.8261593	.02491032696372	163.4080053	-.0115109735171	-0.9789892
PATOU	1.251567026911	1.2535022354234	-.2353720571541	.28450752775976	-.1528560243414	.17831541102082
	-.0696263697219	-3.1841597	.1598265561883	145.8220077	-.0918227729382	-0.8572227
CHAMI	1.2926025606191	1.2926028059651	-.1262823556652	.13786264740191	-.0815944245631	.08910082243474
	.79641060879E-3	0.0353016	.05530710800892	156.3483186	-.0387953410203	-0.9157539
NONOG	1.1585445991511	1.1639489231261	-.1470026580544	.18283520049941	-.0912444236009	.10640541736542
	-.1120335102736	-5.5234387	.10871489808942	143.5154537	-.0547409171137	-0.8575167

CHEPE	1.3685310100644	1.3773793035386	-.3905255426009	.40040367000255	-.2603342706913	.2757538640612
	.15587373193871	6.4979053	.08839060768992	167.2466924	-.0909189806823	-0.9440820
LUJAN	1.5026279441629	1.5556349186104	.97151063419	.98676193849956	.69511874821349	.7675206639428
	.40262794416288	15.0000000	-.1728184334125	-10.0866253	.32541956834418	0.9056678
YUNIO	1.1361224739351	1.1431259548501	-.0973581085134	.11220268729644	-.0588287660915	.06413090292624
	-.1263434718197	-6.3455540	.05577492037857	150.1922871	-.0255332895423	-0.9173232
CHILE	1.1573345789303	1.1627619568094	-.0314304768932	.05471416913656	-.020700590082	.0318097718522
	-.1122142620855	-5.5380430	.04478577259094	125.0610252	-.024152587746	-0.6507619

ment card. KOMPAR = 1. !C
ment card. KOMPAR = 1. !C
ment card. KOMPAR = 1. !C
uest for flushing of punch buffer. !$PUNCH (Flush punched cards: R-L branches for equivalent impedance loads

isting of 80-column card images now being flushed from punch buffer follows.
==========
456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
==========
=======(End of LUNIT7 punched cards as flushed by $PUNCH request)=======
nk card ending node names for voltage output. !BLANK card ending requests for output variables

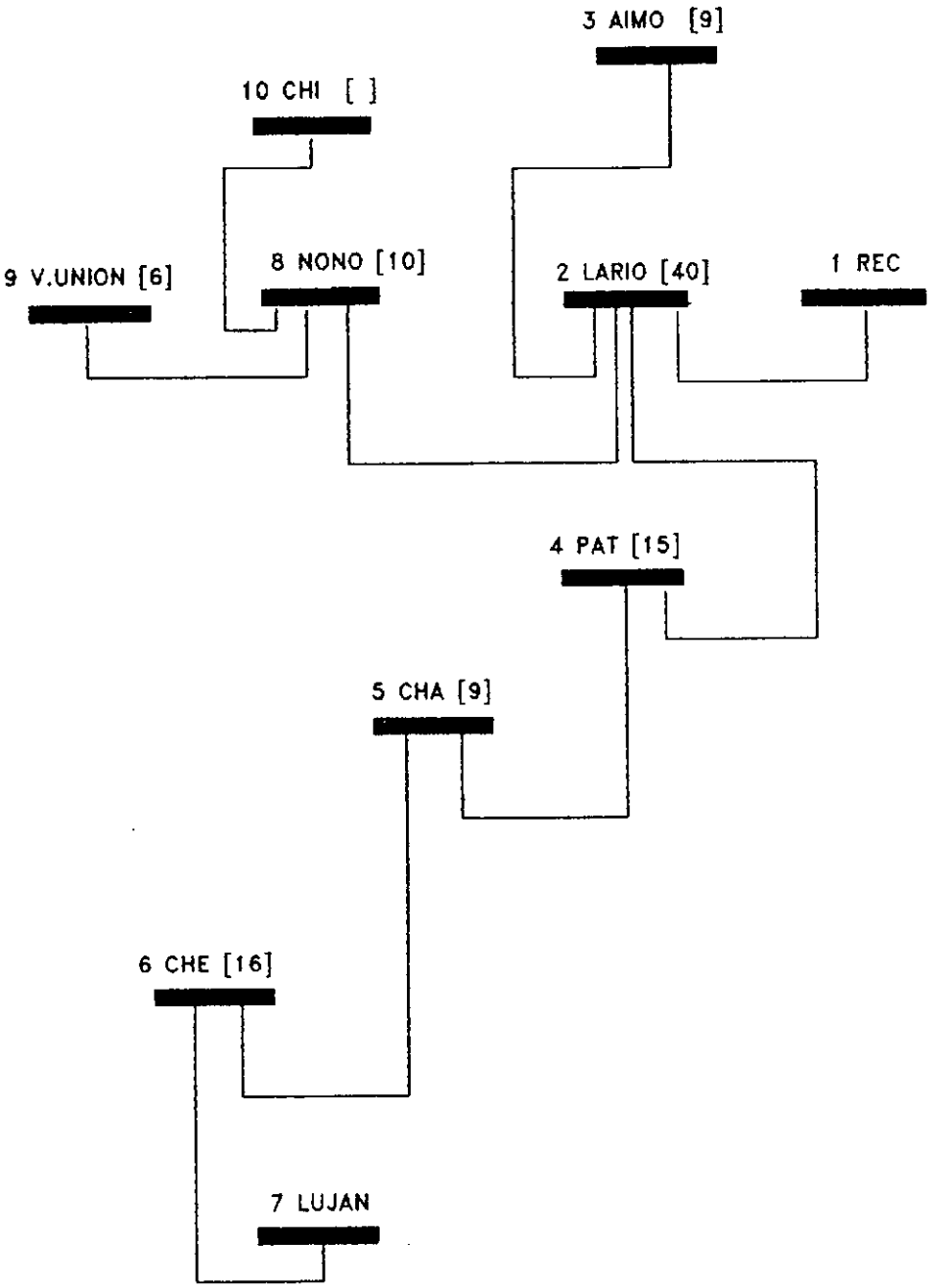
ective branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be
mented to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

rom	To	(======== Branch voltage Vkm = Vk - Vm ==========)				(====== Branch current Ikm from K to M ======)			
s K	bus M	Magnitude	Degrees	Real part	Imag part	Magnitude	Degrees	Real part	Imag part
CRE	LARIO	2.9497395E-01	34.486451	2.4313526E-01	1.6701760E-01	1.1992397E+00	-28.948497	1.0494008E+00	-5.8045986E-01
RIO	AINOG	2.9659880E-02	45.335518	2.0849529E-02	2.1095156E-02	8.7234940E-02	-16.591995	8.3602693E-02	-2.4910327E-02
RIO	PATOU	6.1650672E-02	-17.136020	5.8913874E-02	-1.8164824E-02	3.4463773E-01	-80.570968	5.6460565E-02	-3.3998143E-01
TOU	CHAMI	8.1506337E-02	-120.229464	-4.1035534E-02	-7.0422780E-02	4.5563428E-01	176.335587	-4.5470274E-01	2.9120718E-02
TOU	NONOG	1.0223276E-01	24.507332	9.3022428E-02	4.2407141E-02	3.4620382E-01	-37.191912	2.7579124E-01	-2.0927559E-01
AMI	CHEPE	1.7266761E-01	-116.087143	-7.5928449E-02	-1.5507732E-01	5.8708750E-01	171.731746	-5.8098509E-01	8.4427826E-02
EPE	LUJAN	2.8083737E-01	-118.521574	-1.3409693E-01	-2.4675421E-01	9.8676194E-01	169.913375	-9.7151063E-01	1.7281843E-01
NOG	YUNIO	2.6599374E-02	32.546312	2.2422125E-02	1.4309962E-02	1.1220269E-01	-29.807713	9.7358109E-02	-5.5774920E-02
NOG	CHILE	1.2234460E-03	8.495974	1.2100202E-03	1.8075181E-04	5.4714169E-02	-54.938975	3.1430477E-02	-4.4785773E-02

tual List Sizes for the preceding solution follow. 04-May-94 15.56.25
Size 1-10: 11 9 9 2 -9999 0 -9999 -9999 0 0
Size 11-20: -9999 -9999 -9999 -9999 -9999 0 0 9 23 0
Size 21-29: 0 -9999 9 -9999 -9999 -9999 -9999 -9999 -9999
conds for overlays 1-5 : 21.539 0.000 21.539 --- (CP: I/O; tot)
conds for overlays 6-11 : 16.047 0.000 16.047
conds for overlays 12-15 : 0.000 0.000 0.000
conds for time-step loop : 0.000 0.000 0.000
conds after DELTAT-loop : 0.328 0.000 0.328

Totals : 37.914 0.000 37.914

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 290
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

- 7290-2

CASO 290

```
 Path: C:\RIV\EMIN
 File: PROBE4  .DAT     5:857  06-04-94 15:26:08          Page 1

A:C:\RIV\EMIN\PROBE3.DAT{-06-04-94 15:21; RED 132 kV LA RIOJA;
SO 110; LINEA EN 240 MM2 (NO PATQUIA-NONOGASTA SI LARIO-NONOGASTA}
E
 NEW DATA CASE
ED NUMBER WIDTH, 13, 2,   { Request maximum precision for 8 output columns
OURCE  { An EMTP load flow will satisfy requested phasor power injections.
 FREQUENCY, 50.0,
CELANEA CARD SIGUE II B-1,II B-2
67890123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
TAT   TMAX    XOPT COPT   EPSILN  TOLMAT
200    .000     50.50.{ T-max = 0  means that no transient solution follows
T    IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
  1       1              1       0       1

GA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
E 100 MVA =1; UB=132 KV
UE FORMATO RULE BOOK 4A-2
678901234567890123456789012345678901234567890123456789012345678901234567890
1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
   A6    A6     A6  E6.2  E6.2  E6.2       I1
-8   9-14 15-20 21-26 27-32 33-38 39-44      80
 OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
RE LARIO             0.11  0.22                                         4
IO AIMOG              .16   .30                                         4
IO PATQU              .08   .16                                         4
QU CHAMI              .08   .16                                         4
QU NONOG              .14   .26                                         4
MI CHEPE              .11   .35                                         4
PE LUJAN             .105   .34                                         4
OG VUNIO              .11   .21                                         4
OG CHILE              .01   .02                                         4
IO NONOG              .08   .16                                         4


 card ending branch cards.
 card ending switch cards.
RCE CARD SIGUE FORMATO RULE BOOK VII-4
678901234567890123456789012345678901234567890123456789012345678901234567890
E  IV AMPLITUDE FREQUENCY PHASE     A1         TIME-1    TSTART     TSTOP
 A6 I2   E10.6    E10.6      E10.6  E10.6       E10.6     E10.6     E10.6
-2 9-10 10-20   21-30       31-40    41-50      51-60     61-70     71-80

AN         1.10       50.      15.0                         -1.
RE         1.10       50.      15.0                         -1.


 card terminating all EMTP source cards.
          Next come power constraints of the load flow.   There will be one
          for each non-slack generator.   So, 3 of them will apply to nodes
          that have no  Type-14  source as required by the algorithm.   The
```

program will define these internally. Yet, this is only possible for TMAX non-positive (no transient continuation). If data is modified to make TMAX > 0, a KILL = 40 error termination will will result. Yet, the transient simulation is possible as a 2nd simulation that replaces the power constraints at load nodes by constant-impedance loads. Branch cards for these will be punched by the present subcase, and the transient continuation will be illustrated by the following (4th of 4) subcase.

The following 4 cards would be used if peak rather than RMS input data. Note that average of Vmin & Vmax = 0.5 (1.0 + 1.828428) = 1.414212 (power constraints RED, BLUE, and YELLOW), and 1.4708 = 1.414 * 1.02

```
LORES DE POTENCIA EN PU 1=100 MVA
RA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
5678901234567890123456789012345678901234567890123456789012345678901234567890
BUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN    VMAX    THMIN THMAX
2 3-8 9-14 15-20  21-36          37-52         53-60   61-68   69-74  75-80
RIO                -0.4000          -0.200      .65    1.25
AMI                -0.080           -.034       .65    1.25
TOU                -0.150           -.080       .65    1.25
NOG                -0.10            -.061       .65    1.25
NIO                -.0600           -.02        .65    1.25
JAN                      1.0         1.20                      -20.   40.
CRE                0.8              1.10                      -20.   15.
EPE                -.16             -.09            1.5
MOG               -0.090           -0.04        .65    1.15
ILE                -.1000           -.04            1.15
```

The following load-flow miscellaneous data card has two peculiarities. The use of VSCALE = 1.414 is the special flag requesting RMS rather than peak voltages. The use of KTAPER = 0 ensures constant acceleration factors (this works well for this problem whether RMS or peak values are used).

```
     NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITER  VSCALE  KTAPER
      10-16   17-24   25-32   33-40   41-48   50-56   57-64
          1    2500      20       1     .01     0.2     2.5   1.414       2
```

```
CH        { Flush punched cards: R-L branches for equivalent impedance loads
K card ending requests for output variables
K card ending plot cards
N NEW DATA CASE
```

```
 Path: C:\ATP
 File: AP61528 .SAL   40.060 .a.. 06-04-94 15:27:14        Page 1

rnative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
e (dd-mth-yy) and time of day (hh.mm.ss) = 06-Apr-94  15.26.41    Name of disk plot file, if any, is  C:44061526.pl4
information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
l length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM"  List Sizes follow :    752   900  1500   150  7500
20  2100  5250   225   480   150   150 15000    60 64300   120    12    15  4800  1980   300   450 12000     7  1200   252     4
-------------------------------------------+-----------------------------------------------------------------------------------
riptive interpretation of input data cards.  | Input data card images are shown below, all 80 columns, character by character
                                            0        1        2        3        4        5        6        7        8
                                            01234567890123456789012345678901234567890123456789012345678901234567890123456789012345678890
-------------------------------------------+-----------------------------------------------------------------------------------
ent card.   KOMPAR = 1.                     |C data:C:\RIV\EMIN\PROBE4.DAT
ent card.   KOMPAR = 1.                     |C DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 15:21; RED 132 kV LA RIOJA;
ent card.   KOMPAR = 1.                     |C  CASO 110; LINEA EN 240 MM2 (NO PATQUIA-NONOGASTA SI LARIO-NONOGASTA)
se all of  0   cards in the punch buffer.   |$ERASE
er card preceding new EMTP data case.       |BEGIN NEW DATA CASE
th of time-step loop numbers.  W=13   S=2   |PRINTED NUMBER WIDTH, 13, 2,   ( Request maximum precision for 8 output columns
aration of desired EMTP load flow usage.    |FIX SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
 power frequency  STATFR = 5.00000000E+01  Hz. |POWER FREQUENCY, 50.0,
ent card.   KOMPAR = 1.                     |C MISCELANEA CARD SIGUE II 8-1,II 8-2
ent card.   KOMPAR = 1.                     |C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678890
ent card.   KOMPAR = 1.                     |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
t. data.    2.000E-04   0.000E+00   5.000E+01 | .000200    .000     50.50,( T-max = 0  means that no transient solution follows
ent card.   KOMPAR = 1.                     |C IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NERERG   IPRSUP
ent card.   KOMPAR = 1.                     |C  1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
t. data.     1    1  0  1  0  1  0  0  0  0 |       1       1              1       0       1
ent card.   KOMPAR = 1.                     |C
ent card.   KOMPAR = 1.                     |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS RAMOS (R-L) VALORES EN P.U.
ent card.   KOMPAR = 1.                     |C BASE 100 MVA =1; UB=132 KV
ent card.   KOMPAR = 1.                     |C SIGUE FORMATO RULE BOOK 4A-2
ent card.   KOMPAR = 1.                     |C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678890
ent card.   KOMPAR = 1.                     |C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
ent card.   KOMPAR = 1.                     |C  A6    A6    A6     A6  E6.2  E6.2  E6.2       1I
ent card.   KOMPAR = 1.                     |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
ent card.   KOMPAR = 1.                     |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
ent card.   KOMPAR = 1.                     |C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
ies R-L-C.  1.100E-01  7.003E-04  0.000E+00 |  RECRE LARIO              0.11  0.22                                          4
ies R-L-C.  1.600E-01  9.549E-04  0.000E+00 |  LARIO AIMOG               .16   .30                                          4
ies R-L-C.  6.000E-02  5.093E-04  0.000E+00 |  LARIO PATQU               .08   .15                                          4
ies R-L-C.  8.000E-02  5.093E-04  0.000E+00 |  PATQU CHAMI               .08   .16                                          4
ment card.  KOMPAR = 1.                     |C PATQU NONOG               .14   .26                                          4
ies R-L-C.  1.100E-01  1.114E-03  0.000E+00 |  CHAMI CHEPE               .11   .35                                          4
ies R-L-C.  1.050E-01  1.082E-03  0.000E+00 |  CHEPE LUJAN              .105   .34                                          4
ies R-L-C.  1.100E-01  6.685E-04  0.000E+00 |  NONOG VUNIO               .11   .21                                          4
ies R-L-C.  1.000E-02  6.366E-05  0.000E+00 |  NONOG CHILE               .01   .02                                          4
ies R-L-C.  8.000E-02  5.093E-04  0.000E+00 |  LARIO NONOG               .08   .16                                          4
ment card.  KOMPAR = 1.                     |C
ment card.  KOMPAR = 1.                     |C
nk card ending branches.  IBR, NTOT = 9  11 |BLANK card ending branch cards.
nk card ending switches.   KSWICH = 0.      |BLANK card ending switch cards.
ment card.  KOMPAR = 1.                     |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
ment card.  KOMPAR = 1.                     |C 34567890123456789012345678901234567890123456789012345678901234567890123456789012345678890
ment card.  KOMPAR = 1.                     |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
```

```
Comment card.   KOMPAR = 1.                         !C I2 A6 I2   E10.6    E10.6     E10.6  E10.6       E10.6     E10.6     E10.6
Comment card.   KOMPAR = 1.                         !C  1-2 9-10 10-20   21-30      31-40   41-50      51-60     61-70     71-80
Comment card.   KOMPAR = 1.                         !C
Source.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00     !14LUJAN         1.10       50.      15.0                          -1.
Source.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00     !14RECRE         1.10       50.      15.0                          -1.
Comment card.   KOMPAR = 1.                         !C
Comment card.   KOMPAR = 1.                         !C
Blank card ends electric network sources.           !BLANK card terminating all EMTP source cards.
Comment card.   KOMPAR = 1.                         !C              Next come power constraints of the load flow.  There will be one
Comment card.   KOMPAR = 1.                         !C              for each non-slack generator.  So, 3 of them will apply to nodes
Comment card.   KOMPAR = 1.                         !C              that have no Type-14 source as required by the algorithm.  The
Comment card.   KOMPAR = 1.                         !C              program will define these internally.  Yet, this is only possible
Comment card.   KOMPAR = 1.                         !C              for TMAX non-positive (no transient continuation).  If data is
Comment card.   KOMPAR = 1.                         !C              modified to make TMAX > 0, a KILL = 40 error termination will
Comment card.   KOMPAR = 1.                         !C              will result.  Yet, the transient simulation is possible as a
Comment card.   KOMPAR = 1.                         !C              2nd simulation that replaces the power constraints at load nodes
Comment card.   KOMPAR = 1.                         !C              by constant-impedance loads.  Branch cards for these will be
Comment card.   KOMPAR = 1.                         !C              punched by the present subcase, and the transient continuation
Comment card.   KOMPAR = 1.                         !C              will be illustrated by the following (4th of 4) subcase.
Comment card.   KOMPAR = 1.                         !C       The following 4 cards would be used if peak rather than RMS input data.
Comment card.   KOMPAR = 1.                         !C       Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
Comment card.   KOMPAR = 1.                         !C       (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
Comment card.   KOMPAR = 1.                         !C
Comment card.   KOMPAR = 1.                         !C VALORES DE POTENCIA EN PU 1=100 MVA
Comment card.   KOMPAR = 1.                         !C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
Comment card.   KOMPAR = 1.                         !C 345678901234567890123456789012345678901234567890123456789012345678901234567890
Comment card.   KOMPAR = 1.                         !C NKBUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN     VMAX    THMIN THMAX
Comment card.   KOMPAR = 1.                         !C 1-2 3-8 9-14 15-20  21-36          37-52          53-60    61-68   69-74  75-80
FIX.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00   !  LARIO                -0.4000          -0.200      .65    1.25
FIX.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00   !  CHAMI                -0.080           -.034       .65    1.25
FIX.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00   !  PAIGU                -0.150           -.080       .65    1.25
FIX.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00   !  NONOG                -0.10            -.061       .65    1.25
FIX.  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00   !  VUNIG                -.0600           -.02        .65    1.25
Comment card.   KOMPAR = 1.                         !C LUJAN                      1.0           1.20                    -20.   40.
FIX.   8.000E-01  1.100E+00  0.000E+00  1.000E+19   ! 1RECRE                0.8              1.10                    -20.   15.
FIX.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00   !  CHEPE                -.16             -.09             1.5
FIX.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00   !  AIMOG               -0.090           -0.04       .65   1.15
FIX.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00   !  CHILE                -.1000           -.04             1.15
Comment card.   KOMPAR = 1.                         !C   The following load-flow miscellaneous data card has two peculiarities.  The
Comment card.   KOMPAR = 1.                         !C   use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
Comment card.   KOMPAR = 1.                         !C   voltages.  The use of  KTAPER = 0  ensures constant acceleration factors
Comment card.   KOMPAR = 1.                         !C   (this  works  well  for  this problem whether RMS or peak values are used).
Comment card.   KOMPAR = 1.                         !C        NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
Comment card.   KOMPAR = 1.                         !C         10-16   17-24   25-32   33-40   41-48   50-56   57-64
 <= LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =      9      11      19       0       0       0
Load flow iter.   1   2500   20    1    1.00E-02    !              1    2500      20       1     .01     0.2     2.5   1.414       2
Max del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0149 .0152 .0149 .0137 .0136 .0134 .0133 .0131 .0129 .0127 .0125 .0124 .0126
Source No.      1    -4    -4    -4    -4    -4    -4    -9    -9    -9    -5    -5    -5    -5    -5    -5    -5    -5     7     7
Max del-V:  .0128  .013 .0131 .0112 .0111 .0109 .0106 .0105 .0108 .0106 .0108 .0115 .0116 .0105 .0115 .0117 .0113 .0102 .0113 .0107
Source No.      7     7     7    -5    -5     4    -5     7     4     4     9    -5    -4    -4    -9    -4    -4     9    -9    -4
Max del-V:  .0114 .0108 .0113 .0105 .0114 .0107 .0113 .0102 .0113 .0103  .011 .0117 .0119 .0124 .0102 .0111 .0118  .012 .0135 .0105
Source No.     -4     4    -9    -4    -4     4    -9    -4    -4     9    -9    -4     4    -4     9    -9    -4    -9    -4     9
```

