

U.S. DEPARTMENT OF ENERGY

OFFICE OF TRANSPORTATION

ELECTRIC VEHICLE OPERATION PROGRAM

PERFORMANCE COMPARISON

OF

**SOUTHERN CALIFORNIA EDISON ELECTRIC
FLEET VEHICLE**

WITH

LEAD ACID AND NICKEL METAL HYDRIDE BATTERIES

ELECTRIC VEHICLE PERFORMANCE CHARACTERIZATION SUMMARY



An EDISON INTERNATIONAL Company

ELECTRIC TRANSPORTATION DIVISION

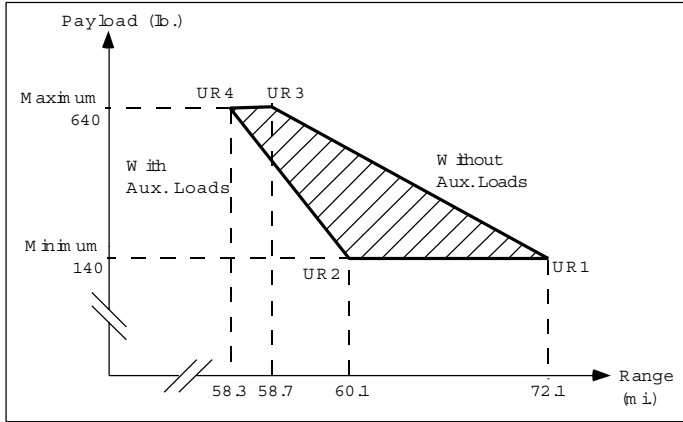
FORD RANGER EV

LEAD ACID BATTERIES

MARCH 1998

Urban Range

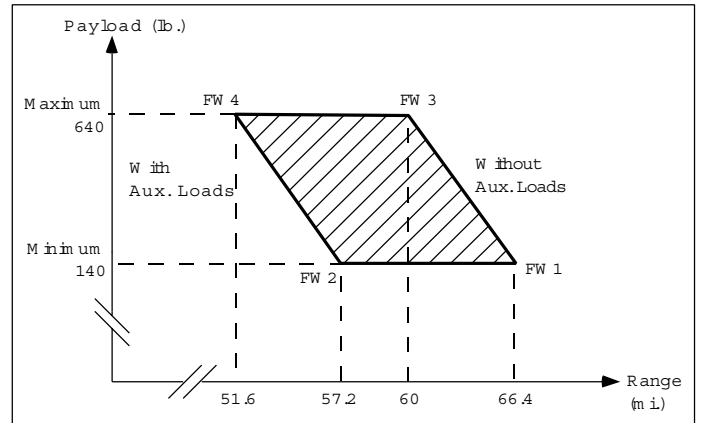
(On Urban Pomona Loop – see other side for map)



Test	UR1	UR2	UR3	UR4
Paylad (lb.)	140	140	640	640
AC kWh Recharge	29.11	28.16	28.20	28.23
AC kWh/mi	0.40	0.47	0.48	0.48
Range (mi)	72.1	60.1	58.7	58.3
Avg. Ambient Temp.	79°F	61°F	69°F	64°F

Freeway Range

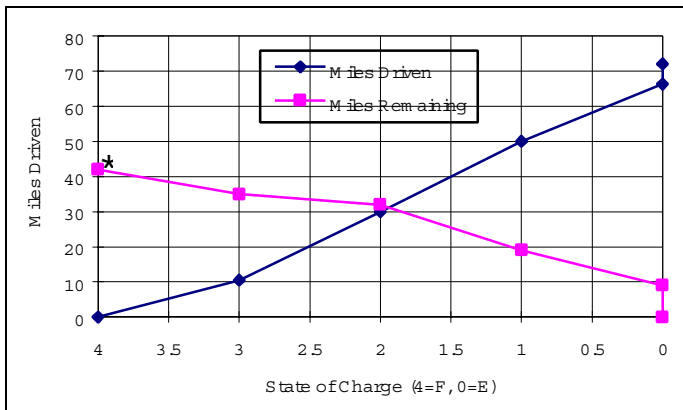
(On Freeway Pomona Loop – see other side for map)



