MSC 3000

TRAFFIC RECORDER

VOLUME/SPEED/CLASSIFICATION

Firmware V1.28

Systems Corporation

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MSC 3000

SYSTEM OPERATION MANUAL

RECORDER

WARRANTY

Mitron Systems Corporation warrants the MSC 3000 Recorder to be free from defects in materials and workmanship for a period of one year. Liability under this warranty is limited to repair or replacement of defective parts when the equipment is shipped prepaid to Mitron's factory in Columbia, Maryland. Mitron reserves the right to perform any necessary repairs or modification on the customer's premises.

Mitron does not assume any liability for consequential damages or damage due to misuse or unauthorized attachments. In no event shall Mitron be liable for any damages, including loss of profits, lost savings or other incidental or consequential damages resulting from the use or inability to use the MSC 3000 products. Mitron cannot assume responsibility for damage due to use of any electrical circuit other than specified. In any event, Mitron's liability shall not exceed the original purchase price.

SERVICE

Questions with regard to Mitron's warranty and service program and requests for repairs and replacement parts should be directed to Mitron Systems Corporation. A service representative may be reached by calling:

410/992-7700
or
800/638-9665 (8:00am - 5:00pm Eastern Time)

Should it become necessary to return equipment to Mitron for repair, call 800/638-9665 and request a Return Material Authorization number, RMA #. The RMA # should be prominently displayed on the outside of the box. It is very important that a note explaining the nature of the equipment problem be included in the package. This note should provide the contact name and telephone number as well. Following these simple procedures will save several days of turn-around time.

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1.0 INTRODUCTION

The MSC 3000 Traffic Recorder is a rugged, solid-state, self-contained, two channel unit capable of recording traffic volume, speed or classification at pre-selected time periods.

The MSC 3000 operates with pneumatic road tubes or output signals generated from loop detectors. The roadside unit consists of an energy-efficient microcomputer, removable CMOS memory packs, air switches, optional loop detector connectors, C-size dry cell batteries and provisions for connecting an easy-to-use programmer.

The recorder's component parts are enclosed in a durable stainless steel enclosure which is rust resistant and designed to withstand vandalism as well as most environmental conditions. The air switch and loop connectors are recessed to protect against handling damage.

Operation of the MSC 3000 traffic recorder has several simple phases. First, the recorder is connected to appropriate input devices, either road tubes or loop detectors. The operator then inserts a memory pack and connects the programmer. Using the programmer, the operator enters identification information and operational parameters. This data is stored in the memory pack along with vehicle counts, speed or classification data. After an appropriate interval, the memory pack is retrieved. The memory pack is inserted in the MSC 3000 translator which either prints a traffic engineering report or transfers the data to a personal computer for analysis and printing.

2.0 FUNCTIONAL DESCRIPTIONS

2.1 Recorder

The primary function of the recorder is to accept pulses from either pneumatic road tubes or loop detectors and store vehicle counts, speed and classification data in memory packs. The recorder receives its basic operating instructions, start time, sample time, date started, etc., from the operator using a hand held programmer.

The recorder consists of a rust resistant stainless steel enclosure, two air switches, two optional piezo sensor inputs, two optional loop detector inputs, a micro-computer, 4 "C-size" non-rechargeable alkaline batteries and one or two memory packs. (See Figure 1.)

2.2 Programmer

The primary function of the programmer is to provide the recorder with the desired parameters required to collect vehicle traffic or speed data at the field location. With the programmer connected to the recorder, the operator is prompted during the parameter entry sequence via the liquid crystal display.

Additionally, the programmer is used for: 1) determining if the road tube, piezo sensor, or loop detector system malfunctioned during the recording operation; 2) indicating low battery condition; 3) displaying vehicle counts, speed rates and generating an audible tone each time the recorder senses a vehicle count when in the test mode.

The programmer consists of a 20-key low profile keyboard, a six character seven segment liquid crystal display and an audio device. These components are contained in a hand held enclosure which is attached to a six foot long cable and connector. (See Figure 2.)

