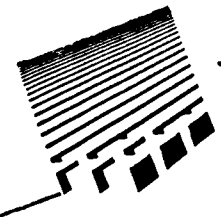

Johnson County
Council of Governments

FY86 IOWA CITY TRANSIT ROADCALL SUMMARY

FY86 Iowa City Transit Roadcall Summary

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Introduction

This study was commissioned by the Iowa City Transit Manager in an attempt to determine if specific buses in the Iowa City Transit fleet are prone to particular mechanical problems. The Iowa City Transit fleet is comprised of six distinct bus types, as follows:

TABLE 1
VEHICLE ROSTER

Bus #	# of Vehicles in Fleet	Year	Make	Model
1-12	12	1971	GMC	35' T6H 4521
13-14	2	1974	GMC	40' T8H 5307
15-17	3	1977	Flx	35' 45096
18-19	2	1963,1967	GMC	35' TDH 4519
20-22	3	1982	Neoplan	40' AN-440-A
23-29	7	1984	Scania	40' CN112

A method of determining if a certain bus is prone to a particular problem is to examine the roadcall history of the vehicle. A roadcall, or bus switch, occurs when a bus is taken out of service for a specific problem.

The following sections will describe the methodology that was followed in this study, summarize the information that was gathered, and explain the conclusions which were drawn.

Methodology

The data used for this study were taken from daily office log sheets compiled by the ICT office in FY86. A record of roadcalls for each day of operation in FY86 was kept by the ICT staff, including the reason the roadcall was necessary. From this record roadcalls were organized into twelve categories, as follows:

1. Low power
2. Fluid leaks (including coolant, engine oil, transmission fluid, and fuel)
3. Brakes (including grabbing, sticking, and soft/ineffective)
4. Steering (including hard to turn and loose steering)
5. Transmission (including slipping and difficulty in engaging)
6. Overheat
7. Slow idle/stall
8. Signals/headlights
9. Loss of air pressure
10. Doors/interlock
11. Heater/defroster
12. Windshield wipers

Other areas of mechanical difficulty were noted, but the incidents reported for these areas were too few to include in the study.

The next step in organizing the data was to total the number of roadcalls that occurred for each bus according to each category of mechanical problem. This information is presented in Table 2. The data were then aggregated by bus type, summarized in Table 3.

It was then necessary to control for two variables: Number of buses in each bus type, and mileage traveled per bus. Without controlling for these variables you would otherwise expect a much higher probability of a roadcall occurring for a bus type with many buses, or a bus type with high average mileage per bus. The following table of average mileage per bus by bus type illustrates ICT's policy of using their newest buses in service as much as possible.

TABLE 2

# of Roadcalls Per Bus - FY 1986

Problem Area	Bus # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
Low Power			1			1			1			1	1									1		1	2		1		1	12
Fluid Leaks	3		1	1	1	1		2		3	1			1	3			1	1	1	2	1		4			1	1	2	31
Brakes			7	3	3	1	2	6		5	3	6		7	3	1	2	3		1	1	1				1		2	3	61
Steering				1				1	1				2	1	1						1									8
Transmission		1	1	1		3		8	1		9		1	2	2				5		6	2	2	1	1	1		4	3	54
Overheat	2	2		2		1				3	1		4			2		5	1	2		1	1	2	2	1	1	6	1	40
Slow Idle/Stalls	1					1	1	1												1		1		2	1		1		2	12
Signals/Headlights	1	3		2	3		2	5			1		1	1	1	2	1		1	2	3	2	2	7	1	4	4		1	50
Air Loss	1		2	1	2	2	1		2	1		1	2	3	2	6	6	2	3	1	1	1			1	3	1		1	46
Doors/Interlock		1		1					1	4	1			2	2		2				1		4	2	3	4	1		3	32
Heater/Defroster	2		1			2	4	8		3					2	4	8			4	4	5	2			2	2		1	54
Wipers										2			1	1	1	3	9	1				1				1			2	22
Total	10	7	13	12	9	12	10	31	6	21	16	8	12	18	17	19	28	12	11	12	19	16	11	19	11	17	12	13	20	422

TABLE 3
# of Roadcalls, Aggregated by Bus Type - FY86

Problem Area:	Bus Type 1-12	13-14	15-17	18-19	20-22	23-29	Total
Low power	4	1	1	0	1	5	12
Fluid leaks	13	1	3	2	4	8	31
Brakes	36	7	6	3	3	6	61
Steering	3	3	1	0	1	0	8
Transmission	24	3	2	5	8	12	54
Overheat	11	4	2	6	3	14	40
Slow idle/stalls	4	0	0	0	2	6	12
Signals/headlights	17	2	4	1	7	19	50
Air loss	13	5	14	5	3	6	46
Doors/interlock	8	2	4	0	1	17	32
Heater/defroster	20	0	14	0	13	7	54
Wipers	2	2	13	1	1	3	22
Total	155	30	64	23	47	103	422

TABLE 4
Average Mileage Per Bus By Bus Type

1-12	22,237
13-14	35,017
15-17	25,201
18-19	17,542
20-22	30,177
23-29	28,850

Adjusting the data by number of buses per bus type and average mileage per bus allows the data to be compared on an equal basis for each bus type and each type of mechanical problem. The data which resulted was compiled into graphs and is listed in Figures 1-12. It should be noted that the numbers on the Y axis of each graph are inflated to allow the information to be presented in whole numbers. The number of roadcalls in each graph is relative to that particular graph and should only be used for comparison between bus types.