Path: C:\ATP

File: AP61528 .SAL 40.060 .a.. 06-04-94 15:27:14 Page 3

del-V:	.0116	.0118	.0115	.0106	.0115	.0109	.0116	.0113	.0115	.011	.0116	.0112	.0115	.011	.0116	.0112	.0115	.011	.0116	.0111
ce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0115	.011	.0116	.011	.0116	.0109	.0116	.011	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0109	.0116	.0108
ce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0116	.0108	.0116	.0108	.0116	.0108	.0116	.0107	.0116	.0108	.0116	.0107	.0116	.0107	.0116	.0106	.0116	.0107	.0117	.0106
ce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4
del-V:	.0116	.0106	.0117	.0106	.0116	.0106	.0117	.0105	.0116	.0106	.0117	.0105	.0116	.0105	.0117	.0104	.0116	.0105	.0117	.0104
ce No.	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	9
del-V:	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0104	.0117	.0104
ce No.	-9	-4	-4	9	-9	-4	-4	9	-9	-9	-4	9	-9	-9	-4	9	-9	-9	-4	9
del-V:	.0116	.0103	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0103	.0117	.0104	.0116	.0104	.0117	.0104	.0116	.0103	.0117	.0104
ce No.	-9	4	-4	9	-9	-9	-4	9	-9	4	-4	9	-9	-9	-4	9	-9	4	-4	9
del-V:	.0116	.0104	.0116	.0104	.0115	.0093	.0112	.0118	.0121	.0121	.0119	.012	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121
ce No.	-9	4	-4	9	-9	-4	-4	-9	-4	-9	9	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.0121	.0122	.012	.0122	.012	.0122	.012	.0122	.012	.0121	.012	.0121	.012
ce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.012
ce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0121	.012	.0121	.012	.0121	.012	.0121	.012	.0121	.0119	.0121	.0119	.0121	.0119	.0121	.0119	.012	.0119	.012	.0119
ce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119
ce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0119	.012	.0118	.012	.0118	.012	.0118	.012	.0118	.012	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0118	.0119	.0117
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0119	.0117	.0119	.0117	.0119	.0117	.0119	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117
rce No.	-4	4	-4	4	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0117	.0118	.0116	.0118	.0116	.0118	.0116	.0118	.0116
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0116	.0117	.0116	.0117	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0116	.0115	.0116	.0115	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9

Path: C:\ATP
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del-V:	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0114	.0114	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113	.0114	.0113	.0113	.0113
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0113	.0113	.0113	.0113	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	4
del-V:	.0113	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0112	.0112
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0112	.0113	.0112	.0113
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0114
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115	.0114	.0115
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0115	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4
del-V:	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0116	.0117	.0115	.0117	.0115	.0117	.0115	.0117
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4

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del-V:	.0114	.0117	.0114	.0117	.0114	.0117	.0113	.0117	.0113	.0117	.0113	.0117	.0112	.0117	.0112	.0117	.0112	.0117	.0112	.0117
rce No.	9	4	9	4	9	4	9	4	9	4	9	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0112	.0118	.0113	.0112	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118	.0113	.0118
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0112	.0116	.0111	.0114	.0108	.0111	.0104	.0107	.01	.0102	.0095	.0096	.0089	.009	.0083	.0084	.0077	.0077	.007	.0071
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0063	.0064	.0057	.0057	.005	.0051	.0044	.0045	.0038	.0039	.0033	.0034	.0028	.0029	.0024	.0024	.002	.002	.0017	.0017
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	9	4	9	4	9	4
del-V:	.0014	.0014	.0012	.0012	.9E-3	.9E-3	.8E-3	.8E-3	.6E-3											
rce No.	9	4	9	4	9	4	9	4	9											

t the load flow iteration loop with counter NEKITE = 1209. If no warning on the preceding line, convergence was attained.

w	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	3	LARIO	8.89348959E-01	-3.80873	-4.04020895E-01	-2.03048523E-01
4	6	CHAMI	9.05428079E-01	0.16103	-8.18270015E-02	-3.56046400E-02
5	5	PATQU	8.82701351E-01	-2.45285	-1.52497678E-01	-8.17911190E-02
6	9	NONOG	8.38623352E-01	-6.21261	-9.08492987E-02	-5.03486506E-02
7	10	VUNIO	8.24732158E-01	-7.03372	-6.01987321E-02	-2.43593172E-02
2	2	RECRE	1.10000000E+00	2.04657	7.92761431E-01	6.78039071E-01
8	7	CHEPE	9.70934254E-01	7.05285	-1.60428259E-01	-9.08059684E-02
9	4	AIMOG	8.57252277E-01	-5.40203	-9.32589514E-02	-4.23486528E-02
0	11	CHILE	8.36738430E-01	-6.33785	-1.09194030E-01	-5.54031841E-02

usoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "F" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
ECRE		1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.77276143126438	.09892796594204
		.05547026886898	2.0434654	-.8348229693001	-38.4964972	.6780390714863 4	0.1978559
	LARIO	1.2555232988362	1.2583049528123	-1.0496480231541	1.3411526246414	-.6938334613223	
		-.0836217696019	-3.8104500	.8348229693006	141.5035028	-.4801831316023	
ARIO		1.2555232988362	1.2583049528123	.1465991001006 2	.16898272912901	.09584336445337	.00228441301951
		-.0836217696019	-3.8104500	-.084046811918	-29.8261026	.04663192719174	0.0042833
	AIMOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912901	-.0932589514339	
		-.1141540097252	-5.4034244	.08404681191799	150.1738974	-.0423486527802	
ARIO		1.2555232988362	1.2583049528123	-.1298428897114	.17513153600272	-.0765966062631	.00122684219611
		-.0836217696019	-3.8104500	-.1175239502998	-137.8509909	.0792058749302 8	0.0024537
	PATQU	1.2471068979652	1.2482515700127	.12984288971139	.17513153600272	.0778234484592	
		-.0534449912241	-2.4539194	.11752395029979	42.1490091	-.0767521905981	
ATQU		1.2471068979652	1.2482515700127	-.3683458960794	.36911928709613	-.2303211268575	.00544993239475
		-.0534449912241	-2.4539194	.0238665186033 3	176.2727727	-.0050389283986	0.0108999
	CHAMI	1.2803932126 28	1.2803982203692	.36834589607941	.36911928709613	.2357710592523	
		.00358103066031	0.1602456	-.0238665186033	-3.7072273	.01593879318811	

I		1.2803932126280	1.2803982203692	-.4963158669284	.50258336703058	-.3175980607765	.01389245335055
		.00358103066031	0.1602456	.07912408706717	170.9419692	-.0515436331864	0.0442033
	CHEPE	1.3626813884637	1.3730704490764	.49631586692843	.50258336703058	.33147051412705	
		.16858793450787	7.0526702	-.0791240870672	-9.0580306	.09574669384728	
E		1.3626813884637	1.3730704490764	-.7444658766525	.76631843595364	-.4919187729672	.03083030712733
		.16858793450787	7.0526702	.18169893720791	166.2841848	-.1865528622466	0.0998315
	LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631843595364	.52274908009457	
		.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294455	
06		1.1794668861286	1.1864257688768	.09734877138892	.11137362356051	.06088095671741	.6822246213?E-3
		-.1283120009229	-6.2086848	-.0541045352449	-29.0644457	.02566174603322	0.0013024
	YUNIO	1.1573965688744	1.1661731111915	-.0973487713889	.11137362356051	-.0601987320?6	
		-.1428037440376	-7.0338096	.0541045352449	150.9355543	-.0243893172106	
06		1.1794668861286	1.1864257688768	.17317298783299	.20706021017633	.10940839983566	.21436965319E-3
		-.1283120009229	-6.2086848	-.113512317528	-33.2442449	.05583192343033	0.0004287
	CHILE	1.1754649098797	1.1827022669092	-.173172989833	.20706021017633	-.1091940301825	
		-.1306403375443	-6.3417867	.11351231752795	146.7557551	-.0554031841239	
10		1.2555232988362	1.2583049528123	.41359218837384	.49313394128363	.27086599862674	.00972724236184
		-.0836217696019	-3.8104500	-.2685564852355	-32.9967432	.15129680679071	0.0194545
	NONOG	1.1794668861286	1.1864257688768	-.4135921883738	.49313394128363	-.2611386552649	
		-.1283120009229	-6.2086848	.26855648523554	147.0032568	-.131842320067	

Total network loss P-loss by summing injections = 1.6323575566?E-01

tion at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed
lt applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the
ciated power factor.

Node name	Source node voltage Rectangular		Source node voltage Polar		Injected source current Rectangular		Injected source power P and Q	Injected source power MVA and P.F.
	RECRE	1.5546456346292	1.5556349186104	1.0496480231542	1.3411526246414	.79276143126438	1.0431719270391
		.05547026886898	2.0434654	-.8348229693001	-38.4964972	.67803907148634	0.7599528
	LARIO	1.2555232988362	1.2583049528123	-.6192996243911	.71870369019806	-.4040208045053	.45217420649034
		-.0836217696019	-3.8104500	.36469572184674	149.5068440	-.2030485226295	-0.8935070
	AIMOG	1.2068533992447	1.2122401846189	-.1465991001006	.16898272912901	-.0932589514339	.10242382737858
		-.1141540097252	-5.4034244	.08404681191799	150.1738974	-.0423486527802	-0.9105201
	PATBU	1.2471068979652	1.2482515700127	-.238503006368	.27726332022687	-.1524976703983	.17304718739007
		-.0534449912241	-2.4539194	.14139046890312	149.3394914	-.0817911189967	-0.8812491
	CHAMI	1.2803932126280	1.2803982203692	-.127969970849	.13939050294654	-.0818270015242	.08923767595443
		.00358103066031	0.1602456	.05525756846384	156.6452622	-.0356043399993	-0.9169536

CHEPE	1.3626813884637	1.3730704490764	-.2481500097241	.26851448230485	-.1604282588402	.18434465040093
	.16858793450787	7.0526702	.10257485014074	157.5418424	-.0908059683994	-0.8702626
LUJAN	1.5026279441629	1.5556349186104	.74446587665248	.76631843595364	.52274908009457	.5960558588722
	.40262794416288	15.0000000	-.1816989372079	-13.7158152	.28638433294465	0.8770136
NONOG	1.1794668861286	1.1864257688768	-.1430704271519	.17509413618719	-.0908492787116	.10386809757585
	-.1283120009229	-6.2036848	.10093963246268	144.7961099	-.0503486506035	-0.8746603
VUNIO	1.1573965688744	1.1661731111915	-.0973487713887	.11137362356051	-.060198732096	.0649404625864
	-.1428037440376	-7.0338096	.0541045352447	150.7355543	-.0243593172106	-0.7269834
CHILE	1.1754649098797	1.1827022669092	-.173172989833	.20706021017432	-.1091940301825	.12244523978112
	-.1306403375443	-6.3417867	.11351231752795	146.7557551	-.0554031641239	-0.8917781

ent card. KOMPAR = 1. ;C
ent card. KOMPAR = 1. ;C
ent card. KOMPAR = 1. ;C
est for flushing of punch buffer. ;$PUNCH (Flush punched cards: R-L branches for equivalent impedance loads

sting of 80-column card images now being flushed from punch buffer follows.
==========
5678901234567890123456789012345678901234567890123456789012345678901234567890
==========
=====(End of LUNIT7 punched cards as flushed by $PUNCH request)=======
k card ending node names for voltage output. ;BLANK card ending requests for output variables

ctive branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be
ented to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

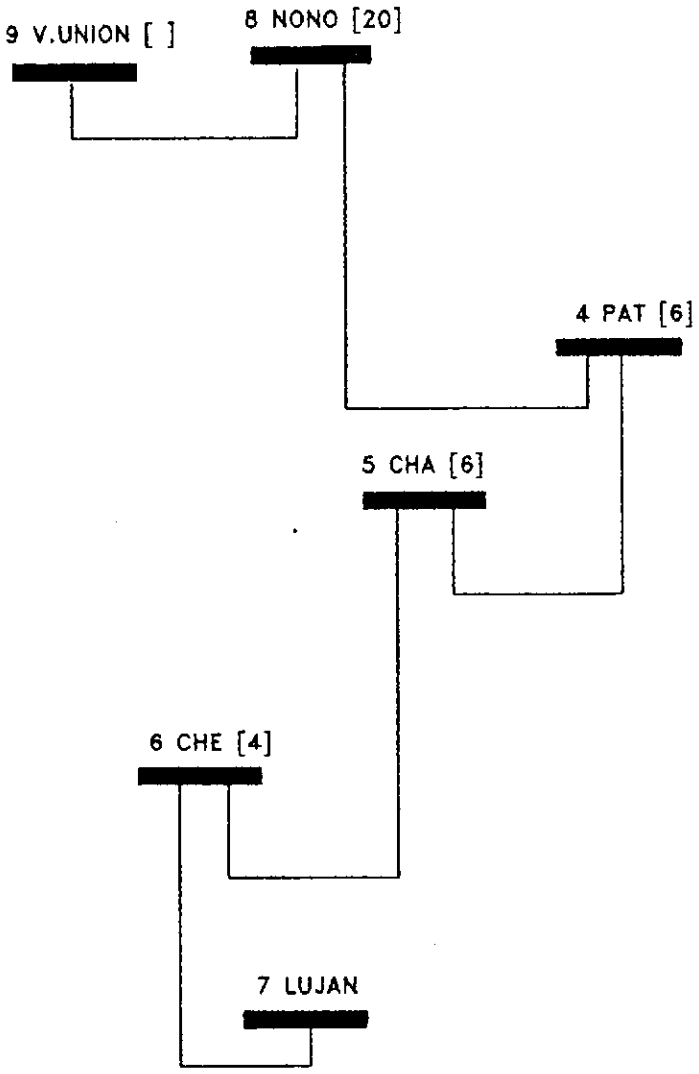
m	To	(======== Branch voltage Vkm = Vk - Vm ========)				(====== Branch current ikm from K to M ======)			
K	bus M	Magnitude	Degrees	Real part	Imag part	Magnitude	Degrees	Real part	Imag part
E	LARIO	3.2987993E-01	24.938452	2.9912234E-01	1.3909204E-01	1.3411526E+00	-38.496497	1.0496480E+00	-8.3482297E-01
O	AIMOG	5.7454128E-02	32.101411	4.8669900E-02	3.0532240E-02	1.6898273E-01	-29.826103	1.4659910E-01	-8.4046812E-02
O	PATGU	3.1328482E-02	-74.416042	8.4164009E-03	-3.0176778E-02	1.7513154E-01	-137.850991	-1.2984289E-01	-1.1752395E-01
U	CHAMI	6.6029887E-02	-120.272278	-3.3286315E-02	-5.7026022E-02	3.6911829E-01	176.292773	-3.6834590E-01	2.3866519E-02
I	CHEPE	1.8438715E-01	-116.505219	-8.2288176E-02	-1.6500690E-01	5.0258339E-01	170.941969	-4.9631587E-01	7.9124067E-02
E	LUJAN	2.7268987E-01	-120.877734	-1.3994656E-01	-2.3404001E-01	7.6631844E-01	166.284185	-7.4446588E-01	1.8169994E-01
G	VUNIO	2.6402832E-02	33.289579	2.2070317E-02	1.4491743E-02	1.1137362E-01	-29.064446	9.7348771E-02	-5.4104535E-02
G	CHILE	4.6300071E-03	30.190704	4.0019762E-03	2.3283366E-03	2.0706021E-01	-33.244245	1.7317299E-01	-1.1351232E-01
O	NONOG	8.8214481E-02	30.438206	7.6056413E-02	4.4690231E-02	4.9313394E-01	-32.996743	4.1355219E-01	-2.6855645E-01

ual List Sizes for the preceding solution follow. 06-Apr-94 15.27.14

Size 1-10:	11	9	9	2	-9999	0	-9999	-9999	0	0
Size 11-20:	-9999	-9999	-9999	-9999	-9999	0	0	9	23	0
Size 21-29:	0	-9999	9	-9999	-9999	-9999	-9999	-9999	-9999	

onds for overlays 1-5 :	22.090	0.000	22.090 --- (CP: I/O; tot)
onds for overlays 6-11 :	11.152	0.000	11.152
onds for overlays 12-15 :	0.000	0.000	0.000
onds for time-step loop :	0.000	0.000	0.000
onds after DELTAT-loop :	0.383	0.000	0.383
Totals :	33.625	0.000	33.625

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 300
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

