

MINUTES OF THE House COMMITTEE ON Transportation

The meeting was called to order by Representative Rex Crowell at
Chairperson

1:30 ~~xxx~~ a.m./p.m. on February 15, 1984 in room 519-S of the Capitol.

All members were present except: Representative Betty Jo Charlton - Excused
Representative Steve Cloud - Excused
Representative Richard Harper - Excused

Committee staff present:

Fred Carman, Revisor of Statutes
Hank Avila, Legislative Research
Donna Mulligan, Committee Secretary

Conferees appearing before the committee:

Mr. Bill Edds, Department of Revenue
Representative Don Rezac
Undersheriff Ray Morgan, Kearny County
Sheriff Bill Thompson, Rice County
Art Stone, Chief of Police, Kansas University Police Dept.
Mr. Ed DeSoignie, Kansas Department of Transportation
Representative Joan Adam
Mr. Garland Rice, Atchison County Co-op
Mr. Randy Moody, Huffman Towing Company, Lincoln, Nebraska
Mr. James A. McPherson, Vice President, Missouri River Basin

Representative Rex Crowell called the meeting to order and the first order of business was a request from Mr. Bill Edds of the Department of Revenue for legislation to amend K.S.A. 1983 Supp. 79-3408 to substitute measurement by volume rather than by weight for computation of motor fuel taxes. (See Attachment 1)

It was moved by Representative Erne to introduce the requested legislation as a committee bill. The motion was seconded by Representative Webb. Motion passed.

Mr. Edds presented a memo to the committee regarding temporary motor vehicle dealer locations. (See Attachment 2) He explained that under K.S.A. 8-2404 motor vehicle dealers are required to maintain an established place of business as a condition to receiving a license. Mr. Edds related that recently it was found that two auto leasing firms made arrangements with credit unions whereby the leasing company will bring a number of vehicles to the credit union's place of business and hold a short-term sale. Mr. Edds indicated his department does not intend to recommend legislation be enacted regarding this matter at this time.

The next order of business was HB-2815 pertaining to warning lights on police cars and ambulances. Mr. Hank Avila discussed Federal specifications pertaining to warning lights for emergency vehicles. (See Attachment 3)

Representative Don Rezac, principal sponsor of HB-2815, briefed the committee on the bill. (See Attachment 4)

Undersheriff Ray Morgan of Kearny County gave testimony in favor of HB-2815 and presented information regarding red and blue emergency lights. (See Attachment 5)

Undersheriff Morgan stated that numerous departments throughout the state utilize the red and blue light combination, but the Kansas Sheriff's Association prefers this choice be optional, not mandatory.

CONTINUATION SHEET

MINUTES OF THE House COMMITTEE ON Transportation,
room 519-S, Statehouse, at 1:30 ~~xx~~ p.m. on February 15, 19 84

Undersheriff Morgan reported to the committee that according to a study made by the California Highway Patrol, a red strobe was the most visible and effective in reducing the speed of passing traffic, while the blue strobe was better in moving traffic away from the experimental vehicle. (See Attachment 6)

Sheriff Bill Thompson of Rice County, also testified in support of HB-2815, and related that the Kansas Sheriff's Association desires that the red lights remain mandatory and the blue combination be optional.

Chief of Police Art Stone of the Kansas University Police Department presented testimony on HB-2815 and reported to the committee that numerous other states use the blue light system and extensive studies have proven that for safety as well as for the individual motorist this combination is the most desirable on law enforcement vehicles.

Mr. Ed DeSoignie of Kansas Department of Transportation presented a memo to the committee regarding HB-2815. (See Attachment 7) Mr. DeSoignie related that the KDOT requests action on this bill be deferred in order to permit study during the Legislative interim on the use of blue lights.

Discussion among committee members regarding the emergency lighting followed.

This ended the hearing on HB-2815.

The next order of business was HB-2887, and Representative Joan Adam, principal sponsor of the bill, briefed the committee. Representative Adam went on to say that HB-2887, also known as the Missouri River Compact bill, authorizes the lower Missouri River Basin states to join together in a compact to promote the development of barge traffic along the Missouri River.

Mr. Garland Rice, Atchison County Co-op, Atchison, Kansas, testified in favor of HB-2887. (See Attachment 8). Mr. Rice conveyed that Kansas has done little to assist in the development of the Missouri River as a transportation system. He further stated that Kansas has direct access to 6 cities with active loading and/or unloading facilities along the Missouri River, with 125 miles of river access area.

Mr. Rice explained that the Missouri River needs to be developed into a 9 foot channel so that Kansas can receive full economic benefits of cheaper river transportation.

The meeting was opened to questioning by the committee, and Representative Shelor asked if there is enough water flowing in the Missouri River to maintain a 9 foot channel. Mr. Rice answered by saying water is not the sole problem. Their main problem is that between Atchison and St. Louis there are several spots where there is not a 9 foot depth, and it stops the entire river from using the 9 foot channel. Mr. Rice also remarked that every other river system open to barge traffic is dredged to maintain a 9 foot channel.

Representative Justice asked how many years they have been trying to get the Corps of Engineers to finish the development of the 9 foot channel, and Mr. Rice answered it has only been the last three years.

Mr. Randy Moody, Manager, Missouri River Marketing, Huffman Towing Company, Lincoln, Nebraska, was the next conferee and presented testimony in favor of HB-2887. (See Attachment 9)

CONTINUATION SHEET

MINUTES OF THE House COMMITTEE ON Transportation,
room 519-S, Statehouse, at 1:30 ~~am~~/p.m. on February 15, 1984

Mr. James A. McPherson, Vice President of Missouri River Basin Association testified as a proponent of HB-2887. (See Attachment 10)

Mr. McPherson explained to the committee that during the past several years almost 20 per cent of the farm products in the lower Missouri River Basin were moved by barge at an average savings of 5 to 7 cents per bushel as compared with the lowest cost alternative modes. Mr. McPherson expressed that the establishment of the Missouri River Barge Compact would appear to be an advantage in increasing farm income in the states involved.

Representative Dempsey asked Mr. McPherson how often they encounter ice jams, and he replied that during the winter there is no navigation on the river.

The meeting adjourned at 2:55 p.m.