Fig. 1

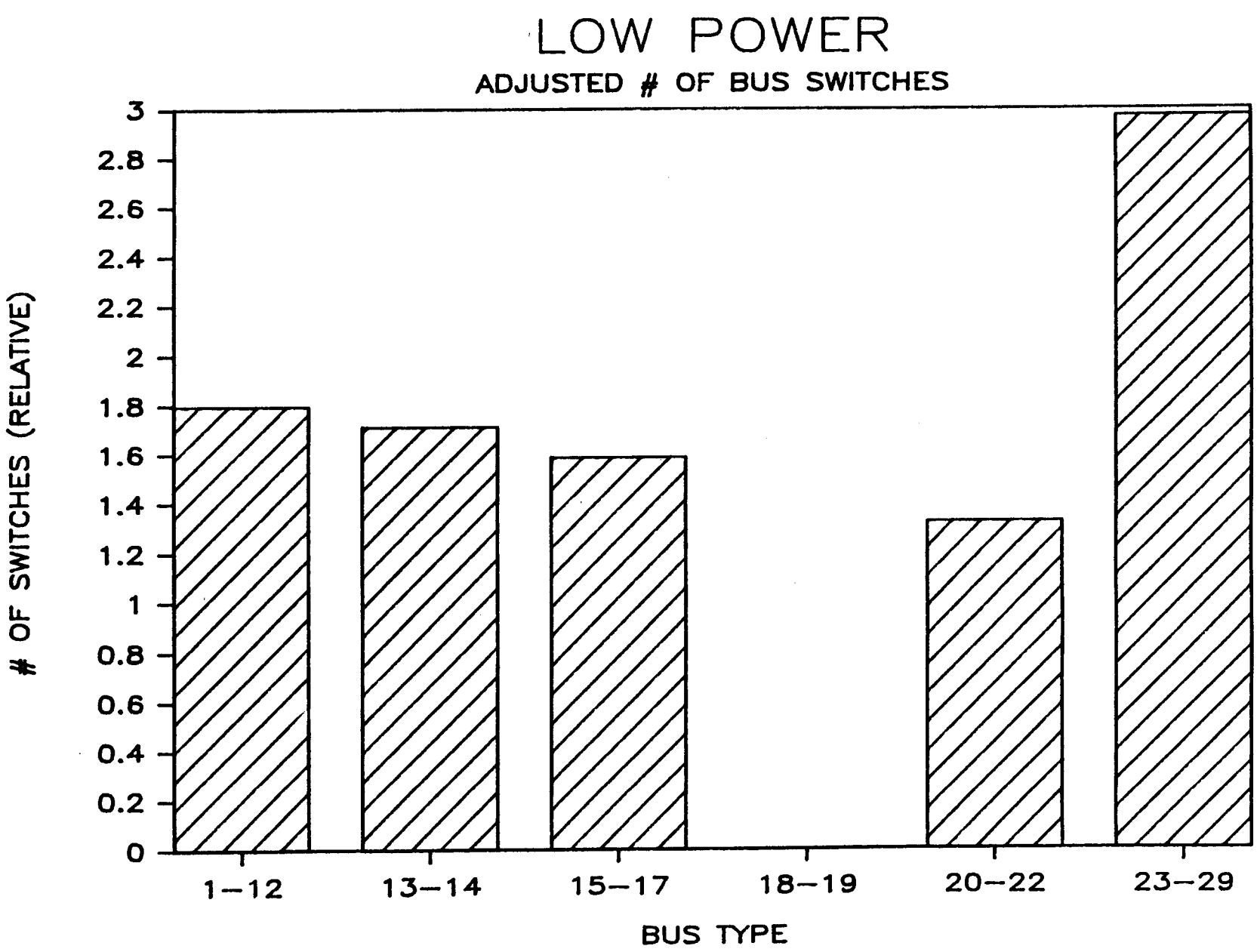

LOW POWER
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 2

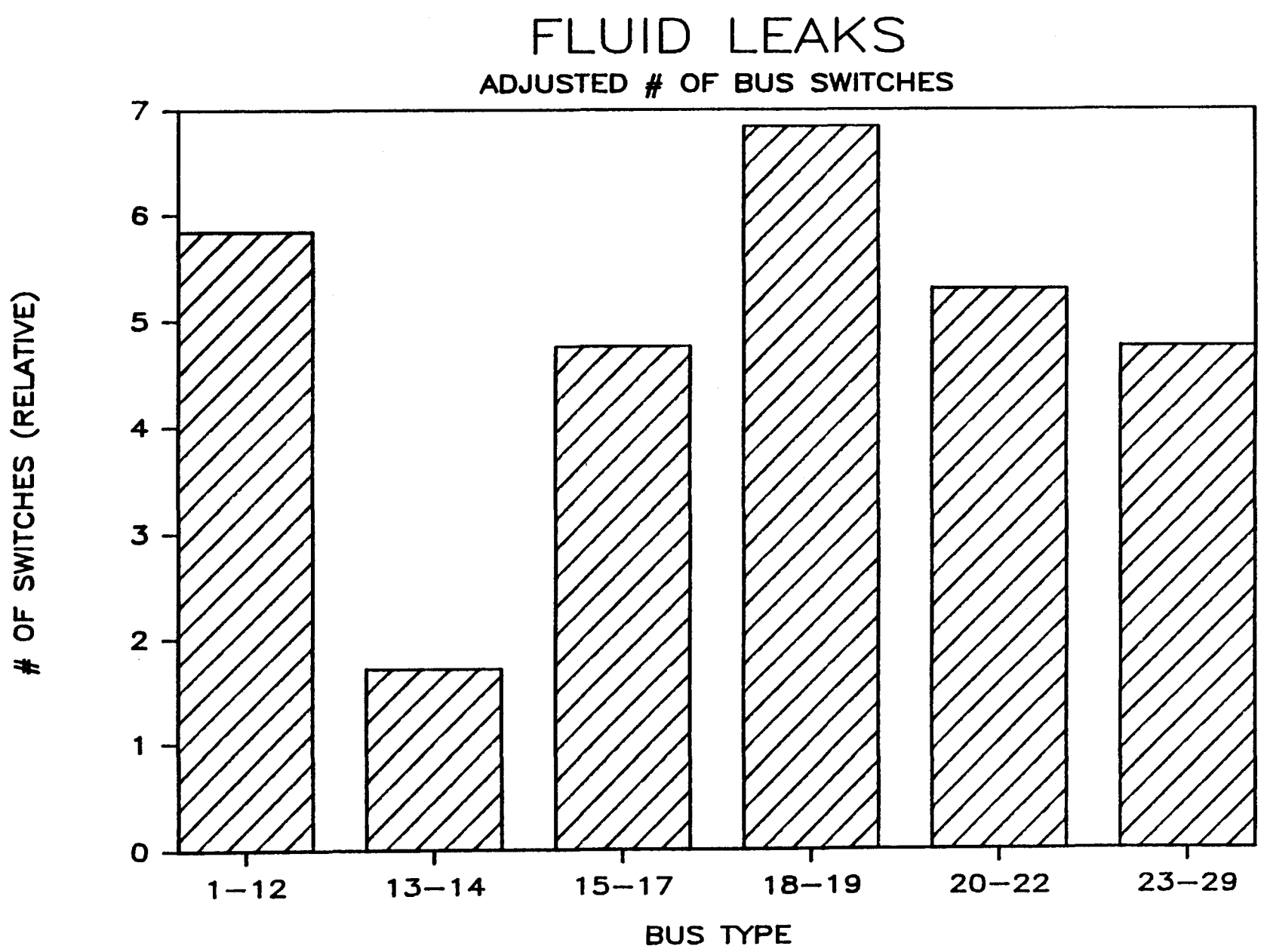

FLUID LEAKS
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 3