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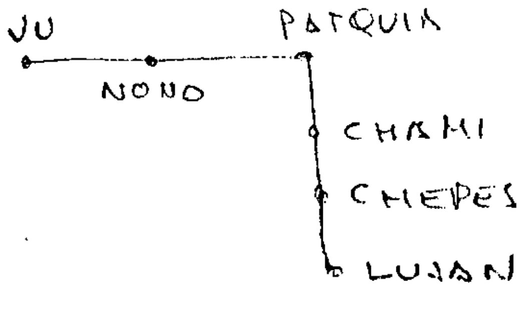
native Transients Program (ATP). Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
 (dd-mth-yy) and time of day (hh.mm.ss) = 05-Apr-93  10.37.43     Name of disk plot file, if any, is  C:34051037.pl4
nformation, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.   Last major program update:  Oct, 1990
 length of "LABCOM" tables =  444863   INTEGER words.   "VARDIM"  List Sizes follow :    752   900  1500   150  7500
0  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252     4
---------------------------------------------------+-----------------------------------------------------------------------------
iptive interpretation of input data cards.          | Input data card images are shown below, all 80 columns, character by character
                                                     0         1         2         3         4         5         6         7         8
                                                     012345678901234567890123456789012345678901234567890123456789012345678901234567890
---------------------------------------------------+-----------------------------------------------------------------------------
nt card.   KOMPAR = 1.                              |C data:A:\ATP\GLO3.DAT
r card preceding new EMTP data case.                |BEGIN NEW DATA CASE
nt card.   KOMPAR = 1.                              |C       EX BENCHMARK DC-26
nt card.   KOMPAR = 1.                              |C       5-bus, 1-phase loadflow example from "Elements of Power System Analysis"
nt card.   KOMPAR = 1.                              |C       by William D. Stevenson.   McGraw-Hill Book Company, 2nd Edition (1962).
nt card.   KOMPAR = 1.                              |C       The Gauss-Seidel solution is contained in Example 10.1, page 219 onward.
nt card.   KOMPAR = 1.                              |C       Data is given in per unit,  and  we  can use this directly (pretend that
nt card.   KOMPAR = 1.                              |C       the base voltage, current, and power are all unity).  We need  XOPT = 60
nt card.   KOMPAR = 1.                              |C       since impedances are in ohms.  Voltages could be multiplied by 1.414  to
nt card.   KOMPAR = 1.                              |C       give the peak values required by the EMTP, but instead we use the VSCALE
nt card.   KOMPAR = 1.                              |C       option that takes RMS  (the square root of 2 is supplied internally)  as
nt card.   KOMPAR = 1.                              |C       input and produces RMS output (at least for the load flow solution table
ent card.  KOMPAR = 1.                              |C       if not for EMTP branch flows).  Bus number one,  LUJAN,  is taken as the
ent card.  KOMPAR = 1.                              |C       slack bus (the only bus without a power constraint).  This is the 3rd of
ent card.  KOMPAR = 1.                              |C       4 subcases.
ent card.  KOMPAR = 1.                              |C       Se encara el estudio de flujo de cargas de una linea de 132 KV en La Rio
ent card.  KOMPAR = 1.                              |C       ja conecta la localidad de V.Union con Nonogasta-Patquia-Chamical-Chepes
ent card.  KOMPAR = 1.                              |C       propone una compensacion de energia reactiva capacitiva en Chamical. Da
ent card.  KOMPAR = 1.                              |C       la tension en por unidad. La barra slack es la de Lujan. La potencia bas
ent card.  KOMPAR = 1.                              |C       e es de 100 MVA. Nonogasta tiene una carga(activa(1/1)) de -0.08 y rea
ent card.  KOMPAR = 1.                              |C       ctiva(1/1)) -0.06. La convencion es carga reactiva + es capacitiva, la
ent card.  KOMPAR = 1.                              |C       - es inductiva: las otras siguen mas abajo. La potencia bvase es de 100
ent card.  KOMPAR = 1.                              |C       MVA, la tension base es de 132 kV. Sigue las instrucciones del ATP Rule
ent card.  KOMPAR = 1.                              |C       Book. Version del EMTP para PC. Se conservan como comentario algunas
ent card.  KOMPAR = 1.                              |C       instrucciones del banco de datos original para poder rastrear posibles
ent card.  KOMPAR = 1.                              |C       errores.
ent card.  KOMPAR = 1.                              |C
ent card.  KOMPAR = 1.                              |C
h of time-step loop numbers.  W=13   S=2            |PRINTED NUMBER WIDTH, 13, 2,     { Request maximum precision for 8 output columns
aration of desired EMTP load flow usage.            |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
power frequency  STATFR = 5.00000000E+01  Hz.       |POWER FREQUENCY                    50.0
. data.      2.000E-04   0.000E+00   5.000E+01      | .000200     .000      50.   { T-max = 0  means that no transient solution follows
. data.       1   1  1  1  1  0  0  0  0  0         |        1         1         1         1         1
ent card.  KOMPAR = 1.                              |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ent card.  KOMPAR = 1.                              |C BUS1  BUS2  BUS3  BUS4  RESIS XL    XC
ent card.  KOMPAR = 1.                              |C A6    A6    A6    A6    E6.2  E6.2  E6.2
ent card.  KOMPAR = 1.                              |C  2-8   9-14  15-20 21-26 27-32 33-38 39-44
es R-L-C.    9.820E-02  6.465E-04  0.000E+00        |  V.UNI NONOG                0.09820.2031
es R-L-C.    1.118E-01  7.363E-04  0.000E+00        |  NONOG PATQU                0.11180.2313
es R-L-C.    6.820E-02  4.491E-04  0.000E+00        |  PATQU CHAMI                0.06820.1411
es R-L-C.    1.148E-01  7.553E-04  0.000E+00        |  CHAMI CHEPE                0.11480.2373
es R-L-C.    1.171E-01  7.706E-04  0.000E+00        |  CHEPE LUJAN                0.11710.2421
ent card.  KOMPAR = 1.                              |C V.UNI LUJAN                1.0E201.0E20
k card ending branches.  IBR, NTOT = 5  7           |BLANK card ending branch cards.
k card ending switches.   KSWTCH = 0.               |BLANK card ending switch cards.
```



```
ent card.  KOMPAR = 1.                                  :C       The following 2 cards would be used if peak rather than RMS input data:
ce.  1.02E+00  5.00E+01  0.00E+00 -1.00E+00  :14V.UNI          1.02        50.        0.0                                        -1.
ce.  1.10E+00  5.00E+01  0.00E+00 -1.00E+00  :14LUJAN          1.1         50.        0.0                                        -1.
ent card.  KOMPAR = 1.                                  :C            --------------+------------------------------
ent card.  KOMPAR = 1.                                  :C            From bus name :  Names of all adjacent busses.
ent card.  KOMPAR = 1.                                  :C            --------------+------------------------------
ent card.  KOMPAR = 1.                                  :C
ent card.  KOMPAR = 1.                                  :C            --------------+------------------------------
 card ends electric network sources.                    :BLANK card terminating all EMTP source cards.

 of input elements that are connected to each node.  Only the physical connections of multi-phase lines are shown (capacitive
inductive coupling are ignored).  Repeated entries indicate parallel connections.  Switches are included, although sources
luding rotating machinery) are omitted -- except that U.M. usage produces extra, internally-defined nodes  "UMXXXX".
-----------+------------------------------
 bus name :  Names of all adjacent busses.
-----------+------------------------------
    V.UNI  :NONOG *
    NONOG  :V.UNI *PATOU *
    PATOU  :NONOG *CHAMI *
    CHAMI  :PATOU *CHEPE *
    CHEPE  :CHAMI *LUJAN *
    LUJAN  :CHEPE *
-----------+------------------------------
ent card.   KOMPAR = 1.                          :C    Next come power constraints of the load flow.   There will be one
ent card.   KOMPAR = 1.                          :C    for each non-slack generator.   So, 3 of them will apply to nodes
ent card.   KOMPAR = 1.                          :C    that have no  Type-14  source as required by the algorithm.   The
ent card.   KOMPAR = 1.                          :C    program will define these internally.  Yet, this is only possible
ent card.   KOMPAR = 1.                          :C    for  TMAX  non-positive (no transient continuation).   If data is
ent card.   KOMPAR = 1.                          :C    modified to make  TMAX > 0,  a  KILL = 40  error termination will
ent card.   KOMPAR = 1.                          :C    will result.   Yet,  the  transient simulation is possible  as  a
ent card.   KOMPAR = 1.                          :C    2nd simulation that replaces the power constraints  at load nodes
ent card.   KOMPAR = 1.                          :C    by constant-impedance loads.
ent card.   KOMPAR = 1.                          :C    The following 4 cards would be used if peak rather than RMS input data.
ent card.   KOMPAR = 1.                          :C    Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
ent card.   KOMPAR = 1.                          :C    (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
ent card.   KOMPAR = 1.                          :C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ent card.   KOMPAR = 1.                          :C NKBUS1 BUS2 BUS3 PK O TITAK      QK O VK            VMIN    VMAX    THMIN THMAX
ent card.   KOMPAR = 1.                          :C I2  A6  A6    A6  E16.0          E16.0              E8.0    E8.0    E6.0  E6.0
ent card.   KOMPAR = 1.                          :C I2 3-8 9-14 15-20 21-36          37-52              53-60   61-68   69-74 75-80
    6.000E-02  1.100E+00  8.500E-01  1.150E+00 : 1V.UNI                        0.06            1.1     .85     1.15  -20.   20.
ent card.   KOMPAR = 1.                          :C 1GREEN                        1.0             1.02                  -20.   20.
ent card.   KOMPAR = 1.                          :C BLUE                          -0.4   -0.08    -0.1 =0.06 .85  1.15
  -2.000E-01 -1.000E-01  8.500E-01  1.150E+00 :  NONOG                          -0.2            -0.1     .85     1.15
ent card.   KOMPAR = 1.                          :C PATOU                         -0.06           0.1      .85     1.15
  -6.000E-02  1.000E-01  8.500E-01  1.150E+00 :  CHAMI                          -0.06           0.1      .85     1.15
  -4.000E-02 -3.000E-02  8.500E-01  1.150E+00 :  CHEPE                          -0.04           -0.03    .85     1.15
ent card.   KOMPAR = 1.                          :C  The following load-flow miscellaneous data card has two peculiarities.  The
ent card.   KOMPAR = 1.                          :C  use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
ent card.   KOMPAR = 1.                          :C  voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
ent card.   KOMPAR = 1.                          :C  (this  works  well  for  this problem whether RMS or peak values are used).
ent card.   KOMPAR = 1.                          :C          NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
 LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =      9       7      11       0       0       1
 flow iter.   1   1500   20    1    1.00E-05  :               1    1500      20       1  .00001     0.0      0.0   1.414       0
 del-V:  .1131 .0143 .0144 .0146 .0147 .0149  .015 .0152 .0152 .0116 .0066 .0044 .0036 .0034 .0033 .0031 .0029 .0028 .0026 .0024
ce No.     1     4     4     4     4     4     4     4     3     3     3     3    -3    -3    -3    -3    -3    -3    -3    -3
```

el-V:	.0023	.0022	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.0021	.002	.002	.002	.002		
e No.	-3	-3	-2	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
el-V:	.002	.0019	.0019	.0019	.0019	.0019	.0018	.0018	.0018	.0018	.0018	.0017	.0017	.0017	.0017	.0017	.0016	.0016	.0016		
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1		
el-V:	.0016	.0015	.0015	.0015	.0015	.0015	.0014	.0014	.0014	.0014	.0014	.0014	.0013	.0013	.0013	.0013	.0013	.0013	.0013	.0012	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.0012	.0012	.0012	.0012	.0012	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.0011	.001	.001	.001	.001	1.E-3	1.E-3	1.E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	1.E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.9E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	.8E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.8E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.7E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
el-V:	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3	.6E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	.5E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.5E-3	.5E-3	.5E-3	.5E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.4E-3	.4E-3	.4E-3	.4E-3	.4E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.3E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.2E-3	.1E-3	.1E-3	.1E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	.1E-3	1.E-4	1.E-4	1.E-4	1.E-4	.9E-4	.9E-4	.9E-4	.9E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.9E-4	.9E-4	.9E-4	.9E-4	.9E-4	.9E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.8E-4	.7E-4	.7E-4	.7E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.7E-4	.7E-4	.7E-4	.7E-4	.7E-4	.7E-4	.7E-4	.7E-4	.7E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	.6E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.6E-4	.6E-4	.6E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	.5E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	.4E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.4E-4	.4E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.3E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.2E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	.1E-4	1.E-5	1.E-5	1.E-5	1.E-5	.9E-5	.9E-5	.9E-5	.9E-5	.9E-5	.9E-5	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.9E-5	.9E-5	.9E-5	.9E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.8E-5	.7E-5	.7E-5	.7E-5	.7E-5	.7E-5	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.7E-5	.7E-5	.7E-5	.7E-5	.7E-5	.7E-5	.7E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	.6E-5	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.6E-5	.6E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.5E-5	.4E-5	
e No.	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	
el-V:	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	.4E-5	

```
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .3E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .2E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 .1E-5 1.E-6 1.E-6 1.E-6 1.E-6 1.E-6 .9E-6 .9E-6 .9E-6 .9E-6 .9E-6 .9E-6
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .9E-6 .9E-6 .9E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .8E-6 .7E-6 .7E-6 .7E-6 .7E-6 .7E-6 .7E-6 .7E-6
ce No.    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1    -1
del-V:  .7E-6 .7E-6 .7E-6 .7E-6
ce No.    -1    -1    -1    -1
 the load flow iteration loop with counter  NEKITE = 724.   If no warning on the preceding line,  convergence was attained.
```

Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	V.UNI	1.10000000E+00	-9.07134	6.00154633E-02	1.24217047E-01
4	NONOG	1.07170724E+00	-9.07090	-1.99986348E-01	-9.99997926E-02
5	CHAMI	1.08944622E+00	-6.29796	-5.99915993E-02	1.00000316E-01
6	CHEPE	1.08757873E+00	-3.31250	-3.99956362E-02	-2.99997674E-02

soidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P"
rinted above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

s K	Bus M	Phasor node voltage Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
NI		1.5361783750873	1.5556349186104	.05101495002466	.17736235734376	.06001546329388	.0015445586249
		-.2452672010563	-9.0713166	-.1698672442719	-73.2838068	.12421704664077	0.0031945
	NONOG	1.4966686696833	1.5156229591696	-.0510149500247	.17736235734376	-.058470904669	
		-.2389473740188	-9.0708805	.16986724427187	106.7161932	-.1210225470815	
OG		1.4966686696833	1.5156229591696	-.1887804963899	.18879158991759	-.1415154430616	.00199240258128
		-.2389473740188	-9.0708805	.00204660851049	179.3788689	.02102275452079	0.0041220
	PATQU	1.5182477097282	1.5307843608201	.1887804963899	.18879158991759	.1435078456429	
		-.1955112560353	-7.3378399	-.0020466085105	-0.6211311	-.0169007266402	
QU		1.5182477097282	1.5307843608201	-.1887804963899	.18879158991759	-.1435078456429	.00121540121685
		-.1955112560353	-7.3378399	.00204660851049	179.3788689	.0169007266402	0.0025146
	CHAMI	1.5314113160428	1.5407096804915	.1887804963899	.18879158991759	.14472324685975	
		-.1690139066951	-6.2979494	-.0020466085105	-0.6211311	-.0143861648851	
MI		1.5314113160428	1.5407096804915	-.2804258623633	.30441122301208	-.2047148461395	.00531903946073
		-.1690139066951	-6.2979494	-.1184378673125	-157.1032344	.11438648039331	0.0109948
	CHEPE	1.5354988991289	1.5380686376194	.28042586236328	.30441122301208	.21003388560027	
		-.0888721823888	-3.3124911	.11843786731245	22.8967656	-.10339163663	
EPE		1.5354988991289	1.5380686376194	-.3300925358352	.33883851853219	-.2500295217959	.00672221576309
		-.0888721823888	-3.3124911	-.076488296013	-166.9537962	.07339186918709	0.0138979

```
      LUJAN     1.5556349186104  1.5556349186104        .3300925358352  .33883851853219        .25675173755894
                            0.0              0.0     .07648829601303        13.0462038         -.0594939320714
 Total network loss  P-loss  by summing injections =   1.6793617646B5E-02

tion at nodes with known voltage.   Nodes that are shorted together by switches are shown as a group of names, with the printed
lt applying to the composite group.   The entry "MVA" is  SQRT( P**2 + Q**2 )  in units of power,  while  "P.F."  is the
ciated power factor.
          Node                  Source  node  voltage                Injected  source  current              Injected  source  power
          name        Rectangular                 Polar          Rectangular                Polar             P  and  Q     MVA and P.F.

          V.UNI    1.5361783750873  1.5556349186104      .05101495002466  .17736235734376      .06001546329388  .13795553816551
                   -.2452672010563        -9.0713166      -.1698672442719       -73.2838068      .12421704664077         0.4350348

          NONOG    1.4966886696833  1.5156229591696      -.2397954464146   .2950529255907      -.1999863477306  .22359449409771
                   -.2389473740188        -9.0708805      .17191385278235       144.3625514      -.0999997925607        -0.8944154

          CHAMI    1.5314113160428  1.5407096804915      -.0916453659734   .1513782745929      -.0599915992798   .1166149865407
                   -.1690139066951        -6.2979494      -.1204844758229      -127.2580869       .1000003155082        -0.5144416

          CHEPE    1.5354988991289  1.5380686376194      -.0496666734719   .0650118834212      -.0399956361956  .04999636948136
                   -.0888721823888        -3.3124911      .04194957129942       139.8148239      -.0299997674429        -0.7999708

          LUJAN    1.5556349186104  1.5556349186104       .3300925358352  .33883851853219       .25675173755894  .26355451559944
                               0.0              0.0      .07648829601303        13.0462038      -.0594939320714         0.9741883

ent card.   KOMPAR = 1.                        !C $UNITS. 0.0, 0.0                -------  1st of punched cards that are produced
ent card.   KOMPAR = 1.                        !C $VINTAGE, 1,
ent card.   KOMPAR = 1.                        !C   Polar V, P, Q =  9.41780959E-01   -3.81708  -5.99988408E-01  -2.99999500E-01
ent card.   KOMPAR = 1.                        !C   RED                          1.18261633E+00  1.56852131E+00
ent card.   KOMPAR = 1.                        !C   Polar V, P, Q =  9.15105791E-01   -8.02053  -3.99985812E-01  -9.99988625E-02
ent card.   KOMPAR = 1.                        !C   BLUE                         1.97046099E+00  1.30673427E+00
ent card.   KOMPAR = 1.                        !C   Polar V, P, Q =  9.82613423E-01   -1.92907  -5.99992780E-01  -1.99999933E-01
ent card.   KOMPAR = 1.                        !C   YELLOW                       1.44830775E+00  1.28060019E+00
 XOPT, COPT = -1.00000000E+00  -1.00000000E+00!$UNITS, -1, -1
 MOLDAT = 0     (data vintage).                !$VINTAGE, 0,               (   -------  last of punched cards that are produced
est for flushing of punch buffer.              !$PUNCH    ( Flush punched cards: R-L branches for equivalent impedance loads

sting of 80-column card images now being flushed from punch buffer follows.
==========================================================================
5678901234567890123456789012345678901234567890123456789012345678901234567B9
==========================================================================
======< End of LUNIT7 punched cards as flushed by  $PUNCH  request  >=======
k card ending node names for voltage output.  !BLANK card ending requests for output variables