Test	FW 1	FW 2	FW 3	FW 4
Paylad (lb.)	140	140	960	960
AC kWh Recharge	26.31	26.24	25.97	25.62
AC kWh/mi	0.40	0.46	0.43	0.50
Range (mi)	66.4	57.2	60	51.6
Avg. Ambient Temp.	70°F	64°F	69°F	63°F

State of Charge Meter

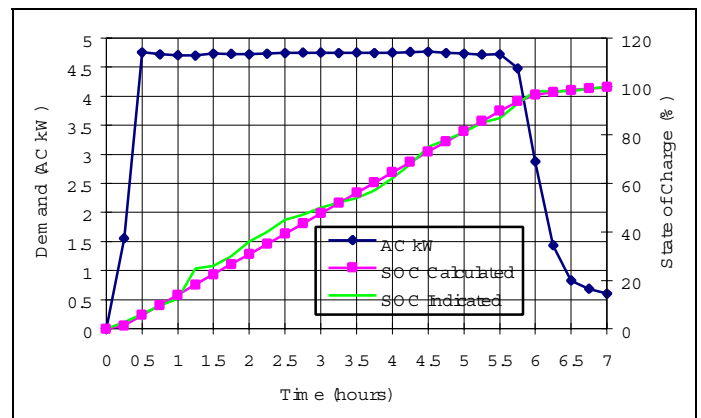
(Urban Range Test)



* Initial "Miles Remaining" depend on driving economy before recharge



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	201.4 V
Current	24.22 A
Real Power	4.859 kW
Reactive Power	379.4 VAR
Apparent Power	4.876 kVA
Total Power Factor	1.00 PF
Displacement Power Factor	1.00 dPF
Voltage THD	0.4%
Current THD	2.6%

ELECTRIC VEHICLE PERFORMANCE CHARACTERIZATION SUMMARY



An EDISON INTERNATIONAL Company

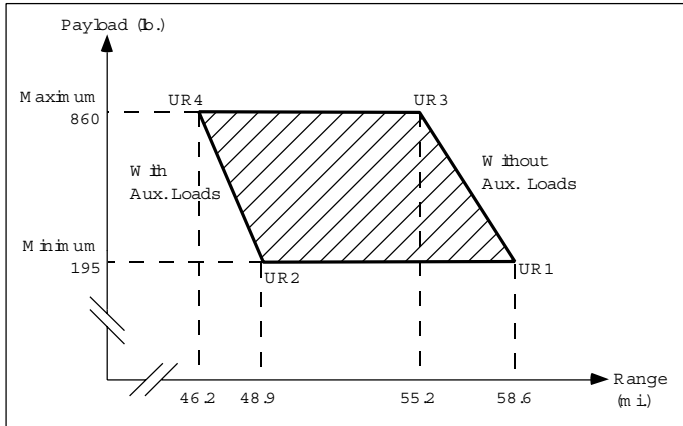
ELECTRIC TRANSPORTATION DIVISION

CHRYSLER EPIC
LEAD ACID BATTERIES

JUNE 1997

Urban Range

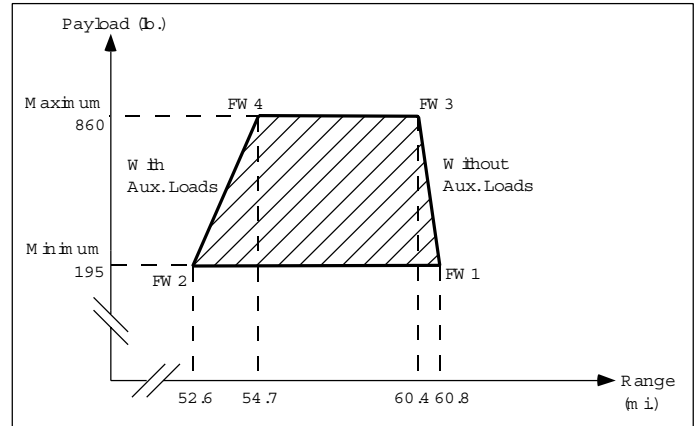
(On Urban Pomona Loop – see other side for map)



Test	UR1	UR2	UR3	UR4
Paybad (lb.)	195	195	860	860
AC kWh Recharge	34.45	33.80	35.47	33.11
AC kWh/mi	0.59	0.69	0.64	0.72
Range (mi)	58.6	48.9	55.2	46.2
Avg. Ambient Temp.	75°F	73°F	72°F	71°F

