E-00000D-02-0065

ORIGINAL

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January 31, 2002

Mr. Ernest Johnson
Director, Utilities Division
Arizona Corporation Commission
1200 W. Washington
Phoenix, Arizona 85007

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RE: DOCKET NO. E-00000D-02-0065 A.R.S. 40-360.02
ARIZONA PUBLIC SERVICE COMPANY'S TEN-YEAR PLAN

Dear Mr. Johnson:

Pursuant to the Arizona Revised Statutes, Section 40-360.02 relating to transmission line siting requirements, attached is Arizona Public Service Company's Ten-Year Plan for the period of 2002 through 2011, for construction of new electric facilities.

If you have any questions regarding this filing, please call me at (602)250-2310.

Sincerely,

Jana Van Ness
Manager
State Regulation

Attachment

JVN/srm

Cc: Patrick Williams, ACC
Manager, Compliance & Enforcement w/o attachment

Docket Control, Original plus 10 copies

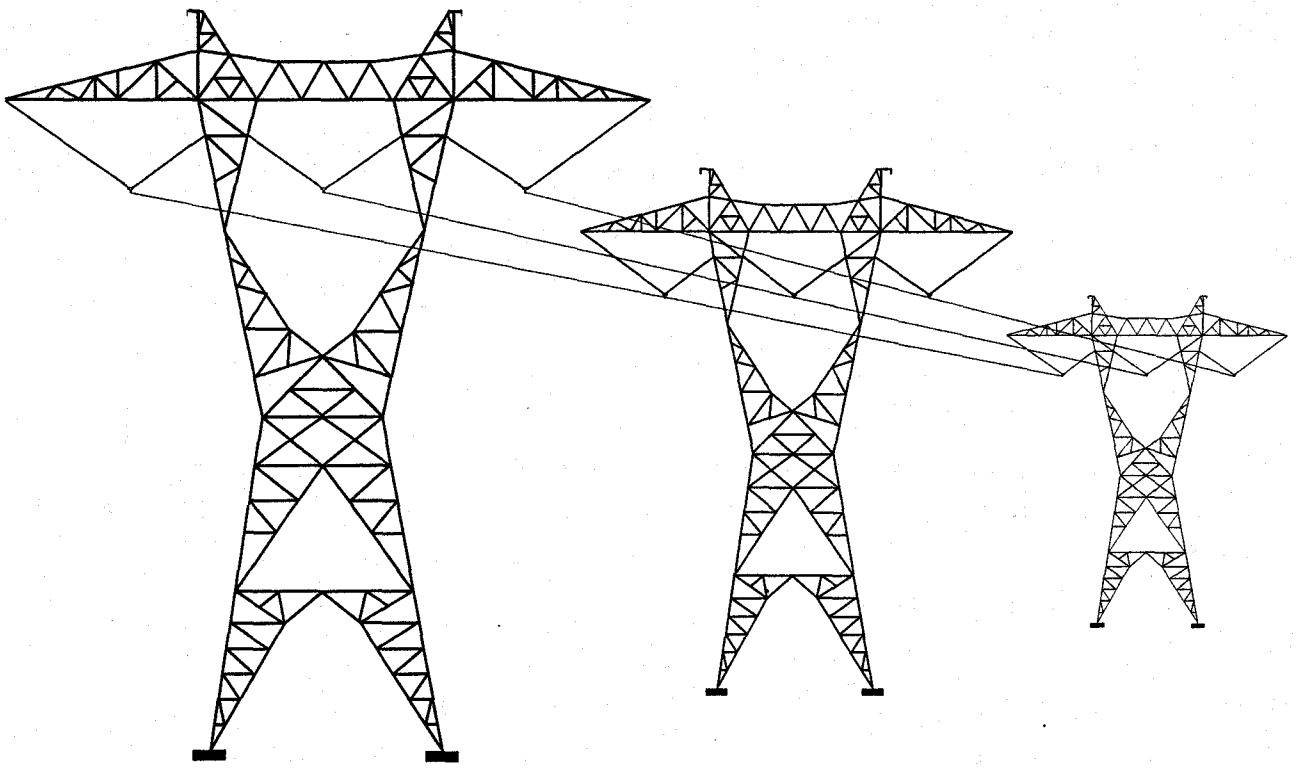
Arizona Corporation Commission
DOCKETED

JAN 31 2002

DOCKETED BY

ARIZONA PUBLIC SERVICE COMPANY

APS



2002 - 2011
TEN-YEAR PLAN

January 2002

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ARIZONA PUBLIC SERVICE COMPANY

2002–2011

TEN-YEAR PLAN

Prepared for the

Arizona Corporation Commission

January 2002

ARIZONA PUBLIC SERVICE COMPANY
2002 - 2011
TEN-YEAR PLAN

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ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

GENERAL INFORMATION

Pursuant to A.R.S. § 40-360.02, as amended by House Bill 2040, Arizona Public Service Company ("APS") submits its 2002-2011 Ten-Year Plan. Additionally, pursuant to Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001) concerning the Biennial Transmission Assessment, APS is including with this filing its Transmission Planning Process and Guidelines and maps showing system ratings on APS' transmission system. The Transmission Planning Process and Guidelines outline generally APS' internal planning for its high voltage and extra-high voltage transmission system, including a discussion of APS' planning methodology, planning assumptions, and its guidelines for system performance. The system ratings maps show emergency and continuous system ratings on APS' extra-high voltage system, and on its Metro, Northern and Southern 230 kV systems.

This 2002–2011 Ten-Year Plan describes planned transmission lines of more than two spans and of 115 kV or higher voltage that APS may construct over the next ten-year period. Pursuant to A.R.S. § 40-360(10), underground facilities are not included. Also, previously reported facilities that have been completed, canceled, or deferred beyond the upcoming ten-year period are not included. These ten-year plans are tentative information only, and pursuant to A.R.S. § 40-360.02(F), are subject to change at any time at the discretion of APS. Further, these plans describe only APS' present transmission expansion plans at the time of this filing, and may change without notice based on land usage, growth pattern changes, regulatory or legal developments, or for other reasons.

For the convenience of the reader, APS has included system maps showing the general location and in-service date for all overhead transmission lines planned by APS for the Arizona and Phoenix Metropolitan Area. Written descriptions of each proposed transmission line are provided on subsequent pages in the currently expected chronological order of each project. The line routings shown on the system maps and the descriptions of each transmission line are intended to be general and are subject to revision. Specific routing is determined by the Arizona Power Plant and Transmission Line Siting Committee when issuing a Certificate of Environmental Compatibility, and through subsequent right-of-way acquisition. Pursuant to the amendments to A.R.S. § 40-360.02, this filing also includes technical study results for the projects identified. The technical study results show project need, which is generally based on either security (contingency performance) or adequacy (generator interconnection or increasing transfer capability) or both.

APS believes that the projects identified in this 2002-2011 Ten-Year Plan, with their associated in-service dates, will help ensure that APS' transmission system meets all applicable reliability criteria. However, changes in underlying assumptions such as load forecasts, generation expansion, and other utilities' plans, may substantially impact this Ten Year Plan and could result in changes to anticipated in-service dates or project scopes.

Additionally, in the future APS intends to join the WestConnect Regional Transmission Organization (RTO) as contemplated by the Commission's Electric Competition Rules. APS anticipates that WestConnect will be formed within the period addressed in this 2002-2011 Ten-Year Plan. Upon joining WestConnect, APS would turn over operational control of its transmission facilities to the RTO. WestConnect will become involved in planning and constructing transmission system improvements and additions within the RTO, which could affect projects identified in this Ten Year Plan. Further, as the

transmission planning function is assumed by WestConnect, it may also file Ten-Year Plans to the extent it is required to do so.

Central Arizona Transmission System Study

Since submission of its 2001-2010 Ten Year Plan, APS has continued an EHV transmission study with several other utilities within the state of Arizona known as the Central Arizona Transmission System (CATS) Study. This study encompasses an area bounded by the Phoenix Metropolitan Area to the north, the Tucson Metropolitan Area to the south, the Palo Verde Nuclear Generating Station to the west, and Globe-Miami-Hayden area to the east. This area includes Coolidge, Casa Grande, Eloy, Marana, Florence, Maricopa as well as metropolitan Phoenix and Tucson. The study participants include APS, Salt River Project, Tucson Electric Power Company, Arizona Electric Power Cooperative, Citizens Communications Company, the Western Area Power Administration, and Commission Staff. Several other utilities, independent power producers and other interested parties have become Correspondence Members.

The stated purpose of the study is to evaluate, from a long-term planning perspective, what high voltage transmission facilities are needed to:

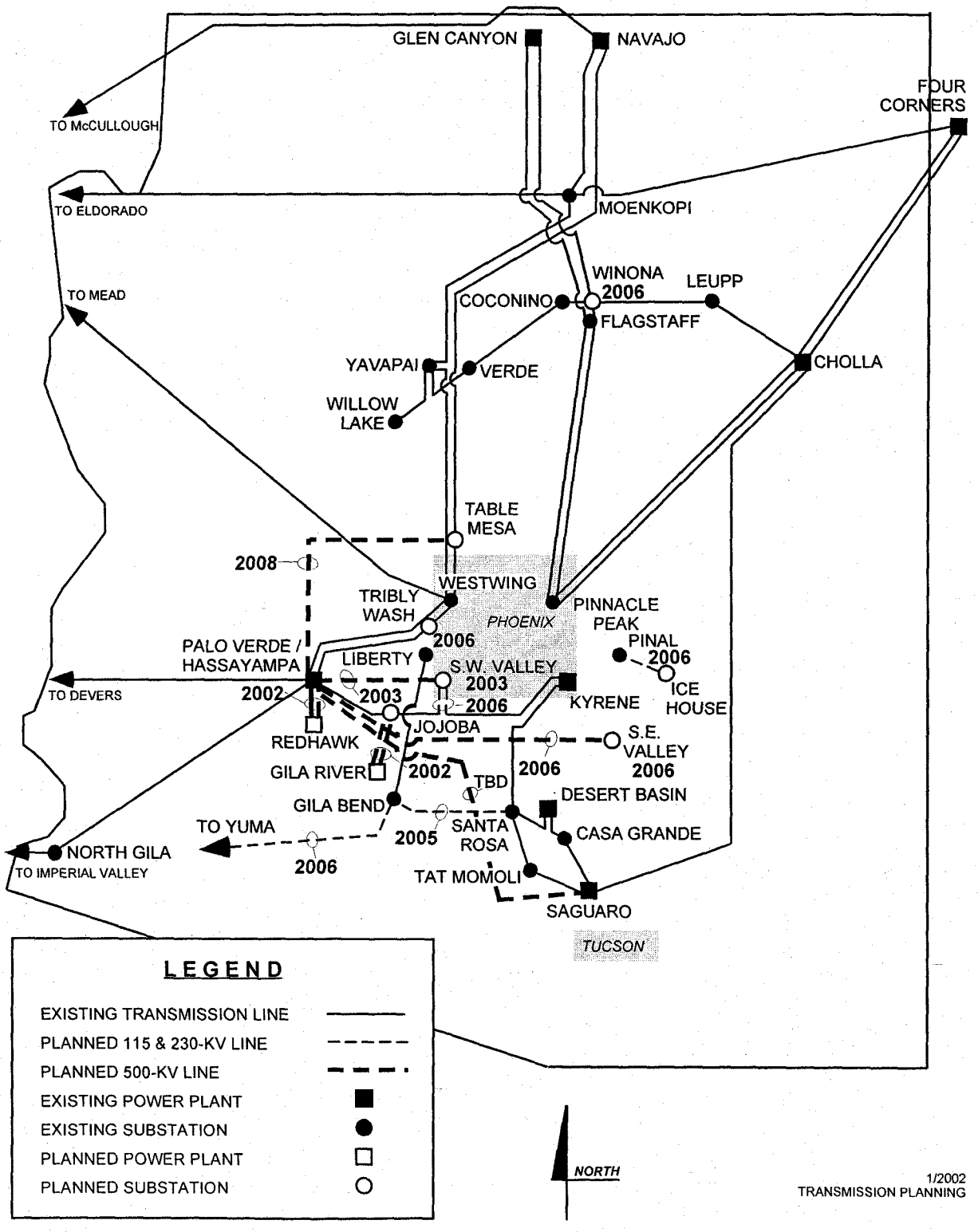
- Improve the use of the existing transmission system for future load growth in Phoenix and Southern Arizona.
- Increase the power transfer import level into the Phoenix area.
- Increase the power transfer import level into the Tucson area.
- Increase the power transfer capability between the Phoenix and Tucson areas.
- Facilitate future generation additions south of Phoenix and north of Tucson.
- Provide additional transmission capacity to and from the Palo Verde hub.
- Provide a framework for the participating utilities to plan and coordinate transmission

lines and receiving stations, and identify how the timing and phasing of projects can be done in a coordinated manner.

The results of the CATS study will be reported to the Commission when completed, and incorporated into the appropriate Ten Year Plans. The initial phase of the CATS study was completed in 2001 and a copy of the report is being filed by SRP as part of their Ten-Year Plan. Phase Two of the study, which further refines the initial study work, will be completed in 2002. APS may participate, in conjunction with other interested parties, in developing some or all of the transmission projects that result in meeting the stated objectives of the CATS study. One such project is the Palo Verde-Southeast Valley 500-kV project, which was announced last year by SRP. Another potential project under the CATS study is the previously-certificated Palo Verde-Saguaro 500-kV line, which was sited as part of the overall Palo Verde transmission system but has not yet been constructed. That proposed transmission line is included in this filing for informational purposes although no in-service date has yet been determined.

ARIZONA PUBLIC SERVICE COMPANY
2002-2011
PLANNED TRANSMISSION MAP

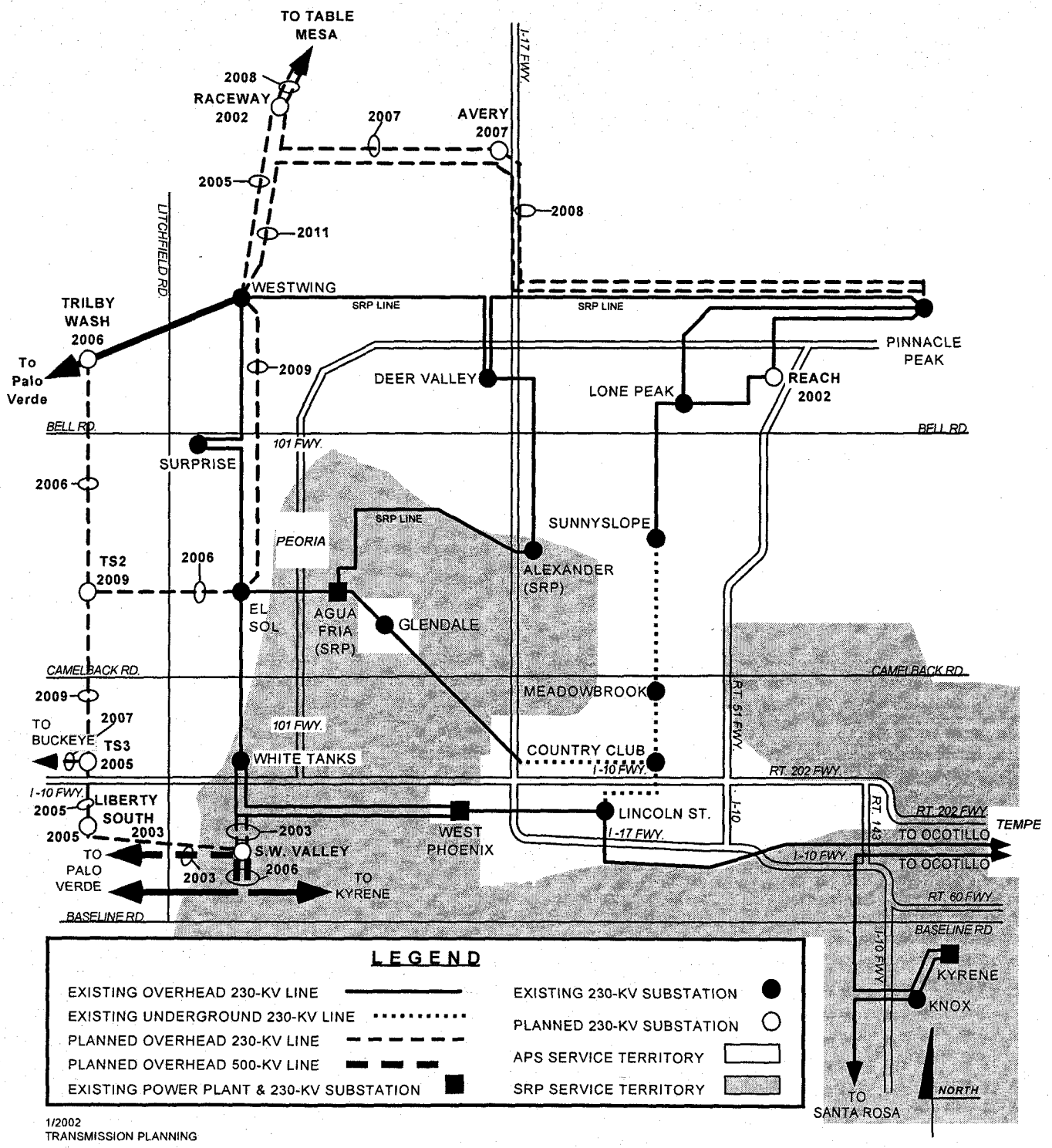
ARIZONA AREA



1/2002
TRANSMISSION PLANNING

The planned transmission lines shown are meant to depict electrical connectivity to the transmission grid and do not in any way represent actual routing of these future lines.

ARIZONA PUBLIC SERVICE COMPANY
2002-2011
PLANNED TRANSMISSION MAP
PHOENIX METROPOLITAN AREA



1/2002
TRANSMISSION PLANNING

The planned transmission lines shown are meant to depict electrical connectivity to the transmission grid and do not in any way represent actual routing of these future lines.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2002

Line Designation	Redhawk – Hassayampa 500-kV line #2
Size	
(a) Voltage	525-kV AC
(b) Capacity	2728 MVA each
(c) Point of Origin	Redhawk Power Plant; Sec. 14 & 23, T1S, R6W
(d) Intermediate Point	None
(e) Point of Termination	Hassayampa switchyard to be constructed approximately 1 mile east of the intersection of Elliott road and Wintersburg road; within Sec. 15, T1S, R6W
(f) Length	Approximately 1.5 mile of single-circuit line each.
Routing	East from Hassayampa to the Palo Verde – Kyrene line, then south to the Redhawk Power Plant.
Purpose	This second single-circuit 500-kV line, along with the first 500-kV circuit and associated Hassayampa switchyard will provide facilities necessary to connect the Redhawk Power Plant to the transmission system.
Dates	
(a) Construction Start	2002
(b) Estimated In Service	2002

Certificate of Environmental Compatibility issued 02/21/2001 (Case No. 108, Decision No. 63392)

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2002

Line Designation	Gila River – Jojoba 500-kV lines #1 & #2
Size	
(a) Voltage	525-kV AC
(b) Capacity	2728 MVA each
(c) Point of Origin	Panda Gila River Power Plant; Sec. 20, T5S, R4W
(d) Intermediate Point	None
(e) Point of Termination	Jojoba switchyard to be constructed near the intersection of AZ highway 85 and the Palo Verde – Kyrene 500kV line; within Sec. 30, T2S, R3W.
(f) Length	Approximately 21 miles of single-circuit line each
Routing	East from Panda Gila River Power Plant to AZ highway 85, then north paralleling the Gila Bend – Liberty 230kV line to the Palo Verde – Kyrene 500kV line.
Purpose	These single-circuit 500-kV lines, along with the associated Jojoba switchyard and Gila River Power Plant Substation will provide facilities necessary to connect the Panda Gila River Power Plant to the transmission system.
Dates	
(a) Construction Start	2001
(b) Estimated In Service	2002

Certificate of Environmental Compatibility issued 10/16/2000 (Case No. 102, Decision No. 62960)

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2003

Line Designation	Palo Verde-S. W. Valley 500kV line
Size	
(a) Voltage	525-kV AC
(b) Capacity	2728 MVA
(c) Point of Origin	Palo Verde Power Plant; Sec. 34, T1N, R6W
(d) Intermediate Point	None
(e) Point of Termination	S.W. Valley substation to be constructed near the intersection of Broadway Road and 119th Avenue; within the southwest quarter of Sec. 24, T1N, R1W.
(f) Length	Approximately 36 miles of single-circuit line
Routing	Northeast from Palo Verde, paralleling the PV-Westwing lines to the north side of Interstate 10, then east to approximately Miller road where it will cross to the south side of Interstate 10. The line will then parallel existing transmission lines in an easterly direction to the new substation.
Purpose	This single-circuit 500-kV line, along with the associated S.W. Valley substation, will provide a needed bulk power source for the rapidly growing southwestern (SW) Phoenix area, thus supplementing existing bulk power sources in the metropolitan area at Westwing (NW) Pinnacle Peak (NE), and Kyrene (SE). It will be jointly developed by APS and Salt River Project (SRP). The S.W. Valley Project will relieve demand upon heavily loaded facilities at the three other bulk power sources. Furthermore, the S.W. Valley Project will improve the balance of power flows throughout the Phoenix metropolitan transmission system and decrease electrical losses, while increasing power import capability, system reliability, and service quality for customers.
Dates	
(a) Construction Start	2002
(b) Estimated In Service	2003

Siting Committee approval issued on December 13, 2001 (Case No. 115); hearing by ACC scheduled for February 7, 2002.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2003

Line Designation	S.W. Valley – Liberty South 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	S.W. Valley substation to be constructed near the intersection of Broadway road and 119th Avenue; within the southwest quarter of Sec. 24, T1N, R1W.
(d) Intermediate Point	None
(e) Point of Termination	The WAPA Liberty substation, or a new substation to be sited in the future near the existing WAPA Liberty substation. Sec. 19, T1N, R2W
(f) Length	Approximately 11 miles of single-circuit 230kV on the same poles as the Palo Verde-S. W. Valley 500kv line.
Routing	An east-west route paralleling existing transmission lines.
Purpose	This 230-kV line will provide additional sources for the TS3 230/69-kV substation planned in the southwestern Phoenix metropolitan area. Increased reliability and quality of service will result for customers served by the 230/69-kV substation.
Dates	
(a) Construction Start	2002
(b) Estimated In Service	2003

Siting Committee approval issued on December 13, 2001 (Case No. 115); hearing by ACC scheduled for February 7, 2002.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2005

Line Designation	Westwing - Raceway 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	Westwing substation; Sec. 12, T4N, R1W
(d) Intermediate Point	None
(e) Point of Termination	Raceway substation to be located along the Westwing-New Waddell 230-kV line, approximately 3 miles south of the New Waddell dam; Sec. 4, T5N, R1E
(f) Length	Approximately 7 miles of line on double-circuit poles
Routing	Northeast from Westwing substation paralleling existing transmission lines to the Raceway substation which will be adjacent to the existing transmission lines.
Purpose	This 230-kV line will serve increasing loads in the far north and northwest parts of the Phoenix metropolitan area. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2003
(b) Estimated In Service	2005

An application for a *Certificate of Environmental Compatibility* will be filed in 2002. This line is one of four projects shown in this Ten-Year filing which will be pursued under one CEC application for the North Valley Project. The other lines involved in the North Valley Project are Raceway-Avery 230kV, Avery-Pinnacle Peak 230kV, and Westwing-Pinnacle Peak 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2005

Line Designation	Santa Rosa–Gila Bend 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	736 MVA
(c) Point of Origin	Santa Rosa substation; Sec. 30, T5S, R4E
(d) Intermediate Point	None
(e) Point of Termination	Gila Bend substation; Sec. 3, T6S, R5W
(f) Length	Approximately 55 miles of single-circuit line
Routing	Per Certificate
Purpose	This 230-kV line will provide an additional 230-kV transmission path to the existing Gila Bend substation, thereby enhancing the reliability and quality of electric service in the town of Gila Bend and adjacent rural areas, while supplying the growing demand for electric power. At the same time, transmission capacity to the Phoenix metropolitan area from the southern portions of the APS transmission system will be increased, thus enhancing APS ability to transmit economical power to the Phoenix load center when available.
Dates	
(a) Construction Start	2004
(b) Estimated In Service	2005

Certificate of Environmental Compatibility issued 1/6/83 (Case No. 61, Decision No. 53389). However, the designation of the Sonoran National Monument across part of the certificated route may require additional state or federal regulatory action prior to constructing the project.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2005

Line Designation	Liberty South–TS3 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	A new Liberty South substation near the existing WAPA Liberty substation. The substation is to be constructed in 2005; Sec. 19, T1N, R2W
(d) Intermediate Point	None
(e) Point of Termination	TS3 substation to be constructed in 2005 approximately 7 miles south of TS2 substation and 10 miles west of White Tanks substation; Sec. 35, T2N, R2W
(f) Length	Approximately 5 miles of double-circuit line
Routing	North 5 miles from Liberty South substation to TS3 substation generally parallel to Tuthill road
Purpose	This 230-kV line will provide additional sources for the TS2 and TS3 230/69-kV substations planned in the western and southwestern Phoenix metropolitan area, respectively. Increased reliability and quality of service will result for customers served by the two 230/69-kV substations.
Dates	
(a) Construction Start	2004
(b) Estimated In Service	2005

An application for a *Certificate of Environmental Compatibility* is planned for 2002. This line is one of two projects shown in this Ten-Year Plan which will be pursued under one CEC application. The other project is Liberty South-Liberty (WAPA) 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2005

Line Designation	Liberty South–Liberty (WAPA) 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	A new Liberty South substation near the existing WAPA Liberty substation. The substation is to be constructed in 2005; Sec. 19, T1N, R2W
(d) Intermediate Point	None
(e) Point of Termination	Liberty substation; Sec. 19, T1N, R2W
(f) Length	Approximately .5 miles of single-circuit line
Routing	North .5 miles from Liberty South substation to Liberty substation
Purpose	This 230-kV line will provide the system tie between the WAPA 230-kV system and the APS 230-kV system. Increased reliability and quality of service will result for customers served by the two substations.
Dates	
(a) Construction Start	2004
(b) Estimated In Service	2005

An application for a *Certificate of Environmental Compatibility* is planned for 2002. This line is one of two projects shown in this Ten-Year Plan which will be pursued under one CEC application. The other project is Liberty South-TS3 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	S.W. Valley loop-in of Jojoba-Kyrene 500-kV line
Size	
(a) Voltage	525-kV AC
(b) Capacity	2728 MVA
(c) Point of Origin	Jojoba-Kyrene 500-kV near 119th Avenue and Broadway road; Sec. 25, T1N, R1W
(d) Intermediate Point	None
(e) Point of Termination	S.W. Valley substation to be constructed near the intersection of Broadway Road and 119th Avenue; within the southwest quarter of Sec. 24, T1N, R1W.
(f) Length	Approximately .5 miles each of two single-circuit lines
Routing	North from the Jojoba-Kyrene 500 kV line near 119th Avenue, paralleling existing transmission lines to the S.W. Valley substation.
Purpose	These two single-circuit 500-kV lines will provide an increase in import capability to the Phoenix metropolitan area as well as reduce the exposure for loss of the 500-kV line serving Kyrene from the Palo Verde area by approximately 50%.
Dates	
(a) Construction Start	2006
(b) Estimated In Service	2006

Siting Committee approval issued on December 13, 2001 (Case No. 115); hearing by ACC scheduled for February 7, 2002.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	Trilby Wash–TS2–El Sol 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Trilby Wash substation to be constructed in 2006 approximately 7 miles southwest of Westwing substation. It will be a 500kV/230kV/69kV substation; Sec. 23, T4N, R2W
(d) Intermediate Point	TS2 substation to be constructed in 2009 approximately 7 miles south of Trilby Wash substation and 8 miles west of El Sol substation; Sec. 26, T3N, R2W
(e) Point of Termination	El Sol substation; Sec. 30, T3N, R1E
(f) Length	Approximately 15 miles of double-circuit line
Routing	South from Trilby Wash substation, generally parallel to Citrus Road for 7 miles, then east 8 miles to El Sol substation, generally parallel to Olive Avenue
Purpose	This line is required to serve the increasing need for electric energy in the western Phoenix metropolitan area, providing improved reliability and continuity of service for growing communities such as El Mirage, Surprise, and Youngtown.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2006

An application for a *Certificate of Environmental Compatibility* is planned for 2003.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	Pinal – Ice House 115-kV line
Size	
(a) Voltage	115-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Pinal substation Sec. 27, T1N, R15E
(d) Intermediate Point	None
(e) Point of Termination	Ice House substation to be constructed in 2006, approximately; Sec. 34, T1N, R15E
(f) Length	Approximately 3.75 miles of single-circuit line
Routing	South and east from Pinal substation, to the general area where Ice House Canyon and Six Shooter Canyon converge.
Purpose	This line is required to serve the increasing need for electric energy in the area of Globe and the San Carlos Indian Reservation.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2006

An application for a *Certificate of Environmental Compatibility* is planned for 2002.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	Hassayampa – S.E. Valley 500-kV line
Size	
(a) Voltage	525-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Hassayampa substation Sec. 3, T1S, R6W
(d) Intermediate Point	Casa Grande area
(e) Point of Termination	A new S.E. Valley 500-kV substation to be constructed in 2006, in the Coolidge/Florence area.
(f) Length	Approximately 120 miles, some built single-circuit and some built double-circuit
Routing	South and east from Hassayampa to the vicinity of the town of Mobile, then east to the new S.E. Valley substation.
Purpose	This is an SRP-led project that is the result of the CATS study. The line will increase import capability to the Phoenix metropolitan area as well as increase the export capability from the Palo Verde/Hassayampa area. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2006

An application for a *Certificate of Environmental Compatibility* has not yet been filed.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	Gila Bend–Yuma 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Gila Bend substation; Sec. 36, T2N, R1W
(d) Intermediate Point	None
(e) Point of Termination	An existing substation to be selected in or near Yuma, Arizona
(f) Length	Approximately 115 miles of single-circuit line
Routing	West from Gila Bend to Yuma, generally parallel to Interstate 8
Purpose	As a new transmission path to Yuma County, this 230-kV line will provide transmission capacity required to supplement limited transmission and generation resources in the Yuma area.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2006

An application for a *Certificate of Environmental Compatibility* has not yet been filed.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2006

Line Designation	Flagstaff-Winona 230-kV lines
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Flagstaff substation owned by WAPA; Sec. 24, T21N, R9E
(d) Intermediate Point	None
(e) Point of Termination	The Cholla-Coconino 230-kV line about 2 miles north of the Flagstaff substation; Sec. 26, T22N, R9E
(f) Length	Approximately 5 miles of double-circuit line
Routing	North from the WAPA owned Flagstaff substation, paralleling existing transmission lines, to the point where the Cholla-Coconino 230-kV line crosses the Glen Canyon-Flagstaff 345-kV lines.
Purpose	These lines will serve projected needs for electric energy in the northern Arizona area as well as increase reliability in the region.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2006

An application for a *Certificate of Environmental Compatibility* has not yet been filed.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2007

Line Designation	Raceway–Avery 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Raceway substation to be located along the Westwing-New Waddell 230-kV line, approximately 3 miles south of the New Waddell dam; Sec. 4, T5N, R1E
(d) Intermediate Point	None
(e) Point of Termination	A new Avery substation near Dove Valley road and 39th Avenue; Sec. 10, T5N, R2E
(f) Length	Approximately 10 miles of double-circuit line
Routing	South from Raceway substation approximately 1 mile, paralleling existing transmission lines, then east approximately 9 miles to the new Avery substation.
Purpose	This line will be essential to serve projected need for electric energy in the area immediately north of the Phoenix metropolitan area. Additionally, improved reliability and continuity of service will result for the area's growing communities such as Anthem, Desert Hills, and New River. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2004
(b) Estimated In Service	2007

Application for a *Certificate of Environmental Compatibility* will be filed in 2002. This line is one of four projects shown in this Ten-Year filing which will be pursued under one CEC application for the North Valley Project. The other lines in the North Valley Project are Westwing-Raceway 230kV, Avery-Pinnacle Peak 230kV, and Westwing-Pinnacle Peak 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2007

Line Designation	TS3–Buckeye 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	TS3 substation; Sec. 35, T2N, R2W
(d) Intermediate Point	None
(e) Point of Termination	Buckeye substation; Sec. 7, T1N, R3W
(f) Length	Approximately 7 miles of double-circuit line
Routing	West by southwest from TS3 substation, generally parallel to Interstate 10 for 7 miles to Buckeye substation
Purpose	This line is required to serve the increasing need for electric energy in the southwestern Phoenix metropolitan area, and to provide improved reliability and continuity of service for growing communities such as Buckeye, Goodyear, Liberty, and Perryville.
Dates	
(a) Construction Start	2006
(b) Estimated In Service	2007

An application for a *Certificate of Environmental Compatibility* has not yet been filed.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2008

Line Designation	Palo Verde-Table Mesa 500-kV line
Size	
(a) Voltage	525-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Palo Verde Power Plant; Sec. 34, T1N, R6W
(d) Intermediate Point	None
(e) Point of Termination	A new Table Mesa substation near the crossing of the Navajo-Westwing 500-kV lines and Interstate 17; Sec. 34, T8N, R2E
(f) Length	Approximately 120 miles of single-circuit line
Routing	North from Palo Verde substation approximately 25 miles and then in a northeasterly direction to the Table Mesa substation.
Purpose	This line will be needed to serve projected need for electric energy in the area immediately north of the Phoenix metropolitan area. It will increase the import capability to the Phoenix metropolitan area as well as increase the export capability from the Palo Verde/Hassayampa area. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2006
(b) Estimated In Service	2008

An application for a *Certificate of Environmental Compatibility* has not yet been filed. This line is one of two projects shown in this Ten-Year Plan which will be pursued under one CEC application. The other project is Table Mesa-Raceway 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2008

Line Designation	Table Mesa-Raceway 230-kV lines
Size	
(a) Voltage	230-kV AC
(b) Capacity	To be determined
(c) Point of Origin	A new Table Mesa substation near the crossing of the Navajo-Westwing 500-kV lines and Interstate 17; Sec. 34, T8N, R2E
(d) Intermediate Point	None
(e) Point of Termination	Raceway substation to be located along the Westwing-New Waddell 230-kV line, approximately 3 miles south of the New Waddell dam; Sec. 4, T5N, R1E
(f) Length	Approximately 16 miles of double-circuit line
Routing	South from the new Table Mesa substation, paralleling existing transmission lines, approximately 16 miles to the Raceway substation
Purpose	These lines will be needed to increase import capability to the Phoenix metropolitan area and serve projected need for electric energy in the area immediately north of the Phoenix metropolitan area. Additionally, improved reliability and continuity of service will result for the area's growing communities such as Anthem, Desert Hills, and New River. The line will also increase the export capability from the Palo Verde/Hassayampa area. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2004
(b) Estimated In Service	2008

An application for a *Certificate of Environmental Compatibility* has not yet been filed. This line is one of two projects shown in this Ten-Year filing which will be pursued under one CEC application. The other project is Palo Verde-Table Mesa 500kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2008

Line Designation	Pinnacle Peak–Avery 230-kV lines
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	Pinnacle Peak substation; Sec. 25, T4N, R3E
(d) Intermediate Point	None
(e) Point of Termination	A new Avery substation near Dove Valley road and 39th Avenue; Sec. 10, T5N, R2E
(f) Length	Approximately 16 miles of double-circuit line
Routing	Along the existing 230-kV right-of-way, west 10 miles from Pinnacle Peak substation to approximately Interstate 17, generally parallel to and south of Happy Valley road; then north 5 miles, generally parallel to Interstate 17, to Dove Valley road, then west to the new Avery substation
Purpose	These lines will be essential to serve projected need for electric energy in the area immediately north of the Phoenix metropolitan area. Additionally, improved reliability and continuity of service will result for the growing communities in the area, such as Anthem, Desert Hills, and New River. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2003
(b) Estimated In Service	2008

Application for a *Certificate of Environmental Compatibility* will be filed in 2002. This line is one of four projects shown in this Ten-Year Plan which will be pursued under one CEC application as the North Valley Project. The other lines in the North Valley Project are Westwing-Raceway 230kV, Raceway-Avery 230kV, and Westwing-Pinnacle Peak 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2009

Line Designation	TS2–TS3 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	TS2 substation to be constructed in 2009 approximately 7 miles south of Trilby Wash substation and 8 miles west of El Sol substation; Sec. 26, T3N, R2W
(d) Intermediate Point	None
(e) Point of Termination	TS3 substation to be constructed in 2005 approximately 7 miles south of TS2 substation and 7 miles west of White Tanks substation; Sec. 35, T2N, R2W
(f) Length	Approximately 7 miles of double-circuit line
Routing	South 7 miles from TS2 substation to TS3 substation generally parallel to Citrus road
Purpose	This 230-kV line will provide additional sources for the TS2 and TS3 230/69-kV substations planned in the western and southwestern Phoenix metropolitan area, respectively. Increased reliability and quality of service will result for customers served by the two 230/69-kV substations.
Dates	
(a) Construction Start	2005
(b) Estimated In Service	2009

An application for a *Certificate of Environmental Compatibility* has not yet been filed.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2009

Line Designation	Westwing–El Sol 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	Westwing substation; Sec. 12, T4N, R1W
(d) Intermediate Point	None
(e) Point of Termination	El Sol substation; Sec. 30, T3N, R1E
(f) Length	Approximately 11 miles of single-circuit line
Routing	Per Certificate
Purpose	This line will increase system capacity to serve growing demand for electric energy in the Phoenix metropolitan area, while maintaining system reliability and integrity for delivery of bulk power from Westwing south into the APS Phoenix metropolitan area 230-kV transmission system
Dates	
(a) Construction Start	2007
(b) Estimated In Service	2008

Certificate of Environmental Compatibility issued 7/26/73 (Case No. 9, Docket No. U-1345) Note that this Certificate authorizes two double-circuit lines. Construction of the first double-circuit line was completed in March 1975. Construction of the second line, planned to be built with double-circuit capability but initially operated with a single circuit, is described above.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
2011

Line Designation	Westwing–Pinnacle Peak 230-kV line
Size	
(a) Voltage	230-kV AC
(b) Capacity	1200 MVA
(c) Point of Origin	Westwing substation; Sec. 12, T4N, R1W
(d) Intermediate Point	Raceway and Avery are possible interconnection points
(e) Point of Termination	Pinnacle Peak substation; Sec. 25, T4N, R3E
(f) Length	Approximately 32 miles of new line to be built on double-circuit poles built for the Westwing-Raceway, Raceway-Avery and Avery-Pinnacle Peak projects.
Routing	Second circuit to be installed on towers built for the Westwing-Raceway 230kV project, the Raceway-Avery 230kV project and the Avery-Pinnacle Peak 230kV project.
Purpose	This line will be needed to increase the adequacy of the existing Phoenix metropolitan area transmission system. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	2003
(b) Estimated In Service	2011

Application for a *Certificate of Environmental Compatibility* will be filed in 2002. This line is one of four projects shown in this Ten-Year Plan which will be pursued under one CEC application as the North Valley Project. The other lines in the North Valley Project are Westwing-Raceway 230kV, Raceway-Avery 230kV, and Avery-Pinnacle Peak 230kV.

ARIZONA PUBLIC SERVICE COMPANY
2002–2011
TEN-YEAR PLAN

PLANNED TRANSMISSION DESCRIPTION
TBD

Line Designation	Palo Verde-Saguaro 500-kV line
Size	
(a) Voltage	525-kV AC
(b) Capacity	To be determined
(c) Point of Origin	Palo Verde Power Plant; Sec. 34, T1N, R6W
(d) Intermediate Point	Hassayampa, Jojoba, and the Casa Grande area are possible interconnection points.
(e) Point of Termination	Saguaro substation; Sec. 14, T10S, R10E
(f) Length	Approximately 130 miles of new line to be built on single-circuit poles or towers. Some sections may be built on double-circuit structures.
Routing	South and east from the Palo Verde switchyard, paralleling existing transmission lines for part of the route. The approved corridor is defined in the CEC identified below.
Purpose	This line is the result of the joint participation CATS study. The line will be needed to increase the adequacy of the existing EHV transmission system and permit increased power delivery throughout the state. It is anticipated the line will be a joint participation project.
Dates	
(a) Construction Start	TBD
(b) Estimated In Service	TBD

Certificate of Environmental Compatibility issued 01/23/1976 (Case No. 24, Decision No. 46802)

2

ARIZONA PUBLIC SERVICE COMPANY

TRANSMISSION PLANNING PROCESS

AND GUIDELINES

APS Transmission Planning
January 2002

TRANSMISSION PLANNING PROCESS AND GUIDELINES

TRANSMISSION PLANNING PROCESS AND GUIDELINES

I. INTRODUCTION AND PURPOSE

The Transmission Planning Process and Guidelines (Guidelines) are used by Arizona Public Service Company (APS) to assist in planning its Extra High Voltage (EHV) transmission system (345kV and above) and High Voltage transmission system (230kv and 115kV). In addition to these Guidelines, APS follows the Western Systems Coordinating Council's (WSCC) regional planning reliability criteria for system disturbance and performance levels.[1] These WSCC Reliability Criteria, which can be found in their entirety on the WSCC website, are (1) Reliability Criteria for Transmission System Planning and (2) Minimum Operating Reliability Criteria. These Guidelines are for internal use by APS and may be changed or modified at any time without notice. Thus, these Guidelines should not be used by others without consultation with APS.

II. PLANNING METHODOLOGY

A. General

APS uses a deterministic approach for transmission system planning. Under this approach, system performance should meet certain specific criteria under normal conditions (all lines in service) and for any single contingency condition (any one element out of service). In general, an adequately planned transmission system will:

- Provide an acceptable level of service at the lowest cost for normal and single contingency operating conditions.
- Not result in the loss of load for any single contingency outage.
- Not result in cascading, overloaded equipment, or unacceptable voltage conditions for any single contingency outage.
- Work in compliment with local generation in load constrained areas.

At present, probabilistic computational techniques are not directly used in the transmission planning process. However, system reliability performance is examined in the solution of switchyard circuit breaker arrangements, transformer reserve

[1] The WSCC is in the process of merging with two other regional transmission authorities to form the Western Electricity Coordinating Council ("WECC").

capacity, and in the choice of using single contingency outages for reserve transmission capacity. Further, deterministic guidelines generally provide some margin. The WSCC is developing and plans to phase in probabilistic performance criteria in its planning criteria, which APS generally follows.

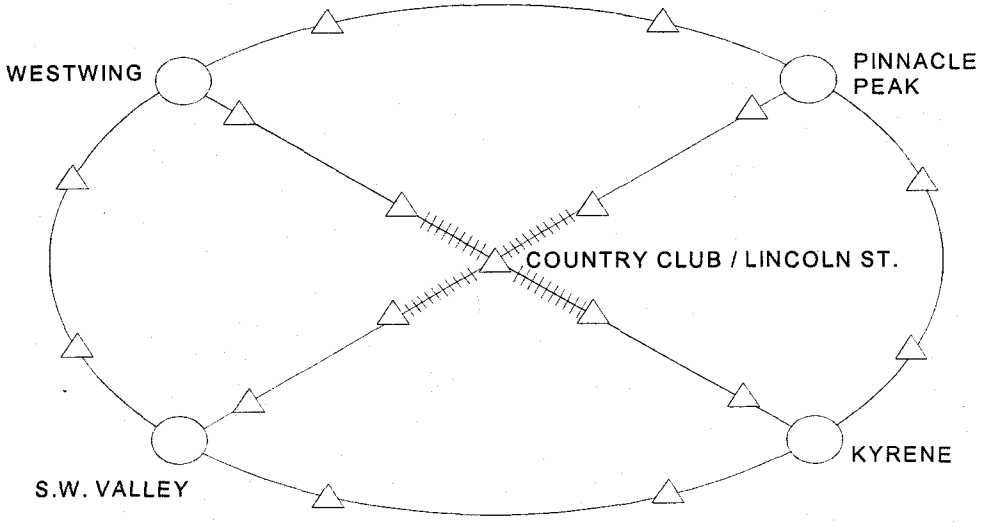
These planning methodologies, assumptions, and guidelines are used as the basis for the development of future transmission facilities. Additionally, consideration of potential alternatives to transmission facilities (such as distributed generation or new technologies) are evaluated on a case-specific basis. As the system grows and changes, and as more planning tools become available to the transmission planning engineer, revisions or additions to these guidelines will be made as appropriate.

B. 230kV Long Range System

APS' planning process begins with the review of the major long-range 230kV system requirements. APS' philosophy regarding long-range 230kV transmission planning has been to develop four major source points (Westwing, Pinnacle Peak, Kyrene, and Southwest Valley) in the Valley. *See* Figure 1. In the future, other major source points may become necessary.

FIGURE 1

APS VALLEY LONG RANGE 230KV TRANSMISSION PHILOSOPHY



LEGEND

- 230kV Bulk Load Substation
- 500kV Bulk Source Substation
- Multi-circuit 230kV O/H Line
- Single-circuit 230kV UN/G Cable

The Long Range Substation Development Master Plan for the Phoenix Metropolitan Area will be utilized in determining the location of future 230/69kV and 69/12.5kV substations. This Master Plan considered future land use plans that were developed by government agencies, Landis aerial photo maps, and master plans that were provided by private developers. Other factors considered in developing the Master Plan included (1) APS' long-range forecasted load densities per square mile for residential, commercial, and industrial loads, (2) the 12.5kV service areas and associated number of 69/12.5kV substations and (3) the 69kV service areas and associated 230/69kV substations for the Phoenix area.

C. Ten Year System Expansion Plans

The next step is to conduct detailed 230kV facility studies to develop APS' ten-year 230kV system expansion plans. In developing these plans, the 69kV and 230kV system requirements are coordinated to minimize future expansion of facilities, while at the same time achieving the long range 230kV and 69kV substation expansion plans set forth in the Master Plan. Consideration is given to load growth patterns due to master planned developments, new housing developments, shopping centers, high/mid rise buildings, and industrial parks. Also considered are other system changes affected by right-of-way, facilities siting constraints, routing of future transportation corridors, and joint planning with neighboring utilities and governmental entities.

D. Facilities Keyed to Generation/Resource Additions

New EHV transmission facilities are also required in conjunction with generation resources due to (1) a "merchant" request by an Independent Power Producer (IPP) for generator interconnection to the APS system, (2) a "merchant" request for point-to-point transmission service from the generator (receipt point) to the designated delivery point or (3) designation of new resources to serve APS network load (including removal of other units' native load designation).

If an interconnection or transmission service request is made by an IPP to interconnect to or deliver power over the APS system, APS will perform the study work and enter into appropriate agreements pursuant to applicable FERC regulations and APS' Open Access Transmission Tariff. At present, FERC is reviewing and standardizing the interconnection process and agreements. APS may design and construct, at the IPP's expense, transmission facilities identified in the Facilities Study that are needed to accommodate the interconnection or a transmission service request.

New transmission facilities may also be required due to re-designation of or units to serve APS' network load.

E. Generation Schedules

For planning purposes, economic dispatch of network resources are determined for APS' system peak load in the following manner:

a. Determine base generation available and schedule these units at maximum output.
b. Determine resources purchased from other utilities, IPPs, or power marketing agencies.
c. Determine APS' spinning reserve requirements.
d. Schedule intermediate generation (oil/gas steam units) such that the spinning reserve requirements in section (c) above are met.
e. Determine the amount of peaking generation (combustion turbine units) required to supply the remaining system peak load.

Phoenix area network resources are dispatched based on economics and any existing import limitations. When possible, spinning reserve will be carried on higher cost Phoenix area network generating units.

Generation output schedules for interconnected utilities and IPPs are based upon consultation with the neighboring utilities and IPPs or as modeled in the latest data in WSCC coordinated study cases.

F. Study Period

Transmission plans are updated on a continuing basis to determine the projected facilities needs for each year over a ten-year period. These plans then become a basis for the transmission capital budget and future facility construction. Each year the plans for the next ten years are developed by first determining the requirements for the tenth year, and then defining the additions required for each for the preceding nine years. Needs for specific projects are incorporated in these 10 years plans.

G. Regional Coordinated Planning

1. Western Systems Coordinating Council (WSCC)

APS is a member of the Western Systems Coordinating Council. The focus of the WSCC is on promoting the reliability of the interconnected bulk electric system. The WSCC provides the means for:

- Developing regional planning and operating criteria.
- Coordinating future plans.
- Compiling regional data banks for use by the member systems and the WSCC in conducting technical studies.
- Assessing and coordinating operating procedures and solutions to regional problems.
- Establishing an open forum with interested non-project participants to review the plan of service for a project.

2. Joint Studies

In many instances, EHV projects can serve the needs of several utilities, IPPs, or both. To this end, joint study efforts may be undertaken. Such joint study efforts endeavor to develop a plan which will meet the needs and desires of all individual companies.

H. Load Projections

APS substation load projections are based on the APS Corporate Load Forecast. Substation load projections for neighboring interconnected utilities or power agencies operating in the WSCC area are based on the latest data in WSCC coordinated study cases. Heavy summer loads are used for the studies.

I. Alternative Evaluations

1. General. In evaluating several alternative plans, comparisons of power flows, transient stability tests and fault levels are made first. After the alternatives are found that meet the system performance criteria in each of these three areas, comparisons may be made of the losses, transfer capability, impact on system operations and reliability of each of the plans. Finally, the costs of facility additions (capital cost items), costs of losses, and relative costs of transfer capabilities are determined. A brief discussion of each of these considerations follows.
2. Power Flow Analyses. Power flows of base case (all lines in service) and single contingency conditions are tested and should conform to the system performance criteria set forth in Section IV of these Guidelines. Double or multiple contingencies are examined, but in general, no facilities are planned for such conditions. Normal system voltages, voltage deviations and voltage extreme limitations are based upon operating experience resulting in acceptable voltage levels to the consumer. Power flow limits are based upon the thermal ratings and/or sag limitations of conductors or equipment, as applicable.

3. Transient Stability Studies. Stability guidelines are established to maintain system stability for single contingency, three-phase fault conditions. Double or multiple contingencies are examined, but in general, no facilities are planned for such conditions.
4. Short Circuit Studies. Three-phase and single-phase to ground fault studies are performed to ensure the adequacy of system protection equipment to clear and isolate faults.
5. Losses Analyses. A comparison of individual element and overall transmission system losses are made for each alternative plan being studied. The losses computed in the power flow program consist of the I^2R losses of lines and transformers and the core losses in transformers where represented.
6. Transfer Capability Studies. In evaluating the relative merits of one or more EHV transmission plans, both simultaneous and non-simultaneous transfer capability studies are performed to determine the magnitude of transfer capabilities between areas or load centers.
7. Subsynchronous Resonance (SSR). SSR phenomenon result from the use of series capacitors in the network where the tuned electrical network exchanges energy with a turbine generator at one or more of the natural frequencies of the mechanical system. SSR countermeasures are applied to prevent damage to machines as a result of transient current or sustained oscillations following a system disturbance. SSR studies are not used directly in the planning process. SSR countermeasures are determined after the transmission plans are finalized.
8. Economic Evaluation. In general, an economic evaluation of alternative plans consists of a cumulative present worth or equivalent annual cost comparison of capital costs.

III. PLANNING ASSUMPTIONS

A. General

1. Loads. Loads used for the APS system originate from the latest APS Corporate Load Forecast. In most cases, the corrected power factor of APS loads is 99.5%.
2. Generation and Other Resources. Generation dispatch is based on firm power and or transmission wheeling contracts including network resources designations.
3. Nominal Voltage Levels
   a. Nominal EHV design voltages are 500kV, 345kV, 230kV, and 115kV.
   b. Nominal EHV operating voltages are 535kV, 348kV, 239kV, and 119kV.

4. Sources of Data Bases. WSCC Heavy Summer base cases are the sources of the data bases. Loop flow (unscheduled flow), of a reasonable amount and direction, will be allowed for use in planning studies.
5. Voltage Control Devices. Devices which can control voltages are shunt capacitors, shunt reactors, TCUL and fixed-tap transformers, static VAR compensators, and machine VAR capabilities. If future voltage control devices are necessary, these devices will be evaluated based upon economics and the equipment's ability to obtain an adequate voltage profile on the EHV and HV systems.
6. Phase Shifters. In general, where phase shifters are used, schedules are held across the phase shifter in base case power flows and the phase shifter angle is held in the outage cases.
7. Conductor Sizes. Existing voltages utilized by APS are 230kV, 345kV, and 500kV. It is presently planned that the 345kV transmission system will not be expanded, thus all future APS EHV lines will be 500kV or 230kV. Planned 500kV lines will initially be modeled using tri bundle 1780 kCM ACSR conductor (Chukar) with a flat phase spacing of 32 ft./32 ft./64 ft. between phases, unless otherwise specified. Preferred construction for 230kV lines consists of 954 ACSS conductor on steel poles.
8. 69kV System Modeling. 230kV facility outages may result in problems to the underlying 69kV system due to the interconnection of those systems. For this reason, power flow cases include a detailed 69kV system representation. Solutions to any problems encountered on the 69kV system are coordinated with the subtransmission planning engineers.
9. Substation Transformers
   a. Bulk substation transformer banks may be made up of three-phase or three single-phase auto-transformers, depending upon bank size and economics. For larger banks where single-phase transformers are used, a fourth (spare) single-phase transformer will be used in a jack-bus arrangement to improve reliability and facilitate connection of the spare in the event of an outage of one of the single-phase transformers. Automatic tap-changing-under-load (TCUL) will be considered in the high voltage windings, generally with a range of plus or minus 10%. High voltage ratings will be 500kV or 345kV class and low voltage windings will be 230kV, 115kV or 69kV class.
   b. For high density load areas, both 230/69kV and 69/12.5kV transformers can be utilized. 230/69kV transformers will be rated at 113/150/188 MVA with a 65^{o}C temperature rise, unless otherwise specified. 69/12.5kV transformers will

be rated at 25/33/41 MVA with a 65°C temperature rise, unless otherwise specified. 188 MVA transformers are utilized in future 230/69kV substations up to a 200 MVA load level. Beyond the 200 MVA load level, the economic sizes of 230/69kV transformers to serve the load are as follows:

1) Add the third 188 MVA transformer if the load potential is expected to be 400 MVA or less.
2) If the load potential is expected to exceed 400 MVA then another 230/69kV substation will be built.

With all elements in service, a transformer may be loaded up to its top Forced Oil Air (FOA) rating without sustaining any loss of service life. For a single contingency outage (loss of one transformer) the remaining transformer or transformers may be loaded up to 20% above their top FOA rating, unless heat test data indicate a different overload capability. The loss of service life sustained will depend on the transformer pre-loading and the outage duration. Tap setting adjustment capabilities on 230/69kV transformers will be ±5% from the nominal voltage setting (230/69kV) at 2 1/2% increments.

10. Switchyard Arrangements

a. 500kV and 345kV Substations. Existing 345kV switchyard arrangements use breaker-and-one-half, main-and-transfer or modified-paired element circuit breaker switching schemes. Because of the large amounts of power transferred via 500kV switchyards and the necessity of having adequate reliability, all 500kV circuit breaker arrangements are planned for an ultimate breaker-and-one-half scheme. If only three or four elements are initially required, the circuit breakers are connected in a ring bus arrangement, but physically positioned for a breaker-and-one-half scheme. The maximum number of elements to be connected in the ring bus arrangement is six. System elements such as generators, transformers and lines will be arranged in breaker-and-one-half schemes such that a failure of a center breaker will not result in the loss of two lines routed in the same general direction and will minimize the impact of losing two elements.

b. 230kV Substations. Future 230/69kV substations should be capable of serving up to 564 MVA of load. 400 MVA has historically been the most common substation load level in the Phoenix Metropolitan area. Future 230/69kV substations should accommodate up to four 230kV line terminations and up to three 230/69kV transformer bays. Based upon costs, as well as reliability and operating flexibility considerations, a breaker-and-one-half layout should be

utilized for all future 230/69kV Metropolitan Phoenix Area substations, with provision for initial development to be a ring bus. Any two 230/69kV transformers are to be separated by two breakers so that a stuck breaker will not result in an outage of both transformers.

11. Series Capacitor Application. Series capacitors may be used on EHV lines to increase system stability, for increased transfer capability and/or for control of power flow. The series capacitors may be lumped at one end of a line because of lower cost; however, the capacitors are generally divided into two banks, one at either end of a line, for improved voltage profile.
12. Shunt and Tertiary Reactor Application. Shunt and/or tertiary reactors may be installed to prevent open end line voltages from being excessive, in addition to voltage control. The open end line voltage must not be more than .05 per unit voltage greater than the sending end voltage. Tertiary reactors may also be used for voltage and var control as discussed above.

B. Power Flow Studies
   1. System Stressing. Realistic generation capabilities and schedules should be used to stress the transmission system in order to maximize the transfer of resources during the maximum load condition.
   2. Displacement. In cases where displacements (due to power flow opposite normal generation schedules) may have an appreciable effect on transmission line loadings, a reasonable amount of displacement (Generation Units) may be removed.

C. Transient Stability Studies
   1. Fault Simulation. When studying system disturbances caused by faults, two conditions will be simulated:
      a. Three-phase-to-ground faults, and
      b. Single-line-to-ground faults with a stuck circuit breaker in one phase with back-up, delayed clearing.
   2. Margin
      a. Generation margin may be applied for the contingencies primarily affected by generation, or
      b. Power flow margin may be applied for the contingencies primarily affected by power flow.
   3. Unit Tripping. Generator unit tripping may be allowed to increase system stability performance.

4. Machine Reactance Representation. For transient stability studies, the unsaturated transient reactance of machines with full representation will be used.
5. Fault Damping. Fault damping will be applied to the generating units adjacent to faults. Fault damping will be determined from studies that account for the effect of generator amortisseur windings and the SSR filters.
6. Series Capacitor Switching. Series capacitors, locations to be determined from short circuit studies, will be flashed and reinserted as appropriate.

D. Short Circuit Studies

Three phase and single phase to ground faults will be evaluated.

1. Generation Representation

   All generation will be represented.
2. Machine Reactance Representation

   The saturated subtransient reactance (X''_d) values will be used.
3. Line Representation

   The transmission line zero sequence impedance (X_o) is assumed to be equal to three times the positive sequence impedance (X_1).
4. Transformer Representation

   The transformer zero sequence impedance (X_o) is assumed to be equal to the positive sequence impedance (X_1). Bulk substation transformers are modeled as auto-transformers. The two winding model is that of a grounded-wye transformer. The three winding model is that of a wye-delta-wye with a solid ground.

IV. SYSTEM PERFORMANCE

A. Power Flow Studies

1. Normal (Base Case Conditions)
   a. Voltage Levels
      1) General
         a) 500kV bus voltages will be maintained between 1.05 and 1.08 p.u. on a 500kV base.
         b) 345kV bus voltages will range between .99 and 1.04 p.u. on the 345kV system.
         c) 500kV and 345kV system voltages are used to maintain proper 230kV bus voltages.

d) Voltage on the 230kV and 115kV system should be between 1.01 p.u. and 1.05 p.u.

e) Tap settings for 230/69kV and 345/69kV transformers should be used to maintain low side (69kV) voltages of 1.03 p.u. to 1.04 p.u. Seasonal tap changes may be required.

2) Specific Buses

a) APS Pinnacle Peak 230kV bus voltage should be between 1.025 p.u. and 1.035 p.u.

b) APS Westwing 230kV bus voltage should be between 1.04 p.u. and 1.05 p.u.

c) Saguaro 115kV bus voltages will be approximately 1.035 p.u.

d) Voltage at the Prescott (DOE) 230kV bus should be approximately 1.02 p.u.

b. Facility Loading Limits

1) Transmission line loadings cannot exceed 100% of the continuous rating, which is based upon established conductor temperature limit or sag limitation.

2) Underground Cable loadings should not exceed 100% of the continuous rating with all elements in service. This rating is based on a cable temperature of 85^{0}C with no loss of cable life.

3) Transformers cannot exceed 100% of top FOA, 65^{0} rise, and nameplate ratings.

4) Series capacitors cannot exceed 100% of continuous rating.

c. Interchange of Vars. Interchange of VARS between companies at interconnections will be reduced to a minimum and maintained near zero.

d. Distribution of Flow. Schedules on a new project will be compared to simulated power flows to ensure a reasonable level of flowability.

2. Single Contingency Outages

a. Voltage Levels. Maximum voltage deviation on APS' major buses cannot exceed 5%. This deviation level yields a close approximation to the post-transient VAR margin requirements of WSCC.

b. Facilities Loading Limits

1) Transmission line loadings cannot exceed 100% of the lesser of the sag limit or the emergency rating (30 minute rating) which is based upon established conductor temperature limit.

2) Underground cable loading should not exceed the emergency rating during a

single contingency outage. This rating is based on a cable temperature of 105°C for two hours of emergency operation with no loss of cable life.

3) Transformers cannot exceed 110% of top FOA 65° rise, name plate rating.

4) Series capacitors cannot exceed 100% of emergency rating.

c. Generator units used for controlling remote voltages will be modified to hold their base case terminal voltages.

d. Impact on Interconnected Systems. Single contingency outages will not cause overloads upon any neighboring transmission system.

B. Transient Stability Studies

Transient stability studies are primarily performed on the 500kV and 345kV systems.

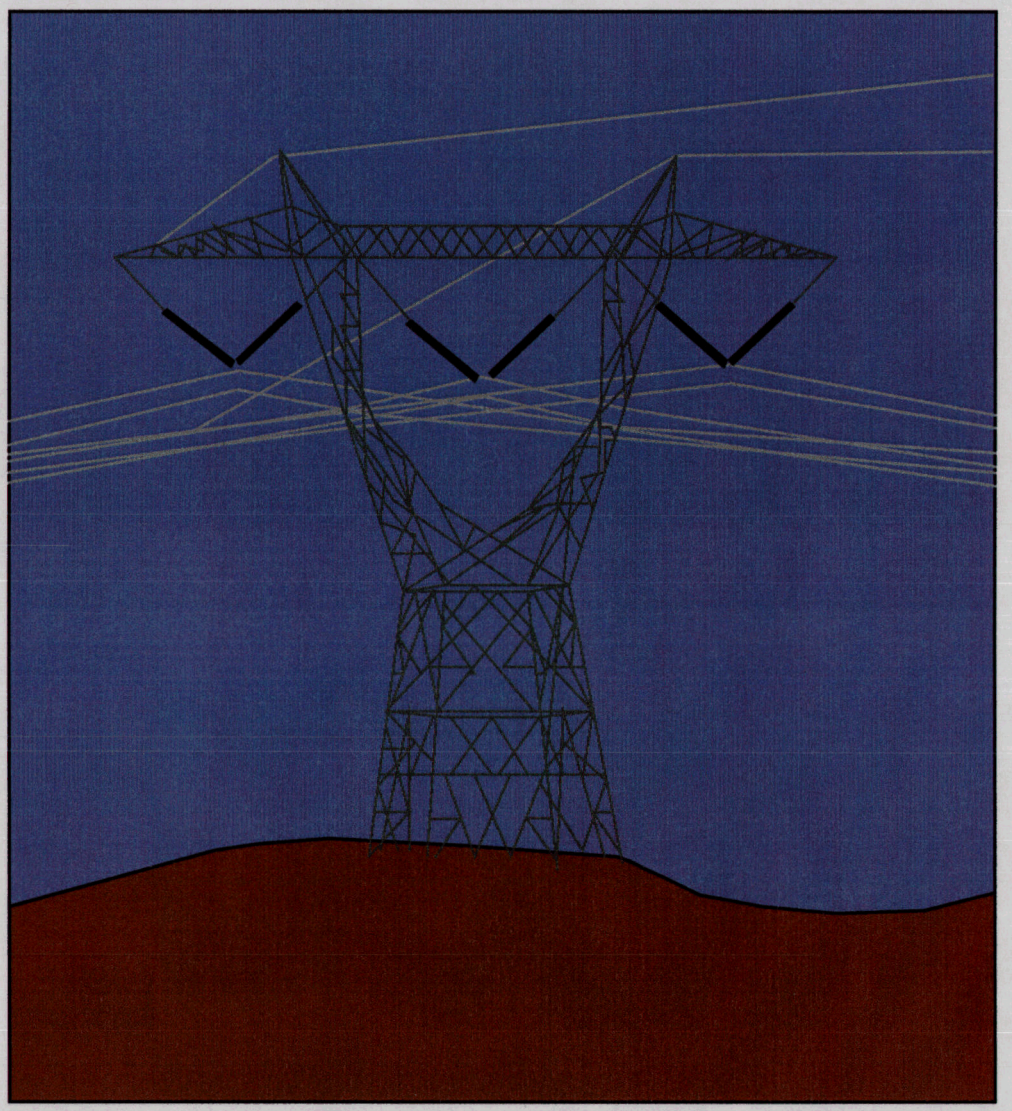
1. Fault Simulation
   a. Three-phase-to-ground faults, and
   b. Single-line-to-ground faults simulating a stuck circuit breaker in one phase with back up, delayed clearing will be simulated. Fault clearing times of four cycles after fault inception (5 cycles for a 230kV fault) and a back-up clearing time of twelve cycles after fault inception is utilized. System elements are switched out at the appropriate clearing times, as applicable. Fault damping will be applied when applicable at fault inception.
2. Series Capacitor Switching. Series capacitors, at locations determined from short circuit studies, will be flashed at fault inception and will be reinserted depending on their reinsertion types.
3. System Stability. The system will be considered stable if the following conditions are met:
   a. All machines in the system remain synchronized as demonstrated by the relative rotor angles.
   b. System damping exists as demonstrated by the damping of relative rotor angles and the damping of voltage magnitude swings. Voltages for the first swing after fault clearing should not drop below 75% of pre-fault value with maximum time duration of 20 cycles for voltage dip exceeding 20%.
4. Re-closing. Automatic re-closing of circuit breakers controlling EHV facilities is not utilized.

C. Short Circuit Studies

Fault current shall not exceed 100% of the substation fault current interruption capability for three phase or single-line-to-ground faults.