ctive branch outputs follow (for column-80 keyed branches only).   Any request for branch current output automatically will be
ented to include branch voltage.  But the converse is not true (a request for voltage only will not produce current output).
m    To        (========  Branch voltage  Vkm  =  Vk - Vm   =========)       (======  Branch current  Ikm  from  K to M   ======)
 K   bus M   Magnitude       Degrees        Real part       Imag part      Magnitude       Degrees         Real part       Imag part
al List Sizes for the preceding solution follow.        05-Apr-93  10.38.02
ize  1-10:     7     5     5     2 -9999     0 -9999 -9999     0     0
ize 11-20: -9999 -9999 -9999 -9999 -9999     0     0     0    23     0
ize 21-29:     0 -9999     6 -9999 -9999 -9999 -9999 -9999 -9999
nds for overlays  1-5  :     9.836     0.000     9.836  --- (CP: I/O: tot)
nds for overlays  6-11 :     9.176     0.000     9.176
```

ads for overlays 12-15 :	0.000	0.000	0.000
ads for time-step loop :	0.000	0.000	0.000
ads after DELTAT-loop :	0.000	0.000	0.000
Totals :	19.012	0.000	19.012

C:\RIV\FORT\FORMS
BAC13210.DAT 3.147 a. 15-04-94 15:36:42 Page 1

EN; NOMBRE ORIGEN; 6 CHAMICAL
INO; NOMBRE DESTINO; 7 LUJAN
132.000 .000
CONSUMIDA
25.000000
MW]; DIST [KM]; COSENO FI; 240.000 258.000 .900
SHUNT CAPACITIVA [MVAR] ;
MVAR] 10.000000 -10.000000
DE CARGA [AMP]; 98.41198 -3.92445
.0000066282 .0000009935
.0137589000
]; 138.96840 .00000
.0272920900 .1820847000
.0001057833 .0007057545
ADOS]; 87.429
22.13307 7.85244
ADO]; 19.53
P]; 99.001070
96.800450 20.757750
GRADOS]; 2.283617
135.818600 17.709820
RADOS]; 47.429063
ORRIENTE DE CARGA [AMP]; 98.490
371.924100 -85.723820
DE LINEA [KVA] NL [CMPLX]; 931.1749000000 3036.4770000000
S CIRCUITO PARAMETROS DISTRIBUIDOS
.9838346000 .0049426690
30.8815300000 101.3015000000
.0000005256 .0003166548
PLX]; 30.8815300000 101.3015000000
PLX]; .0000000912 .0000000137
X]; .121000 .394570
X]; .0000000000 .0000012340
CAPACITIVA DE LA LINEA;
NCIA ATENDIDA [BRAZOS PARALELOS DEL CIRC PI]
S CONCENTRADOS GYT [MVAR] .000000 5.760040
REACTIVA IND. DE LA LINEA;
D ATENDIDO [BRAZO SERIE DEL CIRC PI]
S CONCENTRADOS, NLO [MVAR] 3036.477000 .000000
RESISTIVAS [SERIE CIRC PI];
S CONCENTRADOS, PERD [KW] 882.887900
RESISTIVAS [SERIE CIRC PI];
S CONCENTRADOS, PERD [KW] -295.966900

CONSTANTES DEL CUADRIPOLO
PI CON ADMITANCIAS DISTRIBUIDAS

2[MW] VALU2[KV] CPF SEC [MM2]DIST[KM]
25.00 132.00 1 240.0 258.00

KV] NI [MW] DPU [MW] DU[KV],

94 310 2

135.82 17.71 22.14 7.85 -.36 6.96 3.82 17.71

DELTAU, DEPO[MW] ANGU2I, I1 [AMP] VALI1[AMP] COR[AMP],

3.63 4.12 -7.43 96.80 20.76 99.00 98.412 -3.924

VALCOR[AMP] VALU1[KV] VALU2 [KV] COR120[AMP]
98.490 136.968 132.000 .000 12.132

A, B, C
.9838346 .0049427 30.8815300 101.3015000 -.0000005 .0003167

Z2U Y2U WW
.12100000 .39457000 .00000000 .00000123

CONCLUSION: POSIBLE
[DELTAU < 10% O DEPO < 5%, O ANGU2I < 20]

- 95 320-1

CASO 320

DO ORIGEN, NOMBRE ORIGEN; 7 LUJAN
DO DESTINO, NOMBRE DESTINO; 5 CHAMICAL
[KV]; 132.000 .000
TENCIA CONSUMIDA
A] , N2 30.000000
CCION [MM2], DIST [KM],COSENO FI; 150.000 231.000 .900
TENCIA SHUNT CAPACITIVA [MVAR] ;
SHUNT [MVAR] .000000 .000000
RRIENTE DE CARGA [AMP]; 118.09440 -57.19572
RO .0000106509 .0000024352
SIH .0293120600
COM [KV]; 146.95970 .00000
M .0577120900 .2524163000
MOD []; .0002498359 .0010927110
GU1 [GRADOS]; 6.380
[MW]; 29.24959 2.12568
GN1 [GRADO]; 4.16
LI1 [AMP]; 115.213800
[AMP]; 115.127100 -4.469234
G I1 [GRADOS]; -25.841930
[KV]; 146.049700 16.329730
GU21 [GRADOS]; -6.379712
L.ABS.CORRIENTE DE CARGA [AMP]: 131.216
[OHM?]: 386.253600 -88.312450
RDIDAS DE LINEA [KVA] NL [CMPLX]; 2766.7670000000 5734.2320000000
NSTANTES CIRCUITO PARAMETROS DISTRIBUIDOS

[]; .9699248000 .0144212700
[]; 43.6893900000 91.6874300000
[ ]; -.0000031541 .0006469372
RIM [CMPLX]; 43.6893900000 91.6874300000
RIM [CMPLX]; .0000003122 .0000000714
U [CMPLX]; .193000 .400000
U [CMPLX]; .0000000000 .0000028290
TENCIA CAPACITIVA DE LA LINEA;
LA POTENCIA ATENDIDA [BRAZOS PARALELOS DEL CIRC PI]
RAMETROS CONCENTRADOS QYT [MVAR] .000000 12.750140
TENCIA REACTIVA IND. DE LA LINEA;
CONSUMO ATENDIDO [BRAZO SERIE DEL CIRC PI]
RAMETROS CONCENTRADOS. NLQ [MVAR] 5734.232000 .000000
RDIDAS RESISTIVAS [SERIE CIRC PI];
RAMETROS CONCENTRADOS, PERD [KW] 963.835900
RDIDAS RESISTIVAS [SERIE CIRC PI];
RAMETROS CONCENTRADOS, PERD [KW] -2593.458000

CONSTANTES DEL CUADRIPOLO
PI CON ADMITANCIAS DISTRIBUIDAS

NN,	N2[MW]	VALU2[KV]	CPF SEC [MM2]	DIST[KM]
1	30.00	132.00	1 150.0	231.00

U1[KV]	N1 [MW]	DPU [MW]	DU[KV],

.05 16.33 29.25 2.13 2.25 -10.95 14.05 16.33

LTAU, DEPO[MW] ANGU21, I1 [AMP] VALI1[AMP] COR[AMP],

.18 -2.30 -6.38 115.13 -4.47 115.21 118.094 -57.196

VALCOR[AMP]	VALU1[KV]	VALU2 [KV]	COR120[AMP]
131.216	146.960	132.000	.000 24.902

A,	B,	C			
.9699248	.0144213	43.6873900	91.6874300	-.0000032	.0006469

Z2U	Y2U	NW	
.19300000	.40000000	.00000000	.00000283 1

CONCLUSION: DUDOSA A COMPENSAR
TAU >10%<20% O DEPO >5%<10% , O ANGU21 >20<25]

CASO 325

```
DO ORIGEN, NOMBRE ORIGEN; 7   LUJAN
DO DESTINO, NOMBRE DESTINO; 6   CHAMICAL
 [KV];    132.000        .000
TENCIA CONSUMIDA
a] , N2          30.000000
CCION [MM2], DIST [KM],COSENO FI;    150.000     231.000        .900
TENCIA SHUNT CAPACITIVA [MVAR] :
SHUNT [MVAR]            .000000           -10.000000
RRIENTE DE CARGA [AMP];       118.09440         -13.45706
20          .0000106507            .0000024352
GIH          .0293120600
COM [KV];       140.48320          .00000
M          .0577120900            .2524163000
MOD [];          .0002498359            .0010927110
GU1 [GRADOS];      8.036
 [MW];        26.29506          13.03921
GN1 [GRADO];      26.38
LI1 [AMP];      120.623000
 [AMP];      114.496400          37.953970
G I1  [GRADOS]:  -6.500915
 [KV];      139.103600         19.639530
GU21 [GRADOS];  -8.036264
L.ABS.CORRIENTE DE CARGA  [AMP];    118.859
 [OHM2]: 386.253600    -88.312450
RDIDAS DE LINEA [KVA] NL [CMPLX];      2062.0980000000        4273.7790000000
NSTANTES CIRCUITO PARAMETROS DISTRIBUIDOS

 [];          .9699248000            .0144212700
[];        43.6893900000          91.6874300000
[  ];         -.0000031541            .0006469372
PIM [CMPLX];        43.6893900000          91.6874300000
RIM [CMPLX];          .0000003122            .0000000714
J [CMPLX];         .193000          .400000
U [CMPLX];          .0000000000            .0000028290
TENCIA CAPACITIVA DE  LA LINEA;
LA POTENCIA ATENDIDA [BRAZOS PARALELOS DEL CIRC PI]
RAMETROS CONCENTRADOS QYT [MVAR]            .000000          12.141860
TENCIA REACTIVA IND. DE  LA LINEA;
 CONSUMO ATENDIDO [BRAZO SERIE DEL CIRC PI]
RAMETROS CONCENTRADOS, NLQ [MVAR]        4273.779000             .000000
RDIDAS RESISTIVAS [SERIE CIRC PI];
RAMETROS CONCENTRADOS, PERD [KW]        1668.504000
RDIDAS RESISTIVAS [SERIE CIRC PI];
RAMETROS CONCENTRADOS, PERD [KW]       -1211.752000

          CONSTANTES DEL CUADRIPOLO
      PI CON ADMITANCIAS DISTRIBUIDAS

 NN,  N2[NW]  VALU2[KV]  CPF SEC [MM2]DIST[KM]
 1       30.00  132.00      1   150.0  231.00

   U1[KV]           N1 [MW]      DFU [MW]    DU[KV],
```

2710 19.64 26.30 13.04 -.70 9.96 7.10 19.64

ELTAU, DEPO[MW] ANGU21, I1 [AMP] VALI1[AMP] CDR[AMP],

.04 7.41 -8.04 114.50 37.95 120.62 118.094 -13.457

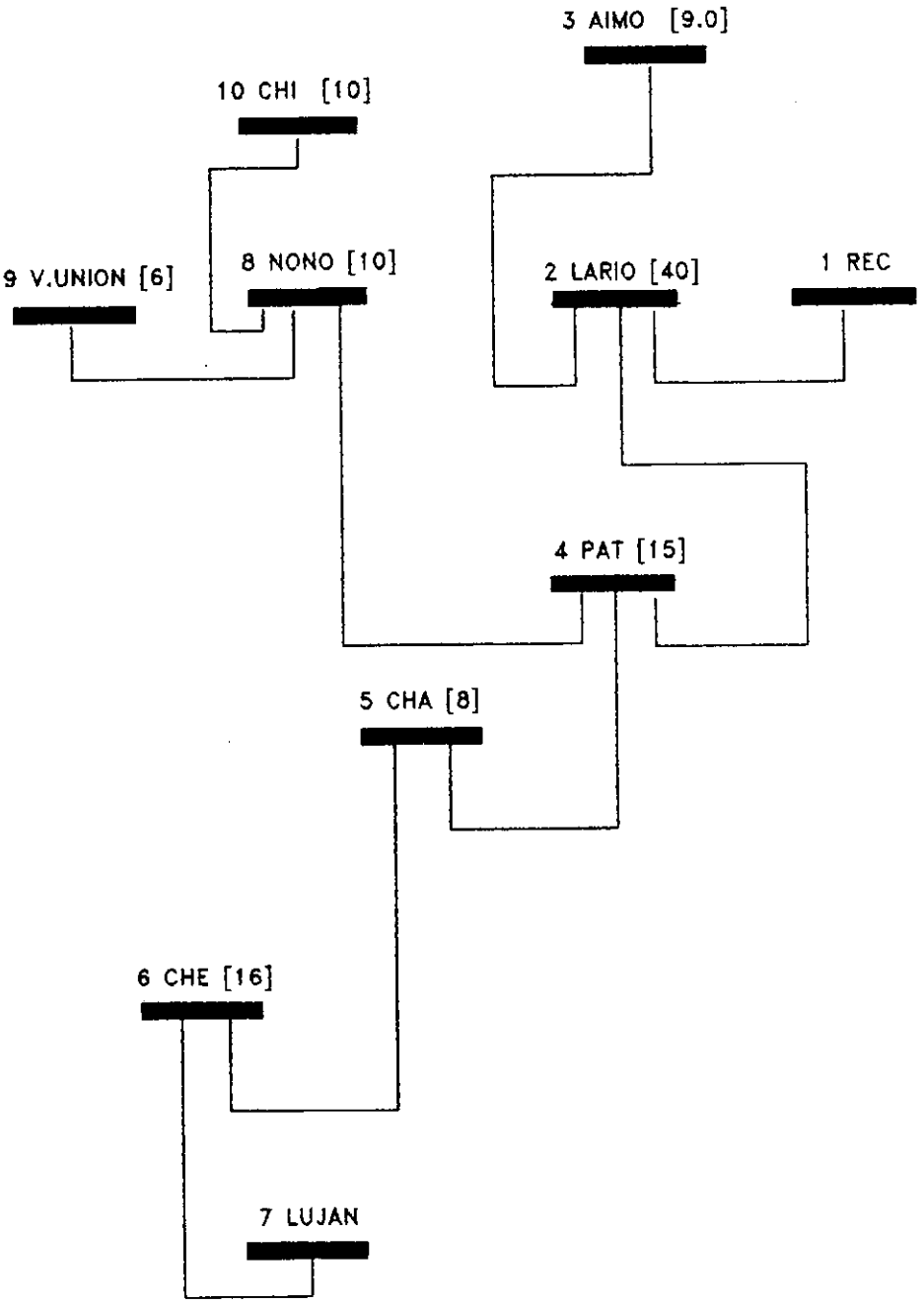
VALCDR[AMP]	VALU1[KV]	VALU2 [KV]	CDRIZD[AMP]
118.859	140.483	132.000	.000 24.902

A,	B,	C			
.9699248	.0144213	43.6893900	91.6874300	-.0000032	.0006469

Z2U		Y2U	WW	
.19300000	.40000000	.00000000	.00000283	1

CONCLUSION: DUDOSA A COMPENSAR
LTAU >10%<20% O DEPO >5%<10% , O ANGU21 >20<25]

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 330
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

caso 330

```
ATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 15:21; RED 132 kV LA RIOJA;
CASO#125; LINEA EN 150 MM2 (CON AUTOTRANSFORMADOR, NO CONSIDERADO)
ASE
IN NEW DATA CASE
NTED NUMBER WIDTH, 13, 2,   ( Request maximum precision for 8 output columns
 SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
ER FREQUENCY, 50.0,
ISCELANEA CARD SIGUE II B-1,II B-2
M5678901234567890123456789012345678901234567890123456789012345678901234567890
ELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
00200    .000     50.50,{ T-max = 0  means that no transient solution follows
OUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MENSAV   ICAT  NERERG   IPRSUP
1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
    1       1              1       0       1

ARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
ASE 100 MVA =1; UB=132 KV
IGUE FORMATO RULE BOOK 4A-2
456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
US1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
A6    A6    A6     A6  E6.2  E6.2  E6.2       II
 3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
AS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
N 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT / ENERG
ECRE LARIO              0.11  0.22                                          4
ARIO AIMOG               .16   .30                                          4
ARIO PATOU               .08   .16                                          4
ATOU CHAMI               .08   .16                                          4
ATOU NONOG               .14   .26                                          4
HAMI CHEPE             0.1218  .25                                          4
HEPE LUJAN               .134  .28                                          4
ONOG VUNIO               .11   .21                                          4
ONOG CHILE               .01   .02                                          4
ARIO NONOS               .08   .16                                          4


NK card ending branch cards.
NK card ending switch cards.
OURCE CARD SIGUE FORMATO RULE BOOK VII-4
456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
AME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART    TSTOP
2 A6 I2   E10.6    E10.6     E10.6  E10.6      E10.6     E10.6     E10.6
1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80

UJAN         1.10       50.      15.0                          -1.
ECRE         1.10       50.      15.0                          -1.


NK card terminating all EMTP source cards.
           Next come power constraints of the load flow.  There will be one
           for each non-slack generator.  So, 3 of them will apply to nodes
           that have no  Type-14  source as required by the algorithm.  The
```

program will define these internally. Yet, this is only possible for TMAX non-positive (no transient continuation). If data is modified to make TMAX > 0, a KILL = 40 error termination will will result. Yet, the transient simulation is possible as a 2nd simulation that replaces the power constraints at load nodes by constant-impedance loads. Branch cards for these will be punched by the present subcase, and the transient continuation will be illustrated by the following (4th of 4) subcase.

The following 4 cards would be used if peak rather than RMS input data. Note that average of Vmin & Vmax = 0.5 (1.0 + 1.828428) = 1.414212 (power constraints RED, BLUE, and YELLOW), and 1.4708 = 1.414 * 1.02

```
ALORES DE POTENCIA EN PU 1=100 MVA
ARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
KBUS1 BUS2  BUS3  PK or QK       QK or VK       VMIN    VMAX    THMIN THMAX
-2 3-8 9-14 15-20  21-36          37-52         53-60   61-68   69-74  75-80
ARIO                  -0.4000          -0.200      .65    1.25
HAMI                  -0.080            -.034      .65    1.25
ATOU                  -0.150            -.080      .65    1.25
ONOG                  -0.10             -.061      .65    1.25
UNIO                  -.0600            -.02       .65    1.25
UJAN                        1.0           1.20                -20.   40.
ECRE                  0.8               1.10                -20.   15.
HEPE                  -.16              -.09           1.5
IMOG                 -0.090           -0.01       .65    1.15
HILE                  -.1000            -.04           1.15
```

The following load-flow miscellaneous data card has two peculiarities. The use of VSCALE = 1.414 is the special flag requesting RMS rather than peak voltages. The use of KTAPER = 0 ensures constant acceleration factors (this works well for this problem whether RMS or peak values are used).

```
     NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITER  VSCALE  KTAPER
      10-16   17-24   25-32   33-40   41-48   50-56   57-64
          1    2500      20       1     .01     0.2     2.5   1.414       2
```

```
NCH       ( Flush punched cards: R-L branches for equivalent impedance loads
NK card ending requests for output variables
NK card ending plot cards
IN NEW DATA CASE
```

```
ernative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
te (dd-mth-yy) and time of day (hh.mm.ss) = 19-Apr-94  10.50.55    Name of disk plot file, if any, is  C:44191050.pl4
 information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.   Last major program update:  Oct, 1990
al length of "LABCOM" tables =  444863   INTEGER words.   "VARDIM"  List Sizes follow :    752    900  1500   150  7500
120  2100  5250   225   480   150   150 15000  .. 60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252    4
--------------------------------------------------+--------------------------------------------------------------------------------
criptive interpretation of input data cards.   |  Input data card images are shown below, all 80 columns, character by character
                                                0         1         2         3         4         5         6         7         8
                                                01234567890123456789012345678901234567890123456789012345678901234567890123456789O
--------------------------------------------------+--------------------------------------------------------------------------------
ment card.   KOMPAR = 1.                        |C data:C:\RIV\EMIN\PROBE4.DAT
ment card.   KOMPAR = 1.                        |C DATA:C:\RIV\EMIN\PROBE3.DAT(-06-04-94 15:21; RED 132 KV LA RIOJA:
ment card.   KOMPAR = 1.                        |C  CASO 125: LINEA EN 150 MM2 (CON AUTOTRANSFORMADOR, NO CONSIDERADO)
se all of  0   cards in the punch buffer.       |$ERASE
ter card preceding new EMTP data case.          |BEGIN NEW DATA CASE
th of time-step loop numbers.  W=13   S=2       |PRINTED NUMBER WIDTH, 13, 2,   { Request maximum precision for 8 output columns
laration of desired EMTP load flow usage.       |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
 power frequency  STATFR = 5.00000000E+01  Hz.  |POWER FREQUENCY, 50.0,
ment card.   KOMPAR = 1.                        |C MISCELANEA CARD SIGUE II B-1,II B-2
ment card.   KOMPAR = 1.                        |C 34567890123456789012345678901234567890123456789012345678901234567890123456789O
ment card.   KOMPAR = 1.                        |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
c. data.     2.000E-04   0.000E+00   5.000E+01  | .000200     .000      50.50.{ T-max = 0  means that no transient solution follows
ment card.   KOMPAR = 1.                        |C IOUT   IPLOT  IDOUBL    KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NENERG   IPRSUP
ment card.   KOMPAR = 1.                        |C  1-8    8-16  17-24      25-32    33-40   41-48    49-56    57-64  65-72
c. data.      1   1  0  1  0  1  0  0  0  0     |       1        1                 1       0       1
ment card.   KOMPAR = 1.                        |C
ment card.   KOMPAR = 1.                        |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
ment card.   KOMPAR = 1.                        |C BASE 100 MVA =1; UB=132 KV
ment card.   KOMPAR = 1.                        |C SIGUE FORMATO RULE BOOK 4A-2
ment card.   KOMPAR = 1.                        |C 34567890123456789012345678901234567890123456789012345678901234567890123456789O
ment card.   KOMPAR = 1.                        |C BUS1  BUS2  BUS3   BUS4 RESIS XL     XC     OUTPUT OPTION
ment card.   KOMPAR = 1.                        |C  A6    A6    A6     A6  E6.2  E6.2  E6.2          I1
ment card.   KOMPAR = 1.                        |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44        80
ment card.   KOMPAR = 1.                        |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
ment card.   KOMPAR = 1.                        |C EN 80 1=CORRIENTE RAMA:2=VOLT RAMA::3=I y V DE RAMA: 4=CONSUMO POT Y ENERG
es R-L-C.    1.100E-01  7.003E-04  0.000E+00    |  RECRE LARIO              0.11  0.22                                         4
es R-L-C.    1.600E-01  9.549E-04  0.000E+00    |  LARIO AIMOG               .16   .30                                         4
es R-L-C.    8.000E-02  5.093E-04  0.000E+00    |  LARIO PATQU               .08   .16                                         4
es R-L-C.    8.000E-02  5.093E-04  0.000E+00    |  PATQU CHAMI               .08   .16                                         4
es R-L-C.    1.400E-01  8.276E-04  0.000E+00    |  PATQU NONOG               .14   .26                                         4
es R-L-C.    1.218E-01  7.958E-04  0.000E+00    |  CHAMI CHEPE            0.1218   .25                                         4
es R-L-C.    1.340E-01  8.913E-04  0.000E+00    |  CHEPE LUJAN              .134   .28                                         4
es R-L-C.    1.100E-01  6.685E-04  0.000E+00    |  NONOG VUNIO               .11   .21                                         4
es R-L-C.    1.000E-02  6.366E-05  0.000E+00    |  NONOG CHILE               .01   .02                                         4
ment card.   KOMPAR = 1.                        |C LARIO NONOG               .08   .16                                         4
ment card.   KOMPAR = 1.                        |C
ment card.   KOMPAR = 1.                        |C
k card ending branches.  IBR, NTOT = 9  11      |BLANK card ending branch cards.
k card ending switches.   KSWITCH = 0.          |BLANK card ending switch cards.
ment card.   KOMPAR = 1.                        |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
ment card.   KOMPAR = 1.                        |C 34567890123456789012345678901234567890123456789012345678901234567890123456789O
ment card.   KOMPAR = 1.                        |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
```