Freeway Range

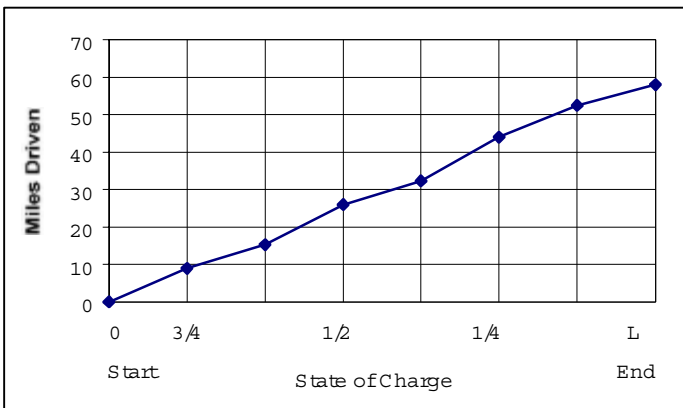
(On Freeway Pomona Loop – see other side for map)



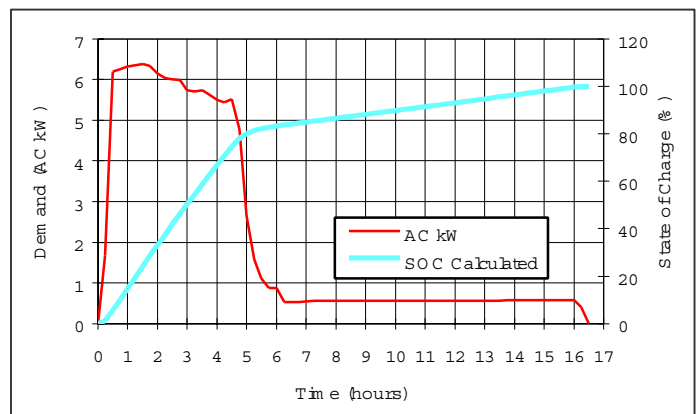
Test	FW 1	FW 2	FW 3	FW 4
Paybad (lb.)	195	195	860	860
AC kWh Recharge	31.43	32.56	33.35	35.39
AC kWh/mi	0.52	0.62	0.55	0.65
Range (mi)	60.8	52.6	60.4	54.7
Avg. Ambient Temp.	81°F	83°F	79°F	77°F

State of Charge Meter

(Urban Range Test)



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	202.6
Current	30.54 A
Real Power	6.159 kW
Reactive Power	-424.2 VAR
Apparent Power	6.190 kVA
Total Power Factor	1.00 PF
Displacement Power Factor	1.00 dPF
Voltage THD	0.5 %
Current THD	6.1 %