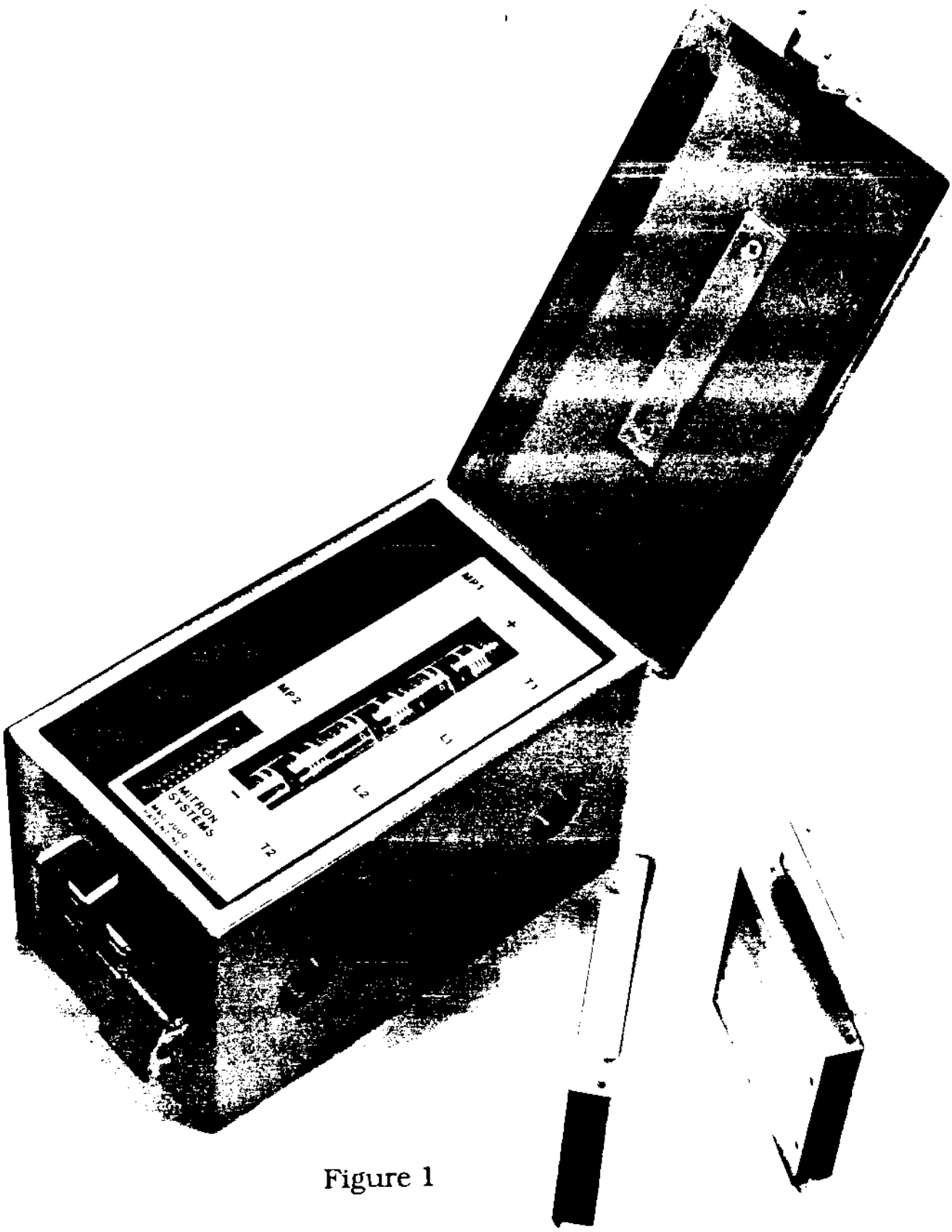


Figure 1

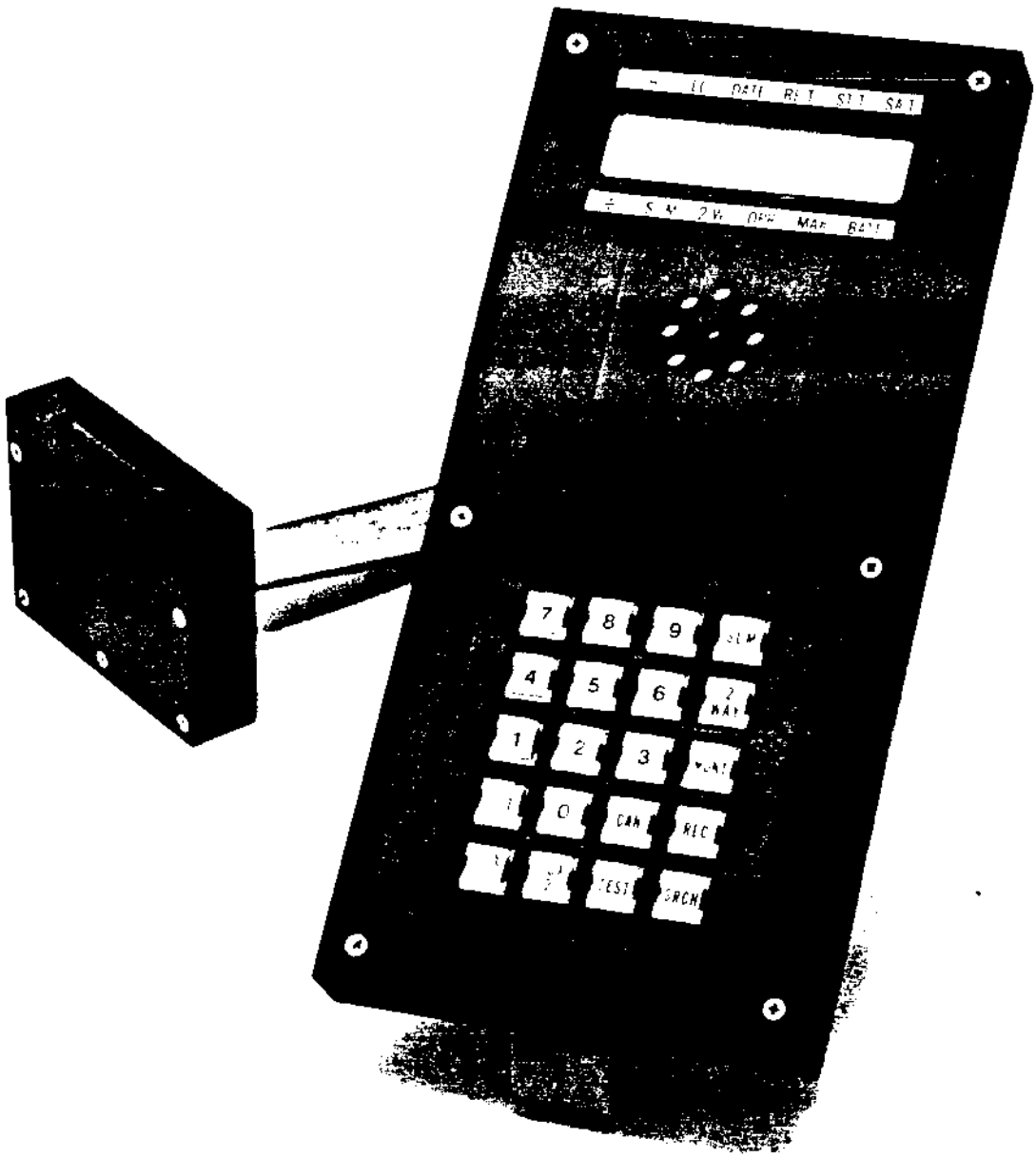


Figure 2

2.3 Memory Pack

The primary function of the memory pack is to store header information and accumulated traffic data. One memory pack per channel is inserted into the recorder. At the end of the recording period, the memory pack(s) is removed and returned to the office where it will be inserted into a translator.

An "electronic write protect" circuit is provided to eliminate the possibility of an operator accidentally using the same memory pack at more than one location. This feature will prevent the loss of previously recorded counts. Prior to setting up the recorder, the memory pack(s) should be cleared. (See MSC 3000 Translator Manual, Paragraph 3.7.)

The memory pack consists of CMOS RAM and a 2.8VDC lithium battery. The standard memory pack is equipped with 8K bytes of memory, enough storage for 14 days of volume using five minute drops; 42 days of volume using fifteen minute drops; and 170 days of volume using one hour drops. Three days of speed or classification recording are possible when sampling every fifteen minutes.

The memory pack is enclosed in a small protective enclosure for ease of insertion into the recorder and translator.

2.4 Power Source

The power source consists of 4 "C-size" non-rechargeable alkaline batteries connected in series to supply 6VDC to the microcomputer logic elements. These inexpensive batteries can be expected to provide more than a year of operation. The voltage is automatically monitored each time the recorder is installed at a field site. The operator has several weeks of use remaining when the battery low indicator is turned 'ON.'

The four batteries are retained in a plastic holder. This reduces the possibility of accidentally dislodging the batteries by rough handling of the recorder.

-- NOTE --

Due to the extremely low current drain of the recorder, the use of gold-tipped batteries is highly recommended for best performance.

2.5 Eight-Lane Summator

The primary function of the 8-lane summator is to process vehicle data of up to eight different traffic lanes simultaneously generated by the digital loop detectors and direct it to either channel one or two of the recorder. The summator's secondary function is to regulate the 12-volt battery and supply a constant 5 volts to the summator and detector circuitry. The summator also has an indicator and logic to monitor the status of battery capacity.

2.6 Digital Loop Detectors

The primary function of the digital loop detector is to generate a single pulse each time a vehicle passes over its corresponding external buried loop. The MSC 3000 can be configured with either four or eight digital loop detectors. Four detectors are mounted on one electronics printed circuit card. These digital loop detectors consume a small amount of battery power and are capable of self-tuning to a wide range of inductances.

3.0 OPERATIONAL MODE DESCRIPTION

The MSC 3000 recorder has three operational phases: 1) pre-record, 2) record, and 3) post-record. During the pre-record phase the operator can enter commands via the programmer, conduct several tests and enter parameters (header variables). During the recording phase the recorder will not respond to commands from the programmer other than to monitor the operation or terminate the recording phase and enter the post-record phase. During the post-record phase the recorder will respond to commands from the programmer to monitor input failures or real time. The operator may optionally re-enter the pre-record phase to setup a new recording.

3.1 Hose Connections

Prior to using the MSC 3000 traffic recorder, the pneumatic hoses must be laid out appropriately for the desired recording. If you are using loop detectors instead of hoses or piezo sensors refer to Appendix A for proper connections.

The MSC 3000 traffic counter will operate with either round tubes or half round tubes. The field site should have the following:

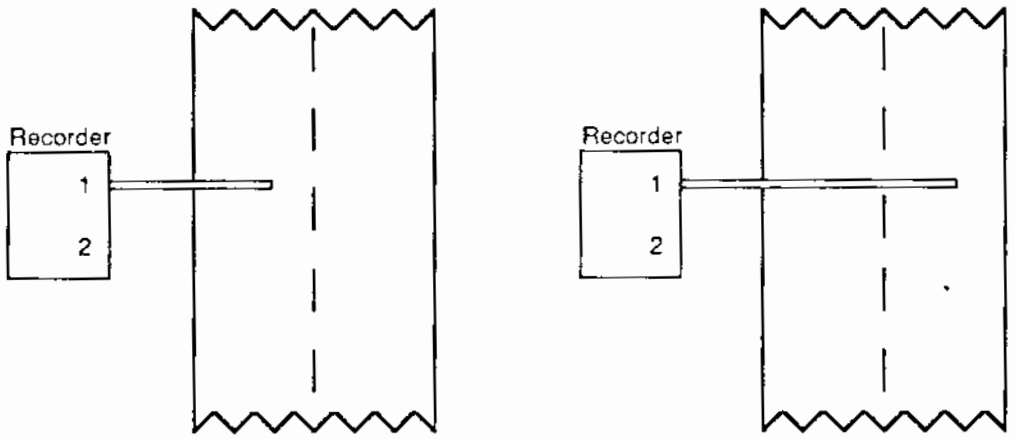
1. A smooth, straight roadway.
2. A rugged post, guard rail, light or telephone pole securing the counter
3. Shoulders that will accommodate tube clamps anchored with nails.