```
ent card.   KOMPAR = 1.                         |C I2 A6 I2   E10.6    E10.6     E10.6  E10.6        E10.6     E10.6     E10.6
ent card.   KOMPAR = 1.                         |C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
ent card.   KOMPAR = 1.                         |C
ce.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00  |14LUJAN         1.10        50.       15.0                              -1.
ce.  1.10E+00  5.00E+01  1.50E+01 -1.00E+00  |14RECRE         1.10        50.       15.0                              -1.
ent card.   KOMPAR = 1.                         |C
ent card.   KOMPAR = 1.                         |C
k card ends electric network sources.           |BLANK card terminating all EMTP source cards.
ent card.   KOMPAR = 1.                         |C              Next come power constraints of the load flow.   There will be one
ent card.   KOMPAR = 1.                         |C              for each non-slack generator.   So, 3 of them will apply to nodes
ent card.   KOMPAR = 1.                         |C              that have no  Type-14  source as required by the algorithm.   The
ent card.   KOMPAR = 1.                         |C              program will define these internally.  Yet, this is only possible
ent card.   KOMPAR = 1.                         |C              for  TMAX  non-positive (no transient continuation).   If data is
ent card.   KOMPAR = 1.                         |C              modified to make  TMAX > 0,  a  KILL = 40  error termination will
ent card.   KOMPAR = 1.                         |C              will result.   Yet,  the  transient simulation is possible  as  a
ent card.   KOMPAR = 1.                         |C              2nd simulation that replaces the power constraints  at load nodes
ent card.   KOMPAR = 1.                         |C              by constant-impedance loads.   Branch cards  for  these  will  be
ent card.   KOMPAR = 1.                         |C              punched by the present subcase,  and  the  transient continuation
ent card.   KOMPAR = 1.                         |C              will be illustrated by the following (4th of 4) subcase.
ent card.   KOMPAR = 1.                         |C          The following 4 cards would be used if peak rather than RMS input data.
ent card.   KOMPAR = 1.                         |C          Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
ent card.   KOMPAR = 1.                         |C          (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
ent card.   KOMPAR = 1.                         |C
ent card.   KOMPAR = 1.                         |C VALORES DE POTENCIA EN PU 1=100 MVA
ent card.   KOMPAR = 1.                         |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
ent card.   KOMPAR = 1.                         |C 34567890123456789012345678901234567890123456789012345678901234567890
ent card.   KOMPAR = 1.                         |C NXBUS1 BUS2  BUS3  PK or QK          QK or VK        VMIN      VMAX    THMIN THMAX
ent card.   KOMPAR = 1.                         |C 1-2 3-8 9-14 15-20  21-36              37-52           53-60     61-68  69-74  75-80
  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00 |  LARIO                     -0.4000          -0.200      .65     1.25
  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                     -0.080           -.034       .65     1.25
  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00 |  PATQU                     -0.150           -.080       .65     1.25
  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                     -0.10            -.061       .65     1.25
  -6.000E-02 -2.000E-02  6.500E-01  1.250E+00 |  VUNIO                     -.0600           -.02        .65     1.25
ent card.   KOMPAR = 1.                         |C LUJAN                          1.0           1.20                         -20.   40.
.  8.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1RECRE                     0.8              1.10                         -20.   15.
.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                     -.16             -.09               1.5
.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00 |  AIMOG                     -0.090           -0.04       .65     1.15
.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00 |  CHILE                     -.1000           -.04                1.15
ent card.   KOMPAR = 1.                         |C    The following load-flow miscellaneous data card has two peculiarities.  The
ent card.   KOMPAR = 1.                         |C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
ent card.   KOMPAR = 1.                         |C    voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
ent card.   KOMPAR = 1.                         |C    (this  works  well  for  this problem whether RMS or peak values are used).
ent card.   KOMPAR = 1.                         |C          NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
ent card.   KOMPAR = 1.                         |C           10-16   17-24   25-32  33-40   41-48   50-56    57-64
 LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =       9      11      19       0       0       0
d flow iter.  1  2500   20    1   1.00E-02  |               1    2500     20       1      .01      0.2      2.5   1.414       2
 del-V:  .0232 .0227 .0223 .0218 .0213 .0209 .0204 .0189 .0152 .0155 .0158 .0151 .0136 .0135 .0133 .0132  .013 .0127 .0125 .0137
rce No.      1     -4     -4     -4     -4     -4     -4     -4     -9     -9     -9     -9     -5     -5     -5     -5     -5     -5      7      7
 del-V:  .0129 .0131 .0117 .0115 .0113 .0111 .0108 .0106 .0113 .0095 .0105 .0113 .0117 .0116 .0117 .0116 .0117 .0116 .0117 .0116
rce No.      7      7     -5     -5     -5      4     -5     -5     -9     -5     -4     -9     -4     -9     -4      4     -4      4     -4      4
 del-V:  .0117 .0116 .0117 .0116 .0117 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0116 .0115 .0116 .0115
rce No.     -4      4     -4      4     -4      4     -4      4     -4      4     -4      4     -4      4     -4      4     -4      4     -4      4
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del-V:	.0116	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0115	.0114	.0115	.0114	.0115	.0114
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0115	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0114	.0113	.0114	.0113	.0114	.0113	.0114	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0113	.0112	.0113	.0112
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0113	.0112	.0112	.0112
rce No.	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4
del-V:	.0112	.0112	.0112	.0112	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111
rce No.	-4	4	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0112	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111	.0111
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0111	.0111	.0111	.0111	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.0111	.011	.011	.011	.011	.011	.011	.011
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109	.011	.0109
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.011	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0109
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0109	.0109	.0109	.0109	.0109	.0109	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0109	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108	.0109	.0108
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0108	.0107	.0108	.0107	.0109	.0107	.0108	.0107
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0108	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0107	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0106
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0106	.0106	.0106	.0106	.0106	.0106	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9
del-V:	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0106	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105	.0105
rce No.	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9

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del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0105 .0104 .0105 .0104
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
dei-V:  .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104 .0105 .0104
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0105 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
ce No.     -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104 .0104
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0104 .0103 .0104 .0103 .0104 .0103 .0104 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9
del-V:  .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0103 .0102 .0103 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102
rce No.    -4    -9    -4    -9    -4    -9    -4    -9    -4    -9    -4     4    -4     4    -4     4     9     4     9     4
del-V:  .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0102 .0101 .0102
rce No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4
del-V:  .0101 .0102 .0101 .0102 .0101 .0102   .01 .0102   .01 .0102   .01 .0102 .0099 .0102 .0099 .0103 .0099 .0103 .0099 .0103
rce No.     9     4     9     4     9     4     9     4     9     4     9     4     9     4     9     4    -4     4    -4     4
del-V:  .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103 .0099 .0103
rce No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
del-V:  .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0103 .0098 .0102
rce No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
del-V:  .0097 .0101 .0095 .0099 .0093 .0096  .009 .0093 .0087 .0089 .0083 .0085 .0078  .008 .0074 .0075 .0069  .007 .0064 .0065
rce No.    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4    -4     4
del-V:  .0058  .006 .0053 .0055 .0048  .005 .0043 .0045 .0039  .004 .0035 .0036 .0031 .0032 .0027 .0028 .0024 .0024 .0021 .0021
rce No.    -4     4    -4     4    -4     4    -4     4     9     4     9     4     9     4     9     4     9     4     9     4
del-V:  .0018 .0018 .0015 .0015 .0013 .0013 .0011 .0011 .9E-3 .9E-3 .8E-3 .8E-3 .7E-3
rce No.     9     4     9     4     9     4     9     4     9     4     9     4     9
t the load flow iteration loop with counter  NEKITE = 1013.   If no warning on the preceding line,  convergence was attained.
```

w	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
3	3	LARIO	8.94035941E-01	2.66405	-4.01991738E-01	-2.00845588E-01
4	6	CHANI	8.72401752E-01	4.16587	-8.03964213E-02	-3.51836953E-02
5	5	FATOU	8.37248967E-01	1.49566	-1.51426441E-01	-8.22549298E-02
6	7	NONDG	7.37211215E-01	-3.12345	-9.20615844E-02	-5.24217800E-02
7	10	VUNIO	7.21038652E-01	-4.21627	-6.13102487E-02	-2.44235159E-02
2	2	RECRE	1.10000000E+00	8.68003	7.96576835E-01	6.56314773E-01

8	8	CHEPE	9.52496096E-01	8.94420	-1.59991038E-01	-9.06375138E-02
9	4	AIMOG	8.62404631E-01	1.10328	-7.18567171E-02	-4.09956888E-02
0	11	CHILE	7.35020491E-01	-3.28589	-1.08309446E-01	-5.43081631E-02

usoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.000000000E+01 Hertz.

Bus K	Bus M	Phasor node voltage Rectangular	Phasor node voltage Polar	Phasor branch current Rectangular	Phasor branch current Polar	Power flow P and Q	Power loss P and Q
CRE		1.5378254999571	1.5556349126104	1.1397068834456	1.3269512280458	.7765768349380[1]	.0968437588868
		.23471840933694	8.6780842	-.6796095501514	-30.8976734	.6563147726225	0.1936880
	LARIO	1.2629438617448	1.2643091260419	-1.139706883446	1.3269512280458	-.6997328590993	
		.05873983549556	2.6629220	.67960855015144	149.1923266	-.4626268205249	
RIO		1.2629438617448	1.2643091260419	.15190336548417	.16495953570083	.0940336487[illegible]853	.0021769718734[illegible]
		.05873983549556	2.6629220	-.0643196390943	-22.9490000	.0450774360417[illegible]	0.0040817
	AIMOG	1.219343431539	1.2195690936314	-.15190336548842	.16495953570083	-.0916567171[illegible]	
		.02345996810539	1.1022254	.06431963909428	157.0510000	-.0409956888779	
RIO		1.2629438617448	1.2643091260419	.33782143720916	.47048229811195	.2037072722116[illegible]	.0088541437134[illegible]
		.05873983549556	2.6629220	-.3274603325575	-44.1077471	.2167037963084[illegible]	0.0177083
	PATOU	1.1835244935588	1.1839274151816	-.33782143720992	.47048229811195	-.1948531284982	
		.03088523214669	1.4948503	.32746033255746	135.8922529	-.1989955088815	
TOU		1.1835244935588	1.1839274151816	-.41093363990975	.42019509425698	-.2418201534142	.0070625568951
		.03088523214669	1.4948503	.08773517441724	167.3481792	-.0582642543674	0.0141251
	CHAMI	1.2304368126582	1.2336759680804	.41093363990748	.42019509425698	.2488827101037[illegible]	
		.08961580057851	4.1656401	-.0877351744172	-12.0518209	.0723693677464[illegible]	
TOU		1.1835244935588	1.1839274151816	.48941367216477	.56532643599208	.2852468404362[illegible]	.0223715785332[illegible]
		.03088523214669	1.4948503	-.2329633131952	-30.0351260	.1750048334151[illegible]	0.0415472
	NONOG	1.041436118024	1.0429810458476	-.48941367216448	.56532643599208	-.2628752618479	
		-.0567474587683	-3.1189409	.28296331319915	149.9648740	-.1334576161298	
AMI		1.2304368126582	1.2336759680804	-.54506681509947	.56157338943481	-.3292791314003	.0192057085078[illegible]
		.08961580057851	4.1656401	.13515486770064	166.0738070	-.1075730630466	0.0384206
	CHEPE	1.3306146681619	1.3469938838181	.54506681509473	.56157338943481	.3434848399081[illegible]	
		.20942064122265	8.9442068	-.1351548677006	-13.9261930	.1469936470117[illegible]	
EPE		1.3306146681619	1.3469938838181	-.8006540724[illegible]	.83335662252474	-.5084758782673	.0465305784404[illegible]
		.20942064122265	8.9442068	.23116296531907	163.8956375	-.2376311608223	0.0772277
	LUJAN	1.5026279441629	1.5556349126104	.80065407247496	.83335662252474	.5550062567078[illegible]	
		.40262794416288	15.0000000	-.2311629653191	-16.1043625	.3348588172651[illegible]	
NOG		1.041436118024	1.0429810458496	.11642656572465	.12946744438888	.0622321487308[illegible]	.9215000536[illegible]-3

	-.0567474587683	-3.1189409	-.0566275017121	-25.9373413	.02618350690922	0.0017600
VUNIO	1.0167374204348	1.0194975159326	-.1164265657247	.12946744438888	-.0613102486772	
	-.0749680123821	-4.2170100	.05662750171208	154.0626587	-.0244235158978	
NOG	1.041436118024	1.0429810458496	.20218245813133	.23327368512418	.10859152875101	.272083060868E-3
	-.0567474587683	-3.1189409	-.1163566319356	-29.9205604	.05485232918143	0.0005442
CHILE	1.037087160804	1.0387998954674	-.2021824581313	.23327368512418	-.1083094456902	
	-.0596275416115	-3.2906100	.11635663193558	150.0794396	-.0543081630597	

Total network loss P-loss by summing injections = 2.042392567662E-01

ution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed uit applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the ociated power factor.

Node name	Source node voltage Rectangular	Polar	Injected source current Rectangular	Polar	Injected source power P and Q	MVA and P.F.
RECRE	1.53782549999571	1.5556349186104	1.1397068834456	1.3269512280458	.79657683498801	1.03212589328205
	.23471840933694	8.6780842	-.8796085501514	-30.8076734	.65631477260224	0.7717827
LARIO	1.2629438617448	1.2643091260419	-.6499820807523	.71086003960011	-.4019919378891	.44933341770246
	.05873983549556	2.6629220	.28782857849971	156.1150204	-.2008455884747	-0.8945610
AIMOG	1.219343431539	1.2195690936314	-.1519033654842	.16495955570083	-.091856717125	.10058977572026
	.02345996810539	1.1022254	.06431963909428	157.0510000	-.040995688779	-0.9131814
PATGU	1.1835244933588	1.1839274151816	-.2593414049519	.2911070548666	-.1514264414762	.17232481150466
	.03088523214669	1.4948503	.13223219377554	152.9840156	-.0822549298338	-0.8787269
CHAMI	1.2304368126582	1.2336759680804	-.1341331751872	.14226853547634	-.080396421296	.09775805930093
	.03961580057851	4.1656401	.04741969528334	160.5301249	-.0351836953001	-0.9161144
NONOG	1.041436118024	1.0429810458496	-.1708044683089	.20314932394352	-.0920615844161	.10594044717513
	-.0567474587683	-3.1189409	.1099791795515	147.2229734	-.0524217800391	-0.8689937
CHEPE	1.3306146681619	1.346993838181	-.2555872573802	.273024542046	-.1599910383592	.18388118790403
	.20942064122265	8.9442068	.09600809561843	159.4119510	-.0906375138105	-0.8700785
LUJAN	1.5026279441629	1.5556349186104	.80065407247496	.83335662252474	.55500625670784	.64819933082735
	.40262794416288	15.0000000	-.2311629653191	-16.1043625	.33485881726511	0.8562278
VUNIO	1.0167374204348	1.0194975159326	-.1164265657247	.12946744438888	-.0613102486772	.06599586897431
	-.0749680123821	-4.2170100	.05662750171208	154.0626587	-.0244235158978	-0.9290013
CHILE	1.037087160804	1.0387998954674	-.2021824581313	.23327368512418	-.1083094456902	.12116233986115
	-.0596275416115	-3.2906100	.11635663193558	150.0794396	-.0543081630597	-0.8939201

```
ament card.   KOMPAR = 1.                    !C
ment card.    KOMPAR = 1.                    !C
ment card.    KOMPAR = 1.                    !C
quest for flushing of punch buffer.          !$PUNCH      { Flush punched cards: R-L branches for equivalent impedance loads
```

sting of 80-column card images now being flushed from punch buffer follows.