ELECTRIC VEHICLE PERFORMANCE CHARACTERIZATION SUMMARY



An EDISON INTERNATIONAL Company

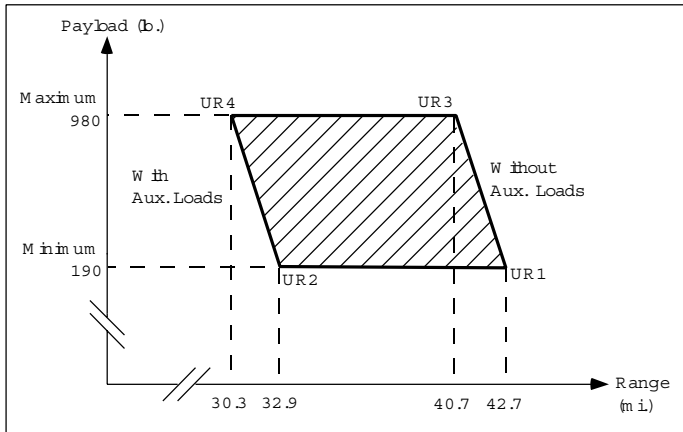
ELECTRIC TRANSPORTATION DIVISION

CHEVROLET S-10 ELECTRIC LEAD ACID BATTERIES

SEPTEMBER 1997

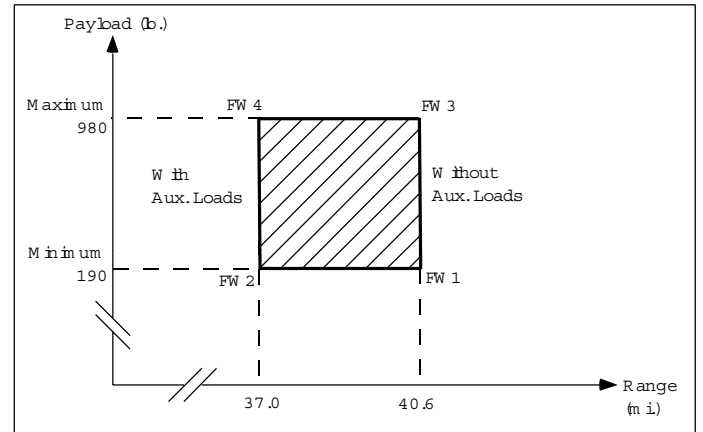
Urban Range

(On Urban Pomona Loop - see other side for map)



Test	UR1	UR2	UR3	UR4
Payload (lb.)	190	190	980	980
AC kWh Recharge	16.93	17.59	19.21	20.24
AC kWh/mi	0.396	0.535	0.472	0.668
Range (mi)	42.7	32.9	40.7	30.3
Avg. Ambient Temp.	77°F	91°F	89°F	90°F

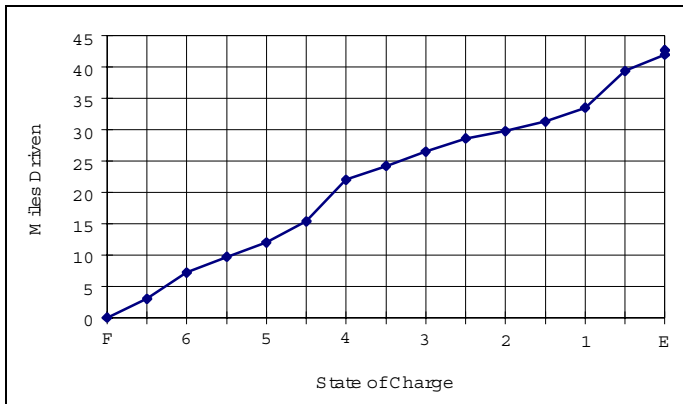
(On Freeway Pomona Loop - see other side for map)



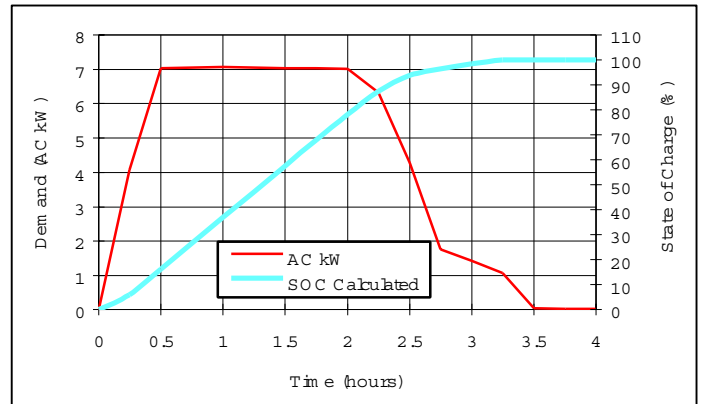
Test	FW 1	FW 2	FW 3	FW 4
Payload (lb.)	190	190	980	980
AC kWh Recharge	19.29	15.80	16.38	16.02
AC kWh/mi	0.475	0.427	0.403	0.433
Range (mi)	40.6	37.0	40.6	37.0
Avg. Ambient Temp.	92°F	87°F	83°F	82°F

State of Charge Meter

(Urban Range Test)



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	232.3 V
Current	21.71 A
Real Power	5.013 kW
Reactive Power	-481.7 VAR
Apparent Power	5.045 kVA
Total Power Factor	0.99 PF
Displacement Power Factor	1.00 dPF
Voltage THD	0.4%
Current THD	4.8%