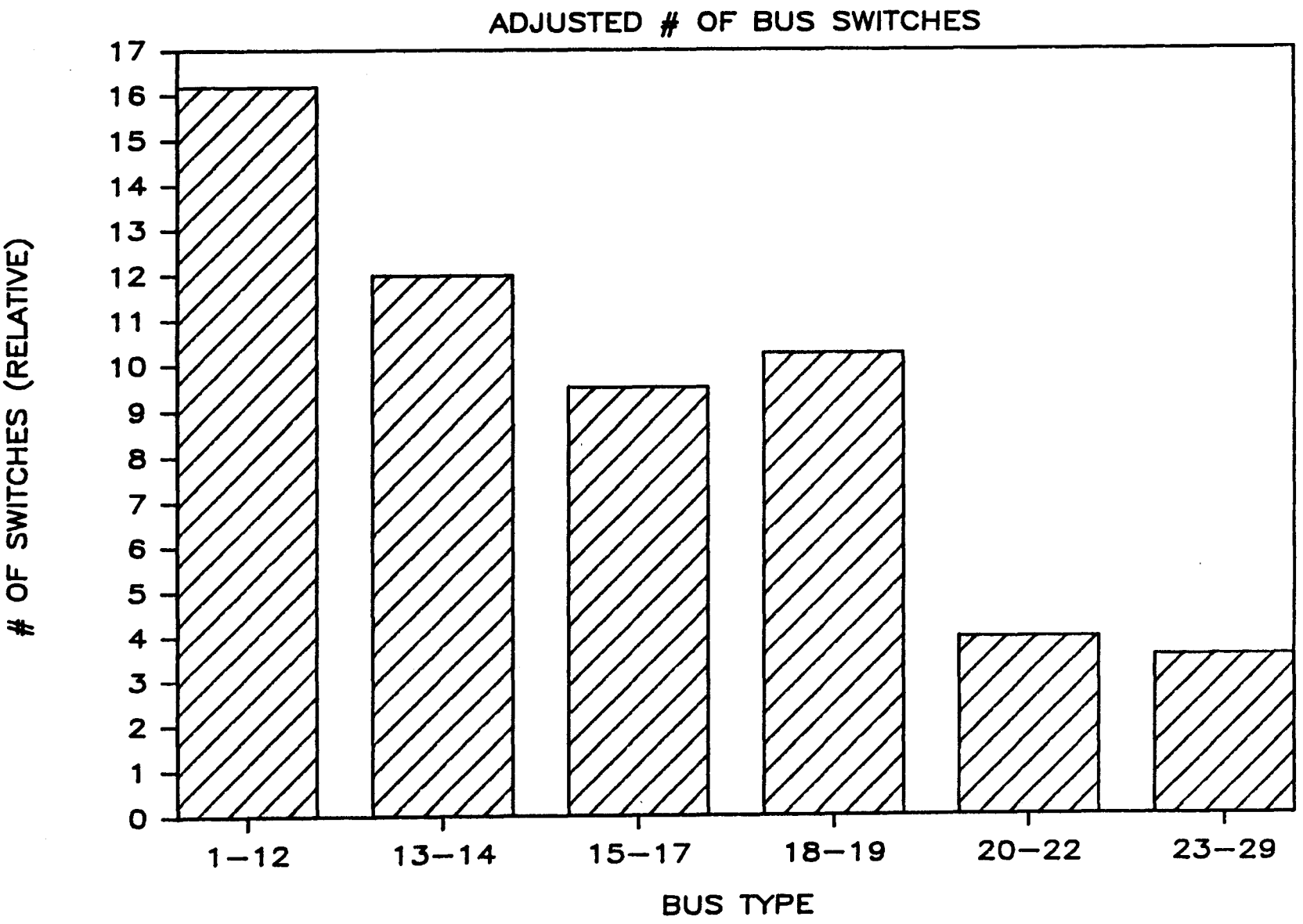

BRAKES
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 4

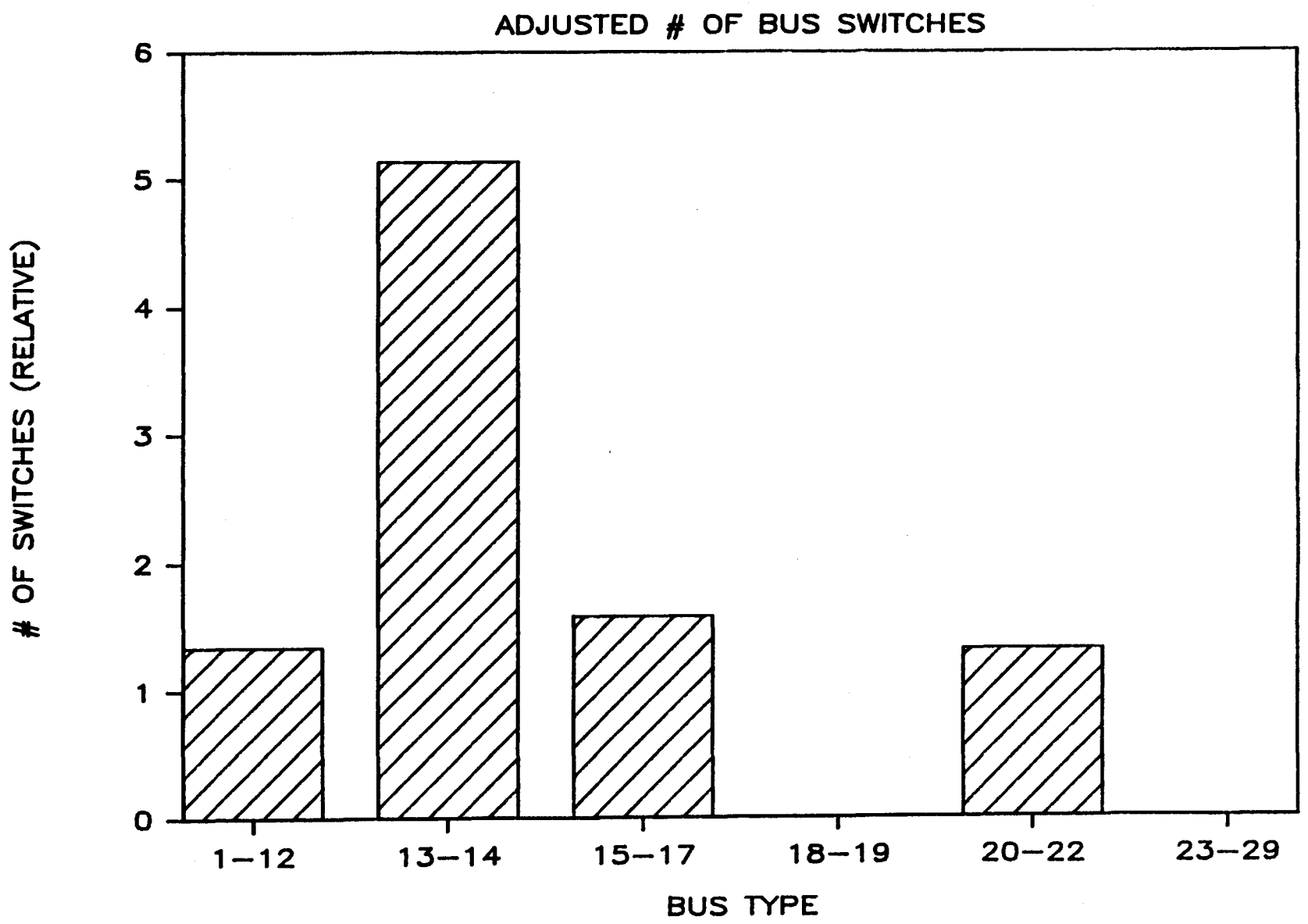

STEERING
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 5