Rex Crowell, Chairman

M E M O R A N D U M

To: House Transportation
Committee

Date: February 15, 1984

From: Department of Revenue

Re: Requests for Legislation

K.S.A. 1983 Supp. 79-3408 discusses the motor fuel tax rate differential on certain alcohol blended fuel. Reference is made to the blend of 90% gasoline plus 10% alcohol as measured by weight. Using the weight method of measurement requires several calculations in each instance. Most other states make the same determination using measurement by volume. The volume method requires no calculations, saves time and is an effective enforcement method.

Amend K.S.A. 1983 Supp. 79-3408 to substitute measurement by volume rather than by weight for computation of motor fuel taxes.

A# 1

24

M E M O R A N D U M

To: House Transportation
Committee

Date: January 31, 1984

From: Kansas Department of Revenue

Re: Temporary Motor Vehicle Dealer
Locations

Under K.S.A. 8-2404 motor vehicle dealers are required to maintain an established place of business as a condition to receiving a license. In addition other requirements are prescribed: compliance with zoning requirements, sufficient lot space must be maintained and a sign must be displayed so as to be easily visible from the street. The statute authorizes dealers to establish supplemental places of business within the same county as their licensure upon payment of a supplemental license fee of \$10.

Recently the Department of Revenue has been faced with a problem in this area. Two auto leasing firms have started to make arrangements with a number of credit unions in the state whereby the leasing company will bring a number of vehicles to the credit union's place of business and hold a short-term sale. Generally, the Department learned about these sales after-the-fact. However, the companies came in before some of them and requested temporary licensing. It is the Department's opinion that the statute does not contemplate issuance of a license for such sales. However, in two instances the Department licensed the credit union as a broker and allowed the sales to take place.

The Department wanted to bring this problem to the committee's attention. The Department does not intend to allow the credit union to be licensed as a broker in these circumstances in the future, and it will take steps to prohibit such sales from being conducted unless the legislature should pass legislation specifically authorizing temporary licensing. The Department does not necessarily recommend that such legislation be enacted; it only wanted to apprise the legislature of the situation. However, a firm position by the Department in requiring a dealer to conduct his business at his established place of business might also impact on some of the recent practices of franchised dealers in the state whereby they have conducted tent sales, shopping mall shows, etc.

WLE:rab

ATTACHMENT 2

COM-74-11009

LEAA POLICE EQUIPMENT SURVEY OF 1972
VOLUME III. SIRENS AND EMERGENCY WARNING LIGHTS

NATIONAL BUREAU OF STANDARDS

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Att 3

About three-fifths of the responding departments mounted their Most Common beacons/flashing lights on a Utility Bar above the roof of the vehicle and about two-fifths mounted them Right On the Vehicle. Only about 2% said they mounted these lights in both locations.

Table 27A./27B./27G./27H. Percentages of Departments Whose "Most Common" Emergency Warning Beacons/Flashing Lights Were Made by Each Manufacturer, and Where These Lights Were Mounted. Percentages of Patrolcars Equipped With Each Brand of Light.

MANUFACTURER:	% Depts. Using This Brand as "Most Common" (n=437)	% Total Patrolcars Reported (n=26,618)	% Depts. Using That Brand Mounting It:	
			<u>Directly on Vehicle</u>	<u>On Utility Bar</u>
Federal	61	67	32	68
Dietz	10	16	48	52
Sireno	3	2	56	44
Unity	3	2	55	44
Whelen	2	3	38	63
Trippe Man. Co.	2	2	55	44
Other Manufacturer	7	7	39	71
No Manufacturer Given	12	1	51	49
TOTAL	100	100	38	62

INSTRUCTIONS: Please give the following information about the MOST COMMON type of emergency warning lights (beacons or flashers) used in your department.

MOST USED BEACON OR FLASHING LIGHT

27.c. Number of lights per unit _____

The majority of the responding departments were using less than three lights per unit for their Most Common beacons/flashing lights: 18% used One Light/Unit, 44% used Two Lights/Unit. A higher percentage of State departments

(34%) were using only One Light/Unit than were the other Department Types. A higher percentage of the Fifty Largest Cities (28%) were using Four Lights/Unit.

Table 27C. Percentages of Departments in Each Department Type Using Specified Number of Lights Per Unit in Their "Most Common" Beacons/Flashing Lights.

DEPARTMENT TYPE:	% Depts. One Light Per Unit	% Depts. Two Lights Per Unit	% Depts. Three Lights Per Unit	% Depts. Four Lights Per Unit	% No Answer
State	34	36	6	21	2
County	25	30	10	17	14
City (1-9)	21	40	16	12	8
50 Largest City (50+)	15	46	4	28	2
City (10-49)	14	52	10	20	2
Township	10	55	6	18	10
	7	48	7	21	17
All Departments	18	44	9	19	8

INSTRUCTIONS: Please give the following information about the MOST COMMON type of emergency warning lights (beacons or flashers) used in your department.

MOST USED BEACON OR FLASHING LIGHT

27.d. Number of units per vehicle _____

About three-fourths of the responding departments reported that they had only one of their Most Common emergency warning light units per vehicle. Almost 9 out of 10 (89%) of State departments had only One Unit/Vehicle compared to 68%-76% of the departments in the other six Department Types.

Thirteen percent of the departments reported Two Units/Vehicle and only 4% reported More Than Two Units/Vehicle.

Table 27D. Percentages of Departments in Each Department Type Using Specified Number of Units Per Vehicle.

DEPARTMENT TYPE:	% Depts. One Unit Per Vehicle	% Depts. Two Units Per Vehicle	% Depts. More Than Two Units Per Vehicle	% No Answer
State	89	6	4	0
50 Largest	76	17	4	2
City (10-49)	75	12	3	10
City (50+)	73	19	3	4
City (1-9)	69	12	9	10
Township	69	7	0	24
County	68	13	2	17
All Departments	74	13	4	9

INSTRUCTIONS: Please give the following information about the MOST COMMON type of emergency warning lights (beacons or flashers) used in your department.