ELECTRIC VEHICLE PERFORMANCE CHARACTERIZATION SUMMARY



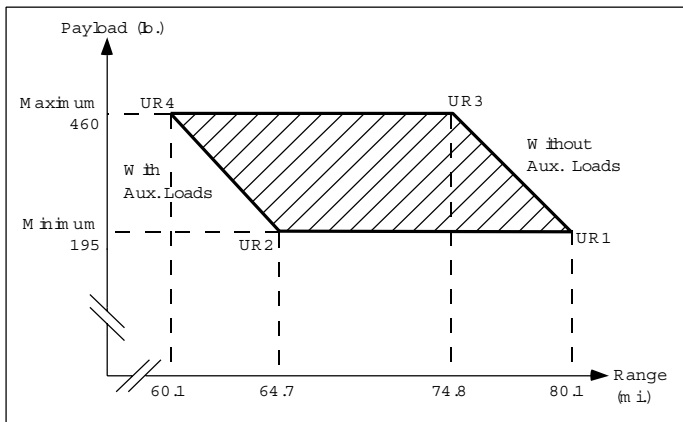
EDISON
An EDISON INTERNATIONAL Company
ELECTRIC TRANSPORTATION DIVISION

GM EV1 LEAD ACID BATTERIES

SEPTEMBER 1997

Urban Range

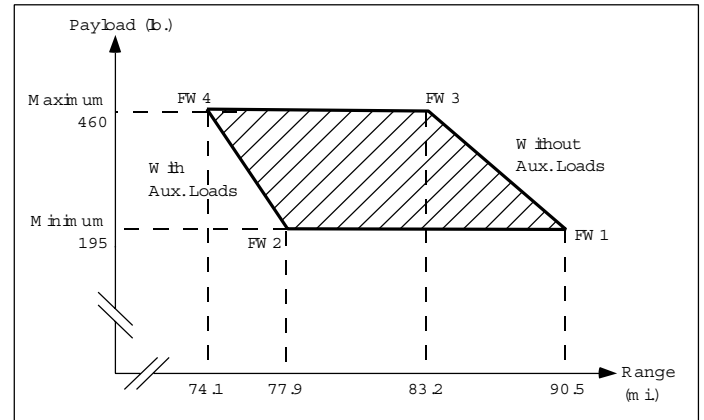
(On Urban Pomona Loop – see other side for map)



Test	UR1	UR2	UR3	UR4
Paylad (lb.)	195	195	460	460
AC kWh Recharge	22.50	19.36	18.34	18.28
AC kWh/mi	0.281	0.299	0.245	0.304
Range (mi)	80.1	64.7	74.8	60.1
Avg. Ambient Temp.	79°F	76°F	73°F	78°F

Freeway Range

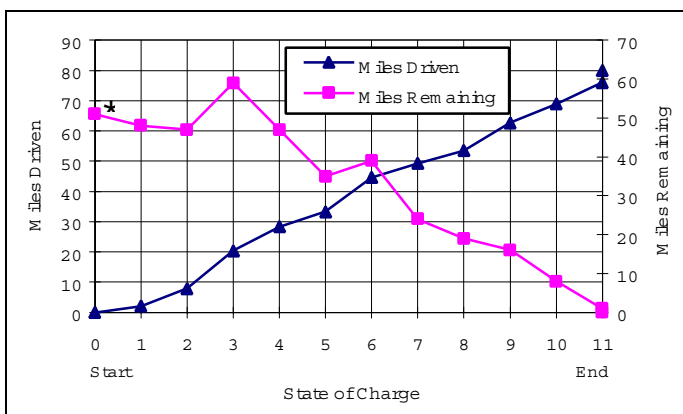
(On Freeway Pomona Loop – see other side for map)



Test	FW 1	FW 2	FW 3	FW 4
Paylad (lb.)	195	195	460	460
AC kWh Recharge	21.68	18.12	20.73	21.57
AC kWh/mi	0.240	0.233	0.25	0.291
Range (mi)	90.5	77.9	83.2	74.1
Avg. Ambient Temp.	80°F	91°F	82°F	82°F