Always stretch the road tube approximately 10% of the distance between road clamps. When recording high speed traffic, 40 MPH and

over, use approximately 5 feet of road tube with the excess coiled up near the counter. The coil diameter should not be less than 2 feet. Bends or kinks will prevent the air pulse from reaching the counter. When recording low speed traffic, 20 MPH and below, use the shortest possible hose length. The road tube should be placed perpendicular to the road. A skewed road tube will result in generating two counts per 2-axle vehicle rather than the desired one count per 2-axle vehicle.

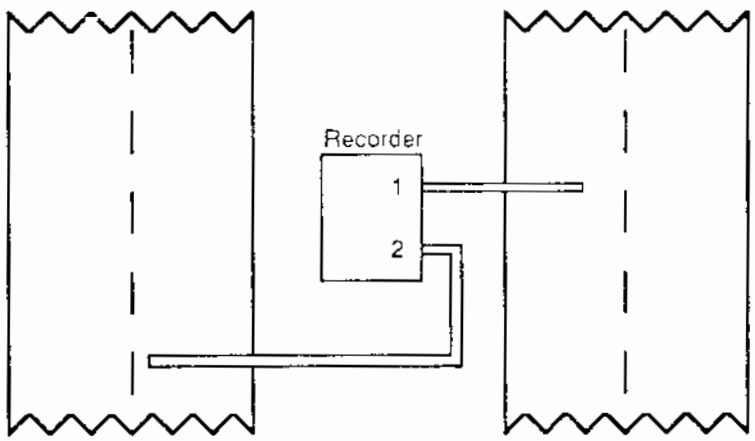
The MSC 3000 traffic recorder may be used for single channel volume, dual channel volume, two-way volume, speed or classification recording. Each recording mode has its own correct hose layout.

3.1.1 Hose Layout for Single Channel Volume



A single hose, connected to the channel 1 air switch may be stretched across one or more lanes.

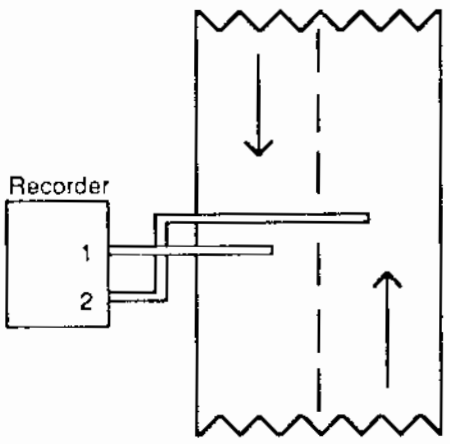
3.1.2 Hose Layout for Dual Channel Volume



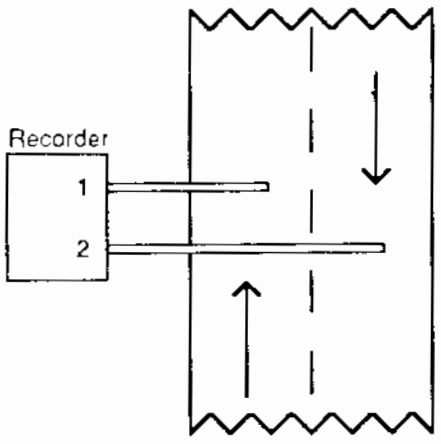
Each air hose may be stretched across one or more lanes.

3.1.3 Hose Layout for Two-Way Volume

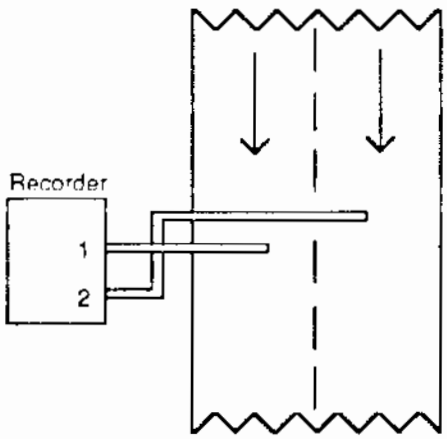
It is important to connect the long tube to Channel 2 and the short tube to Channel 1.



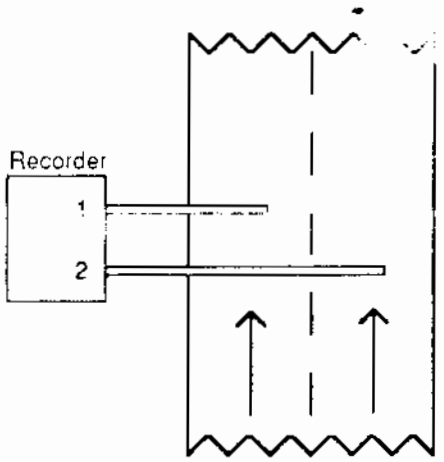
Example 1: Separate recording of northbound (outside lane) and southbound (inside lane) traffic on two lanes with road tubes.



Example 2: Separate recording of northbound (inside lane) and southbound (outside lane) traffic on two lanes with road tubes.

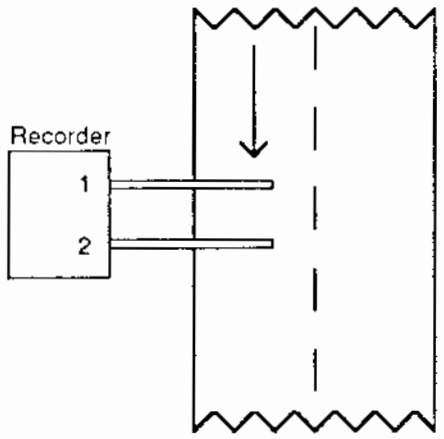


Example 3: Separate recording of southbound traffic on two lanes with road tubes.



Example 4: Separate recording of northbound traffic on two lanes with road tubes.

3.1.4 Hose Layout for Speed or Classification



Both hoses are stretched across only one lane. It is important that the traffic crosses the Channel 1 hose before Channel 2. The nominal distance between hoses should be sixteen feet (488 centimeters). The actual hose spacing should be carefully measured to the nearest centimeter for entry during the recorder setup. (See Sections 3.4.2 and 3.4.4.) It is important to use two hoses of the same length. Hoses of different lengths will introduce errors.

3.2 Power On

There is no power-on switch. Power is automatically turned 'ON' when either one of the two memory packs is inserted. To increase battery life, remove both memory packs when the recorder is not in use.

-- NOTE --

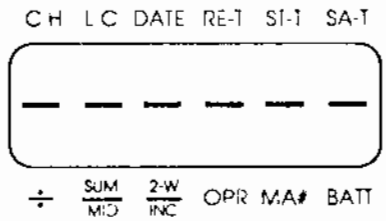
The memory packs should be cleared in the translator before use.

Connect the programmer to the recorder. Disregard any display that may show on the programmer. You may press any key other than TEST to display the firmware version number.

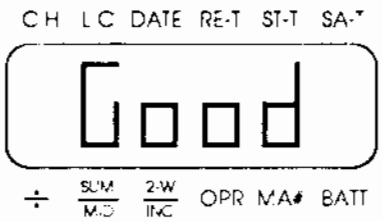
3.3 Memory Test

Before the recorder can be used to collect traffic counts, a memory test must be performed to determine if (1) a previously recorded memory pack from another site has been accidentally inserted, or (2) there has been a memory pack component failure since it was last used.