MOST USED BEACON OR FLASHING LIGHT

27.e. Color(s) of warning signal:

- Red & Blue
- Red & Clear
- Blue & Clear
- Clear
- Red
- Blue
- Yellow (Amber)
- Other (specify)

27.f. Color of dome _____

Three-quarters of the responding departments used Red (either alone or in combination with other colors) for their Most Common emergency warning lights. One half (56%) used Only Red warning signals. Within each of the seven Department Types, the greatest proportions of departments were using red warning signals, but a slightly smaller percentage of States were using Red than the other Department Types.

About one-third (34%) of the departments were using Blue warning signals (either alone or in combination with other colors), but only 21% were using Only Blue warning signals. A slightly greater percentage of State departments (34%) were using Only Blue warning signals than the other Department Types (Range: 21% of Townships to 28% of the Fifty Largest Cities).

Table 27E-1. Percentages of Departments in Each Department Type Using Red or Blue Warning Signals in Their "Most Common" Beacons/Flashers.

DEPARTMENT TYPE:	RED:				BLUE:		
	% Depts. Red Only	% Depts. Red & Clear	% Depts. Any Red	% Depts. Red & Blue	% Depts. Any Blue	% Depts. Blue & Clear	% Depts. Blue Only
	City (1-9)	64	8	70	8	35	4
State	57	4	63	2	36	0	34
County	56	11	75	8	32	0	24
City (10-49)	54	12	77	11	34	2	21
City (50+)	54	10	72	8	33	2	23
50 Largest	52	13	74	9	39	2	28
Township	45	21	73	7	28	0	21
All Depts.	56	11	75	8	34	2	24

Very few of the responding departments were using Only Clear (6%) or Only Yellow (7%) warning signals in their Most Common beacons/flashings lights. However, 19% of State departments reported that they were using Only Yellow warning signals.

DON M. REZAC
 REPRESENTATIVE SIXTH FIRST DISTRICT
 WABAUNSEE COUNTY AND PARTS
 OF POTTAWATOMIE AND RILEY COUNTIES



TOPEKA

HOUSE OF
 REPRESENTATIVES

COMMITTEE ASSIGNMENTS
 MEMBER, AGRICULTURE AND FORESTRY
 MEMBER, MANUFACTURES, MECHANICAL
 AND MINING

HB 2815 is legislation that pertains to the red light/
 blue light combination lights on emergency vehicles. I
 became involved in this issue for three reasons:

First, this was made known to me by a deputy sherrif
 in one of my home counties.

Second, I do live by a railroad track and once in a
 while the Union Pacific will have a blue flashing light
 on top of their locomotives and this is eye catching,
 making the engine very visible.

Third, being representatives, we're all on the road
 quite a bit and I've noticed that there are a lot of red
 lights. For example, many neon signs, tail lights, stop
 lights, etc. In a steady flow of traffic, it is hard to
 distinguish one red light from another.

I've handed out some information from the California
 highway patrol study that was done a few years ago. I've
 also handed out a list of sherrif and police officers from
 across the state that support this legislation.

Attachment 4

Supportive Evidence for
HB 2815

1. In tests conducted by the California Highway Patrol, blue lamps had much better peripheral effectiveness at night than the red or amber lamps therefore attracting more attention when the observer was looking away from lamps at a wide angle.
2. Red lamps were most visible in daylight and caused for the most speed reduction. Whereas the blue lamp was by far the most visible at night and caused the greatest speed reduction in traffic.
3. The California Highway Patrol report concluded that a blue lamp is not a good substitute for red in day light, but because blue is more effective at night, a combination of the two provides the best effectiveness at all hours.
4. The most effective of this combination was a red strobe and a blue strobe, however strobes are the most expensive of lighting devices.
5. The engineering section of the California Highway Patrol recommended that the Department should install blue lamps in addition to the red in the overhead light bar, (either the blue strobe or the less effective blue revolving).
6. The blue light tended to wash out when viewed from the front with headlights on. When the blue light was viewed from the rear with the taillight and rear warning lamp on, "the color contrast was quite effective and accentuated the blue lamp most effectively".
7. Physiological research has shown that red is not a logical choice for a warning light. Allen (1964) found that in 2/3 of the population, red colored objects were seen as farther away than they actually were.

1-7. taken from the blue light study
conducted by the California
Highway Patrol (1973)

8. A list of supporters of the bill stands for itself, including chiefs of police and sheriffs across Kansas. Most of whom believe the cost to change over won't be that great.

TRANSPORTATION COMMITTEE

Rex Crowell, Chairman

Submitted by

Roy Morgan, Undersheriff, Kearny County Sheriff's Dept.
February 15, 1984

A. ATTORNEY GENERAL'S OPINION

1. Opinion requested from Larry Draffin, Emergency Preparedness director, Russell County.
2. Opinion number 83-176 dated November 28, 1983 cites several statutes.
3. A concern of a good number of police administrators prompted this proposal. We are proposing that statute 8-1720 be amended.

B. KANSAS SHERIFF'S ASSOCIATION BOARD OF DIRECTORS MEETING

1. I attended a Kansas Sheriff's Association Board of Directors Meeting in December 1983.
2. Among other matters of business, discussed was the Attorney General's recent opinion. Concerns discussed were:
 - a. potential legal liabilities of departments who utilize a combination of red/blue.
 - b. numerous departments throughout the state utilize this combination.
 - c. budget problems if forced to change back strictly to red.
 - d. The fact that those who utilize red/blue recognize their far superior performance vs. straight red.
 - e. Some cannot financially change back to all red.
3. At this meeting the board of directors instructed newly appointed legislative committee chairman, sheriff Jack Mendenhall, to work on a proposal for an optional not mandatory provision in the statutes which would authorize the departments who currently utilize them and any department who may wish to implement their use, to do so.

C. STUDIES DONE ON THE USE OF EMERGENCY LIGHTS

1. Sights and sounds of Emergency Vehicles
 - a. read captions
2. Emergency, Journal of Emergency Services
 - a. read from color down through conclusions
 - b. every study I have obtained or read is pro combination of colors. Most frequently Red/Blue combination is favored.

D. CALIFORNIA HIGHWAY PATROL STUDY

1. Have detailed - lengthy study
2. Too thick to copy

E. PROPOSED HOUSE BILL 2815

1. Section meets the intent of the Kansas Sheriff's Association.
2. Section (b) does not meet the intent of the KSA and therefore requests that it be deleted entirely.