State of Charge Meter

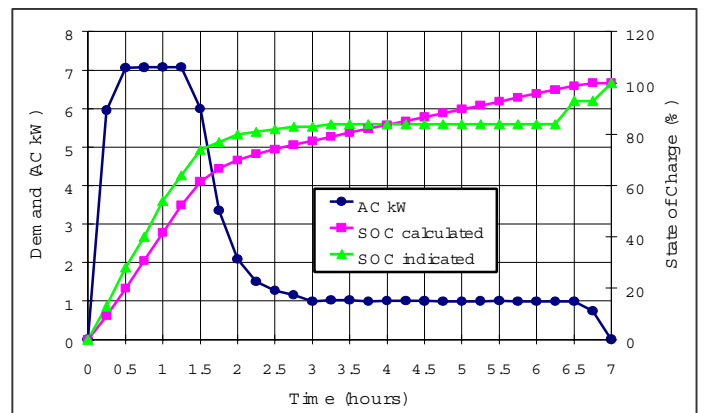
(Urban Range Test)



*Initial "Miles Remaining" depend on driving economy before recharge



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	233.5 V
Current	30.29 A
Real Power	7.019 kW
Reactive Power	840.3 VAR
Apparent Power	7.074 kVA
Total Power Factor	0.99 PF
Displacement Power Factor	0.99 dPF
Voltage THD	0.3 %
Current THD	3.4 %

ELECTRIC VEHICLE PERFORMANCE CHARACTERIZATION SUMMARY



An EDISON INTERNATIONAL Company

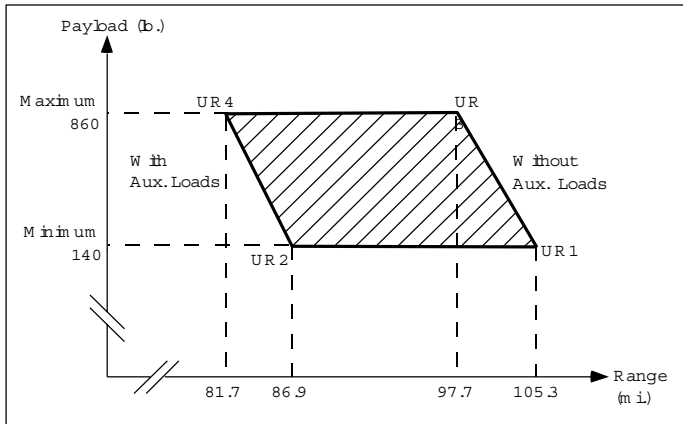
ELECTRIC TRANSPORTATION DIVISION

HONDA EV PLUS
NIMH BATTERIES

SEPTEMBER 1997

Urban Range

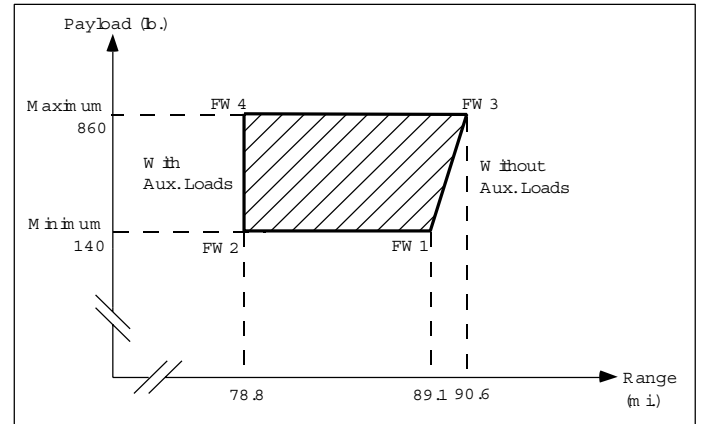
(On Urban Pomona Loop - see other side for map)



Test	UR1	UR2	UR3	UR4
Maximum Payload (lb.)	140	140	860	860
Minimum Payload (lb.)	140	140	860	860
AC kWh Recharge	40	43	40	45
AC kWh/mi	0.38	0.49	0.41	0.55
Range (mi)	105.3	86.9	97.7	81.7
Avg. Ambient Temp.	79°F	83°F	84°F	89°F