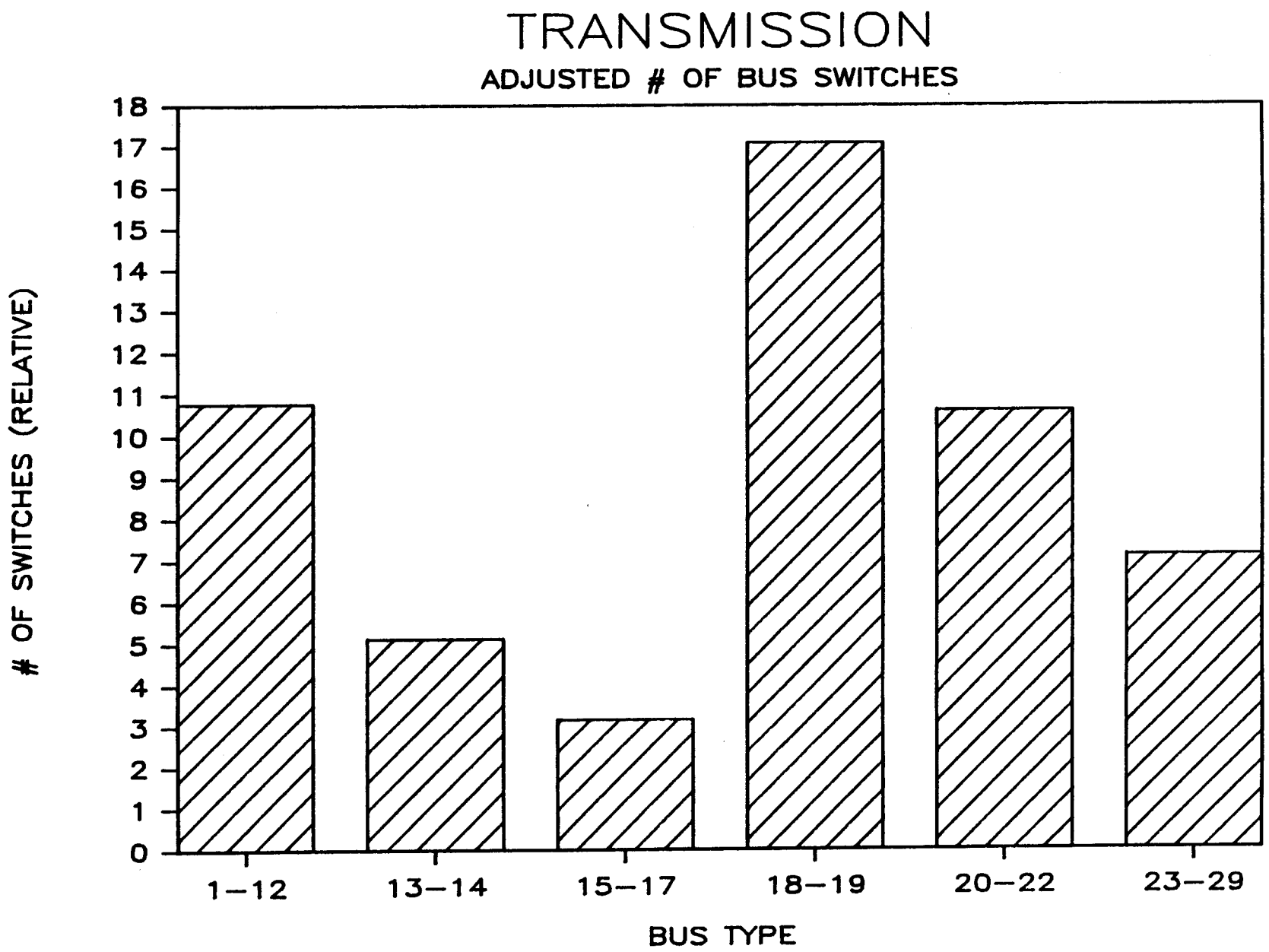

TRANSMISSION
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 6

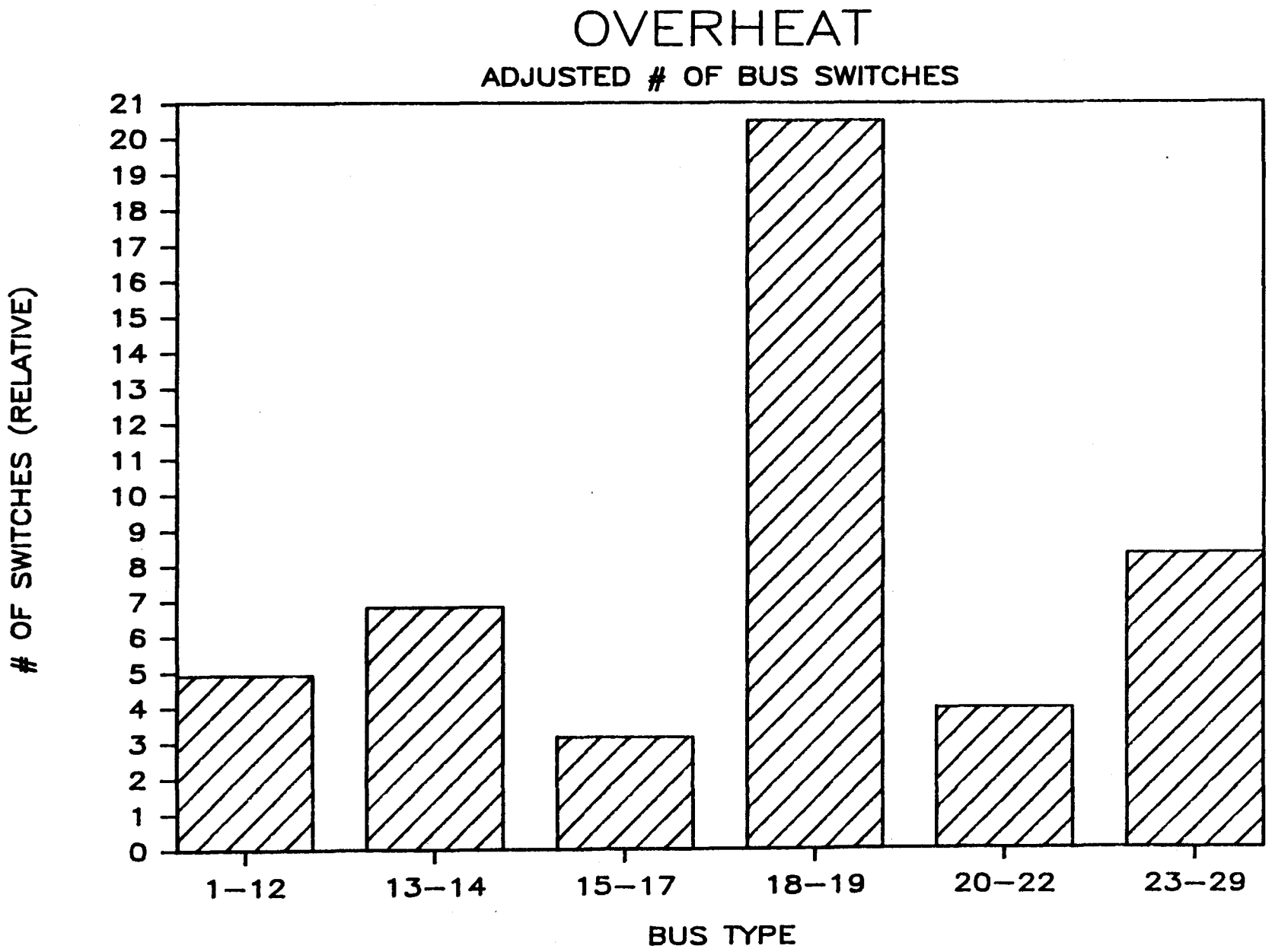

OVERHEAT
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 7