F. SUPPORTERS

1. Discuss list of supporters
2. There are currently 30 sheriffs and police departments who openly support an amendment to 8-1720.
3. Total marked patrol units between these 30 departments total 154.
4. Mention upcoming February 21, 1984 meeting of the KSA, KPOA and Kansas Troopers Association.
5. Discuss letters from supporters.

G CONCLUSIONS

1. There are more than a few departments, scattered throughout the state who currently utilize a combination of red and blue.
2. There is no doubt more than 30 departments and more than the current 154 marked cars.

3. There are some very concerned police administrators which have no money to change their system over to red and are worried about potential liabilities.
4. All studies thus far, at the very least, reveal no single color should be used. And some specifically say a red/blue combination was determined superior.
5. Considering the number of departments and vehicles involved in using red/blue, it obviously is not due to arbitrary decisions on the part of administrators, but rather due to the fact that red/blue combinations are far superior to plain red.
6. The bill should remain optional and not mandatory.

Respectfully Submitted,

Roy Morgan, Undersheriff, Kearny County Sheriff's Dept.

The Sights and Sounds of Emergency Vehicles

A look at the effectiveness of color, lighting and sirens

THE EMERGENCY DISPATCH is more accurately a demand, rather than a request, for assistance. The safe and expeditious delivery of the team's professional services and equipment is therefore the emergency vehicle operator's primary responsibility, and how an organization responds to a particular service-call under exigent conditions is often a scale against which the unit's leadership and the personal competence of its members are evaluated. Delay in approach to the emergency scene or en route to the hospital, or failure to arrive at all, may result in a minor crisis becoming serious or a serious incident becoming fatal. This is true whether the delay precipitates from acts or omissions of the emergency vehicle driver or those of other roadway users, but the rescue mission can be compromised even where driver error is absent when inordinate dependence is placed upon inadequate critical equipment, particularly emergency signals such as sirens and warning lights.

The exact scope of emergency vehicle accidents is rather vague, although the collisions that do occur are often dramatic and, like other aspects of the "fish-bowl occupations," usually very highly visible. We do know that an injury-producing traffic collision occurs about every three seconds and that a life is lost on the highway about every five minutes. According to the National Highway Traffic Safety Administration, emergency vehicles accounted for 24 percent of the "other vehicles" reporting category (excludes common conveyances like buses, passenger cars,

motorcycles, and trucks) in 1976, but accounted for only 14 percent of vehicle occupant fatalities in that category, with police cars representing 42 percent of these, ambulances 38 percent, and fire trucks 20 percent.¹ These figures apparently do not reflect pedestrians involved, although the National Safety Council reporting systems indicate that about 9,000 lose their lives each year.² The California Highway Patrol's "1979 Annual Report of Fatal and Injury Motor Vehicle Traffic Accidents" shows that two persons were killed and 1,270 were injured in emergency vehicle collisions last year in California.³ A computer survey entitled "1979 California Accidents Involving Emergency Vehicle (sic) by Primary Collision Factor" identified 4,733 accidents, of which 1,528 were injurious and 19 were fatal; the other 3,186 resulted in property damage only.

It is obvious that emergency vehicles are not immune to the rules of the road, whether in the frame of Uniform Traffic Codes or the physical laws of gravity and inertia. After a tragically lengthy experience base of accidental death, bodily injury, loss of equipment, vehicle down time, and financial liabilities such as lawsuits and escalated insurance premiums, the rescue industry has developed its own programs or supported existing Emergency Vehicle Operator Courses. Several educational films are being marketed, addressing specific target occupations ("Ambulance Run", "Fire — Code Three", and "Police Pursuit", for example).

Audio And Visual Warning

Probably as the combined result of increased demands for professionalism in the helping occupations and more comprehensive data collection resources, there has been a rising interest in the relationship of driver expertise and the structurally inherent factors that

could be considered safety adjuncts, such as sirens, emergency light systems, and the color and profile of the vehicle. In negotiating through traffic at the greatest speeds consistent with safety, agency policy, and the law, an emergency vehicle operator depends upon both auditory and visual warning devices in avoiding collisions and minimizing obstructions to the prompt delivery of services. This dependency continues for on-site rescue or fire suppression operations, patient stabilization and packaging, and incident investigation. Further movement in the emergency signal mode (hereafter referred to by the infamous "Code Three") may, and often does, continue on to the hospital emergency department. Finally, under certain conditions (in California, for example) vehicle statutes may authorize the return to headquarters with activated lights and sirens.

In spite of all this, substantial information now exists that many traditional concepts of emergency warning appliances may actually be unsound by their mechanical or electrical nature, as well as in their manner of use. Even those agencies that are aware of enhanced safety systems may hesitate to employ them due to initial purchase costs or the long-term burden of equipment maintenance. Moreover, some interesting, often emotionally grounded, administrative notions have apparently influenced the persistence of a few traditional, however less safe, practices. For example, many veteran highway patrol officers insist that fatigued or intoxicated drivers tend to "home in" on the blinking amber lamp of cruisers parked on the shoulder, although their agency, perhaps apprehensive of the consequences of collision by sober drivers, mandate that the flashing light be utilized. Attachment 6

By Steve Scarano,
Police Officer/NREMT

A signal is a sensory stimulus generated either to convey information or to convey a demand for particular action. Sirens, color and lights of an emergency vehicle are all signals and are designed to first solicit the attention of other roadway users to its presence and identify it as a specific type of vehicle. The secondary message is the expectation of a certain type of behavior from the motoring or pedestrian recipients of the signal, whose compliance may be evidenced externally, like slowing or moving aside, or may not be visible, like staying alert.

There exists little uniformity of emergency vehicles among states, and wide variations are often found even within jurisdictions. Red lights may be found on tow trucks, green lights may designate the privately-owned vehicles of volunteer firefighters, and blue lights may appear on law enforcement "units." Some agencies often vary their color options depending upon the call's priority of response: lifeguards rolling "Code Two" may display a yellow, rear-facing lamp, for example, or a highway patrol car may use a single steady red spotlight rather than its overhead rotating combinations of red and blue. Maintenance trucks, doctor's cars, and commercial loads may be assigned other colors and configurations, depending upon the presence (or some cases, absence) of applicable regulations.