Freeway Range

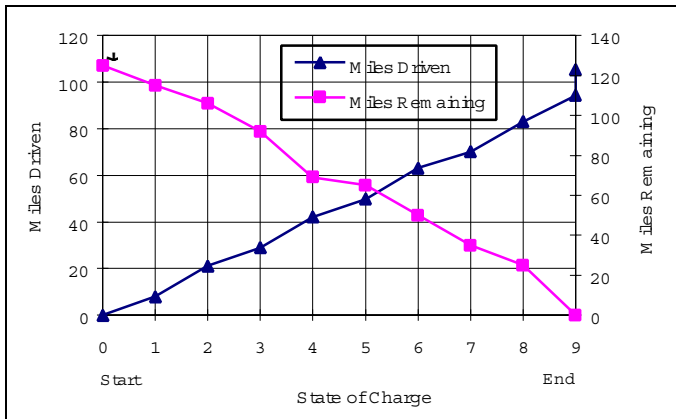
(On Freeway Pomona Loop - see other side for map)



Test	FW1	FW2	FW3	FW4
Maximum Payload (lb.)	140	140	860	860
Minimum Payload (lb.)	140	140	860	860
AC kWh Recharge	40	42	44	44
AC kWh/mi	0.45	0.53	0.49	0.56
Range (mi)	89.1	78.8	90.6	78.8
Avg. Ambient Temp.	84°F	93°F	93°F	83°F

State of Charge Meter

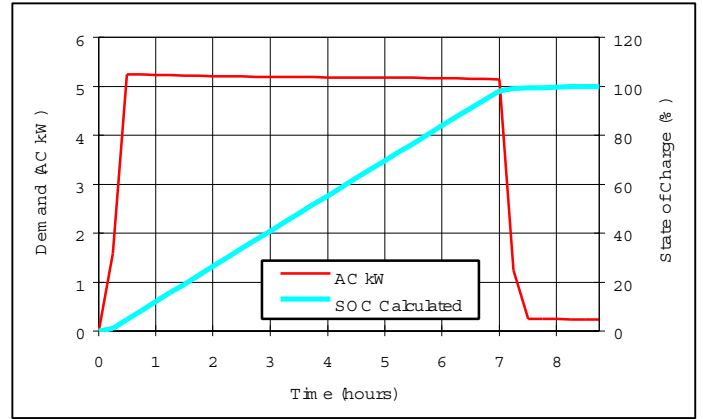
(Urban Range Test)



*Initial "Miles Remaining" depend on driving economy before recharge



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	201.3 V
Current	25.78 A
Real Power	5.117 kW
Reactive Power	-584.1 VAR
Apparent Power	5.19 kVA
Total Power Factor	0.99 PF
Displacement Power Factor	0.99 dPF
Voltage THD	0.60%
Current THD	12.10%

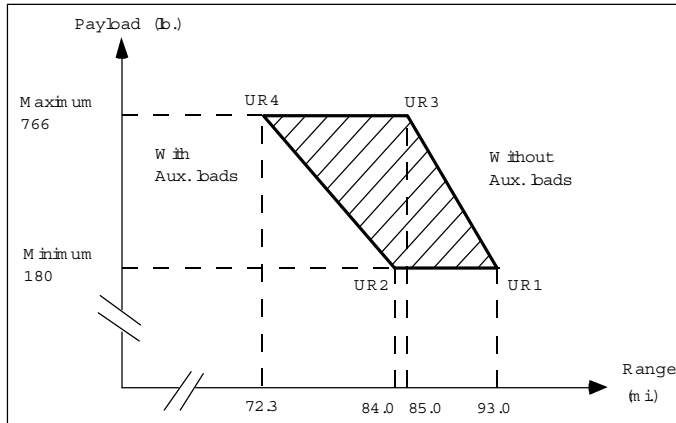
1999 TOYOTA RAV4-EV (CONDUCTIVE) PERFORMANCE CHARACTERIZATION SUMMARY

ELECTRIC TRANSPORTATION DIVISION



Urban Range

(On Urban Pomona Loop – see other side for map)