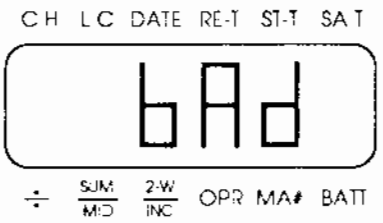
To initiate the memory test, depress the key marked TEST on the programmer. While the memory test is being performed, the programmer will display



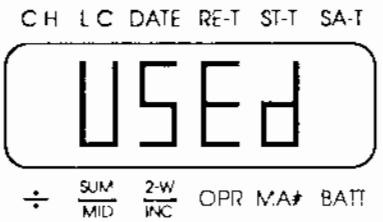
If the memory pack is unused and passes the test, the display will change to



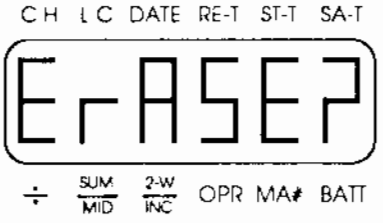
A pack with a hardware fault will result in a display of



while one that already contains data will be indicated by



If the display says USEd and you know that the data in the pack is no longer needed, you may press AUX 1. The display will show



asking if you want to erase the pack. Press TEST to erase the pack and rerun the memory test.

- NOTE --

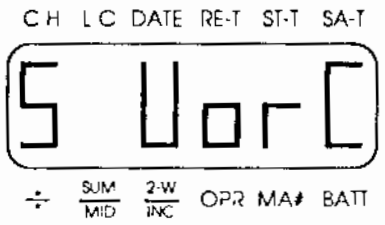
Unless the word Good is displayed on the programmer, you cannot proceed to the next operational mode. If bAd is displayed, you must use another memory pack.

3.4 Input Test

After successfully completing the memory test, the operator must perform the input test. This test accomplishes two things. It selects the recorder mode (volume, speed, or classification) and it allows the operator to check his road tube, piezo sensor or loop installation prior to storing traffic counts.

3.4.1 Speed, Volume or Classification Selection

To initiate the Input Test, press the TEST key. The LCD (liquid crystal display) will show

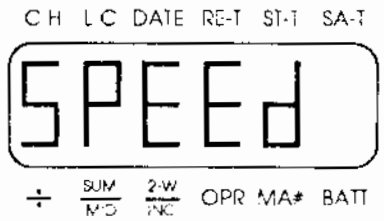


Press 1 for speed, 2 for volume or 3 for classification. The LCD will confirm your selection. If you have made the wrong selection, press CAN and select again. Once you proceed beyond this point, you

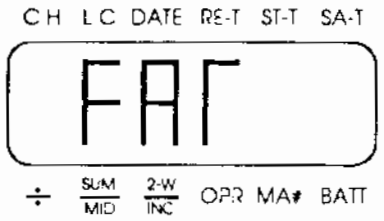
cannot change this selection. Proceed to the input test appropriate to the mode you have chosen.

3.4.2 Speed Mode — Input Test

The programmer now displays



Press TEST and the programmer will prompt for the distance between the loops or tubes with

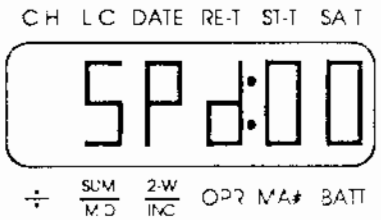


Enter the number of centimeters between the input tubes or between the leading edges of the input loops. Accuracy of this measurement is critical to the calibration of the recorder. If your measure is marked in inches, multiply by 2.54 to obtain the number of centimeters. An inch to centimeter conversion table is provided in Appendix B.

-- NOTE --

The recorder will operate on distances of 122 cm (48 inches) to 732 cm (288 inches). However, for best results, use 488 cm (16 feet) when possible.

After entering the proper distance, press ENT and the display will change to

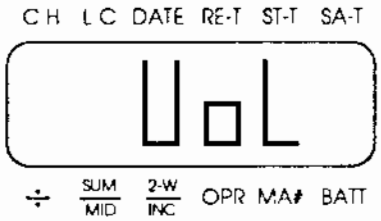


As each vehicle passes, its speed will be displayed and an audible signal will be generated.

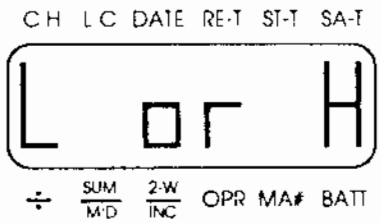
If the speeds are incorrect, check all connections and press CAN to reenter the distance measurement. When satisfied that the recorder is operating correctly, press CAN. The display will go blank and you may proceed with parameter entry (Section 3.5).

3.4.3 Volume Mode — Input Test

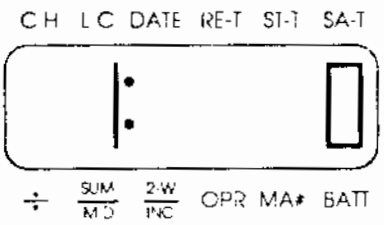
The programmer now displays



Press TEST and the programmer will prompt with



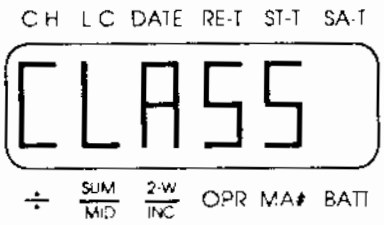
Enter 1 for loop inputs and 2 for hoses or piezo sensors. The programmer will display the count for channel 1.



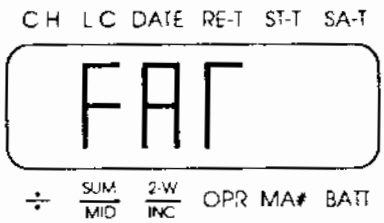
As each vehicle passes, the display will increment and the audible signal will sound. At any time, you may press 1 or 2 to test the corresponding channel. When satisfied that the recorder is operating correctly, press CAN. The display will go blank and you may proceed with parameter entry (Section 3.5).

3.4.4 Classification Mode — Input Test

The programmer now displays



Press TEST and the programmer will prompt for the distance between the hoses or piezo sensors with

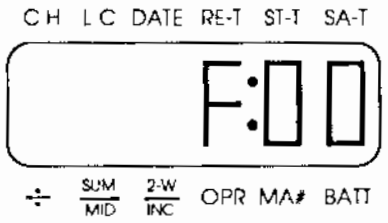


Enter the number of centimeters betw en the input tubes. Accuracy of this measurement is critical to the calibration of the recorder. If your measure is marked in inches, multiply by 2.54 to obtain the number of centimeters. An inch to centimeter conversion table is provided in Appendix B.

-- NOTE --

The recorder will operate on distances of 122 cm (48 inches) to 732 cm (288 inches). However, for best results, use 488 cm (16 feet) when possible.

After entering the proper distance, press ENT and the display will change to

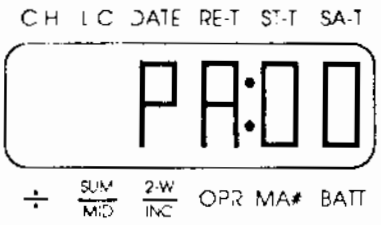


As each vehicle passes, its FWHA scheme "F" vehicle classification will be displayed and an audible signal will be generated.

-- NOTE --

The MSC 3000 is available with special software to classify vehicles according to schemes other than the FWHA "F" scheme. This special software will have a slightly different display. For example, an MSC 3000

with the State of Pennsylvania classification scheme will display



If the classifications are incorrect, check all connections and press TEST to reenter the distance measurement. When satisfied that the recorder is operating correctly, press CAN. The display will go blank and you may proceed with parameter entry.

3.5 Parameter Entry

Parameter entry consists of entering the appropriate data in response to a series of prompts. If an error is made while entering a parameter entry, press CAN and the prompt for that parameter will be redisplayed. After each parameter has been entered, look at the display to verify that it is correct. Then press ENT to store that parameter. If an error is discovered after ENT has been pressed, press CAN to blank the display and return to the start of parameter entry.

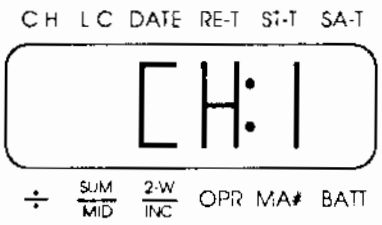
-- NOTE --

At any time during parameter entry, you may start over by pressing CAN twice at most.