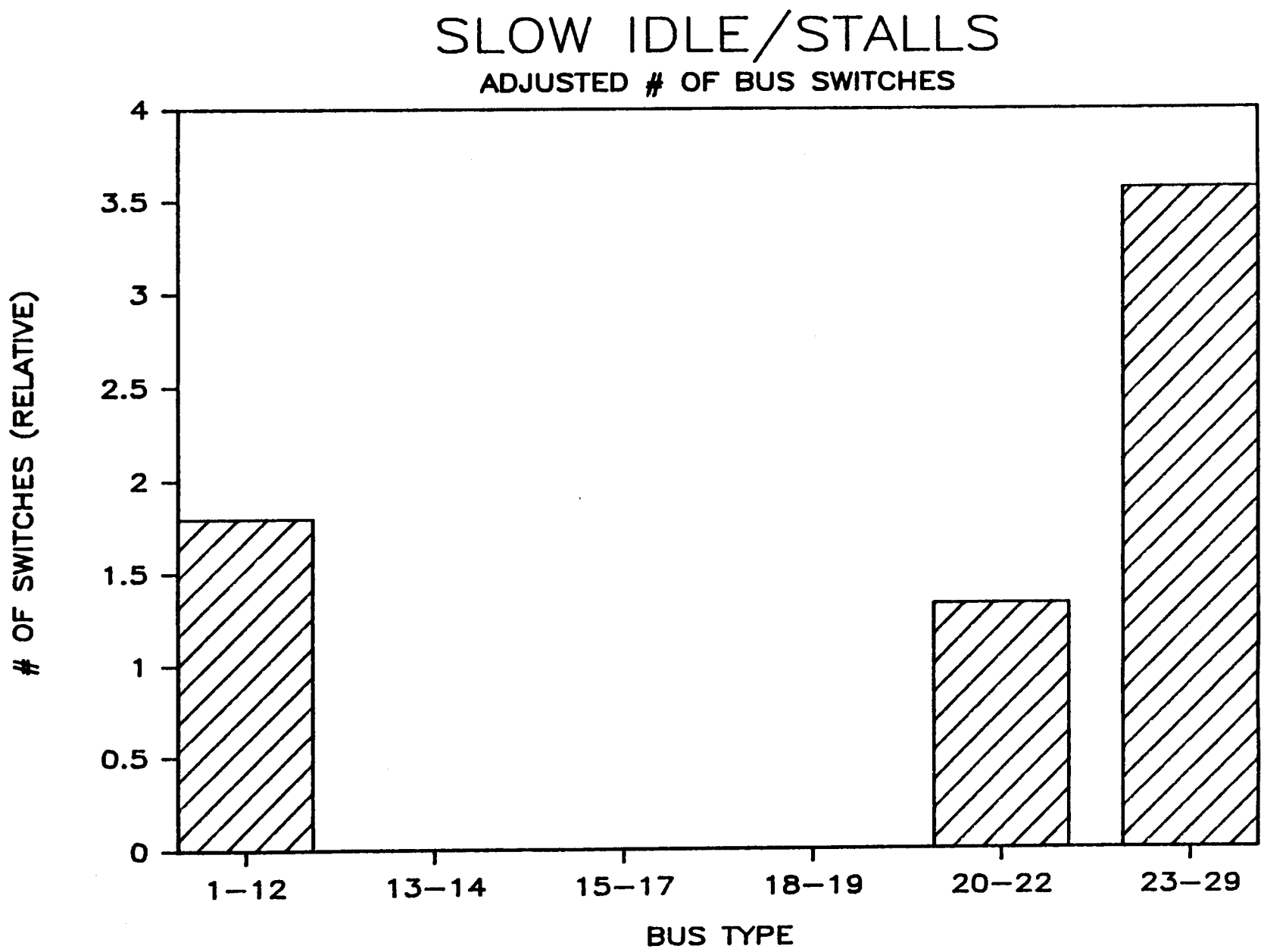

SLOW IDLE/STALLS
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
4
3.5
3
2.5
2
1.5
1
0.5
0
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 8