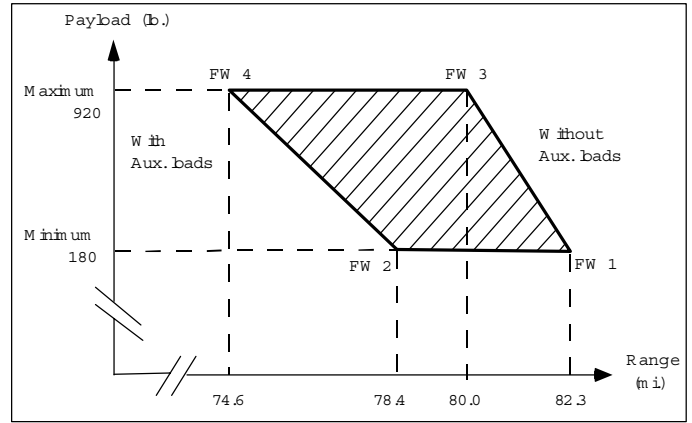


Test	UR1	UR2	UR3	UR4
Payload (lb.)	180	180	766	766
AC kWh Recharge	33.21	31.35	30.28	33.10
AC kWh/mi	0.355	0.369	0.354	0.436
Range (mi)	93.0	84.0	85.0	72.3
Avg. Ambient Temp.	82°F	80.5°F	72°F	83.3°F

UR1	Urban Range Test, Min Payload, No Auxiliary Loads
UR2	Urban Range Test, Min Payload, A/C on High, Headlights on Low, Radio On
UR3	Urban Range Test, Max Payload, No Auxiliary Loads
UR4	Urban Range Test, Min Payload, A/C on High, Headlights on Low, Radio On

Freeway Range

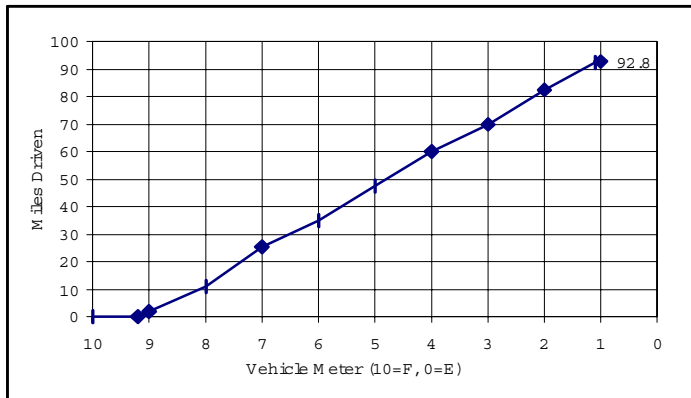
(On Freeway Pomona Loop – see other side for map)



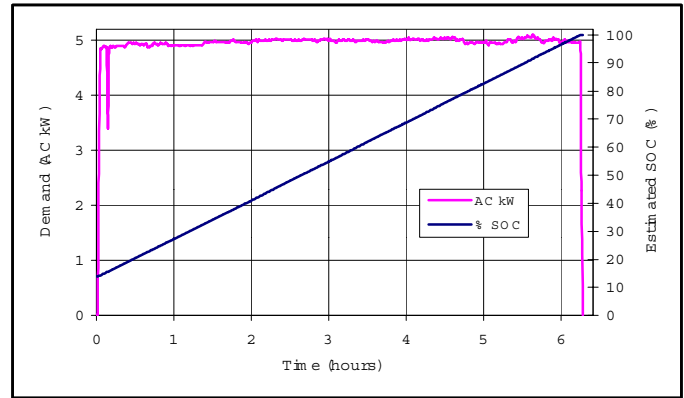
Test	FW 1	FW 2	FW 3	FW 4
Payload (lb.)	180	180	766	766
AC kWh Recharge	30.98	32.36	32.86	30.96
AC kWh/mi	0.374	0.409	0.409	0.410
Range (mi)	82.3	78.4	80.0	74.6
Avg. Ambient Temp.	84°F	79°F	81°F	83.5°F

FW 1	Freeway Range Test, Min Payload, No Auxiliary Loads
FW 2	Freeway Range Test, Min Payload, A/C on High, Headlights on Low, Radio On
FW 3	Freeway Range Test, Max Payload, No Auxiliary Loads
FW 4	Freeway Range Test, Min Payload, A/C on High, Headlights on Low, Radio On

State of Charge Meter (UR1)



Charger



MEASURED VALUE AT PEAK AC POWER	
Voltage	232.8 V
Current	21.20 A
Real Power	4.899 kW
Reactive Power	573.8 VAR
Apparent Power	4.935 kVA
Total Power Factor	0.99 PF
Displacement Power Factor	0.99 dPF
Voltage THD	2.1%
Current THD	2.6%