At the end of parameter entry, the display will again go blank. Press ENT to proceed (volume mode only).

3.5.1 Channel 1 (volume mode only)

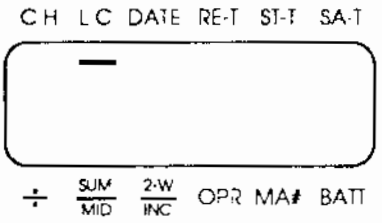
The display will show



indicating that you are starting to enter parameters for Channel 1 in volume counting mode. Press ENT.

3.5.2 Location Code

The display will prompt



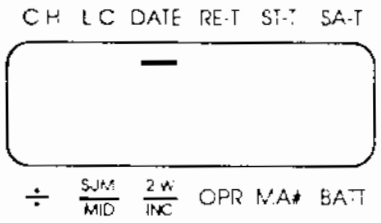
Up to twelve digits may be entered, though only the last six can be displayed. If the last digit entered is a 0, 1, 2, 3 or 4, it will be interpreted as the direction.

0 = no direction
1 = northbound
2 - eastbound
3 = southbound
4 = westbound

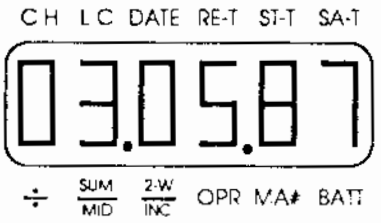
When the location code has been entered, or if none is desired, press ENT.

3.5.3 Date

The display will prompt



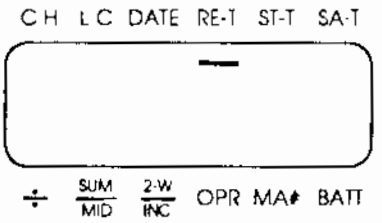
The date must be entered as six digits: two digits for the month, two digits for the day and two digits for the year. The date will be displayed with decimal points separating the month, day and year. For example, March 5, 1987 will be entered as 030587 and will be displayed as



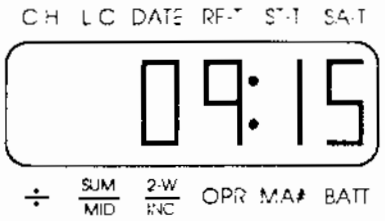
When the date has been entered, press ENT.

3.5.4 Real Time

The display will prompt



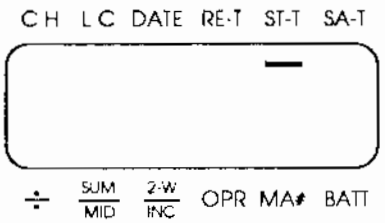
This entry sets the real time clock in the recorder. Four digits must be entered in the 24 hour range, 0000 through 2359. For example, 9:15 am would be entered as 0915 and displayed as



2:30 pm would be entered as 1430. When the time has been entered, press ENT. This zeros the seconds of the real time clock.

3.5.5 Start Time

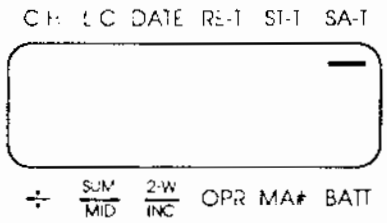
The display will prompt



Start time is entered in the same format as real time . Four digits must be entered using a 24-hour format. The recorder can be programmed to start on any hour, but the start time must be *on the hour* . The range for start time is 0000 through 2300.

3.5.6 Sample Time

The display will prompt



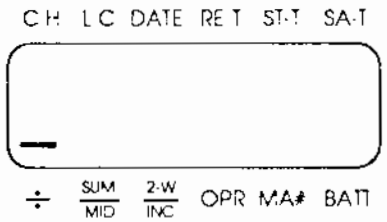
Sample time is the number of minutes between drops. Two digits must be entered. The recorder will accept any sample time from 1 to 60 minutes.

-- NOTE --

If the MSC 3000 translator is to print a report from the data, you must use a sample time of 05, 15, 30 or 60 minutes in volume mode or 15, 30 or 60 minutes in speed mode.

3.5.7 Divide (volume mode only)

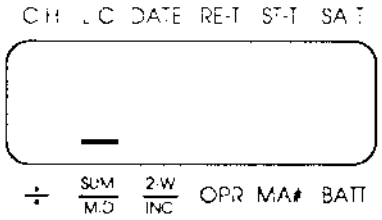
The display will prompt



When recording with inductive loops, press 1. When using road tubes or piezo sensors, press 2. For skewed road tubes on exit ramps, press 4. If this parameter is not specified, the recorder will default to divide by 2.

3.5.8 Summation (volume mode only)

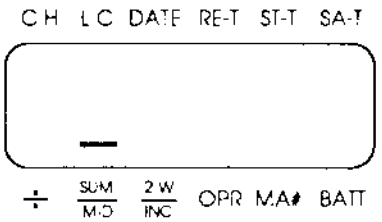
The display will prompt



If the SUM/MID key is pressed at this point, the sum of Channels 1 and 2 will be stored in the Channel 1 memory pack. If summation is not desired, press ENT.

3.5.9 Mid-Range (speed mode only)

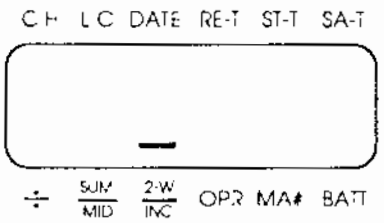
The display will prompt



The operator must enter 25, 30, 35, 40, 45, 50, 55 or 65. The selected mid-range speed (in MPH) will become the center point of the twelve speed bins.

3.5.10 Two Way (volume mode only)

The display will prompt



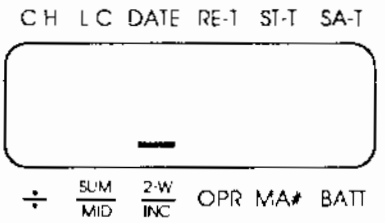
The two-way feature allows recording separate volume counts for two lanes of traffic on a single roadway using a short and a long tube.

See Section 3.1.3 for hose layout.

To select the two-way feature, press 2-W/INC, otherwise press ENT.

3.5.11 Increment (speed mode only)

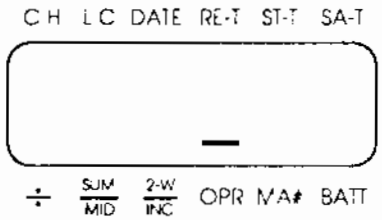
The display will prompt



The operator must enter a 2 or 5 to select either 2MPH or 5MPH speed bin sizes. The combination of the mid-range and the increment selections determine the total range of speeds to be monitored and recorded.

3.5.12 Operator Number

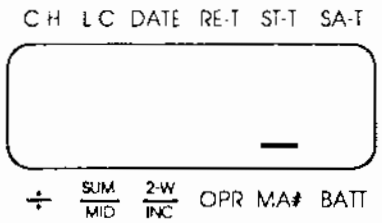
The display will prompt



Up to six digits may be entered to identify the operator setting the recorder. This parameter may be bypassed by pressing ENT.

3.5.13 Machine Number

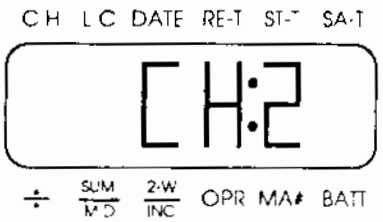
The display will prompt



Up to six digits may be entered to identify the recorder being used. This parameter may be bypassed by pressing ENT.

3.5.14 Channel 2 (volume mode only)

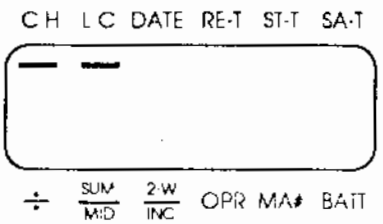
If two channels of volume data are desired, press ENT. The display will show



indicating that you are starting to enter parameters for Channel 2 in volume counting mode. Press ENT.