3

2001 SYSTEM RATING MAPS



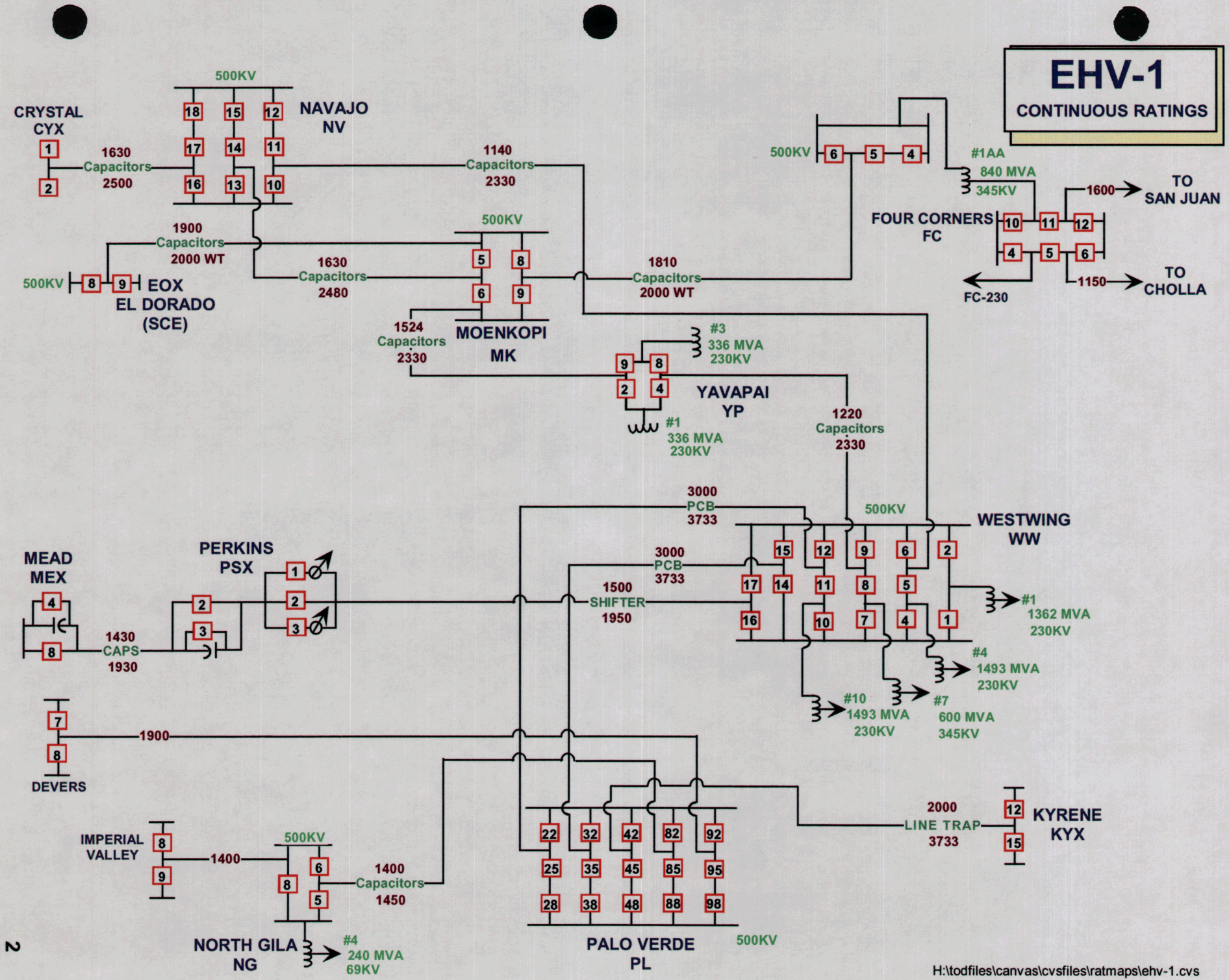
Prepared By

Transmission Operations
December 2001

TABLE OF CONTENTS

LEGEND
SYSTEM RATING MAPS

SYMBOL	DESCRIPTION
###	CURRENT LIMIT IN AMPS
###	LIMITING ELEMENT
###	CONDUCTOR LIMIT IN AMPS
	TRANSFORMER LIMITS ARE IN MVA
————	OVERHEAD TRANSMISSION LINE
– – – – – –	UNDERGROUND CABLE
M	MOTOR OPERATED SWITCH
V	VACCUM SWITCH
H	HYDRAULIC SWITCH
1	BREAKER NUMBER


EHV-1
CONTINUOUS RATINGS
500KV
CRYSTAL
CYX
1
2
1630
Capacitors
2500
18
15
12
17
14
11
16
13
10
NAVAJO
NV
1140
Capacitors
2330
1900
Capacitors
2000 WT
500KV
8
9
EOX
EL DORADO
(SCE)
1630
Capacitors
2480
500KV
5
8
6
9
1524
Capacitors
2330
MOENKOPI
MK
1810
Capacitors
2000 WT
500KV
6
5
4
#1AA
840 MVA
345KV
FOUR CORNERS
FC
10
11
12
4
5
6
1600
TO
SAN JUAN
1150
TO
CHOLLA
FC-230
#3
336 MVA
230KV
9
8
2
4
YAVAPAI
YP
#1
336 MVA
230KV
1220
Capacitors
2330
3000
PCB
3733
500KV
WESTWING
WW
MEAD
MEX
4
8
1430
CAPS
1930
PERKINS
PSX
2
3
1
2
3
3000
PCB
3733
1500
SHIFTER
1950
15
12
9
6
2
17
14
11
8
5
16
10
7
4
1
#1
1362 MVA
230KV
#4
1493 MVA
230KV
#10
1493 MVA
230KV
#7
600 MVA
345KV
7
8
DEVERS
1900
IMPERIAL
VALLEY
8
9
1400
500KV
8
6
5
1400
Capacitors
1450
NORTH GILA
NG
#4
240 MVA
69KV
22
32
42
82
92
25
35
45
85
95
28
38
48
88
98
PALO VERDE
PL
500KV
2000
LINE TRAP
3733
12
15
KYRENE
KYX
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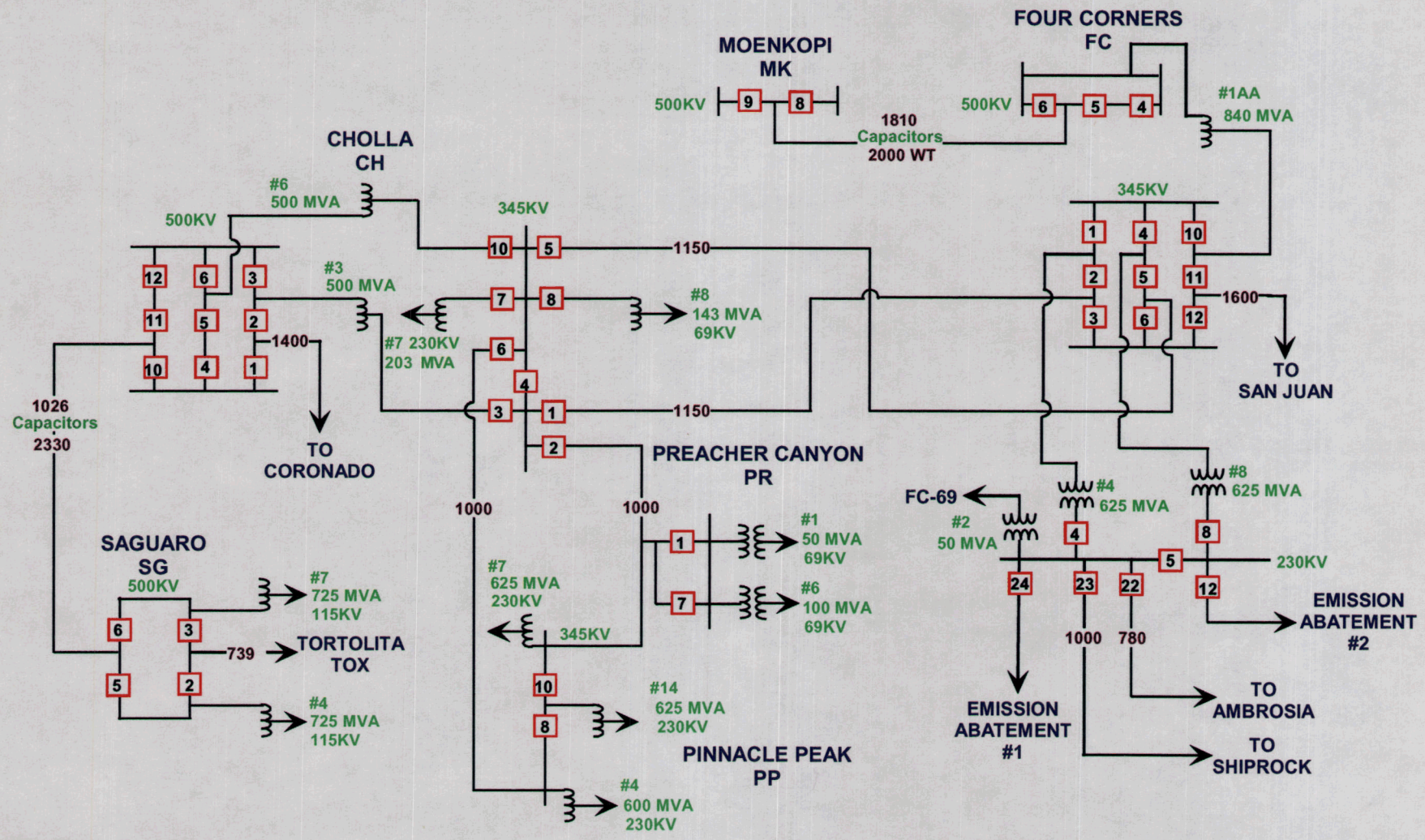
Rev. 01/03/01

EHV-2
CONTINUOUS RATINGS



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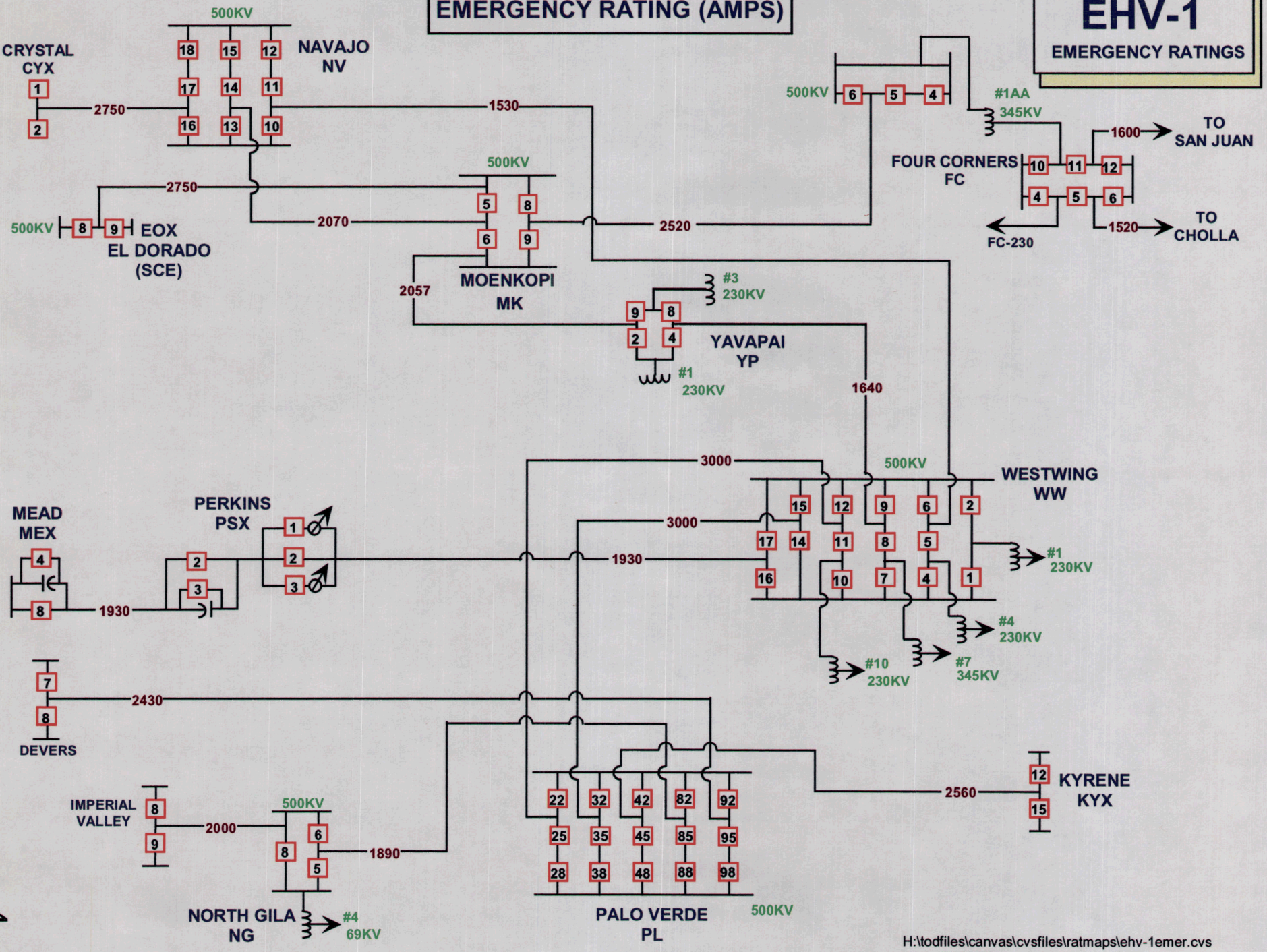
Rev. 01/03/02

EMERGENCY RATING (AMPS)

EHV-1
EMERGENCY RATINGS



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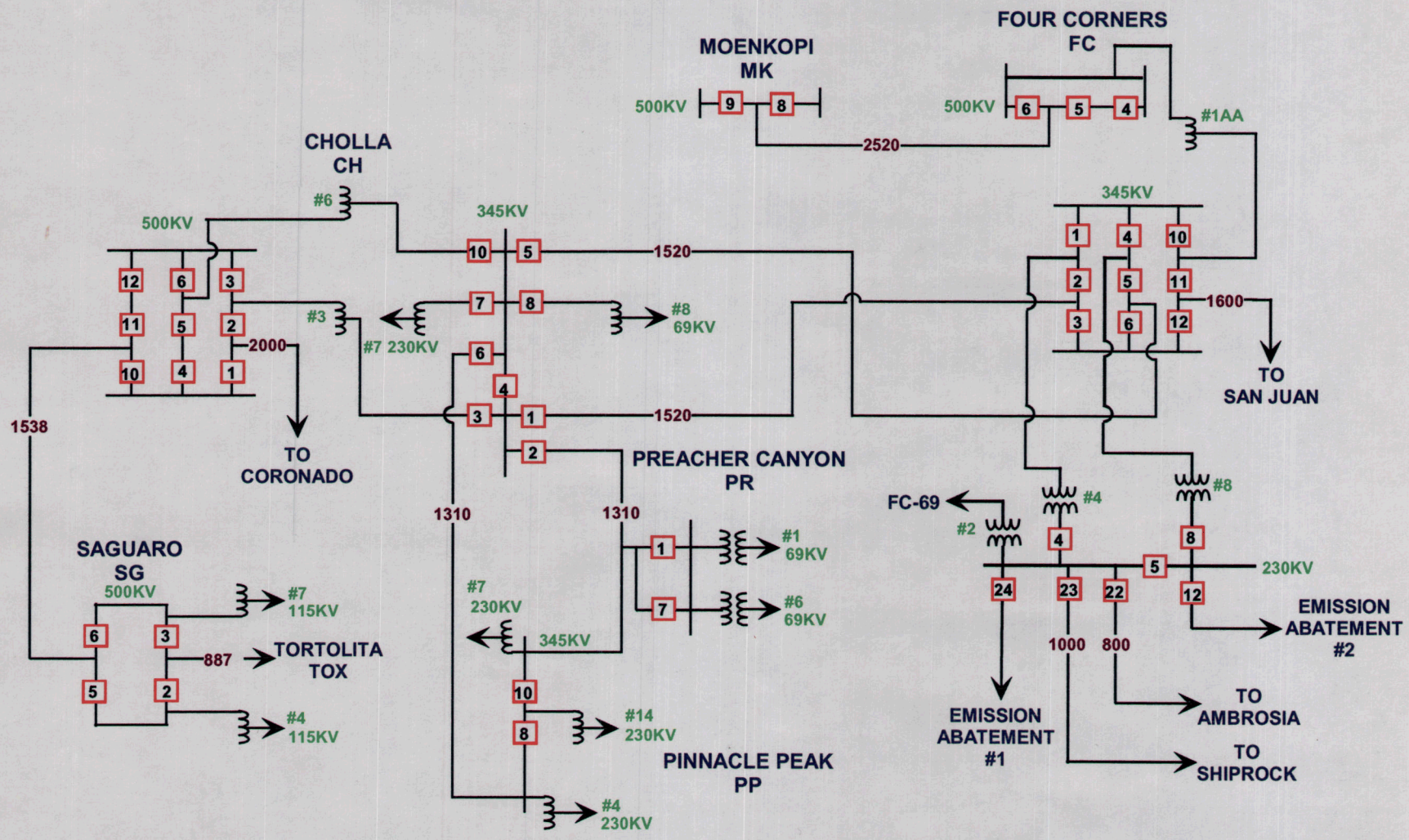
EHV-2
EMERGENCY RATINGS



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Rev. 01/02/02

METRO 230KV

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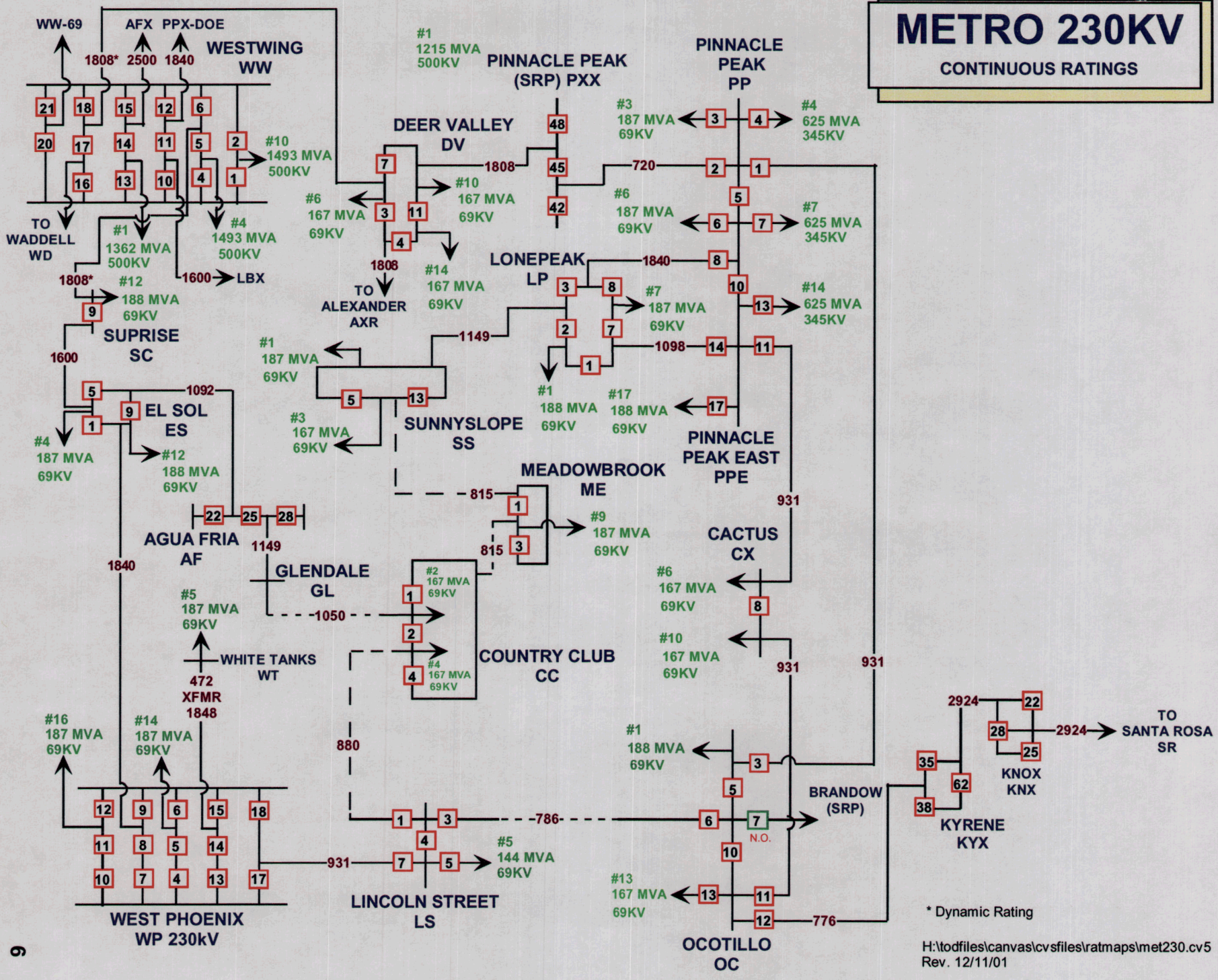

* Dynamic Rating

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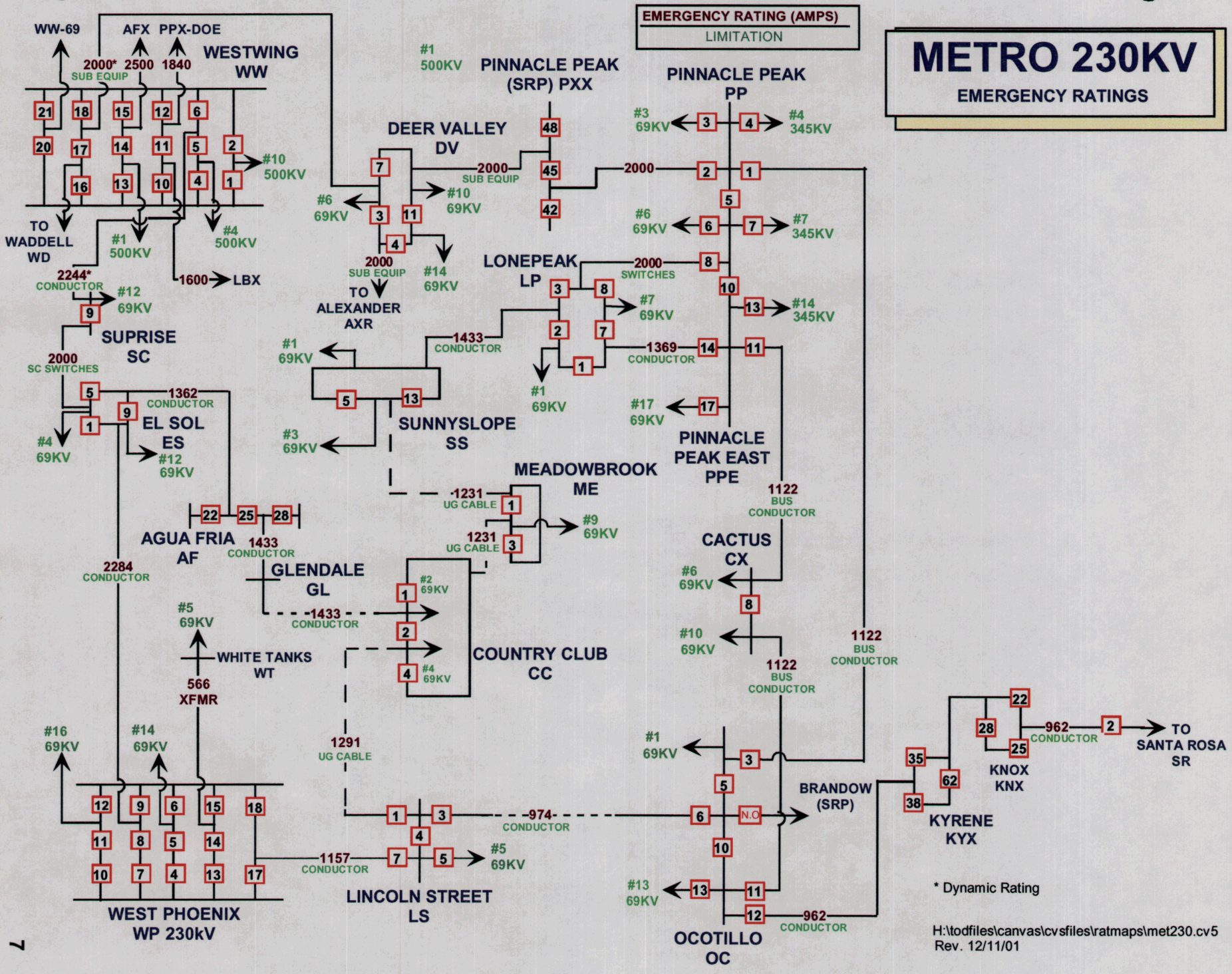
Rev. 12/11/01


EMERGENCY RATING (AMPS)
LIMITATION
METRO 230KV
EMERGENCY RATINGS
WW-69
AFX
PPX-DOE
WESTWING
WW
2000* SUB EQUIP
2500
1840
#10 500KV
TO WADDELL WD
#1 500KV
#4 500KV
1600
LBX
2244* CONDUCTOR
#12 69KV
SUPRISE SC
2000 SC SWITCHES
1362 CONDUCTOR
EL SOL ES
#4 69KV
#12 69KV
AGUA FRIA AF
1433 CONDUCTOR
2284 CONDUCTOR
#5 69KV
WHITE TANKS WT
566 XFMR
#16 69KV
#14 69KV
WEST PHOENIX WP 230kV
#1 500KV
PINNACLE PEAK (SRP) PXX
DEER VALLEY DV
2000 SUB EQUIP
#6 69KV
#10 69KV
2000 SUB EQUIP
#14 69KV
TO ALEXANDER AXR
LONEPEAK LP
2000 SWITCHES
#7 69KV
#1 69KV
1433 CONDUCTOR
#1 69KV
#3 69KV
SUNNYSLOPE SS
MEADOWBROOK ME
1231 UG CABLE
#9 69KV
1231 UG CABLE
GLENDALE GL
#2 69KV
1433 CONDUCTOR
#4 69KV
COUNTRY CLUB CC
1291 UG CABLE
1157 CONDUCTOR
#5 69KV
LINCOLN STREET LS
974 CONDUCTOR
N.O
PINNACLE PEAK PP
#3 69KV
#4 345KV
2000
#6 69KV
#7 345KV
2000 SWITCHES
#14 345KV
1369 CONDUCTOR
#17 69KV
PINNACLE PEAK EAST PPE
1122 BUS CONDUCTOR
CACTUS CX
#6 69KV
#10 69KV
1122 BUS CONDUCTOR
1122 BUS CONDUCTOR
#1 69KV
BRANDOW (SRP)
#13 69KV
962 CONDUCTOR
OCOTILLO OC
962 CONDUCTOR
KNOX KNX
KYRENE KYX
TO SANTA ROSA SR
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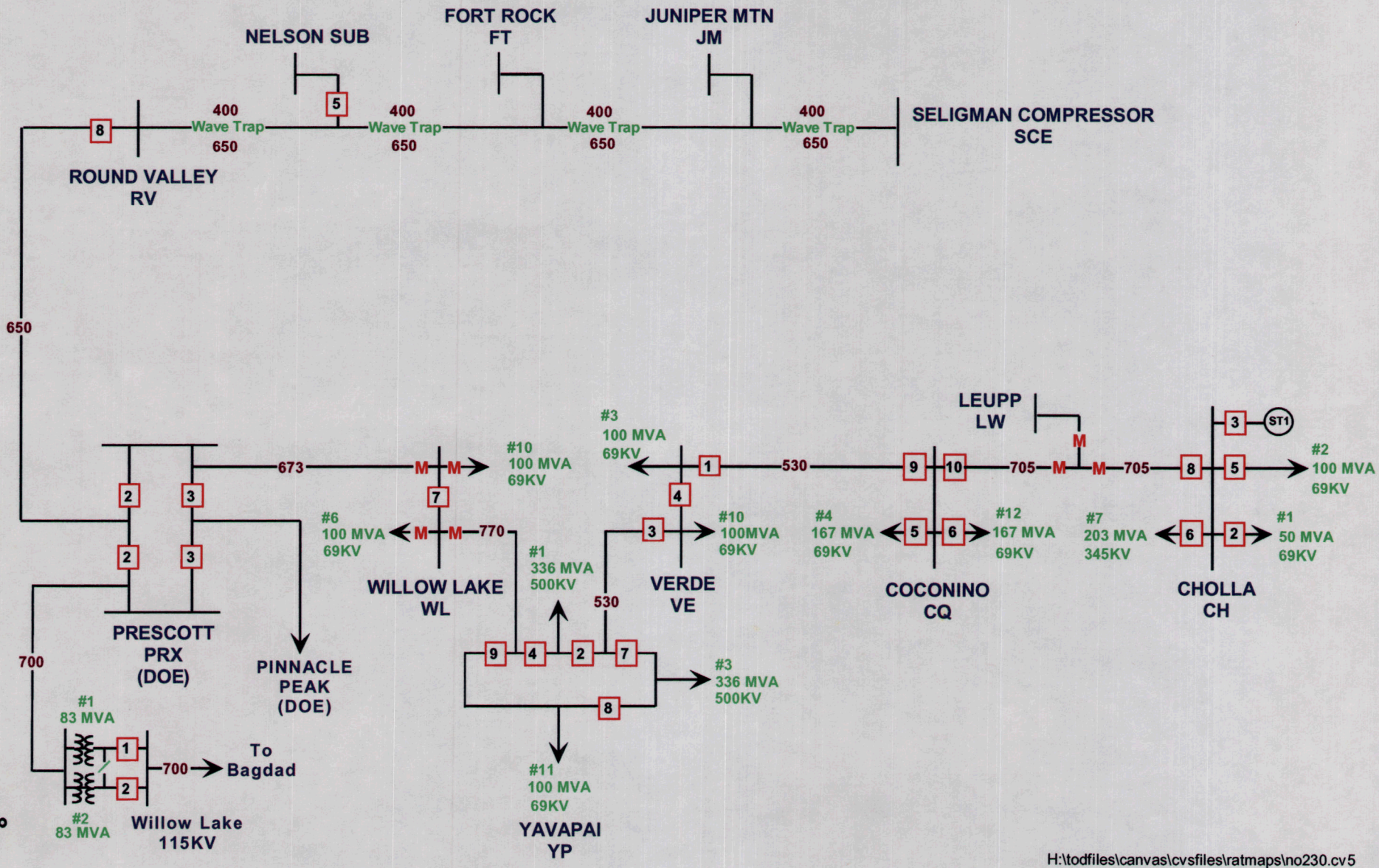
Rev. 12/11/01

NORTHERN 230KV

CONTINUOUS RATINGS



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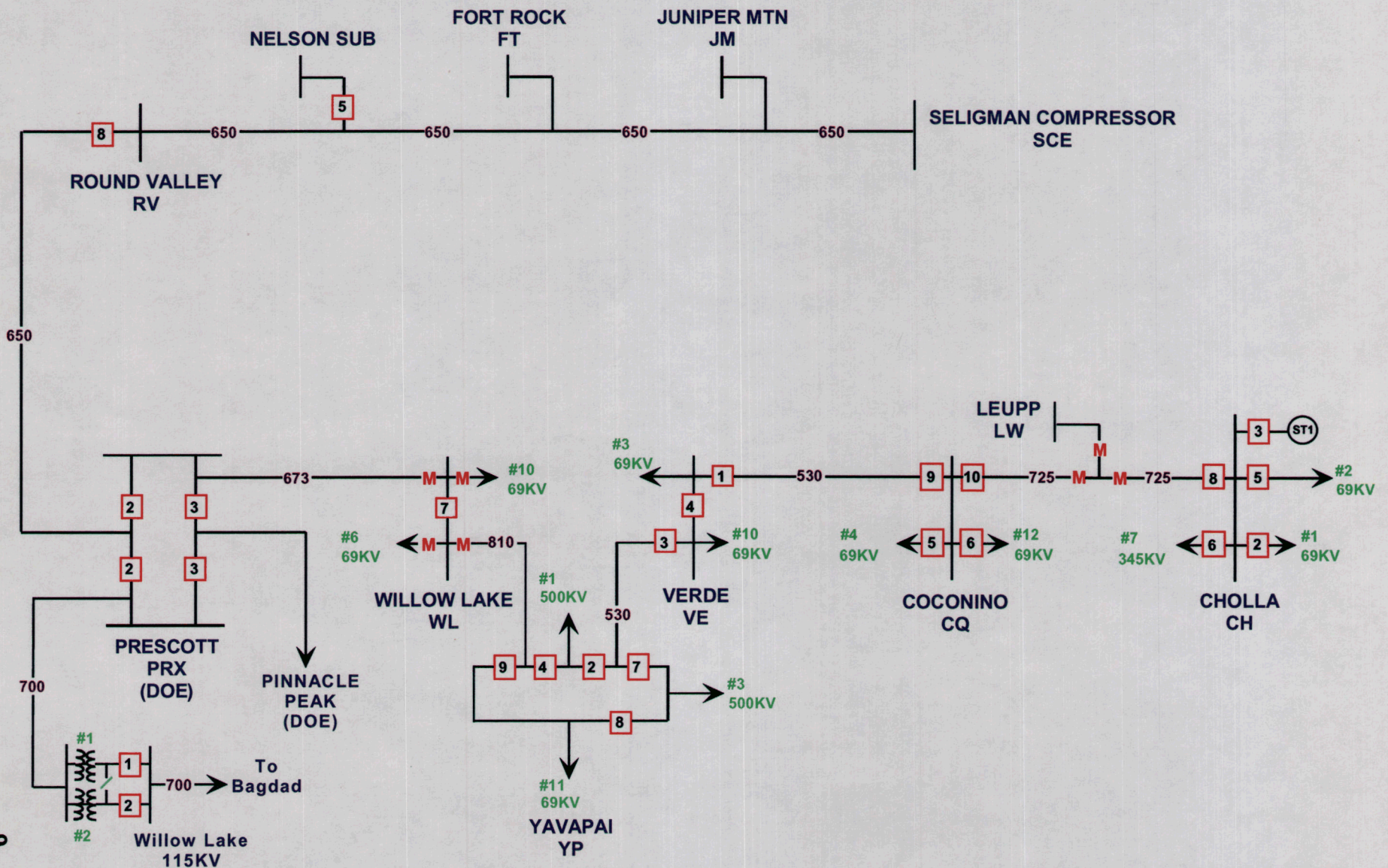
Rev. 12/11/01

NORTHERN 230KV

EMERGENCY RATINGS

EMERGENCY RATING (AMPS)



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SOUTHERN
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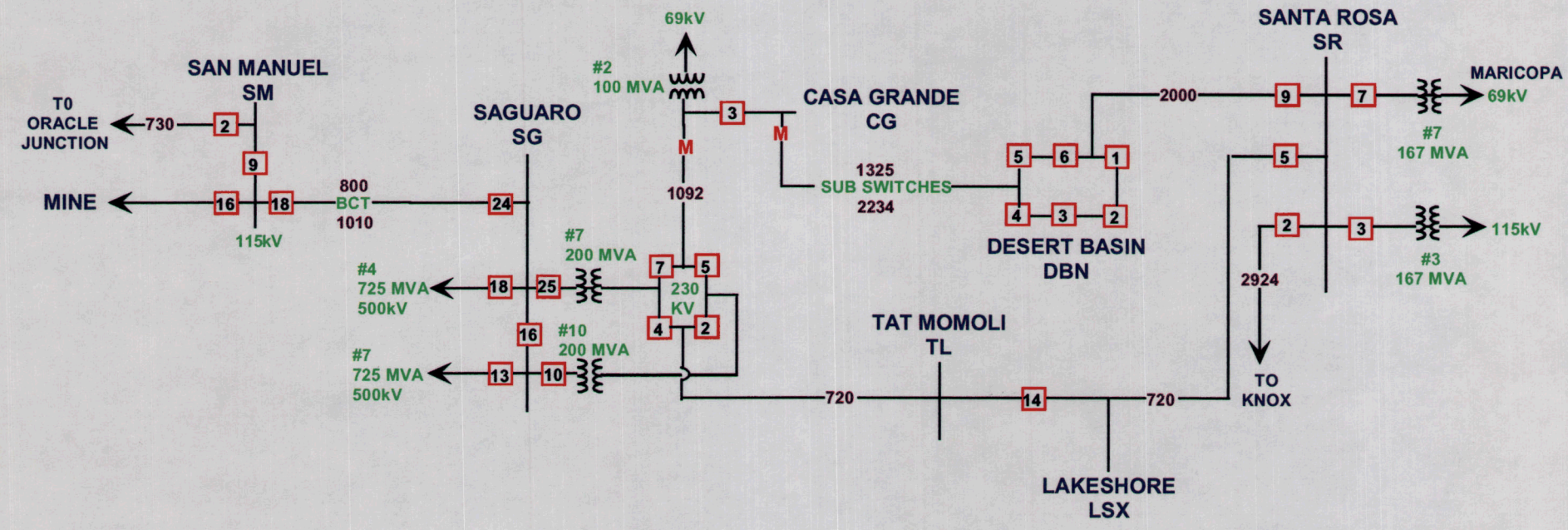

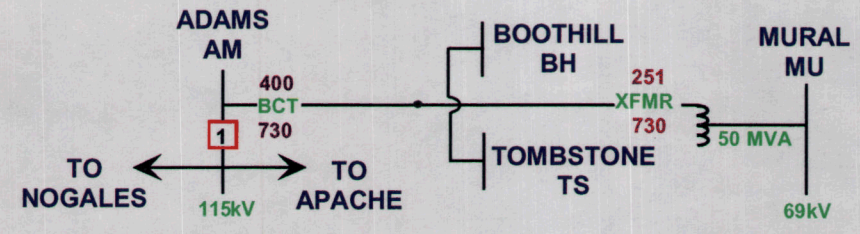

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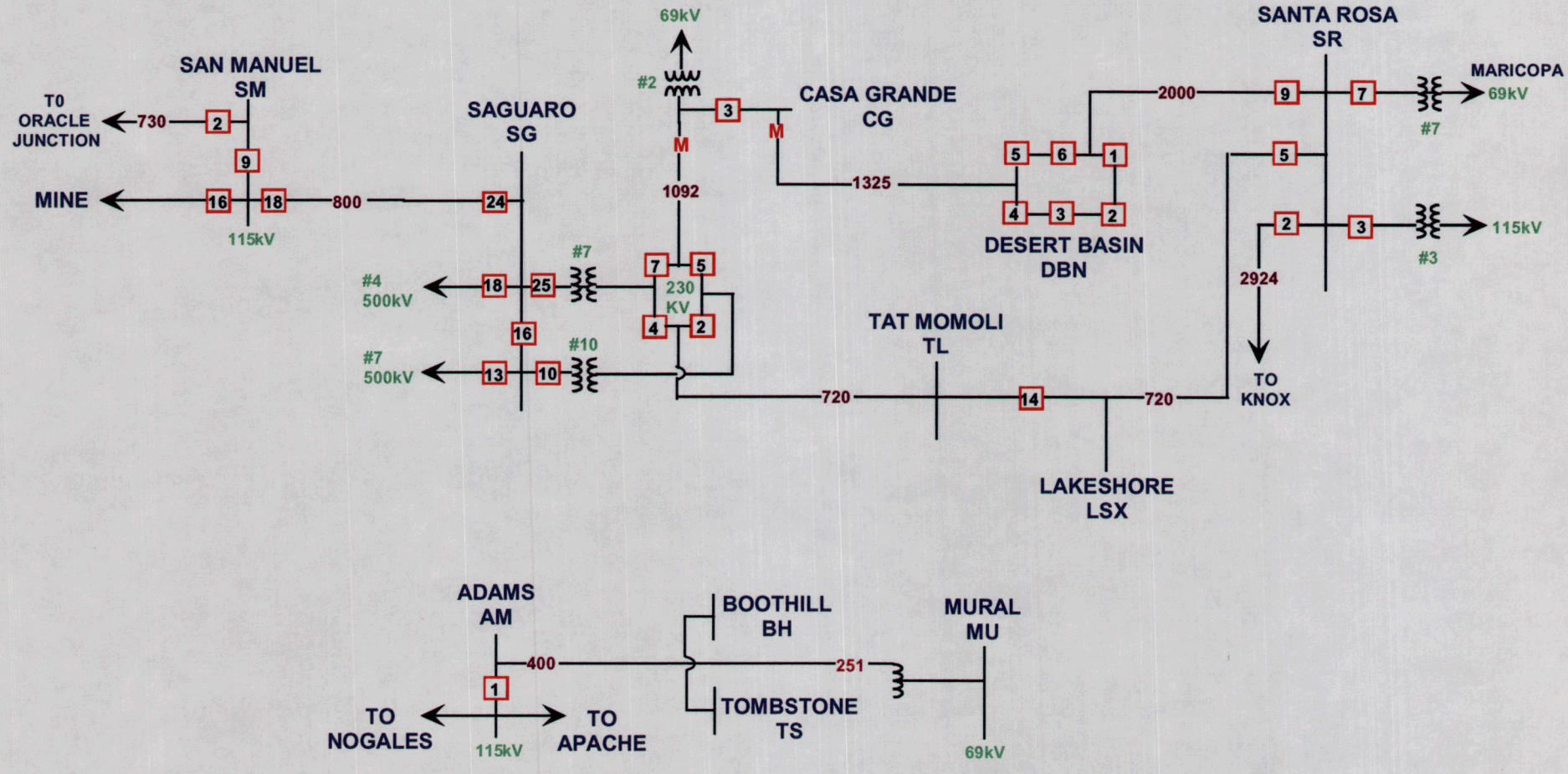
Rev. 12/11/01

SOUTHERN
EMERGENCY RATINGS



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Rev. 12/11/01

4

ARIZONA PUBLIC SERVICE COMPANY

TEN-YEAR PLAN

2002 – 2011

TECHNICAL STUDY REPORT

FOR

THE ARIZONA CORPORATION COMMISSION

JANUARY 2002

Table of Contents

ARIZONA PUBLIC SERVICE COMPANY
2002-2011
TEN-YEAR PLAN
TECHNICAL STUDY REPORT

I. Introduction

This technical study report is filed with the ACC pursuant to A.R.S. § 40-360.02, as recently amended by House Bill 2040, and Arizona Corporation Commission ("Commission") Decision No. 63876 (July 25, 2001) regarding the Biennial Transmission Assessment prepared by Commission Utilities Division Staff.

Two aspects of technical studies were performed and reported here. They are power flow analyses and stability analyses. Power flow analysis was performed for two scenarios. The first is for all transmission system elements being in service. All system elements must be within its continuous rating. The second scenario is for outage of a single element. All remaining system elements must remain within its emergency ratings. Voltage deviations for these scenarios must also be within established guidelines. These voltage deviation guidelines closely approximate post transient var margin requirements of the Western Systems Coordinating Council. More detail is provided in APS Transmission Planning Process and Guidelines, which is also included in this filing.

The stability analyses were performed to simulate electrical disturbances on the transmission system and evaluate the system response. The desired result is that all generators will remain on line, no additional lines will open and the system oscillations will damp out.

Results of the power flow and stability analyses aid in determining when and where new electrical facilities are needed because of reliability or security reasons. Additionally, some facilities are planned to address adequacy concerns. These include the interconnection of generation to the transmission system or efforts to increase import capability to load-constrained or other areas.

II. Power Flow Analyses

Power flow cases were created for each year of the 2002-2011 study time frame. These cases represent the latest transmission and sub-transmission plans, load projections and resource plans of utilities and independent power producers. Base case and single contingency conditions are evaluated to determine system needs and timing. Various iterations of possible solutions lead to the final plans for transmission additions.

The single contingency analysis involves simulations for every non-radial 115kV or above line which APS owns, partially owns, or operates. Transformer outages are also evaluated. Results of the power flow studies are tabulated in a Security Needs Table and an Adequacy Needs Table, below. These tables identify twenty-two transmission lines

which are included in this Ten-Year Plan filing. Projects identified for 2008 and beyond have been classified as Adequacy Needs because of the uncertainty of system representation and, more importantly, generation location, size, and availability in the later years. As projects near the five-year planning time frame, they may be redefined as Security Needs projects. Selected maps of the power simulations are contained in the appendix.

Security Needs Table

In Service Year	Critical Outage	Limiting Element	Transmission Project
2003	Jojoba-Kyrene 500kv line	Voltage deviation @ Kyrene	Palo Verde-S.W. Valley 500kv line
2003 2005	White Tanks transformers & local 69kv system	White Tanks transformer & Voltage deviation @ White Tanks & 69kv system lines	S.W. Valley-Liberty South; Liberty South-Liberty; & Liberty-TS3 230kv lines
2005	Westwing-Raceway 230kv line #1	Voltage deviation @ Raceway & 69kv system lines	Westwing-Raceway 230kv line #2
2005	Liberty-Gila Bend 230kv line	Voltage deviation @ Gila Bend & 69kv system lines	Santa Rosa-Gila Bend 230kv line
2006	Westwing-Surprise 230kv line & Surprise-Javelina 69kv	Voltage deviation @ Javelina and Waddell & 69kv system lines	Trilby Wash-TS2-El Sol 230kv lines
2006	Globe area 21kv system	Voltage deviation @ Globe and 21kv system lines	Pinal-Ice House 115kv line
2006	Palo Verde-N. Gila 500kv line	Voltage deviation @ Yuma & scheduling capacity	Gila Bend-Yuma 230kv line
2006	Cholla-Coconino 230kv line	Voltage deviation @ No. AZ and Yavapai-Verde 230kv line	Flagstaff-Winona 230kv lines
2007	Raceway transformer & local 69kv lines	Voltage deviation @ Avery & 69kv system lines	Raceway-Avery 230kv line
2007	Liberty-Buckeye 230kv line; Liberty-TS3 230kv	Voltage deviation @ Buckeye & 69kv system lines; Voltage deviation @ TS3	TS3-Buckeye 230kv line

Adequacy Needs Table

In Service Year	Transmission Project	System Benefits
2002	Redhawk-Hassayampa 500kv #2 line	Connects new generation to the transmission grid, increases reliability of the system and for the units
2002	Gila River-Jojoba 500kv lines	Connects new generation to the transmission grid, increases reliability of the system and for the units
2006	Loop-in of Jojoba-Kyrene 500kv to S.W. Valley 500kv substation	Increase import capability to the Phoenix metropolitan area
2006	Hassayampa-S.E. Valley 500kv line	Increases import capability for the Phoenix metropolitan area, increases the export capability from the PV area
2008	Palo Verde-Table Mesa 500kv, Table Mesa-Raceway, & Pinnacle Peak-Avery 230kv lines	Increases import capability for the Phoenix metropolitan area, increases the export capability from the PV area
2009	TS2-TS3 230kv line	Increase transmission system reliability and ability to deliver power
2009	Westwing-El Sol 230kv line	Increase transmission system reliability and ability to deliver power
2011	Westwing-Pinnacle Peak 230kv line	Increase transmission system reliability and ability to deliver power
TBD	Palo Verde-Saguaro	Increase transmission system reliability and ability to deliver power

III. Stability Analysis

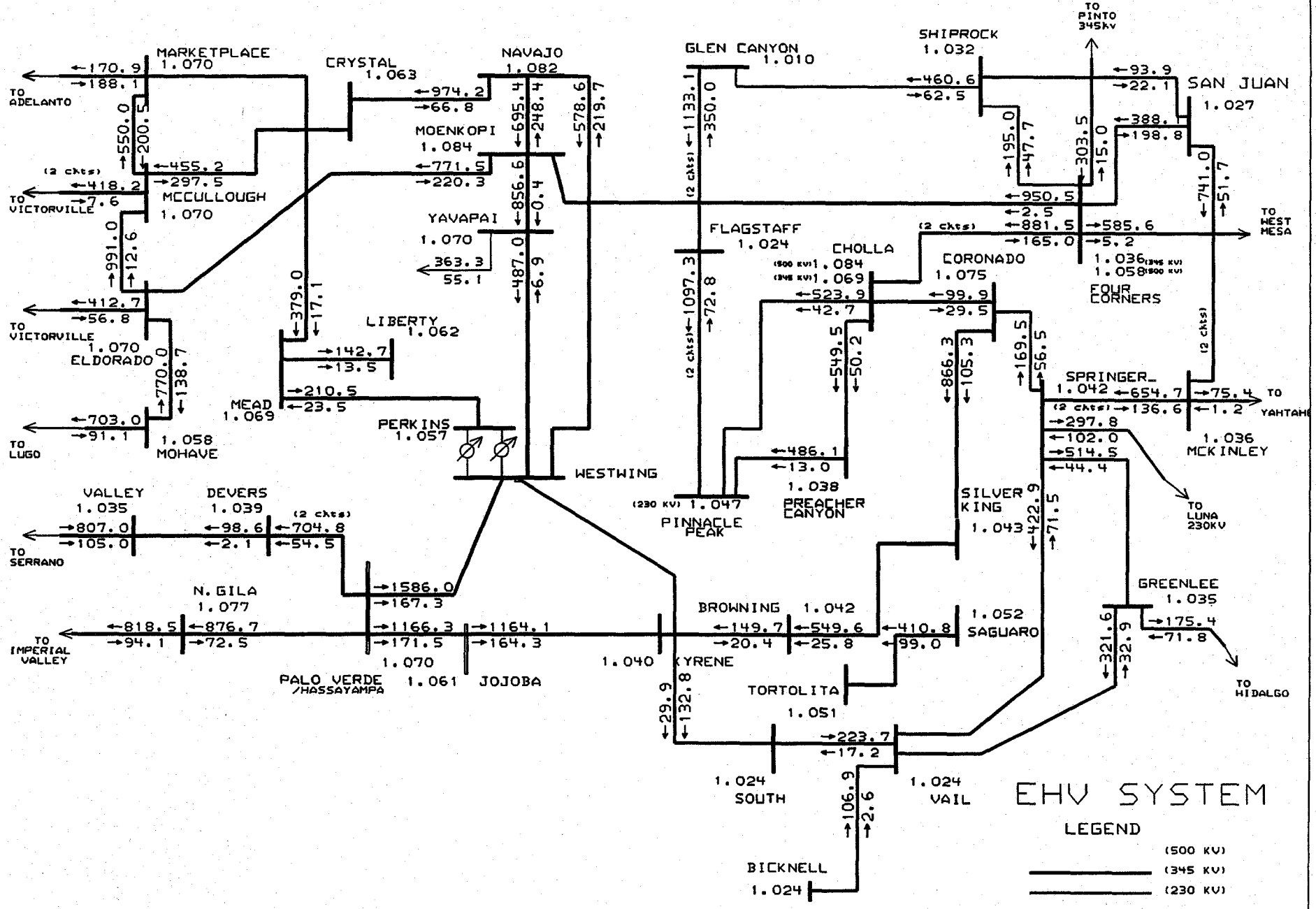
A stability simulation for simulated three-phase faults was performed for 2003 for every 345kV or 500kV line that APS owns (totally or partially) or operates. It has been APS' experience that stability concerns do not manifest on the 230kV system, which is primarily designed to deliver power to load. Therefore, no 230kV simulations were performed. Additionally, every new proposed generation plant will be required to perform stability evaluations prior to receiving permission to interconnect to the transmission system.

Each simulation modeled a 3-phase bus fault, appropriate series capacitor flashing and reinsertion, and fault removal and transmission line removal. System performance was evaluated by monitoring representative generator rotor angles, bus voltages and system frequency. Plots of these system parameters are included in Appendix B. The

stability simulations performed to date indicate that no stability problems limit the transmission system.

APPENDIX A

Power Flow Maps



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GENERAL ELECTRIC COMPANY

2002

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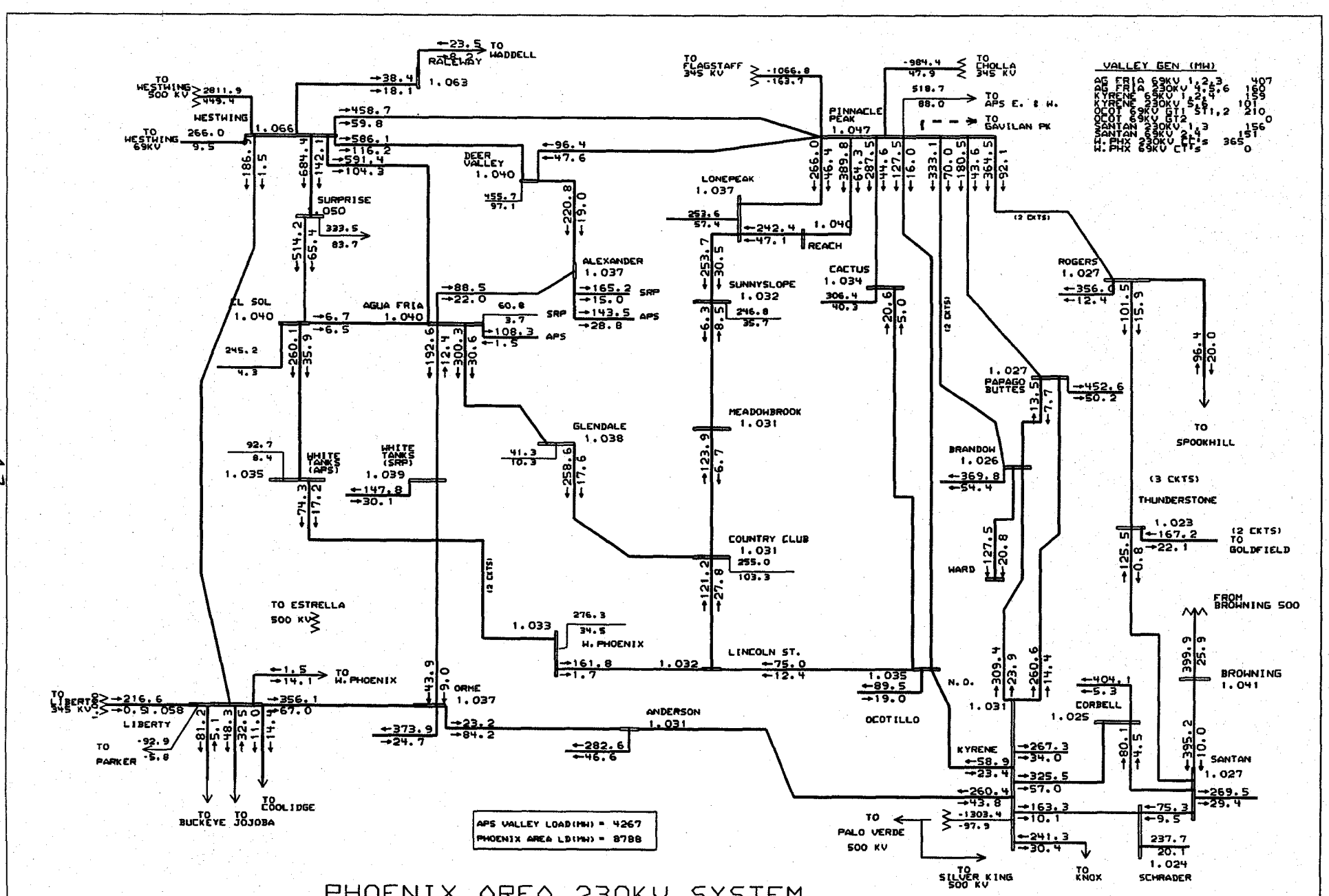

PHOENIX AREA 230KV SYSTEM

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MW/MVAR
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GENERAL ELECTRIC COMPANY
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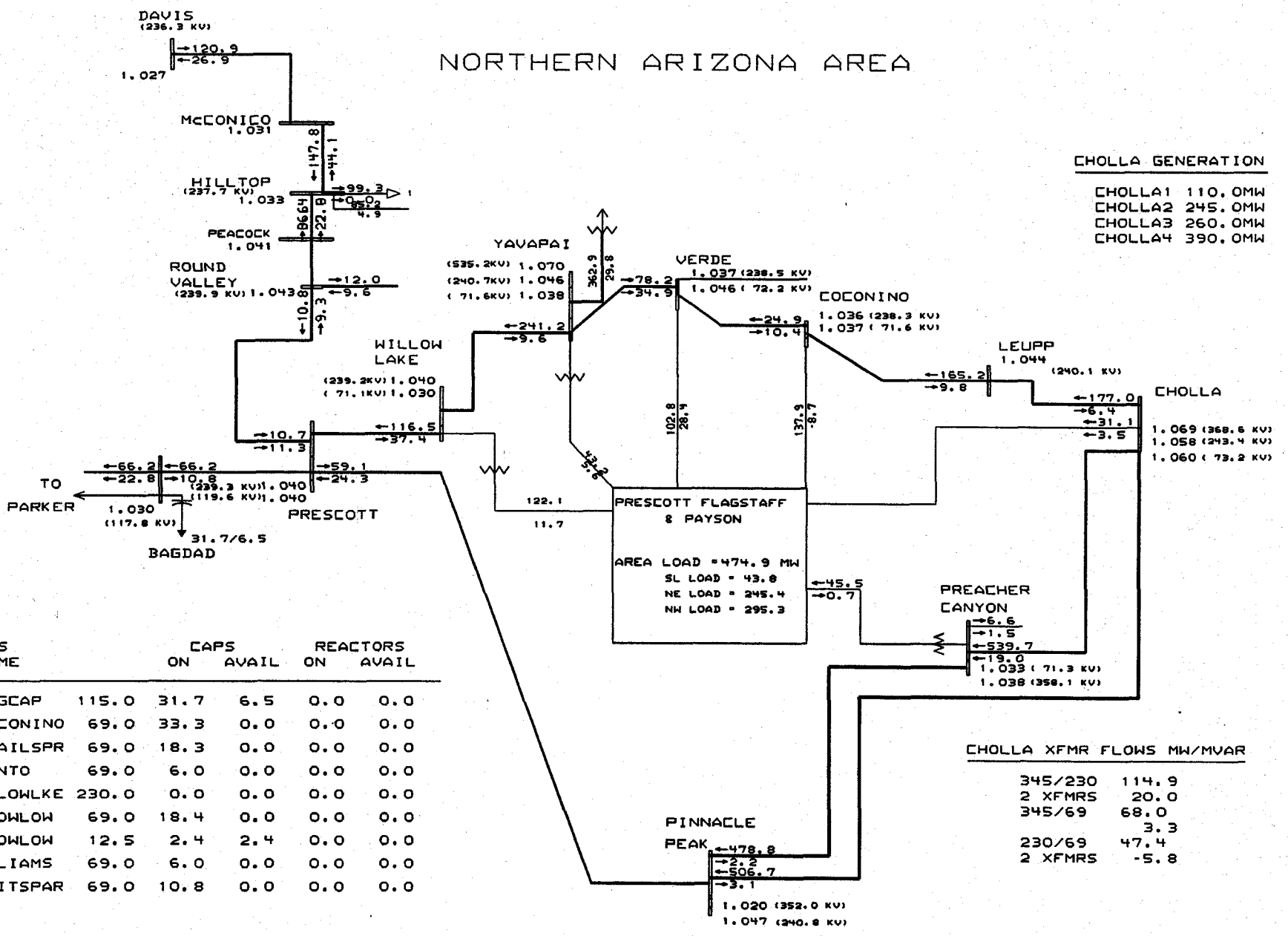
NORTHERN ARIZONA AREA



CHOLLA GENERATION

CHOLLA1	110.0MW
CHOLLA2	245.0MW
CHOLLA3	260.0MW
CHOLLA4	390.0MW

BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	31.7	6.5	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	2.4	2.4	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

CHOLLA XFMR FLOWS MW/MVAR

345/230	114.9
2 XFMRS	20.0
345/69	68.0
	3.3
230/69	47.4
2 XFMRS	-5.8

A3

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GENERAL ELECTRIC COMPANY

2002

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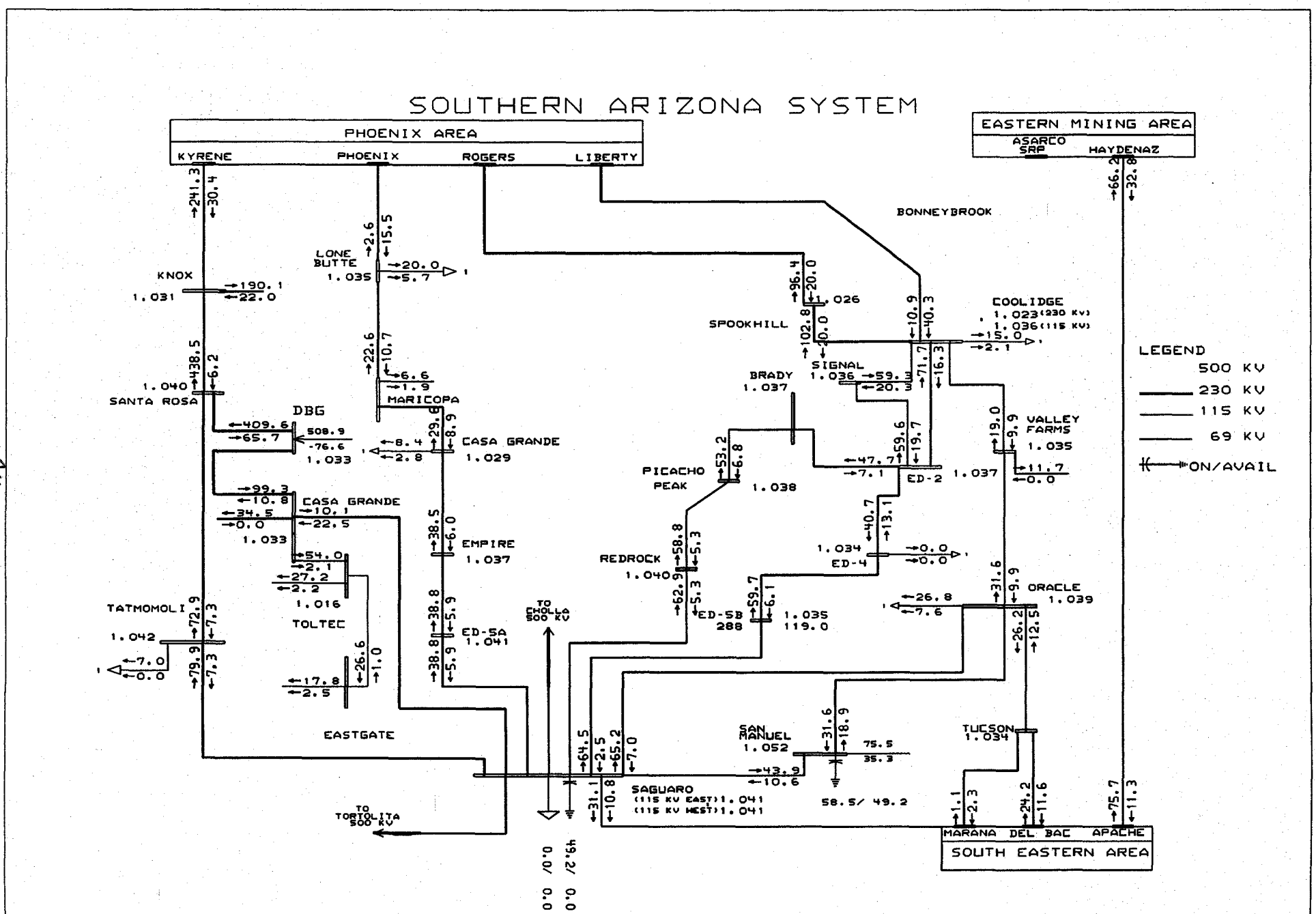
SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
KNOX
1.031
LONE BUTTE
1.035
SPOOKHILL
1.026
COOLIDGE
1.023 (230 KV)
1.036 (115 KV)
SIGNAL
1.036
BRADY
1.037
SANTA ROSA
1.040
MARICOPA
DBG
1.033
CASA GRANDE
1.029
VALLEY FARMS
1.035
PICACHO PEAK
1.038
ED-2
1.037
CASA GRANDE
EMPIRE
1.037
REDROCK
1.040
ED-4
1.034
ORACLE
1.039
TATMOMOLI
1.042
TOLTEC
1.016
ED-5A
1.041
ED-5B
288
1.035
119.0
TO SAGUARO 500 KV
SAN MANUEL
1.052
TUCSON
1.034
EASTGATE
SAGUARO
(115 KV EAST) 1.041
(115 KV WEST) 1.041
58.5/ 49.2
TO TORTOLITA 500 KV
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL
MW/MVAR
Thu Jan 31
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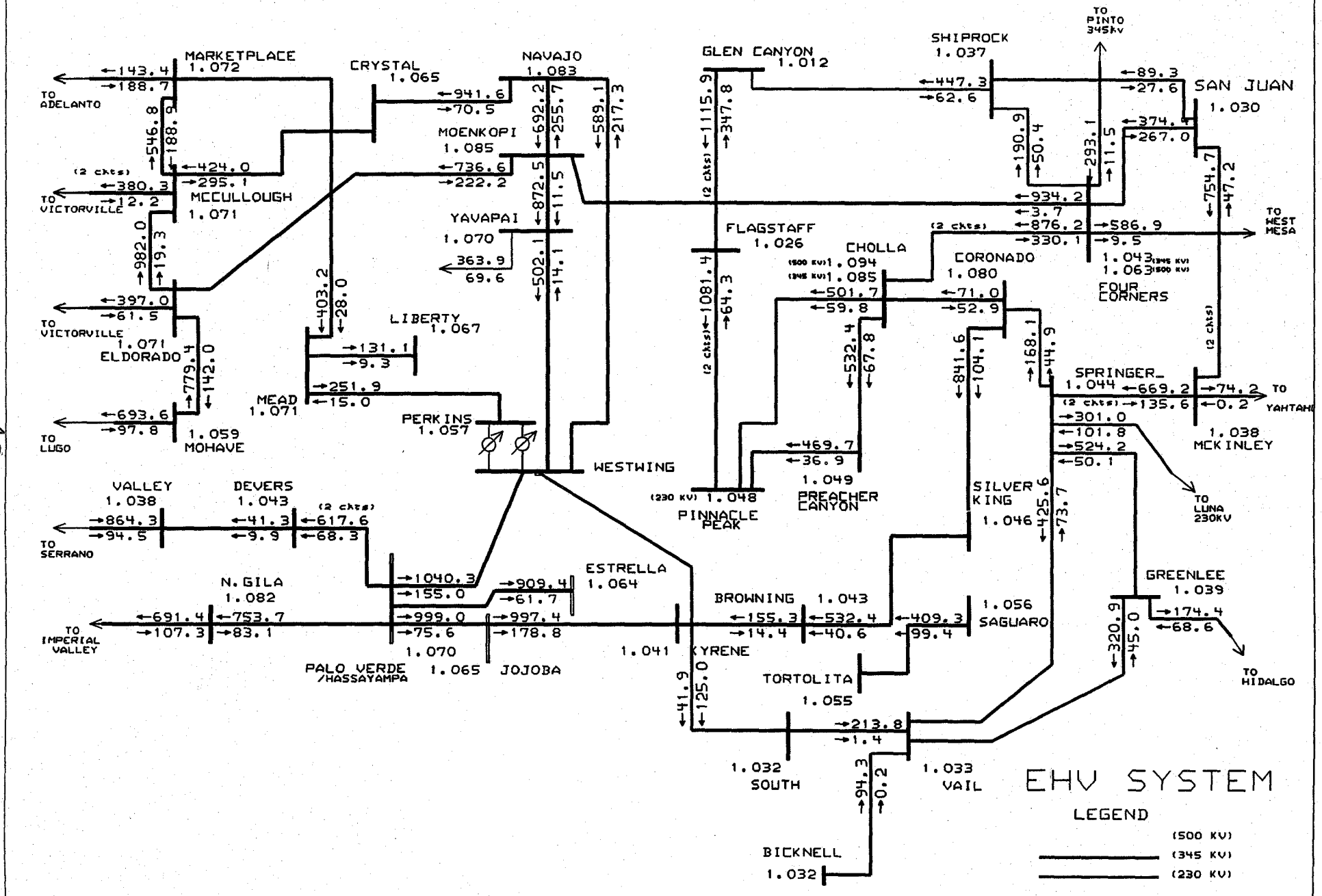