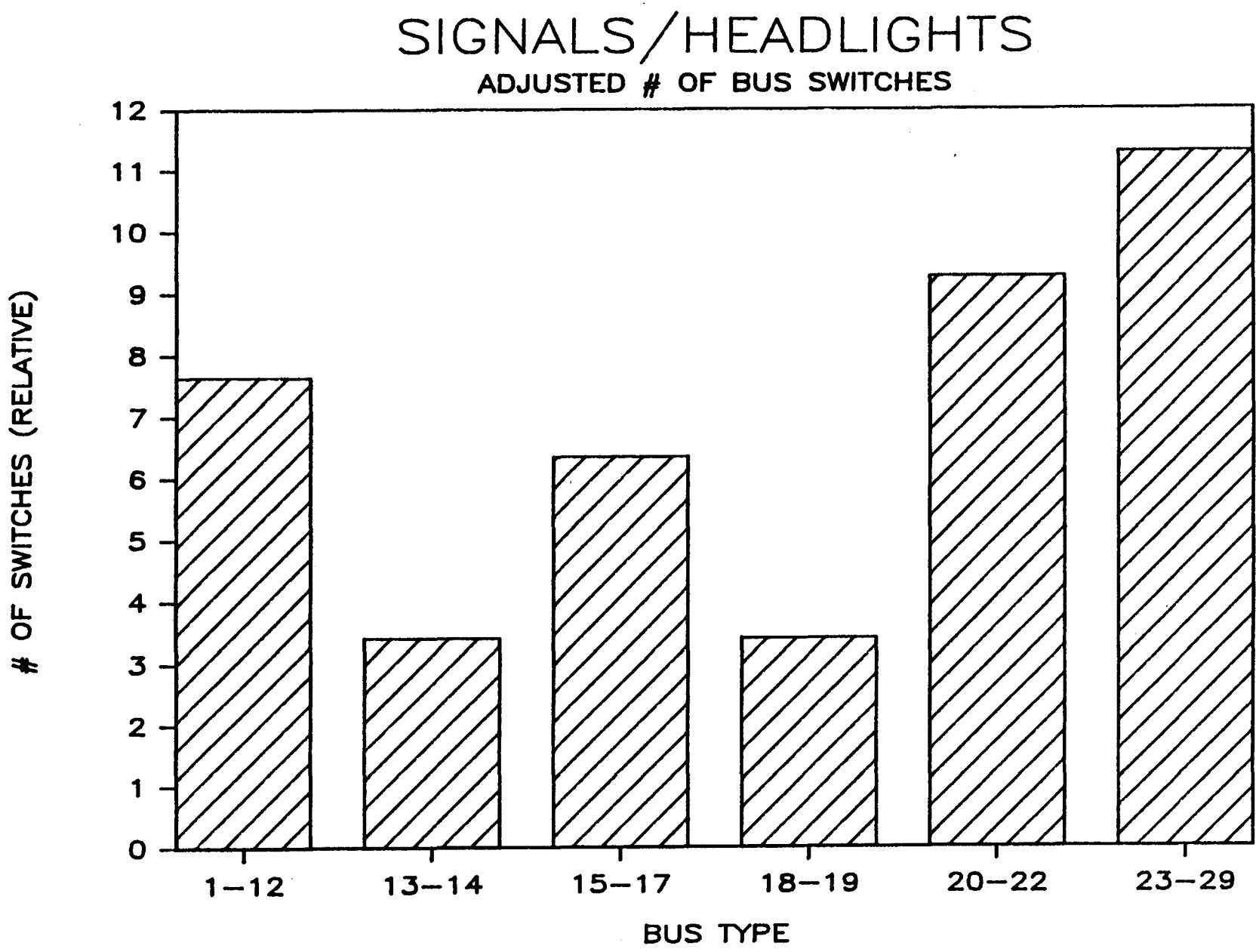

SIGNALS/HEADLIGHTS
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
8
9
10
11
12
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 9

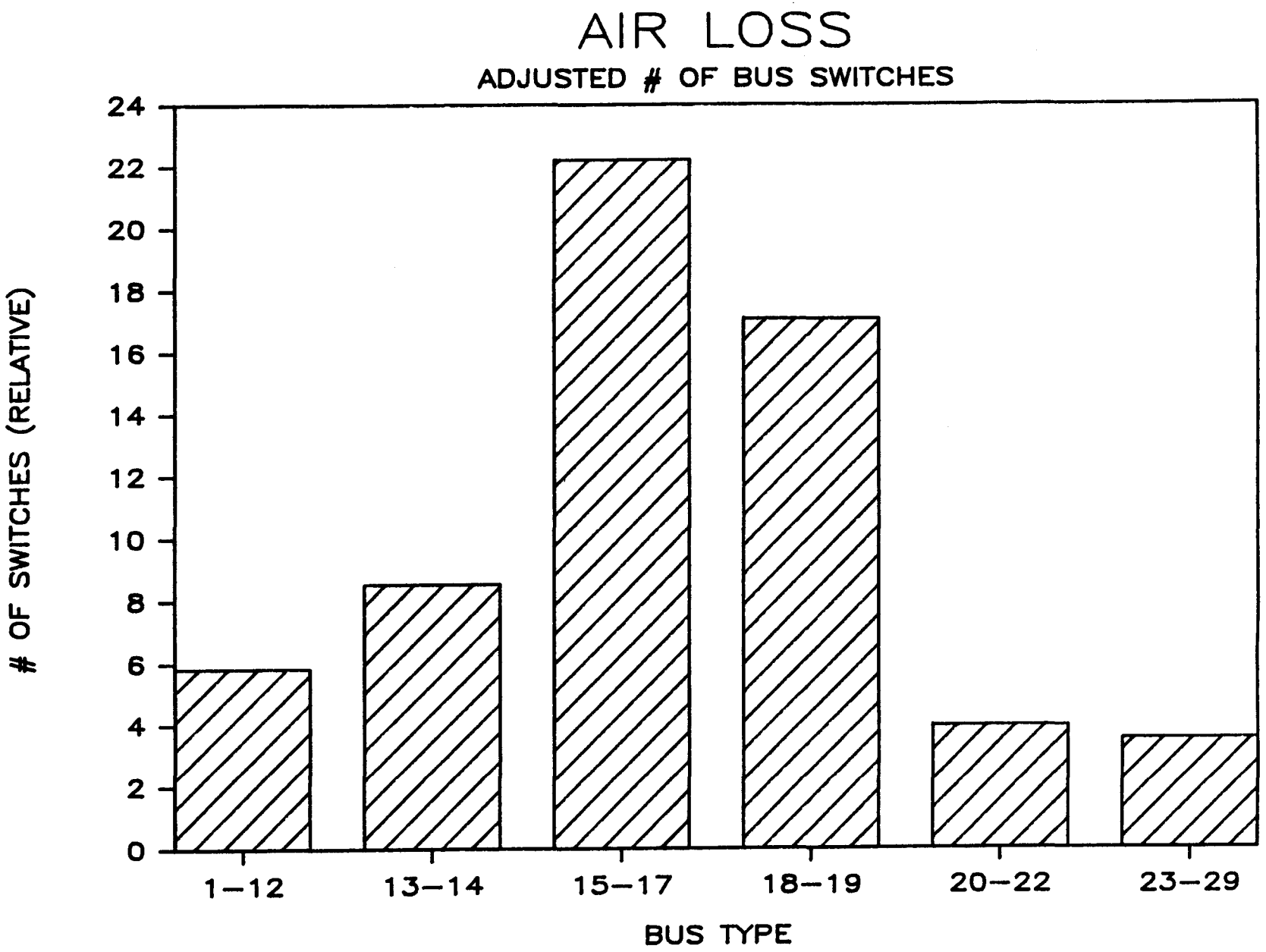

AIR LOSS
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
2
4
6
8
10
12
14
16
18
20
22
24
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 10