3.5.15 Channel 2 Location Code (volume mode only)

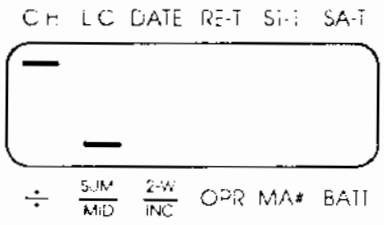
The display will prompt



The Channel 2 location code is entered in the same manner as Channel 1. When the location code has been entered, or if none is desired, press ENT.

3.5.16 Channel 2 Summation (Volume mode only)

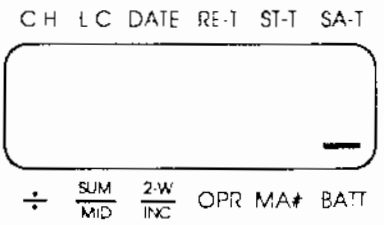
The display will prompt



If the SUM/MID key is pressed at this point, the sum of Channels 1 and 2 will be stored in the Channel 2 memory pack. If summation is not desired, press ENT.

3.6 Battery Check

When the battery voltage approaches its minimum operating level, the black bar segment adjacent to BATT (low battery) will turn 'ON' during the parameter entry phase. Should this condition exist, the batteries have approximately several weeks of useful life remaining and, therefore, should be replaced.



-- NOTE --

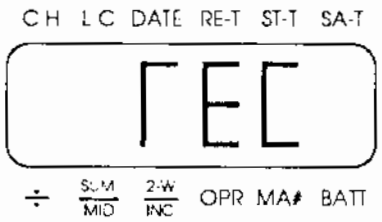
Premature failure of batteries can cause malfunction of the recorder. Due to the

extremely low current drain, the use of gold-tipped batteries is highly recommended.

3.7 Record

After all the parameters have been entered, the display will go blank. If desired, the current real time may be verified using the monitor feature described in Section 3.10.

Press REC. The display will show



indicating that the recorder is now in the record phase. When the real time reaches the start time, the recorder will begin accumulating vehicle counts. After each subsequent sample time, these counts will be stored in the memory pack(s).

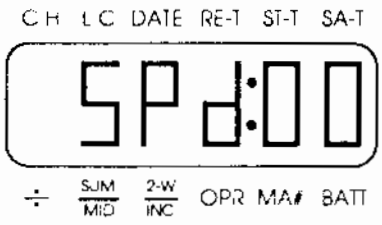
The programmer may now be disconnected from the recorder. The recorder should be closed, locked and secured to an immovable object with a chain.

3.8 Record Monitoring

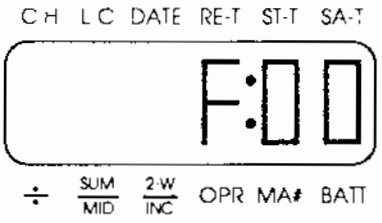
While in the record phase, the operator may monitor the real-time clock and the traffic recording.

To monitor real time, press MONT. The display will show the time set in the recorder's internal clock.

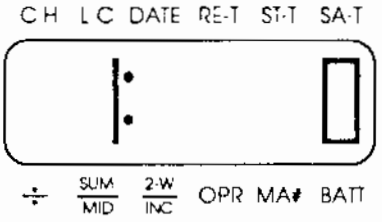
To monitor the traffic recording, press MONT a second time. If recording speed data, the display will show the speed of each vehicle as it passes.



Likewise, if recording classification data, it will show the class of each vehicle.



During volume recording, the display will show the channel 1 count for the current sample time.



As each vehicle passes, the count will increase. At any time, you may press 1 or 2 to view the corresponding channel. The count will be reset to zero each time the data is dumped into the memory pack.

To terminate the record monitor, press CAN.

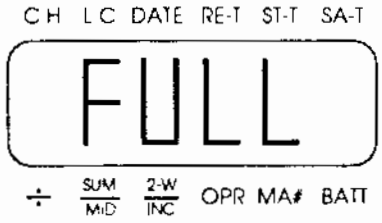
3.9 Record Termination

After collecting the desired data, the operator has two choices:
1) To terminate a recording session at a location when the memory packs will be returned to the office for translation;
2) To end a recording session at a location and move the recorder to another location for additional counting and recording within the same memory packs.

To terminate a recording session, reconnect the programmer. Press ENT and then 0. Wait for the display to clear, then remove the memory packs.

To remove the recorder to another location and continue recording in the same memory packs, press ENT and then 0. Set the recorder in the new location and enter parameters for the new location. Do NOT remove memory packs.

If the display shows



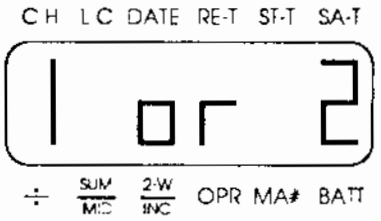
when EOT is entered, one or both memory packs have overflowed. Cleared packs must be inserted to collect more data.

3.10 Monitor

The monitor feature has two modes of operation: 1) it allows the operator to display real time, and 2) it allows the operator to determine prior to returning to the office with memory packs if the road tube, piezo sensor or loop detector failed (input failure) during the recording sessions. The recorder automatically stores the maximum number of consecutive hours that passed with no traffic pulses from either the road tubes or loop detectors. A maximum of 99 hours with no traffic counts is monitored.

To monitor real time, press MONT. The display will show real time.

To initiate the input failure test, press MONT a second time. The display will show



asking which channel is to be displayed. If Channel 1 is desired, press 1. If Channel 2 is desired, press 2. The maximum number of consecutive hours with no traffic on the channel selected will be displayed.

To change the monitored channel, simply press the appropriate channel number. To exit, either monitor mode, press CAN.

3.11 Eight-Lane Summator (optional)

3.11.1 Power On/Off Switch

The power on/off switch controls 12V battery voltage to the 5VDC regulator circuitry. The output of the regulator is connected to the summator and digital loop detector logic. Turning 'ON' this power switch will enable only the summator and digital loop detectors. Power will not be supplied to the MSC 3000 recorder with the use of this switch. (See Section 3.2 for recorder power operation description.) When the summator and digital loop detector are not in service, this on/off switch should be turned 'OFF' in order to conserve battery power.

3.11.2 Battery Indicator

A battery LED indicator has been provided to indicate the status of the battery. Three important conditions are monitored: (1) fully charged, (2) charging required and (3) cut-off voltage reached. When the indicator is blinking every three seconds, it indicates a fully charged battery, when blinking every ten seconds, it indicates charging required and when the indicator is not blinking, the cut-off voltage of the battery has been reached and power is automatically disconnected from the load.

Lead-acid rechargeable batteries that are connected to a load and operated at or below the cut-off voltage level can be severely damaged. To eliminate this possibility a logic circuit monitors the battery voltage and automatically disconnects the summator and digital detector circuits when the cut-off voltage has been sensed.

3.11.3 Lane Switches

There are eight lane toggle switches located next to the 12V battery. These switches allow the technician t , summate (add) any combination of the eight lanes into either channel one or two of the recorder. An off position for all eight lanes is provided. The switches are marked CH1, OFF, CH2 for each lane. The position of the toggle switch determines the desired summation selection. (See example, Figure 1.)

3.12 Digital Loop Detector (optional)

3.12.1 Test Mode

The TEST switch is used to visibly test the operation of the loop installation. After the loop detector connector wires are connected to the lead-in wires from the buried loops in the roadway, turn on the power switch. Depressing the TEST switch will power up the lane LED indicators for a five-minute period only (this is a power saving feature). If more than five minutes is required, the switch may be depressed again after the first five minute period has elapsed. Each time a vehicle passes over the buried loop, the corresponding lane LED will activate. The length of LED on-time will be determined by how long the vehicle is over the loop.

3.12.2 8-Position Dip Switch

One 8-position dip switch is located on the top of each digital loop detector printed circuit board (see Figure 2). The switch selections give the technician the option of selecting the following operating parameters.