Some states simply require flashing or alternating lights but don't specify a color, while others require a steady burning lamp of a certain intensity regardless of what other options may be exercised. While some states require only forward-shining lights, others require visibility on three sides. Finally, some states permit cities or counties to develop their own emergency light codes.

Different light, siren, or vehicle marking signals may elicit different responses from roadway users. In California, the Vehicle Code requires identical behavior regardless of the type of vehicle bearing the emergency signal: drivers must yield the right-of-way, drive to the right side of the road and stop until the emergency vehicle passes; pedestrians must remain at or go to the nearest curb or place of safety.

Signal Standardization

There seems to be an excellent basis for signal standardization. Limiting the number of possible signals tends to reduce the reaction time required for target recipients to recognize the signal and to recall the appropriate reaction.

In certain instances, such as the stresses induced by the decision-making requirements in heavy traffic conditions, or when a signal is unexpectedly introduced (most of us know that our sirens are generally detected a mere five or six car lengths away at freeway speeds) some drivers will act inappropriately. Furthermore, signals which maintain ambiguous relationships with expected responses can paradoxically create danger. The protective effect of air horns, and particularly sirens, has been notoriously overestimated; these auditory signals ineffectively penetrate roadway and engine noises and the sounds of air-conditioning, radio, and simple conversation. Furthermore, sirens provide little information in terms of broadcasting the location, direction of travel, or distance of the emergency vehicle. Sirens with variable sound modes (yelp, wail, hi-lo, etc.) impose additional decision-making responsibilities on target roadway users.

While emergency lights should warn, they should not blind nor avert the recipient's attention from the road.

If warning signal standardization is a reasonable objective, what color(s) and type(s) should be considered most effective? Generally, studies in this area have shown that some methods of comparing visibility may lead to different results than other methods. For example, equal luminous intensity must be afforded to each color being examined. Color conspicuity is also greatly influenced by the background color behind a particular light. Colors in motion may have different effects than if the same colors were stationary. Finally, the effectiveness of a color may even be somewhat dependent upon the observer's exposure-experience with that color or color combination.

The California Highway Patrol's "Blue Light" and "Twinsonic" studies indicate that no single color should be used as an emergency vehicle warning light, and that certain combinations, in a variety of deployment modes, should be considered optimum. In bright sunlight,

according to the CHP's first study, a red strobe was most visible and effective in reducing the speed of passing traffic, while blue was better in moving traffic away from the experimental vehicle. During hours of darkness, blue was most visible and considered superior in reducing traffic speed. The latter study found that dual amber lamps resulted in greater speed reduction compliance in both day and night. Combining light colors and a steady burning or slowly rotating lamp with a strobe was found to be optimum for attention-getting and for identifying the emergency vehicle's location, rate, and direction of travel.⁴

Optometrist/firefighter Stephen S. Solomon is well known for his considerable research of the eye's neurology in relation to "emergency colors." He similarly supports certain color pairings, favoring red/yellow or blue/yellow. Green lights have traditionally implied safe passage, he notes, and red is too common on the roadway in the form of traffic signals, brake lamps, and neon advertising. Where a blue lamp is of true blue color and distal to the green portion of the spectrum, it is too weak to gain attention. The eye is most sensitive to yellow, although it is admittedly a common environmental color.⁵

Weather effects, however, play an important role. Although it has been reported that two-thirds of the population perceive red objects to be farther away than they really are⁶, red light tends to scatter least away from its original direction of travel than blue light, upon striking air molecules. The size, quantity and configuration of warning lights necessary to ensure en route and on-scene safety have also been questioned. Apparently, to some point of diminishing returns, the larger the signal the better, although it may not be practicable to provide adequate power to energize many or very large lamps. While signals should warn of the emergency vehicle's presence, they should not blind nor cause recipients to avert their exclusive attention away from other roadway events.

When an emergency vehicle overtakes a lead vehicle, the lead driver's recognition typically occurs through the rearview mirror (although many motor-vehicle drivers never or only sparingly use it). Intervening vehicles may mask the overtaking emergency vehicle's approach, inducing an additional obstacle to the target driver, and assuming a domino-effect recognition. Consequently, there is a strong basis for providing emergency warning lights at a level approximating the angle of vision

through the lead vehicle's centerview mirror and rear window. On-site safety demands that adequate protection should be provided to the rear of the slow-moving or stopped emergency vehicles. This is best done with a light pattern that produces a peripheral outline effect and provides overtaking drivers an effective reference point for depth perception. Bumper or tailgate level clearing lamps are exemplary.

Effectiveness Of Strobe Systems

The relative effectiveness and safety of strobe light systems represents a continuing controversy in state-of-the-art studies. It has been demonstrated, however, that a light flickering at a slow rate appears brighter than the same light shone steadily ("brightness enhancement") and that at a certain level the human eye is incapable of distinguishing between high-speed flashes ("critical flicker frequency," where fusion occurs). Since distance estimation to a flashing source is very difficult, a driver's extra effort in attempting to localize the strobe-equipped emergency vehicle may well divert his attention away from other critical roadway events and he may still fail to sense the proper information. If the strobe is particularly bright, moreover, night vision may be compromised, especially in fog or snowfall.

The stroboscopic effect of revolving wheels, flickering television sets, sunlight passing through fence slats and aircraft propellers has won medical attention as seizure-inducing stimuli. Strobe lights have been used clinically to excite electrical activity of the brain's frequency components, causing dizziness, nausea, nervousness and in some instances seizures, but case-finding studies of actual detrimental effects of emergency vehicle strobes are apparently absent. The 1978 Commission For the Control of Epilepsy and Its Consequences estimated that one percent of the population suffers some form of epilepsy, while other researchers suggest that two to four percent of the uncontrolled epileptic population can suffer flicker-induced seizures.⁷ Many variables exist, however. While a six to 10 second exposure can be sufficient stimulus to trigger an epileptic seizure, even a single high intensity flash may do so. All other factors aside, the mere excitement of the emergency scene could precipitate a seizure as well as the emergency vehicle's warning lights per se. It appears that a consideration of the benefit-risk ratio overwhelmingly favors the use of strobe systems (in terms of the

effect on epileptics) as adjuncts to expediency and early warning, and is unfavorable to the fear of the systems as potential seizure-inducing stimuli.