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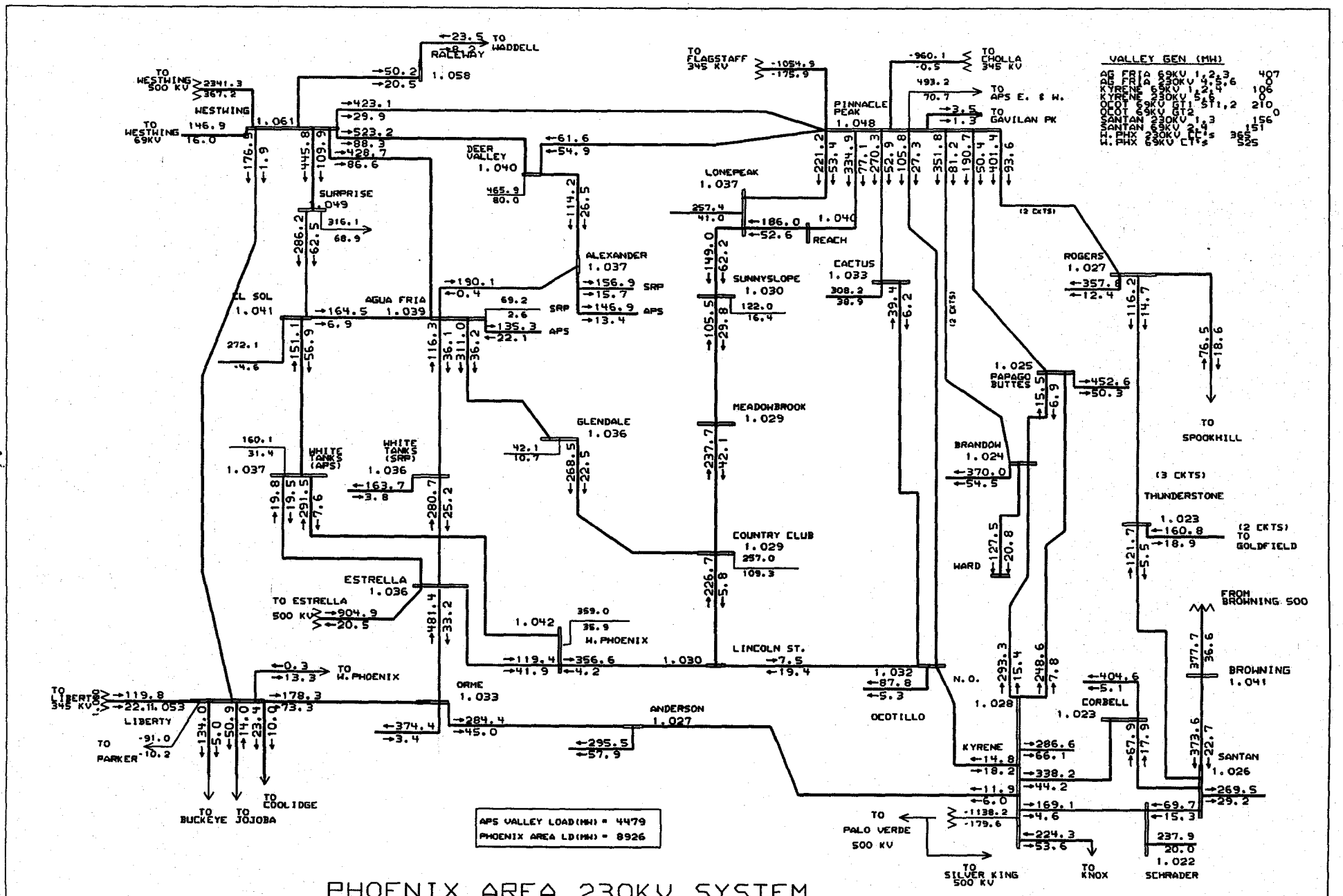
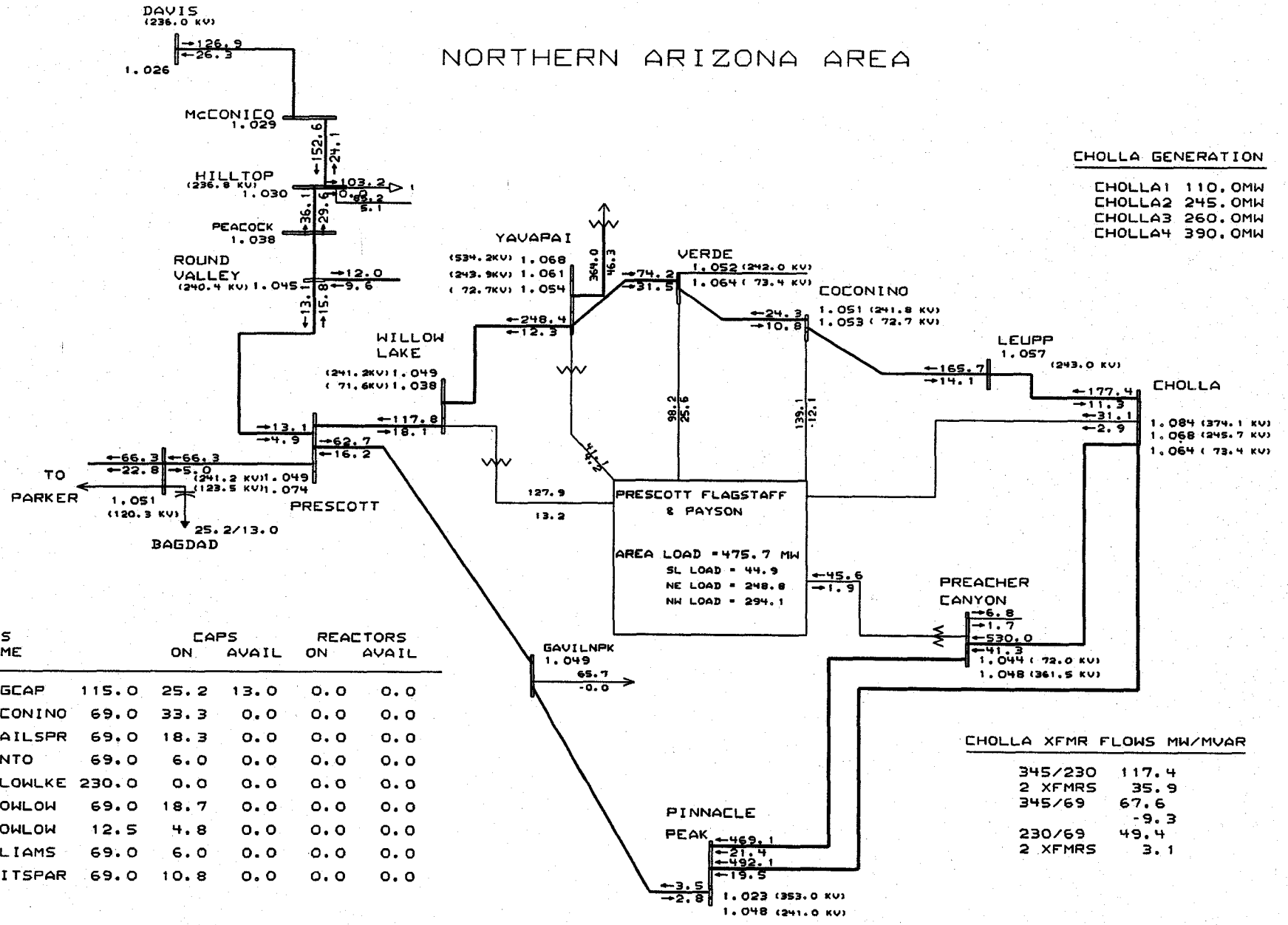


PHOENIX AREA 230KV SYSTEM



CHOLLA GENERATION

CHOLLA1	110.0MW
CHOLLA2	245.0MW
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BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
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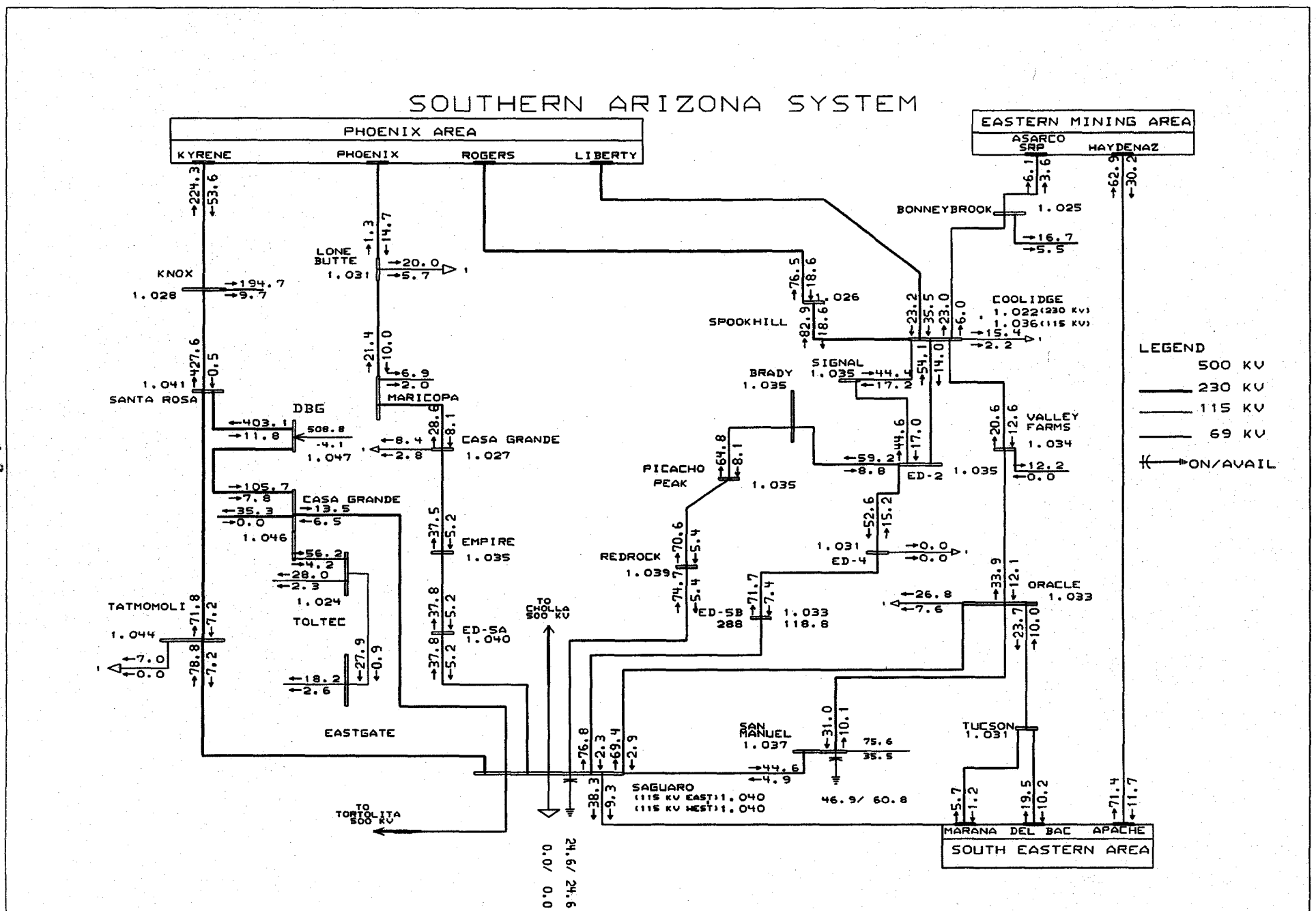
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.7	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

CHOLLA XFMR FLOWS MW/MVAR

345/230	117.4
2 XFMRS	35.9
345/69	67.6
	-9.3
230/69	49.4
2 XFMRS	3.1


SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
1.025
LONE BUTTE
1.031
KNOX
1.028
SPOOKHILL
1.026
COOLIDGE
1.022 (230 KV)
1.036 (115 KV)
BRADY
1.035
SIGNAL
1.035
1.041
SANTA ROSA
DBG
MARICOPA
CASA GRANDE
1.027
1.047
PICACHO PEAK
1.035
ED-2
1.035
VALLEY FARMS
1.034
CASA GRANDE
1.046
EMPIRE
1.035
REDROCK
1.039
1.031
ED-4
ORACLE
1.033
TATMOMOLI
1.044
TOLTEC
1.024
ED-5B
288
1.033
118.8
ED-5A
1.040
TO CHOLLA 500 KV
SAN MANUEL
1.037
TUCSON
1.031
EASTGATE
SAGUARO
(115 KV EAST):1.040
(115 KV WEST):1.040
46.9/ 60.8
TO TORTOLITA 500 KV
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL
MW/MVAR
Thu Jan 31
2002
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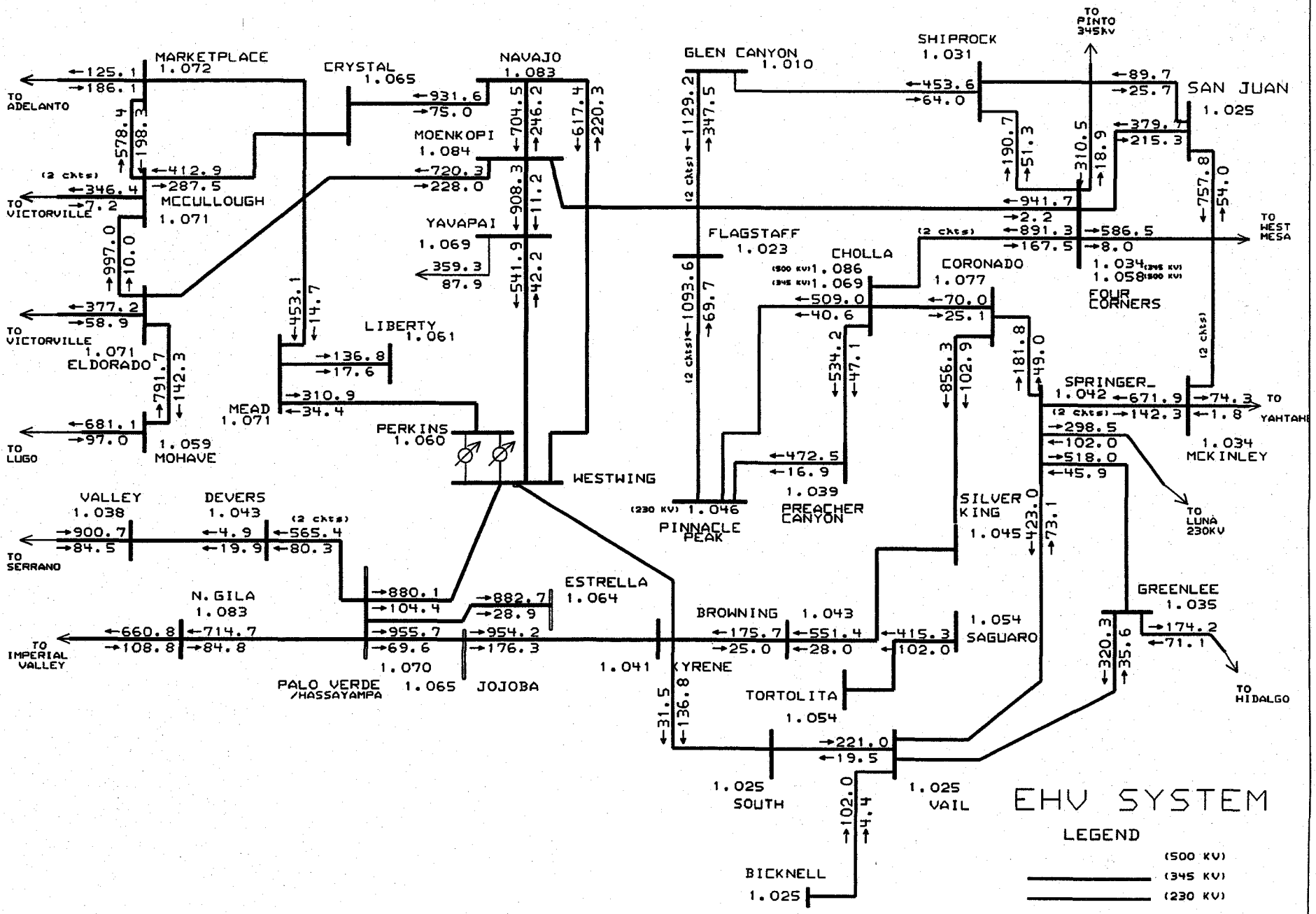
2003



General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 04:31:28 2002

GENERAL ELECTRIC COMPANY

2004

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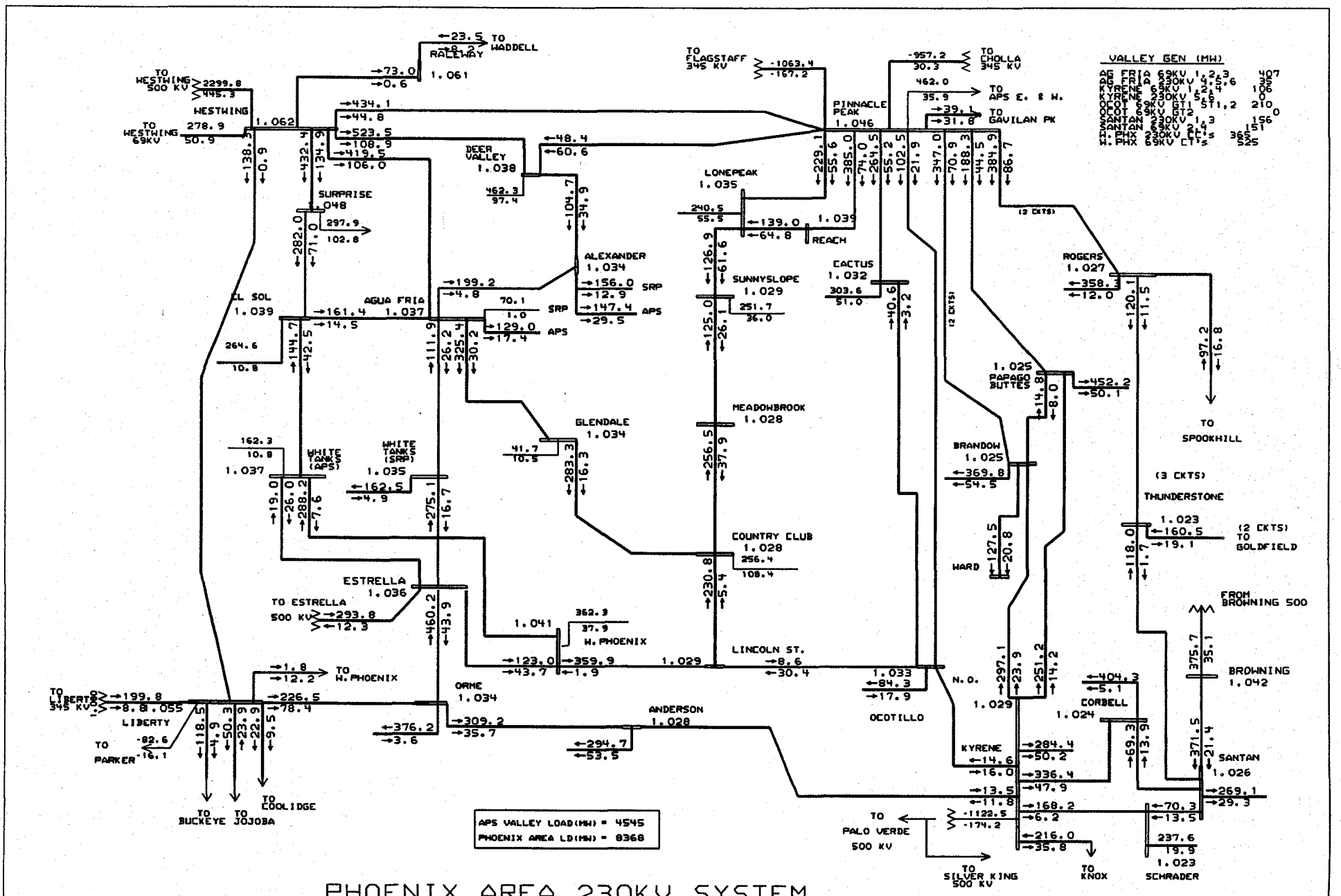
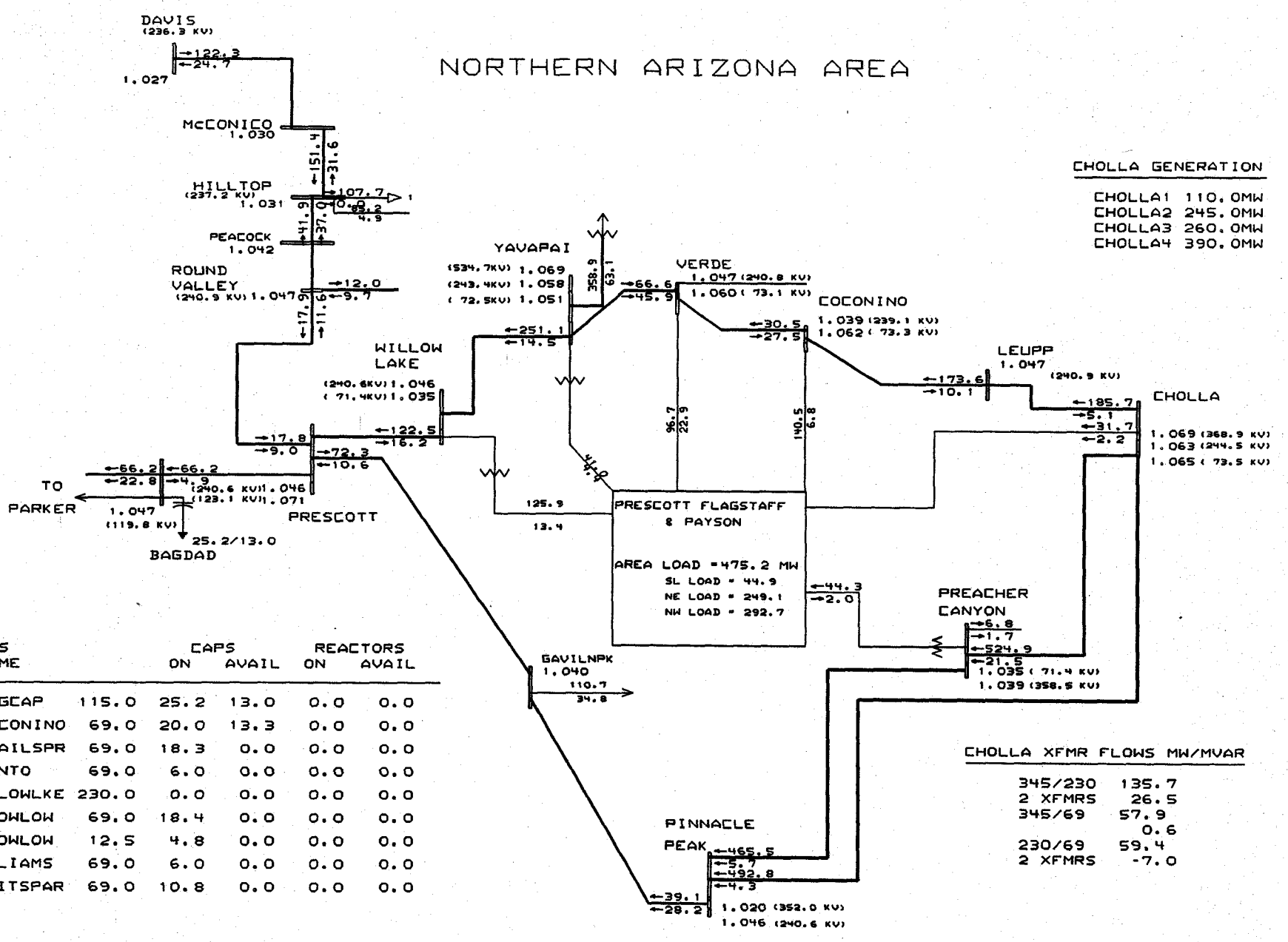
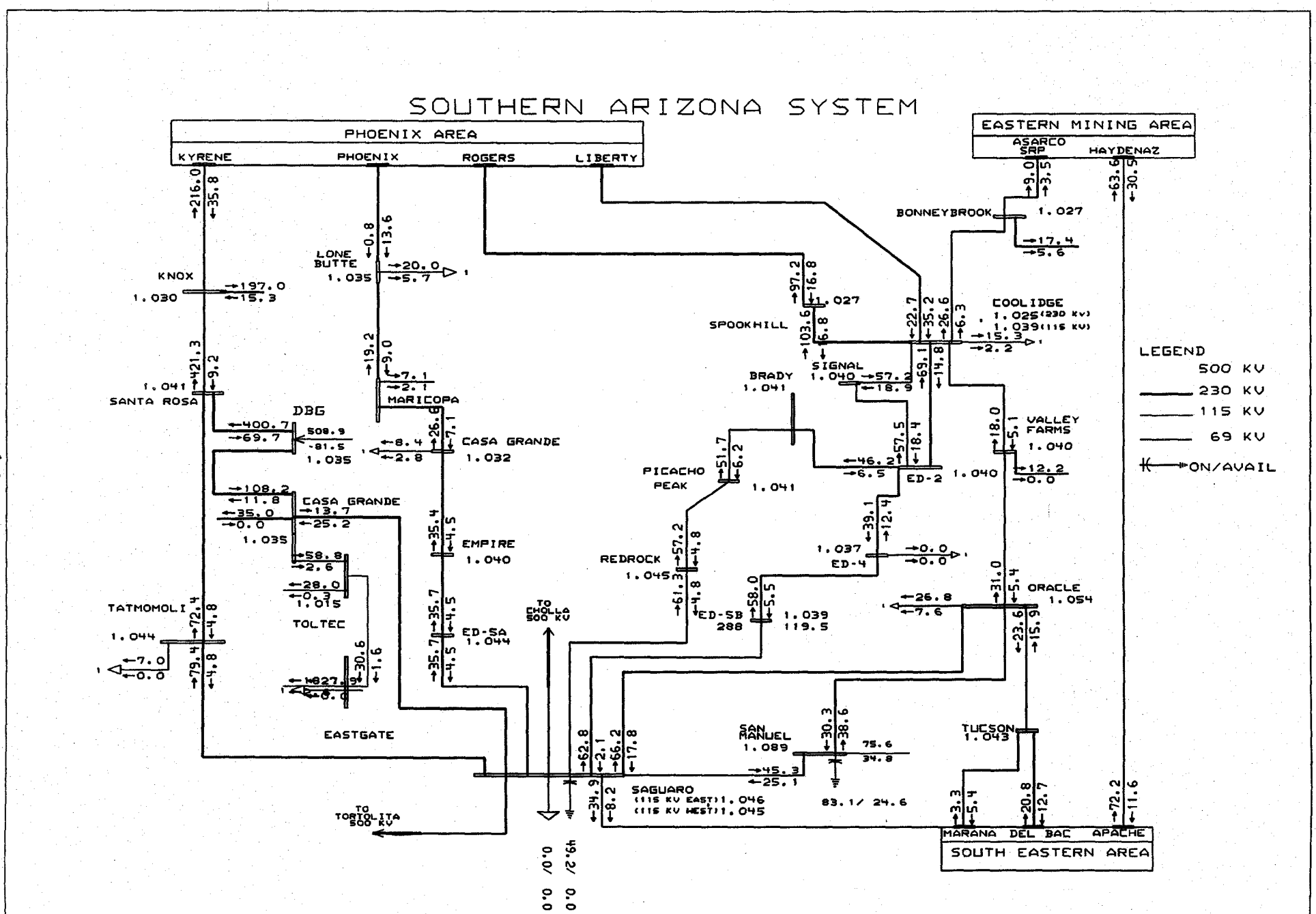


PHOENIX AREA 230KV SYSTEM



BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	25.2	13.0	0.0	0.0
COCONINO	69.0	20.0	13.3	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0



General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 [illegible] 2002

GENERAL ELECTRIC COMPANY

2004

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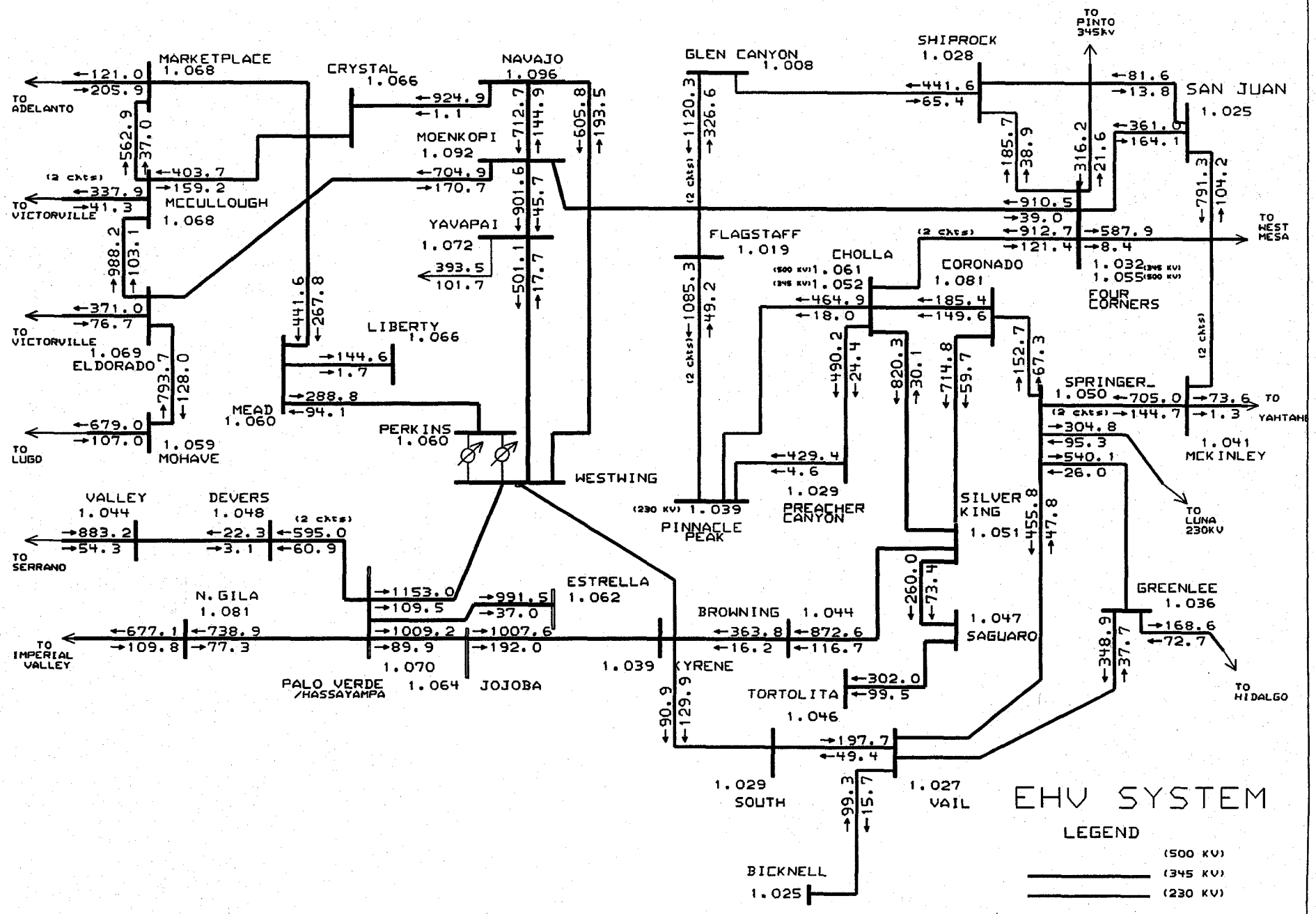

A13

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 04:33:28 2002

GENERAL ELECTRIC COMPANY

2005

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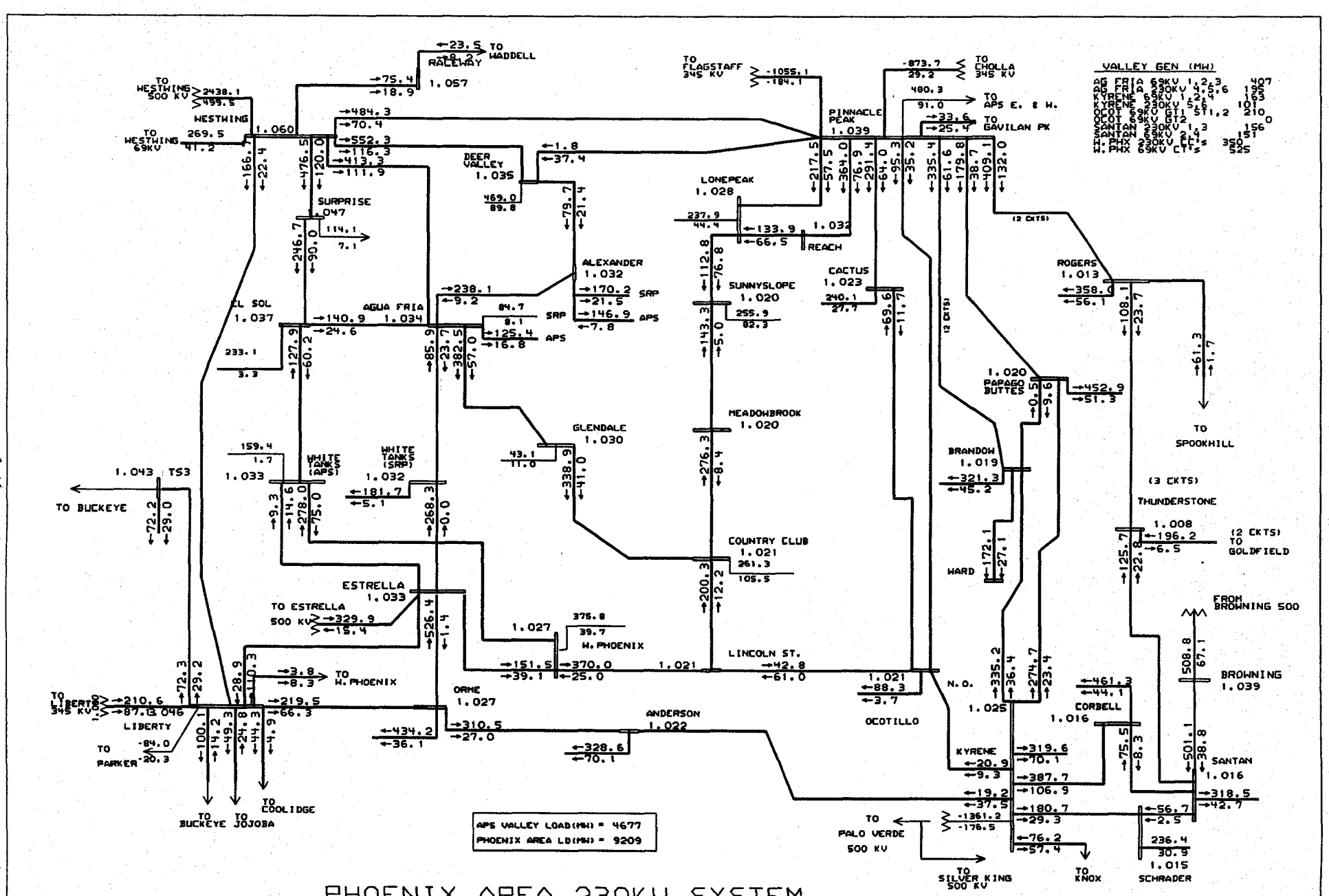

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 [illegible]:42 2002

GENERAL ELECTRIC COMPANY

2005

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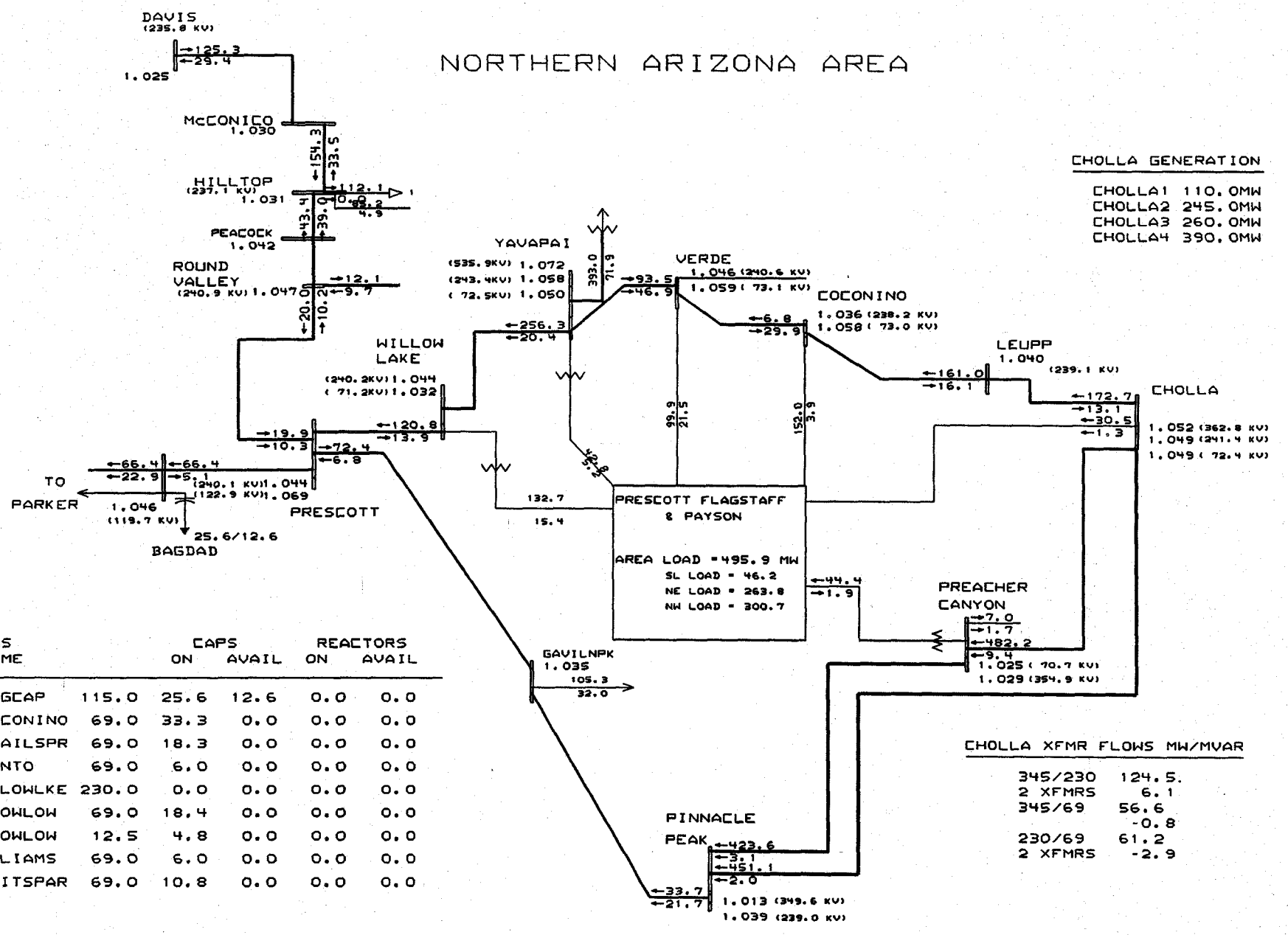
NORTHERN ARIZONA AREA



CHOLLA GENERATION

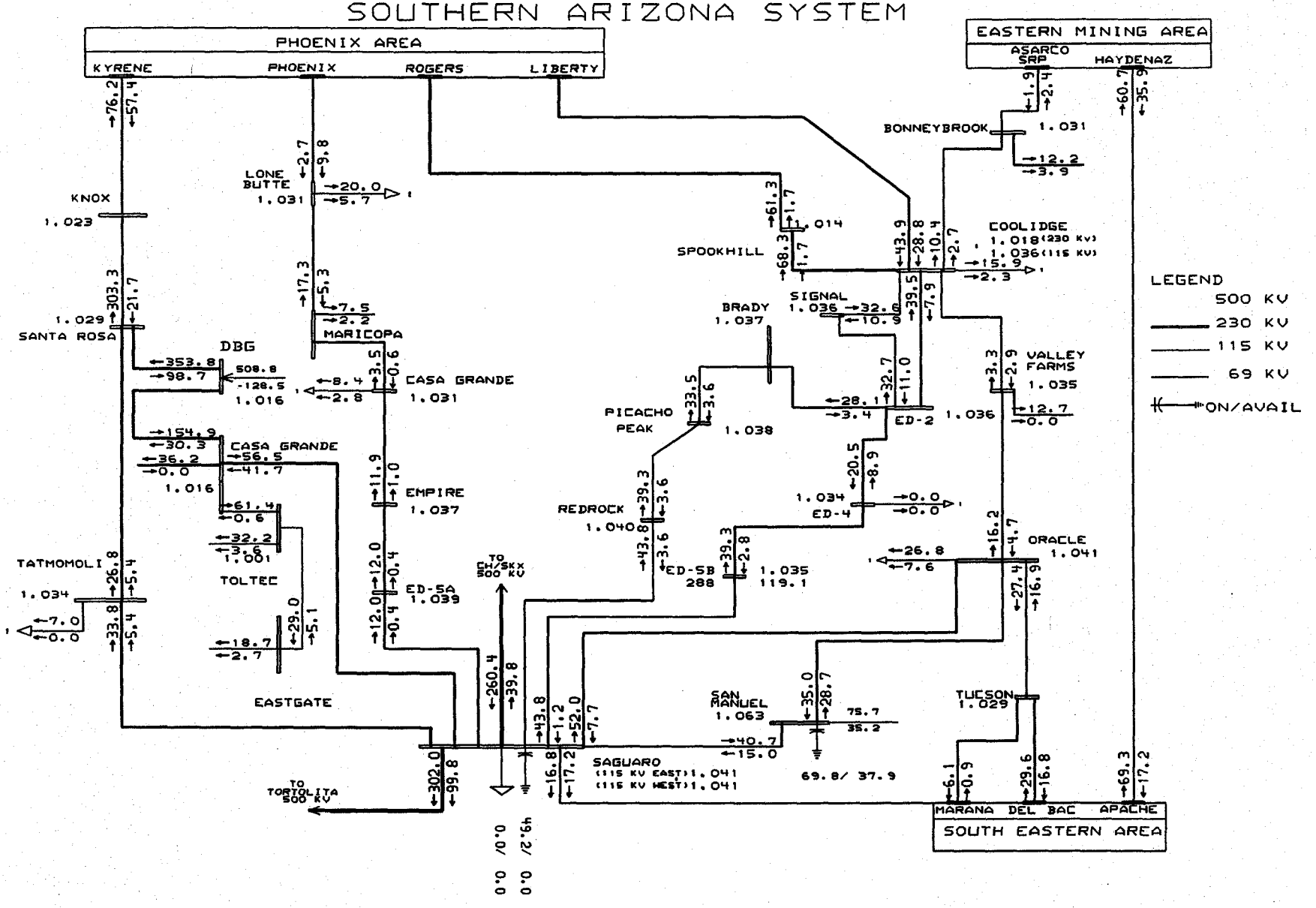
CHOLLA1	110.0MW
CHOLLA2	245.0MW
CHOLLA3	260.0MW
CHOLLA4	390.0MW

BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	25.6	12.6	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

CHOLLA XFMR FLOWS MW/MVAR

345/230	124.5.
2 XFMRS	6.1
345/69	56.6
	-0.8
230/69	61.2
2 XFMRS	-2.9

SOUTHERN ARIZONA SYSTEM



9/16

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 07:24 2002

GENERAL ELECTRIC COMPANY

2005

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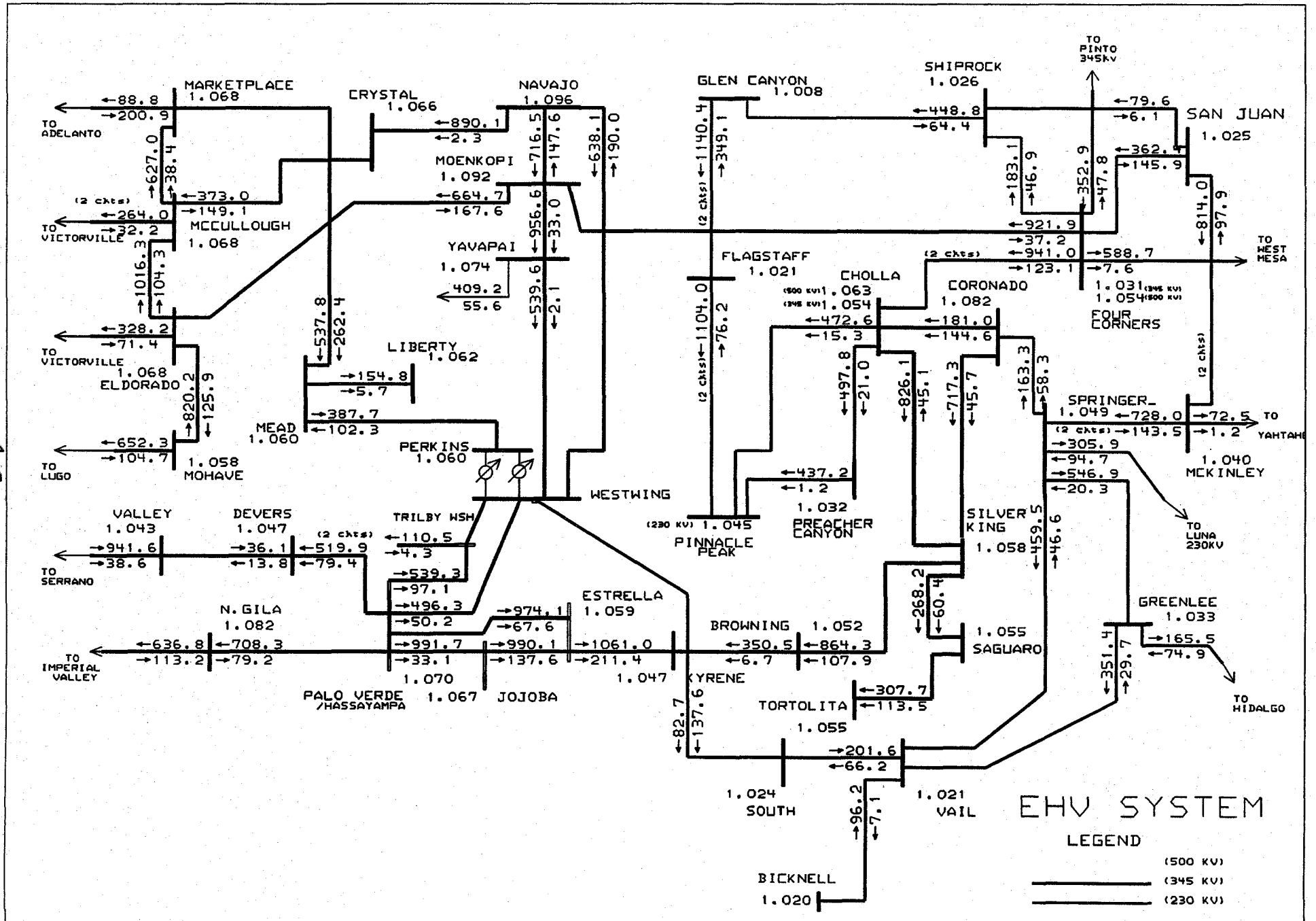
Rating = 2



General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 02:05:56 2002

GENERAL ELECTRIC COMPANY

2006 BASE CASE
sm2006a33

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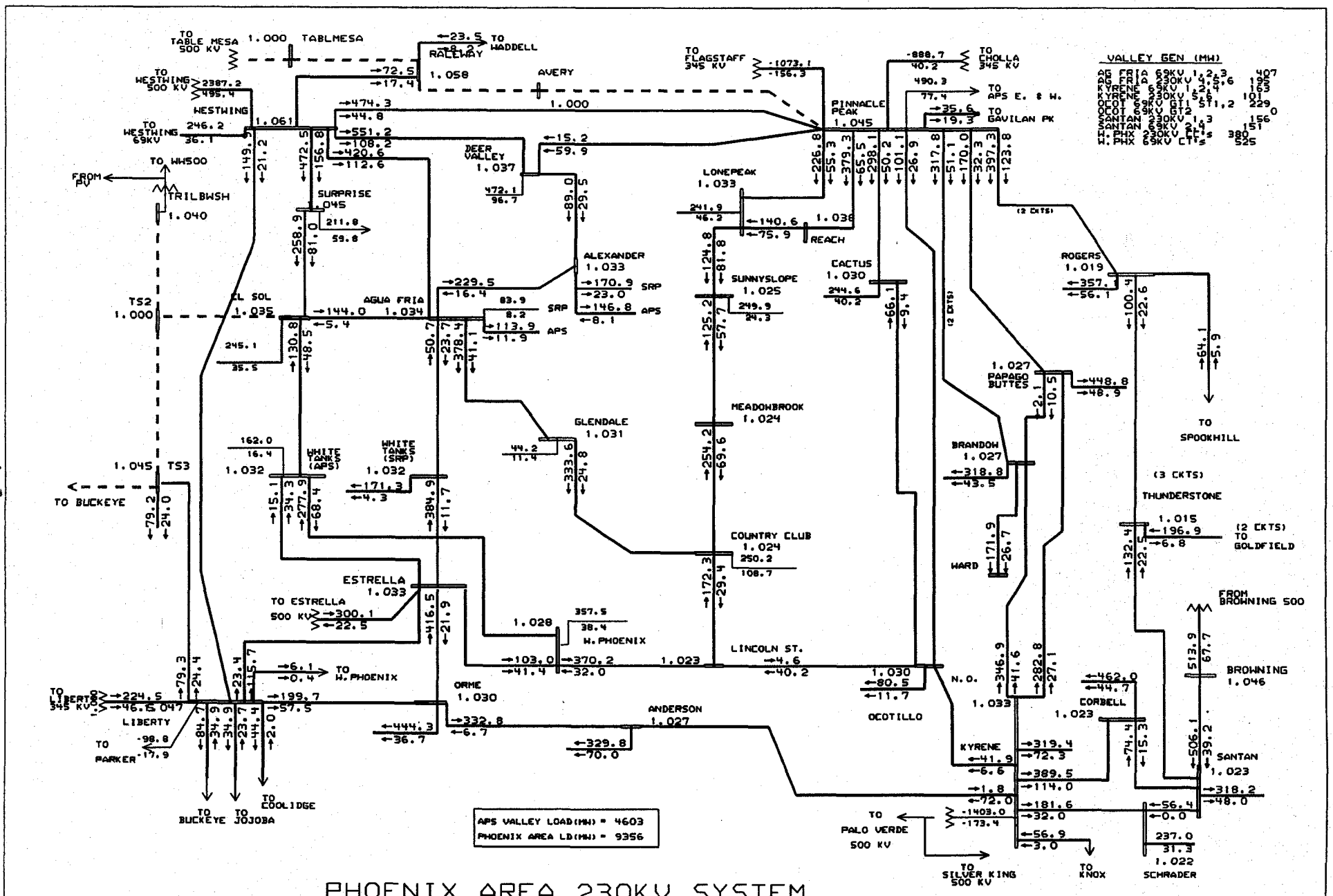

PHOENIX AREA 230KV SYSTEM

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 [illegible]:02 2002

GENERAL ELECTRIC COMPANY

2006 BASE CASE
sm2006a33

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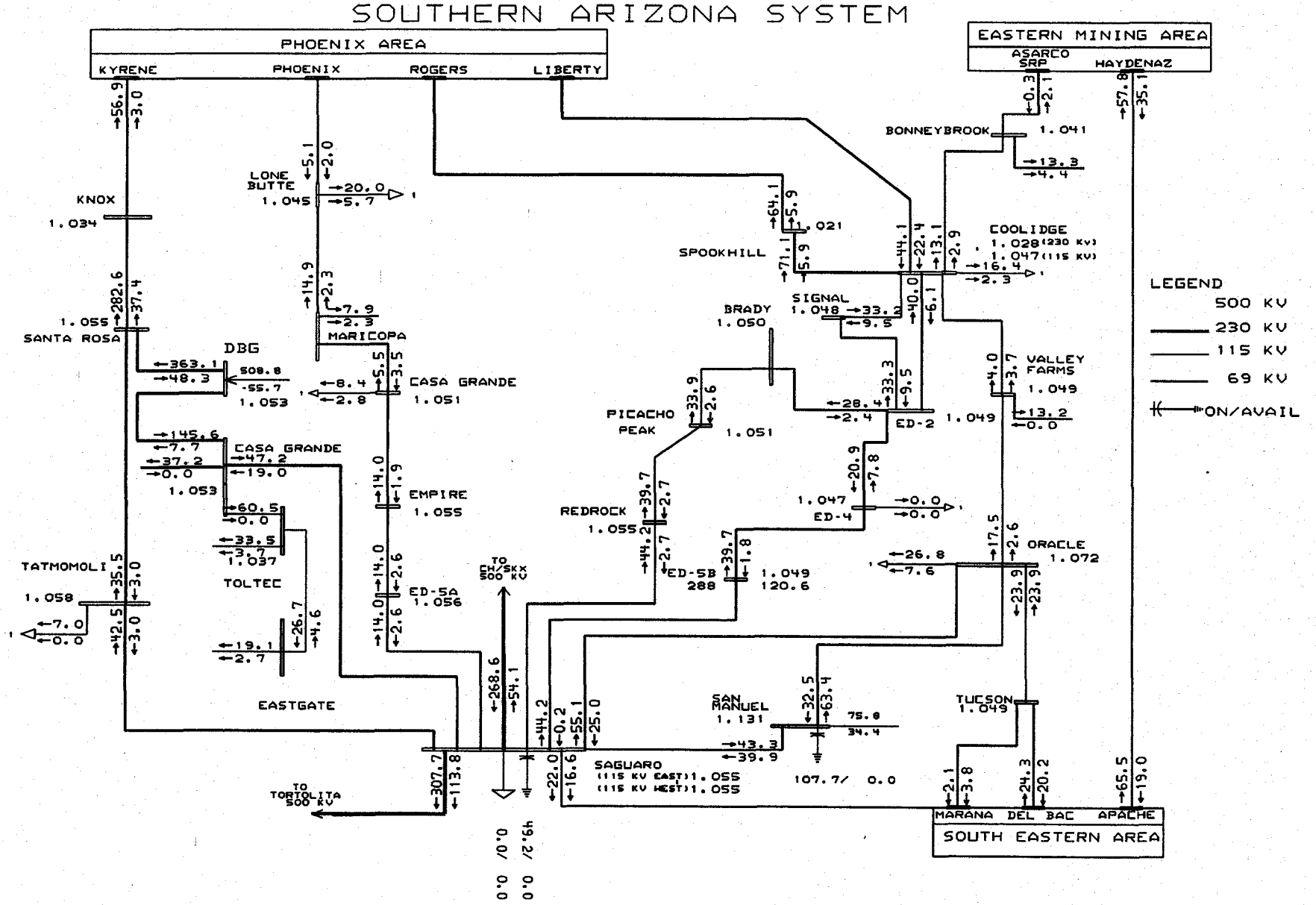
SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
1.041
LONE BUTTE
1.045
KNOX
1.034
SPOOKHILL
1.021
COOLIDGE
1.028 (230 KV)
1.047 (115 KV)
SIGNAL
1.048
BRADY
1.050
SANTA ROSA
1.055
DBG
MARICOPA
CASA GRANDE
1.051
VALLEY FARMS
1.049
PICACHO PEAK
1.051
ED-2
1.049
CASA GRANDE
EMPIRE
1.055
REDROCK
1.055
1.047
ED-4
ORACLE
1.072
TATMOMOLI
1.058
TOLTEC
1.037
ED-5A
1.056
ED-5B
288
1.049
120.6
TO SX/SK 500 KV
EASTGATE
SAN MANUEL
1.131
TUCSON
1.049
SAGUARO
(115 KV EAST) 1.055
(115 KV WEST) 1.055
TO TORTOLITA 500 KV
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL
General Electric International, Inc.
PSLF Program
MW/MVAR
Thu Jan 31 02:24:40 2002
GENERAL ELECTRIC COMPANY
2006 BASE CASE
sm2006a33
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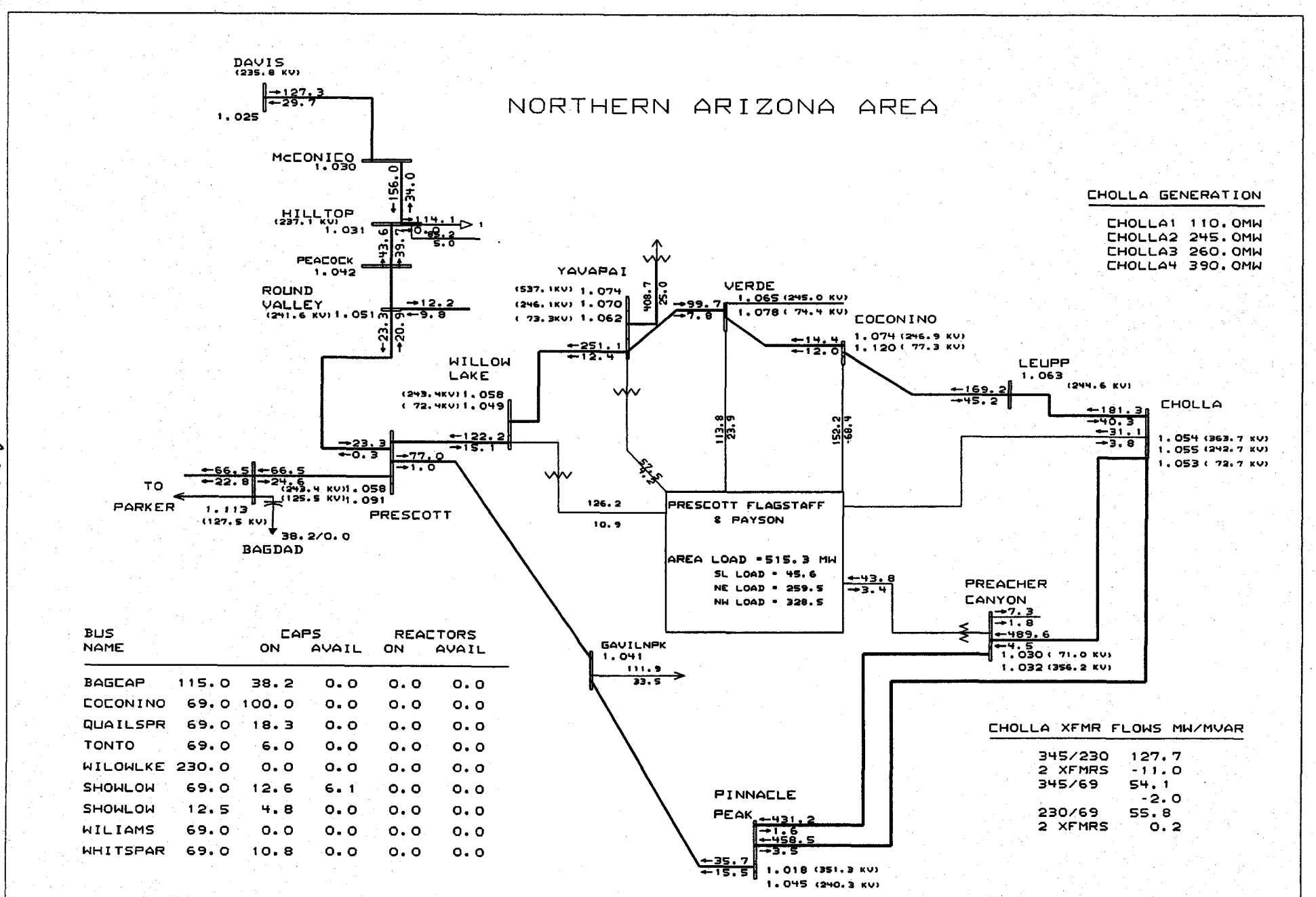
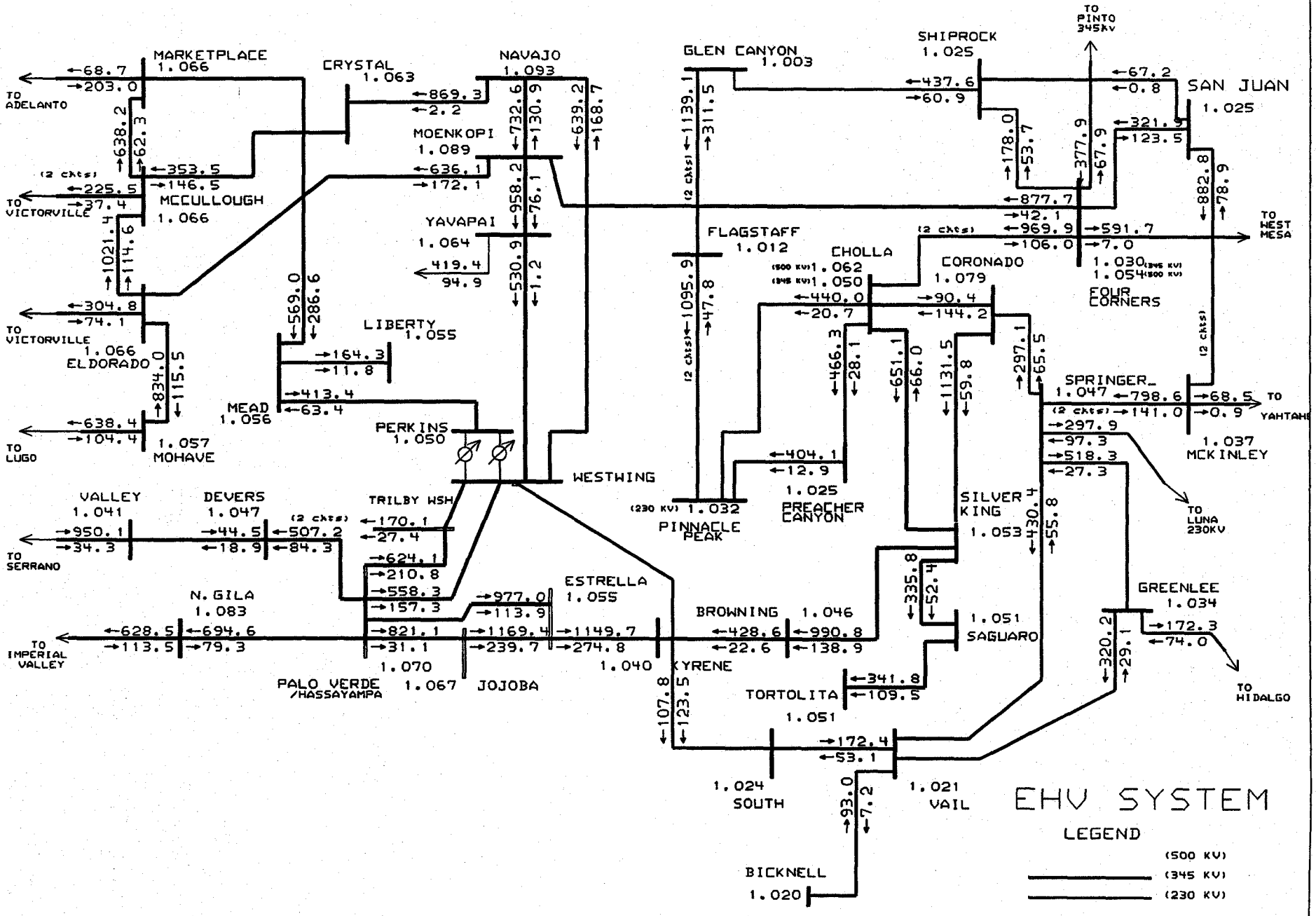
Rating = 1



BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	100.0	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	12.6	6.1	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	0.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0