```
================================================================================
5678901234567890123456789012345678901234567890123456789012345678901234567890
================================================================================
======( End of LUNIT7 punched cards as flushed by $PUNCH request )=======
k card ending node names for voltage output. /BLANK card ending requests for output variables
```

ective branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be ented to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

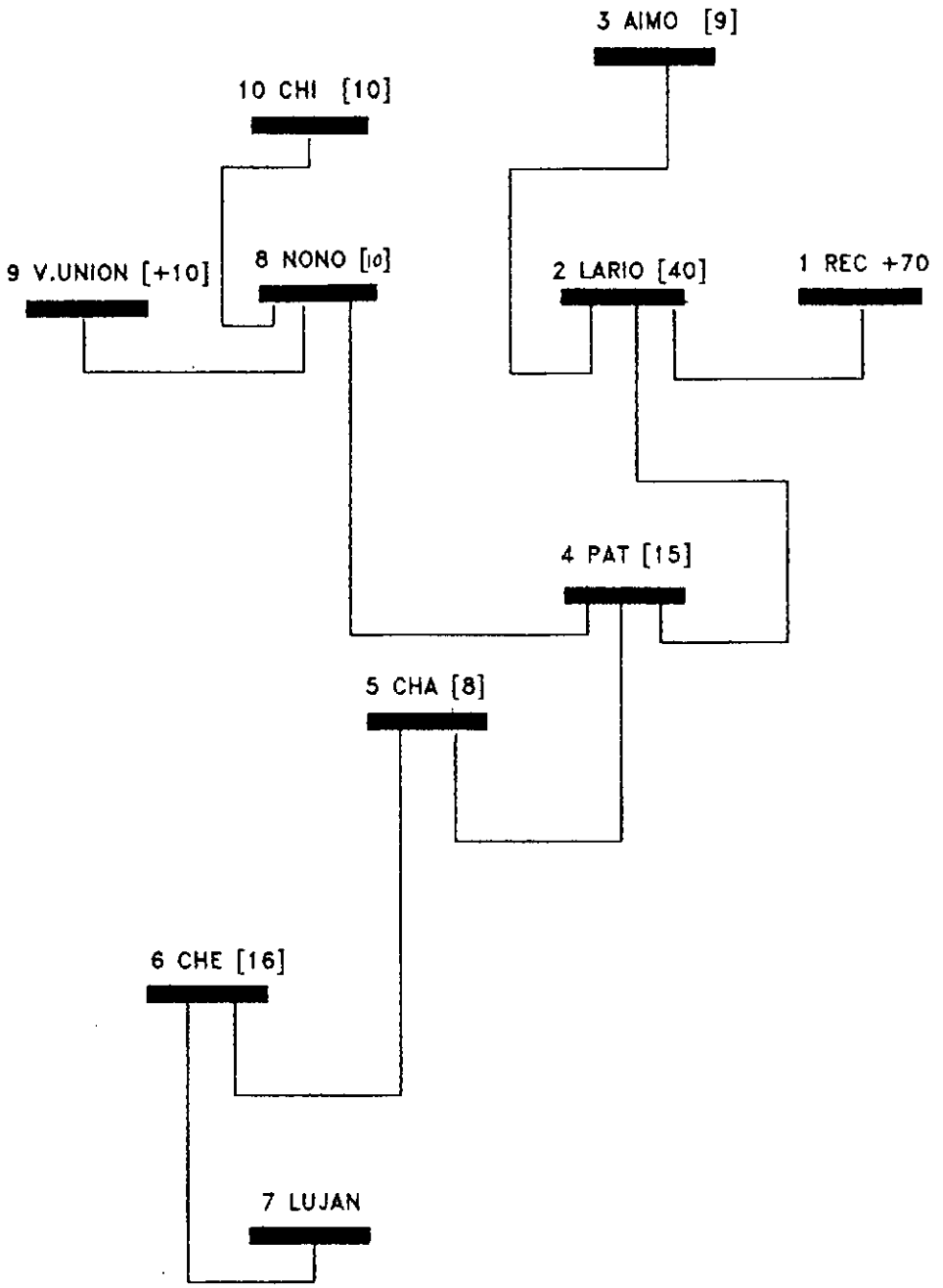
m	To	(======== Branch voltage Vkm = Vk - Vm ========)				(====== Branch current Ikm from K to M ======)			
s K	bus M	Magnitude	Degrees	Real part	Imag part	Magnitude	Degrees	Real part	Imag part
RE	LARIO	3.2638685E-01	32.627275	2.7488164E-01	1.7597857E-01	1.3269512E+00	-30.807673	1.1397069E+00	-6.7960855E-01
IO	AIMOG	5.6086242E-02	38.978513	4.3600430E-02	3.5279867E-02	1.6495954E-01	-22.949000	1.5190337E-01	-6.4319639E-02
IO	PATOU	8.4162432E-02	19.327202	7.9419368E-02	2.7854603E-02	4.7048230E-01	-44.107747	3.3782144E-01	-3.2746033E-01
OU	CHAMI	7.5166784E-02	-128.616872	-4.6712319E-02	-5.8730568E-02	4.2019509E-01	167.948179	-4.1093364E-01	8.7735174E-02
OU	NONOG	1.6693890E-01	31.654118	1.4208838E-01	8.7632691E-02	5.6532644E-01	-30.035126	4.9941367E-01	-2.8296331E-01
MI	CHEPE	1.5616915E-01	-129.901537	-1.0017786E-01	-1.1930484E-01	5.6157339E-01	166.073807	-5.4506682E-01	1.3515487E-01
PE	LUJAN	2.5868442E-01	-131.678807	-1.7201328E-01	-1.9320730E-01	8.3335662E-01	163.895637	-8.0065407E-01	2.3116297E-01
OG	VUNIO	3.0692250E-02	36.416683	2.4698698E-02	1.8220554E-02	1.2946744E-01	-25.937341	1.1642457E-01	-5.6627502E-02
OG	CHILE	5.2161582E-03	33.514388	4.3489572E-03	2.8500928E-03	2.3327369E-01	-27.920560	2.0218246E-01	-1.1635663E-01

ual List Sizes for the preceding solution follow. 19-Apr-94 10.51.47

```
Size  1-10:    11     9     9     2 -9999     0 -9999 -9999     0     0
Size 11-20: -9999 -9999 -9999 -9999 -9999     0     0     9    23     0
Size 21-29:     0 -9999     9 -9999 -9999 -9999 -9999 -9999 -9999
```

onds for overlays 1-5 :	40.328	0.000	40.328 --- (CP: I/O; tot)
onds for overlays 6-11 :	11.539	0.000	11.539
onds for overlays 12-15 :	0.000	0.000	0.000
onds for time-step loop :	0.000	0.000	0.000
onds after DELTAT-loop :	0.441	0.000	0.441
Totals :	52.309	0.000	52.309

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
CASO 340
CARGA MW [ ] AÑO 1993



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

340-2

CASO 340

```
C DATA:C:\RIV\ENIN\PROBE5.DAT(-20-04-94 12:00; RED 132 kV LA RIOJA;
C  CASO 130; LINEA EN 150 MM2 (ALIMENTACION VILLA UNION)
$ERASE
BEGIN NEW DATA CASE
PRINTED NUMBER WIDTH, 13, 2,   ( Request maximum precision for 8 output columns
FIX SOURCE   ( An EMTP load flow will satisfy requested phasor power injections.
POWER FREQUENCY, 50.0,
C MISCELANEA CARD SIGUE II B-1,II B-2
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
 .000200    .000     50.50.( T-max = 0  means that no transient solution follows
C IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MEMSAV   ICAT  NERERG   IPRSUP
C  1-8    8-16  17-24     25-32   33-40   41-48    49-56    57-64  65-72
       1       1               1       0       1
C
C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
C BASE 100 MVA =1; UB=132 KV
C SIGUE FORMATO RULE BOOK 4A-2
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
C  A6    A6    A6     A6  E6.2  E6.2  E6.2       II
C   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
C EN 80 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
  RECRE LARIO              0.11  0.22                                          4
  LARIO AIMOG               .16   .30                                          4
  LARIO PATQU               .08   .16                                          4
  PATQU CHAMI               .08   .16                                          4
  PATQU NONOG               .14   .26                                          4
  CHAMI CHEPE             0.1218  .25                                          4
  CHEPE LUJAN               .134  .28                                          4
  NONOG VUNIO               .11   .21                                          4
  NONOG CHILE               .01   .02                                          4
C LARIO NONOG               .08   .16                                          4
C
C
BLANK card ending branch cards.
BLANK card ending switch cards.
C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
C I2 A6 I2   E10.6    E10.6     E10.6  E10.6       E10.6     E10.6     E10.6
C  1-2 9-10 10-20   21-30      31-40    41-50     51-60     61-70     71-80
C
14LUJAN         1.10       50.      15.0                          -1.
14RECRE         1.10       50.      15.0                          -1.
14VUNIO         1.1        50.      15.0                          -1.
C
C
BLANK card terminating all EMTP source cards.
C             Next come power constraints of the load flow.   There will be one
C             for each non-slack generator.   So, 3 of them will apply to nodes
```

```
C               that have no  Type-14  source as required by the algorithm.   The
C               program will define these internally.  Yet, this is only possible
C               for  TMAX  non-positive (no transient continuation).   If data is
C               modified to make  TMAX > 0,  a  KILL = 40  error termination will
C               will result.   Yet,  the  transient simulation is possible  as  a
C               2nd simulation that replaces the power constraints  at load nodes
C               by constant-impedance loads.  Branch cards  for  these  will  be
C               punched by the present subcase,  and  the  transient continuation
C               will be illustrated by the following (4th of 4) subcase.
C         The following 4 cards would be used if peak rather than RMS input data.
C         Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
C         (power constraints  RED, BLUE, and YELLOW),  and  1.4708 = 1.414 * 1.02
C
C VALORES DE POTENCIA EN PU 1=100 MVA
C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4;10-6
C 345678901234567890123456789012345678901234567890123456789012345678901234567890
C NKBUS1 BUS2  BUS3  PK or QK        QK or VK        VMIN     VMAX    THMIN THMAX
C 1-2 3-8 9-14 15-20  21-36           37-52           53-60    61-68  69-74  75-80
  LARIO                   -0.4000             -0.200      .65     1.25
  CHAMI                   -0.080               -.034      .65     1.25
  PATQU                   -0.150               -.080      .65     1.25
  NONOG                   -0.10                -.061      .65     1.25
C VUNIO                   -.0600               -.02       .65     1.25
 1VUNIO                   0.1                  1.1                        -20.    15.
C LUJAN                          1.0            1.20                       -20.    40.
 1RECRE                   0.7                   1.10                       -20.    15.
  CHEPE                   -.16                 -.07               1.5
  AIMOG                  -0.090               -0.04       .65     1.15
  CHILE                   -.1000               -.04               1.15
C    The following load-flow miscellaneous data card has two peculiarities.  The
C    use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
C    voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
C    (this  works  well  for  this problem whether RMS or peak values are used).
C          NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
C           10-16   17-24   25-32   33-40   41-48   50-56   57-64
                1    2500      20       1     .01     0.2     2.5   1.414       2
C
C
C
$PUNCH        { Flush punched cards: R-L branches for equivalent impedance loads
BLANK card ending requests for output variables
BLANK card ending plot cards
BEGIN NEW DATA CASE
```

```
ernative Transients Program (ATP), Salford 386 translation.  Copyright 1987.  Use licensed only by LEC (K.U. Leuven, Belgium).
te (dd-mth-yy) and time of day (hh.mm.ss) = 20-Apr-94  12.03.58    Name of disk plot file, if any, is  C:\AP201203.pl4
 information, consult the copyrighted ATP EMTP Rule Book published by LEC in July, 1987.  Last major program update:  Oct, 1990
al length of "LABCOM" tables =  444863   INTEGER words.  "VARDIM" List Sizes follow :    752   900  1500   150  7500
120  2100  5250   225   480   150   150 15000    60 64800   120    12    15  4800  1980   300   450 12000     9  1200   252    4
-------------------------------------------------+-------------------------------------------------------------------------------
criptive interpretation of input data cards.     |  Input data card images are shown below, all 80 columns, character by character
                                                 0        1        2        3        4        5        6        7        8
                                                 01234567890123456789012345678901234567890123456789012345678901234567890123456789
-------------------------------------------------+-------------------------------------------------------------------------------
ment card.   KOMPAR = 1.                         |C data:C:\RIV\EMIN\PROBE5.DAT
ment card.   KOMPAR = 1.                         |C DATA:C:\RIV\EMIN\PROBE5.DAT(-20-04-94 12:00; RED 132 KV LA RIOJA;
ment card.   KOMPAR = 1.                         |C  CASO 130; LINEA EN 150 MM2 (ALIMENTACION VILLA UNION)
se all of  0   cards in the punch buffer.        |$ERASE
ker card preceding new EMTP data case.           |BEGIN NEW DATA CASE
th of time-step loop numbers.  M=13   S=2        |PRINTED NUMBER WIDTH, 13, 2,   { Request maximum precision for 8 output columns
laration of desired EMTP load flow usage.        |FIX SOURCE   { An EMTP load flow will satisfy requested phasor power injections.
 power frequency  STATFR = 5.00000000E+01  Hz.   |POWER FREQUENCY, 50.0,
ment card.   KOMPAR = 1.                         |C MISCELANEA CARD SIGUE II B-1,II B-2                                        3.
ment card.   KOMPAR = 1.                         |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.   KOMPAR = 1.                         |C DELTAT   TMAX    XOPT COPT   EPSILN  TOLMAT
c. data.     2.000E-04   0.000E+00   5.000E+01  | .000200    .000     50.50.{ T-max = 0  means that no transient solution follows
ment card.   KOMPAR = 1.                         |C IOUT   IPLOT  IDOUBL   KSSOUT   MAXOUT  IPUN   MSMSAV   ICAT  NENERG   IPRSUP
ment card.   KOMPAR = 1.                         |C  1-8    8-16  17-24     25-32    33-40   41-48    49-56   57-64  65-72
c. data.      1    1  0  1  0  1  0  0  0  0    |       1       1               1       0       1
ment card.   KOMPAR = 1.                         |C
ment card.   KOMPAR = 1.                         |C CARGA DE VALORES PASIVOS DE LOS DISTINTOS TRAMOS (R-L) VALORES EN P.U.
ment card.   KOMPAR = 1.                         |C BASE 100 MVA =1; UB=132 KV
ment card.   KOMPAR = 1.                         |C SIGUE FORMATO RULE BOOK 4A-2
ment card.   KOMPAR = 1.                         |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.   KOMPAR = 1.                         |C BUS1  BUS2  BUS3   BUS4 RESIS XL    XC    OUTPUT OPTION
ment card.   KOMPAR = 1.                         |C  A6    A6    A6     A6  E6.2  E6.2  E6.2       11
ment card.   KOMPAR = 1.                         |C   3-8   9-14 15-20 21-26 27-32 33-38 39-44     80
ment card.   KOMPAR = 1.                         |C LAS OPCIONES DE SALIDA SON: (IV-A.2 RULE BOOK ACTUALIZ)
ment card.   KOMPAR = 1.                         |C EN 60 1=CORRIENTE RAMA;2=VOLT RAMA;;3=I y V DE RAMA; 4=CONSUMO POT Y ENERG
ies R-L-C.   1.100E-01  7.003E-04  0.000E+00    |  RECRE LARIO              0.11  0.22                                          4
ies R-L-C.   1.600E-01  9.549E-04  0.000E+00    |  LARIO AIMOG               .16   .30                                          4
ies R-L-C.   8.000E-02  5.093E-04  0.000E+00    |  LARIO PATOU               .06   .16                                          4
ies R-L-C.   8.000E-02  5.093E-04  0.000E+00    |  PATOU CHAMI               .08   .16                                          4
ies R-L-C.   1.400E-01  8.276E-04  0.000E+00    |  PATOU NONOG               .14   .26                                          4
ies R-L-C.   1.218E-01  7.958E-04  0.000E+00    |  CHAMI CHEPE             0.1218  .25                                          4
ies R-L-C.   1.340E-01  8.913E-04  0.000E+00    |  CHEPE LUJAN               .134  .23                                          4
ies R-L-C.   1.100E-01  6.685E-04  0.000E+00    |  NONOG YUNIO               .11   .21                                          4
ies R-L-C.   1.000E-02  6.366E-05  0.000E+00    |  NONOG CHILE               .01   .02                                          4
ment card.   KOMPAR = 1.                         |C LARIO NONOG               .08   .16                                          4
ment card.   KOMPAR = 1.                         |C
ment card.   KOMPAR = 1.                         |C
nk card ending branches.  IBR, NTOT = 9  11      |BLANK card ending branch cards.
nk card ending switches.   KSWTCH = 0.           |BLANK card ending switch cards.
ment card.   KOMPAR = 1.                         |C SOURCE CARD SIGUE FORMATO RULE BOOK VII-4
ment card.   KOMPAR = 1.                         |C 345678901234567890123456789012345678901234567890123456789012345678901234567890
ment card.   KOMPAR = 1.                         |C NAME  IV AMPLITUDE FREQUENCY PHASE    A1        TIME-1    TSTART     TSTOP
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ent card.   KOMPAR = 1.                         |C I2 A6 I2   E10.6    E10.6    E10.6  E10.6        E10.6     E10.6     E10.6
ent card.   KOMPAR = 1.                         |C  1-2 9-10 10-20   21-30       31-40    41-50     51-60     61-70     71-80
ent card.   KOMPAR = 1.                         |C
ce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00  |14LUJAN          1.10         50.        15.0                                  -1.
ce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00  |14RECRE          1.10         50.        15.0                                  -1.
ce.   1.10E+00  5.00E+01  1.50E+01 -1.00E+00  |14VUNIO          1.1          50.        15.0                                  -1.
nent card.   KOMPAR = 1.                      |C
nent card.   KOMPAR = 1.                      |C
k card ends electric network sources.         |BLANK card terminating all EMTP source cards.
nent card.   KOMPAR = 1.                      |C              Next come power constraints of the load flow.   There will be one
nent card.   KOMPAR = 1.                      |C              for each non-slack generator.   So, 3 of them will apply to nodes
nent card.   KOMPAR = 1.                      |C              that have no  Type-14  source as required by the algorithm.   The
nent card.   KOMPAR = 1.                      |C              program will define these internally.  Yet, this is only possible
nent card.   KOMPAR = 1.                      |C              for  TMAX  non-positive (no transient continuation).   If data is
nent card.   KOMPAR = 1.                      |C              modified to make  TMAX > 0,  a  KILL = 40  error termination will
nent card.   KOMPAR = 1.                      |C              will result.   Yet,  the  transient simulation is possible  as  a
nent card.   KOMPAR = 1.                      |C              2nd simulation that replaces the power constraints  at load nodes
nent card.   KOMPAR = 1.                      |C              by constant-impedance loads.   Branch cards  for  these  will  be
nent card.   KOMPAR = 1.                      |C              punched by the present subcase,  and  the  transient continuation
nent card.   KOMPAR = 1.                      |C              will be illustrated by the following (4th of 4) subcase.
nent card.   KOMPAR = 1.                      |C         The following 4 cards would be used if peak rather than RMS input data.
nent card.   KOMPAR = 1.                      |C         Note that average of  Vmin  &  Vmax = 0.5 ( 1.0 + 1.828428 ) = 1.414212
nent card.   KOMPAR = 1.                      |C         (power constraints  RED, BLUE, and YELLOW).  and  1.4708 = 1.414 * 1.02
nent card.   KOMPAR = 1.                      |C
nent card.   KOMPAR = 1.                      |C VALORES DE POTENCIA EN PU 1=100 MVA
nent card.   KOMPAR = 1.                      |C PARA RESTRICCIONE DE POTENCIASIGUE RULE BOOK 10-4:10-6
nent card.   KOMPAR = 1.                      |C 34567890123456789012345678901234567890123456789012345678901234567890123456789 0
nent card.   KOMPAR = 1.                      |C NKBUS1 BUS2  BUS3  PK or QK          QK or VK         VMIN      VMAX    THMIN THMAX
nent card.   KOMPAR = 1.                      |C 1-2 3-8 9-14 15-20  21-36              37-52            53-60     61-68  69-74  75-80
.  -4.000E-01 -2.000E-01  6.500E-01  1.250E+00 |  LARIO                  -0.4000           -0.200       .65    1.25
.  -8.000E-02 -3.400E-02  6.500E-01  1.250E+00 |  CHAMI                  -0.080            -.034        .65    1.25
.  -1.500E-01 -8.000E-02  6.500E-01  1.250E+00 |  PATOU                  -0.150            -.080        .65    1.25
.  -1.000E-01 -6.100E-02  6.500E-01  1.250E+00 |  NONOG                  -0.10             -.061        .65    1.25
nent card.   KOMPAR = 1.                      |C VUNIO                  -.0600            -.02         .65    1.25
.   1.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1VUNIO                 0.1                1.1                         -20.   15.
nent card.   KOMPAR = 1.                      |C LUJAN                         1.0         1.20                         -20.   40.
.   7.000E-01  1.100E+00  0.000E+00  1.000E+19 | 1RECRE                 0.7                1.10                        -20.   15.
.  -1.600E-01 -9.000E-02  0.000E+00  1.500E+00 |  CHEPE                  -.16              -.09                 1.5
.  -9.000E-02 -4.000E-02  6.500E-01  1.150E+00 |  AIMOG                  -0.090            -0.04        .65    1.15
.  -1.000E-01 -4.000E-02  0.000E+00  1.150E+00 |  CHILE                  -.1000            -.04                 1.15
nent card.   KOMPAR = 1.                      |C   The following load-flow miscellaneous data card has two peculiarities.  The
nent card.   KOMPAR = 1.                      |C   use of  VSCALE = 1.414  is the special flag requesting RMS rather than peak
nent card.   KOMPAR = 1.                      |C   voltages.   The use of   KTAPER = 0   ensures constant acceleration factors
nent card.   KOMPAR = 1.                      |C   (this  works  well  for  this problem whether RMS or peak values are used).
nent card.   KOMPAR = 1.                      |C        NNNOUT  NITERA  NFLOUT  NPRINT  RALCHK  CFITEV  CFITEA  VSCALE  KTAPER
nent card.   KOMPAR = 1.                      |C          10-16   17-24   25-32   33-40   41-48   50-56    57-64
 LASTOV, NTOT, NEXT, IOFKOL, IOFKOR, NCURR =      9      11      19       0       0       0
d flow iter.  1   2500    20     1    1.00E-02  |              1   2500      20       1      .01     0.2     2.5   1.414      2
 del-V:  .0263 .0264 .0265 .0266 .0267 .0268 .0269 .0269  .027  .027 .0271 .0271 .0271 .0271 .0271 .0271 .0271 .0271 .0256  .023
rce No.     -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5    -5
 del-V:  .0208 .0189 .0171 .0156 .0132 .0111 .0109  .011 .0111 .0108 .0113 .0114 .0112 .0116 .0116 .0115 .0119 .0119 .0118 .0122
rce No.     -5    -5    -5    -5    -5    -5     4     4     4     9     4     4     9     4     4     9     4     4     9     4
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del-V:	.012	.0124	.0123	.0123	.0128	.0128	.013	.013	.0133	.0133	.0131	.0134	.0136	.0137	.0137	.0139	.0143	.0199	.0258	.0144
rce No.	9	4	9	9	4	9	4	9	4	9	9	4	4	4	9	9	4	-4	-9	-9
del-V:	.018	.014	.0149	.0238	.0258	.0145	.0211	.0136	.0145	.022	.0258	.0146	.0221	.0135	.0144	.0201	.0258	.0144	.0187	.0138
rce No.	-4	-4	-9	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4
del-V:	.0148	.0239	.0257	.0146	.0223	.0136	.0144	.0203	.0257	.0144	.0182	.0139	.0148	.0239	.0257	.0145	.0206	.0137	.0146	.0233
rce No.	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4
del-V:	.0256	.0146	.0218	.0137	.0145	.0215	.0256	.0144	.0189	.0139	.0147	.0239	.0256	.0145	.0212	.0137	.0145	.0224	.0256	.0145
rce No.	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9
del-V:	.0195	.0139	.0146	.0239	.0255	.0145	.0212	.0138	.0145	.0223	.0255	.0144	.0188	.0139	.0146	.024	.0255	.0145	.0204	.0139
rce No.	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4
del-V:	.0145	.0233	.0255	.0145	.0194	.0139	.0146	.024	.0255	.0145	.02	.0139	.0145	.0237	.0254	.0144	.0193	.0139	.0146	.024
rce No.	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4
del-V:	.0254	.0144	.0193	.014	.0145	.024	.0254	.0144	.019	.014	.0145	.024	.0254	.0144	.0187	.014	.0145	.0241	.0253	.0144
rce No.	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9
del-V:	.0184	.014	.0145	.0241	.0253	.0144	.0181	.014	.0145	.0241	.0253	.0144	.0178	.0141	.0145	.0241	.0253	.0144	.0175	.0141
rce No.	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4
del-V:	.0145	.0241	.0253	.0143	.0172	.0141	.0145	.0241	.0253	.0143	.0169	.0141	.0145	.0241	.0252	.0143	.0166	.0141	.0145	.0241
rce No.	4	-4	-9	-9	-4	-4	4	-4	-9	-9	-4	-4	-9	-4	-9	-9	-4	-4	-9	-4
del-V:	.0252	.0143	.0163	.0141	.0145	.0242	.0252	.0143	.016	.0141	.0145	.0242	.0252	.0143	.0158	.0142	.0145	.0242	.0252	.0143
rce No.	-9	-9	-4	-4	-9	-4	-9	-9	-4	-4	-9	-4	-9	-9	-4	-4	4	-4	-9	-9
del-V:	.0155	.0142	.0145	.0242	.0251	.0143	.015	.0142	.0145	.0242	.0252	.0141	.0139	.0144	.0185	.0142	.0138	.0144	.0173	.0142
rce No.	-4	-4	-9	-4	-9	-9	-4	-4	4	-4	-9	-9	4	-4	4	-9	4	-4	4	-9
del-V:	.0138	.0143	.0165	.0142	.0138	.0143	.0163	.0142	.014	.0143	.0159	.0143	.0143	.0143	.0156	.0143	.0144	.0143	.0155	.0143
rce No.	4	-4	4	-9	4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9
del-V:	.0145	.0143	.0154	.0143	.0145	.0143	.0153	.0143	.0145	.0143	.0153	.0143	.0145	.0143	.0152	.0143	.0144	.0143	.0152	.0143
rce No.	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9
del-V:	.0145	.0143	.0152	.0143	.0145	.0143	.0151	.0143	.0145	.0143	.0151	.0143	.0144	.0143	.015	.0142	.0144	.0143	.015	.0142
rce No.	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9
del-V:	.0144	.0143	.015	.0142	.0144	.0143	.0149	.0142	.0143	.0143	.0149	.0142	.0143	.0143	.0149	.0142	.0143	.0143	.0149	.0142
rce No.	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9
del-V:	.0143	.0143	.0148	.0142	.0143	.0143	.0148	.0142	.0142	.0143	.0147	.0142	.0142	.0143	.0147	.0142	.0142	.0143	.0146	.0142
rce No.	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9
del-V:	.0142	.0143	.0146	.0142	.0141	.0143	.0145	.0142	.0141	.0142	.0145	.0142	.0141	.0142	.0145	.0142	.014	.0142	.0145	.0142
rce No.	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	-4	-4	4	-9	4	-4	4	-9
del-V:	.014	.0142	.0144	.0142	.014	.0142	.0144	.0142	.014	.0142	.0143	.0142	.014	.0142	.0143	.0142	.014	.0142	.0142	.0142
rce No.	4	-4	4	-9	4	-4	4	-9	4	-4	4	-9	4	-4	4	-9	4	-4	4	-9
del-V:	.014	.0142	.0142	.0142	.014	.0142	.0142	.0142	.0141	.0142	.0141	.0142	.0141	.0142	.0141	.0142	.0141	.0142	.014	.0142
rce No.	4	-4	4	-9	4	-4	4	-9	4	-4	4	-9	4	-4	4	-9	4	-4	-4	-9
del-V:	.0141	.0142	.014	.0142	.0141	.0142	.014	.0142	.0141	.0142	.014	.0142	.0141	.0142	.014	.0142	.0141	.0142	.014	.0141
rce No.	4	-4	9	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	-4	-9
del-V:	.0141	.0142	.0141	.0141	.0141	.0142	.014	.0141	.0141	.0142	.0141	.0141	.0141	.0142	.014	.0141	.0141	.0142	.0141	.0141
rce No.	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9
del-V:	.0141	.0142	.0141	.0141	.0141	.0142	.0141	.0141	.0141	.0142	.014	.0141	.0141	.0142	.0141	.0141	.0141	.0141	.014	.0141
rce No.	4	-4	-4	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	9	-9
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.014	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141
rce No.	4	-4	-4	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	-4	-9
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141
rce No.	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	9	-9
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014
rce No.	4	-4	9	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9
del-V:	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014
rce No.	4	-4	-4	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	-4	-9	4	-4	-4	-9