The California Highway Patrol released the results of its six month field test of single and double red/blue roof-mounted strobe lights in October, 1980, and found them unfavorable. Some of the most frequently cited problems included temporary discomfort or blindness to the officers and motorists

painting a large block "harlequin" pattern on the surface, similar to the treatment given large obstructions and towers at airports.⁹ This scheme offers large area contrast with any background from any angle of view, but has only a presumed effectiveness, as no actual vehicle tests have been conducted. Other studies, however, suggest that multi-tones tend to break-up a vehicle's outline and to, therefore, serve to camouflage it, defeating the vital func-

The premise is to make vehicles very dark and very light simultaneously, by painting a large block "harlequin" pattern on the surface.

when in close proximity to the light, significant "bounce back" in fog, and a subjective, hypnotic effect. During daylight the strobe appeared to dilute the color of the lens cover, and during darkness the strobes were too brilliant for "round robin" (a traffic flow slowdown technique in which a patrol car weaves from lane to lane in front of "packs" of vehicles).

Color Choice For Vehicles

The entire surface of the emergency vehicle itself is a signal. Therefore, the color must be highly visible even during periods of reduced light and must contrast vividly with the environmental and climatic background while maintaining an emphatic psychological effect. While fire suppression vehicles tend to be more standardized in color than other primary response apparatus, some estimates indicate that about 45 percent of new paint orders are for the traditional red, while 40 percent seek the apparently more visible lime-yellow. Most of the remaining 15 percent receive white or other coats.⁸

The monochromatic population perceives only light and dark contrasts and is totally color blind. Dichromatic persons are color defective and perceive no redness or greenness — everything appears to be blue or yellow-toned to them. A federal study suggested maximizing conspicuity by making the vehicle contrast as much as possible with the average background. The premise is to make the vehicle very dark and very light simultaneously, by

tion of preserving natural information and detail.

Solomon reported that "as early as 1825 scientists knew that the human eye was 'red blind' at night and 'red weak' during even the sunniest of days."¹⁰ Unless a red vehicle surface is brightly illuminated, it will be perceived as black. White is well-suited for contrast but bears no implication of action and is muted during rain, fog, snow or dust conditions. Dr. Solomon has concluded that the most effective color for vehicles (and personnel apparel) is lime-yellow, based upon the neurology of the eye and because it is uncommonly found in the roadway and commercial environment. In fact, the FAA in 1949 directed that the color of aviation-related emergency vehicles be changed from red to "high visibility yellow."¹¹ The trend in yellow has even been applied to previously red fire hydrants.

A few alternatives to the costly business of refinishing entire fleets in lime-yellow have been suggested as interim measures; they also serve as compromises where a jurisdiction is reluctant to surrender traditional red. For example, a wide lime-yellow band at eye level and another one higher up on the patient compartment or fire truck could provide an increased warning factor.

Financial considerations have not been the only factor in administrative decisions to stay with the less visible, traditional red color. The mayor of one middle-sized southern California beach community nearly laid the local contro-

versy to rest when he publically decreed that fire trucks were red when he was a child, that the public likes red trucks, and that his town would have red trucks because it was a personal thing" with him.

In support of those who, like the mayor, would have red emergency vehicles, several manufacturers have placed growing emphasis on the effectiveness of lighting systems as the critical factor in providing early warning signals.

Emergency Personnel Safety

Public safety personnel frequently apply their skills at the roadway emergency. That hostile setting has become a common working environment for them and its hazards cannot well be appreciated by other components of the health care industry. Ironically, it is evident that the very commonplace nature of frequent roadway responses has fostered a relaxed safety consciousness among rescue people, creating a real threat of injury or death, bred by complacency. The fact is that once committed to the roadway, rescuers enjoy no particular immunity and assume all of the risks of other pedestrians, if not more so.

According to the National Safety Council, 27,800 of the 51,500 pedestrian fatalities occurring in 1979 happened at night.¹² Another 100,000 pedestrians were injured that year. Whether during darkness, daylight, the intermediate periods of reduced light (dawn and dusk), or in unfavorable weather, it is imperative that the clothing worn by emergency personnel is easily seen by drivers. Unfortunately, this is not typical among the choice of uniforms, which characteristically are various combinations of blue, green, black or brown.

One research group studied statements of accident investigators and involved drivers to find that 87 percent of the drivers who struck a pedestrian at night cited difficulty in seeing the victim, while less than 12 percent made the same allegation during the daytime. In fact, over 23 percent of the night drivers denied having seen the pedestrian victim until after the collision.¹³

In tests conducted with manikins covered with black or gray fabric, healthy and sober drivers at 40 mph saw them only 50 percent of the time. White-shrouded dummies were determined to be safely visible only up to 50 feet, and only reflectorized ones were considered safely visible above that speed.¹⁴ Commercially available high visibility uniform attachments should be

considered essential safety equipment and should be made mandatory by the employing agency. These adjuncts include fluorescent ("day-glow") and retro-reflective cap covers, tan-brown style belts, arm bands, gloves, and vest panels.

Entire garments are now available which are constructed of a reflective finish of billions of retro-reflective microspheres. This "Early Warning Fabric" has the appearance and feel of common cloth during normal lighting conditions. When the garment is struck by vehicle headlamps, however, it emits a silver glow and provides up to 600 feet of advance warning.

Most studies indicate that neither speed nor other moving violations were primary collision factors for the majority of nighttime auto-pedestrian accidents. Drivers with good 20-15 daytime visual acuity in one study were found to have less than 20-40 nighttime acuity. This acuity loss is compounded for the older

**It is imperative
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driver, who may need as much as seven times more light than a younger person to perform the same task.¹⁵ Risk factors greatly increase when the pedestrian must share the highway with an intoxicated driver.

Rescue workers at the roadway emergency must continually guard against overestimating their own visibility. "Because they have adapted to a low level of ambient illumination and thus perceive an oncoming vehicle quite easily, they may fail to appreciate the difficulty of the driver's detection task," comments researchers in a study by Indiana University's Division of Optometry.¹⁶ Data of the California Highway Patrol indicates that at 55 mph it will take the average driver 60 feet to react to a pedestrian-rescuer's sudden image, and another 165 feet to brake on dry pavement. Even at 35 mph the emergency crew should expect some 35 feet of "thinking distance" and another 67 feet for braking to occur.