A21

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 01:41:50 2002

GENERAL ELECTRIC COMPANY

2007 BASE CASE
sm07a48

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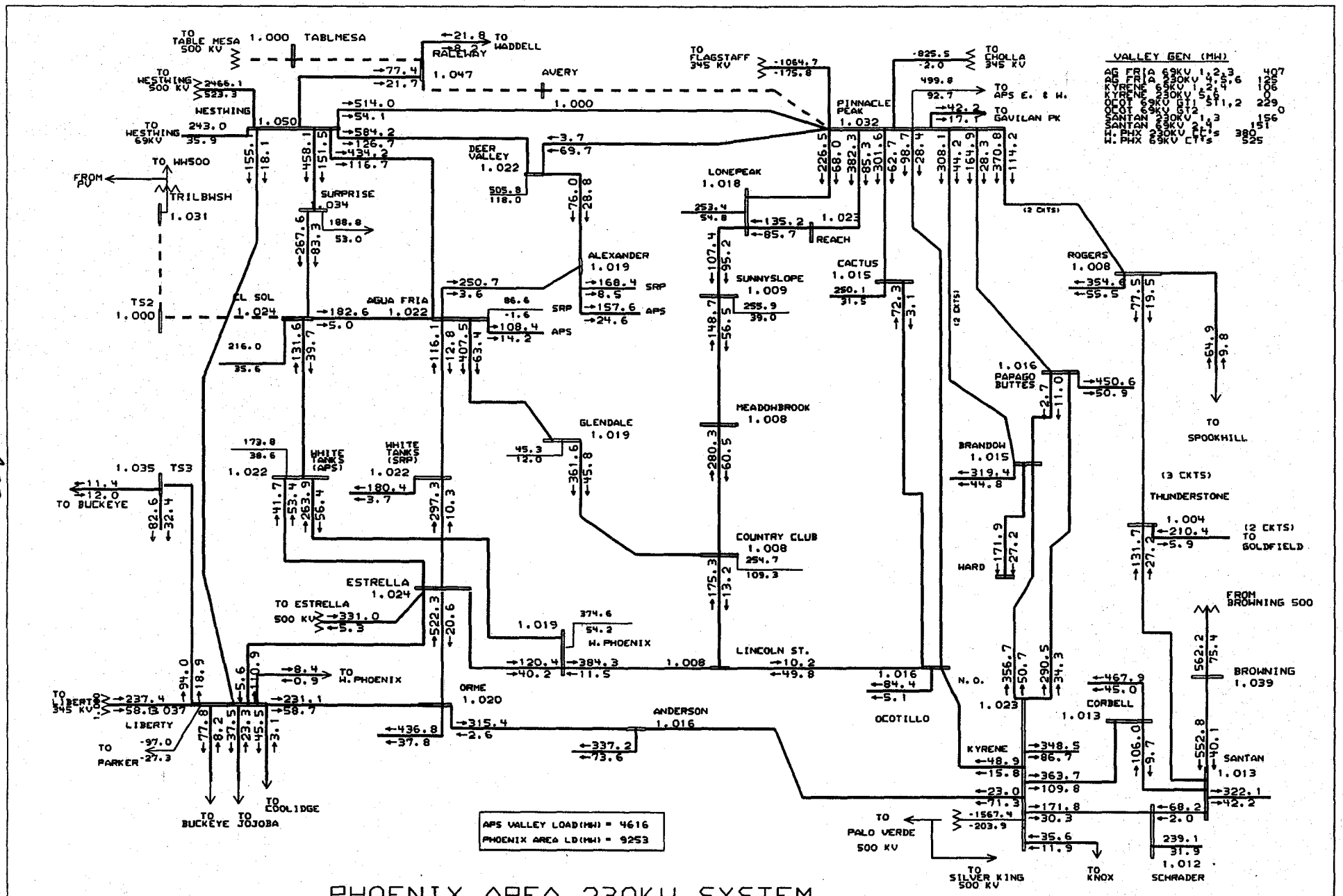
Rating = 2



PHOENIX AREA 230KV SYSTEM

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 11:17 2002
GENERAL ELECTRIC COMPANY
2007 BASE CASE
sm07a48
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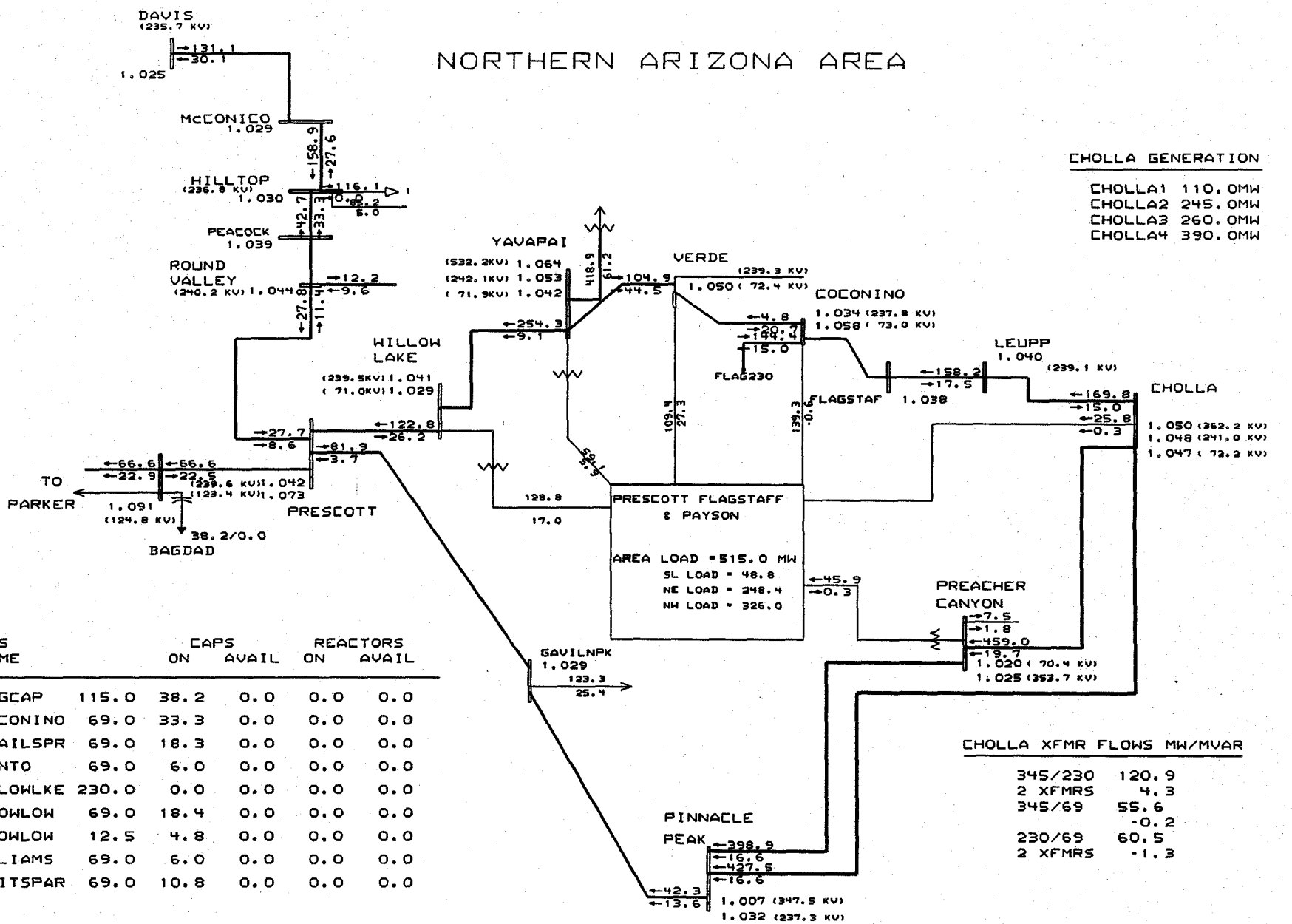
Rating = 2

NORTHERN ARIZONA AREA



CHOLLA GENERATION

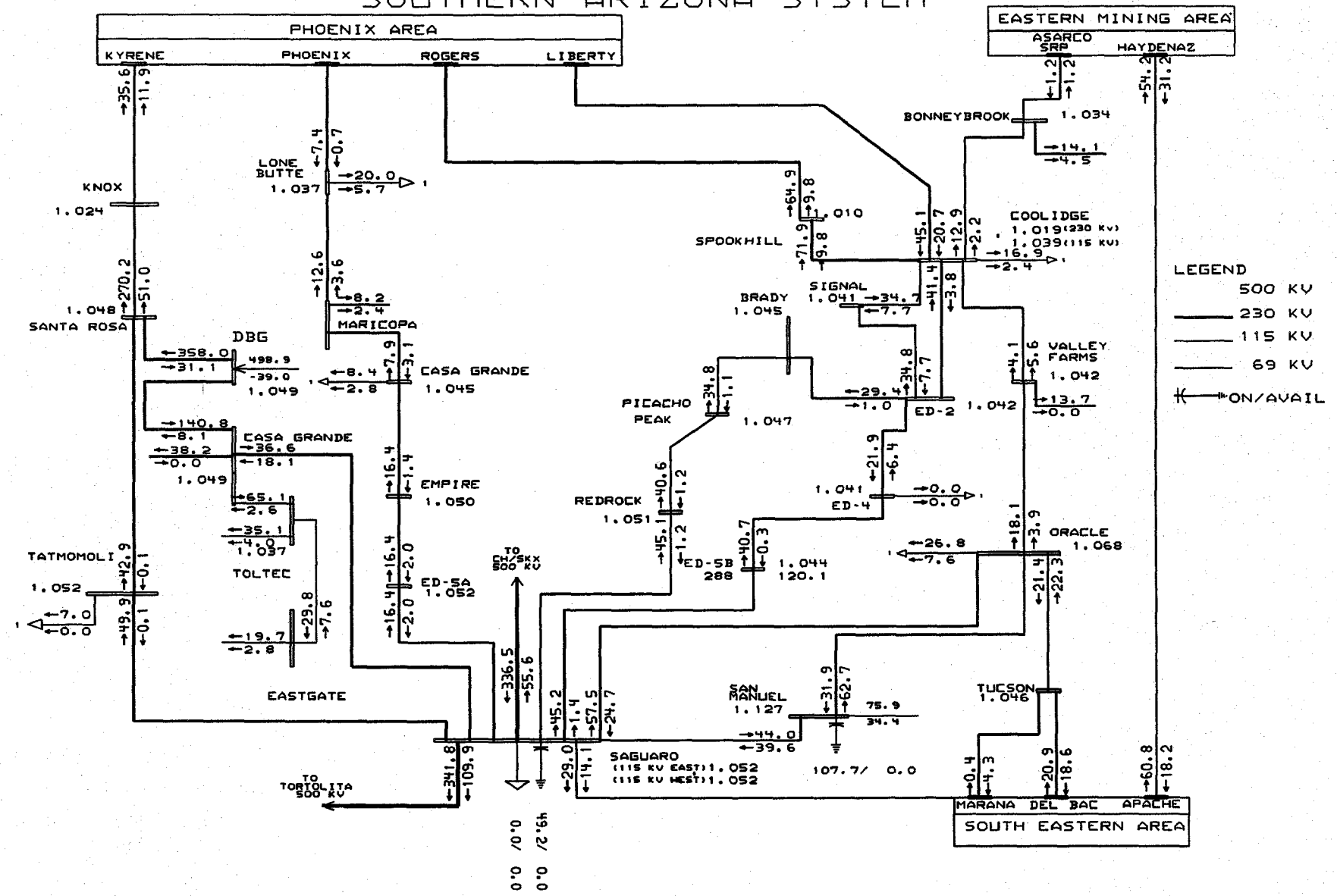
CHOLLA1	110.0MW
CHOLLA2	245.0MW
CHOLLA3	260.0MW
CHOLLA4	390.0MW

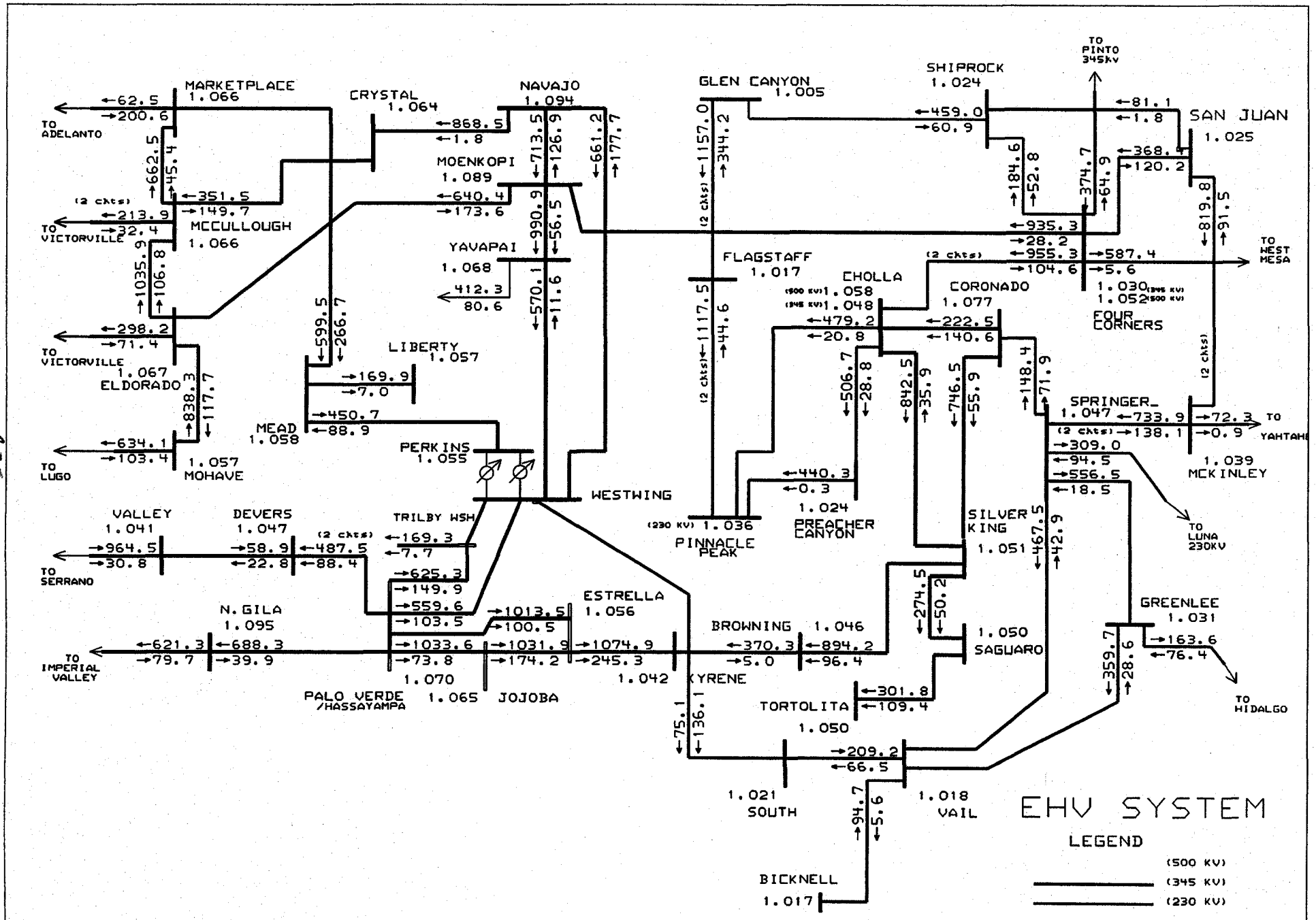
BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

CHOLLA XFMR FLOWS MW/MVAR

345/230	120.9
2 XFMRS	4.3
345/69	55.6
	-0.2
230/69	60.5
2 XFMRS	-1.3

SOUTHERN ARIZONA SYSTEM





A25

General Electric International, Inc. PSLF Program MW/MVAR Thu Jan 31 01:33:55 2002

GENERAL ELECTRIC COMPANY

2008 BASE CASE
sm08s29

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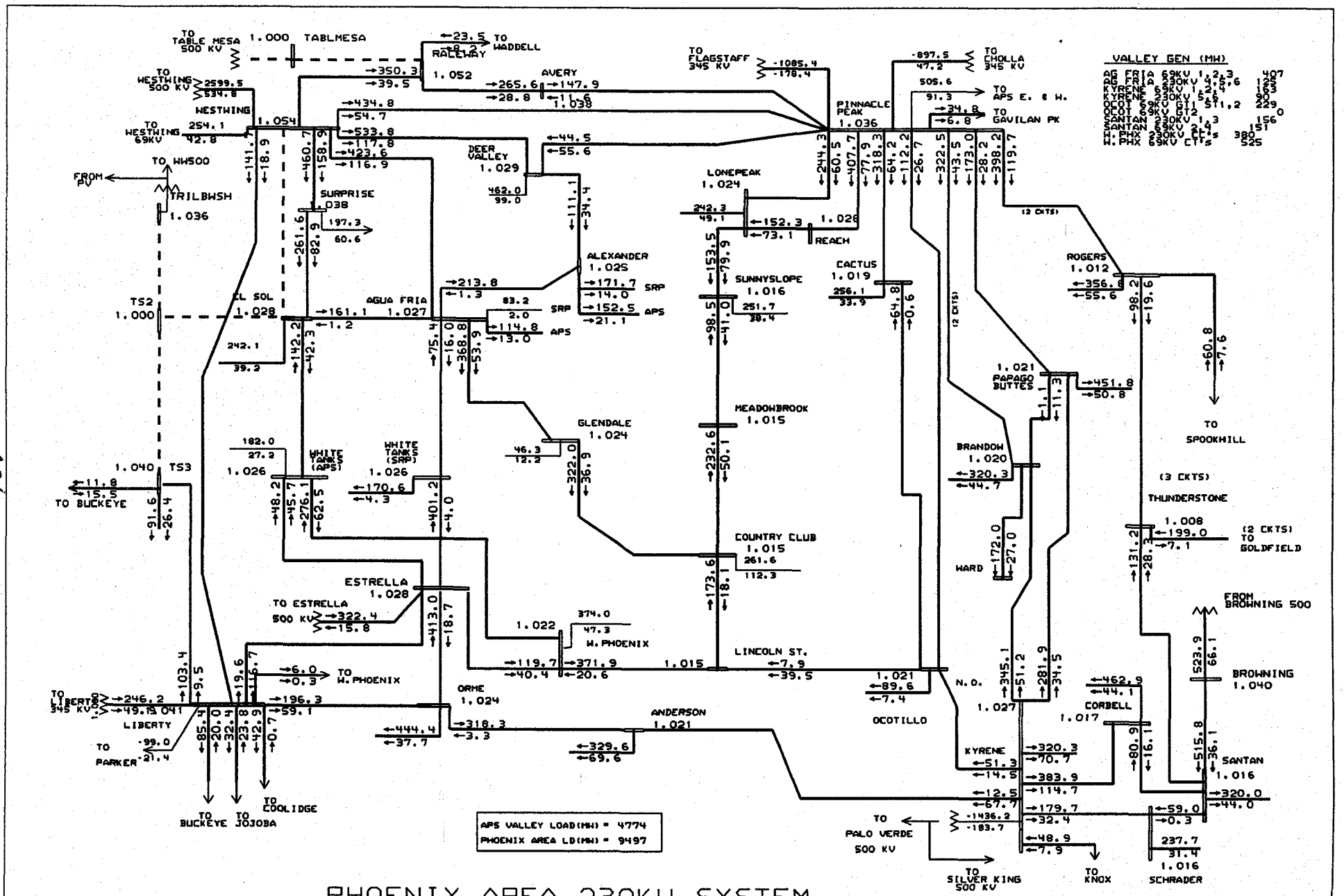
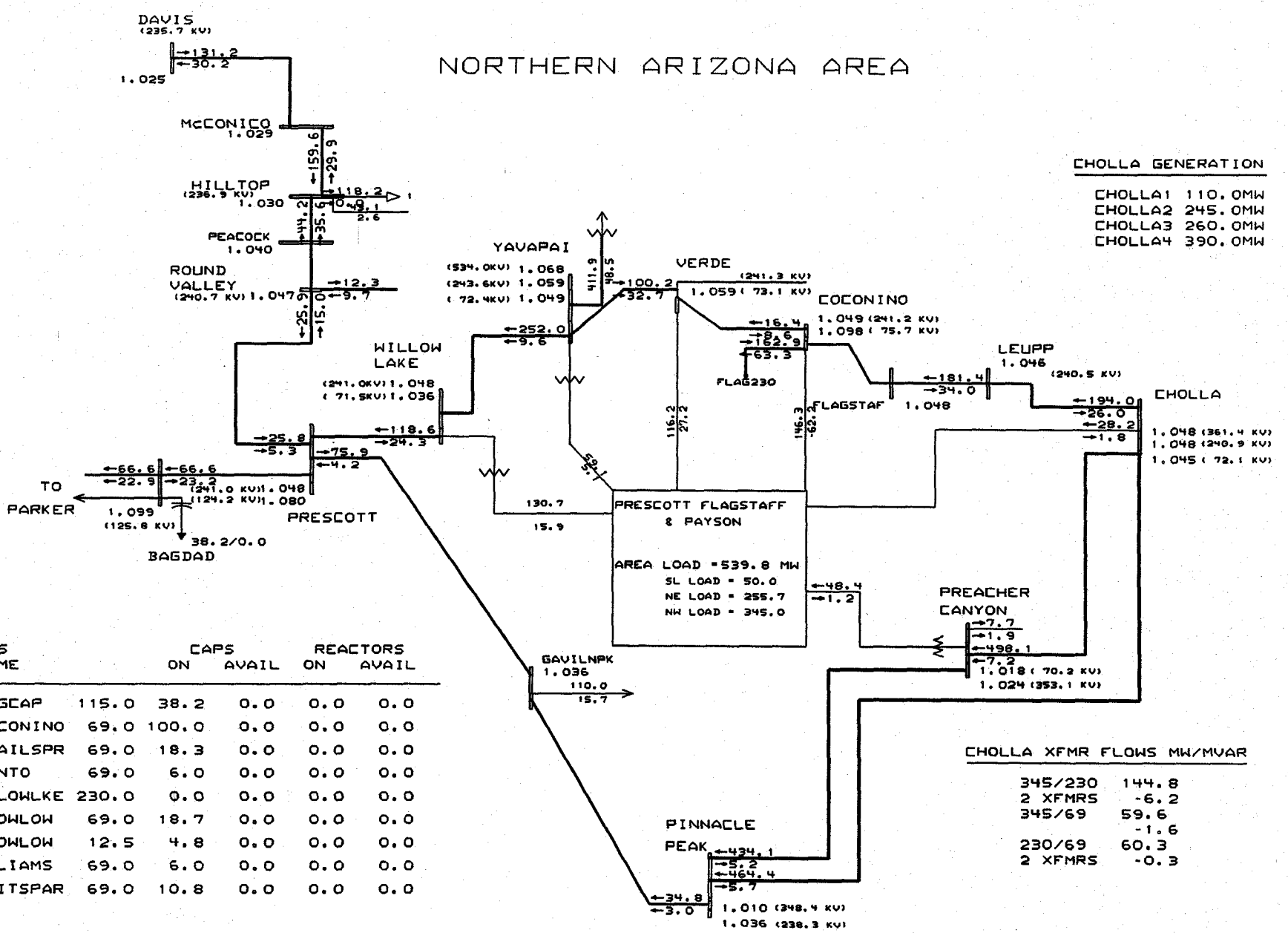


PHOENIX AREA 230KV SYSTEM

A26

NORTHERN ARIZONA AREA



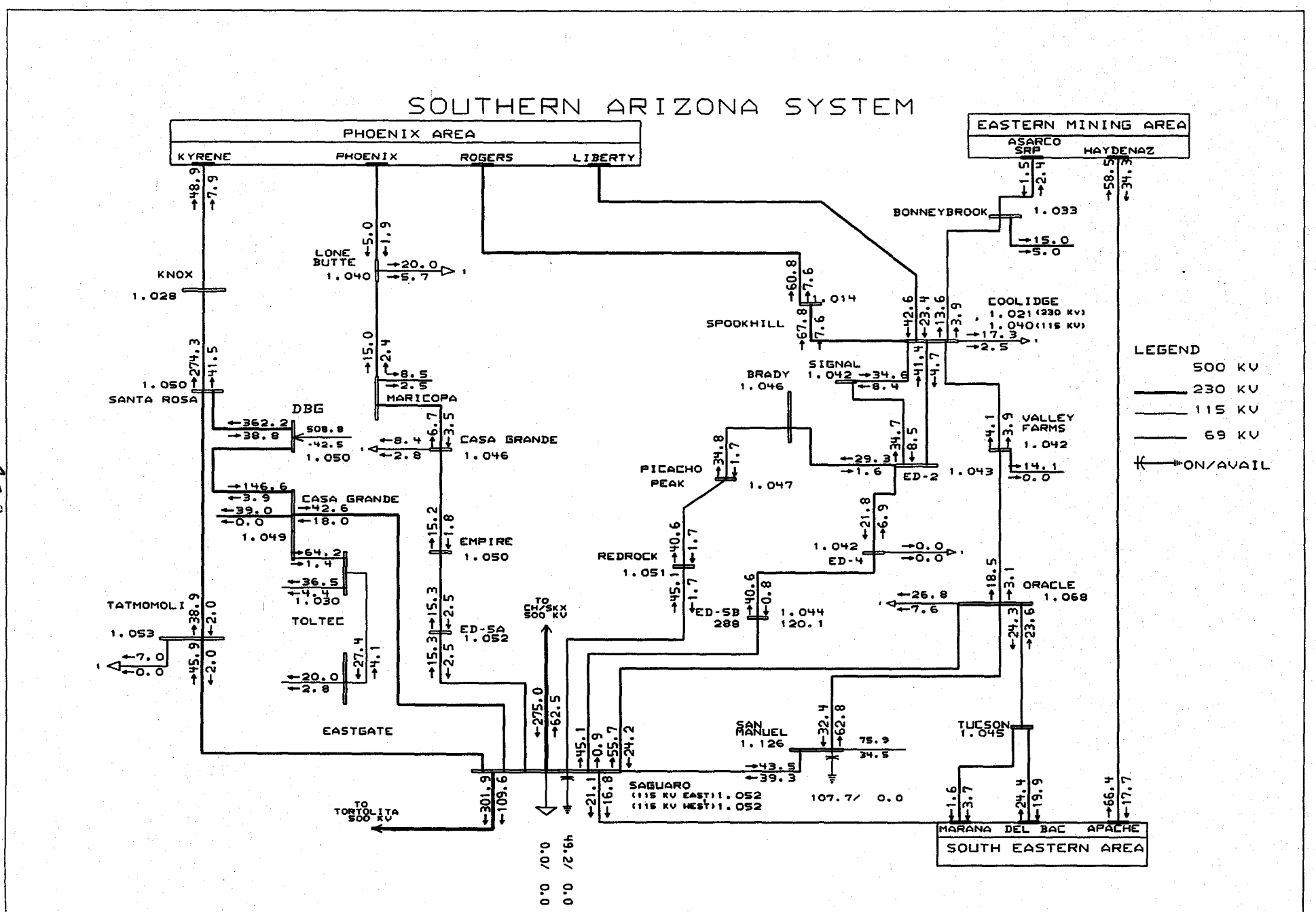
CHOLLA GENERATION

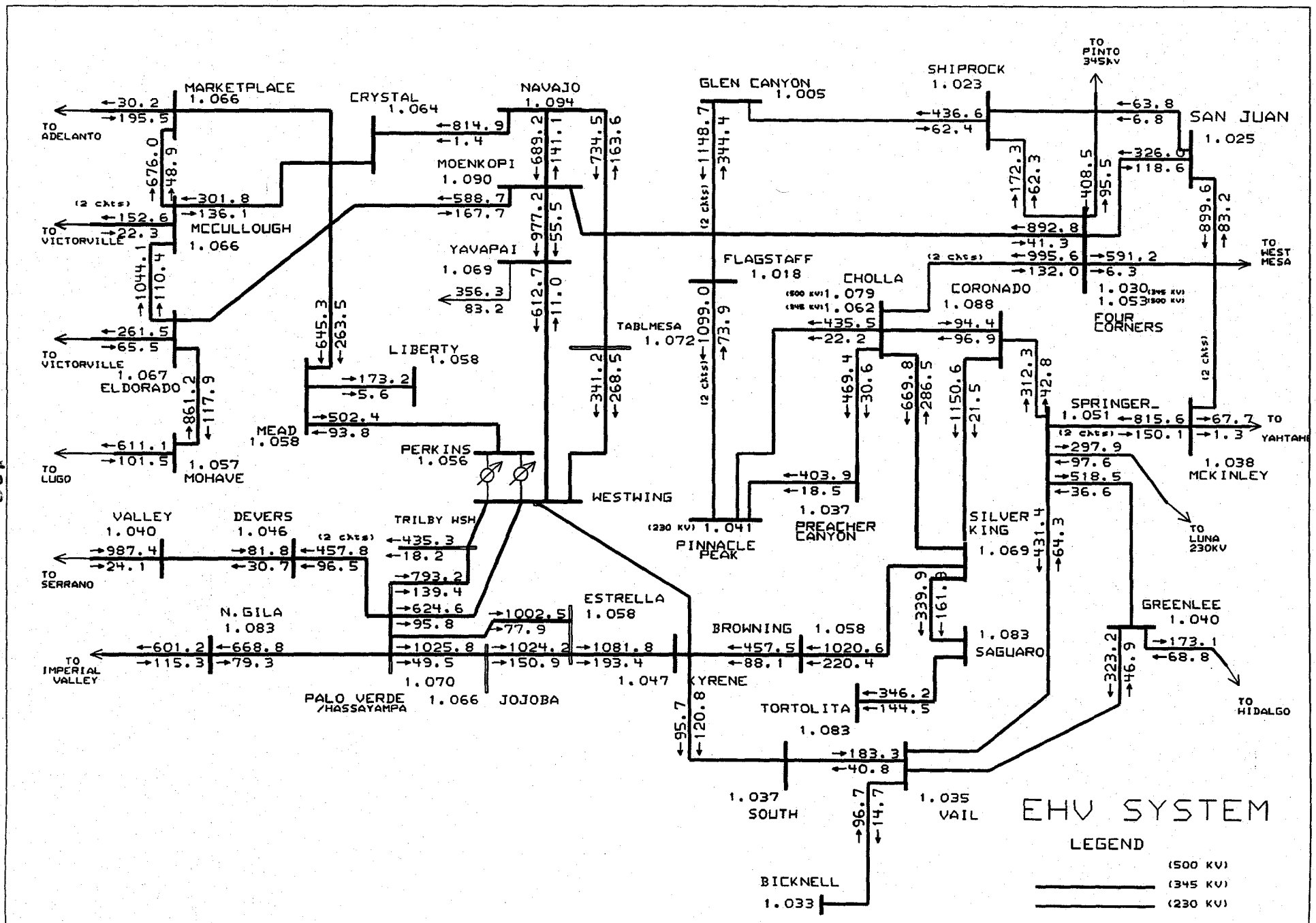
CHOLLA1	110.0MW
CHOLLA2	245.0MW
CHOLLA3	260.0MW
CHOLLA4	390.0MW

BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	100.0	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.7	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

CHOLLA XFMR FLOWS MW/MVAR

345/230	144.8
2 XFMRS	-6.2
345/69	59.6
	-1.6
230/69	60.3
2 XFMRS	-0.3


SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
1.033
COOLIDGE
1.021 (230 KV)
1.040 (115 KV)
SPOOKHILL
1.014
LONE BUTTE
1.040
KNOX
1.028
SANTA ROSA
1.050
DBG
MARICOPA
CASA GRANDE
1.046
BRADY
1.046
SIGNAL
1.042
VALLEY FARMS
1.042
PICACHO PEAK
1.047
ED-2
1.043
CASA GRANDE
1.049
EMPIRE
1.050
REDROCK
1.051
ED-4
1.042
TATMOMOLI
1.053
TOLTEC
1.030
ED-5A
1.052
ED-5B
288
1.044
120.1
ORACLE
1.068
TO SOO KV
EASTGATE
SAN MANUEL
1.126
TUCSON
1.045
SAGUARO
(115 KV EAST) 1.052
(115 KV WEST) 1.052
TO TORTOLITA 500 KV
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL



General Electric International, Inc. PSLF Program MW/MVAR Wed Jan 30 20:57:44 2002

GENERAL ELECTRIC COMPANY

2010 BASE CASE
sm10s32

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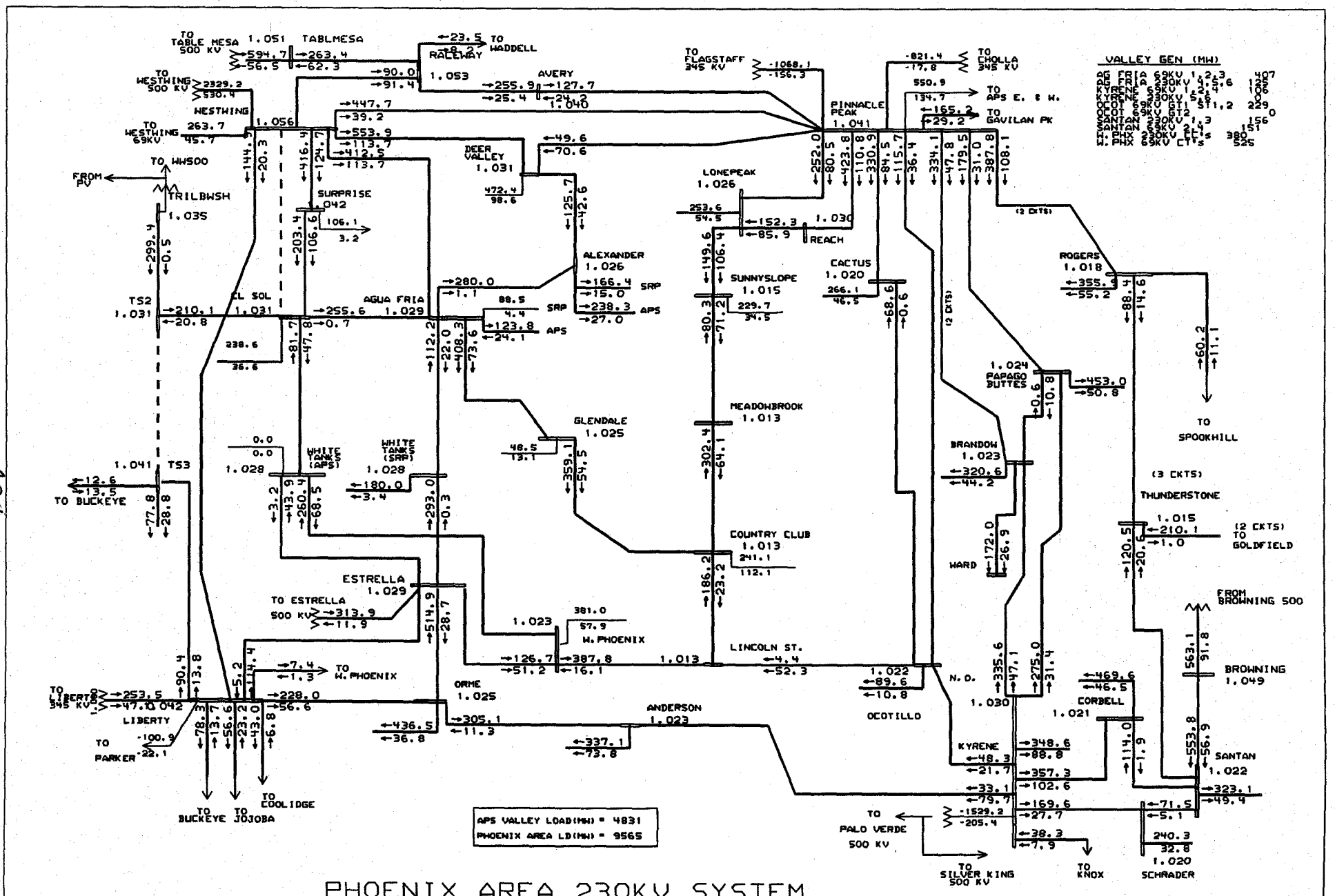
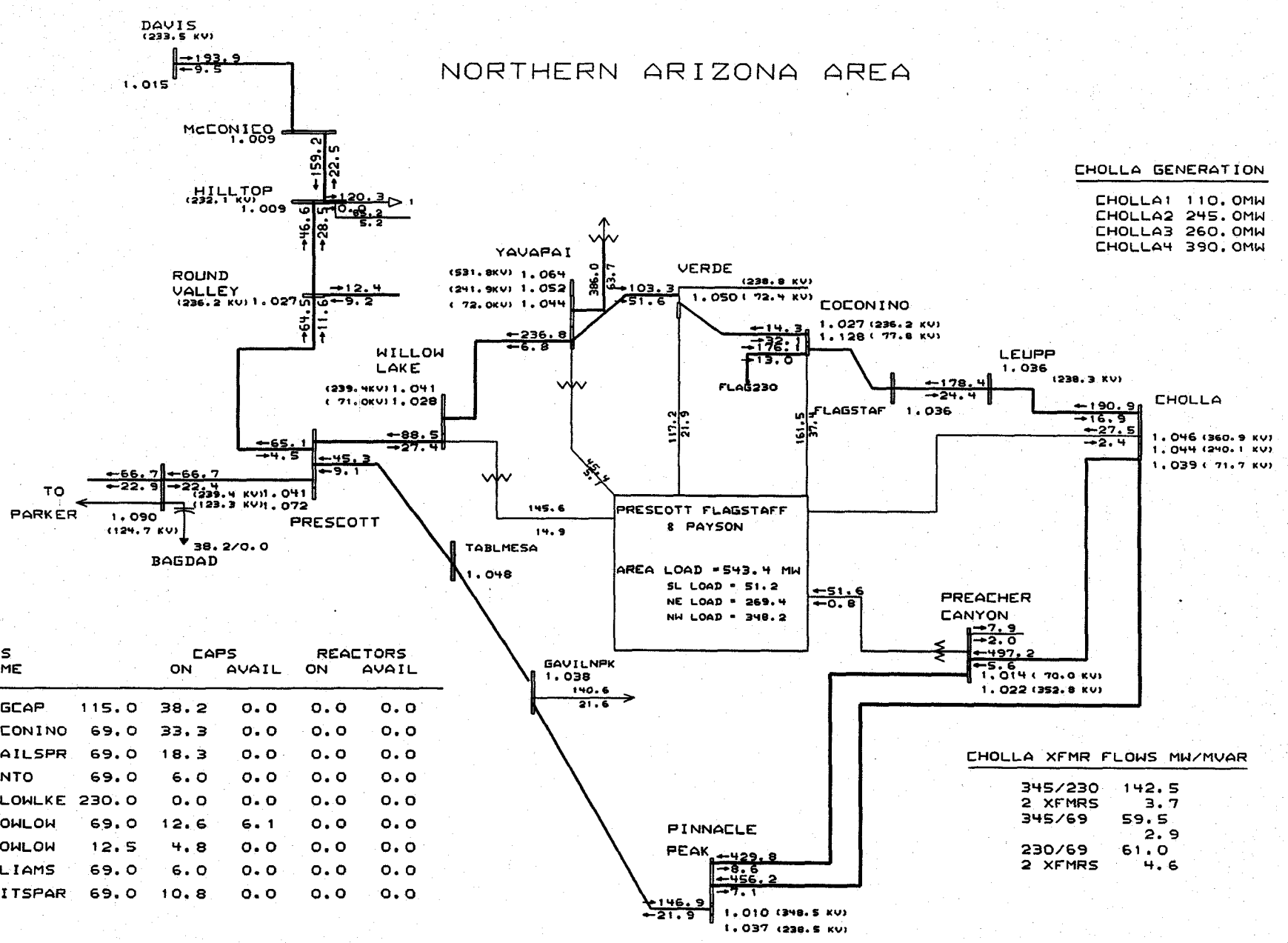


PHOENIX AREA 230KV SYSTEM

434



CHOLLA GENERATION

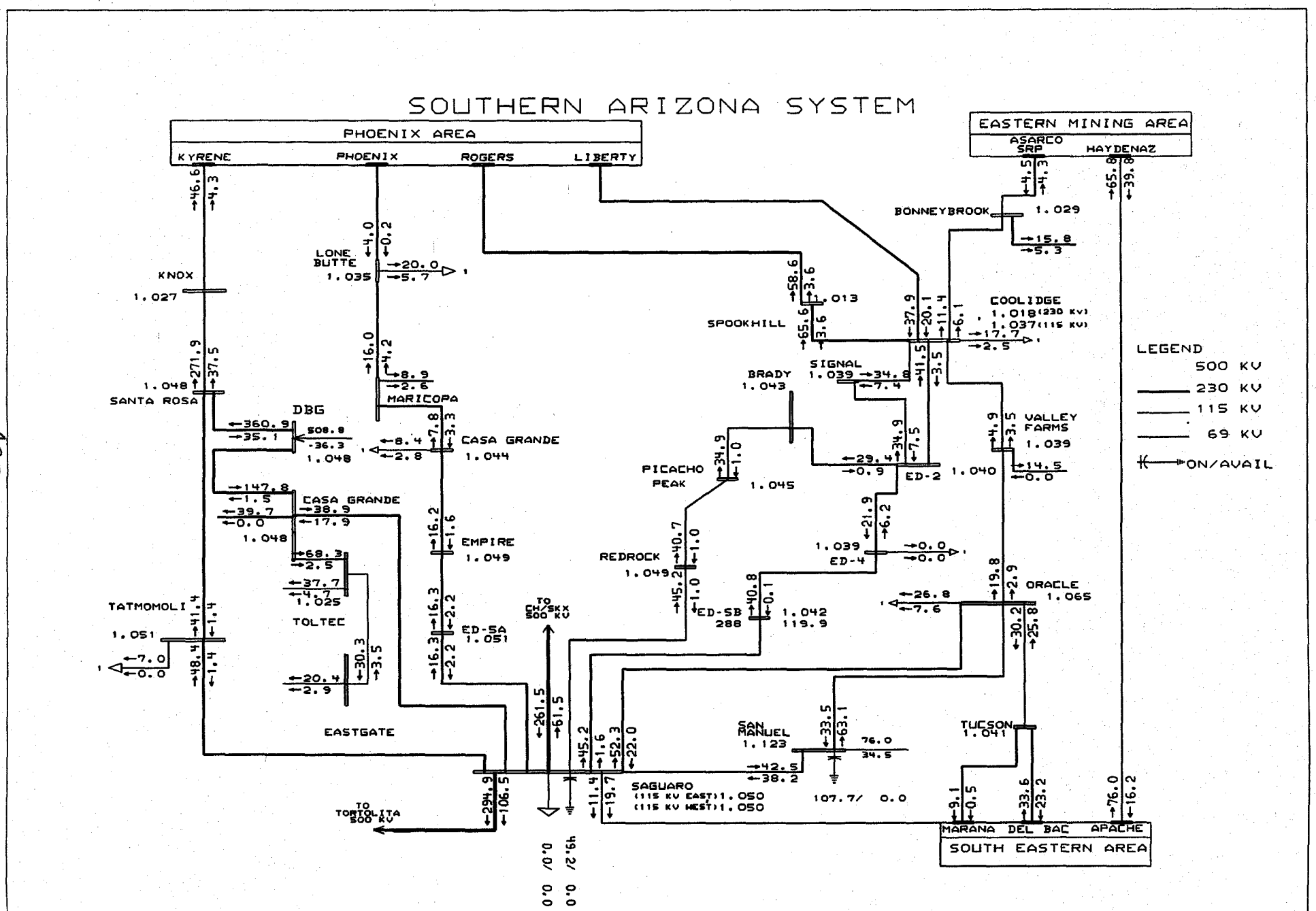
CHOLLA1	110.0MW
CHOLLA2	245.0MW
CHOLLA3	260.0MW
CHOLLA4	390.0MW

BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	12.6	6.1	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

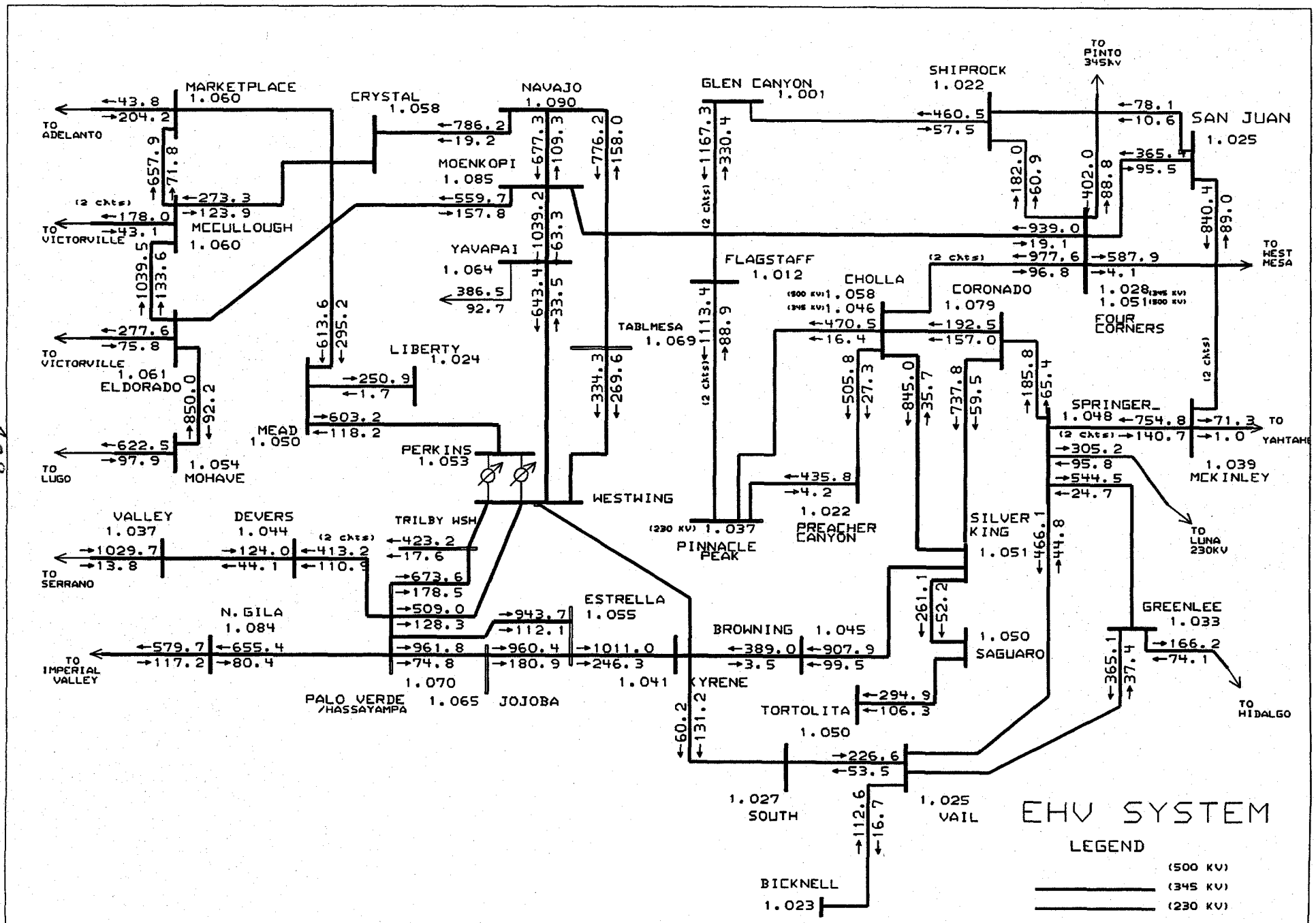
CHOLLA XFMR FLOWS MW/MVAR

345/230	142.5
2 XFMRS	3.7
345/69	59.5
	2.9
230/69	61.0
2 XFMRS	4.6

A31


SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
1.029
COOLIDGE
1.018(230 KV)
1.037(115 KV)
SPOOKHILL
1.013
KNOX
1.027
LONE BUTTE
1.035
SANTA ROSA
1.048
DBG
MARICOPA
CASA GRANDE
1.044
BRADY
1.043
SIGNAL
1.039
VALLEY FARMS
1.039
PICACHO PEAK
1.045
ED-2
1.040
CASA GRANDE
1.048
EMPIRE
1.049
REDROCK
1.049
1.039
ED-4
ED-5A
1.051
ED-5B
288
1.042
119.9
ORACLE
1.065
TATMOMOLI
1.051
TOLTEC
1.025
EASTGATE
TO CH/SKX 500 KV
SAN MANUEL
1.123
TUCSON
1.041
SAGUARO
(115 KV EAST)1.050
(115 KV WEST)1.050
TO TORTOLITA 500 KV
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL
MW/MVAR
Thu Jan 31
7:52 2002
2009 BASE CASE
SM09s22
Rating = 1

A32



A29

General Electric International, Inc. PSLF Program

MW/MVAR Thu Jan 31 00:53:28 2002

GENERAL ELECTRIC COMPANY

2009 BASE CASE
SM09e22

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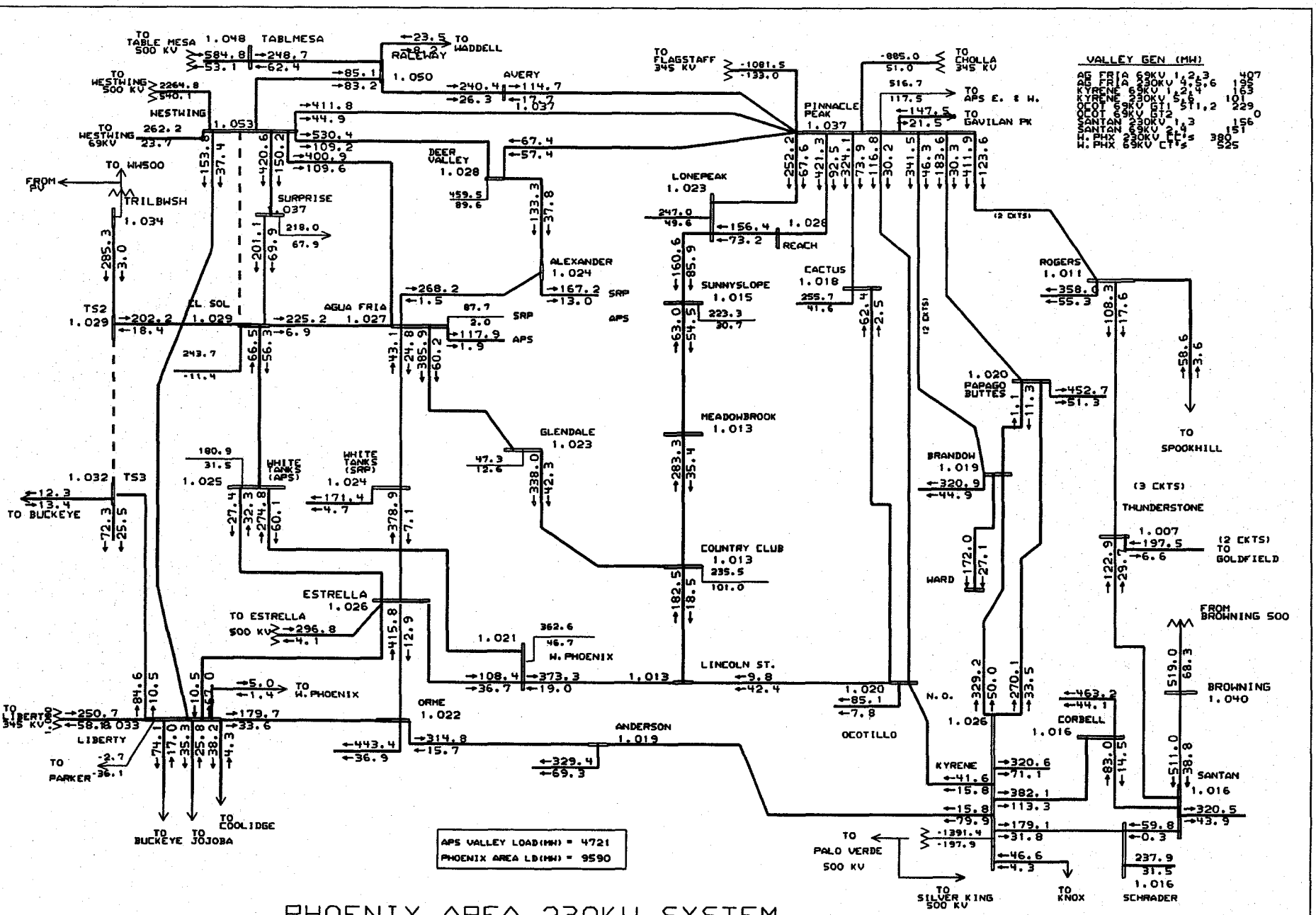

PHOENIX AREA 230KV SYSTEM

A30

General Electric International, Inc. PSLF Program

MW/MVAR

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GENERAL ELECTRIC COMPANY

2009 BASE CASE
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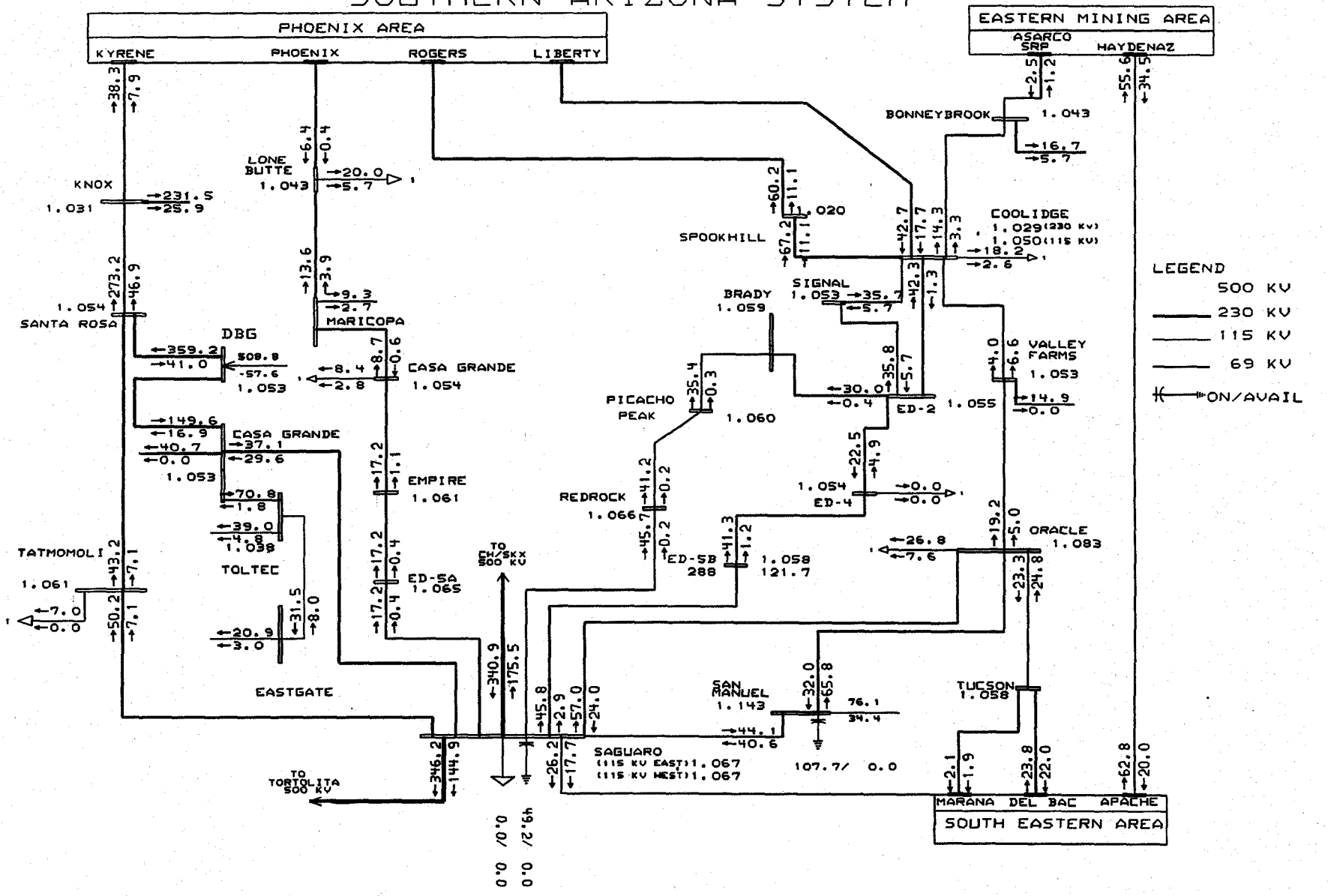

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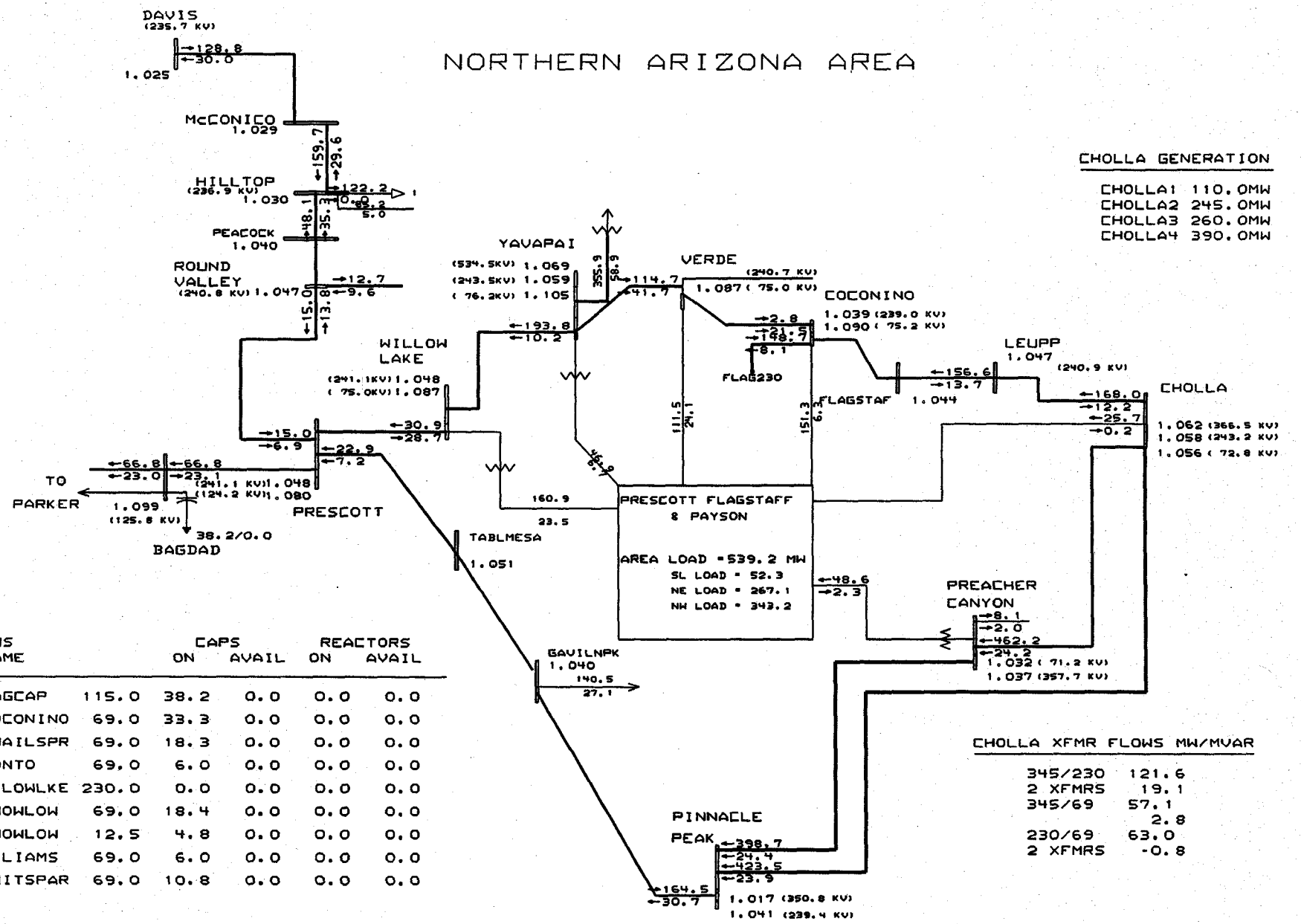

BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
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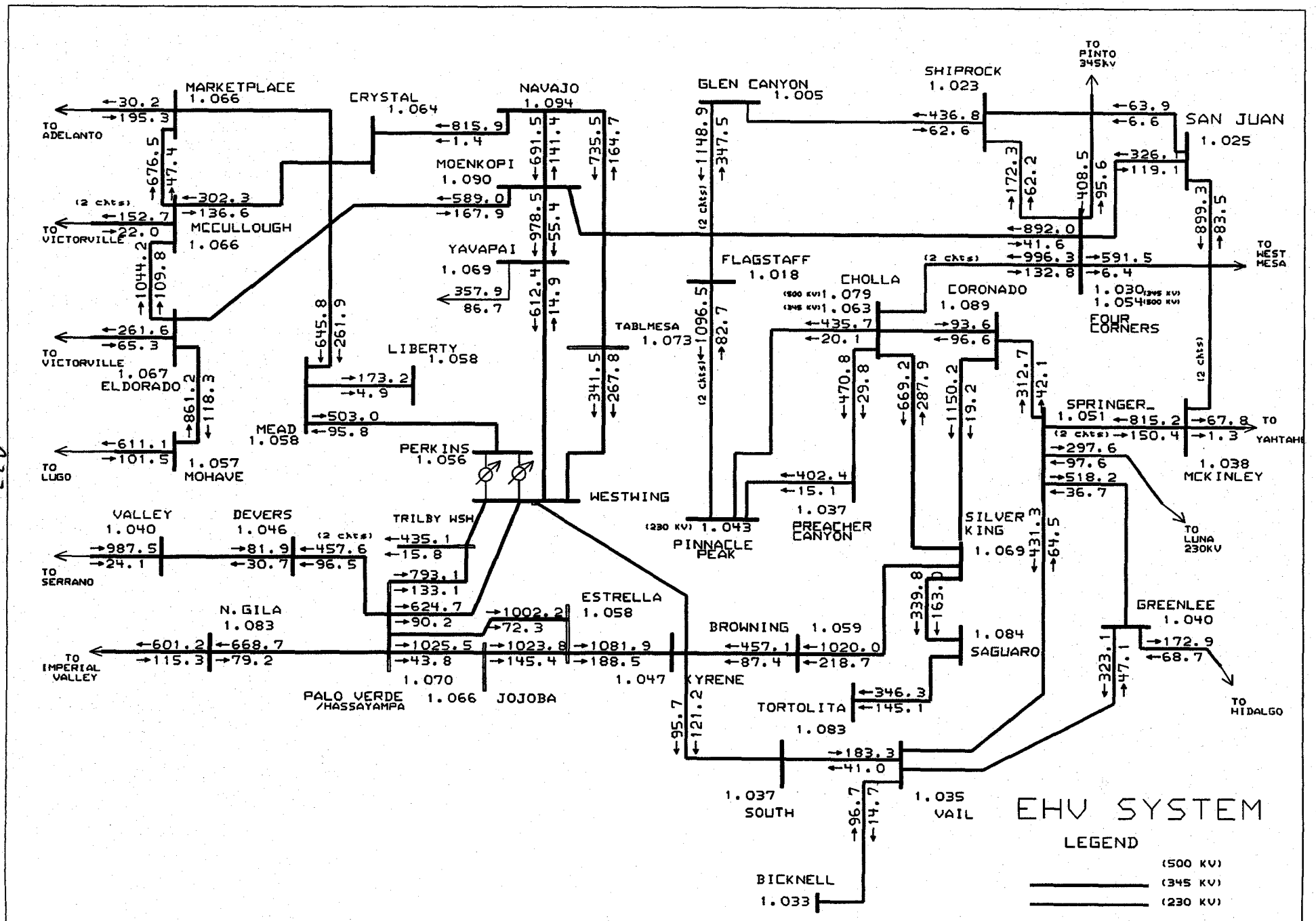