del-V:	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0142	.0141	.0141	.0141	.0138	.0113	.0142	.0142
rce No.	4	-4	-4	-9	4	-4	9	-9	4	-4	9	-9	4	-4	-9	-9	9	9	-9	-4
del-V:	.0141	.0144	.0144	.0144	.0144	.0145	.0144	.0144	.0144	.0145	.0144	.0144	.0144	.0145	.0144	.0144	.0144	.0145	.0144	.0144
rce No.	4	4	-4	9	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0143	.0145	.0144	.0144	.0143	.0145	.0144	.0144	.0143	.0145	.0144	.0144	.0143	.0145	.0144	.0144	.0143	.0145	.0144	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0143	.0145	.0144	.0144	.0143	.0145	.0144	.0144	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144	.0143	.0145	.0143	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0143	.0145	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144	.0143	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0142	.0144	.0143	.0144	.0142	.0144	.0143	.0144	.0142	.0144	.0143	.0144	.0142	.0144	.0143	.0144	.0142	.0144	.0143	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0142	.0144	.0141	.0144	.0142	.0144
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	-4
del-V:	.0141	.0144	.0142	.0144	.0141	.0144	.0142	.0143	.0141	.0144	.0142	.0143	.0141	.0144	.0142	.0143	.0141	.0144	.0142	.0121
rce No.	-9	4	-4	-4	-9	4	-4	-4	-9	4	-4	9	-9	4	-4	9	-9	4	-4	-9
del-V:	.0142	.014	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141
rce No.	-9	9	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0141	.0141	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014	.0141	.014	.0141	.0141	.0141	.014	.0141	.0141	.0141	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.0139	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014	.014	.0139	.014	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4
del-V:	.014	.0139	.014	.014	.014	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4

del-V:	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	
del-V:	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.014	.0139	.0139	.0139	.0139	
rce No.	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	-9	-4	
del-V:	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0138	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0138	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0138	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	.0139	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.0139	.014	.014	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	.014	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.014	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.014	.0141	.0141	.0141	.0141	.0141	.0141	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0141	.0142	.0141	.0142	.0141	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0142	.0141	.0142	.0141	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0142	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	
del-V:	.0142	.0142	.0142	.0142	.0142	.0142	.0142	.0141	.0142	.014	.0142	.014	.0142	.0139	.0142	.0138	.0142	.0138	.0142	.0138	
rce No.	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	9	4	-4	4	-4	
del-V:	.0142	.0138	.0143	.0138	.0143	.0138	.0143	.0139	.0143	.0139	.0143	.0139	.0143	.0139	.0143	.0139	.0143	.0139	.0143	.0139	
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	
del-V:	.0141	.0137	.0138	.0134	.0134	.0128	.0128	.0122	.012	.0114	.0112	.0105	.0103	.0096	.0093	.0086	.0083	.0076	.0073	.0066	
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	
del-V:	.0063	.0057	.0054	.0048	.0046	.004	.0038	.0033	.0031	.0027	.0025	.0021	.002	.0017	.0016	.0013	.0012	1.E-3	.9E-3	.7E-3	
rce No.	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	4	-4	
del-V:	.7E-3	.5E-3	.5E-3																		
rce No.	4	-4	4																		

t the load flow iteration loop with counter NEXITE = 1443. If no warning on the preceding line, convergence was attained.

w	Node	Name	Voltage magnit	Degrees	Real power P	Reactive power
4	3	LARIO	9.84131935E-01	7.40490	-4.02451874E-01	-2.00752871E-01
5	6	CHAMI	9.9056733BE-01	7.08011	-8.02959822E-02	-3.49401326E-02
6	5	PATOU	9.85846721E-01	5.61556	-1.50582043E-01	-8.02383390E-02
7	7	NONOG	1.02435925E+00	2.03351	-1.11764035E-01	-7.62374662E-02
3	10	VUNIO	1.10000000E+00	1.06563	9.29445117E-02	3.50169746E-01
2	2	RECRE	1.10000000E+00	13.98075	6.95472923E-01	2.64054969E-01
9	8	CHEPE	1.01816078E+00	10.18902	-1.53939836E-01	-9.05838393E-02
9	4	AIMOG	9.55469302E-01	6.11408	-9.25553934E-02	-4.11532710E-02
0	11	CHILE	1.02227222E+00	1.94247	-9.14793632E-02	-2.72257733E-02

usoidal steady-state phasor solution, branch by branch. All flows are away from a bus, and the real part, magnitude, or "P" printed above the imaginary part, the angle, or "Q". The first solution frequency = 5.00000000E+01 Hertz.

us K	Bus M	Phasor node voltages Rectangular	Polar	Phasor branch current Rectangular	Polar	Power flow P and Q	Power loss P and Q
CRE		1.5095608090938	1.5556349186104	.94966174314211	.95641169321592	.69547292278074	.05030978235061
		.37580069671061	13.9774481	-.113427953047	-6.8111622	.26405496864384	0.1006196
	LARIO	1.3801438676778	1.3917486493073	-.7496617431421	.95641169321592	-.6451631398001	
		.17935218805452	7.4041967	.11342795304699	173.1888378	-.1634354026826	
RIO		1.3801438676778	1.3917486493073	.14270509033718	.14992891872303	.09435363781723	.00179329445835
		.17935218805452	7.4041967	-.0459775806376	-17.8582133	.04452507308307	0.0033718
	AIMOG	1.3435177790326	1.351201831867	-.1427050903372	.14992891892303	-.0925553933549	
		.14389707385538	6.1133423	.04597758063761	162.1417867	-.0411532709737	
RIO		1.3801438676778	1.3917486493073	.19626191551641	.24349485934894	.14835757770817	.00237139506929
		.17935218805452	7.4041967	.14410460523523	36.2878428	-.0818425416199	0.0047425
	FATOU	1.3874996512741	1.3941901666108	-.1962619155164	.24348485934894	-.1459861826387	
		.13642191315307	5.6153940	-.1441046052352	-143.7121572	.08658533175852	
TOU		1.3874996512741	1.3941901666108	-.1878551733759	.20313290349261	-.1355963713192	.00165051905925
		.13642191315307	5.6153940	-.0772878406819	-157.6366326	.04080464492305	0.0033010
	CHANI	1.3901620106351	1.4008434966094	.18785517337586	.20313290349261	.13724669037842	
		.17266176814776	7.0800285	.07728784068195	22.3633674	-.0375036068046	
TOU		1.3874996512741	1.3941901666108	.15787712512962	.35217694595297	.13100051110309	.00868200208825
		.13642191315307	5.6153940	.31480694817857	63.3660256	-.2076263156816	0.0161217
	NONOG	1.4472466602824	1.4481556120787	-.1578771251298	.35217694595297	-.1223185090148	
		.05130088787432	2.0301268	-.3148069481786	-116.6339744	.22373203384546	
AMI		1.3901620106351	1.4008434966094	-.3077690516479	.31060996641529	-.217542872552	.0058755437707
		.17266176814776	7.0800285	-.0419137457674	-172.2448427	.00256347422529	0.0120578
	CHEPE	1.417169844684	1.4398774625605	.30776905164791	.31060996641529	.22341841632231	
		.25470912529421	10.1890352	.04191374576741	7.7551573	.00949634467927	
EPE		1.417169844684	1.4398774625605	-.5486804621757	.55033363979916	-.3833582519511	.02029209671134
		.25470912529421	10.1890352	.04262470552636	175.5578509	-.1000801839496	0.0424019
	LUJAN	1.5026279441629	1.5556349186104	.54868046217574	.55033363979916	.40565034866142	
		.40262794416288	15.0000000	-.0426247055264	-4.4421491	.14248158006189	
NOG		1.4472466602824	1.4481556120797	-.1278300863421	.46578385586623	-.0810120086841	.01193250302121
		.05130088787432	2.0301268	.44789961979376	105.9236913	-.3273895127077	0.0127832
	VUNIO	1.5553668899367	1.5556349186104	.12783008634206	.46578385586623	.09294451170529	
		.02887624782884	1.0636057	-.4478996197938	-74.0763087	.35016574594792	
NOG		1.4472466602824	1.4481556120787	.12772060459661	.13199982466131	.09156649254765	.37115768558E-4

	.05130088787432	2.0301268	-.0333376794667	-14.6289636	.02740001284272	0.0001742
CHILE	1.4453027006471	1.4461357918352	-.1277206045966	.13199782466181	-.0914793631791	
	.04907985257706	1.9449132	.03333767946674	165.3710364	-.0272257733056	

Total network loss P-loss by summing injections = 1.029992569272E-01

ution at nodes with known voltage. Nodes that are shorted together by switches are shown as a group of names, with the printed
ult applying to the composite group. The entry "MVA" is SQRT(P**2 + Q**2) in units of power, while "P.F." is the
ociated power factor.

Node	Source node voltage		Injected source current		Injected source power	
name	Rectangular	Polar	Rectangular	Polar	P and Q	MVA and P.F.
RECRE	1.5095608090936	1.5556349186104	.94956174314211	.95641169321592	.69547252278074	.74391371326679
	.37580069671061	13.7794481	-.113427953047	-6.8111612	.26405496864384	0.9349337
LAGIO	1.3801438676778	1.3917486493073	-.6106947372895	.6462999077194	-.4024518742787	.44974351130794
	.17935218805452	7.4041967	.21155497764461	160.8930499	-.2007528712195	-0.8948475
AIHOG	1.3433177790326	1.351201831867	-.1427050903372	.14992831892303	-.0925553932549	.10127211494931
	.14389707385538	6.1133423	.04597758063761	162.1417867	-.0411532703737	-0.9137473
PATGU	1.3874996512741	1.3941301666108	-.2262399637625	.24476680828087	-.150582042855	.17061577860894
	.13642191315307	5.6153940	.09341450226149	157.5642650	-.080238339	-0.8825287
CHAMI	1.3901620106351	1.4008434966094	-.119913878272	.12502263711965	-.0302959821736	.08756953967745
	.17266176814776	7.0800285	.03537409491444	163.5641601	-.0349401325793	-0.7169496
NOHOG	1.4472466602824	1.4481556120787	-.1579866068753	.18684939089921	-.1117640347512	.13529987663307
	.05130088787432	2.0301268	.09975499214845	147.7311026	-.0762374662191	-0.8261077
CHEPE	1.417169844684	1.4398774625605	-.2409114105278	.25531364528664	-.1599378356288	.18381018166615
	.25470912529421	10.1890352	.08453845129377	160.6634695	-.0905838392694	-0.8701359
LUJAN	1.5026279441629	1.5556349186104	.54868046217574	.55033363979916	.40365034866242	.42805911347877
	.40262794416288	15.0000000	-.0426247055264	-4.4421491	.14248158006189	0.9429781
VUNIO	1.5553668899367	1.5556349186104	.12783008634206	.46578395596623	.05294451170529	.36227481535525
	.02887624782884	1.0636057	-.4478976197938	-74.0713087	.35016974594782	0.2055439
CHILE	1.4453027006471	1.4461357918352	-.1277206045966	.13199782466182	-.0914793631791	.09544483547971
	.04907985257706	1.9449132	.03333767946674	165.3710364	-.0272257733056	-0.9584527

```
oment card.   KOMPAR = 1.                   |C
ment card.   KOMPAR = 1.                    |C
oment card.   KOMPAR = 1.                   |C
quest for flushing of punch buffer.         |$PUNCH       { Flush punched cards; R-L branches for equivalent impedance loads

isting of 80-column card images now being flushed from punch buffer follows.
==============================================================================
4567890123456789012345678901234567890123456789012345678901234567890123456789
==============================================================================
======(  End of LUNIT7 punched cards as flushed by  $PUNCH  request  )=======
```

card ending node names for voltage output. !BLANK card ending requests for output variables.

tive branch outputs follow (for column-80 keyed branches only). Any request for branch current output automatically will be
nted to include branch voltage. But the converse is not true (a request for voltage only will not produce current output).