It is quite apparent that not all persons

perceive or react to light and color signals in the same manner. Emergency vehicle warning signals and pedestrian safety equipment must have alerting characteristics that are not alarming or distracting, and which convey a concise meaning. An agency's assessment of what signals will be most effective should begin with a study of how its vehicles and personnel will be deployed (at high speeds, moving slowly through heavy traffic, or stopped at roadway emergency sites), the types of roadways over which the equipment will travel (speed limits, medians, one-way passage) and expected driver reactions (perhaps mandated by law or a particular age-group population). Mounting positions, synchronization, color or color combinations, and the number of lights will be based upon those factors and upon the best available experience. □

Steve Scarano is an NREMT and police officer for the Oceanside, California Police Department.

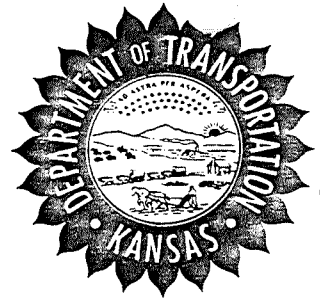
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KANSAS DEPARTMENT OF TRANSPORTATION

STATE OFFICE BUILDING—TOPEKA, KANSAS 66612



JOHN B. KEMP, Secretary of Transportation

JOHN CARLIN, Governor

MEMORANDUM TO: House Committee on Transportation
FROM: Kansas Department of Transportation
REGARDING: House Bill 2815
DATE: February 15, 1984

I. SUMMARY

House Bill 2815 amends Kansas Statutes regulating lighting equipment on authorized emergency vehicles. The bill permits the use of flashing light combinations consisting of red and blue or red, blue, and white in addition to the red or red and white lights presently allowed. The bill removes the provision that police emergency vehicles need not be equipped with red flashing lights, and would permit ambulances the option of being equipped with blue and white flashing lights.

II. FISCAL IMPACT

The bill would not impact the Kansas Department of Transportation over and above the Governor's budget recommendation.

III. COMMENTS

The Kansas Department of Transportation has concerns with House Bill 2815.

The present law governing emergency lights is modeled after Section 12-218 of the Uniform Vehicle Code (UVC) as published by the National Committee on Uniform Laws and Ordinances. This bill as drafted would not conform to the UVC which does not permit the use of blue lights.

The issue of blue lights on emergency vehicles has surfaced from time to time. The issue arose in the Fall of 1983 and at that time the Kansas Attorney General issued an opinion that Kansas Statutes do not permit the use of a blue light on emergency vehicles.

The Department would request action on the bill be deferred in order to permit study during the Legislative Interim of the use of blue lights. The need to identify the entities presently employing blue flashing lights in Kansas, the operational characteristics of red, white and blue lights and need for analysis of the Attorney General's opinion is the basis for the Department's request.

Attachment 7

Wednesday - 12:45 PM - February 15, 1984

at Joan Adams Office

Compact Bill
(10 minutes)

Mr. Garland Rice

The Missouri River is the most under-rated transportation system in Kansas. ^{development of the}
Kansas has done almost nothing to assist in the Missouri River as a transportation system.

Kansas has direct access to 6 cities with active loading and/or unloading facilities along the Missouri River - Kansas City, Wolcott, Leavenworth, Atchison, St. Joseph, and White Cloud *with 125 miles of River access area.*

Products move to and from these river locations from all over Kansas as well as other states. Products move to and from the river by rail and truck. Highway I35, I70, and US36 are three main arteries serving Kansas to and from the Missouri River.

Products include soybeans, corn, milo, wheat, soybean meal, distillers by-products, alfalfa meal and pellets, molasses, dry fertilizer, liquid fertilizer, ammonia fertilizer, coal, coke, limestone, asphalt products, all kinds of steel products, cement, paper, and many many others.

Let me cite you some examples of freight comparison using the Missouri River versus rail.

Atchison to NOLA for grain	=	16.20 ton rail
		<u>10.00 ton barge</u>
18¢/bu savings		6.20 ton
NOLA to Atchison for fertilizer	=	36.00 ton rail
Include unload		<u>12.00 ton barge</u>
Savings		24.00 ton
Steel products NOLA to Atchison	=	34.00 ton rail
		<u>14.00 ton barge</u>
		20.00 ton

However these savings are smaller than they should be because the Missouri River is the only navigable river in the U.S. that operates with less than a 9' channel Missouri River average loading in 1982 was 8'3" and 8' is considered standard.

We need your help to join with other states to insist the Corp of Engineers finish

Attachment 8

the development of the Missouri River to a 9' channel. It is a must if Kansas is to receive the full economic benefits of cheaper river transportation.

Because we have less than a 9' channel, barges to the Missouri River must be light loaded. Barges loaded from the Missouri River are loaded too light for the rest of the river system by about 200 ton per barge. Our freight charges are increased by 15% or more.

Kansas customers pay this extra transportation cost. Lets join with other Missouri River states ^{then this compact and gain the clout to} ~~and~~ insist on a 9' Missouri River channel. This could improve the economics of Kansas farmers and businesses across the state.

The Case for a Missouri River Compact

by

Randy Moody, Manager
Missouri River Marketing
Huffman Touring Company
Lincoln, Nebraska

The Missouri River barge compact can accomplish four goals:

- 1) Increase Barge traffic on the Missouri River;
- 2) Promote economic development along the river;
- 3) Encourage intermodal cooperation in the transportation of commodities; and
- 4) Increase the awareness of potential shippers and the general public of the advantages of Missouri River navigation.

The impetus for this coordinated approach to increasing Missouri River traffic stems from a European marketing trip taken by Gov. Charles Thone in the fall of 1979. While there, he observed the tremendous amount of commerce being moved on the Rhine River. Noting that many of the characteristics of the Rhine and the Missouri were similar, he became concerned about the lack of use of the Missouri for navigation.