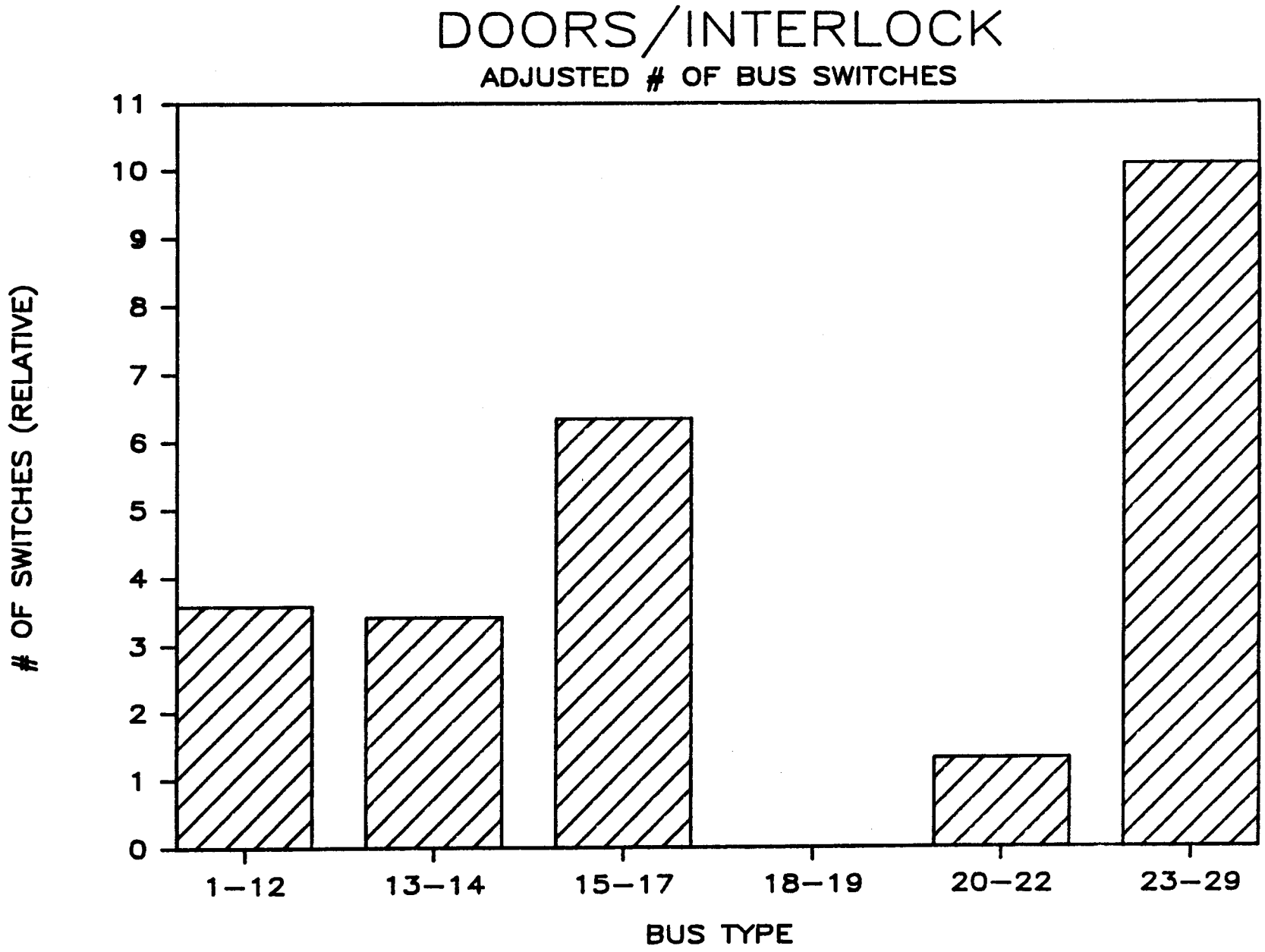

DOORS/INTERLOCK
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
8
9
10
11
1-12
13-14
15-17
18-19
20-22
23-29
BUS TYPE