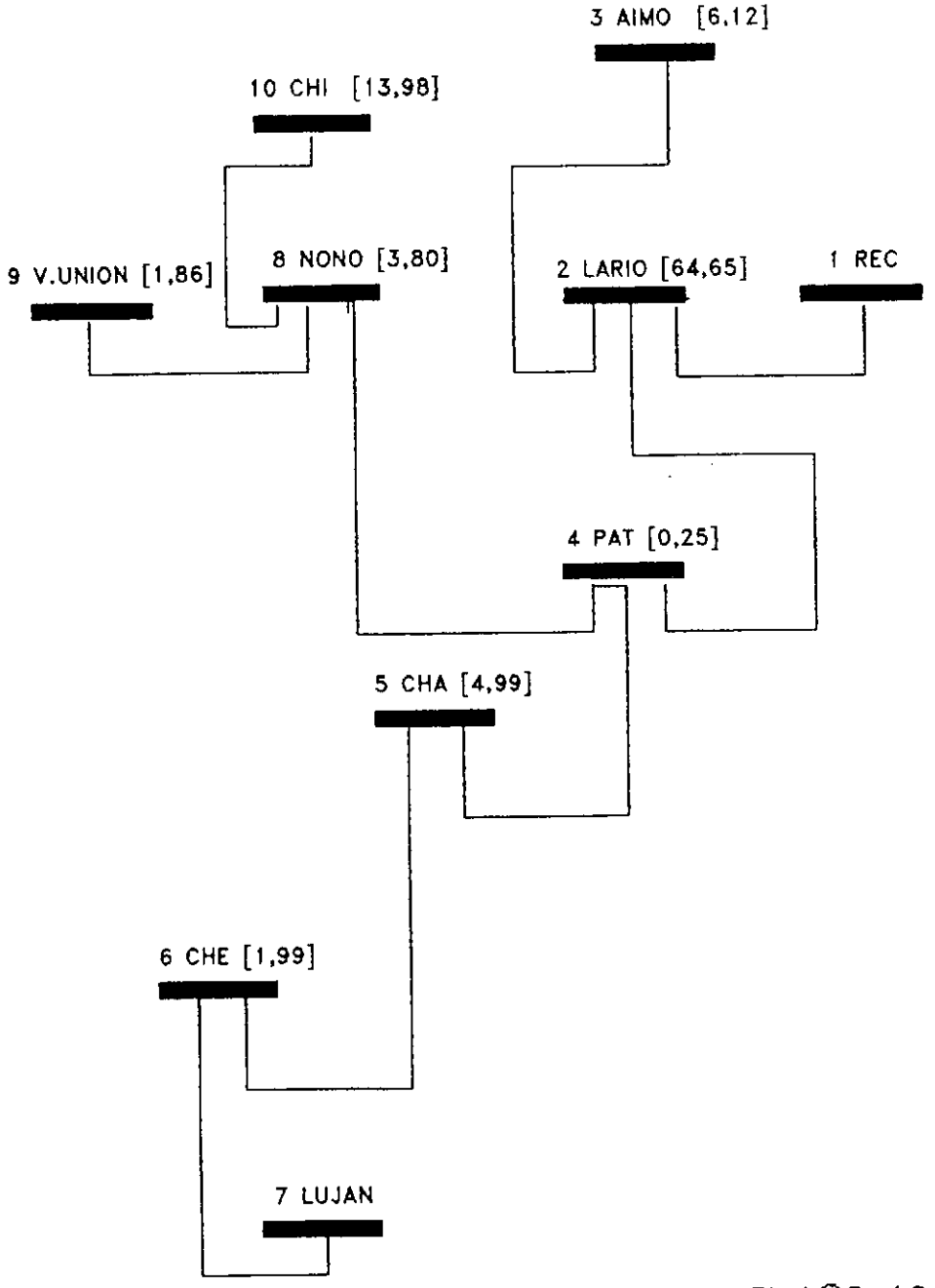
K	To bus M	(======== Branch voltage Vkm = Vk - Vm ========) Magnitude	Degrees	Real part	Imag part	(====== Branch current Ikm from K to M ======) Magnitude	Degrees	Real part	Imag part
E	LARIO	2.3524617E-01	56.623787	1.2941694E-01	1.9644851E-01	9.5e41697E-01	-6.811162	9.4966174E-01	-1.1342755E-01
B	AIMOG	5.0975832E-02	44.069300	3.6626087E-02	3.54551114E-02	1.47928726-01	-17.858213	1.4270509E-01	-4.5977581E-02
D	PAIGU	4.3555896E-02	99.722792	-7.3557836E-03	4.2930275E-02	2.4348486E-01	36.287843	1.9626192E-01	1.4410461E-01
V	CHAMI	3.6337518E-02	-94.201684	-2.6623594E-03	-3.6239855E-02	2.0313290E-01	-157.636633	-1.8785517E-01	-7.7267841E-02
U	NONOG	1.0399661E-01	125.065270	-5.9747009E-02	8.5121025E-02	3.5217695E-01	63.366026	1.5787713E-01	3.1480675E-01
I	CHEPE	8.6378191E-02	-108.220187	-2.7007834E-02	-8.2047357E-02	3.1060997E-01	-172.244843	-3.0776905E-01	-4.1513746E-02
E	LUJAN	1.7083051E-01	-120.016594	-8.5458099E-02	-1.4791882E-01	5.5033364E-01	175.557851	-5.4668046E-01	4.2624706E-02
G	YUNIO	1.1042123E-01	169.282716	-1.0812023E-01	2.2424640E-02	4.6578386E-01	105.928691	-1.2783005E-01	4.4789962E-01
G	CHILE	2.9516058E-03	48.805985	1.9439596E-03	2.2210353E-03	1.3199982E-01	-14.628964	1.2772060E-01	-3.3337679E-02

al List Sizes for the preceding solution follow. 20-Apr-94 12.04.37

ize 1-10:	11	9	9	3	-9999	0	-9999	-9999	0	0
ize 11-20:	-9999	-9999	-9999	-9999	-9999	0	0	9	23	0
ize 21-29:	0	-9999	9	-9999	-9999	-9999	-9999	-9999	-9999	

nds for overlays 1-5 :	26.594	0.000	26.594	--- (CP: I/O; tot)
nds for overlays 6-11 :	12.359	0.000	12.359	
nds for overlays 12-15 :	0.000	0.000	0.000	
nds for time-step loop :	0.000	0.000	0.000	
nds after DELTAT-loop :	0.332	0.000	0.332	
Totals :	39.285	0.000	39.285	

CIRCUITO PARA FLUJO
DE CARGAS 132 kV – LA RIOJA
GRAFICO Nª LAR-G-300-1
CARGA MW [ ] AÑO 1995
ALTERNATIVA Nª 3-7



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

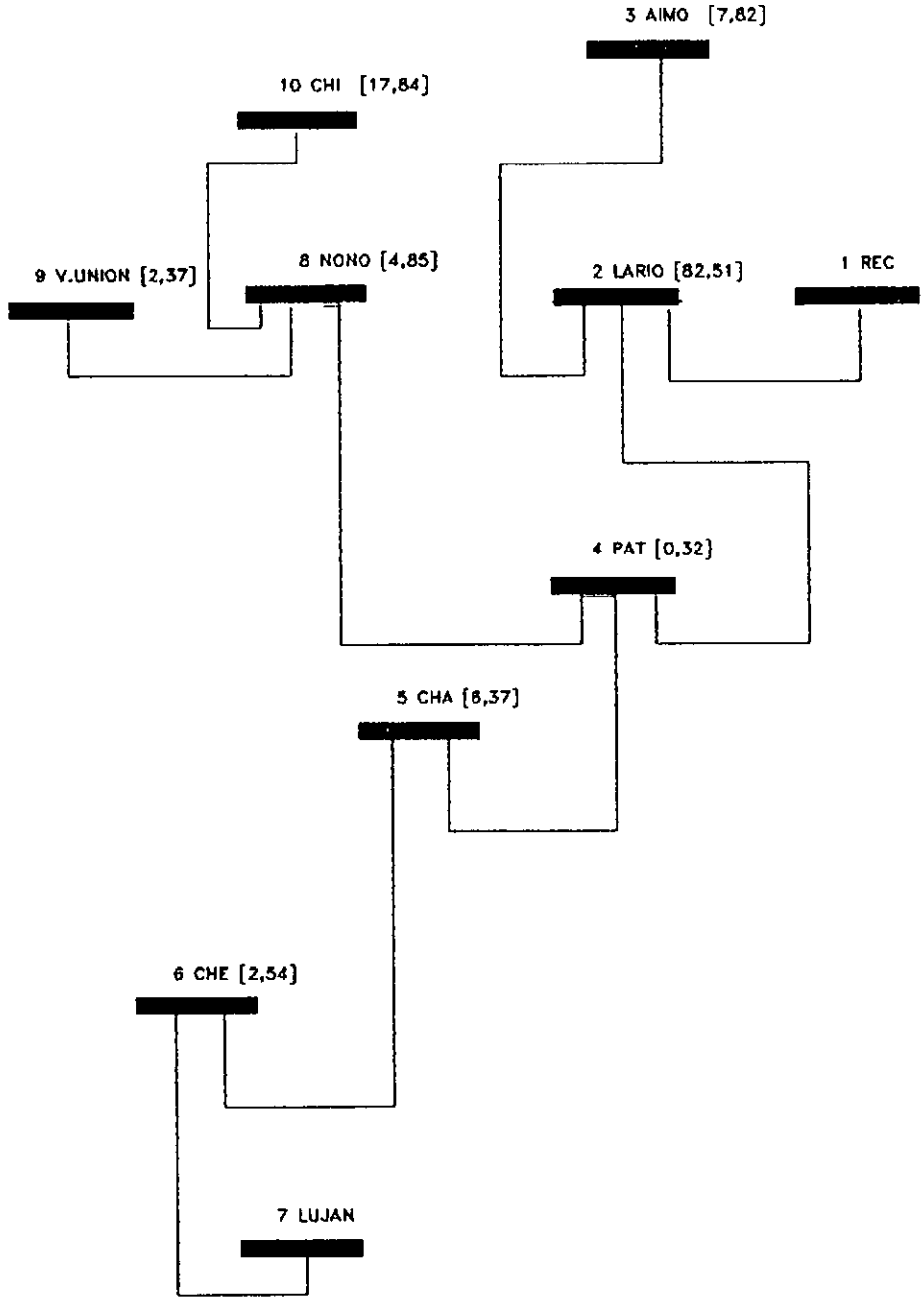
CIRCUITO PARA FLUJO

DE CARGAS 132 kV – LA RIOJA

GRAFICO Nº LAR-G-300-2

CARGA MW [ ] AÑO 2000

ALTERNATIVA Nº 1-7



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

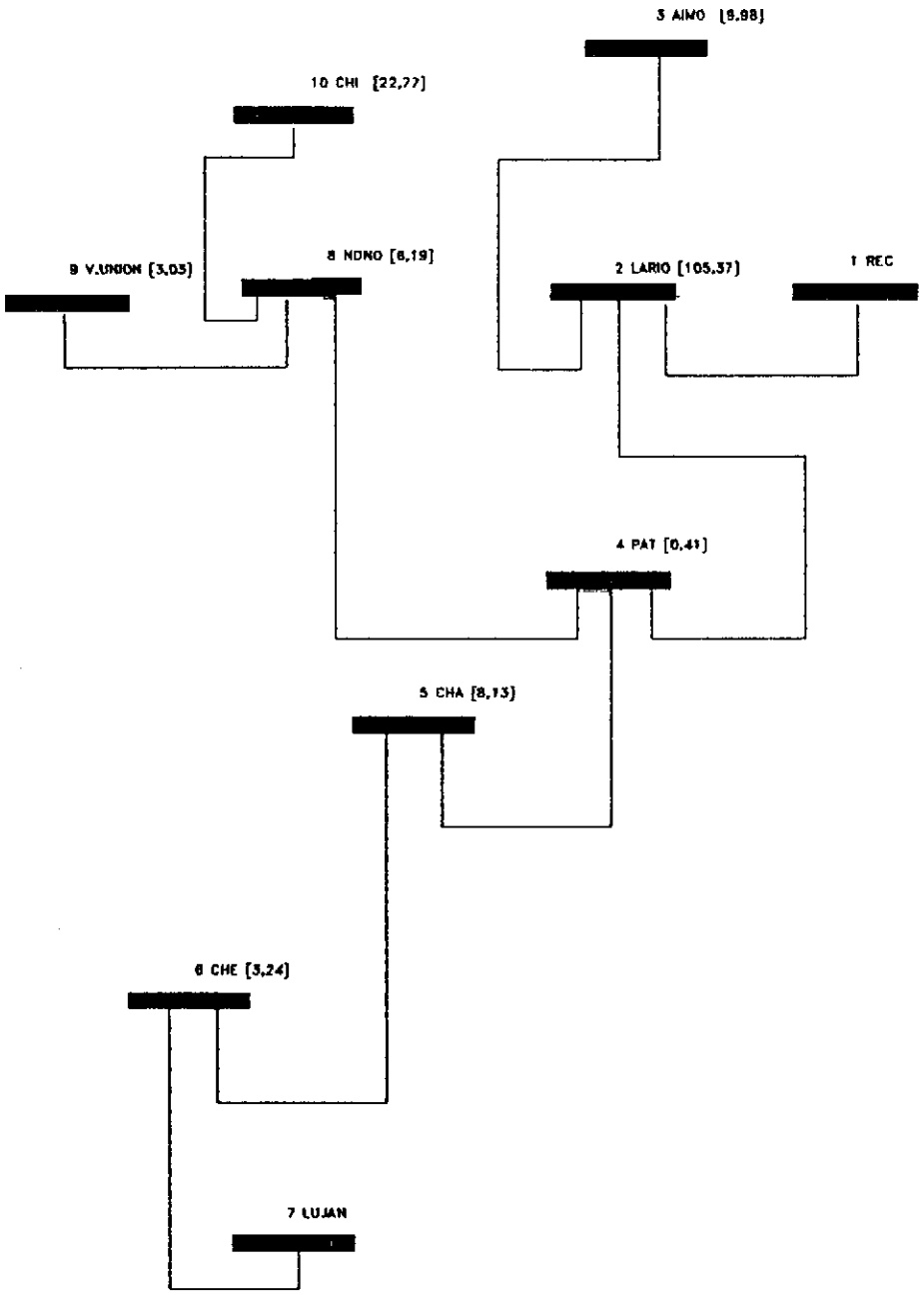
CIRCUITO PARA FLUJO

DE CARGAS 132 kV – LA RIOJA

GRAFICO Nº LAR-G-300-3

CARGA MW [ ] AÑO 2005

ALTERNATIVA Nº 5-7



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

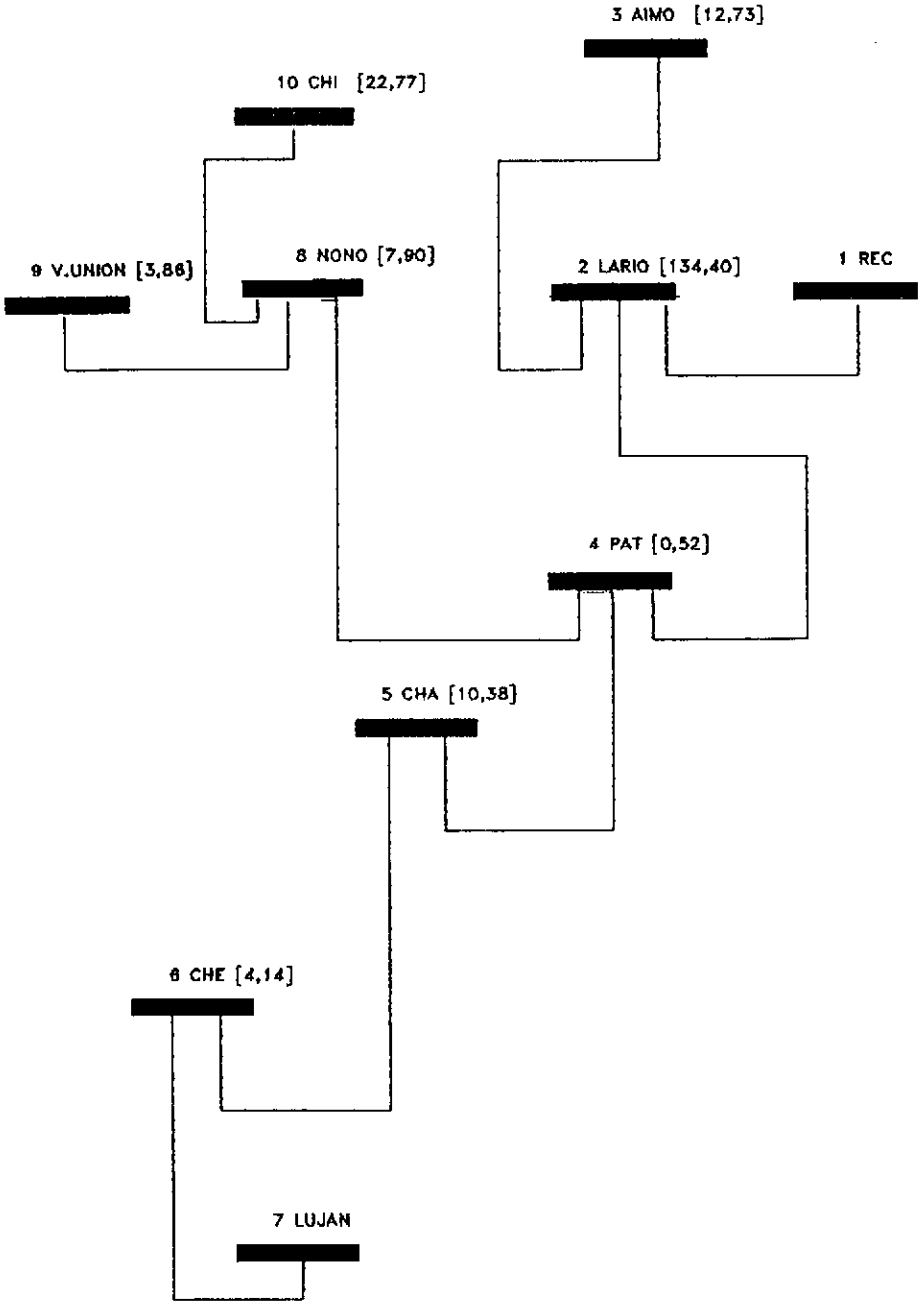
CIRCUITO PARA FLUJO

DE CARGAS 132 kV – LA RIOJA

GRAFICO Nº LAR-G-300-4

CARGA MW [ ] AÑO 2010

ALTERNATIVA Nº 6-7



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993

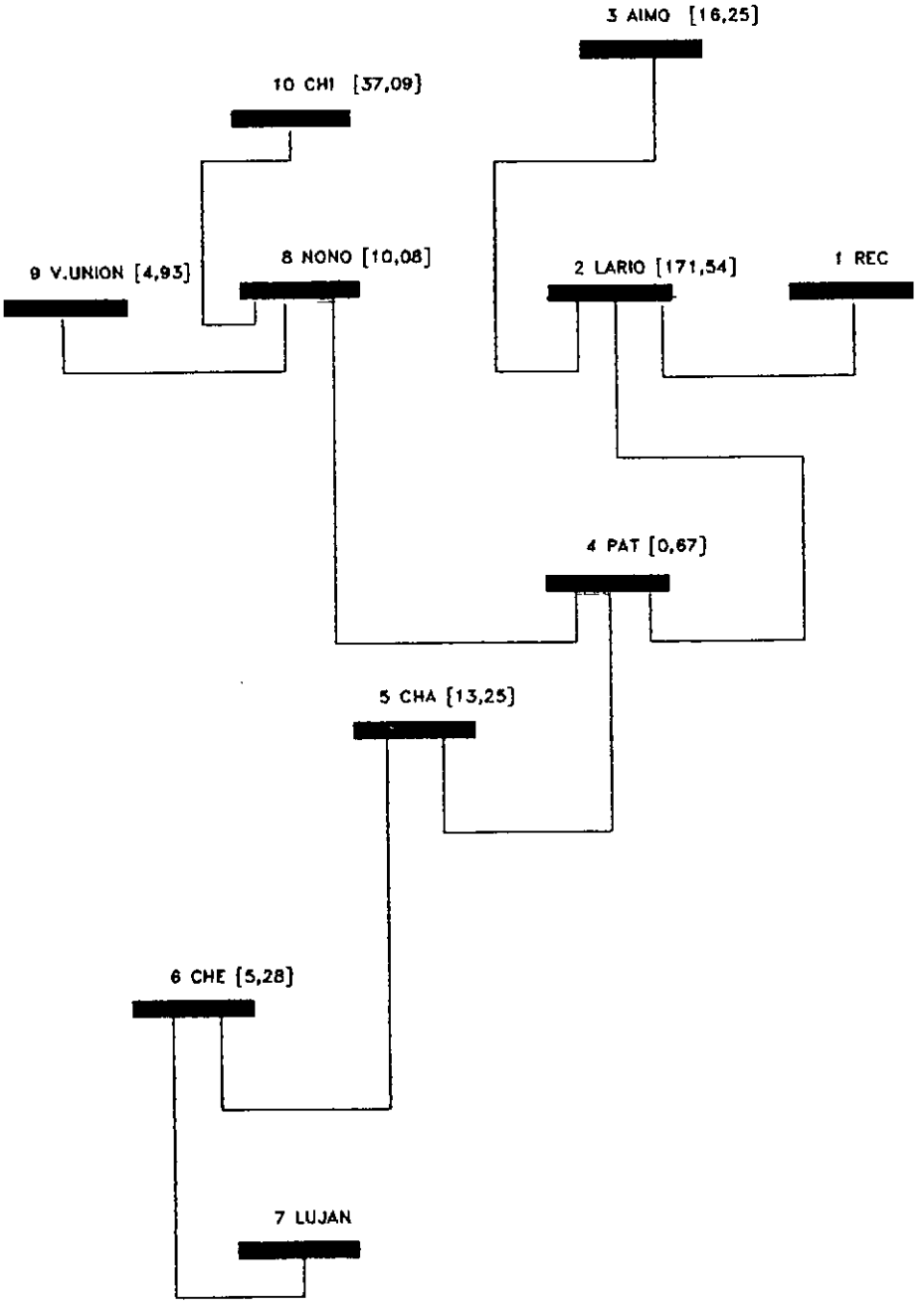
CIRCUITO PARA FLUJO

DE CARGAS 132 kV – LA RIOJA

GRAFICO Nº LAR-G-300-5

CARGA MW [ ] AÑO 2013

ALTERNATIVA Nº 7–7



ESTUDIO DE ELECTRIFICACION DE LA RIOJA–CFI AÑO 1993