General Electric International, Inc. PSLF Program

MW/MVAR Thu Jan 31 00:49:14 2002

GENERAL ELECTRIC COMPANY

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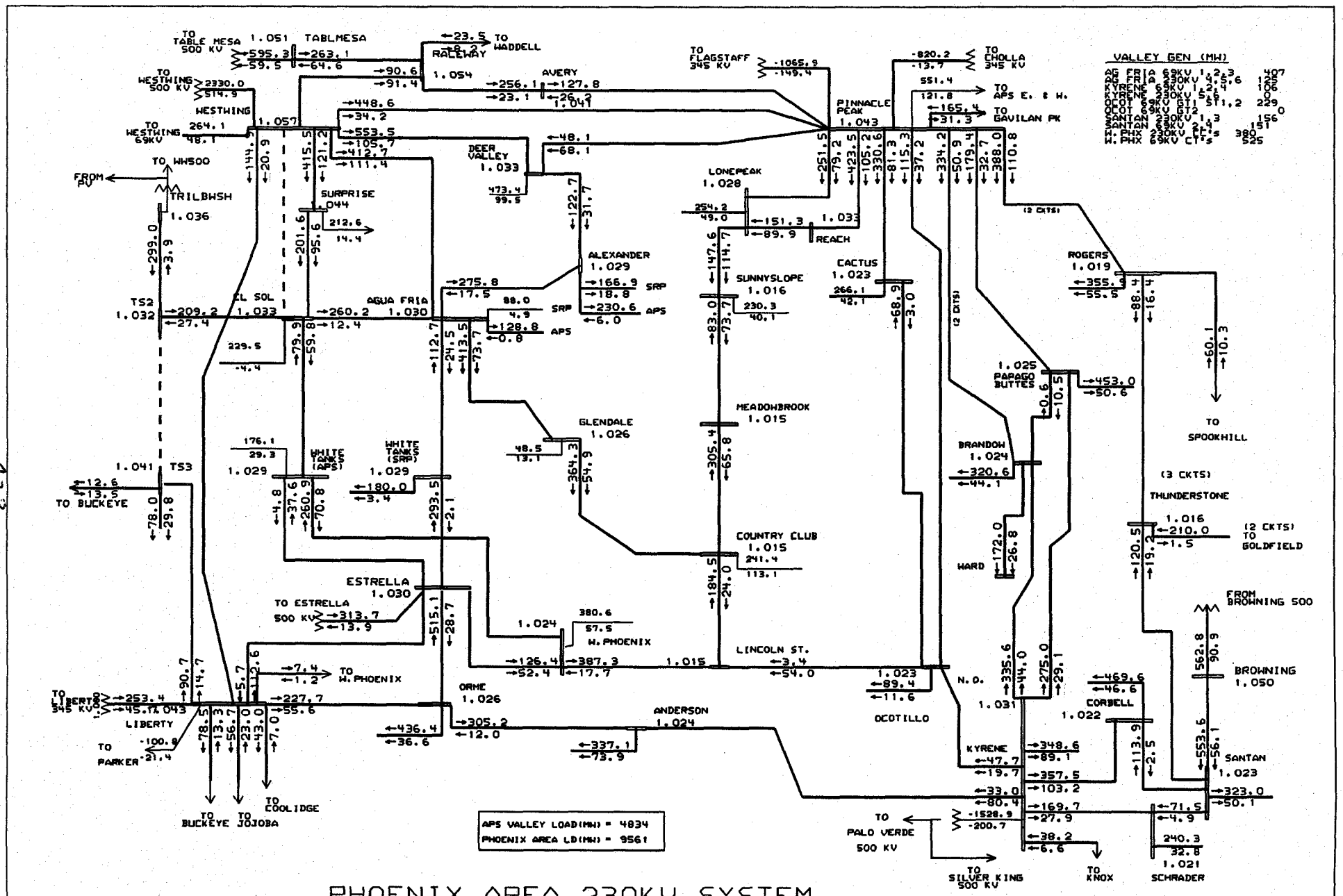
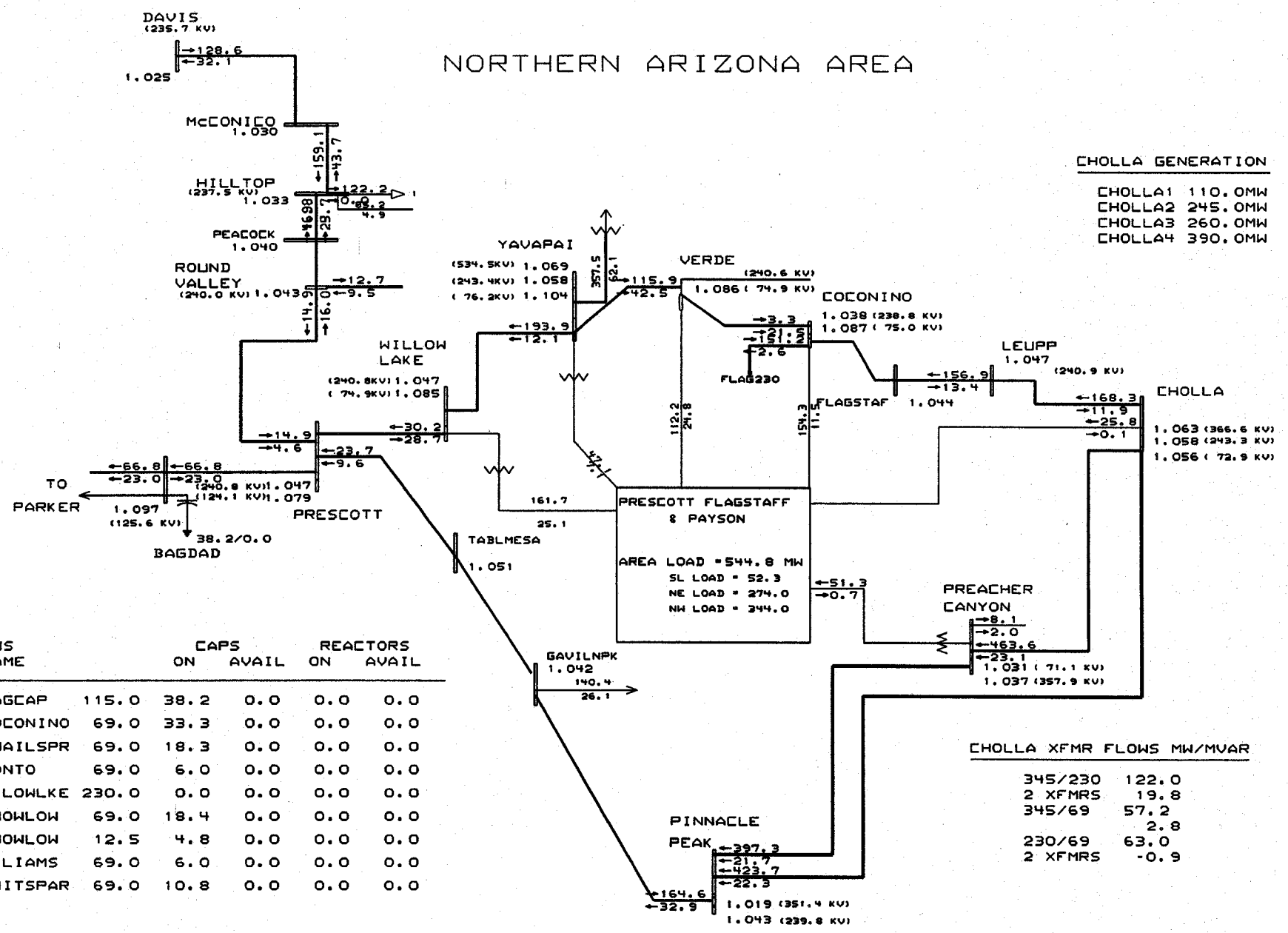


PHOENIX AREA 230KV SYSTEM

A33



BUS NAME		CAPS ON	CAPS AVAIL	REACTORS ON	REACTORS AVAIL
BAGCAP	115.0	38.2	0.0	0.0	0.0
COCONINO	69.0	33.3	0.0	0.0	0.0
QUAILSPR	69.0	18.3	0.0	0.0	0.0
TONTO	69.0	6.0	0.0	0.0	0.0
WILOWLKE	230.0	0.0	0.0	0.0	0.0
SHOWLOW	69.0	18.4	0.0	0.0	0.0
SHOWLOW	12.5	4.8	0.0	0.0	0.0
WILIAMS	69.0	6.0	0.0	0.0	0.0
WHITSPAR	69.0	10.8	0.0	0.0	0.0

A39

General Electric International, Inc. PSLF Program — MW/MVAR — Thu Jan 31 02:40:51 2002

GENERAL ELECTRIC COMPANY

2011 BASECASE
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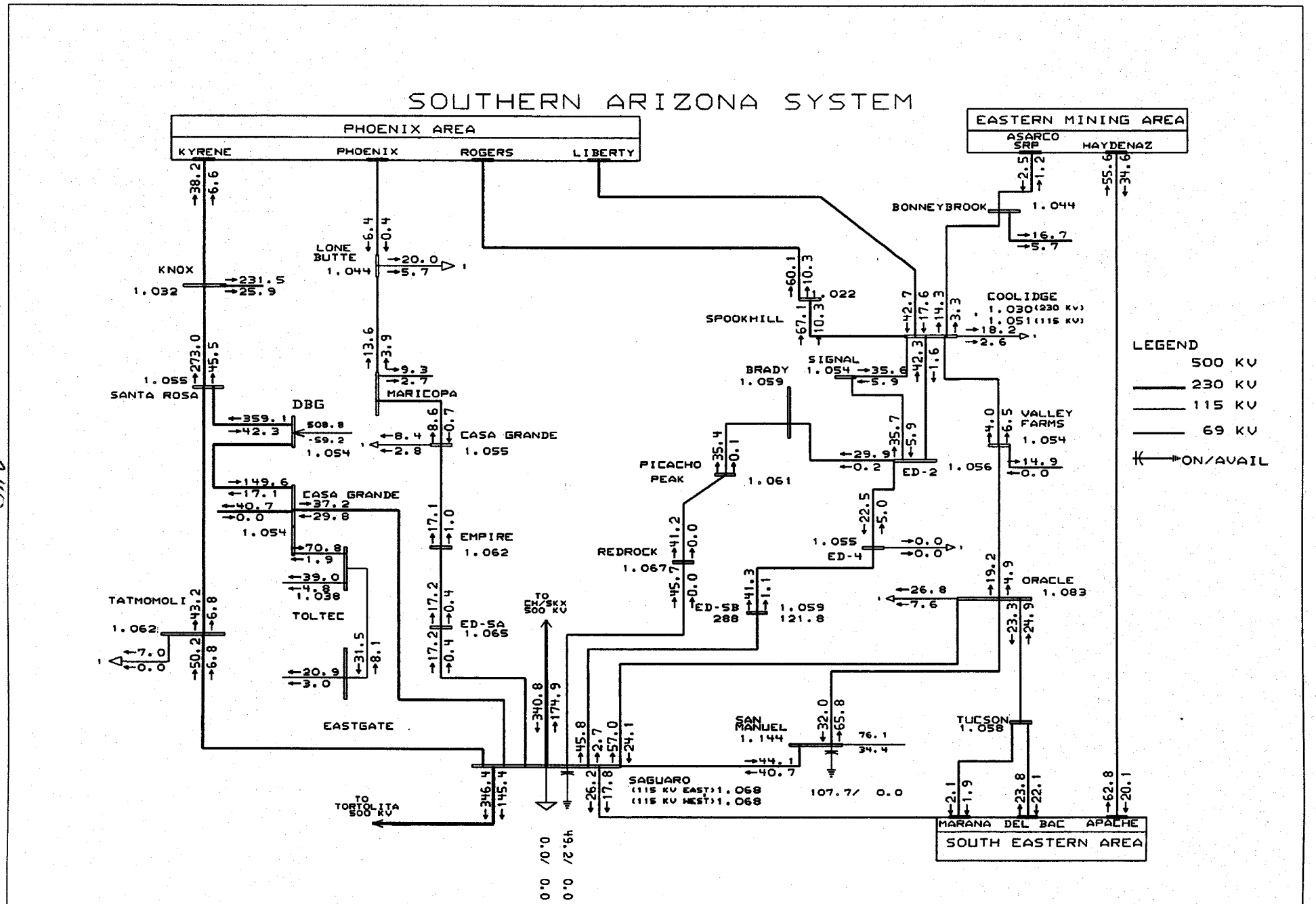
SOUTHERN ARIZONA SYSTEM
PHOENIX AREA
KYRENE
PHOENIX
ROGERS
LIBERTY
EASTERN MINING AREA
ASARCO
SRP
HAYDENAZ
BONNEYBROOK
1.044
COOLIDGE
1.030 (230 KV)
1.051 (115 KV)
SPOOKHILL
1.022
KNOX
1.032
LONE BUTTE
1.044
SANTA ROSA
1.055
MARICOPA
DBG
CASA GRANDE
1.055
CASA GRANDE
1.054
BRADY
1.059
SIGNAL
1.054
VALLEY FARMS
1.054
PICACHO PEAK
1.061
ED-2
1.056
ED-4
1.055
REDROCK
1.067
ED-5B
288
1.059
121.8
ED-5A
1.065
EMPIRE
1.062
TOLTEC
1.038
TATMOMOLI
1.062
EASTGATE
TO SN/SK 500 KV
TO TORTOLITA 500 KV
SAGUARO
(115 KV EAST) 1.068
(115 KV WEST) 1.068
SAN MANUEL
1.144
ORACLE
1.083
TUCSON
1.058
MARANA
DEL BAC
APACHE
SOUTH EASTERN AREA
LEGEND
500 KV
230 KV
115 KV
69 KV
ON/AVAIL
MW/MVAR
PSLF Program
General Electric International, Inc.
2011 BASECASE
sm11s02
GENERAL ELECTRIC COMPANY
Thu Jan 31 10:34 2002
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c:\upsl12\w...sm11s02a.sav
Rating = 1

APPENDIX B

Stability Plots

Table of Contents

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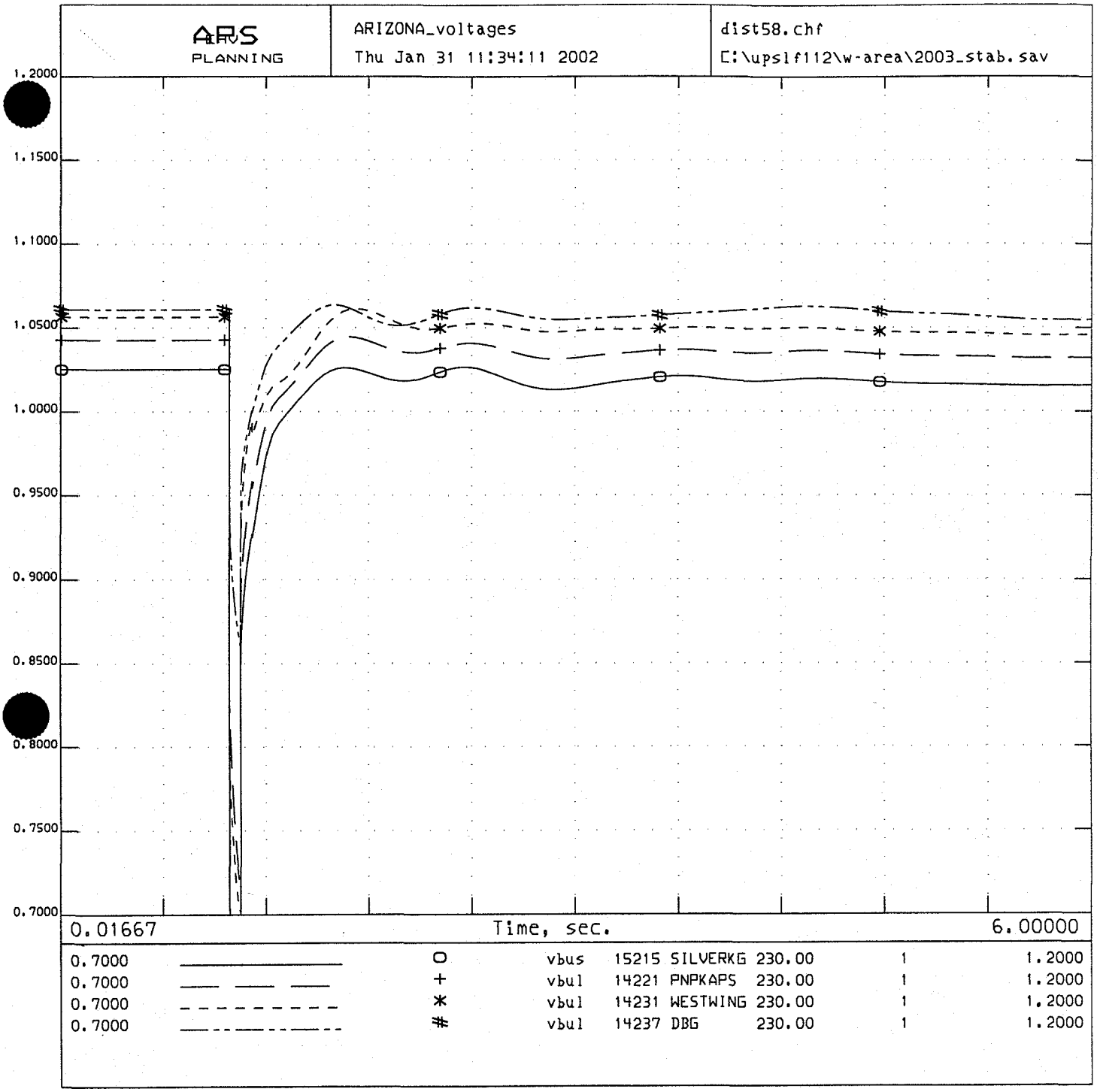
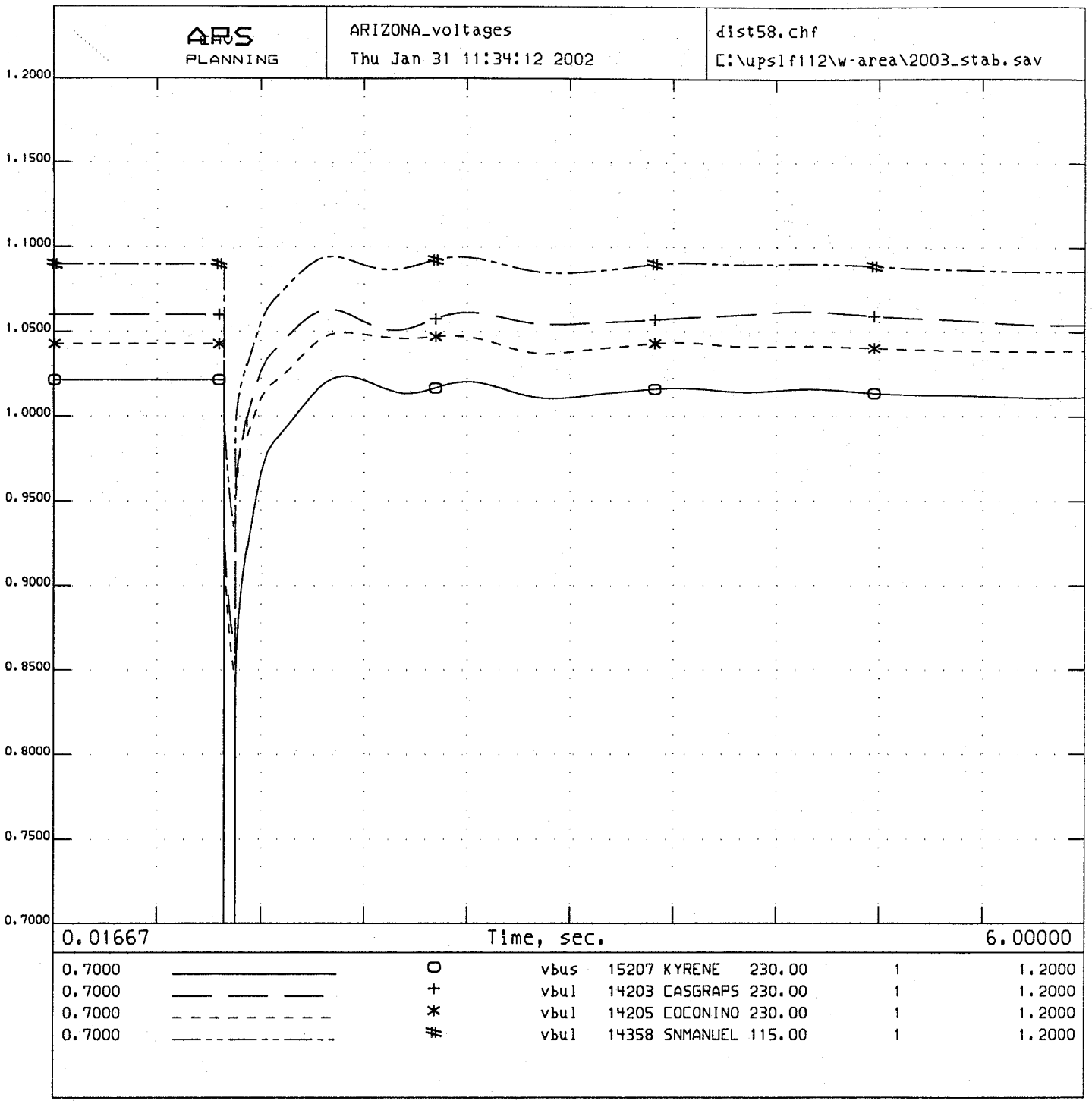


JOJOBA FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT JJ500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



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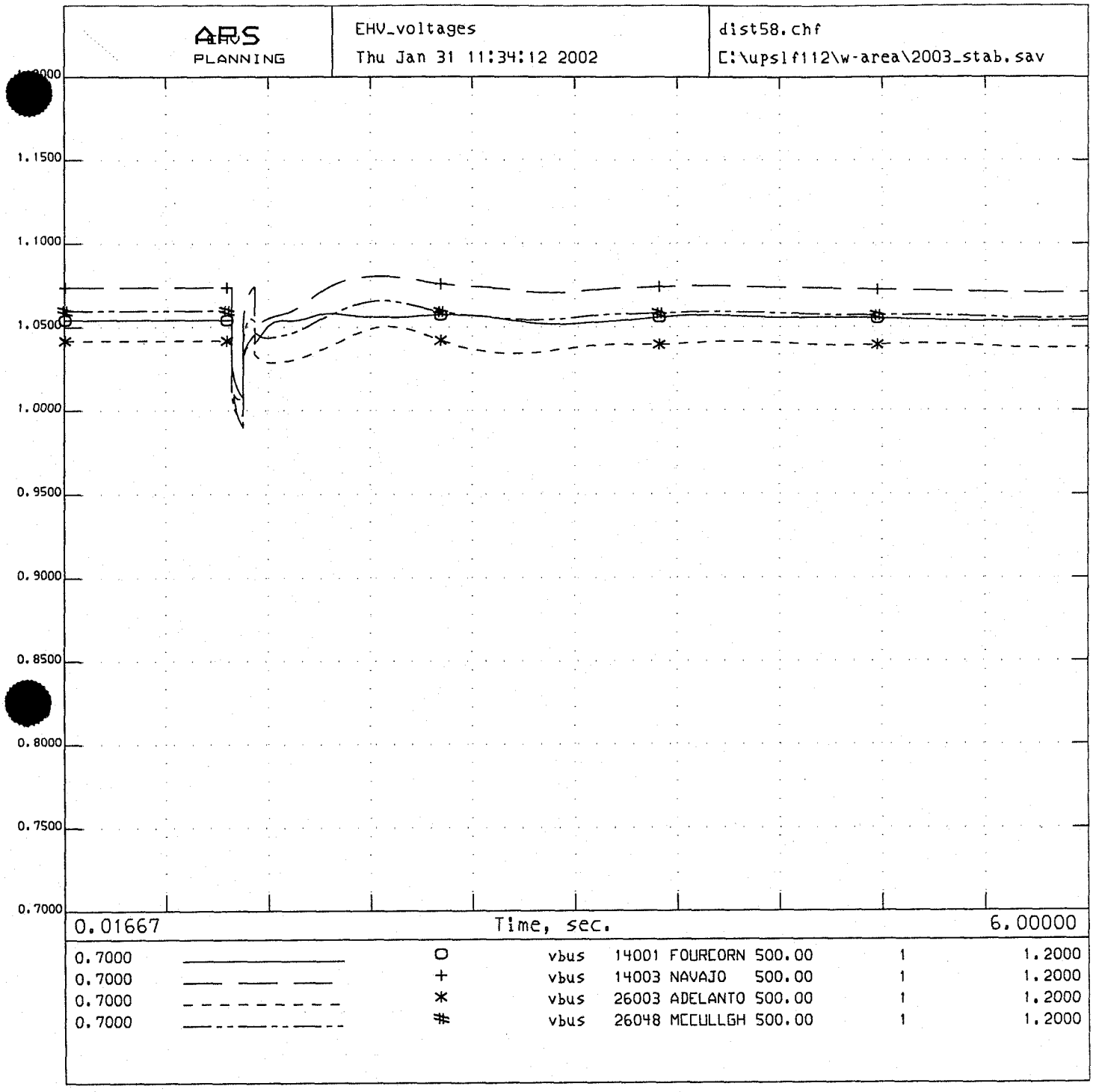

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2003 HS3S

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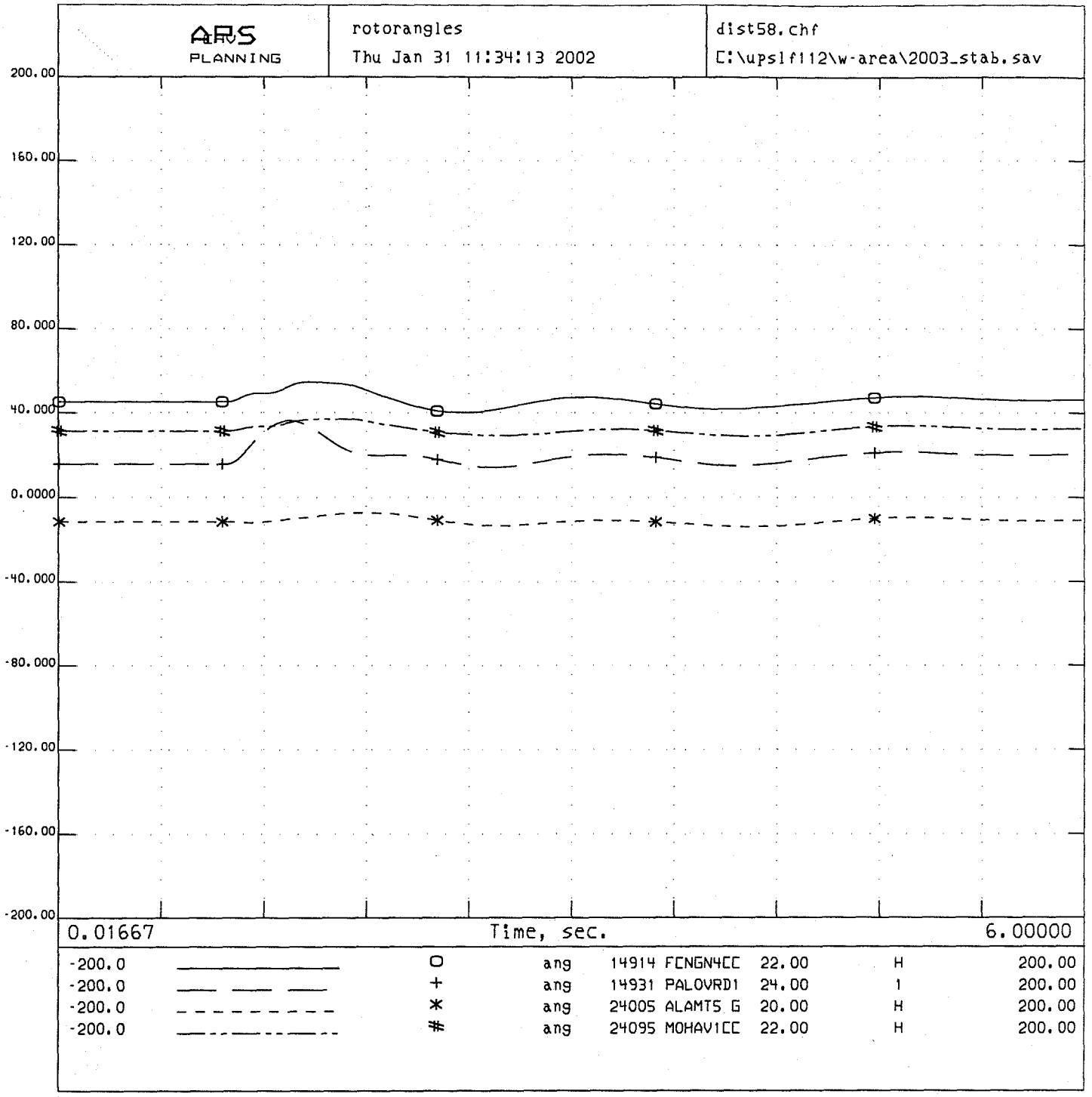
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



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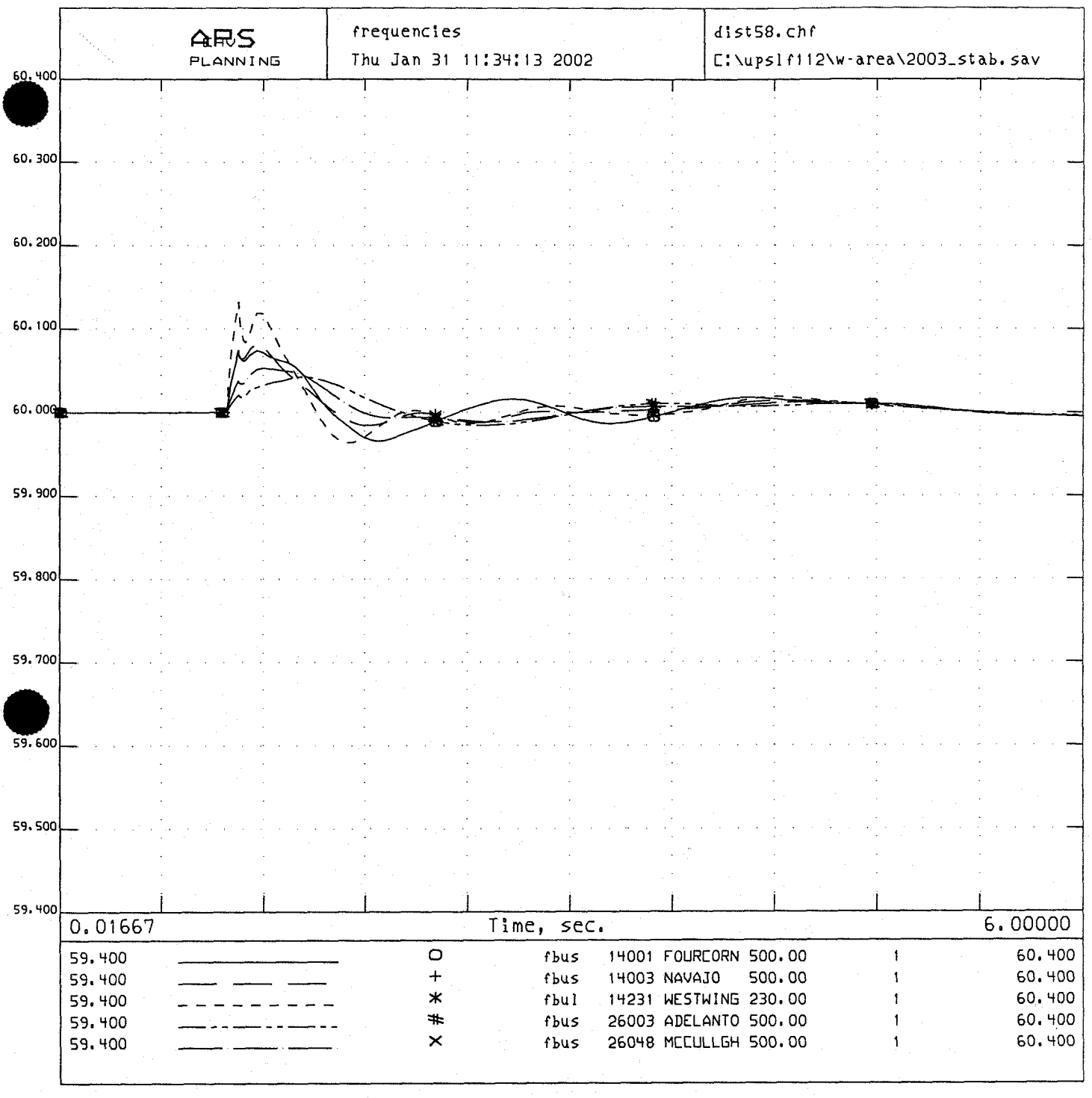

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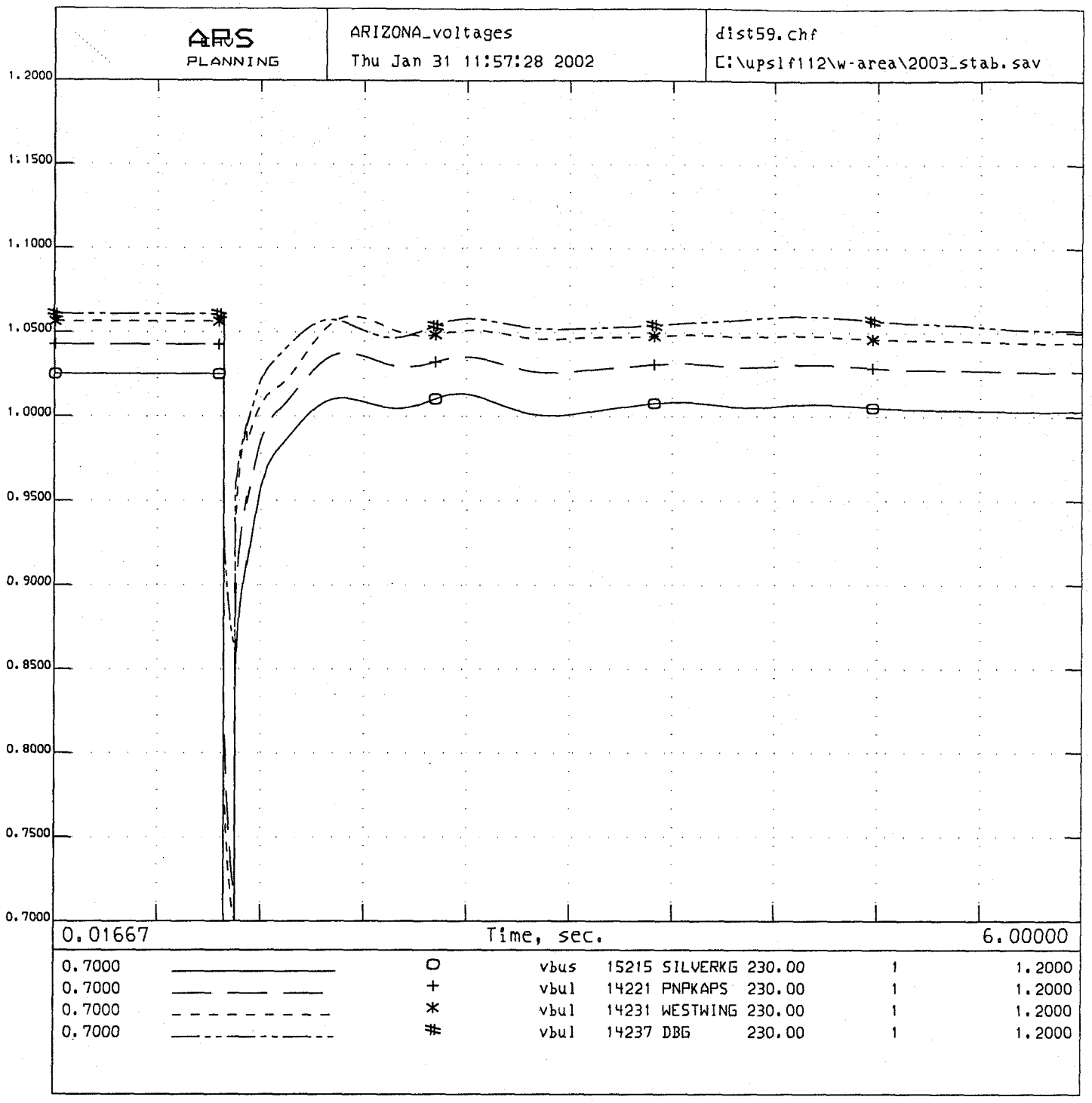

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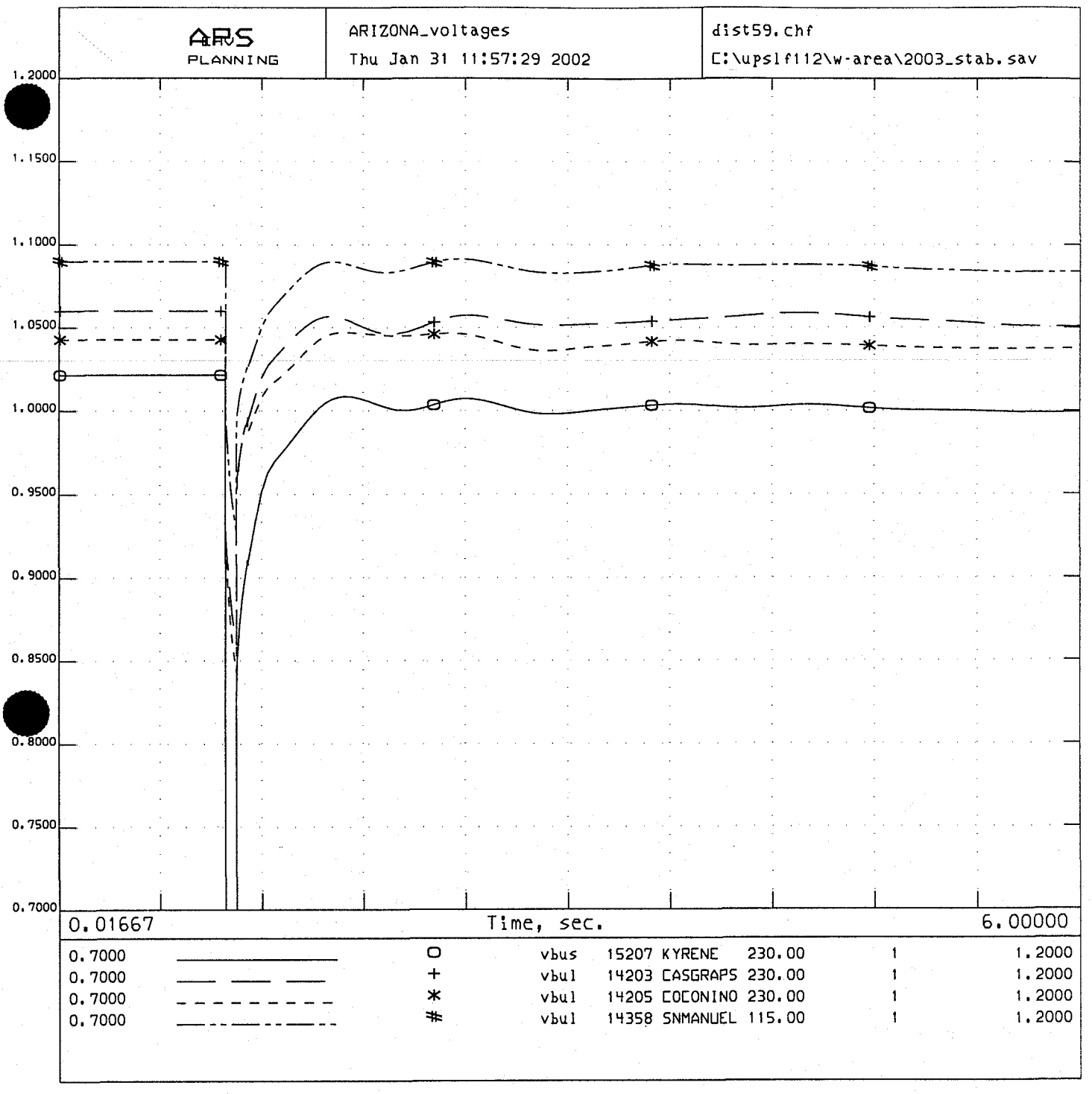

JOJOBA FLT JOJOBA-KYR LINE OUT
2003 HS3S

JJ-KYR STAB #1; 01/2002; T=0 3P FLT JJ500;10% FLT DMPING;FLSH CAPS
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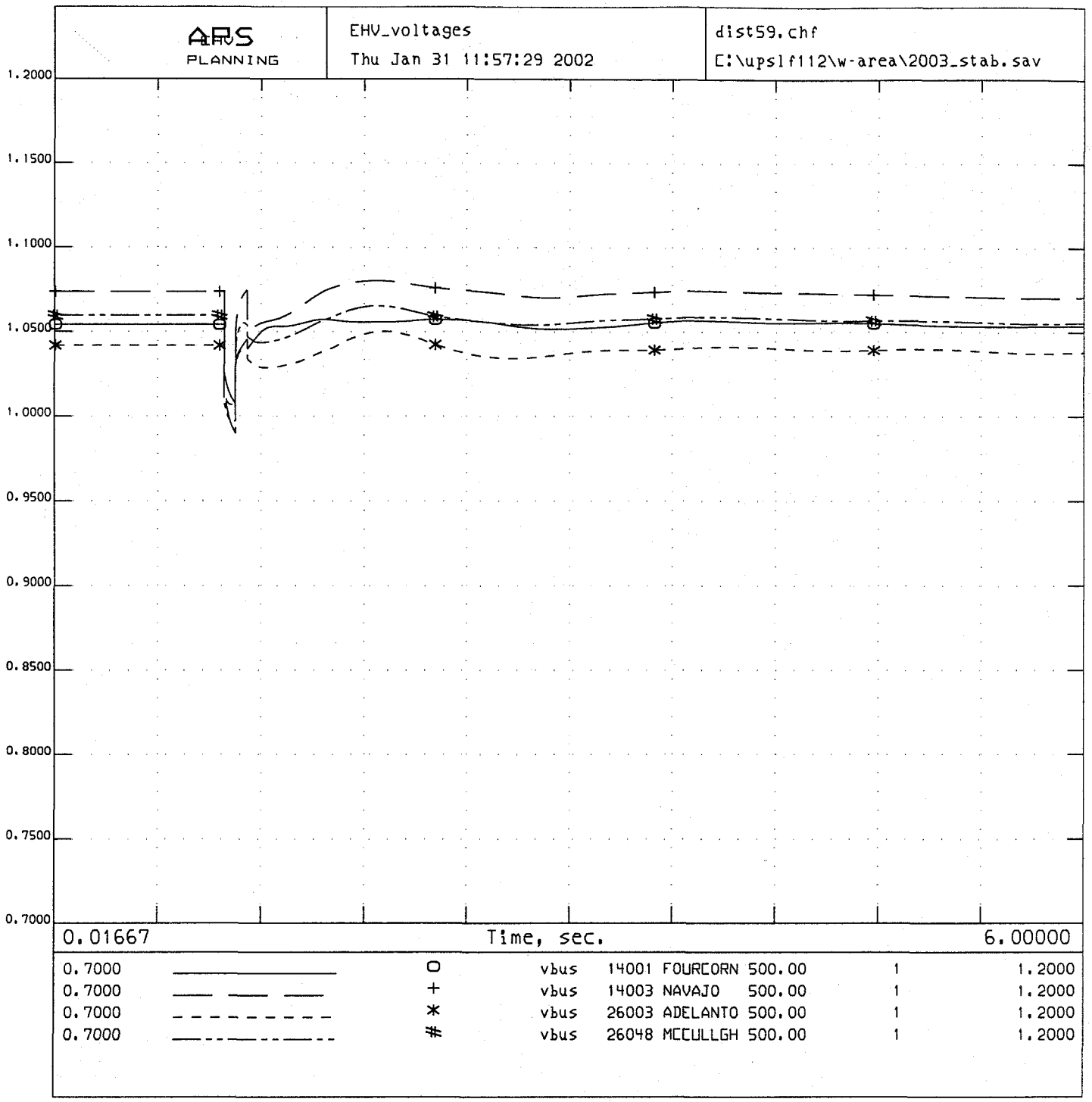

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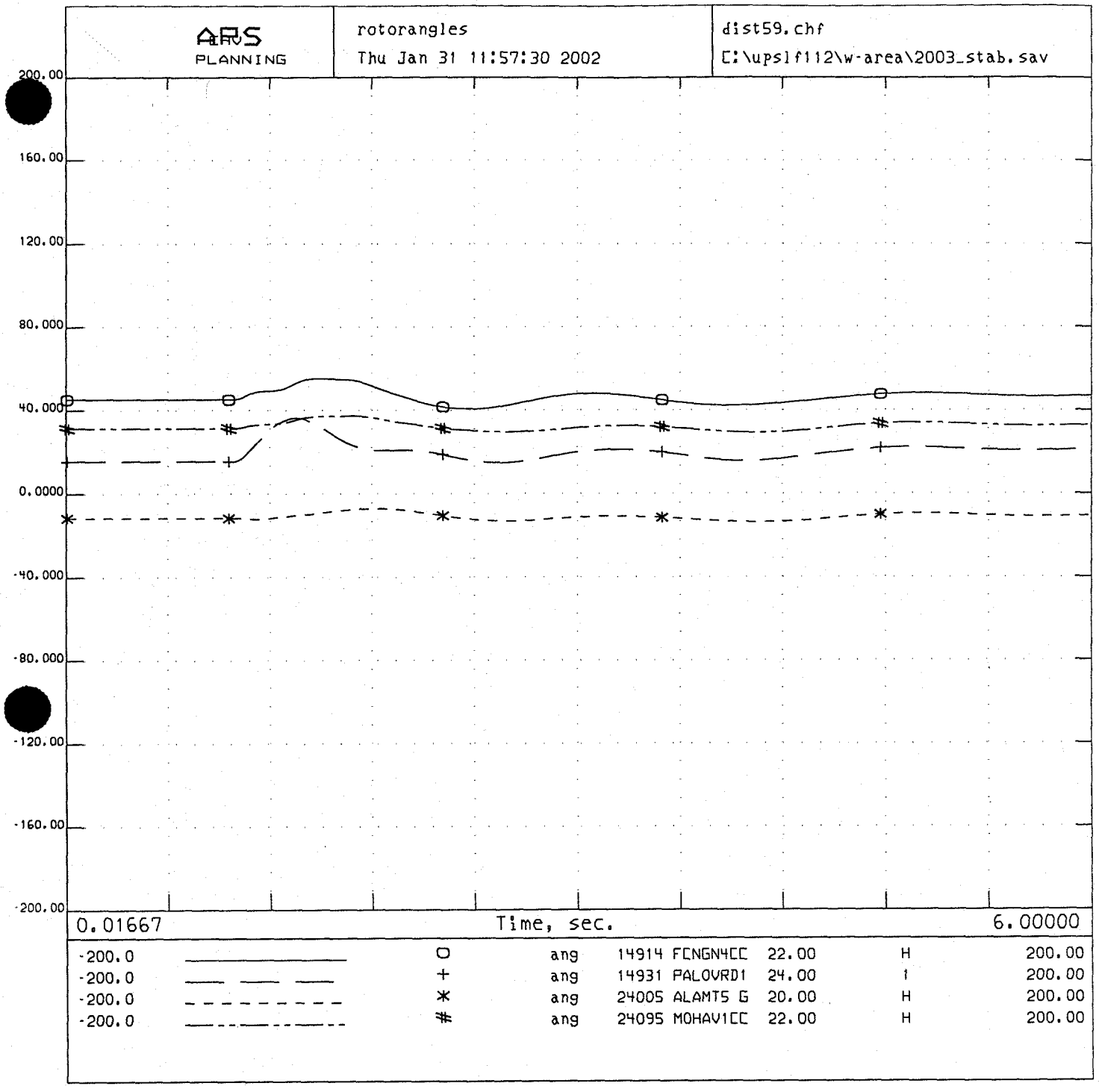

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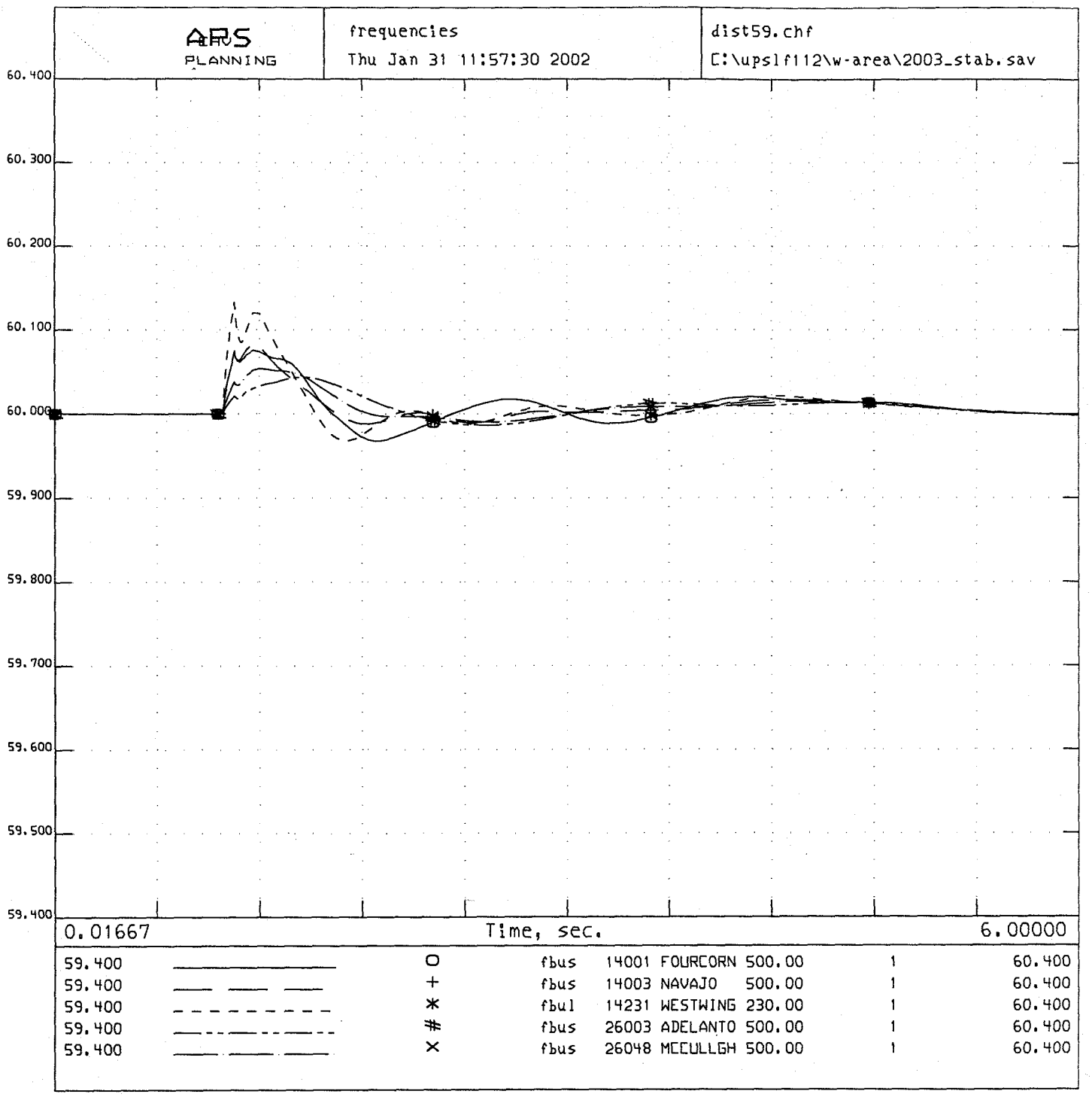

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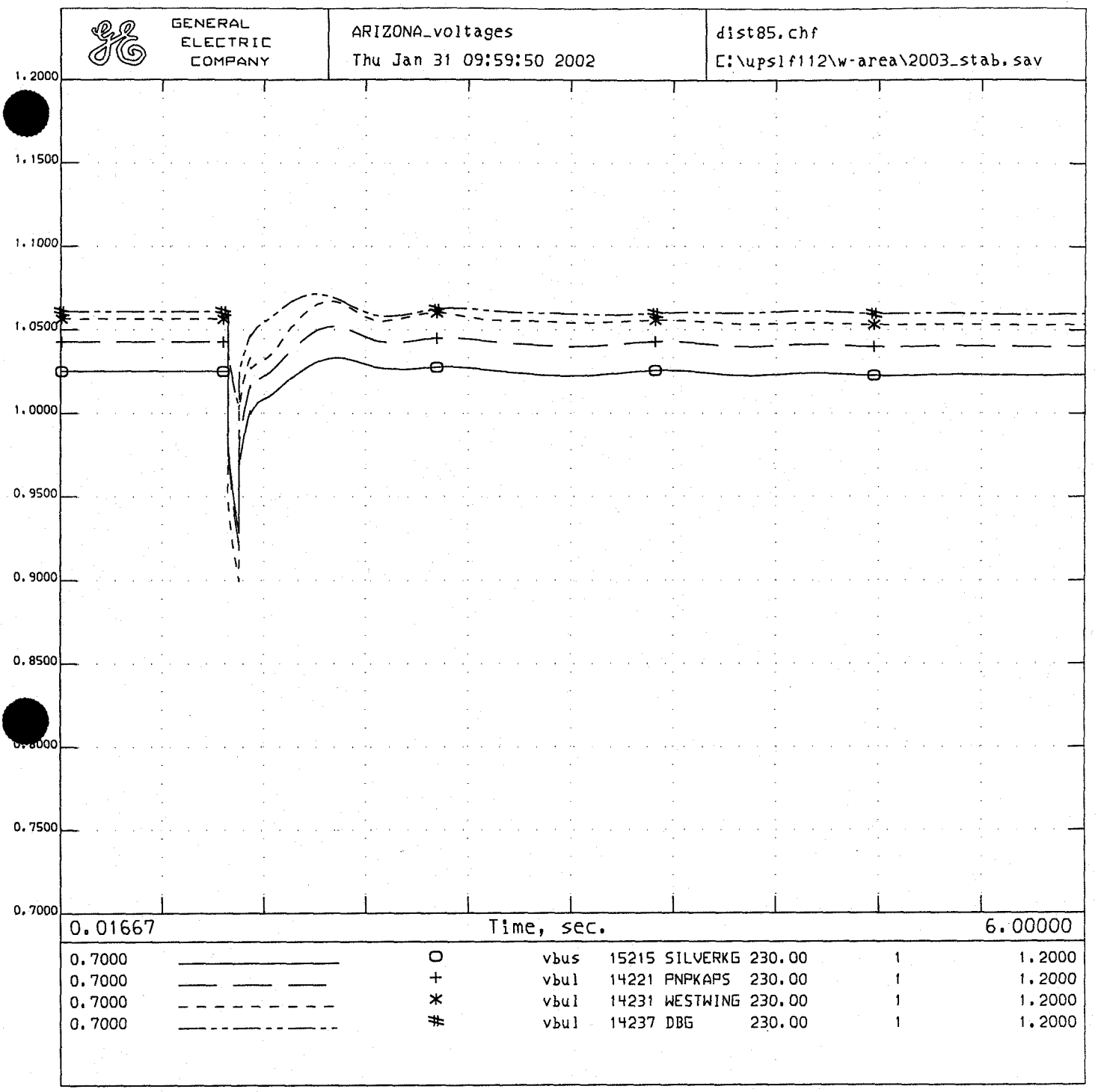

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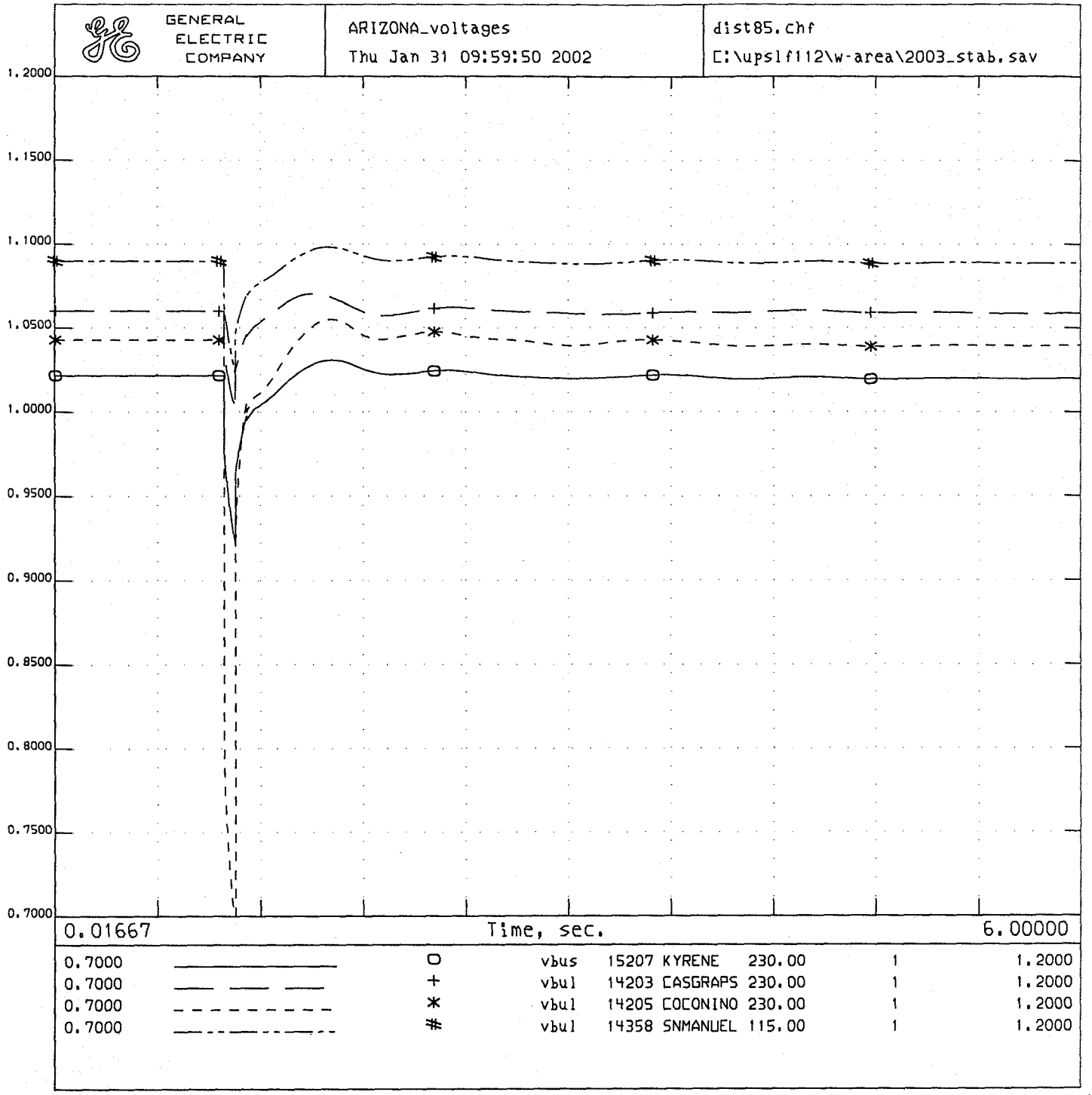

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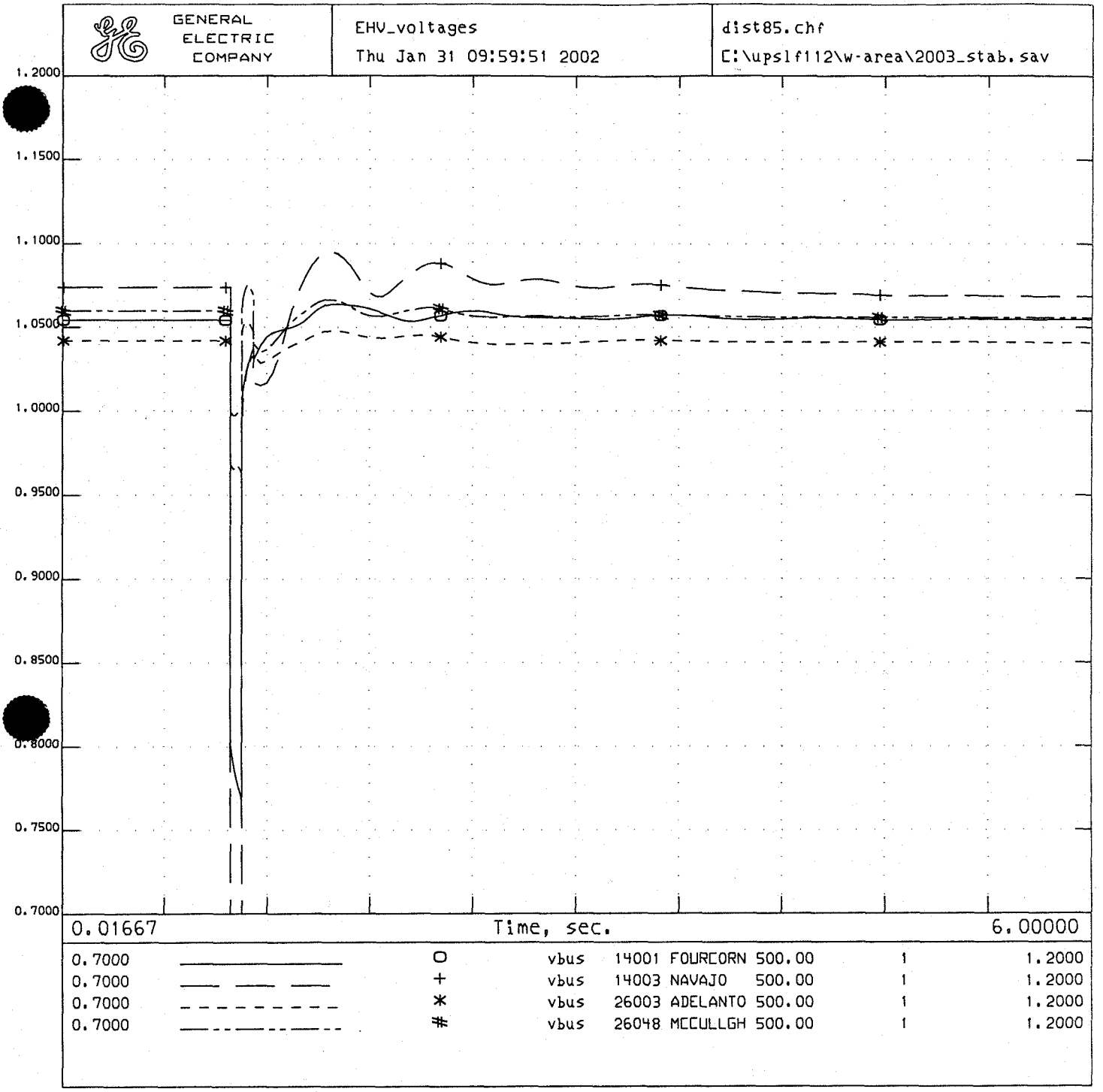

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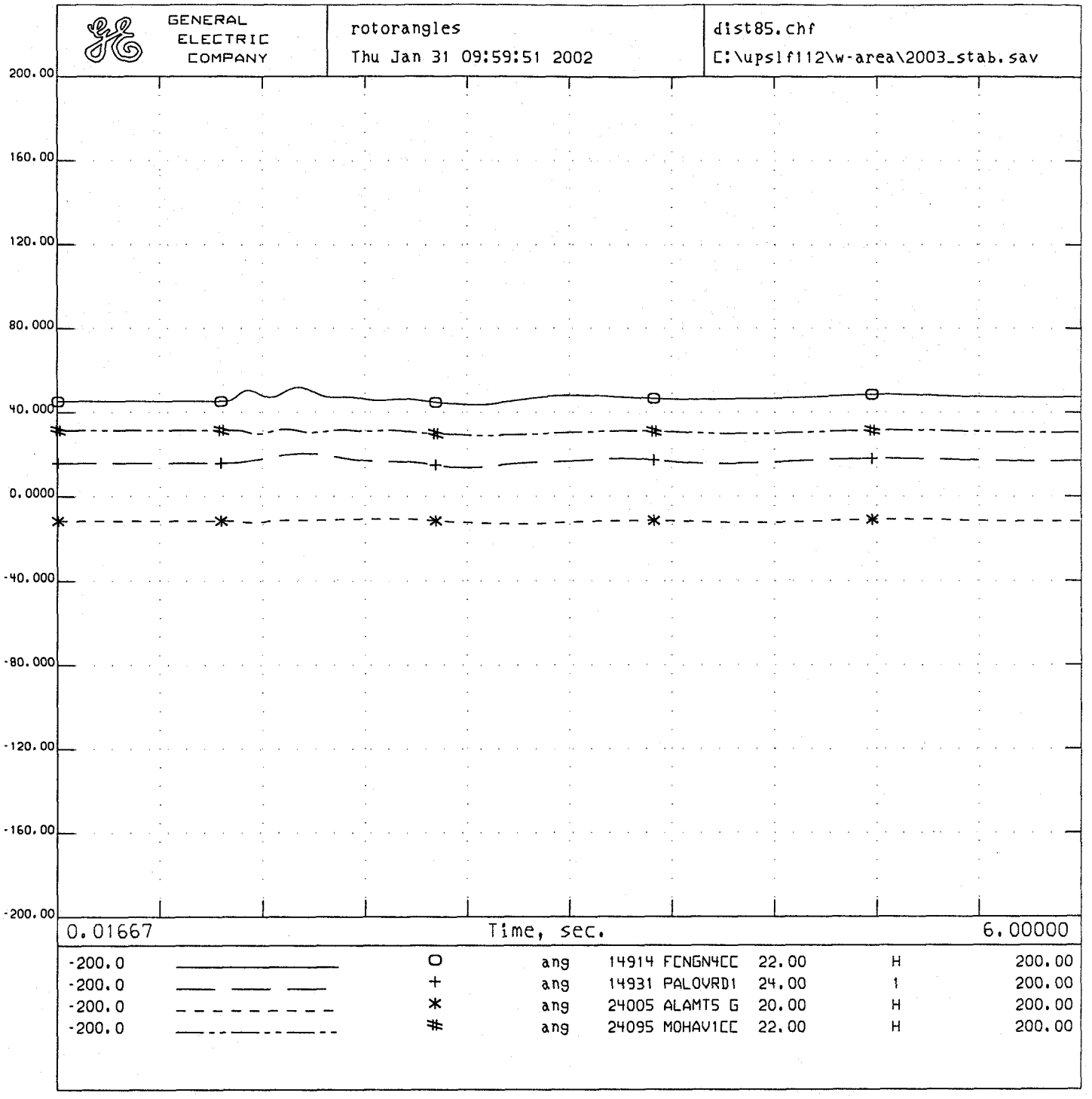