For example, if you stand at one spot near the Rhine, you can see one tow go by every three minutes. If you stand at one spot on the Missouri, you'll see one tow every three days. Average annual tonnage on the Missouri is about 3 million. The potential, according to the Army Corps of Engineers, is 20 million tons per 8-month shipping season.

With the tremendous transportation problems that are chronic in our part of the country, it's a crime that the Missouri has not been more fully utilized - not only to ship out grain, but to bring in raw products for manufacturing.

In Nebraska, interest in the Missouri River has not been confined to the Executive Branch. Several members of our Unicameral Legislature - especially Senators

Dick Maresh, Cal Carsten, Elroy Hefner and former Senator Walter George--have long advocated increased river use.

During the 1980 Legislative Session, the Unicameral unanimously passed LB 759 directing the Governor to enter into a compact with Iowa, Missouri and Kansas "to develop the Missouri River for more barge traffic and to promote the use of barges on the Missouri River". It was signed into law on March 7, 1980.

We in Nebraska feel it is especially important that efforts to increase the use of the Missouri River be approached at a regional level. One or two states cannot make it work.

The four compact states either contain or border on the entire 735 mile length of the navigable portion of the Missouri River. The potential for unified effort to increase the river's use is virtually unlimited.

What are the advantages of a regional approach? The answers are obvious. Four states have more clout than one. Four states working in a coordinated effort certainly would be more effective in protecting the water, attracting new industry and business investment to the region, in working with the Federal government and in improving relations with each other.

In coming years there are going to be increased demands for use of Missouri River water, particularly from upriver states. Right now plans are being made for increased irrigation and increased consumptive uses of Missouri River water in the Dakotas, Montana and Wyoming. These uses have legal priority over navigation. How are we going to insure that we get our fair share of the water? By banding together in the compact. This not only will be to the advantage of navigation, but also to fish and wildlife interests--which, by the way, have no legal priority either.

Currently, the Corps of Engineers is formulating a plan to spend millions of dollars on fish and wildlife migration along the Missouri River. This plan will be sent to the Congress for action. Don't you believe that the compact states--speaking together--would have more influence on the final version of that plan than each state separately going its own way?

River users and barge line operators constantly complain about the physical barriers to Missouri navigation--sharp bends, less than a 9-foot draft, swift currents and other shipping hazards. Working with the Corps and the Congress as members of a compact, it should be much easier to convince someone to do something about these problems.

Awareness. That's what a compact will bring to state government and the general public. As a region, we need to make everyone aware of the potential of the Missouri River as a Highway of Commerce.

There's something especially appealing from a political standpoint about four states working together on a project like the Missouri River. We constantly hear cries of "Federal intervention," "get the Feds off our backs," and "we can do it better ourselves." Through the compact, we have the perfect opportunity to show how we can do it better ourselves. Don't get us wrong. We're not advocating that the states take over responsibility for operation and maintenance of the river or that we fund future construction. What we are advocating through the compact is that the four states, working together, fill a huge void by acting as advocates for its use. Private enterprise. That's what it's all about. We can

work together to encourage more barge lines to operate on the river, to attract industry that might go to Cleveland or Pittsburgh or Chicago to locate along the river, to point out to the railroads the advantages of working with the barge companies, and to educate potential shippers about the cost and energy savings than can be realized by river use.

What is going to be the cost of the compact to each state? We think it will be minimal. We're talking not of money, but of emphasis. State agencies participating in a task force can accomplish many of their objectives by performing their normal functions. We believe that with this type of commitment by each state, private enterprise will be attracted to the river for investment, construction and transportation purposes.

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LS/T5/B1-3

STATEMENT BY:
JAMES A. MCPHERSON
EXECUTIVE VICE PRESIDENT
MISSOURI RIVER BASIN ASSOCIATION

February 15, 1984

HOUSE TRANSPORTATION COMMITTEE

RE: H.B. 2887

Mr. Chairman, thank you for your invitation to appear here today to urge favorable consideration of the Missouri River Barge Compact Bill, H.B.2887.

The Missouri River Basin Association sponsors the Missouri River Shippers and Operators Committee, a group composed of companies that operate on the Missouri River and companies which ship their products by barge.

At the present time, except for this committee and MRBA, there are no other groups representing these river interests in the lower Missouri River Basin, nor is there any other group advocating the solutions of problems common throughout this region.

We therefore recommend approval of the Compact for the following reasons:

First, Missouri River navigation provides additional and much needed carrying capacity for bulk commodities. Most of these commodities are in three agriculturally oriented groups of grains, food products and ag chemicals.

In fact, during the past several years, almost 20 percent of the farm products in the lower Missouri River Basin were moved by barge, about 10 percent of the food and kindred products and about 20 percent of the ag chemicals. The average move was more than 1,700 miles.

For farmers able to ship by barge, their savings have been 5 to 7 cents per bushel as compared with the lowest cost alternative modes.

The establishment of the Missouri River Barge Compact would

Attachment 10

appear to be of great advantage in increasing farm incomes in the four states involved.

Second, programs now being addressed on a state wide basis could be expanded to a regional basis among the compact states. For example, Iowa has established a program of rail-truck-barge combined rates. The shipper need only pay one bill at a set rate therefore saving money and time.

Another example is the former Missouri River Marketing Office established by the state of Nebraska to assist shippers to transport commodities by barge. This office closed last year due to lack of money.

The Missouri River Barge Compact could be the mechanism to make these two programs regional.

Third, the four state representatives could act together on such problems as unreliable channel depths, attracting business and Missouri River promotional programs.

For example, barges on the Missouri River typically are able to load only from $7\frac{1}{2}$ to $8\frac{1}{2}$ foot depths, even though the navigation project was Congressionally authorized for nine foot depths. For each one-half foot under nine, you can count on 100 tons per barge less load. That translates simply into less profit for the barge line and more cost for the shipper, farmer and consumer.

The purposes as stated in Article I of the Compact should be considered on a regional basis rather than individually by each state.

The use of water by navigation does not exclude its additional uses for cooling electric power plants, providing water supply to the cities and towns along the banks of the Missouri, carrying away the wastes of the region and for uses for fish, wildlife and recreation.

For these many and varied reasons we hope you will give favorable

page - 3 Barge Compact

consideration to H.B. #2887, the Missouri River Barge Compact Bill.

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