Fig. 11

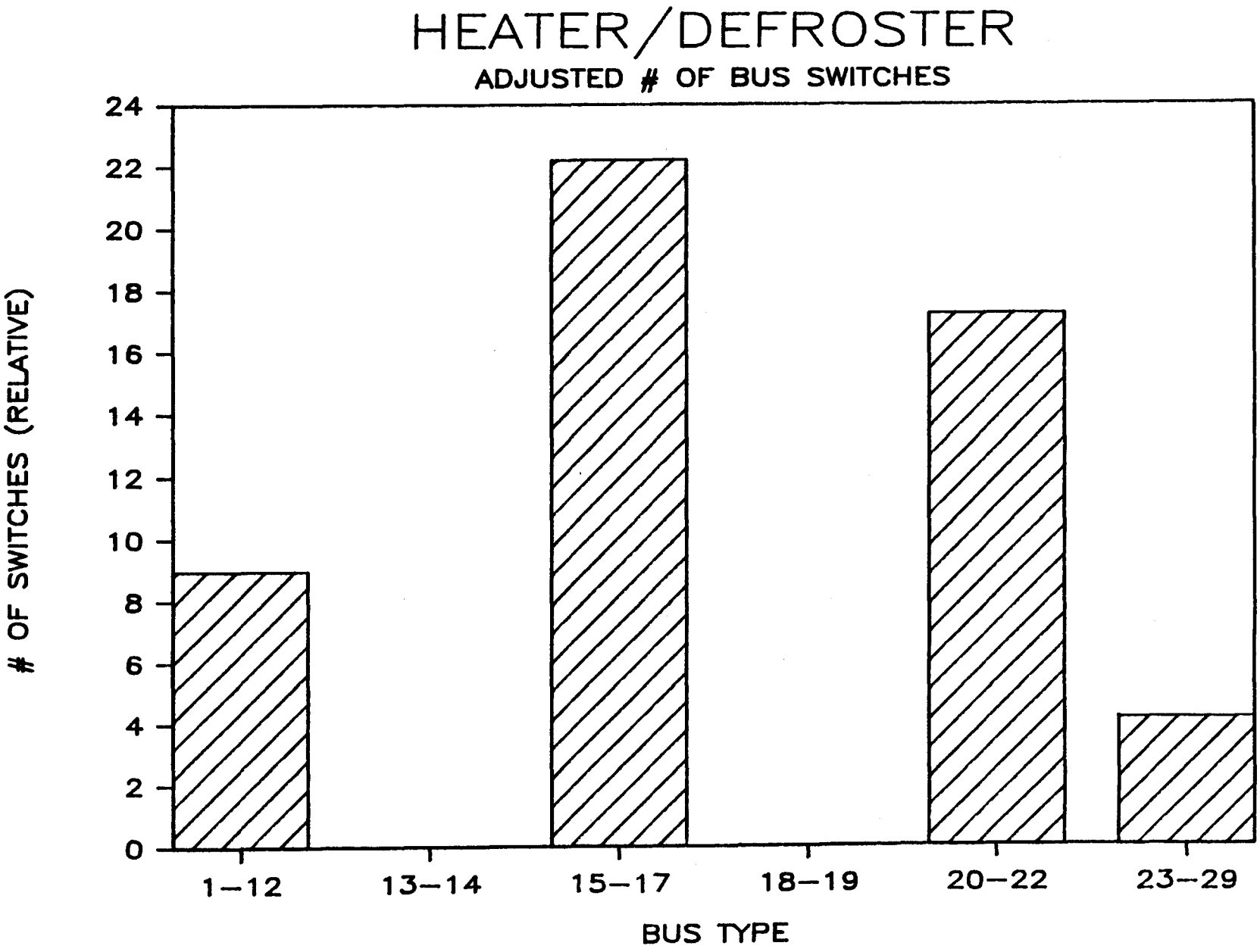
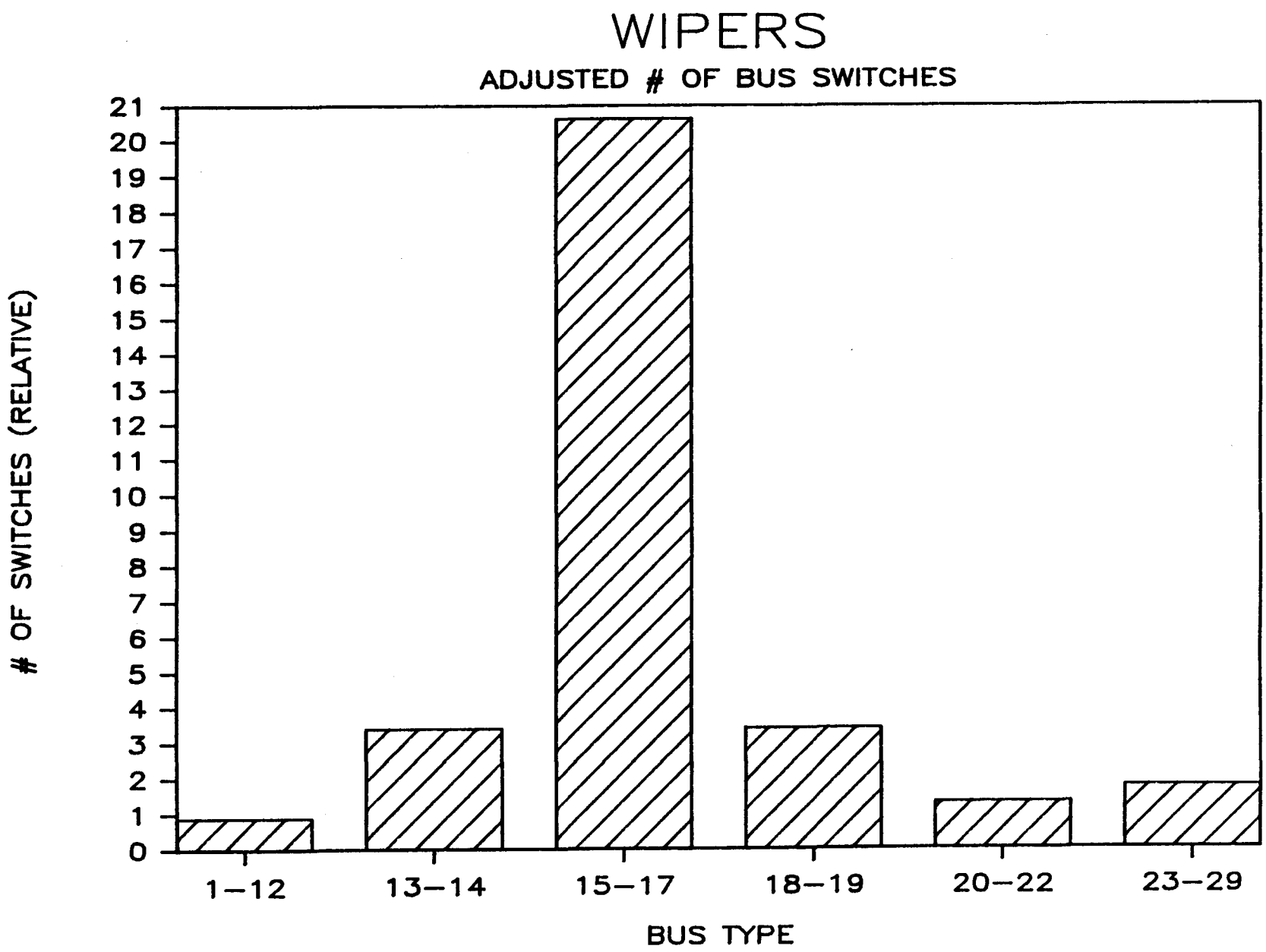

HEATER/DEFROSTER
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
2
4
6
8
10
12
14
16
18
20
22
24
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Fig. 12


WIPERS
ADJUSTED # OF BUS SWITCHES
OF SWITCHES (RELATIVE)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
1–12
13–14
15–17
18–19
20–22
23–29
BUS TYPE

Conclusions

A simple method of examining the data contained in Figures 1-12 is to summarize the strengths and weaknesses of each bus type. "Strength" indicates a bus type had a low incidence of roadcalls for that particular mechanical problem, and "weakness" indicates a high roadcall incidence.

#1-12, 35' 1971 GMC Model T6H 4521

Strengths: Air Pressure Loss
Windshield wipers

Weaknesses: Brakes
Transmission
Fluid leaks

#13-14, 40' 1974 GMC Model T8H 5307

Strengths: Fluid leaks
Transmission
Signal/headlights
Heater/defroster

Weaknesses: Brakes (usually too soft)
Steering (difficult to turn)

#15-17 35' 1977 Flexible Model 45096

Strengths: Transmission
Overheating

Weaknesses: Air pressure loss
Doors/interlock
Heater/defroster (usually not enough heat)
Windshield wipers (would not function, or would stop functioning)

#18-19, 35' 1963 and 1967 GMC Model TDH 4519

Strengths:
- Low power
- Steering
- Door/interlock
- Heater/defroster

Weaknesses:
- Fluid leaks
- Transmissions (#19 had a chronic transmission slip)
- Overheating (#18 had a chronic overheating problem)
- Air pressure loss

#20-22, 40' 1982 Neoplan Model AN-440-A

Strengths:
- Brakes
- Overheating
- Air loss
- Doors/interlock
- Windshield wipers

Weaknesses:
- Heater/defroster (usually not enough heat)
- Signals/headlights
- Transmission (slow to engage gears)

#23-29 40' 1984 Scania Model CN112

Strengths:
- Brakes
- Steering
- Air pressure loss
- Windshield wipers

Weaknesses:
- Loss of power
- Overheating (especially with A/C operating)
- Slow idle/stalls
- Signals/headlights
- Doors/interlock

It should be kept in mind when analyzing the data that a bus with a chronic problem that is repeatedly sent out in service will drive up the number of bus switches for that particular type of bus, especially if there are only two or three buses of that type. Air conditioning problems plagued all of the buses with air conditioning.