WESTERN SYSTEMS COORDINATING COUNCIL
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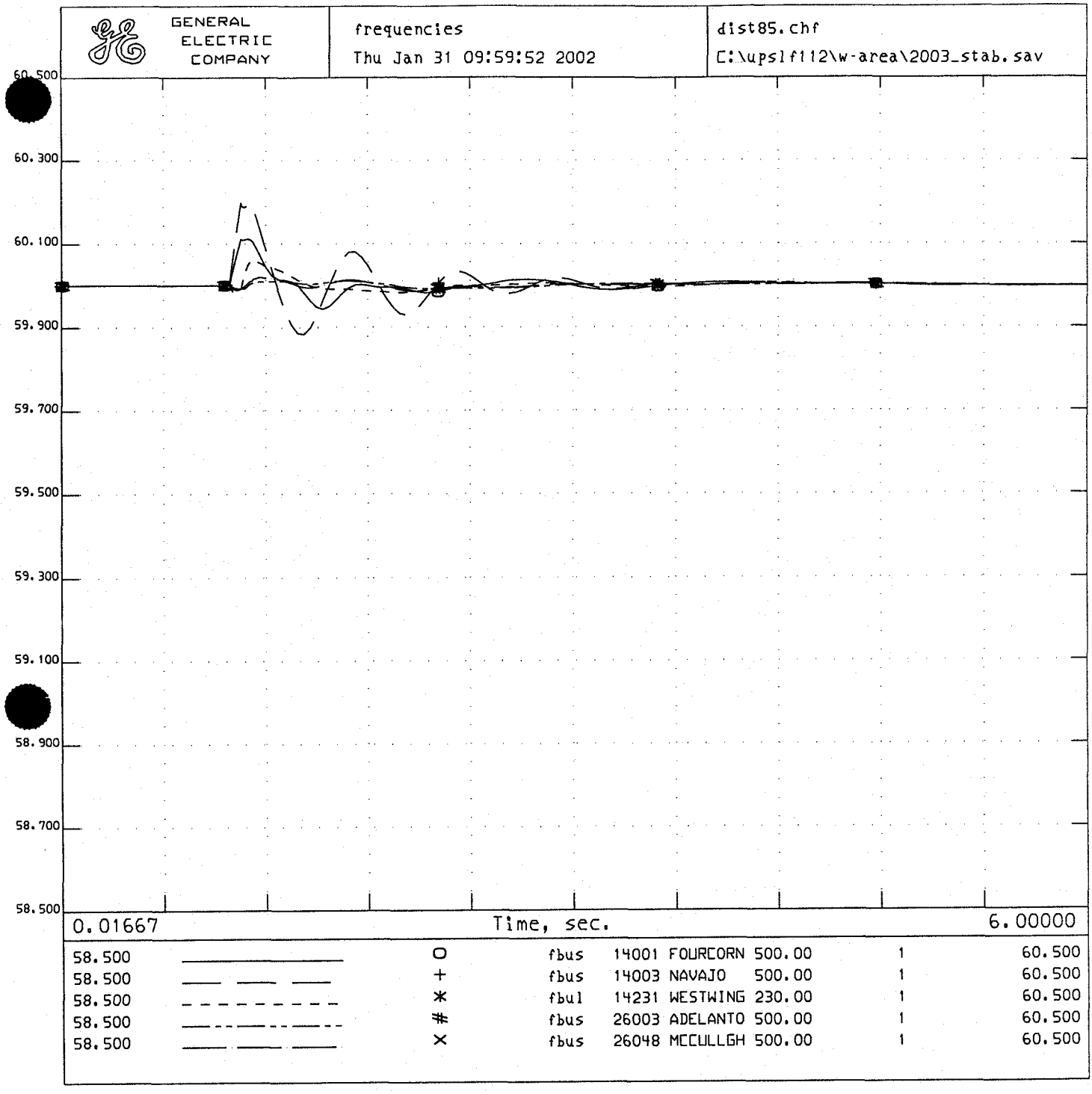

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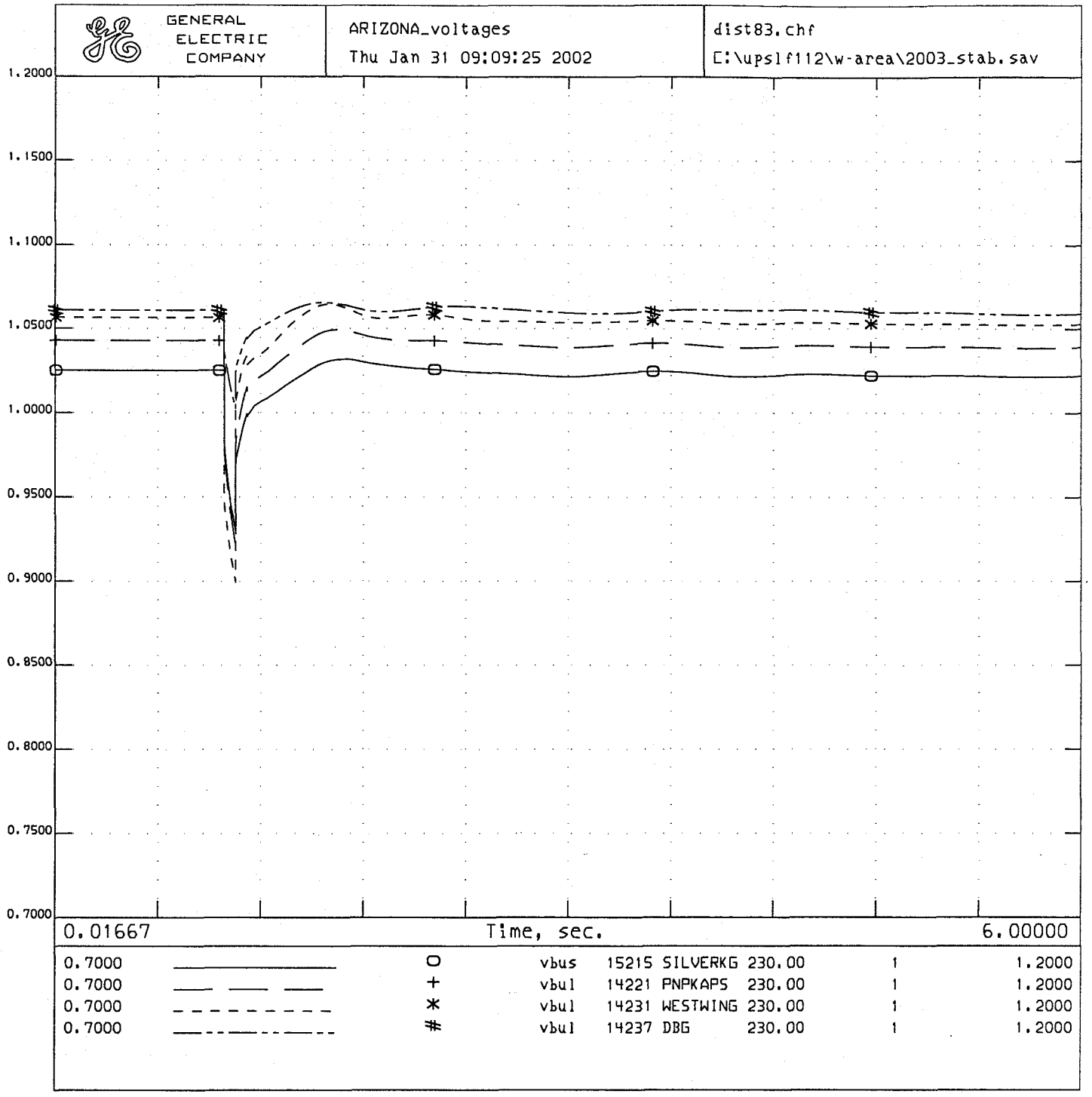

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MKP-YAV STAB; jan/2002; T=0 3P FLT MKP500;FLSH CAPS MKP-YAV/YAV-WWG,
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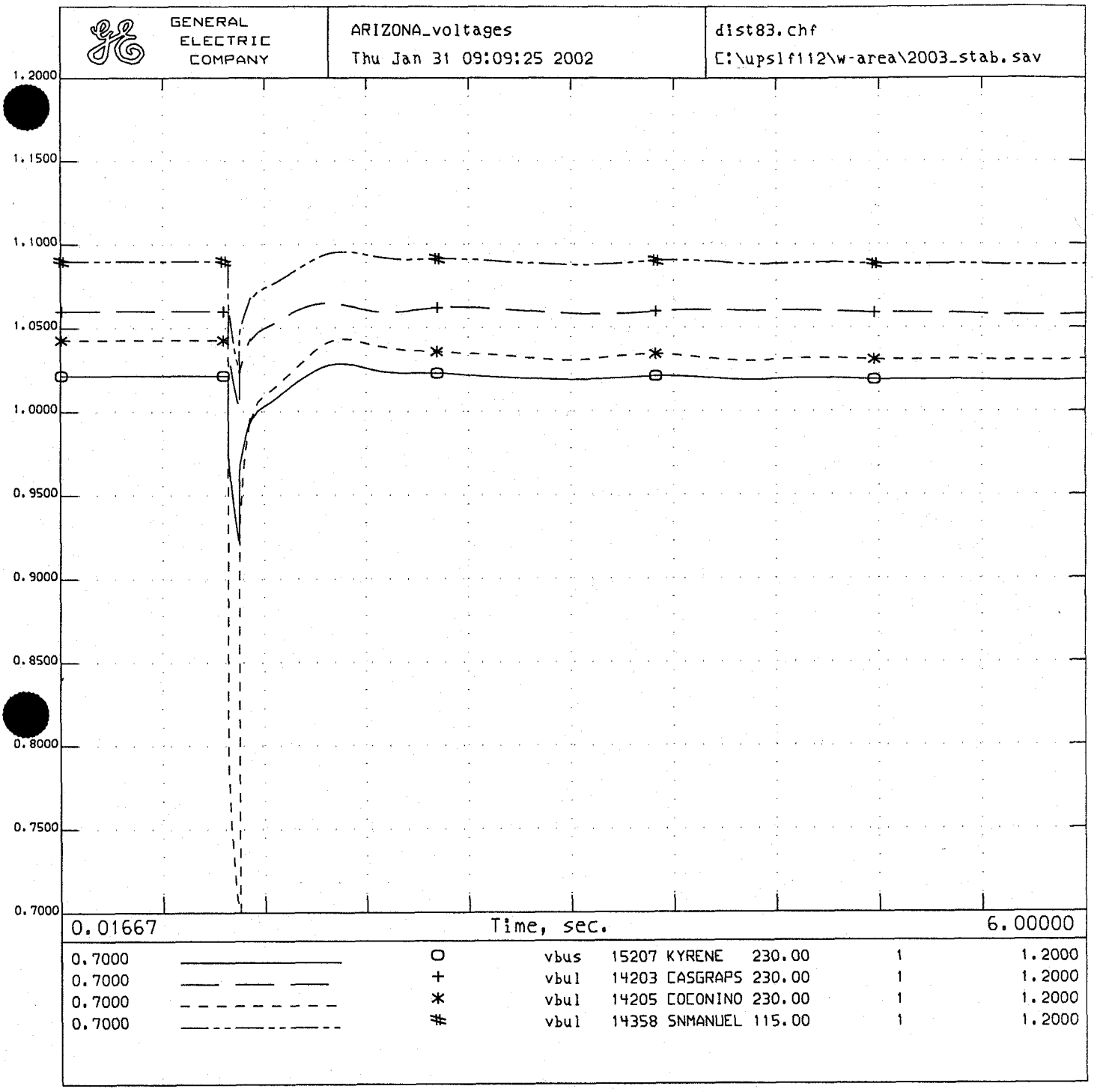

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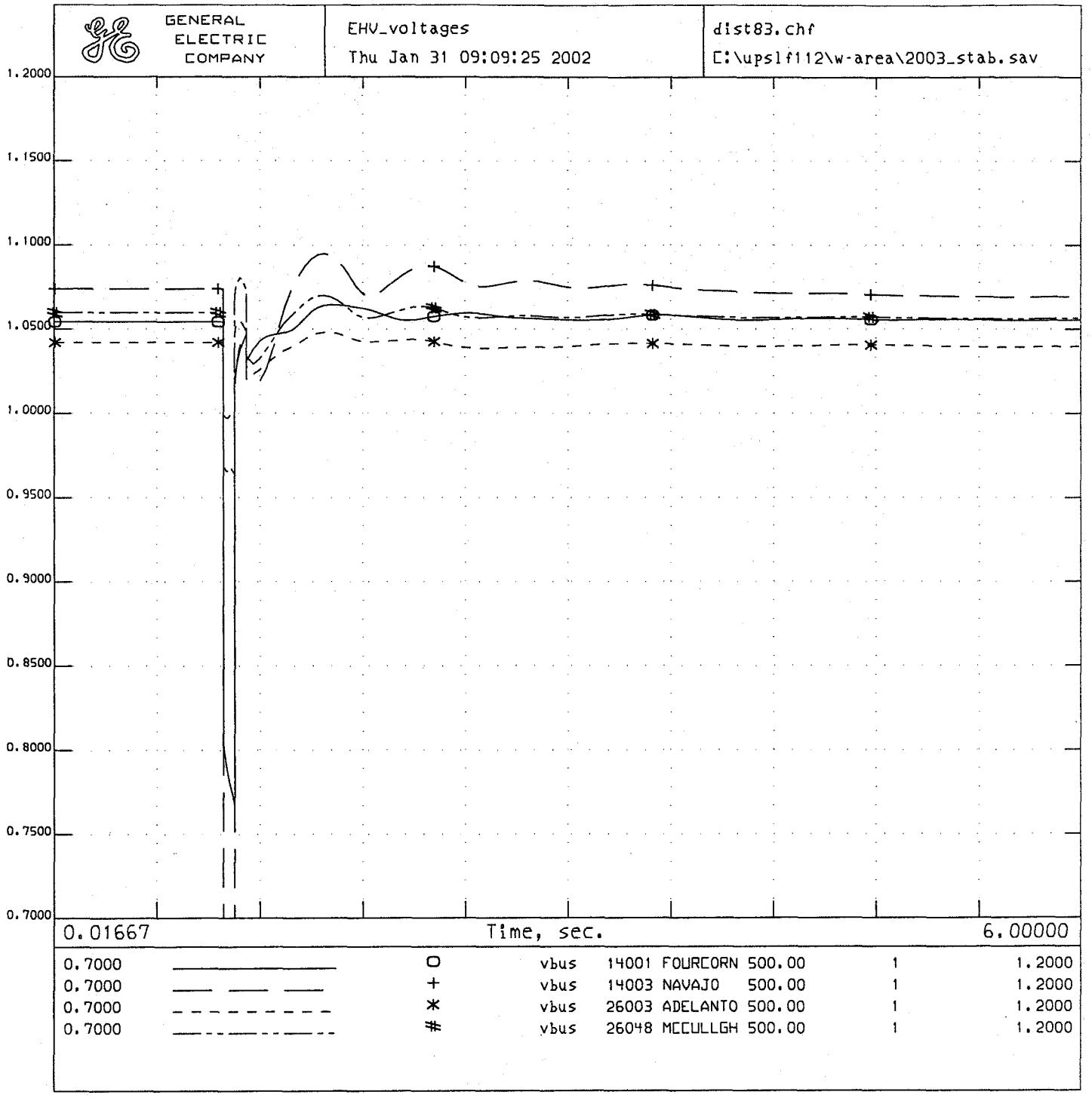

NAV. FLT MKP-YAV line out
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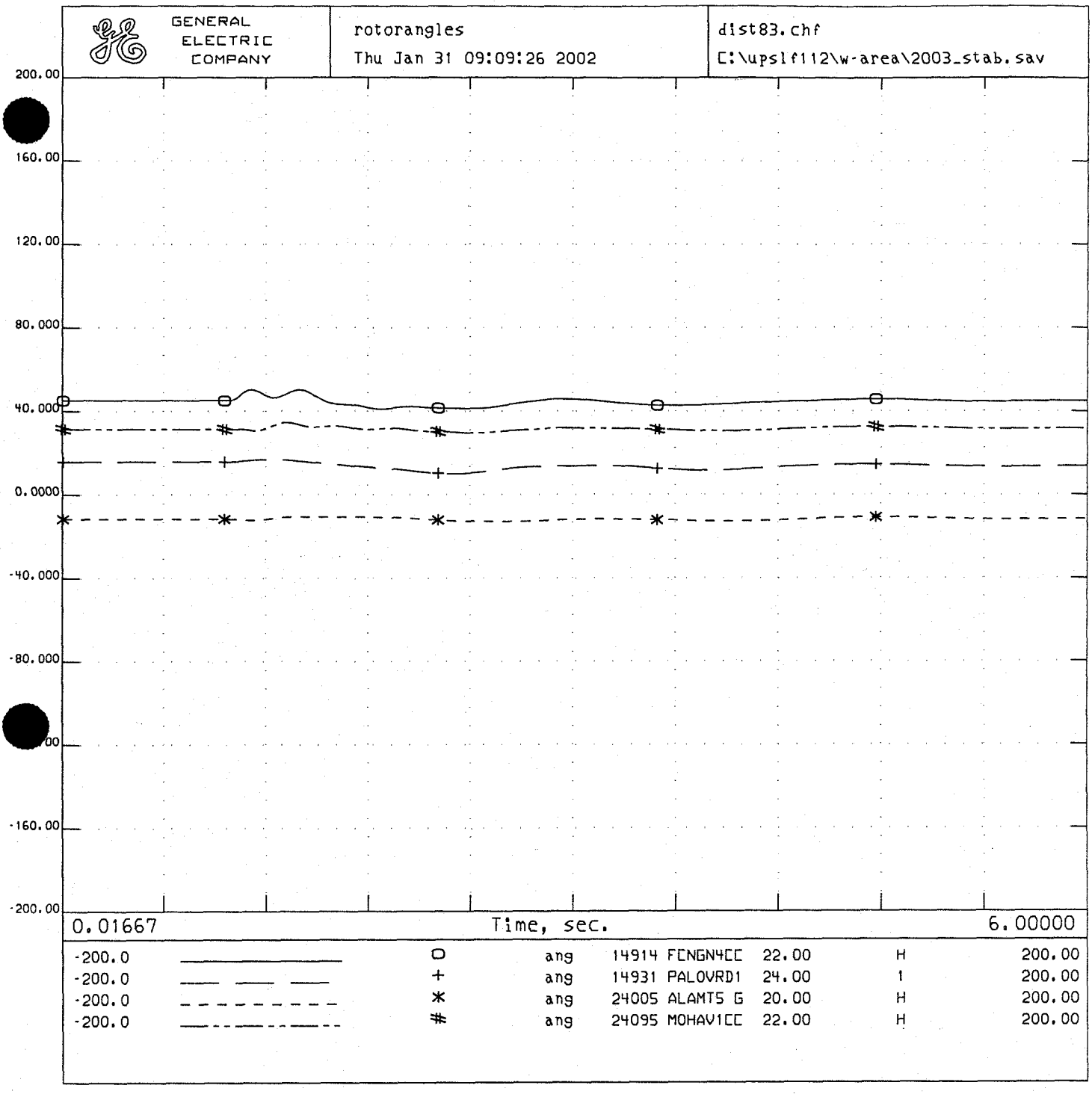

NAV. FLT MKP-YAV line out
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MKP-YAV STAB; jan/2002; T=0 3P FLT MKP500;FLSH CAPS MKP-YAV/YAV-WWG,
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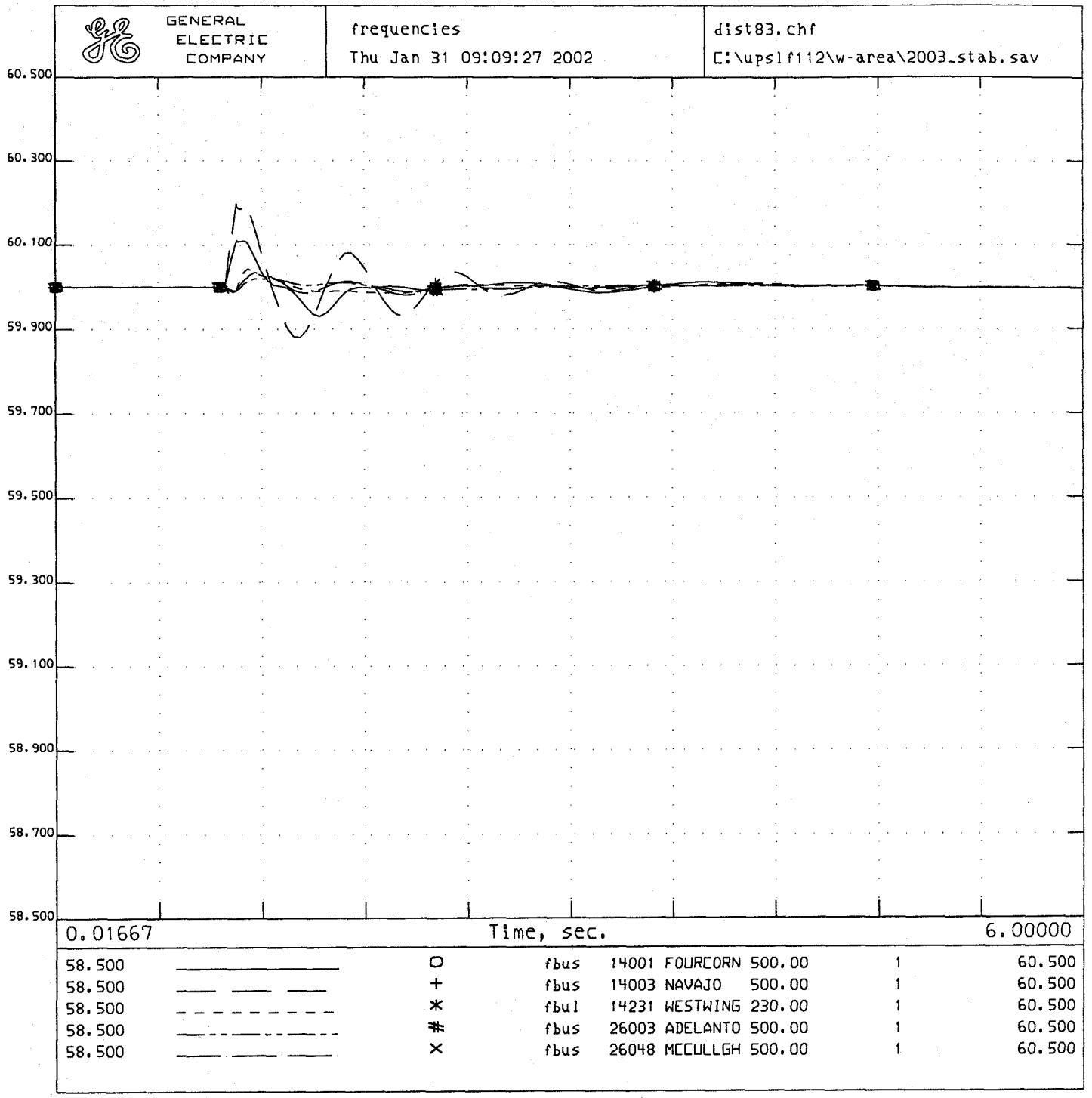

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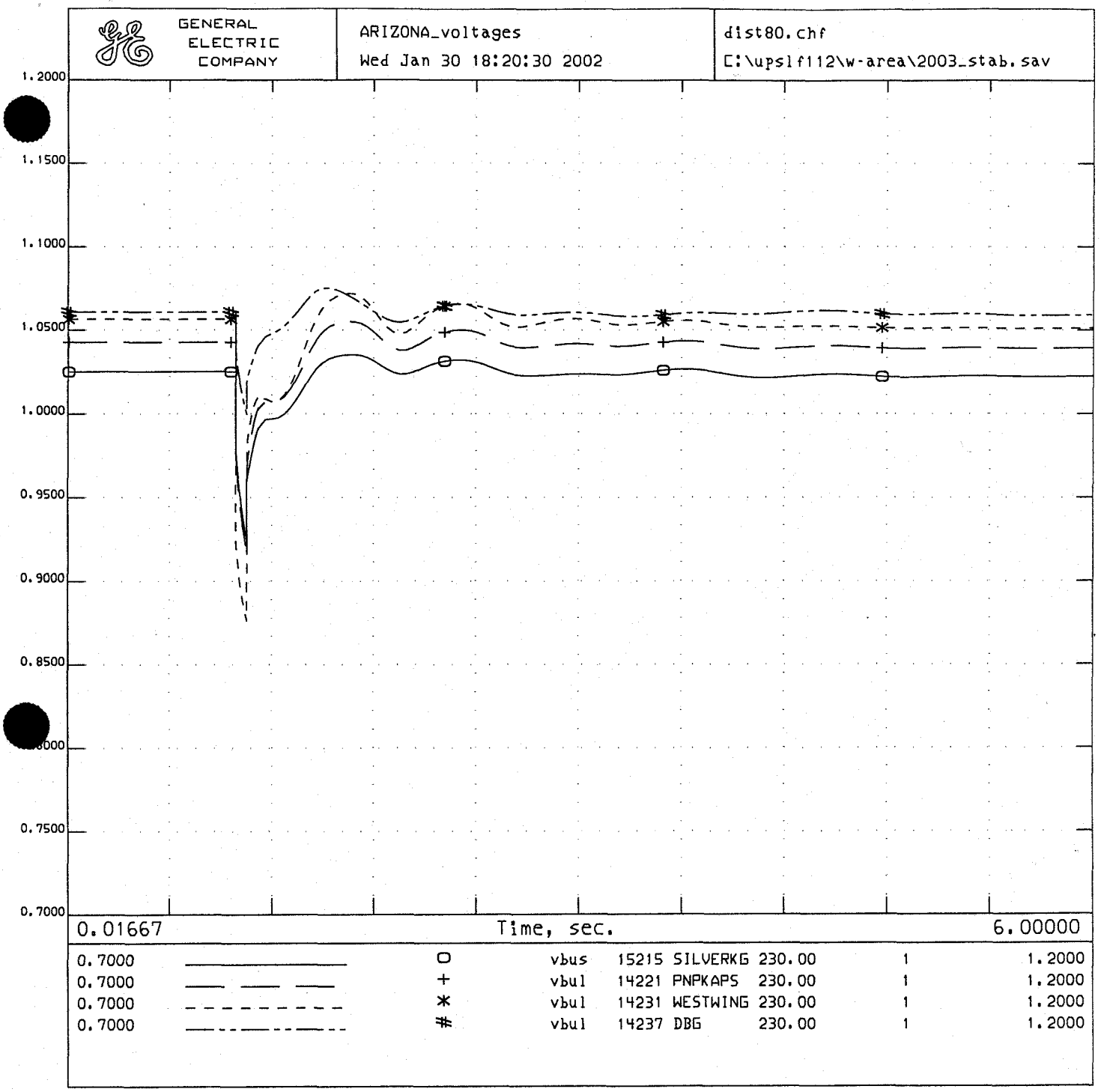

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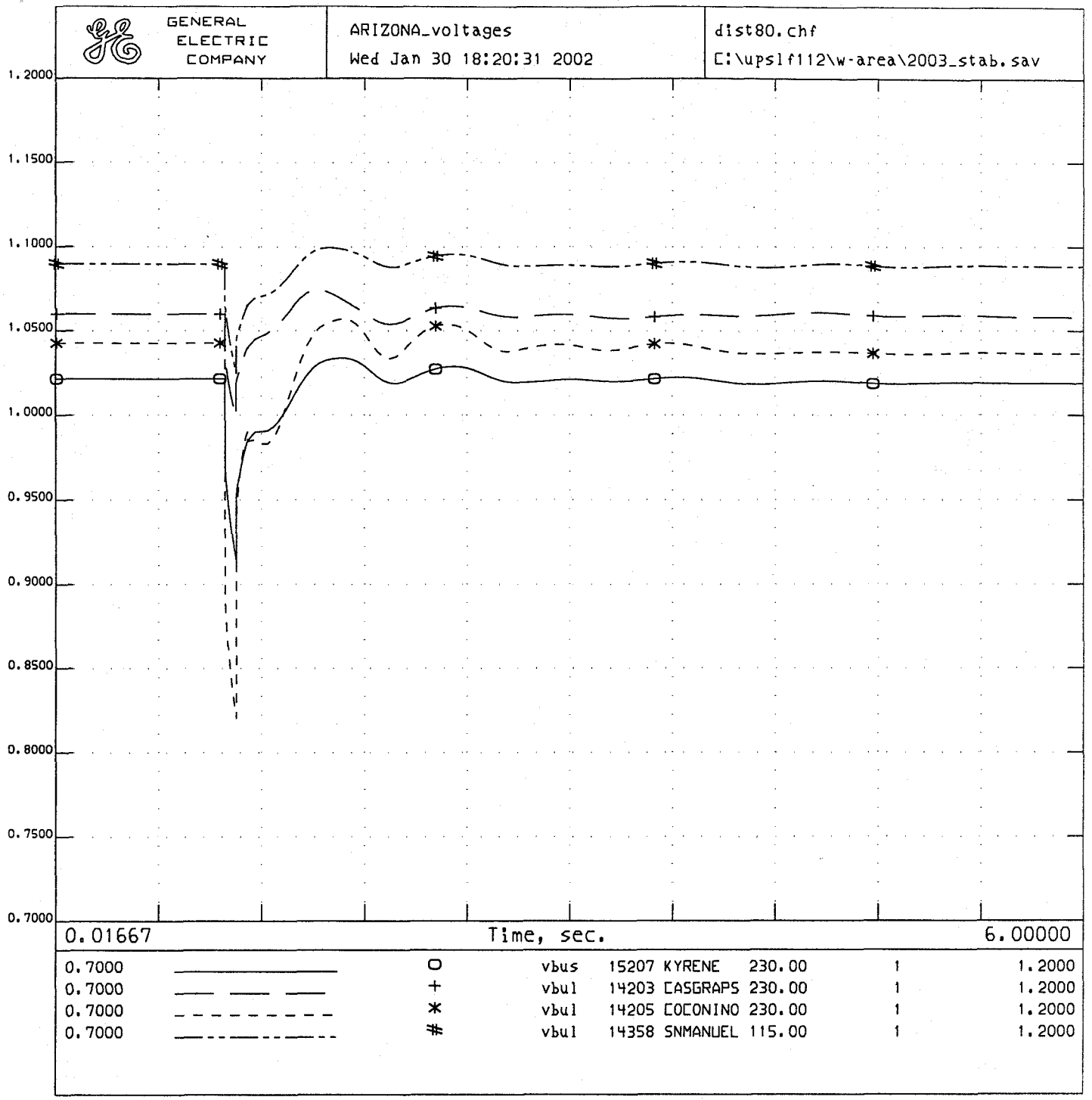

WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Nav-Crystal line out

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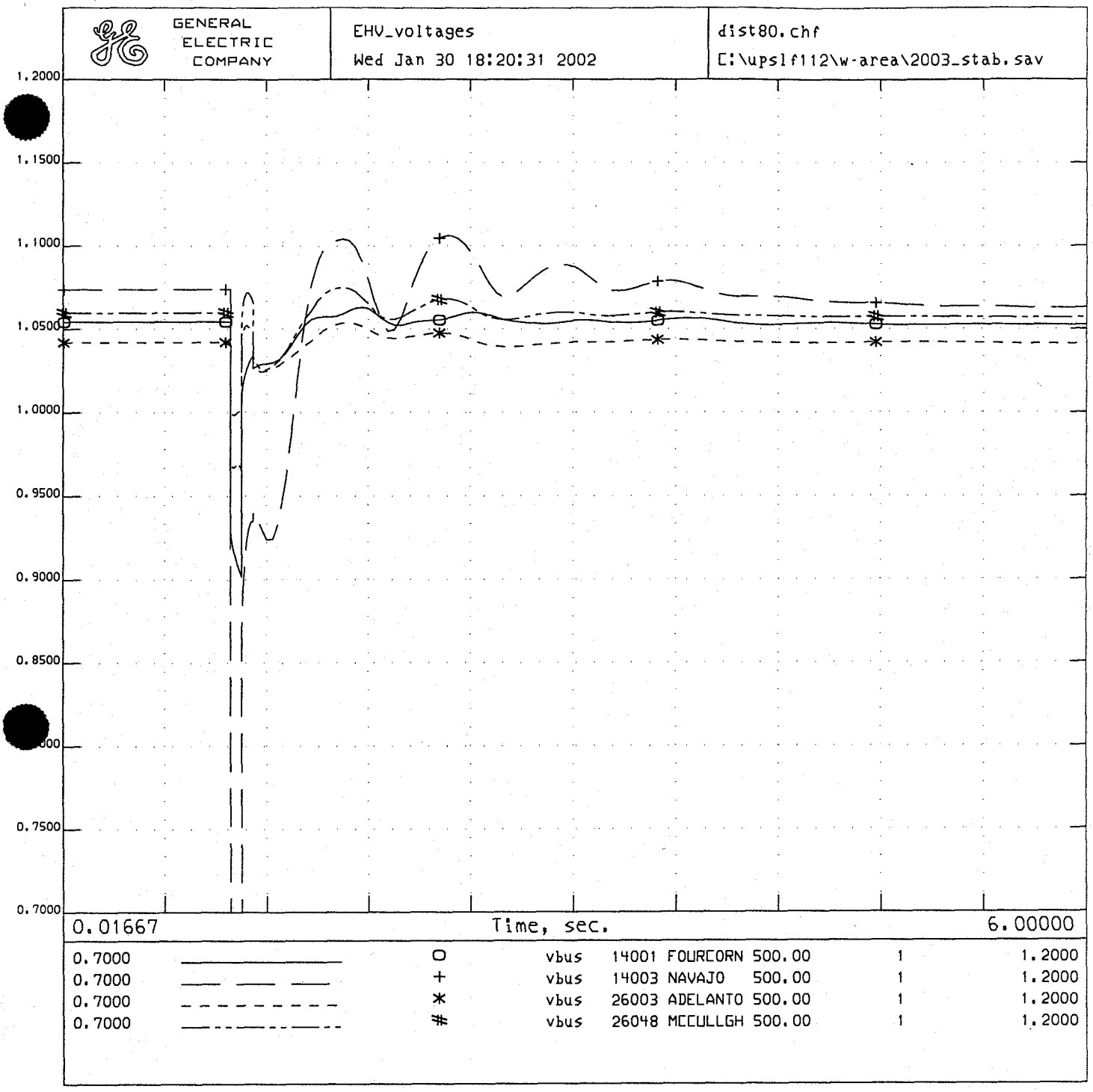

WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Nav-Crystal line out

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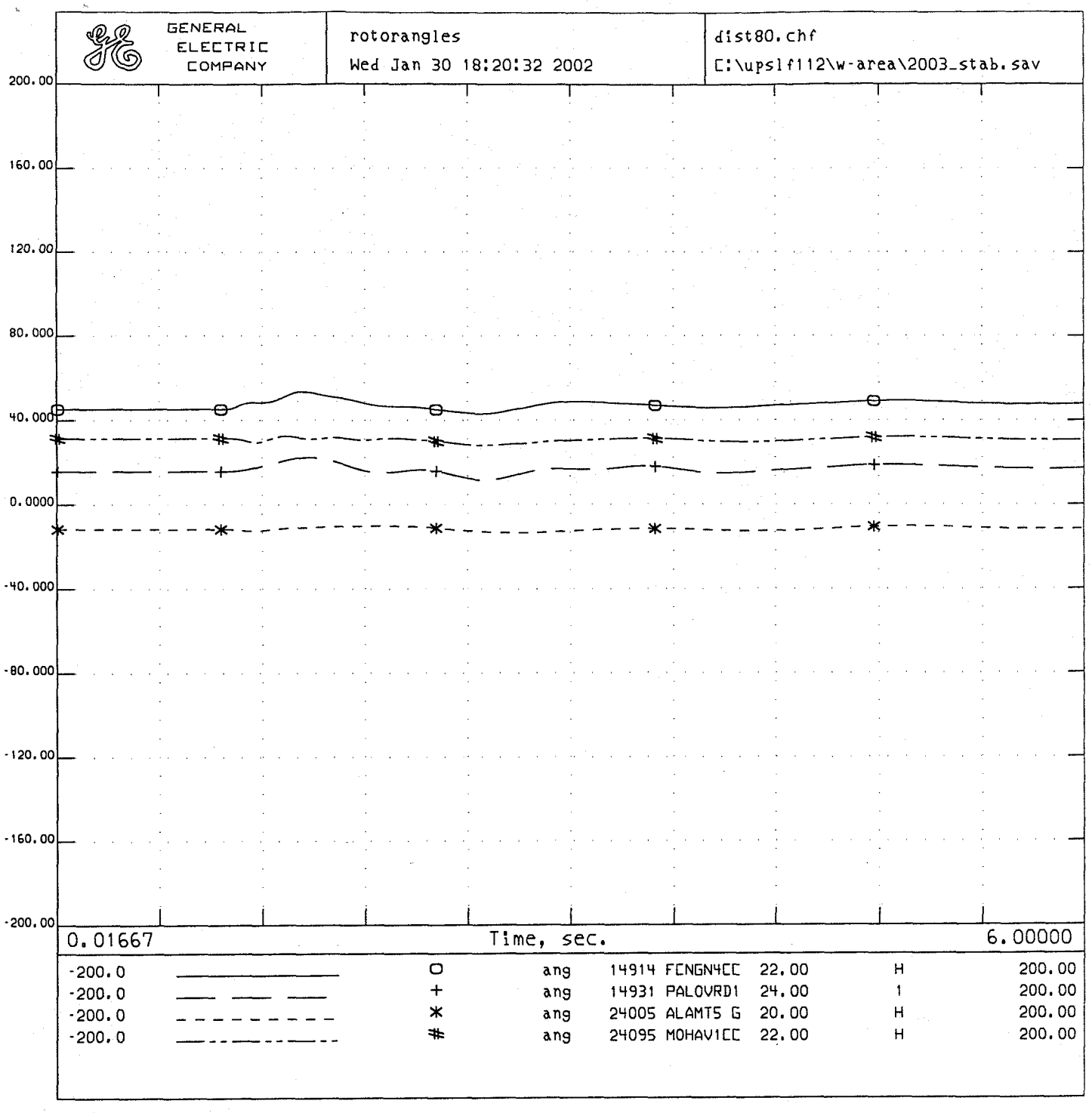
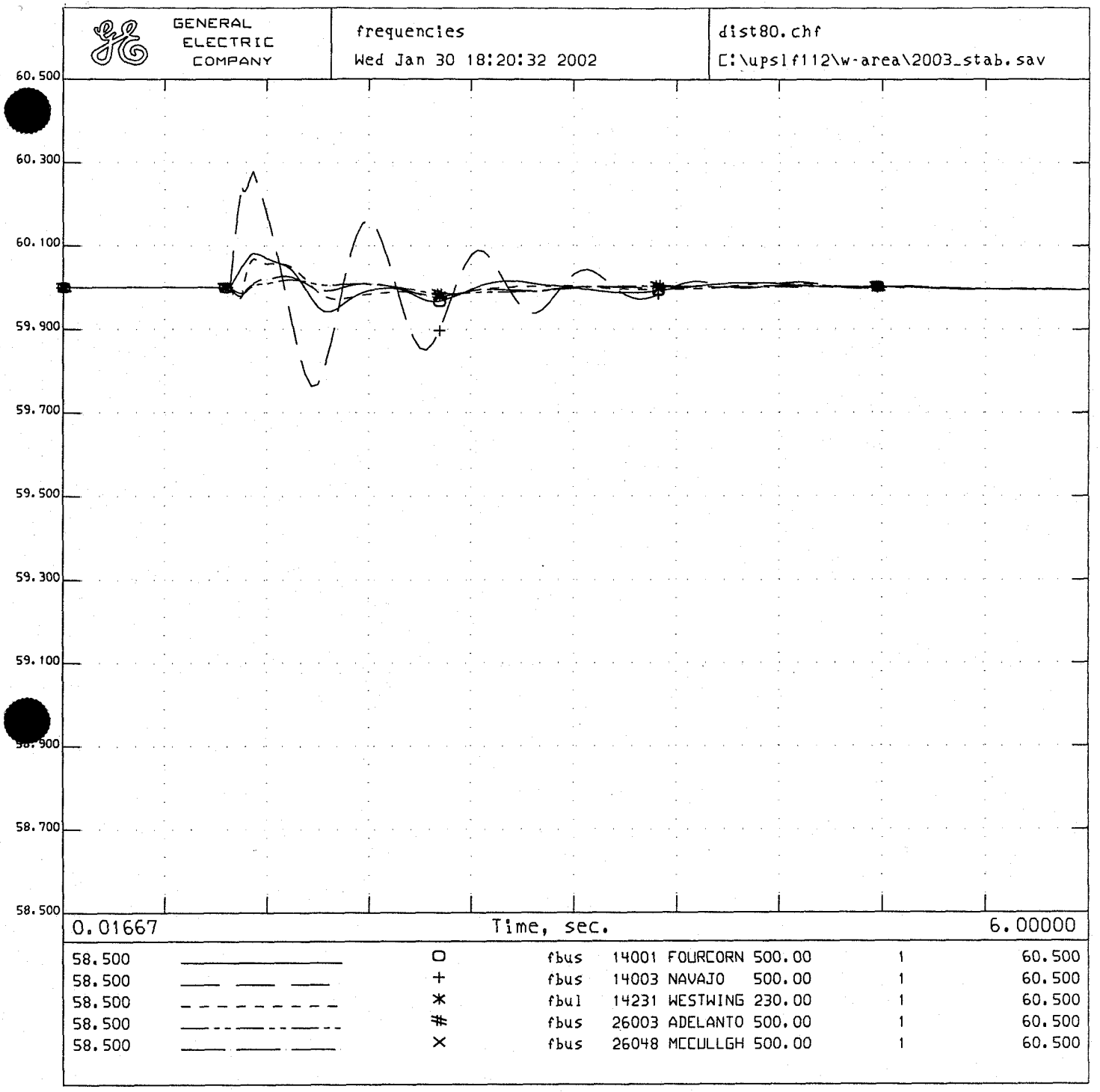


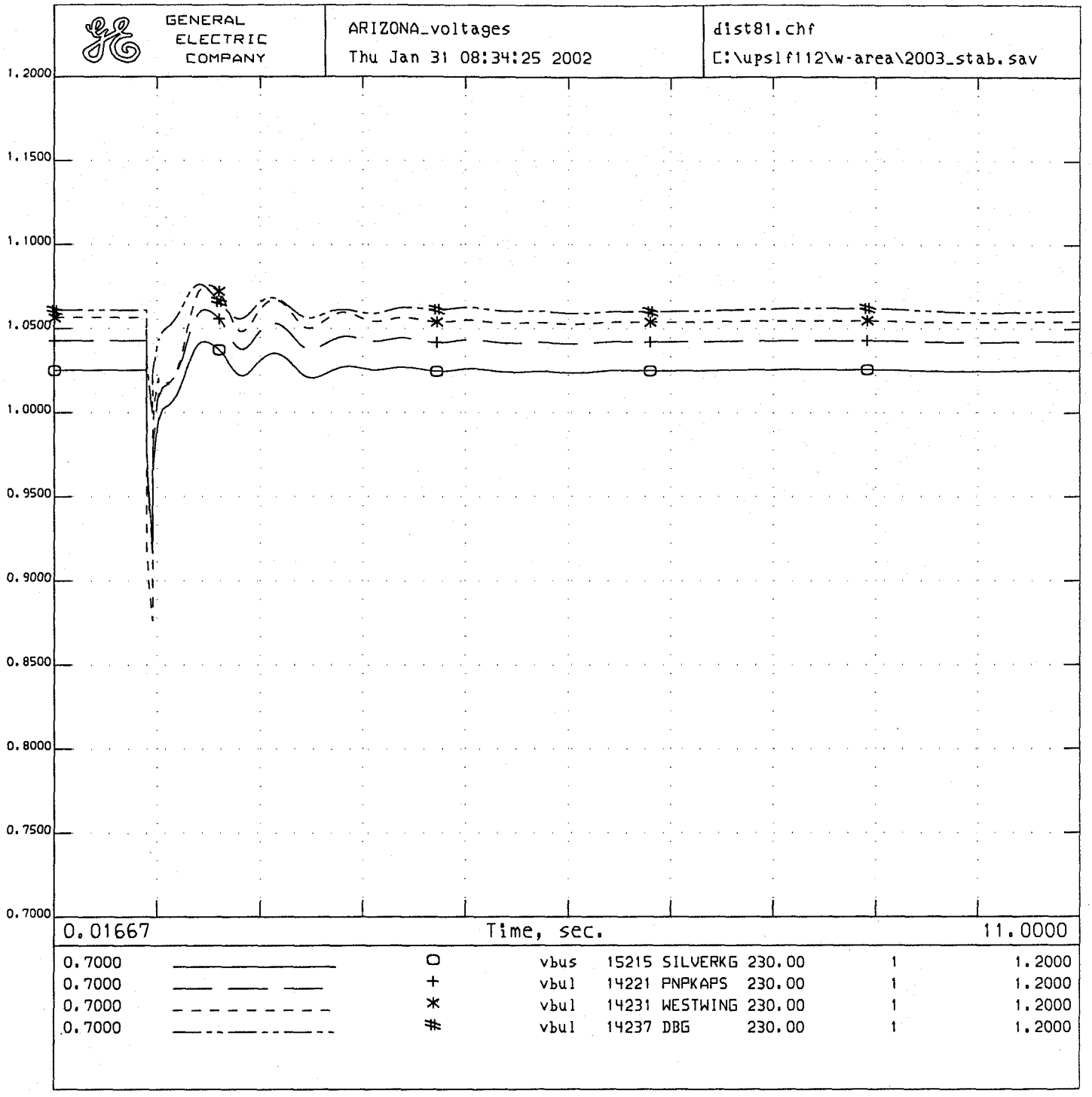
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Nav-Crystal line out

NAV-CRYS STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-CRYS;8C REIN;2002.dyd;WSCC.bat



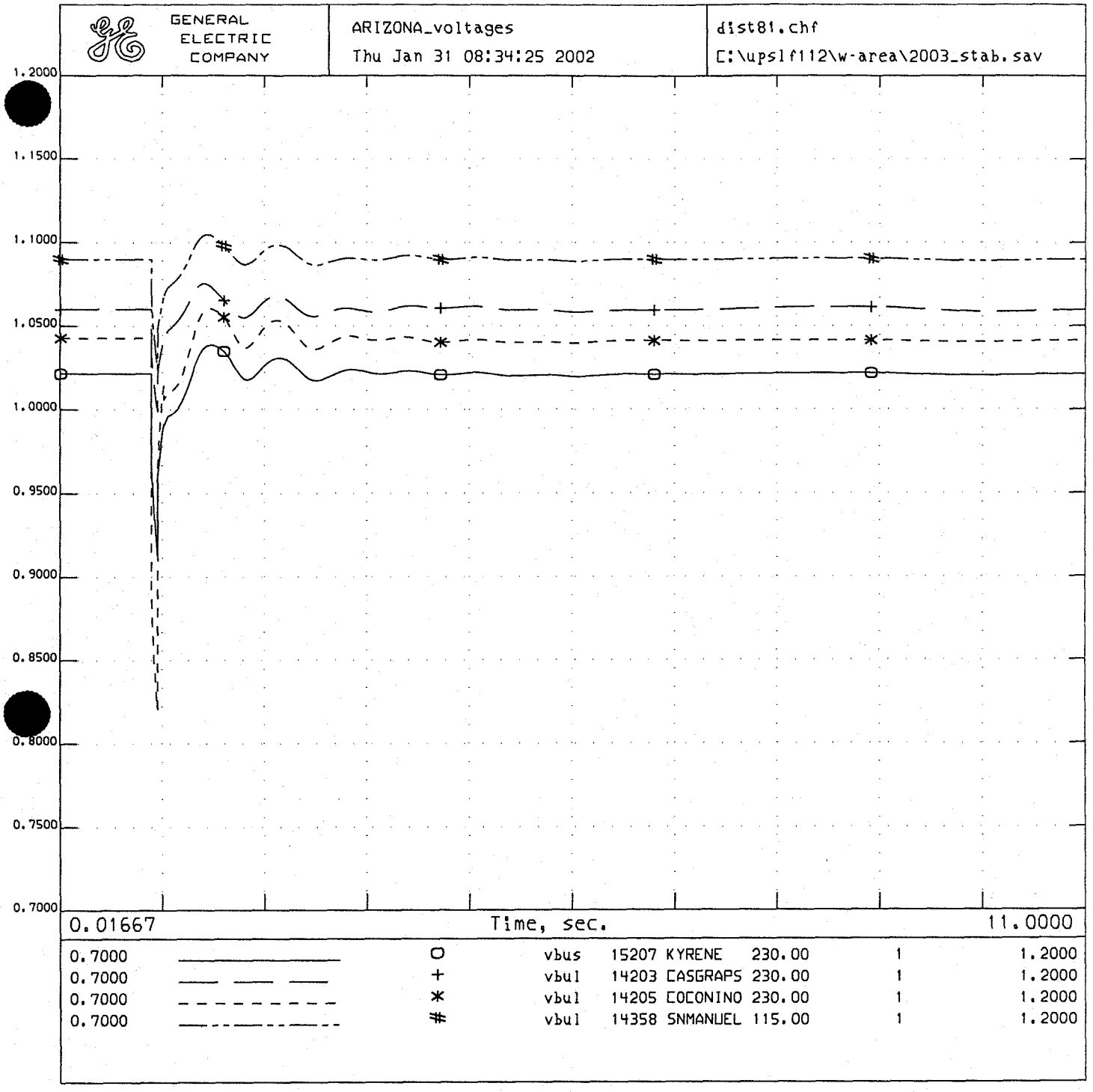
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Nav-Crystal line out

NAV-CRYS STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-CRYS;8C REIN;2002.dyd;WSCC.bat



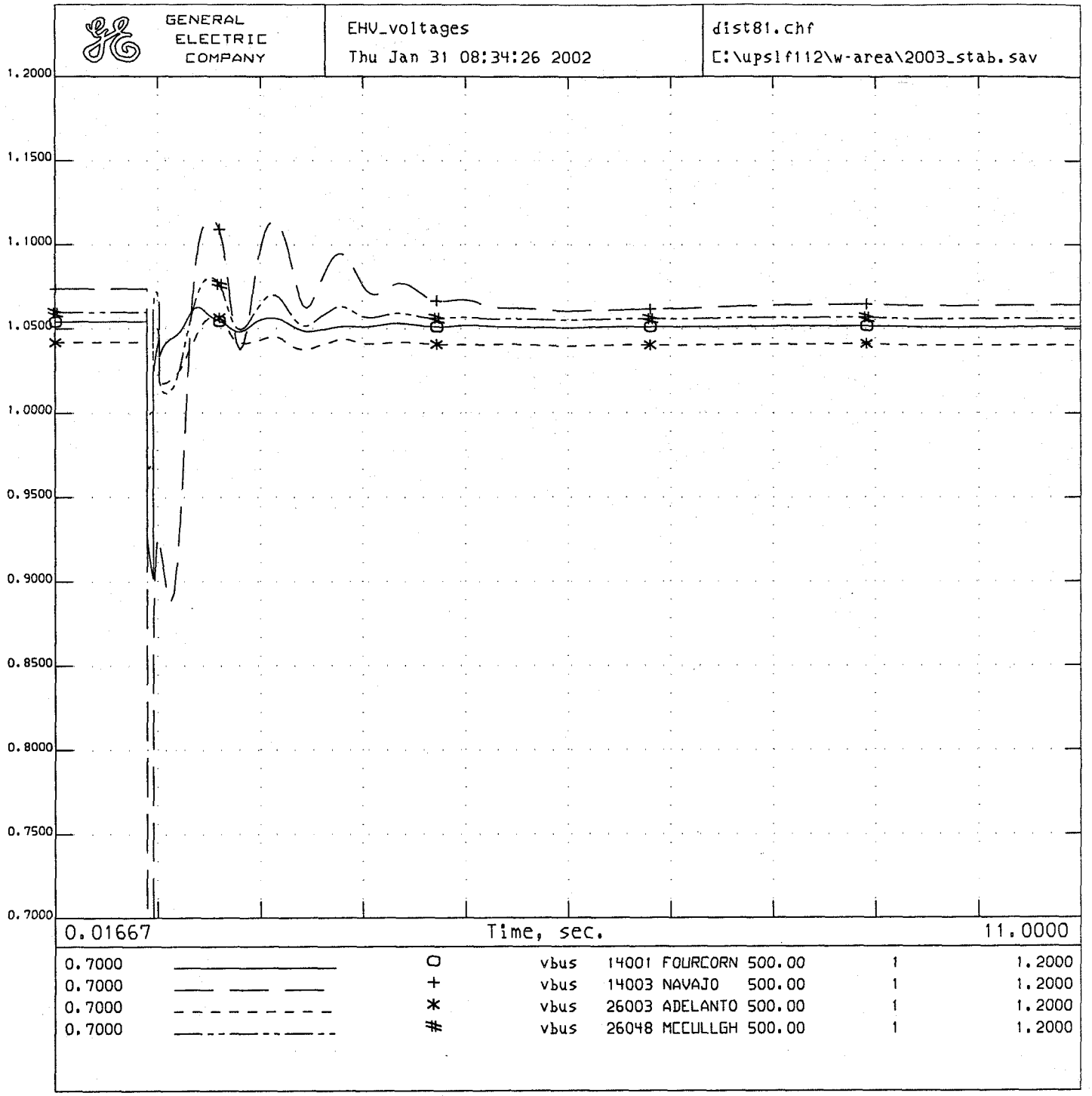
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Navjo-Mnk. line out

NAV-MKP STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-MKP;8C REIN;2003.dyd;WSCC.bat



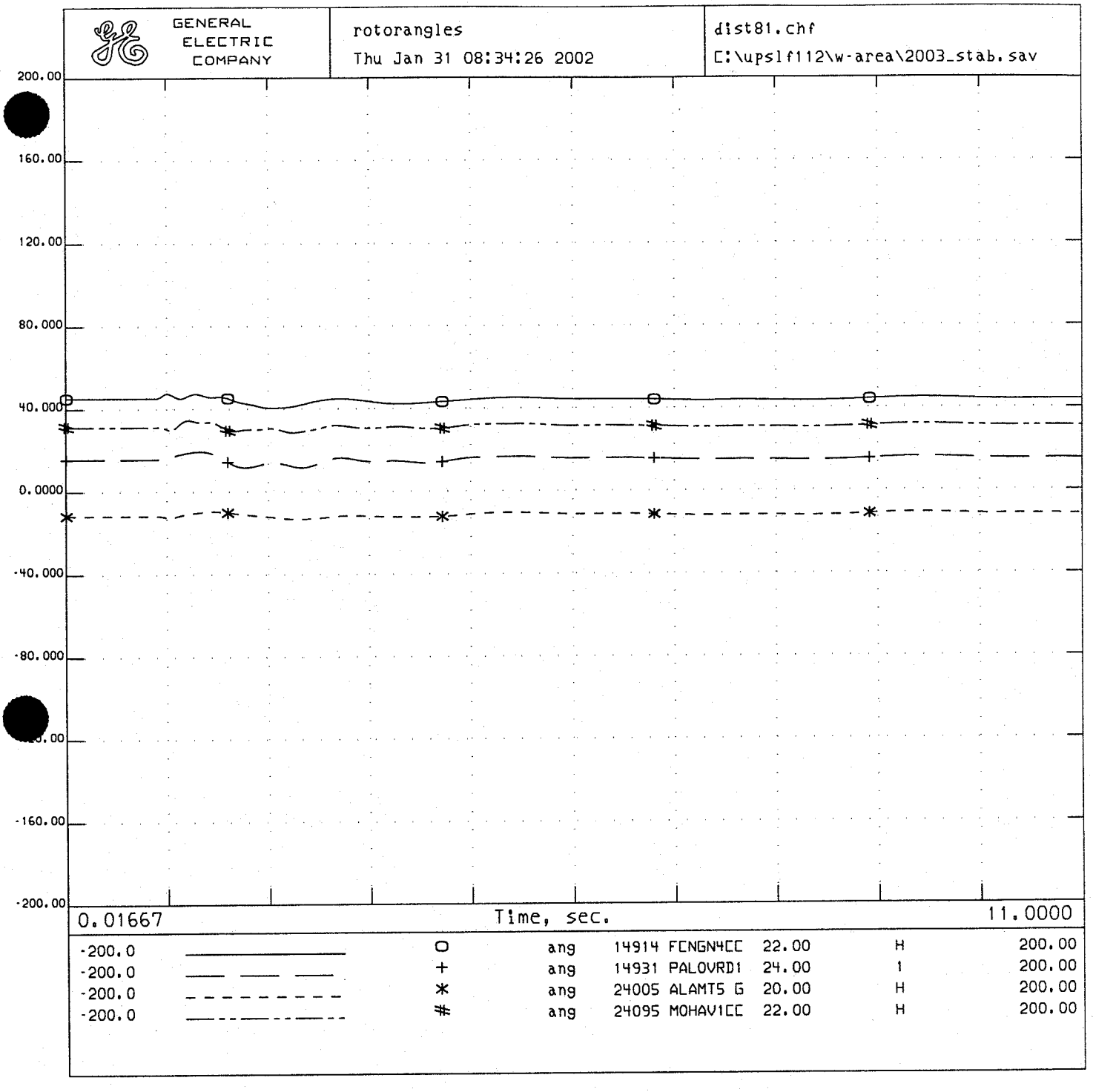
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Navjo-Mnk. line out

NAV-MKP STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-MKP;8C REIN;2003.dyd;WSCC.bat



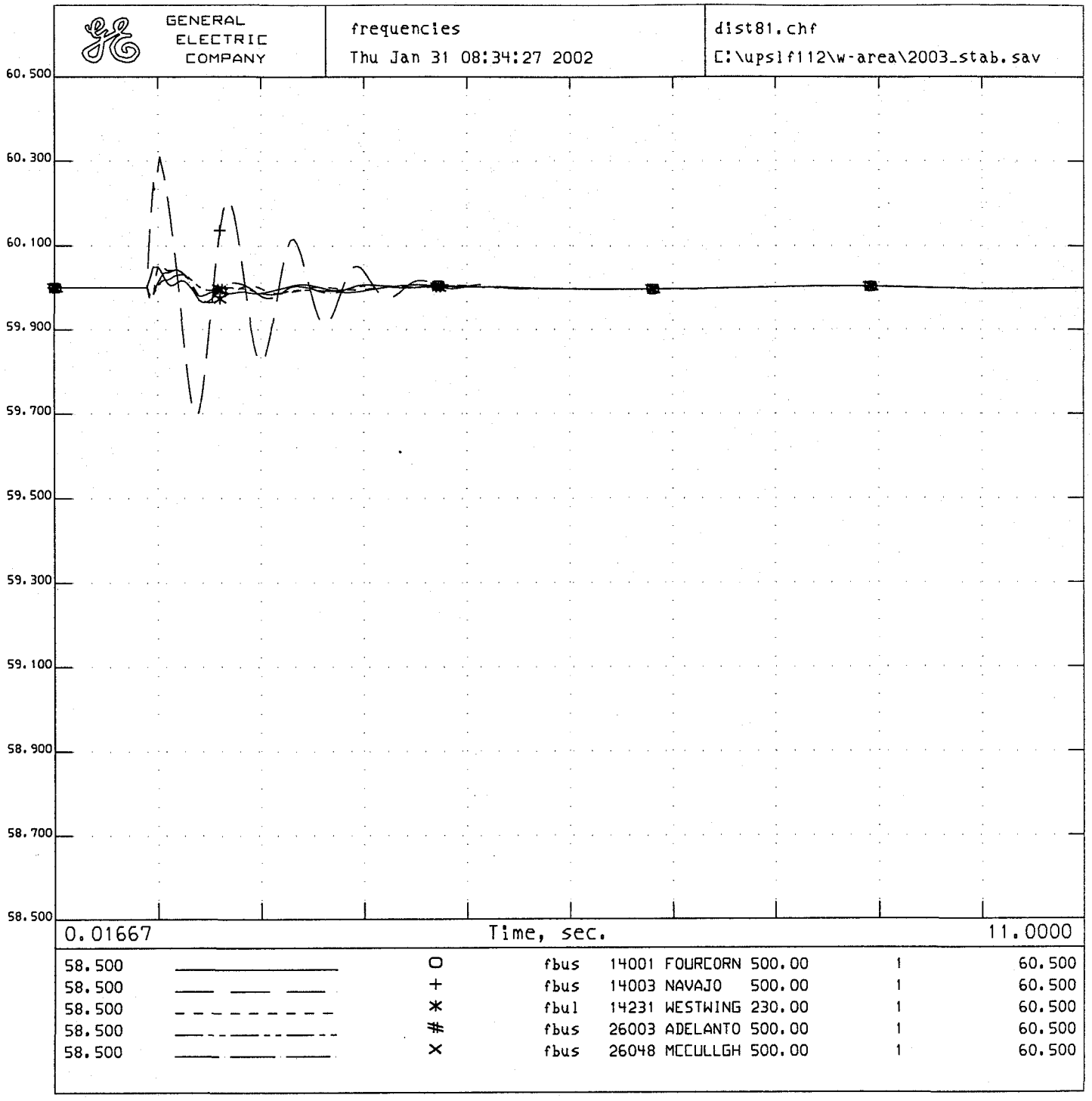
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Navjo-Mnk. line out

NAV-MKP STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-MKP;8C REIN;2003.dyd;WSCC.bat



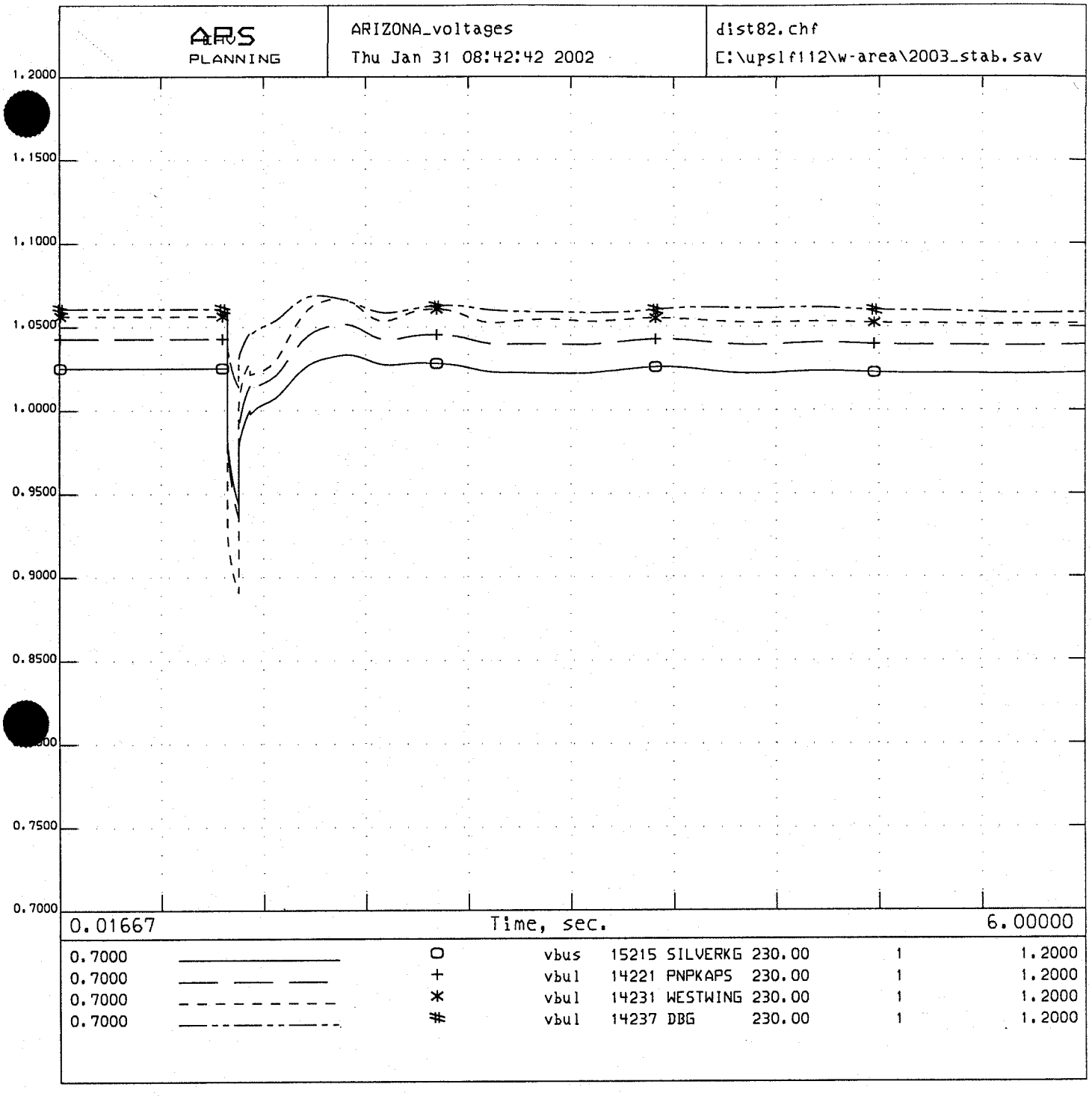
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Navjo-Mnk. line out

NAV-MKP STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-MKP;8C REIN;2003.dyd;WSCC.bat



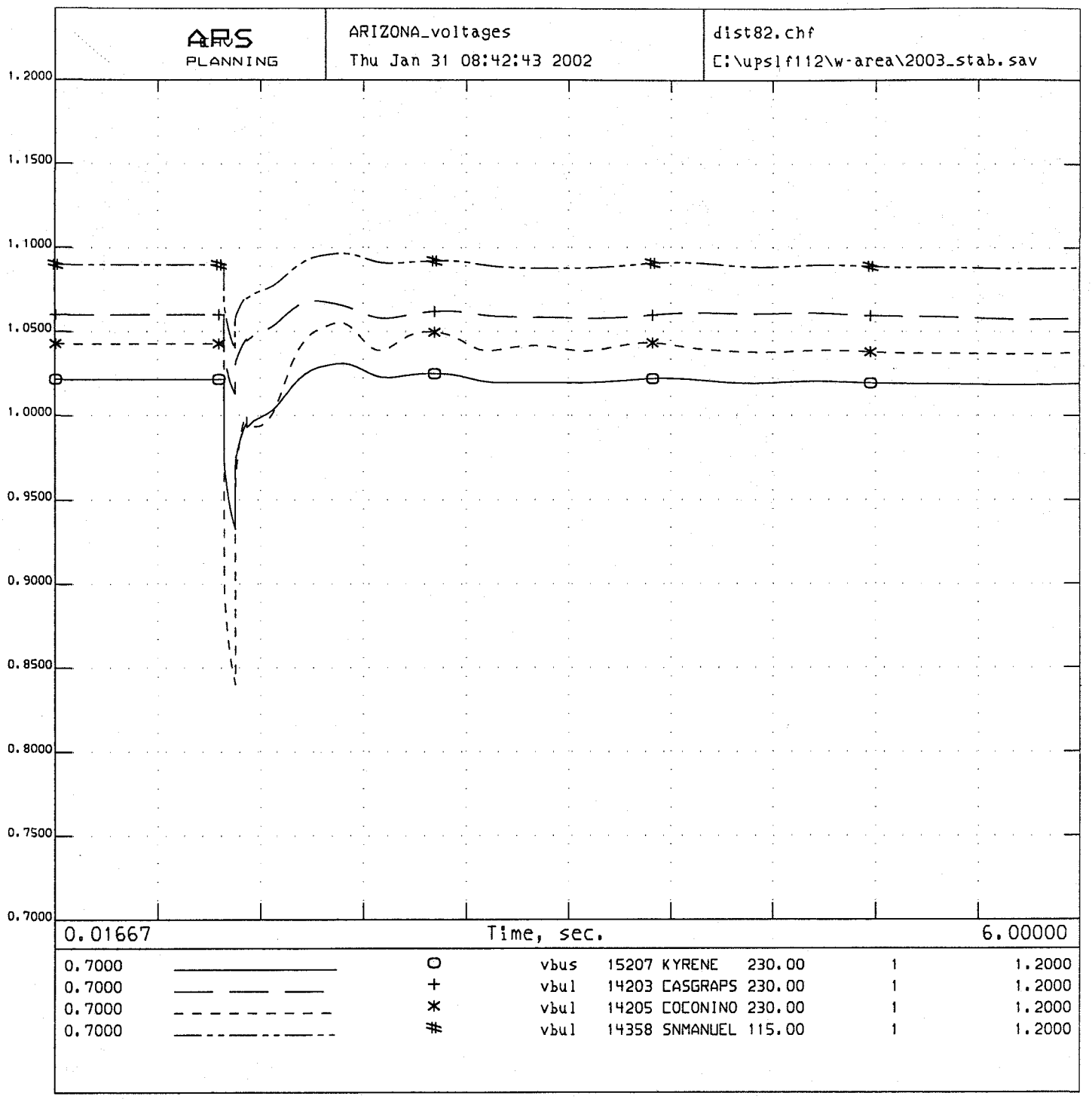
WESTERN SYSTEMS COORDINATING COUNCIL
NAV. FLT. Navjo-Mnk. line out

NAV-MKP STAB; jan/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-MKP;8C REIN;2003.dyd;WSCC.bat



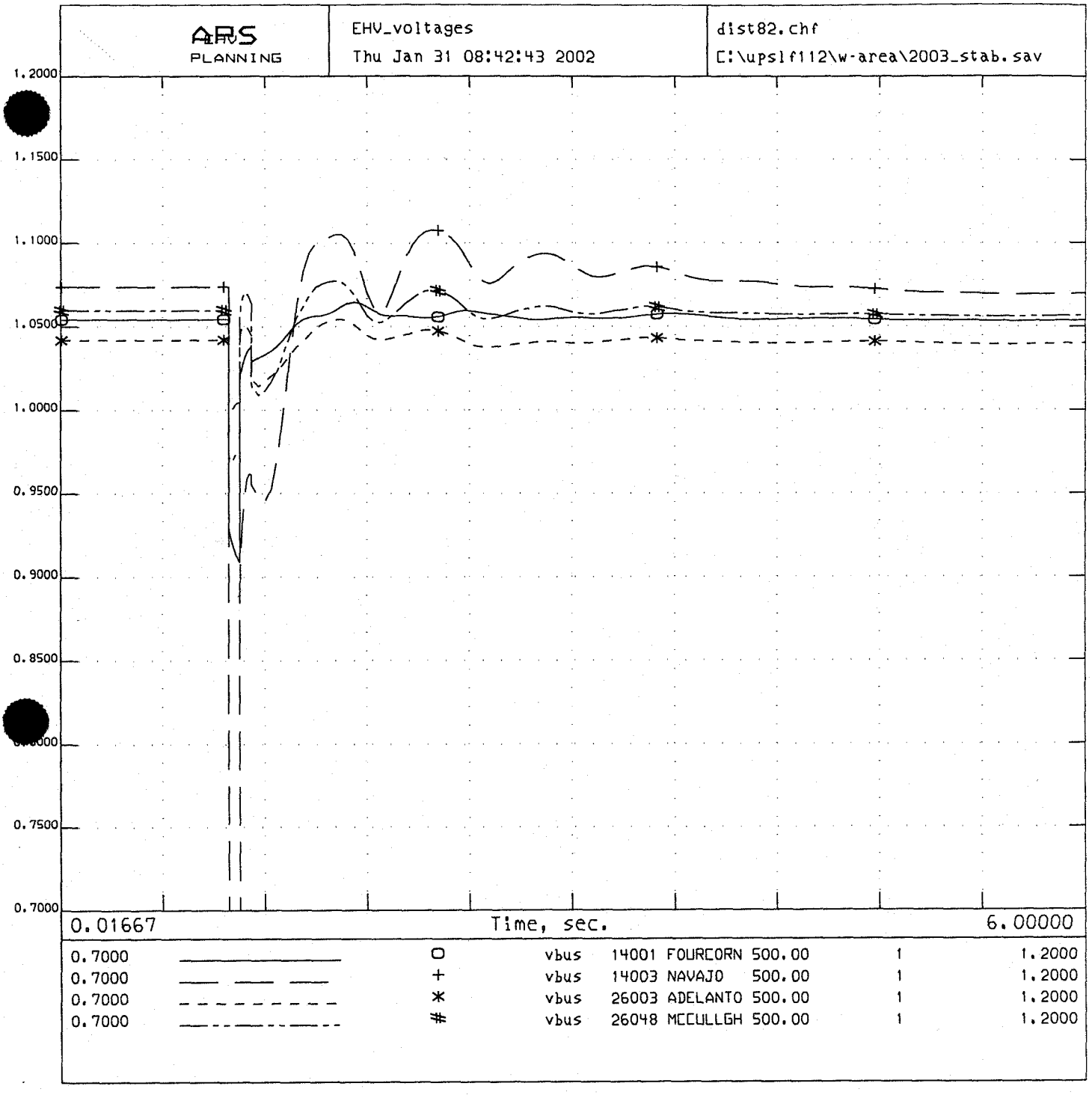
NAV FLT NAV-WW LINE OUT
2003 HS3S

NAV-WWG STAB; 01/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-WWG;8C REIN;2003.dyd;WSCC.bat



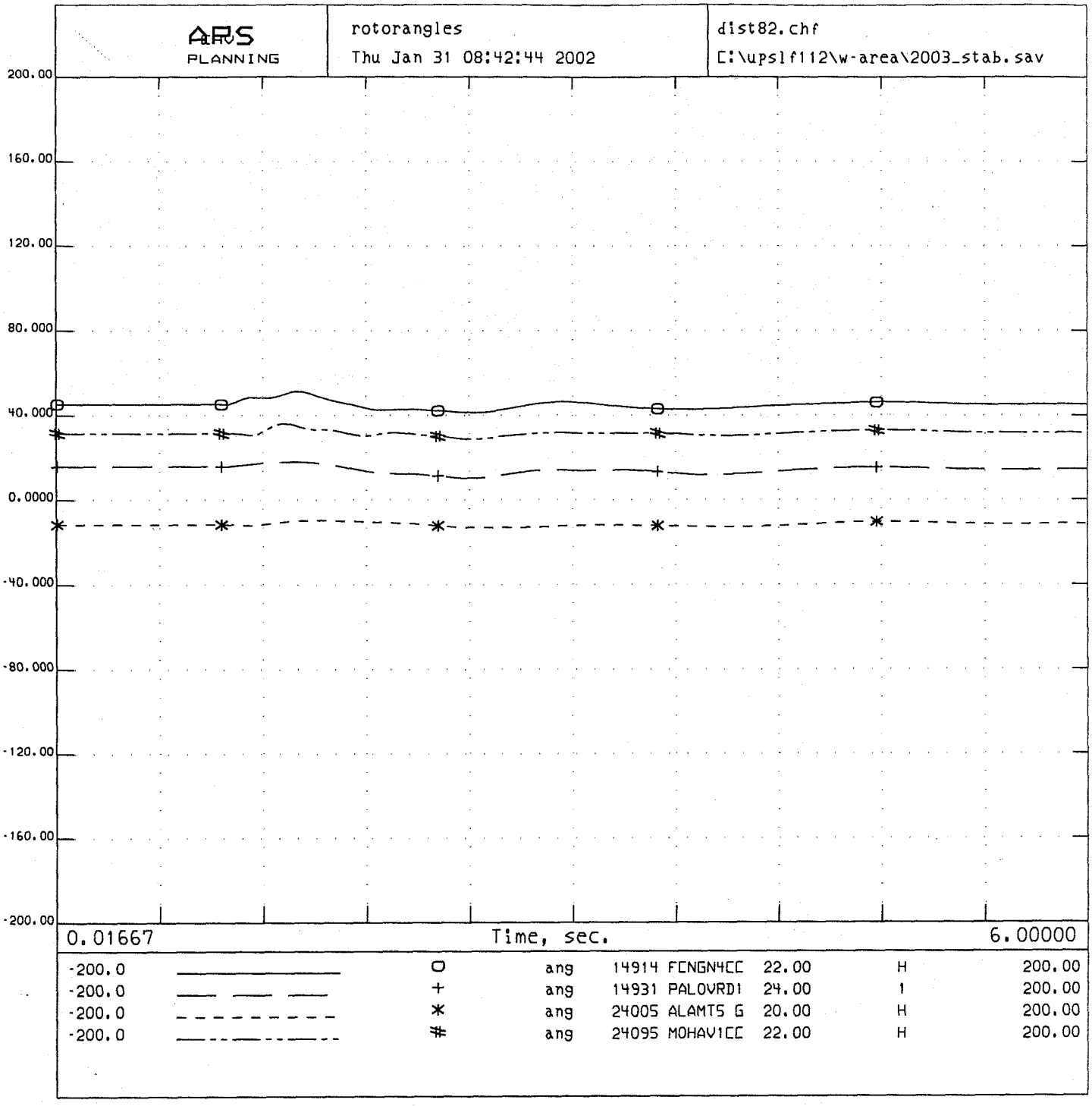
NAV FLT NAV-WW LINE OUT
2003 HS3S

NAV-WWG STAB; 01/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-WWG;8C REIN;2003.dyd;WSCC.bat



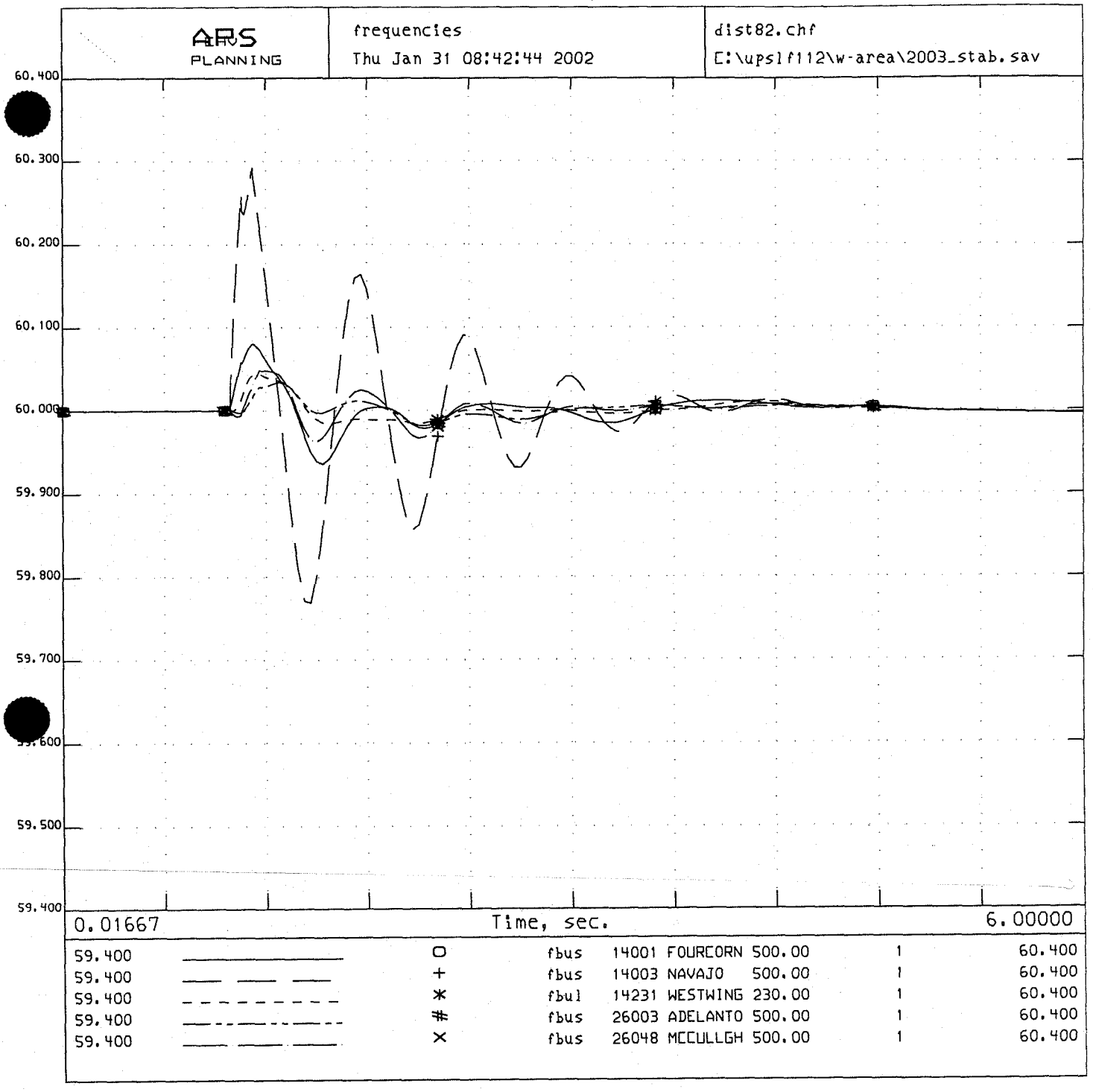
NAV FLT NAV-WW LINE OUT
2003 HS3S

NAV-WWG STAB; 01/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-WWG;8C REIN;2003.dyd;WSCC.bat



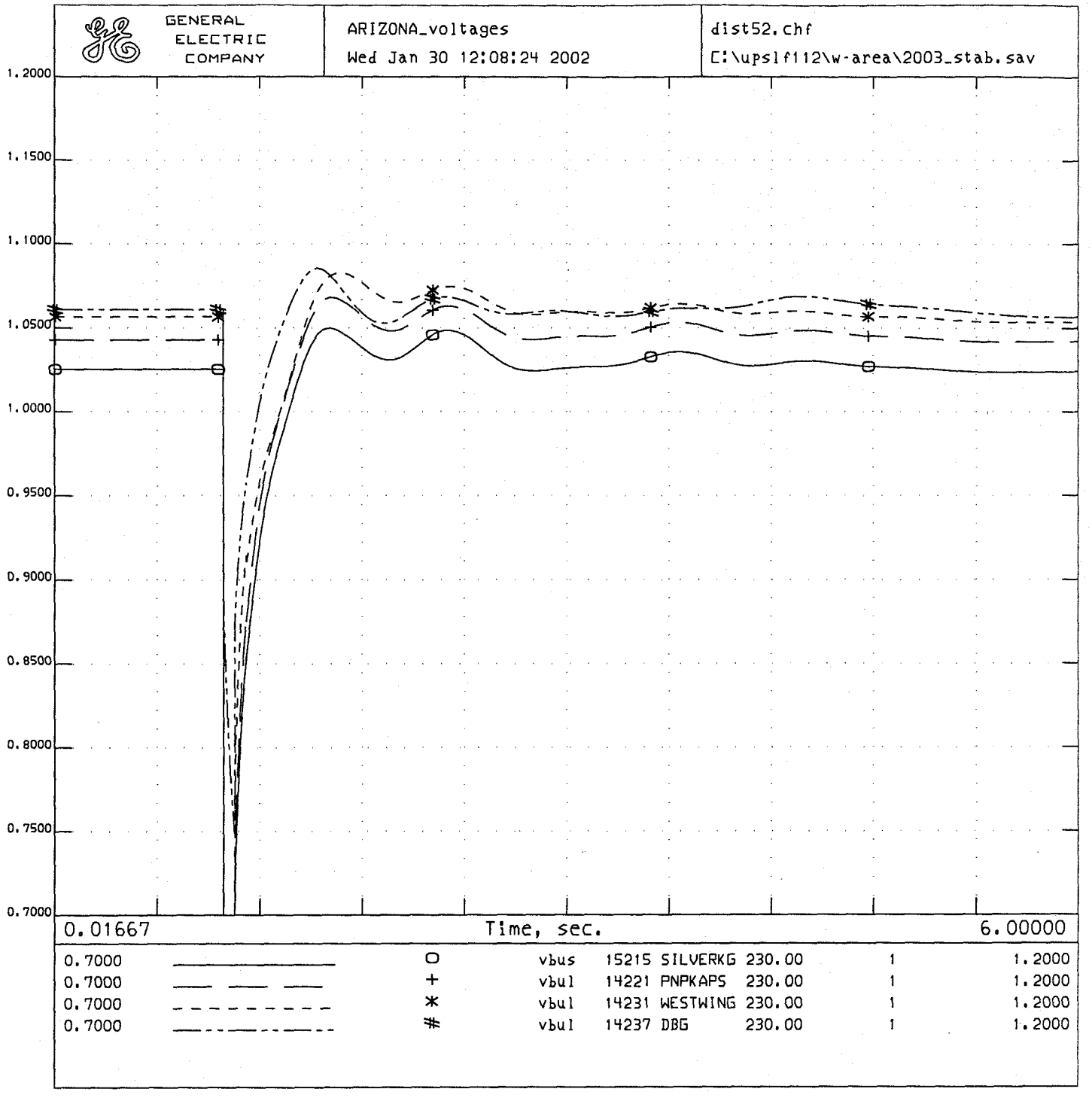
NAV FLT NAV-WW LINE OUT
2003 HS3S

NAV-WWG STAB; 01/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-WWG;8C REIN;2003.dyd;WSCC.bat



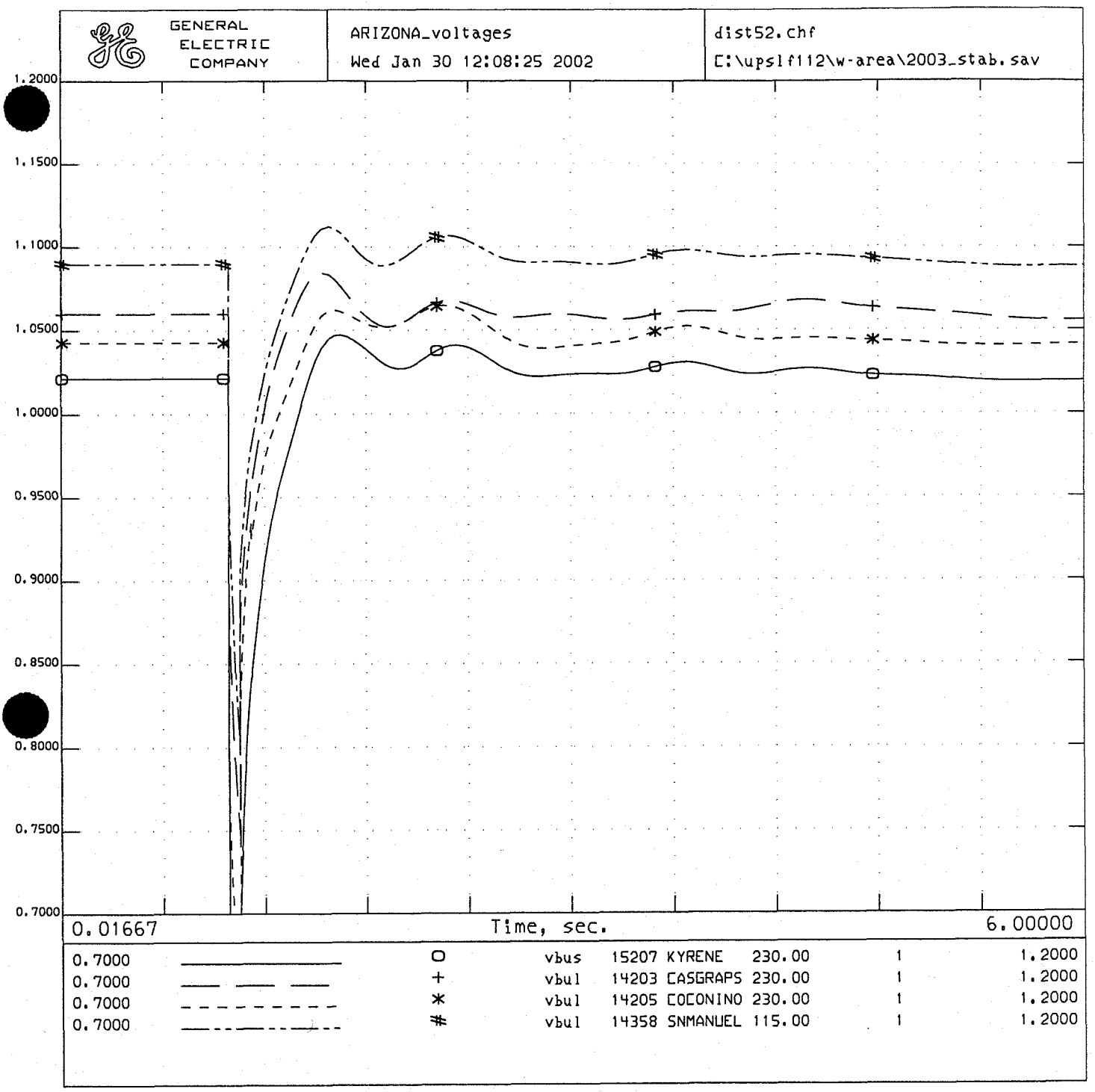
NAV FLT NAV-WW LINE OUT
2003 HS3S

NAV-WWG STAB; 01/2002; T=0 3P FLT NAV500; 6% FLT DMPING;FLSH CAPS
NAV-MCC/MKP,MKP-ELD;4C CLR FLT W/NAV-WWG;8C REIN;2003.dyd;WSCC.bat



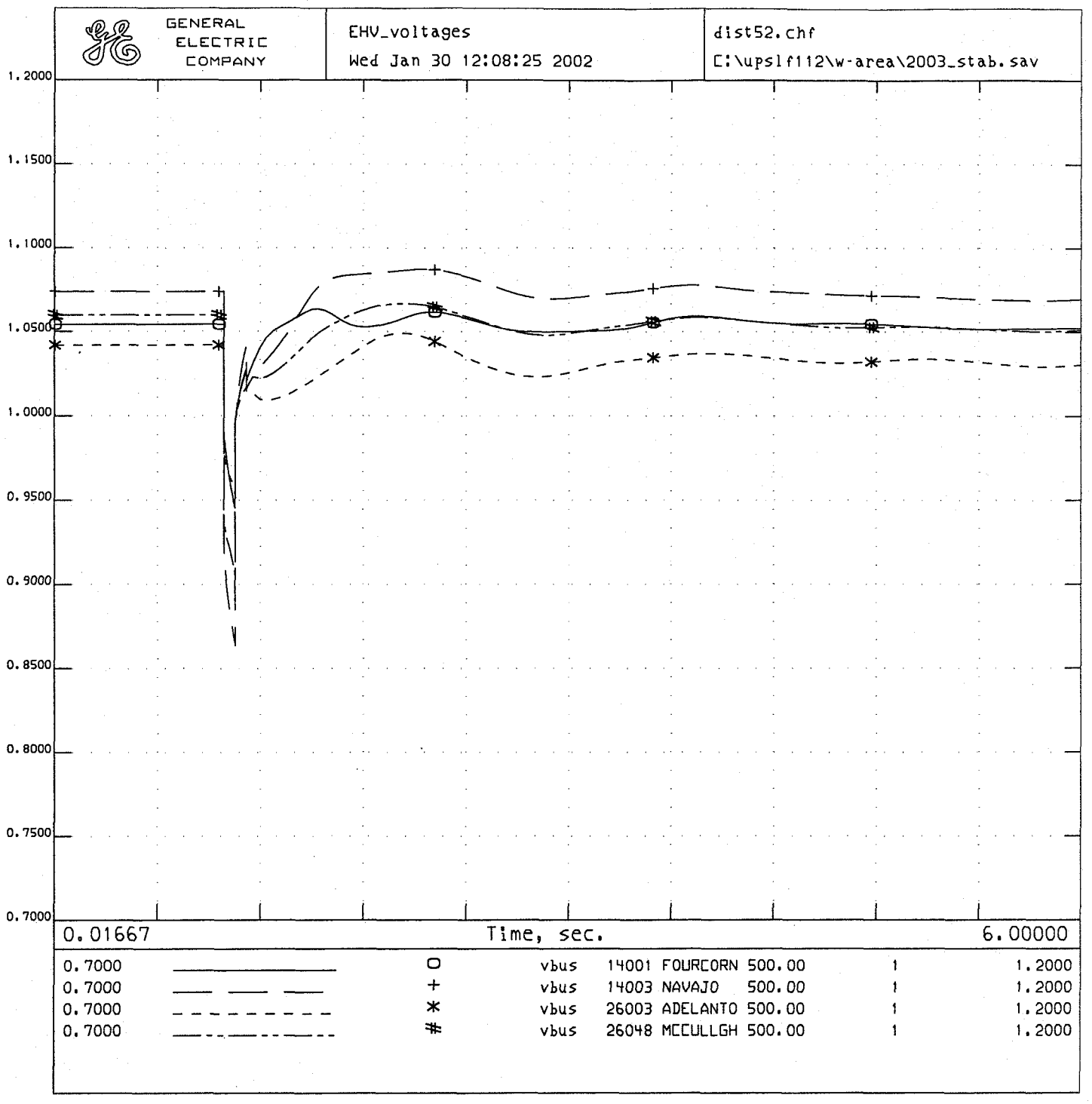
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT. w/PV - Devers line out

PV-DEV STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-DEV8C REIN;2003.dyd;WSCC.bat



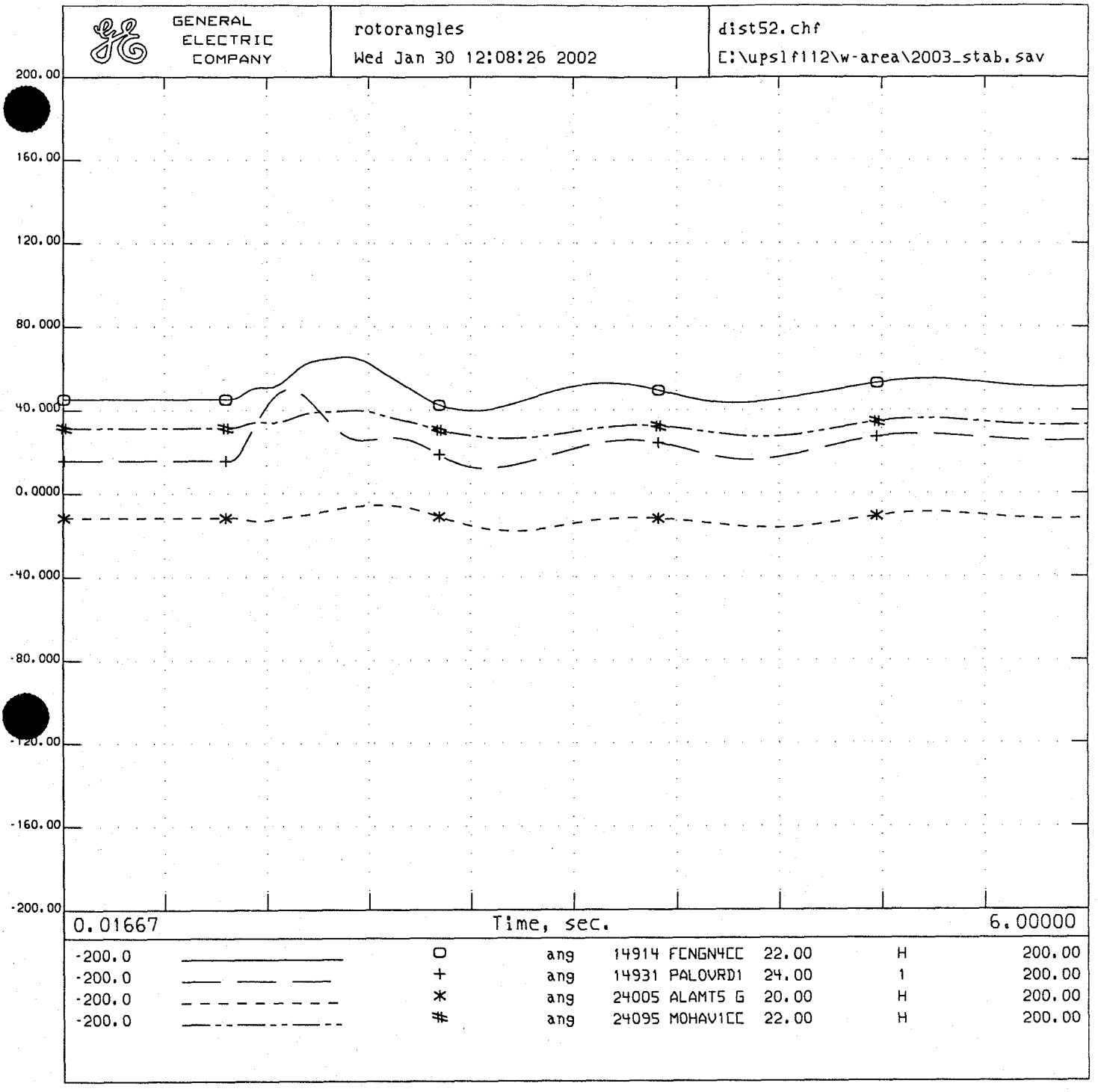
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT. w/PV - Devers line out

PV-DEV STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-DEV8C REIN;2003.dyd;WSCC.bat



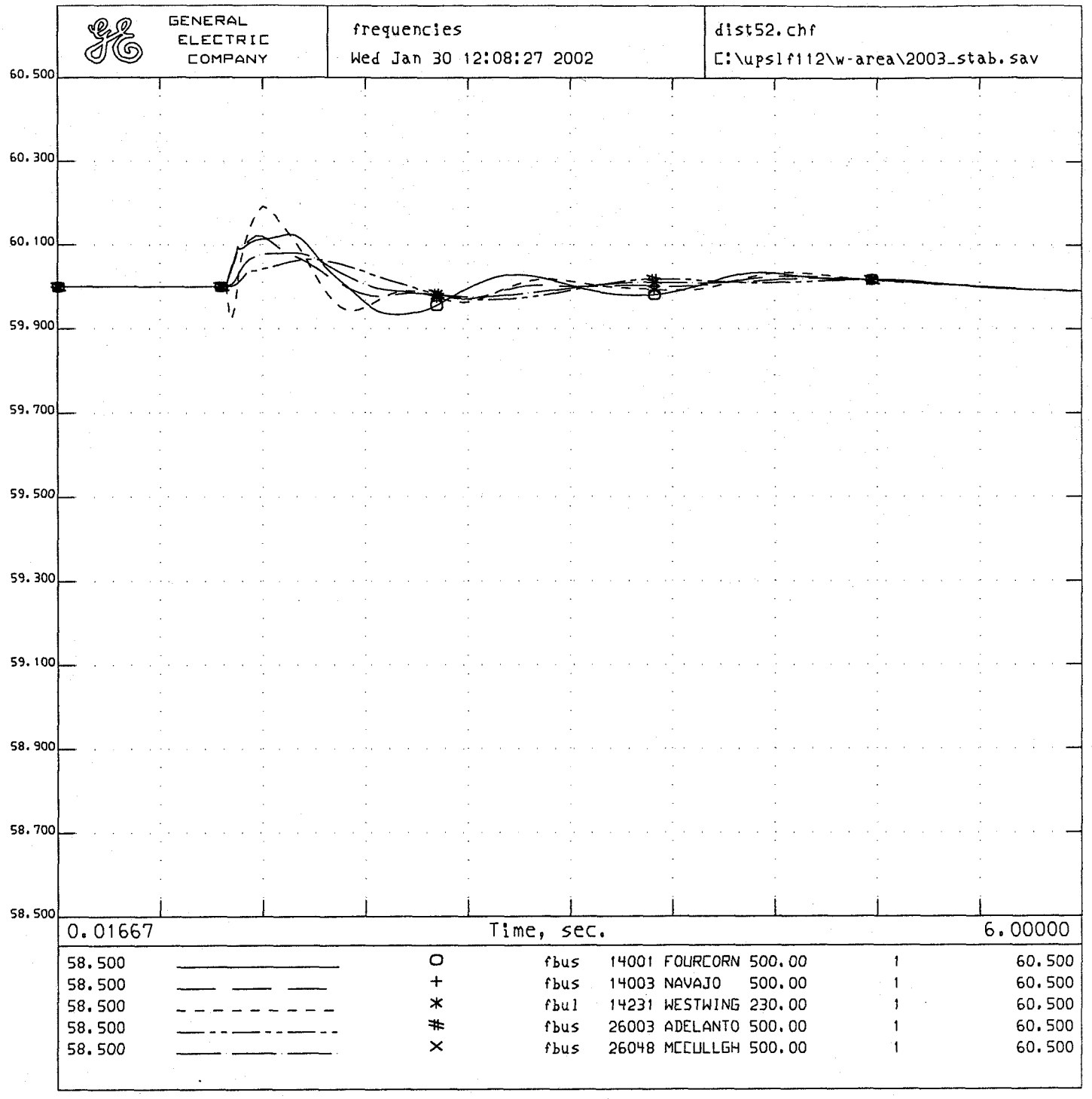
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT. w/PV - Devers line out

PV-DEV STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-DEV8C REIN;2003.dyd;WSCC.bat



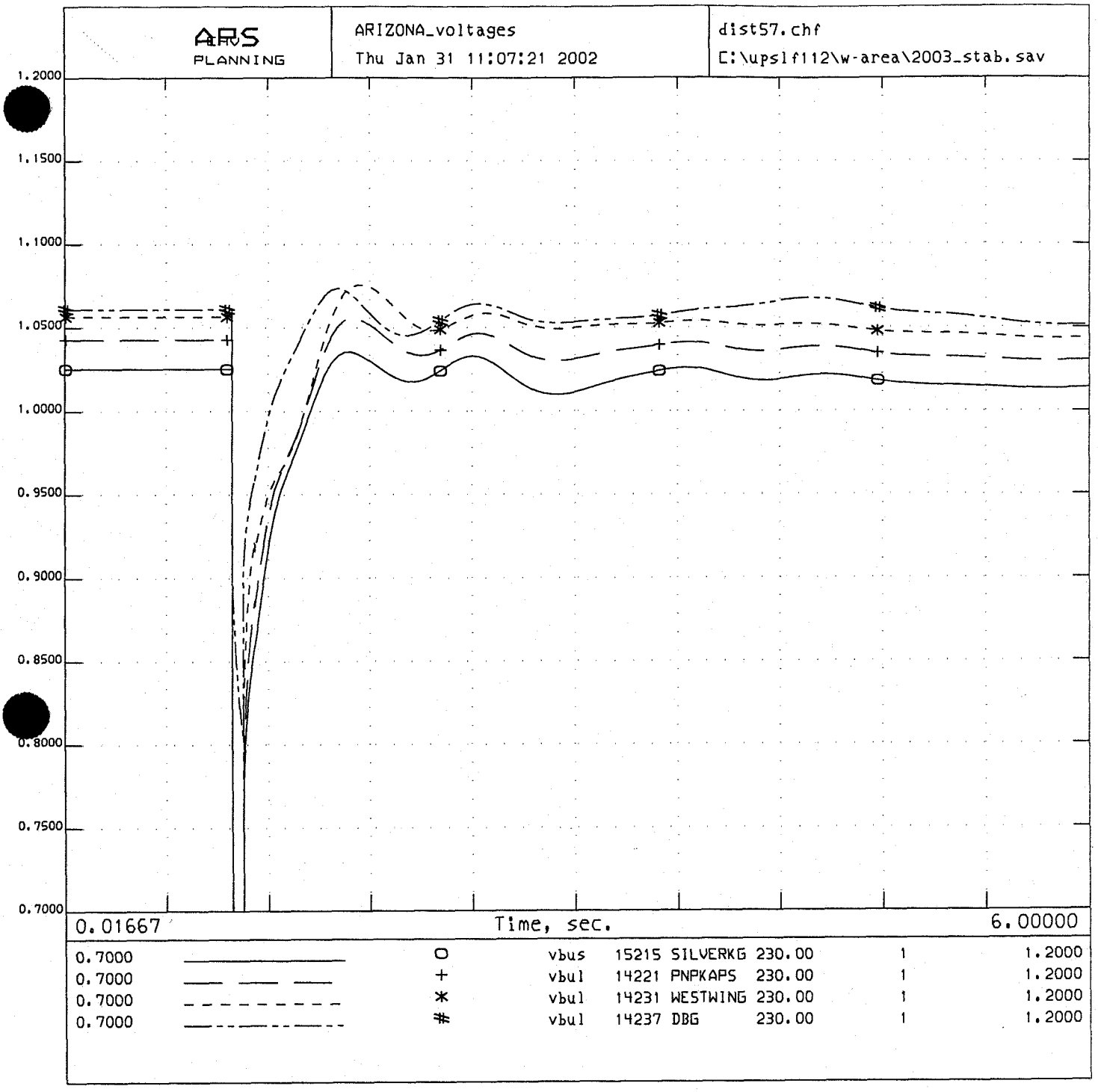
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT. w/PV - Devers line out

PV-DEV STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-DEV8C REIN;2003.dyd;WSCC.bat



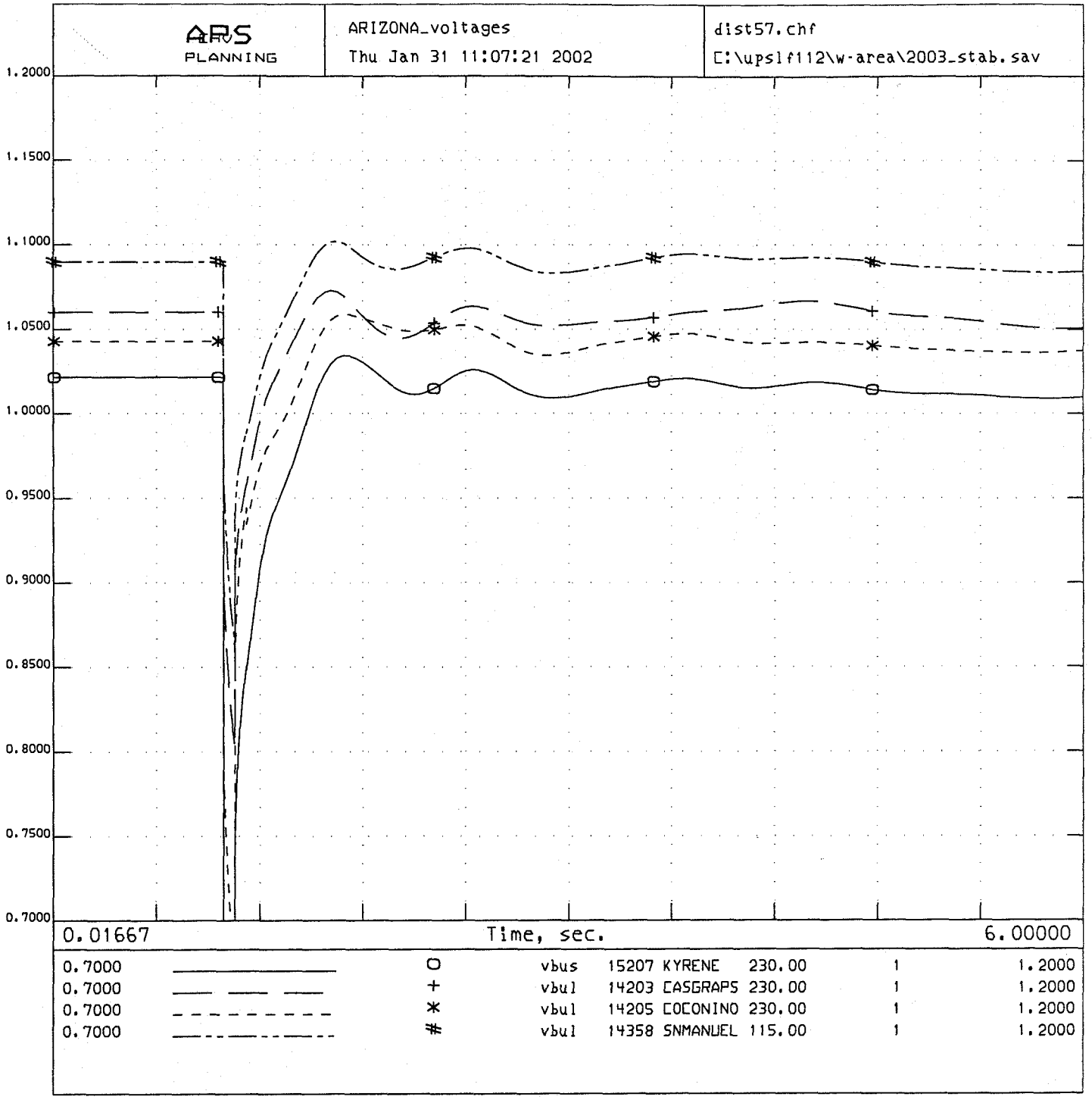
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT. w/PV - Devers line out

PV-DEV STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-DEV8C REIN;2003.dyd;WSCC.bat



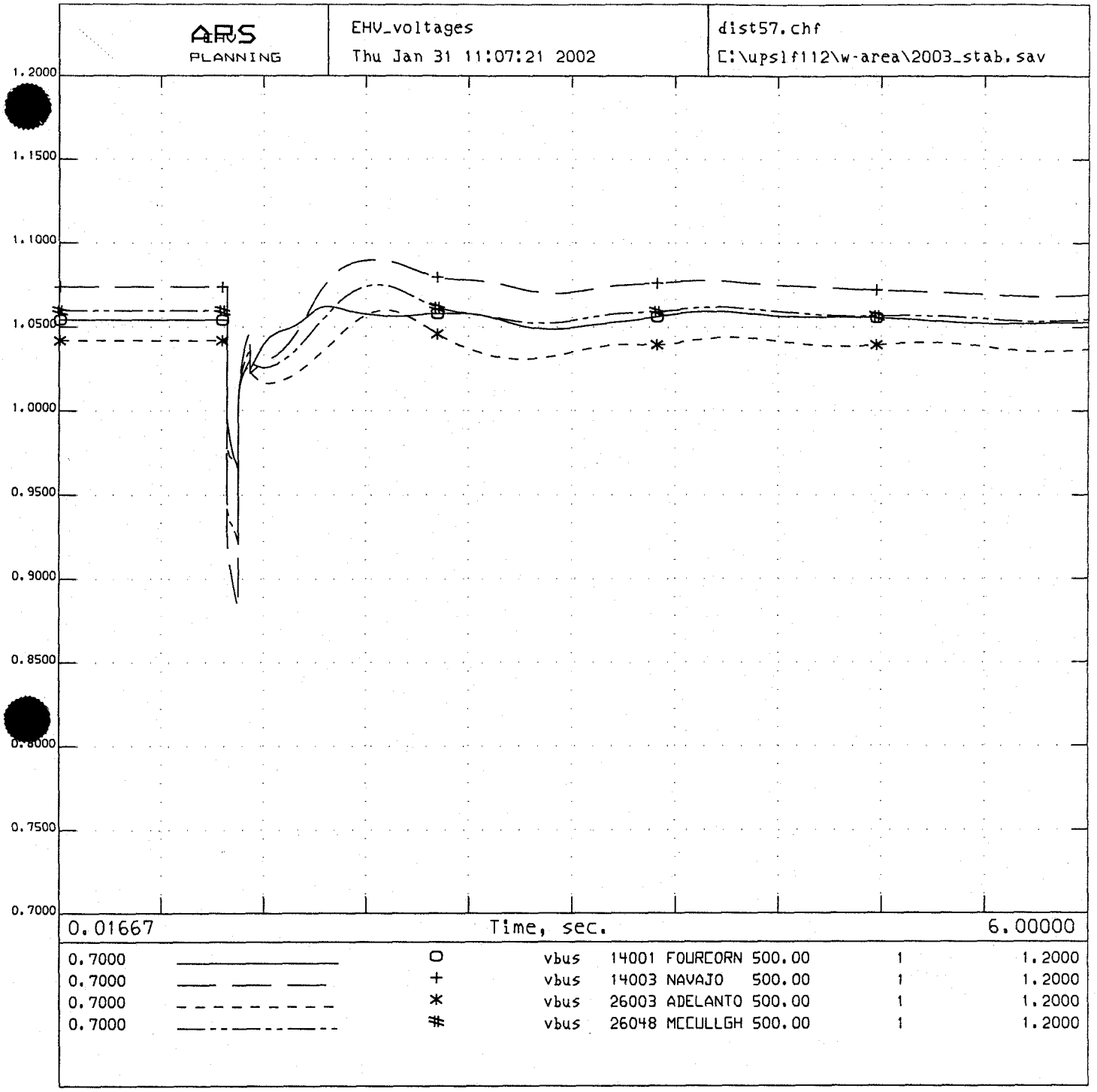
PALO VERDE FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



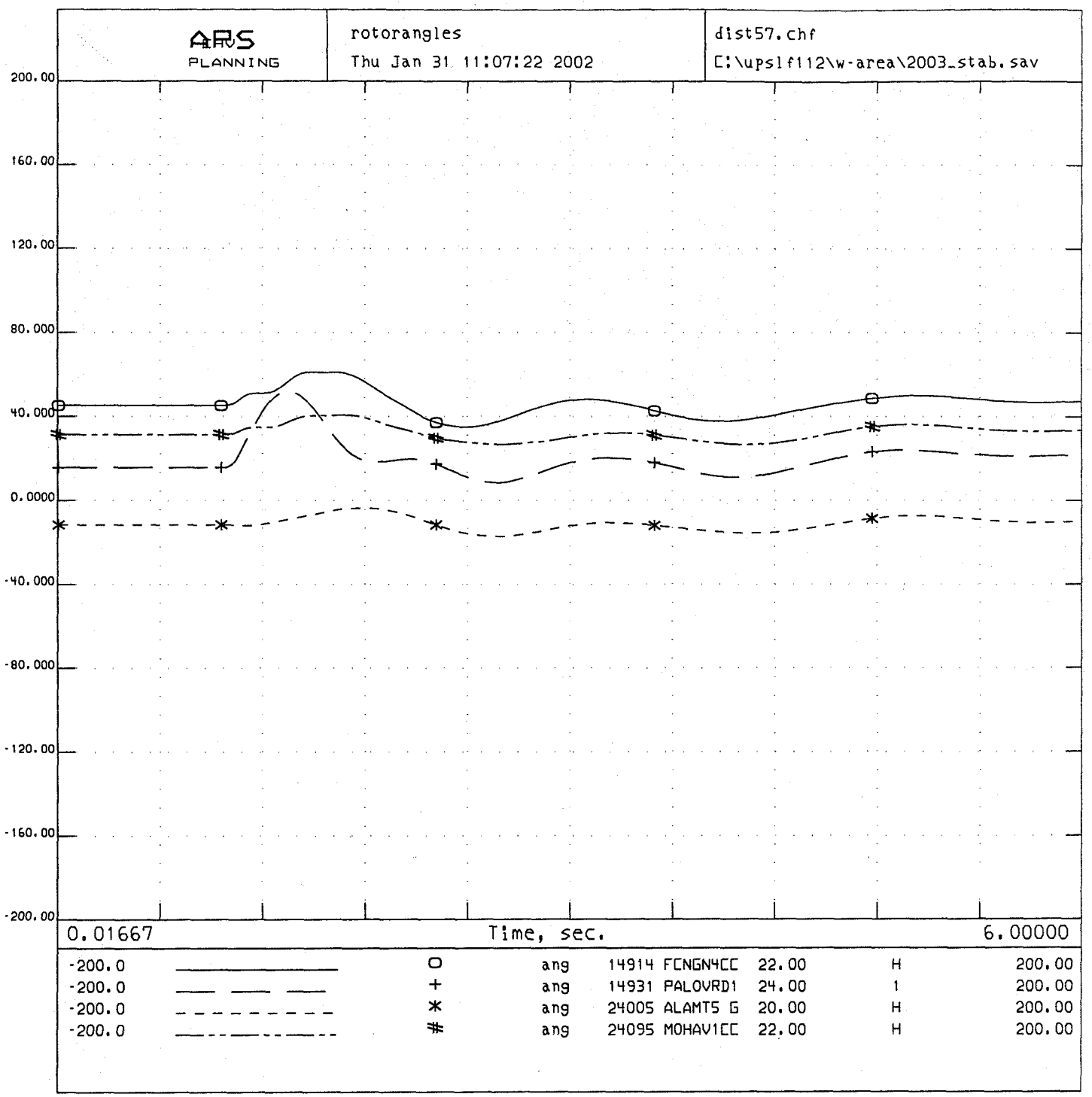
PALO VERDE FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



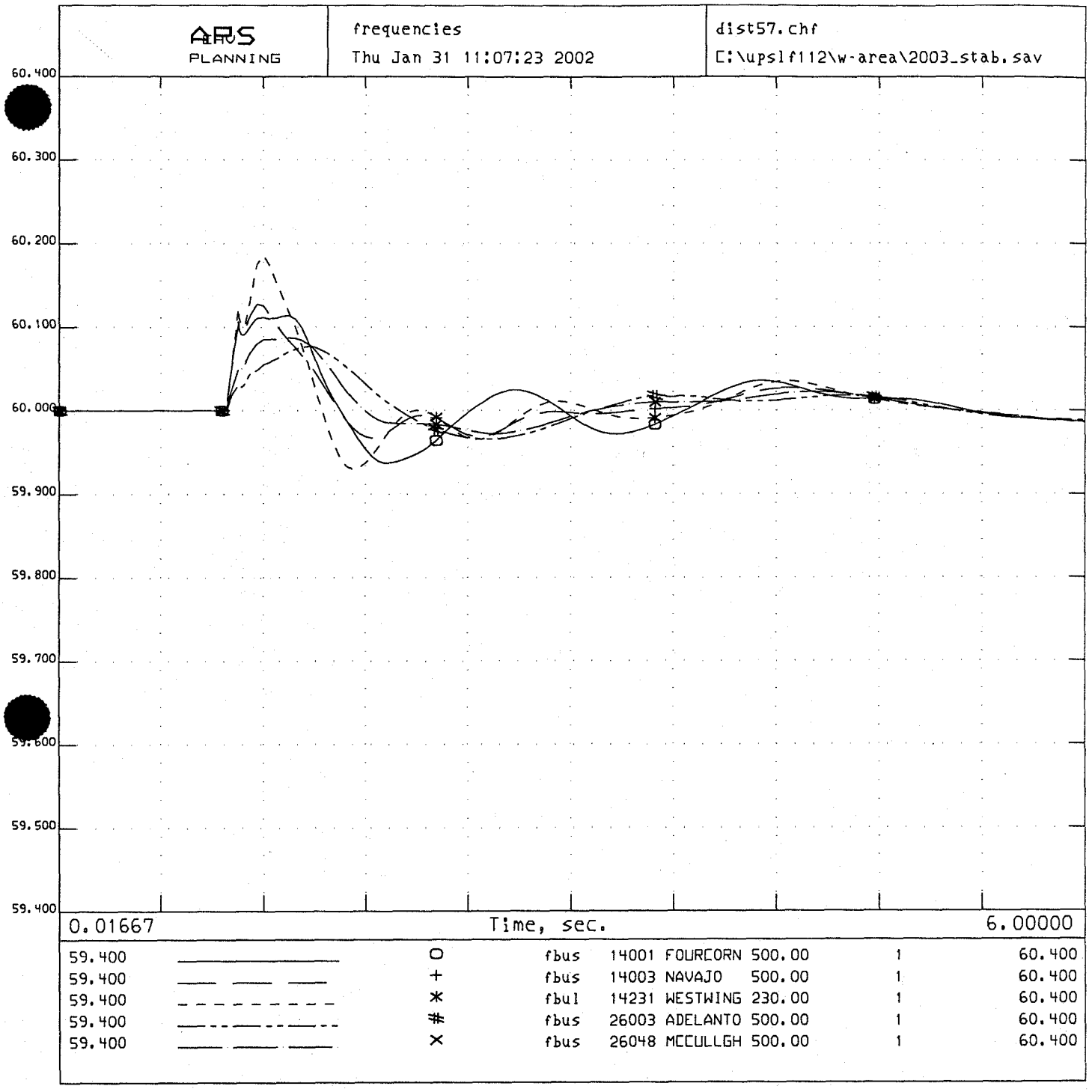
PALO VERDE FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



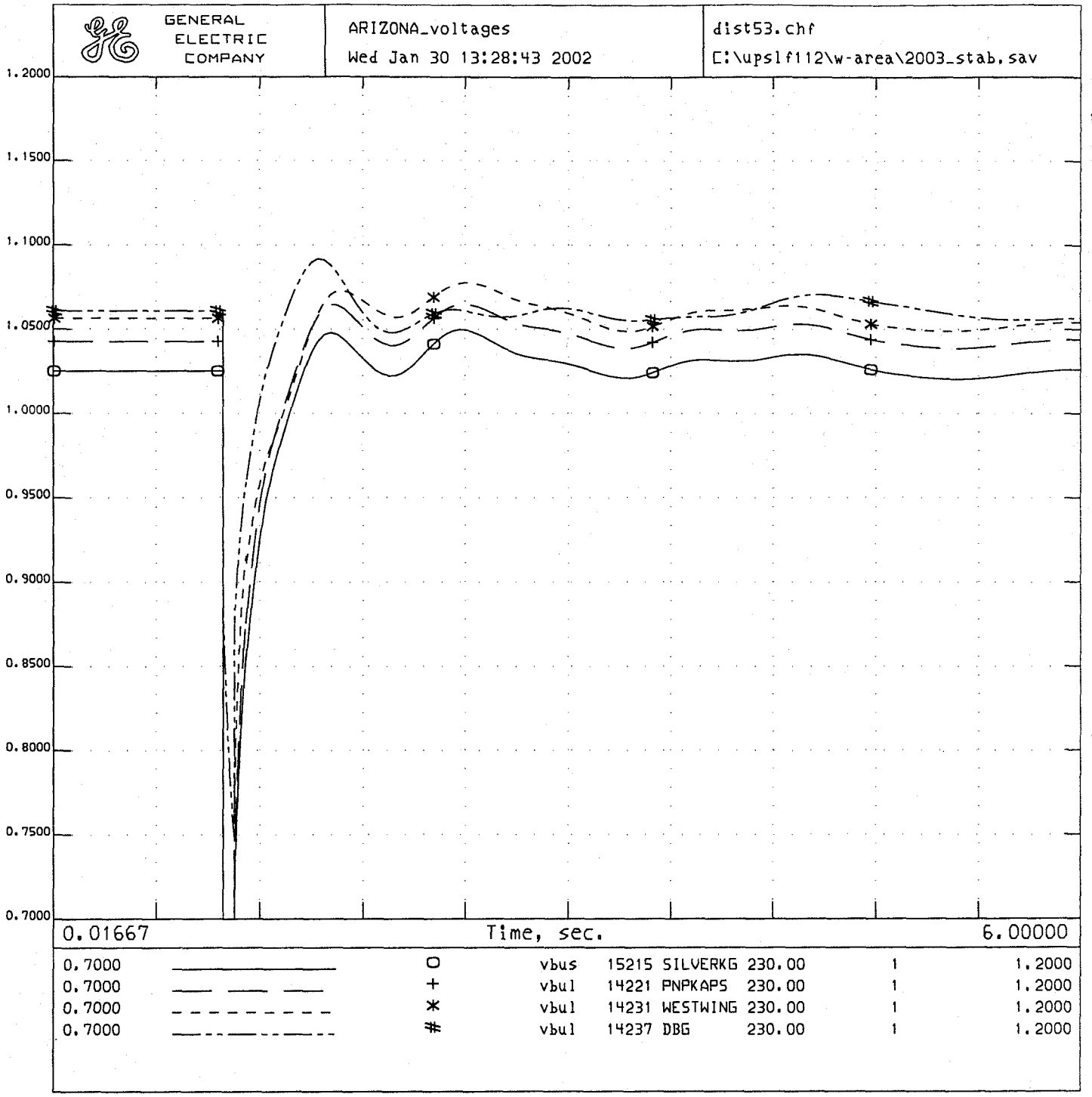
PALO VERDE FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



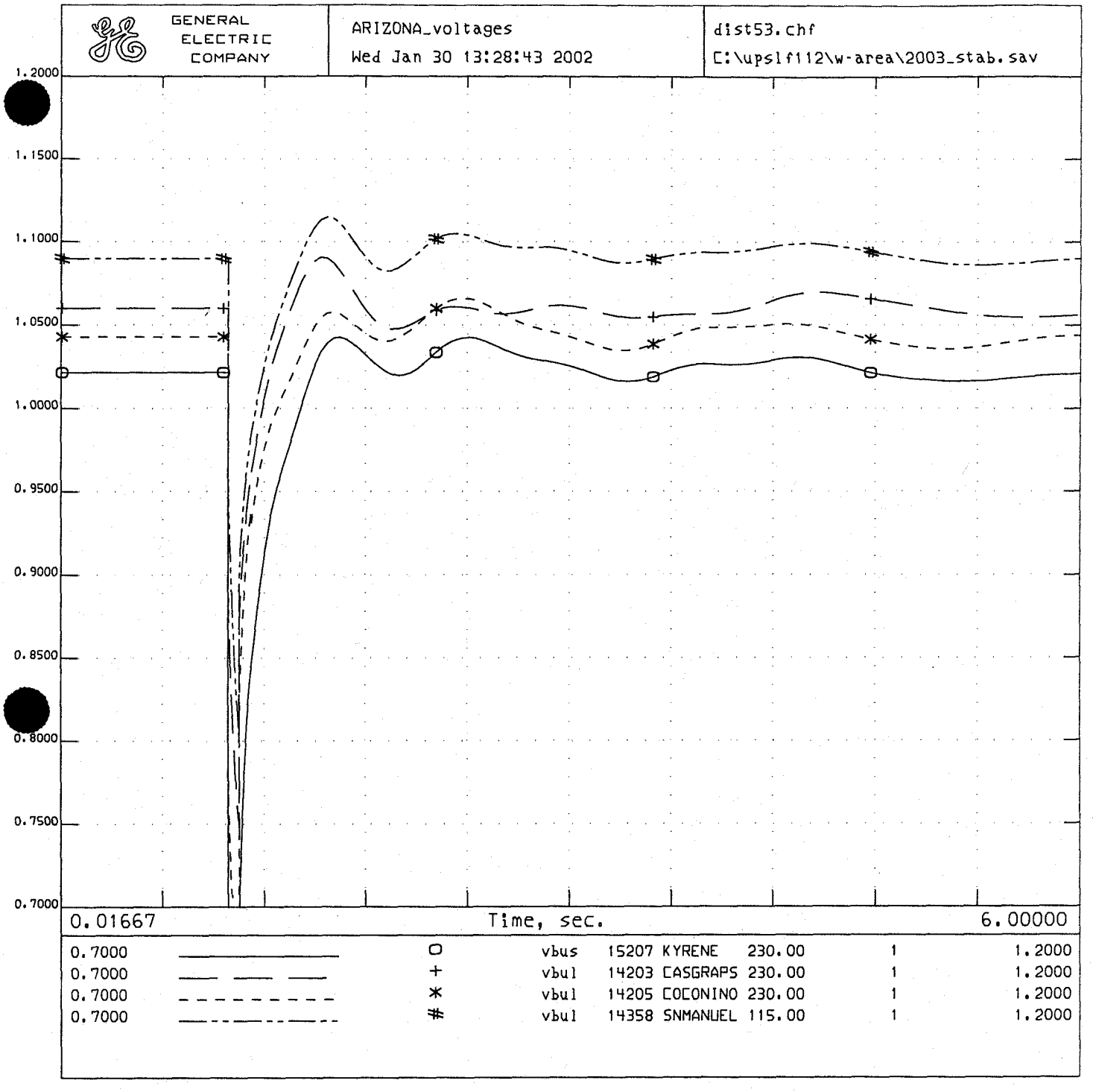
PALO VERDE FLT HASSY-JOJOBA LINE OUT
2003 HS3S

HAS-JJ STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/HAS-JJ;8C REIN;2003.dyd;WSCC.bpt



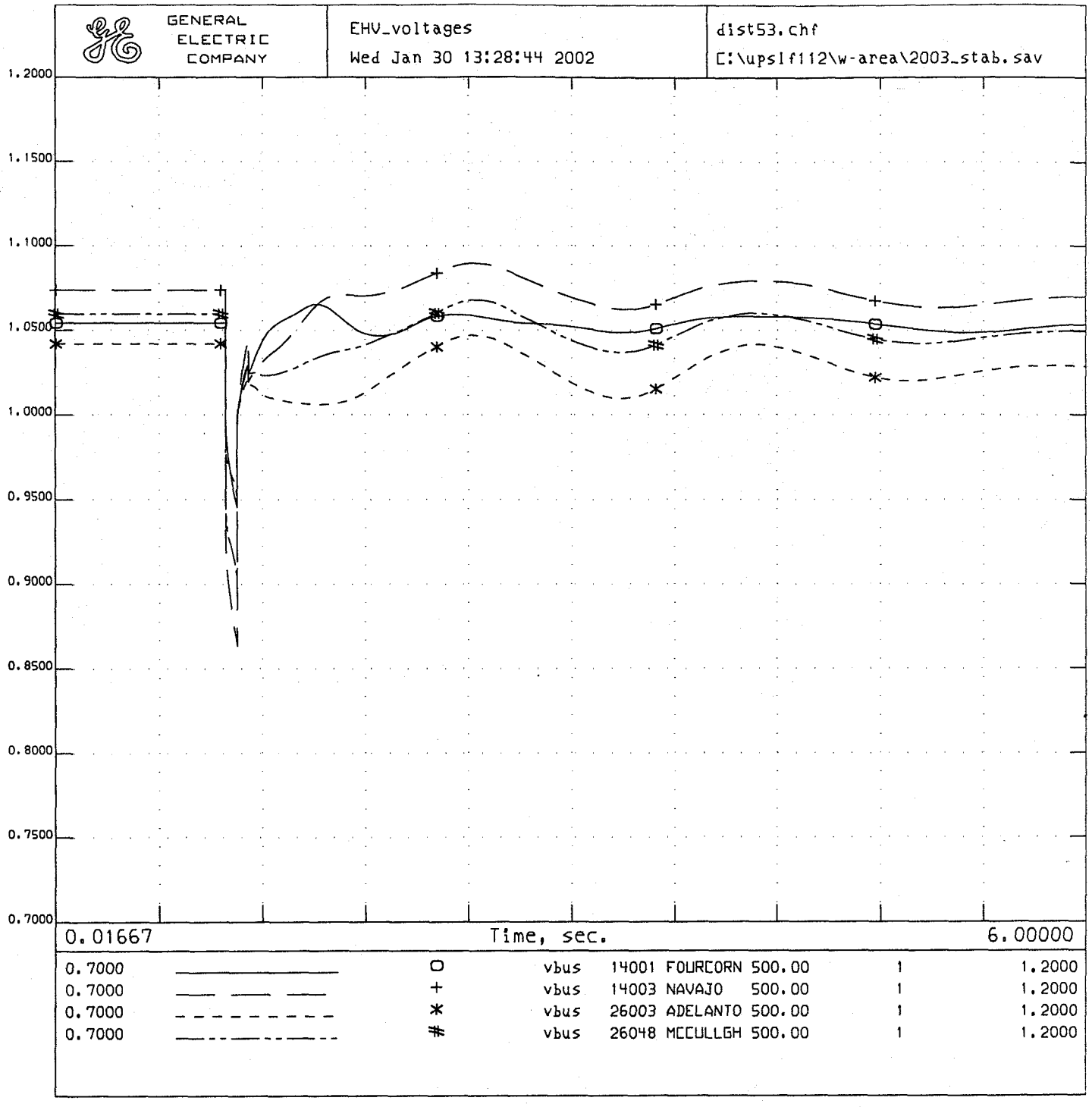
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S

PV-NGILA STAB; jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-NG;8C REIN;2003.dyd;WSCC.bat



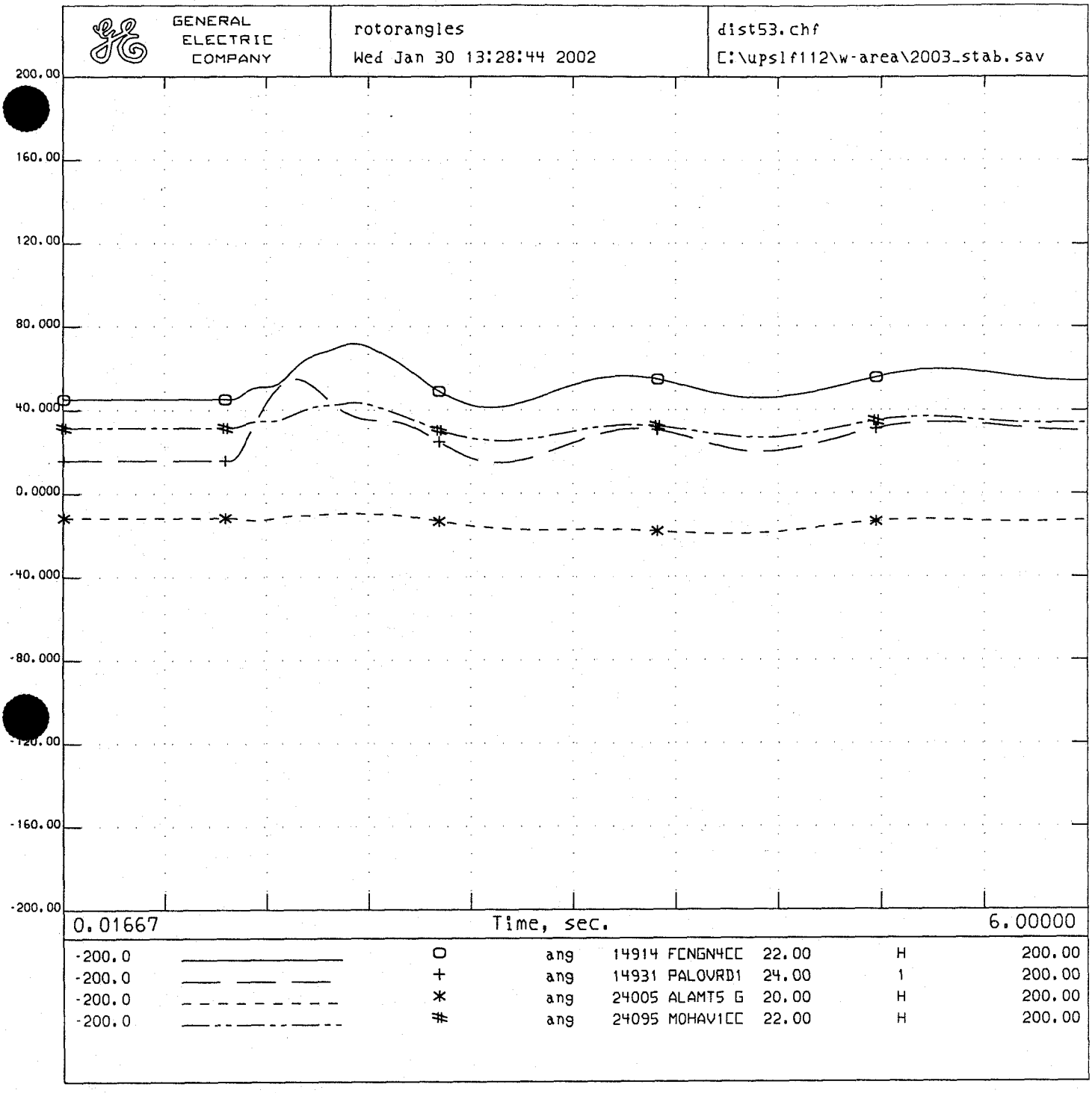
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S

PV-NGILA STAB; jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-NG;8C REIN;2003.dyd;WSCC.bat



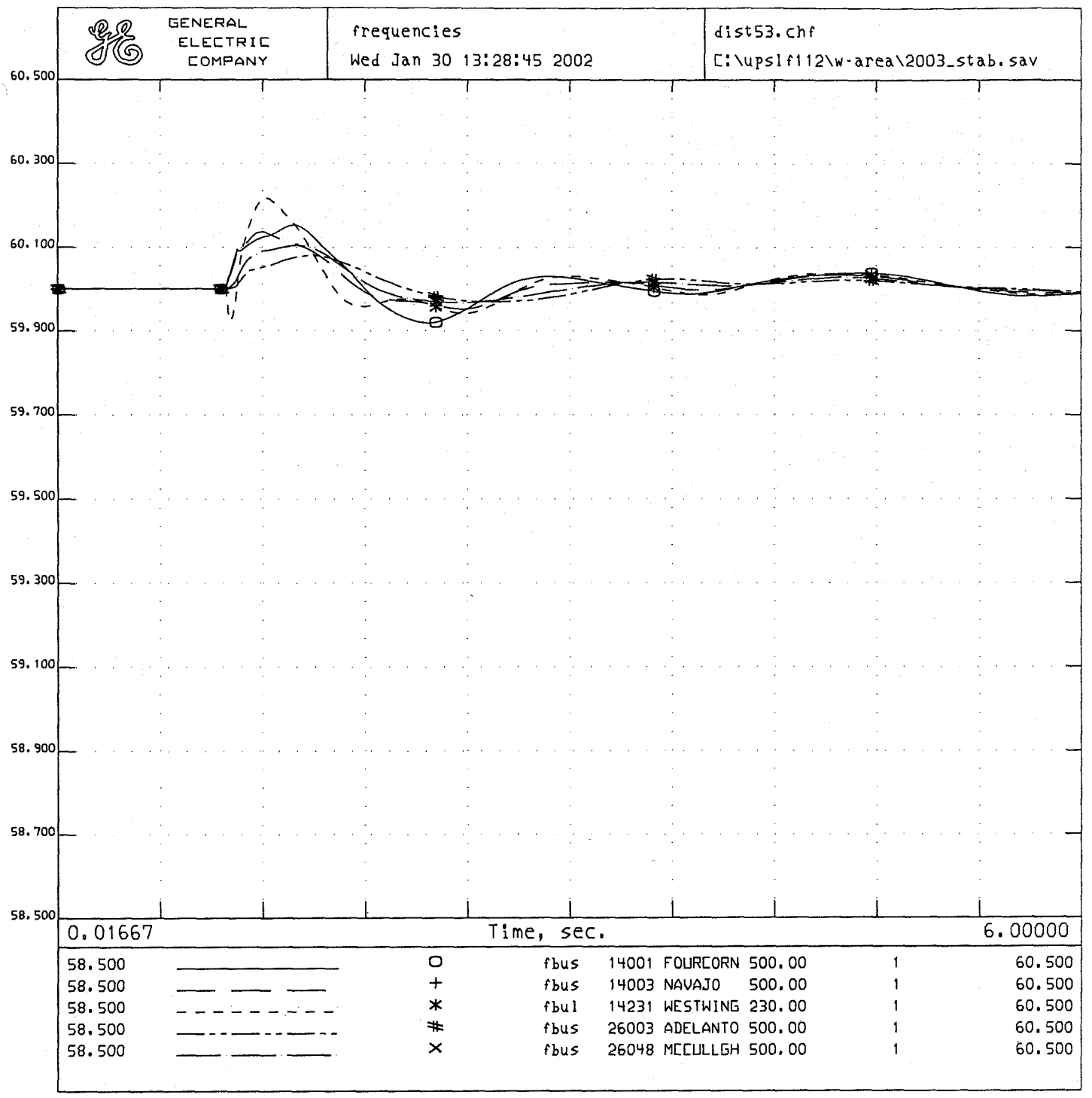
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S

PV-NGILA STAB; jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-NG;8C REIN;2003.dyd;WSCC.bat



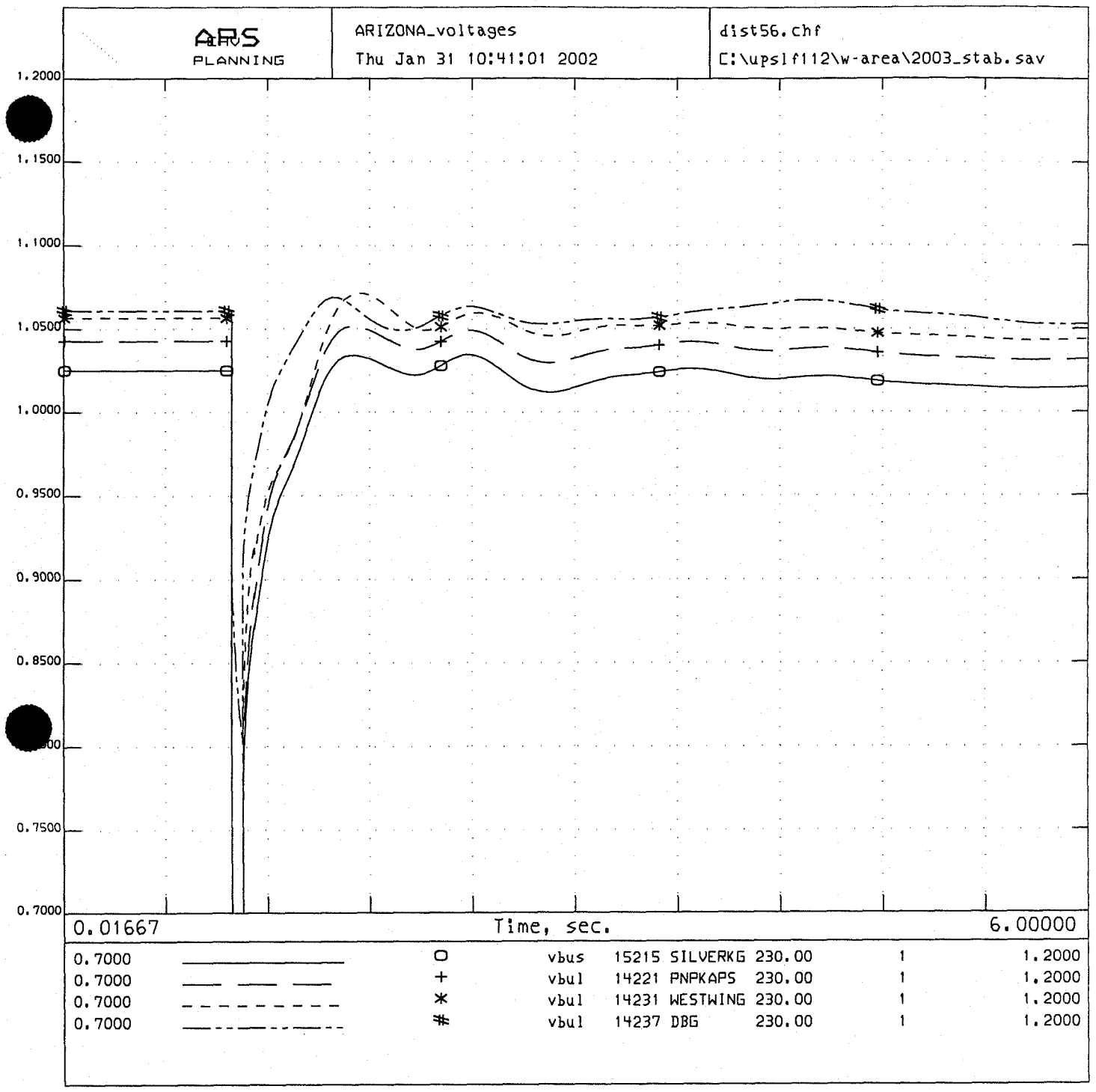
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S

PV-NGILA STAB; jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-NG;8C REIN;2003.dyd;WSCC.bat

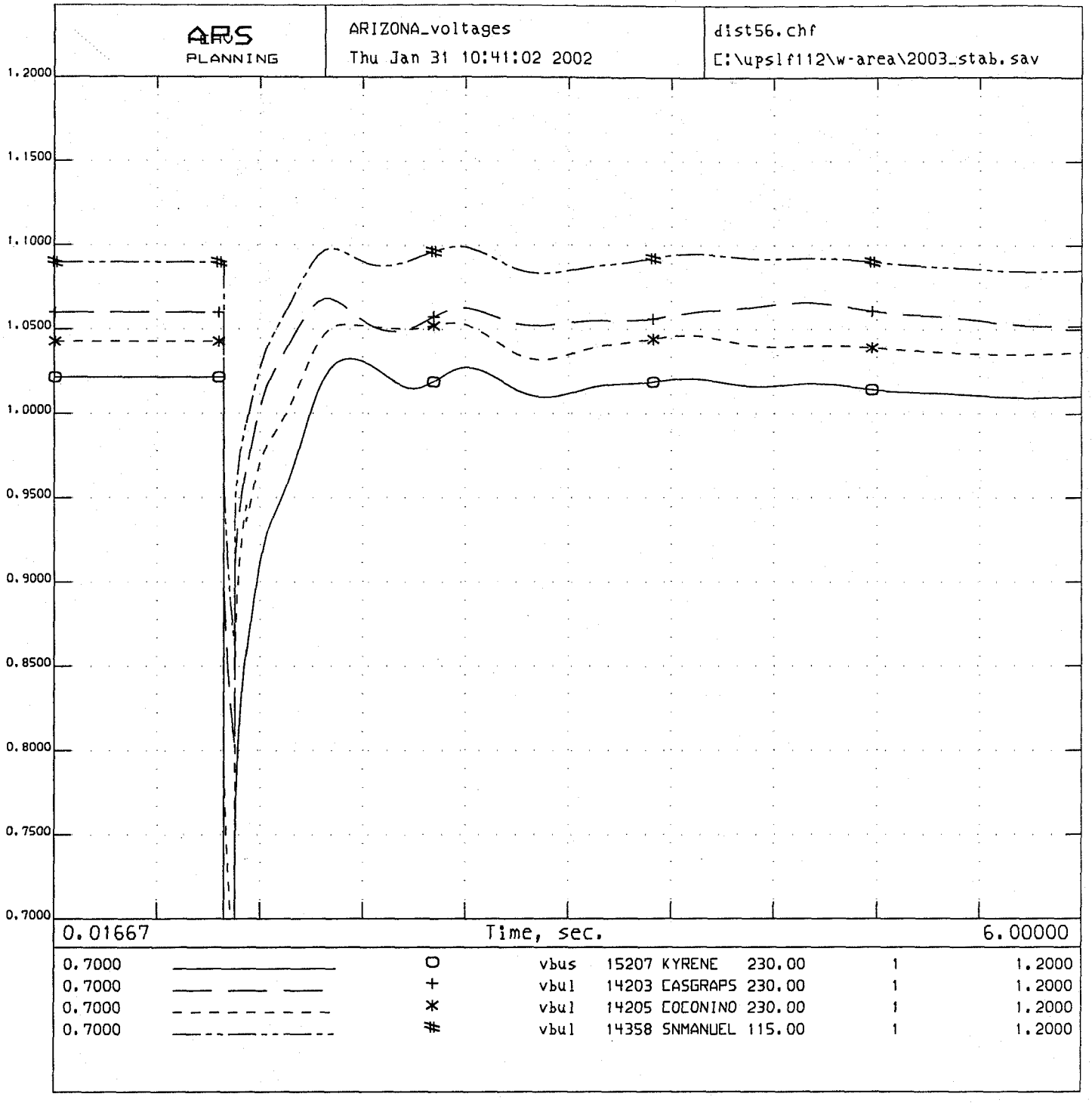


WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S

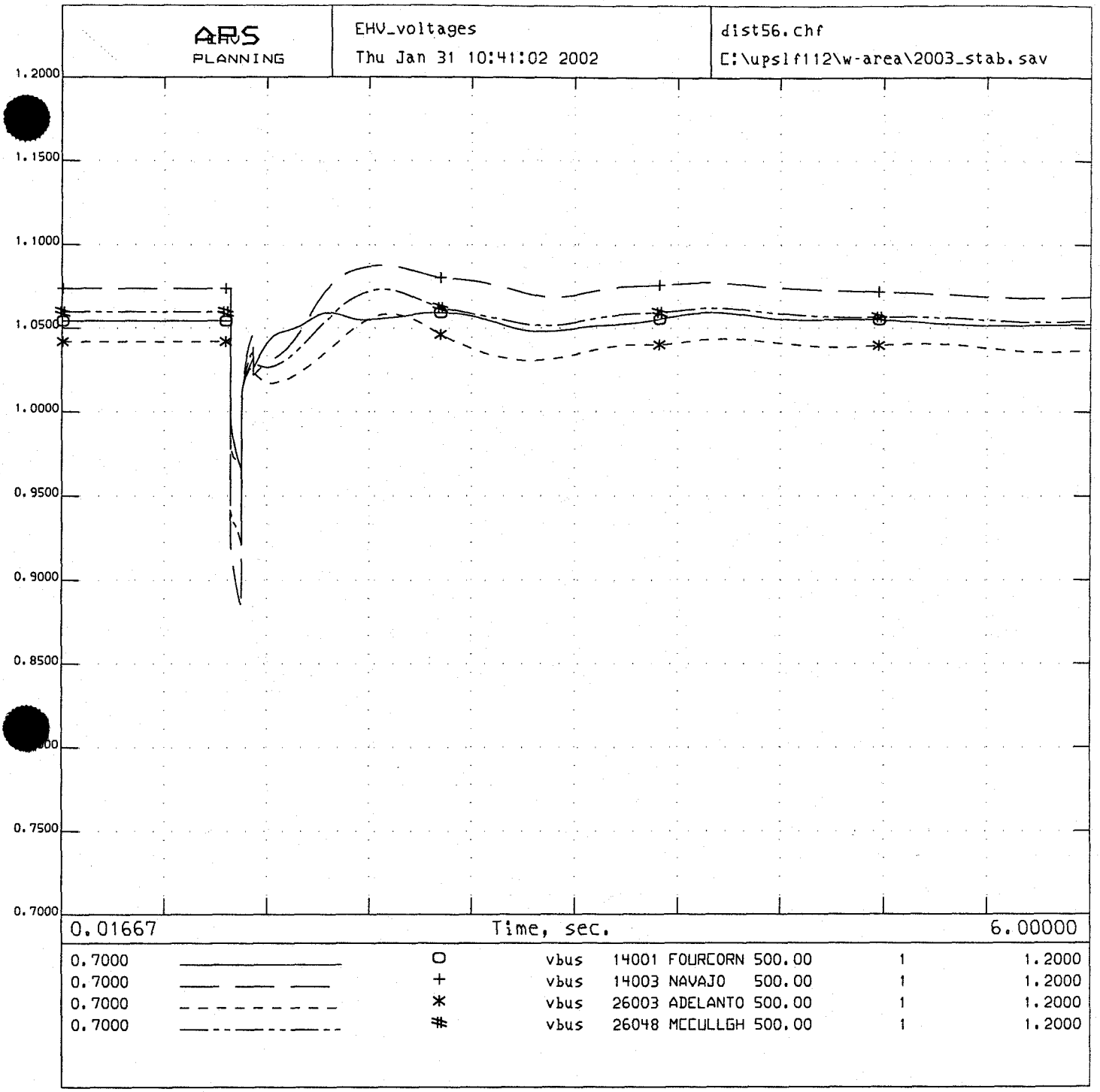
PV-NGILA STAB; jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-NG;8C REIN;2003.dyd;WSCC.bat



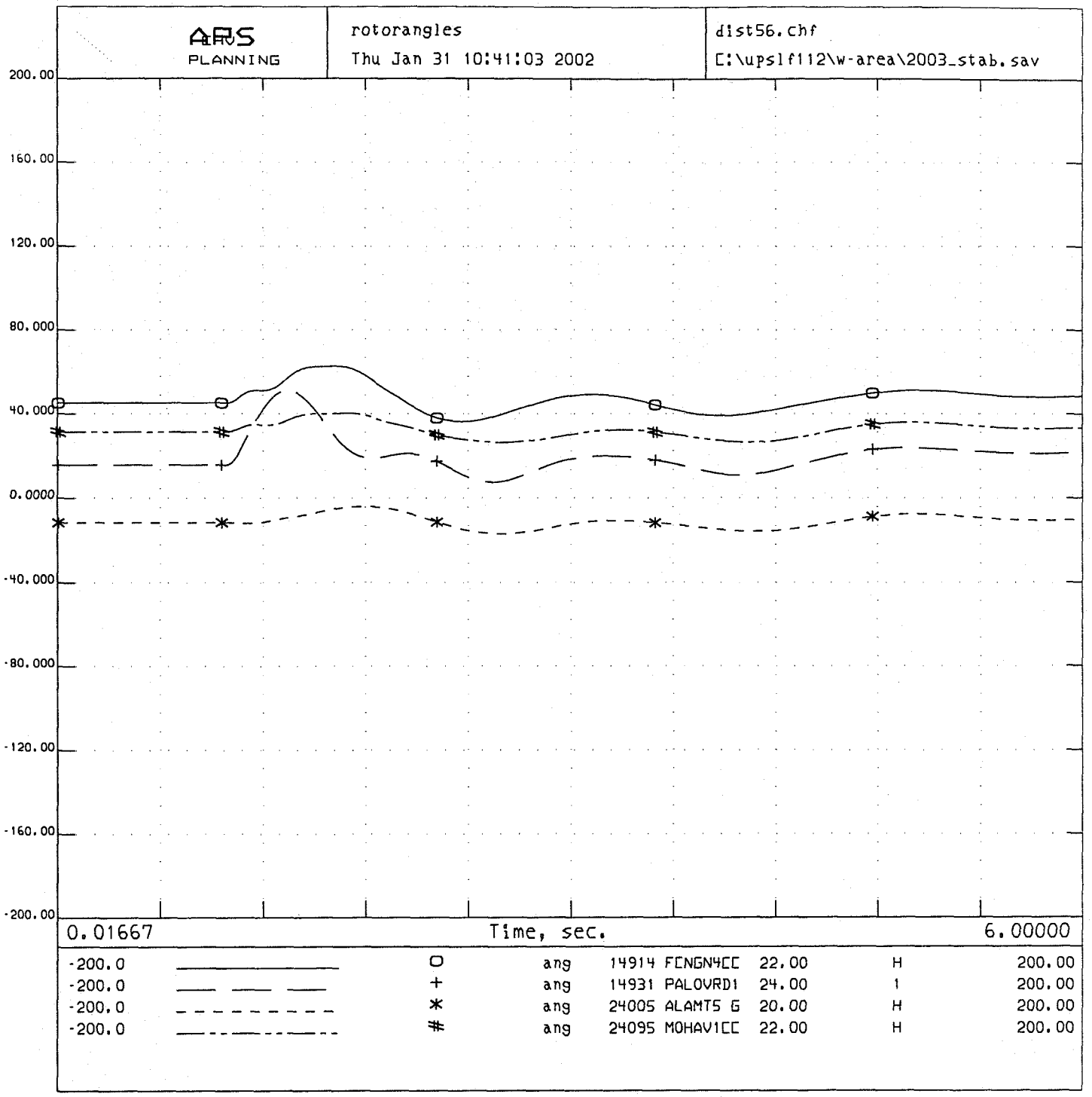
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S
PALO VERDE FLT PV-ESTR LINE OUT
PV-ESTR STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-ES;8C REIN;2003.dyd;WSCC.bpt



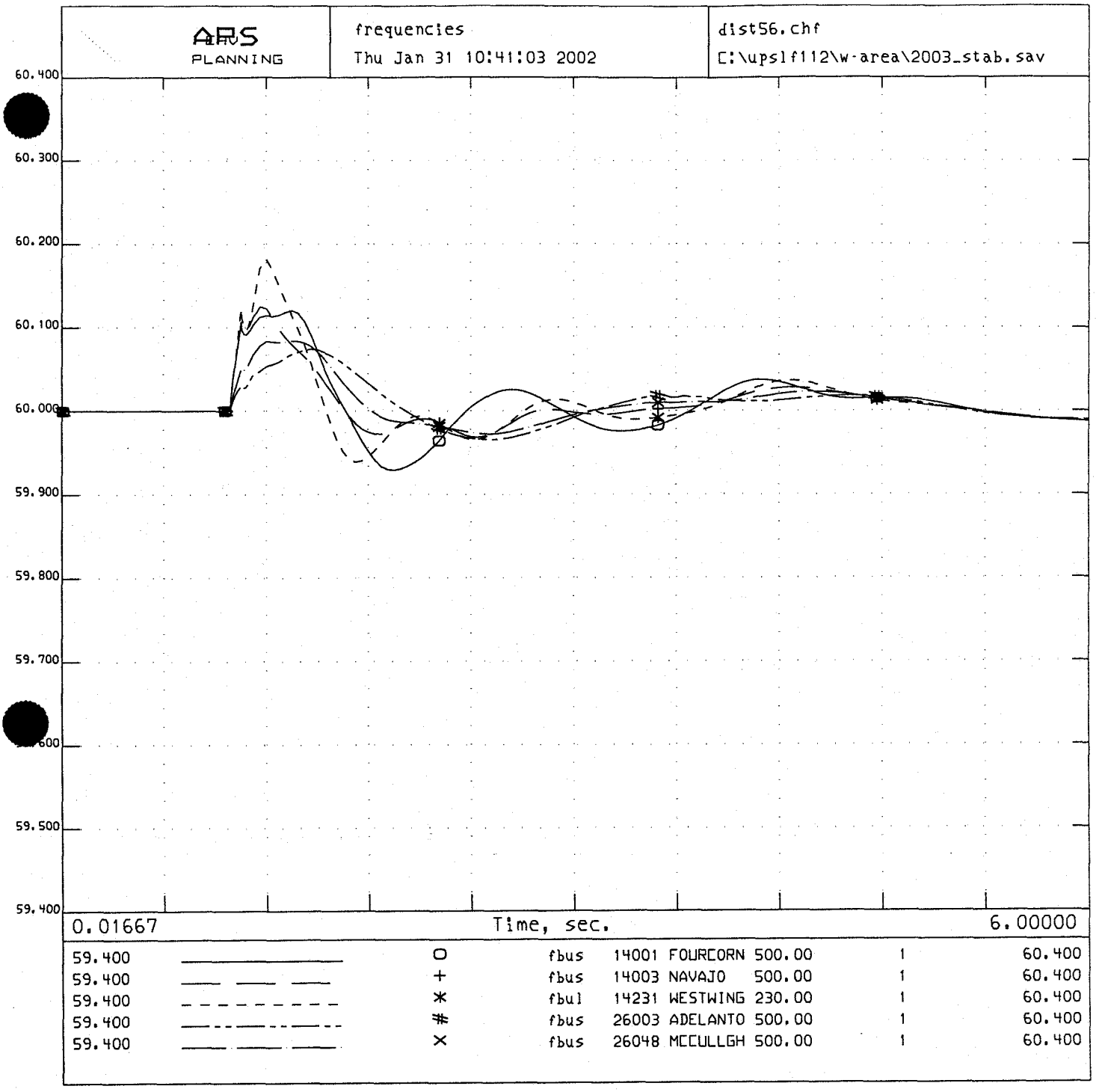
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S
PALO VERDE FLT PV-ESTR LINE OUT
PV-ESTR STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-ES;8C REIN;2003.dyd;WSCC.bpt



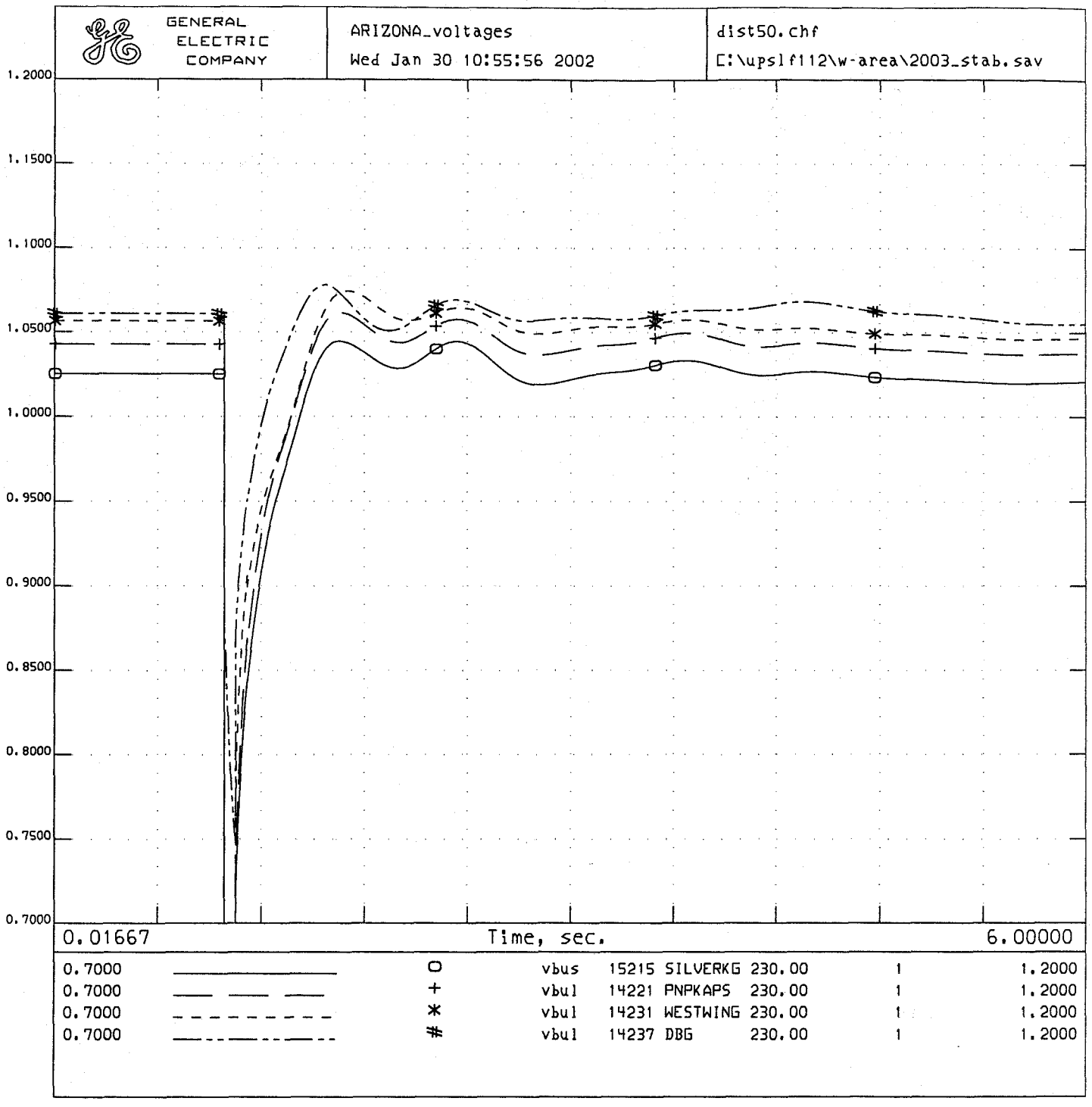
WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S
PALO VERDE FLT PV-ESTR LINE OUT
PV-ESTR STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-ES;8C REIN;2003.dyd;WSCC.bpt



WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S
PALO VERDE FLT PV-ESTR LINE OUT
PV-ESTR STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-ES;8C REIN;2003.dyd;WSCC.bpt

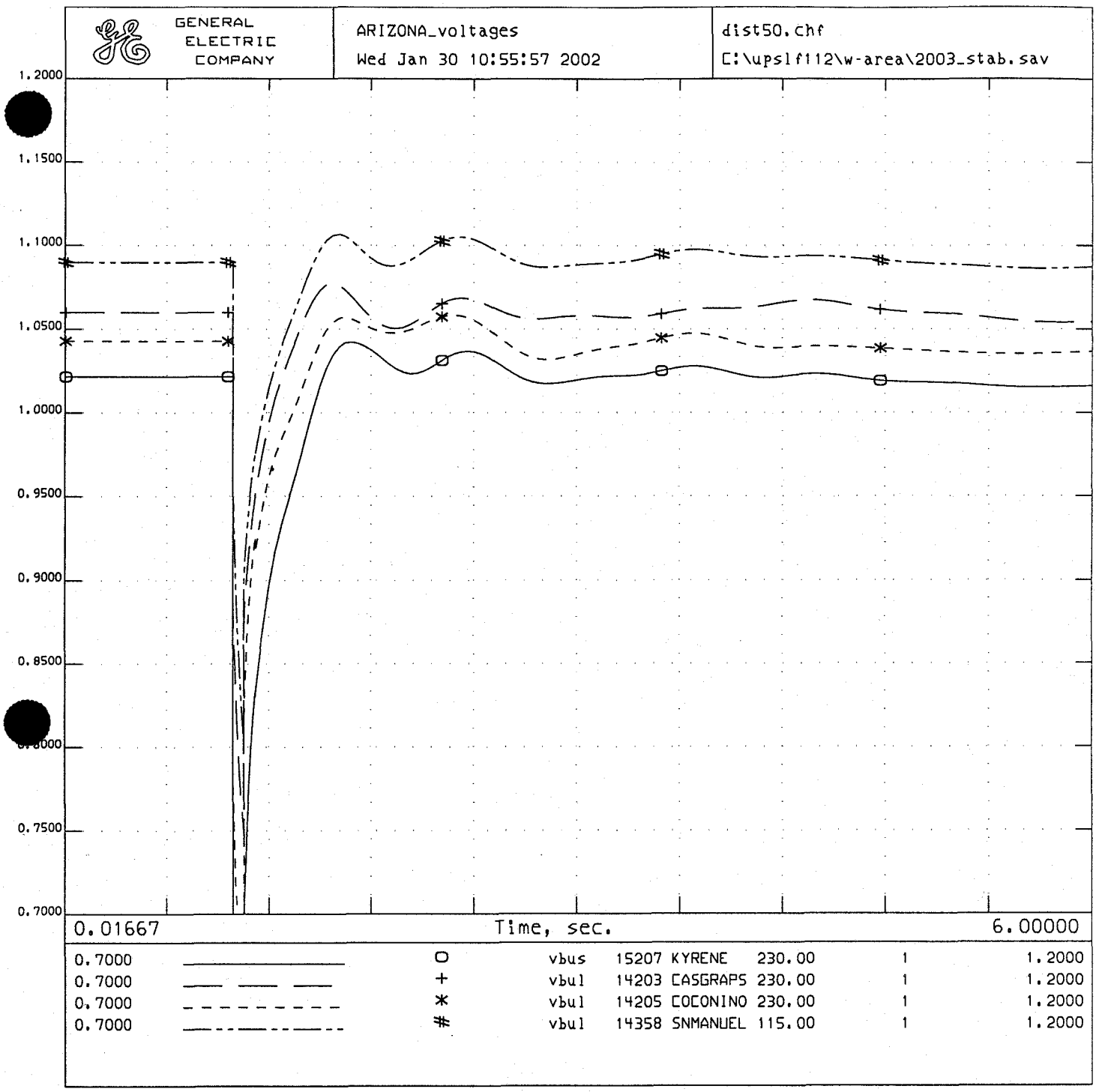


WESTERN SYSTEMS COORDINATING COUNCIL
2003 HS3S
PALO VERDE FLT PV-ESTR LINE OUT
PV-ESTR STAB #1; 01/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-ES;8C REIN;2003.dyd;WSCC.bpt



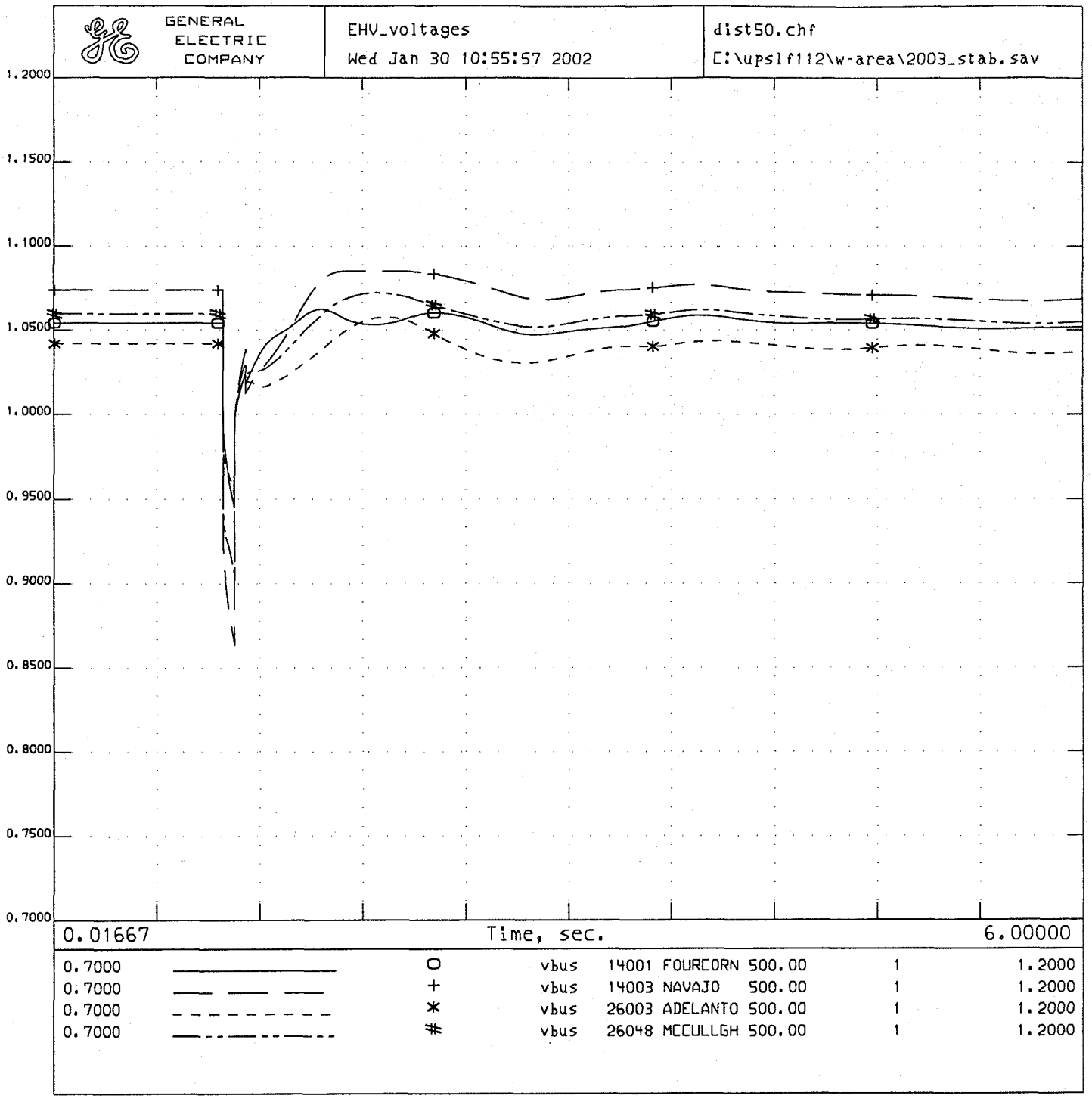
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT w/PV-WW line out

PV-WWG STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-WW;8C REIN;2003.dyd;WSCC.bat



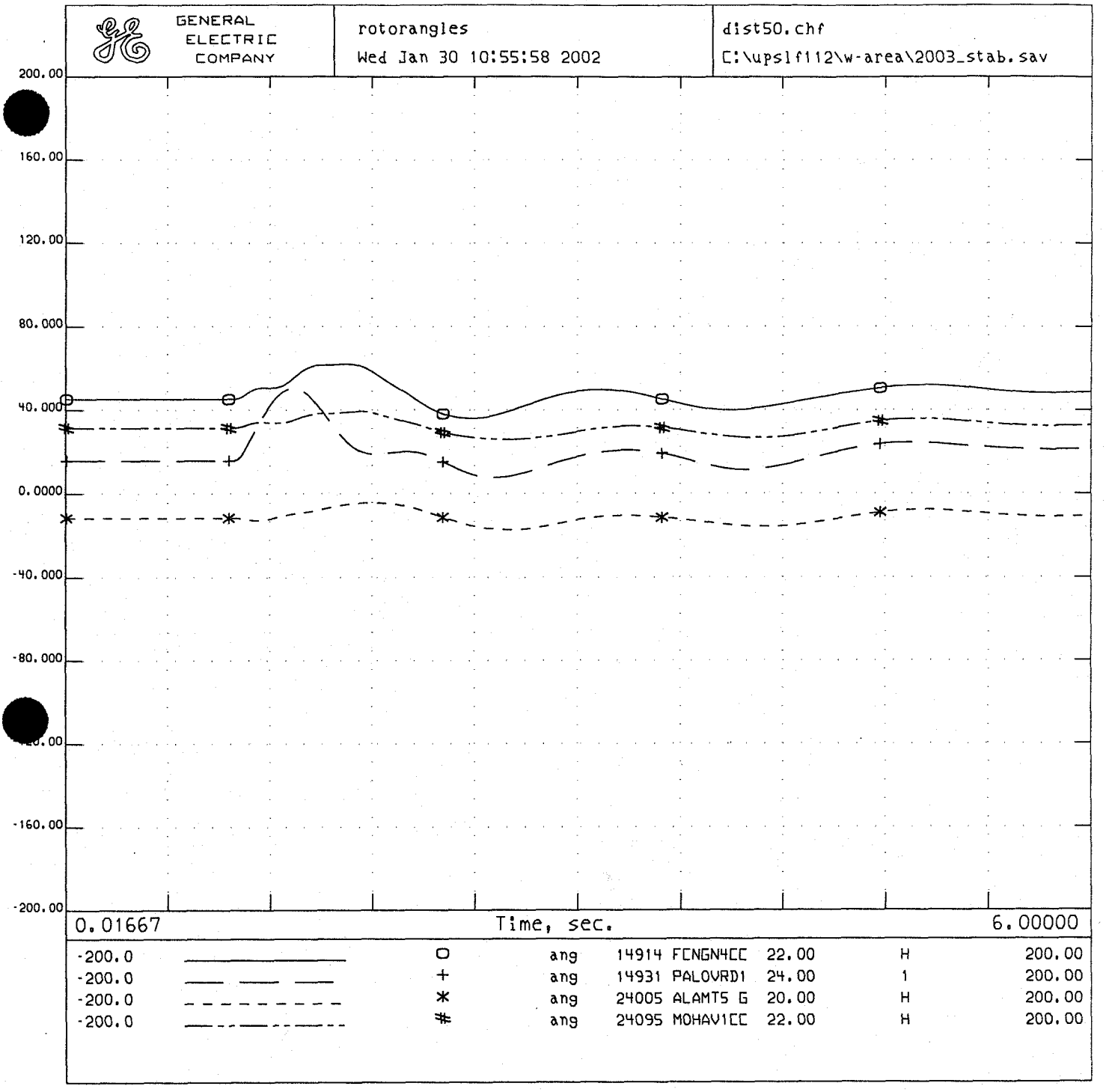
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT w/PV-WW line out

PV-WWG STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-WW;8C REIN;2003.dyd;WSCC.bat



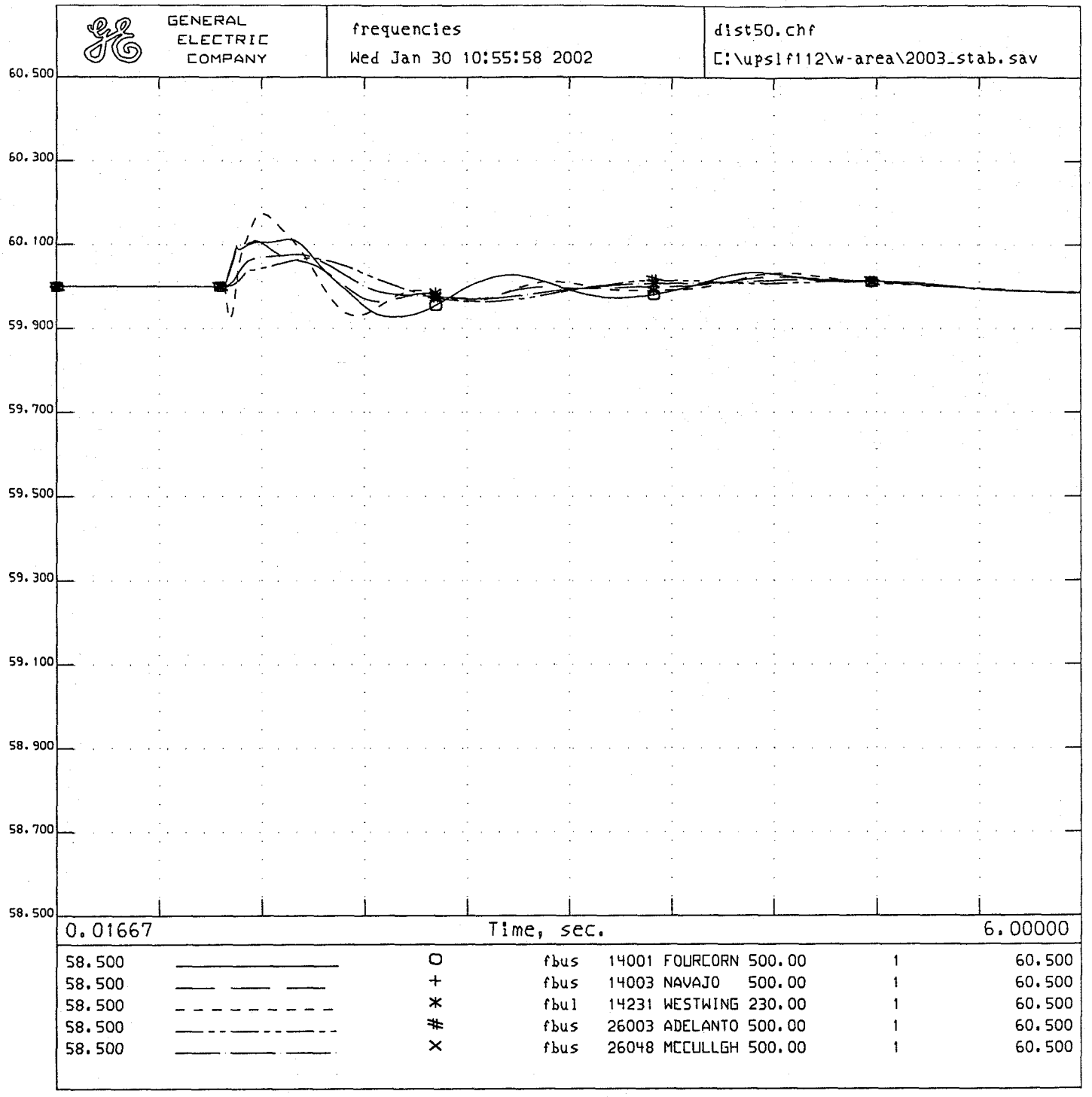
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT w/PV-WW line out

PV-WWG STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-WW;8C REIN;2003.dyd;WSCC.bat



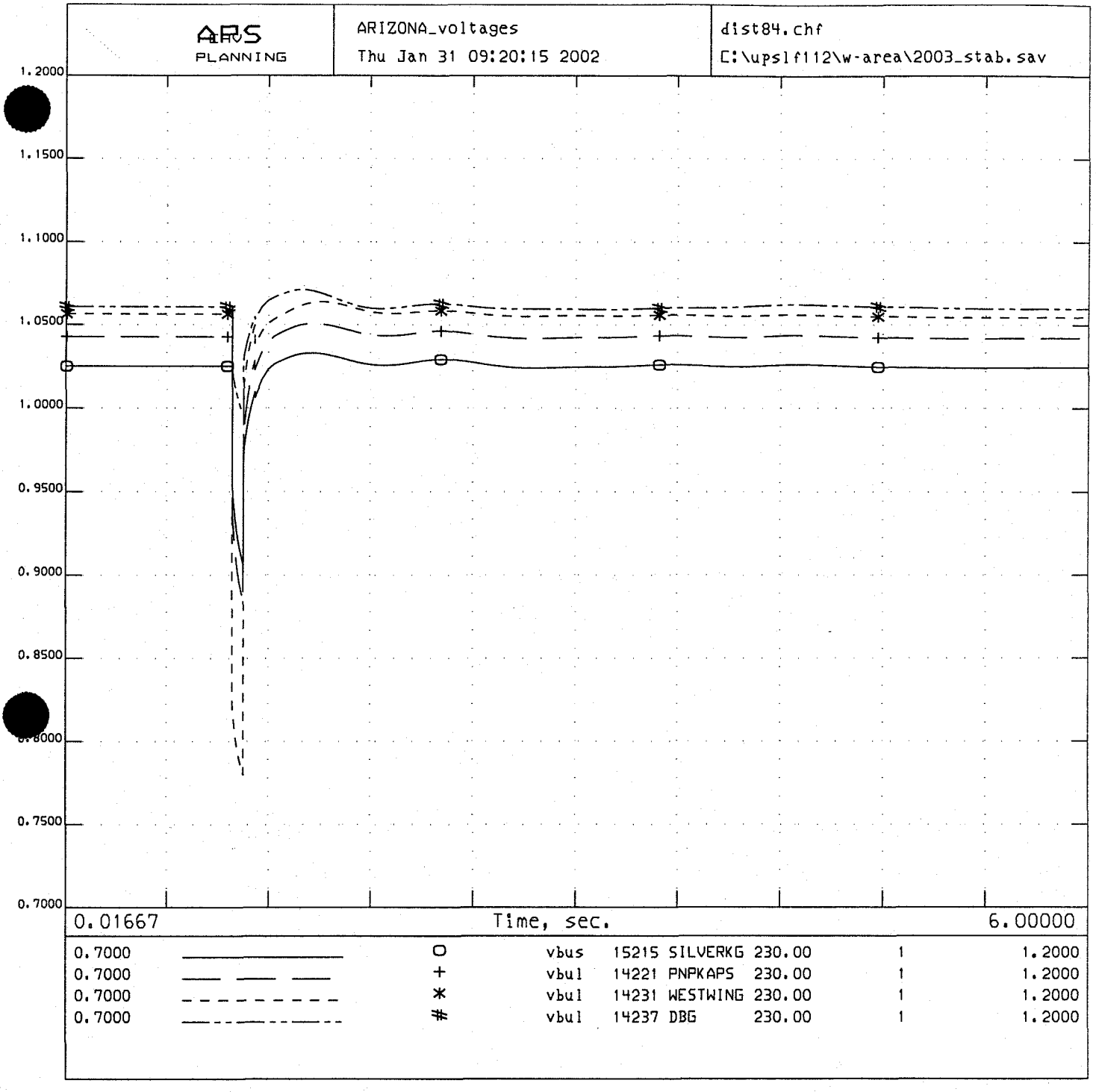
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT w/PV-WW line out

PV-WWG STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-WW;8C REIN;2003.dyd;WSCC.bat



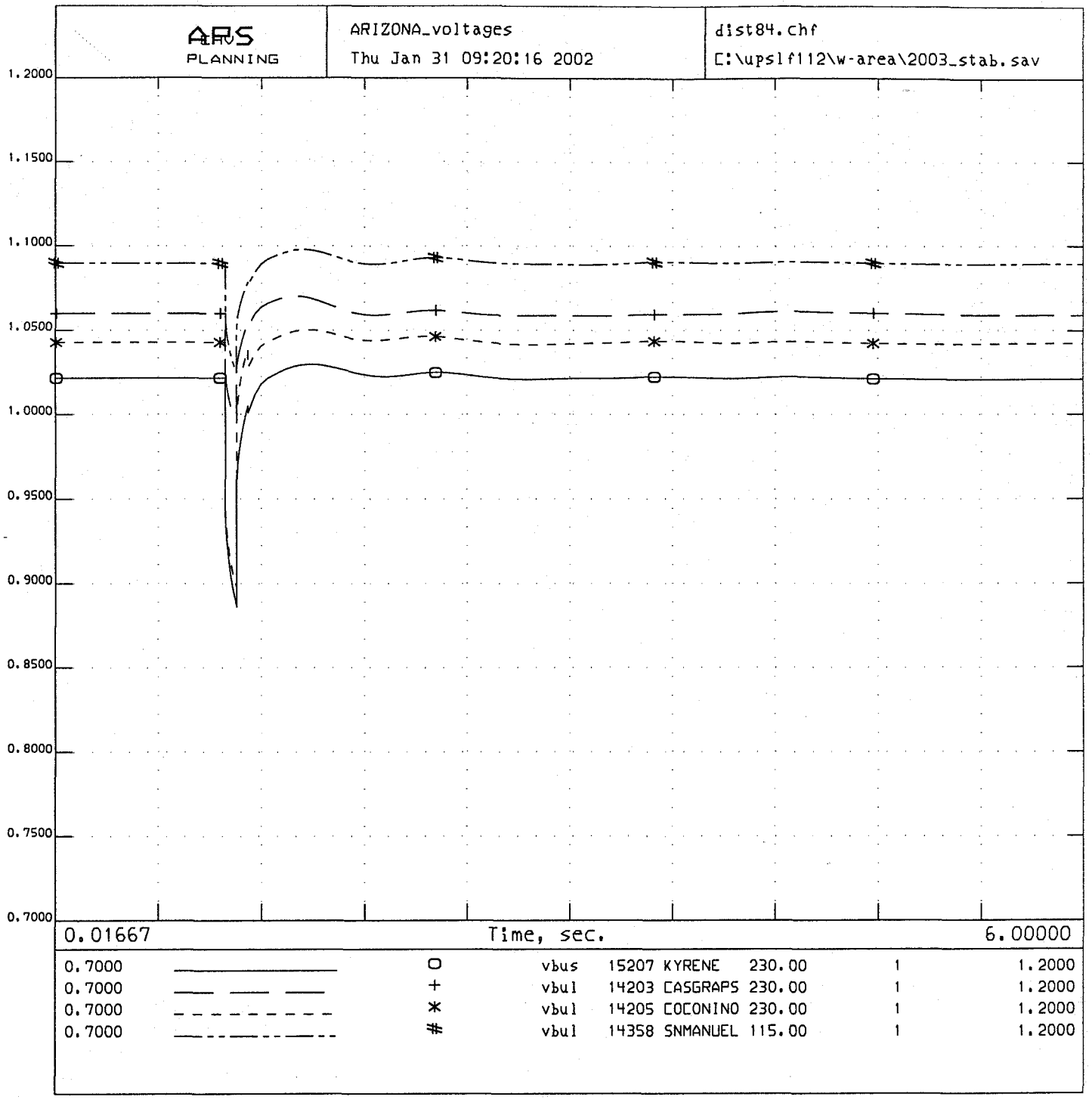
WESTERN SYSTEMS COORDINATING COUNCIL
PV FLT w/PV-WW line out

PV-WWG STAB; Jan/2002; T=0 3P FLT PV500;10% FLT DMPING;FLSH CAPS
NAV-MKP/MKP-YAV,PV-DV/NG;4C CLR FLT W/PV-WW;8C REIN;2003.dyd;WSCC.bat



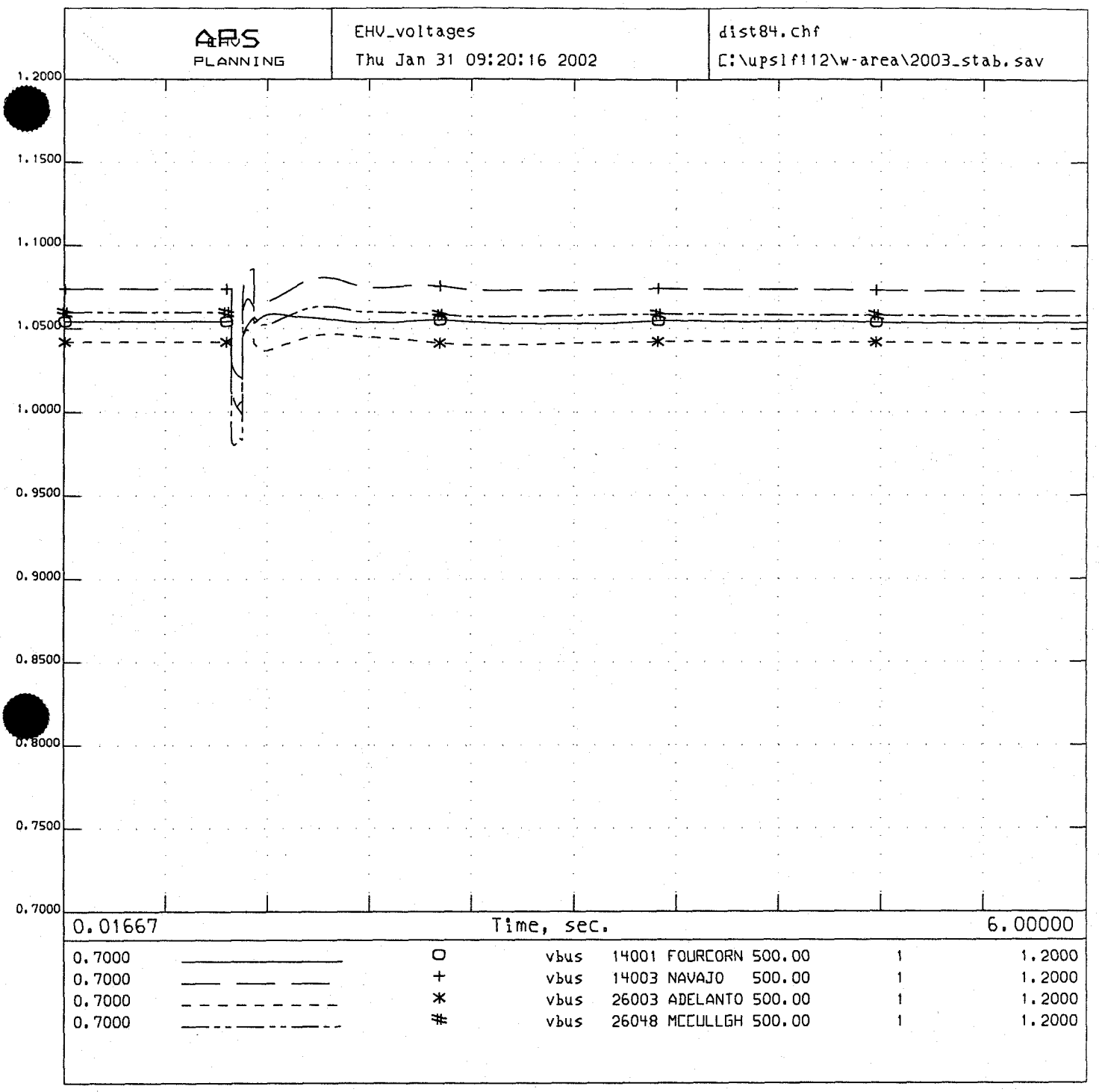
PERKINS FLT PERKINS-MEAD LINE OUT
2003 HS3S

PERK-MEAD STAB; 01/2002; T=0 3P FLT PERK500;FLSH CAPS MKP-YAV/YAV-WWG,
NAV-MKP/WWG;4C CLR FLT W/PERK-MEAD;8C REIN;2003.dyd;WSCC.bat



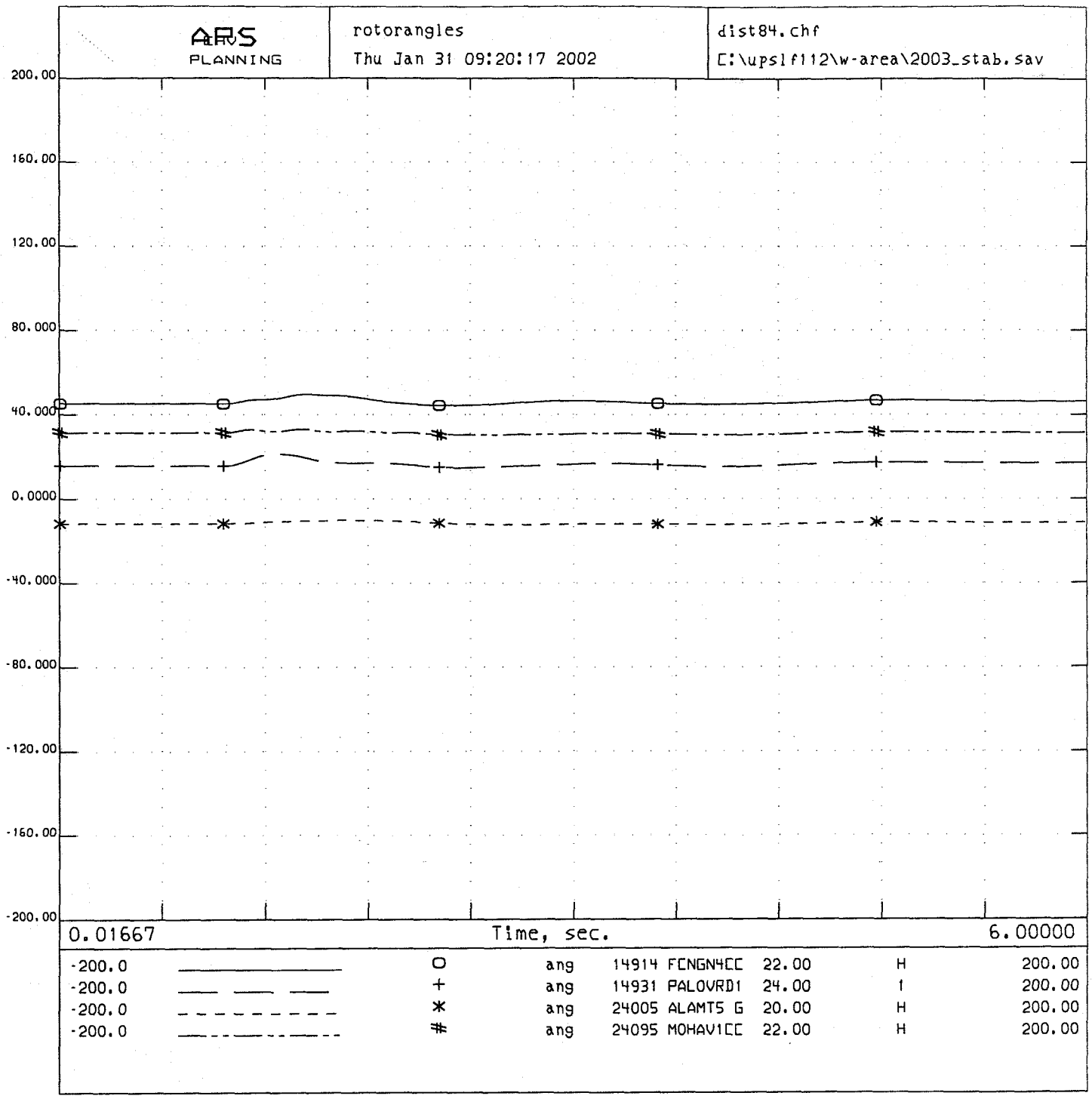
PERKINS FLT PERKINS-MEAD LINE OUT
2003 HS3S

PERK-MEAD STAB; 01/2002; T=0 3P FLT PERK500;FLSH CAPS MKP-YAV/YAV-WWG,
NAV-MKP/WWG;4C CLR FLT W/PERK-MEAD;8C REIN;2003.dyd;WSCC.bat



PERKINS FLT PERKINS-MEAD LINE OUT
2003 HS3S

PERK-MEAD STAB; 01/2002; T=0 3P FLT PERK500;FLSH CAPS MKP-YAV/YAV-WWG,
NAV-MKP/WWG;4C CLR FLT W/PERK-MEAD;8C REIN;2003.dyd;WSCC.bat



PERKINS FLT PERKINS-MEAD LINE OUT
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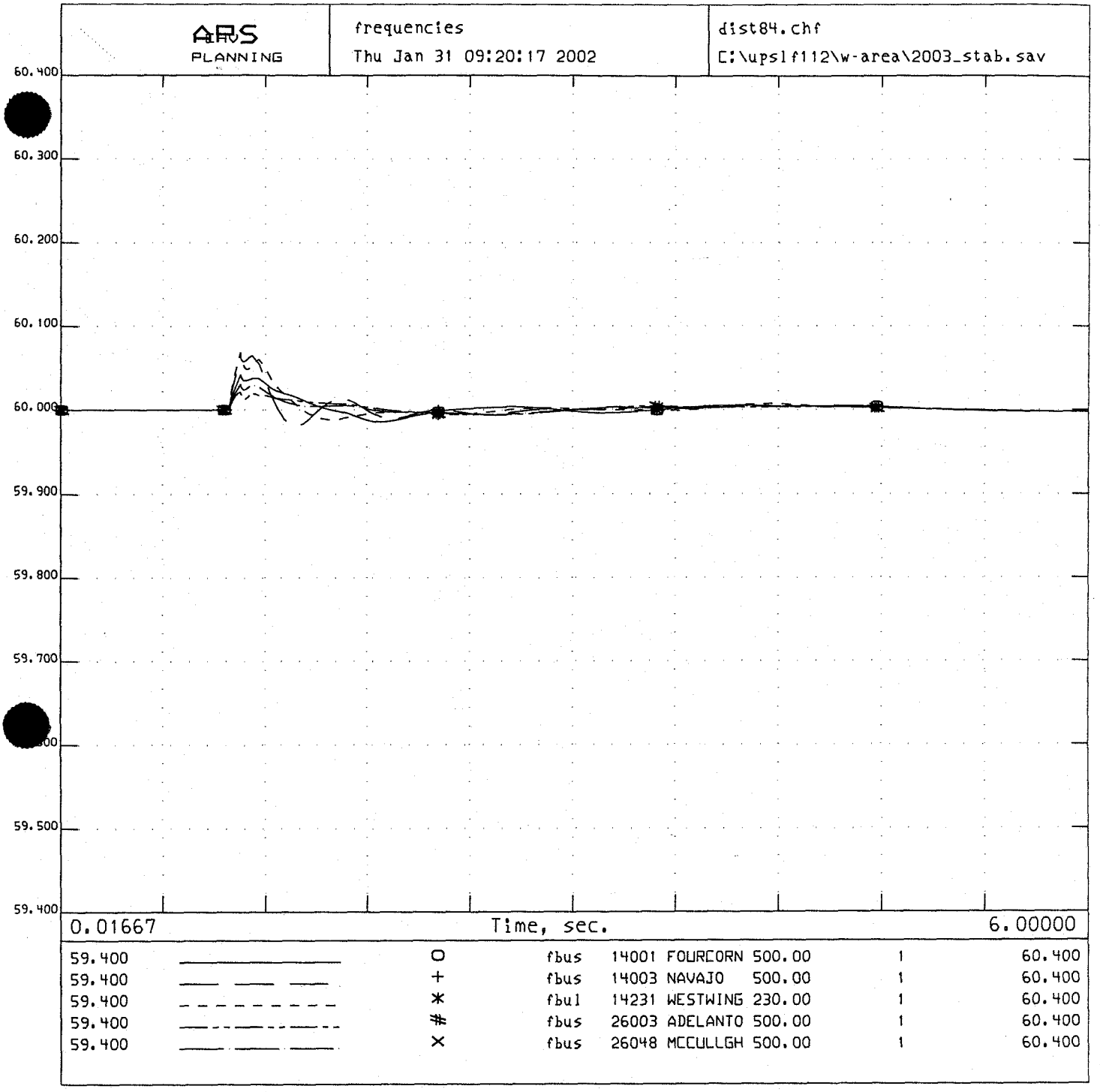

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