Switch Position	Functional Description
1	Sets the "fail select mode." 1 (ON) If the loop or lead-in wire fails to operate properly, the corresponding detector will originate a continuous call. 1 (OFF) will disable this function.
2	Sets the general speed range for the board. 2 (OFF) is for traffic operating at speeds of 40 MPH or less. 2 (ON) is for traffic operating at speeds of 41 MPH or more. If the speed of the traffic is unknown or varies widely, set switch position 2 (ON).
3 and 4	Sets the sensitivity of the board. 4 (OFF) 3 (OFF) = Low sensitivity 4 (ON) 3 (OFF) = Med Low sensitivity 4 (OFF) 3 (ON) = Med Hi sensitivity 4 (ON) 3 (ON) = Hi sensitivity The sensitivity is normally set to the highest level which will not generate a pulse from vehicles in the adjacent lanes.
5	Changes detector #1 frequency. Used when two detector boards are installed and cross talk between lanes is experienced.
6	Changes detector #2 frequency. Used when two detector boards are installed and cross talk between lanes is experienced.

Switch Position	Functional Description
7	Changes detector #3 frequency. Used when two detector boards are installed and cross talk between lanes is experienced.
8	Changes detector #4 frequency. Used when two detector boards are installed and cross talk between lanes is experienced.

3.13 Lead-Acid Rechargeable Battery (optional)

3.13.1 Type

A rechargeable, lead-acid battery with a nominal open circuit operates at 12.7 volts. Nominal capacity at 68°F at the 20-hour rate is 6.0 ampere hours. This battery has an operating temperature range of -60°F (-51°C) to 140°F (60°C).

3.13.2 Battery Life (Lead-acid type)

In simple terms, a battery is a single or group of cells connected together to furnish electric current. The typical lead-acid battery is made up of positive and negative plates immersed in an acid electrolyte chemical compound. Charging the battery with an external source allows it to generate and store electric current for prolonged periods of time. When a load is connected across the battery terminals, the battery will give up (discharge) its stored electric current at a rate determined by the load resistance. Each time the battery is charged and discharged, there is a loss of positive and negative plate material. Temperatures can effect a battery's overall performance because the chemical compound is very active at high temperatures and inactive at low temperatures.

It is important to remember that batteries wear out. A new battery will perform within the manufacturer's specifications the first time used. However, depending on the "use factors," the battery might only deliver 50% of its rated capacity after only 30 charge and discharge cycles.

To understand why it's difficult to accurately predict how much life is in a used battery, several historical "use factors" need to be known in absolute terms. The following is a list of these factors.

(1) storage temperature and time
(2) operating temperature, load resistance and time
(3) discharge voltage level per cycle
(4) amount of discharge capacity per cycle
(5) number of discharge cycles
(6) charging voltage and time

In order to assist the traffic engineer in determining the status of the battery without recording the "use factors" on a daily basis, a logic circuit with an LED indicator has been provided. (See Section 3.11.2 for details.) This does not indicate capacity remaining, but only conditioned status.

An alternate method of determining battery capacity is to charge the battery until the open terminal voltage is equal to 2.35 VDC per cell (14.1 VDC). With the charger disconnected, connect a two ohm 60 watt resistor to the battery terminals. With a volt meter connected to the battery terminals, record the time in minutes that it takes the voltage to drop to 9.0 VDC. (Caution: The resistor will be hot.) When the battery is new, it should take 30 minutes, indicating that the battery has the capability of supplying a full 6 ampere hours of electric current. If the 9.0 VDC is reached in less than 30 minutes, take that time and divide it by 30. The resultant number will be equal to the percentage of battery capacity available.

Example: 9.0 VDC was reached in 23 minutes.
23 ÷ 30 = .76 or 76%

The battery when fully charged will only deliver 76 of its rated capacity or .76 x 6 AH = 4.56 AH. Recharge the battery prior to use.

Each time a battery is used, its future capacity is affected by the manner in which it is used and the number of times it is recharged. Eventually the battery's capacity will be lowered to a level where it will require replacement.

3.13.3 System Capacity Rating

Battery Capacity Table In Days At 70°F (21°C)
For a New Battery Charged
Within Manufacture Specifications

Number of Lanes Active	Sensitivity at High Scan Rate			
	High	Medium High	Medium Low	Low
1	67	95	112	122
2	45	67	90	108
3	33	52	84	95
4	27	42	62	84
5	22	36	45	73
6	19	31	40	67
7	16	27	36	61
8	15	24	33	56

Increasing the operating temperature of the battery to 120°F (49°C) will increase the number of days by 10%. Decreasing the operating temperature of the battery to 0°F (-18°C) will decrease the number of days by 30%.

3.13.4 Charging Methods

The life and performance of the battery is a function of the charger and how it is used. In all cases, the initial current should not exceed 3 amperes. The battery is fully charged when the voltage at room temperature is maintained at 14.1 volts and the current drops to a level of 60 (± 20) miliamps.

3.13.5 Battery Care and Maintenance

3.13.5.1 Inspection

Prior to putting a battery in service, it should be inspected for leaks. Small amounts of sulphuric acid electrolyte can damage electronic components or cause severe burns to skin and eyes.

3.13.5.2 Importance of Ventilation

Recharging should always be done in well ventilated room to eliminate the possibility of a spark causing an explosion due to hydrogen and oxygen gas accumulation.

3.13.5.3 Self-Discharge

High temperatures increase the rate of self-discharge when in storage or not in service. In general, the rate of self-discharge can be expected to double for each 20°F (11°C) rise in temperature above 70°F (21°C). Batteries stored at 0°F (-18°C) lose 5% of capacity in six months while at 100°F (38°C), lose 90%.

3.13.5.4 Boost Charging

To maintain a battery at ready condition during storage, it is suggested that boost charging be conducted at the following intervals relative to storage temperatures.

Storage Temperature	Boost Charge in Months
0° to 30°F	24
31° to 60°F	18
61° to 80°F	9

Boost charging can be accomplished by connecting a constant voltage of 14.1 volts at a maximum of 3 amperes for a period of 10-20 hours (follow general charging rules).

Cold storage at 30°F or less is highly recommended to extend the life of the battery and to reduce boost charging periods. Less boost charging will extend the battery's life cycle.

3.14 Loop Connector Cable (optional)

Supplied with each digital loop detector printed circuit card is one water-tight eight-pin prewired connector used to connect the loop lead-in wires to the digital loop detectors. Inter-connect the wires as shown in Figure 3 for proper operation.

Example:

3 Lanes North
3 Lanes South

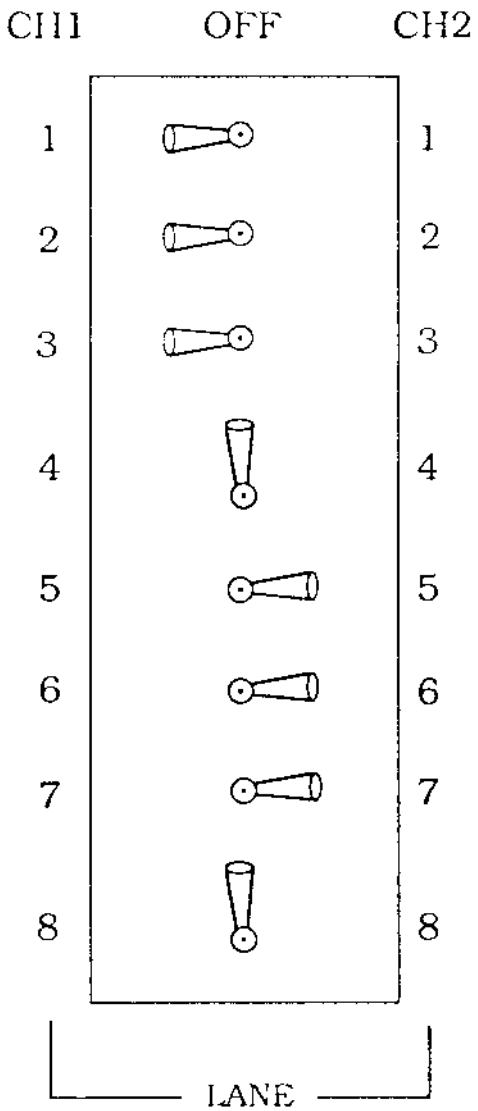


Figure 1

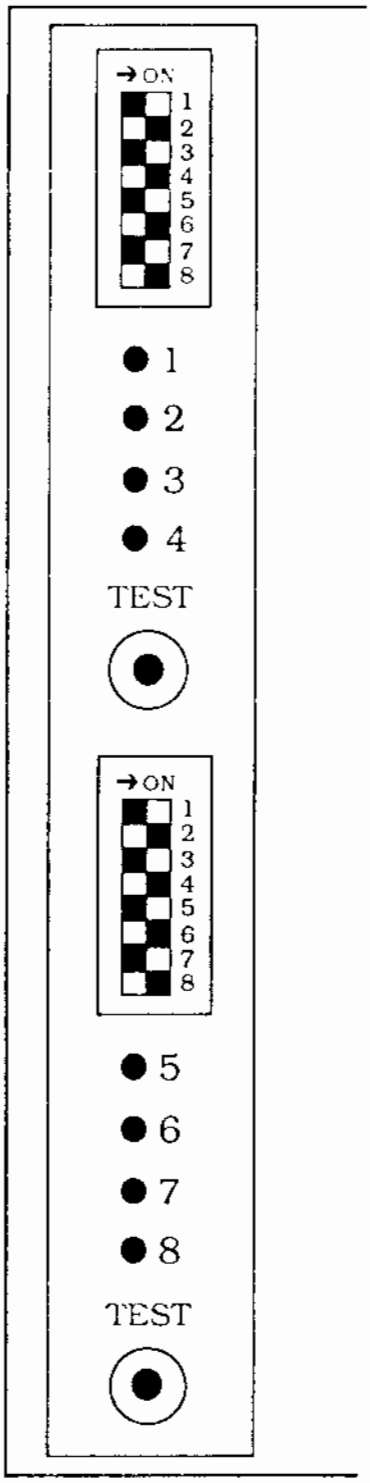
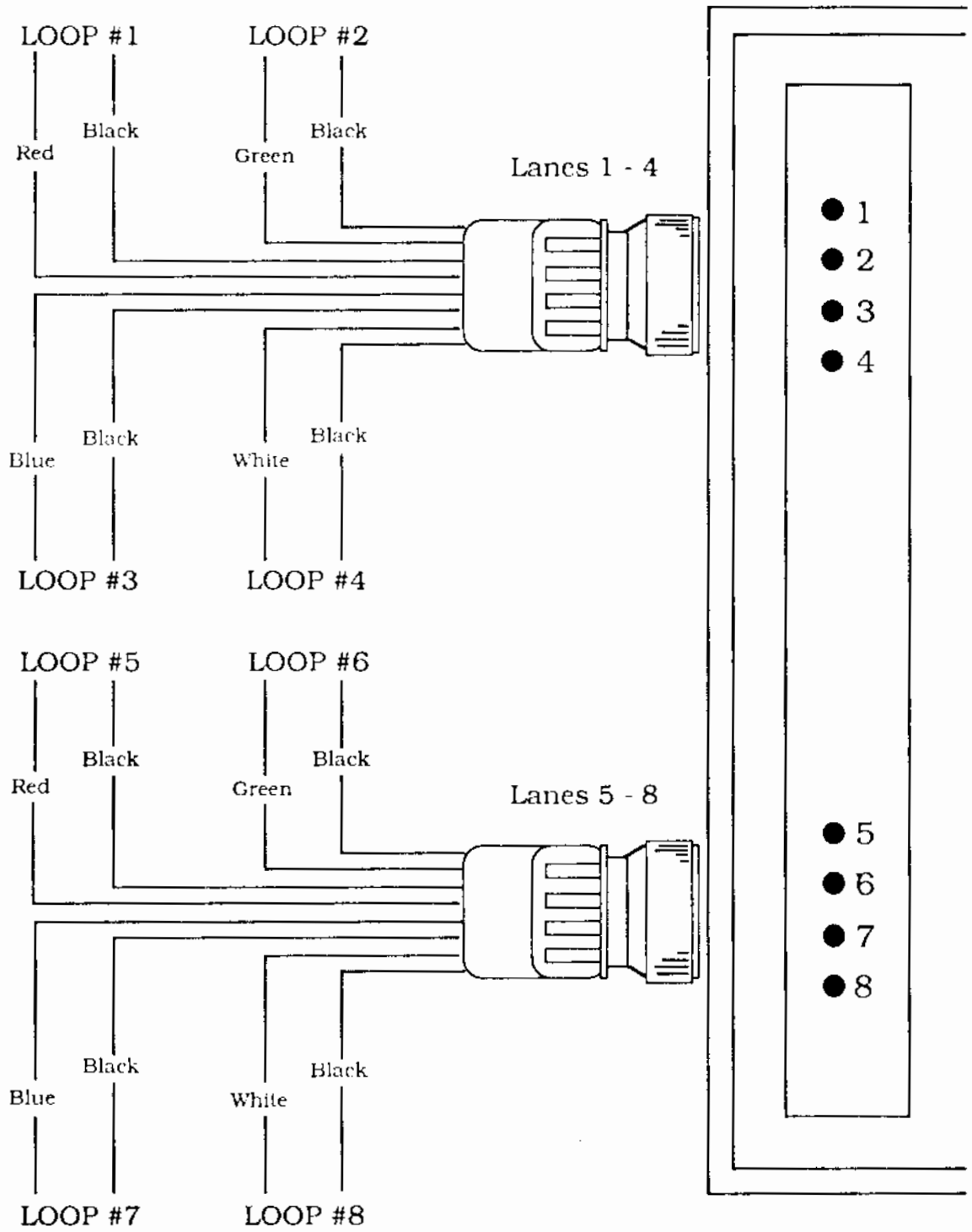


Figure 2

CONNECTOR WIRING DIAGRAM



NOTE: Wires are twisted pairs.

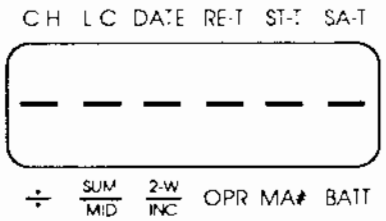
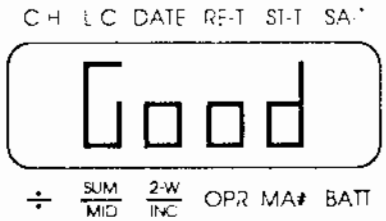
Figure 3

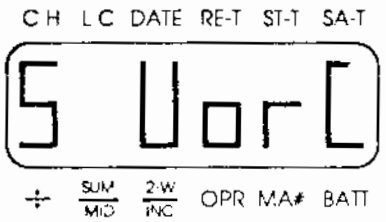
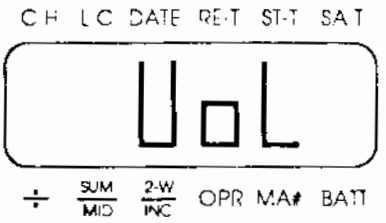
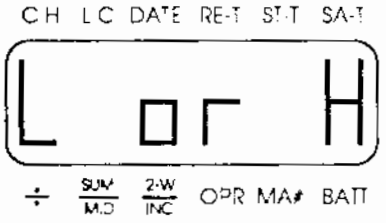
4.0 FIELD OPERATING PROCEDURES: EXAMPLES

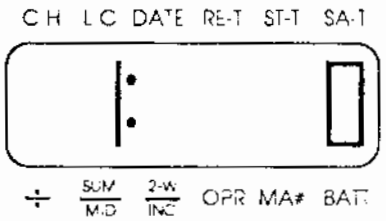
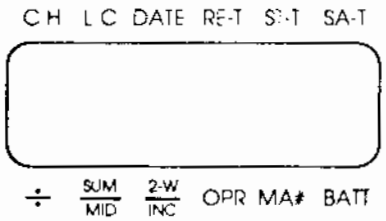
The following represents the SHORT FORM Operator's Guide. (All information contained represents examples only.)

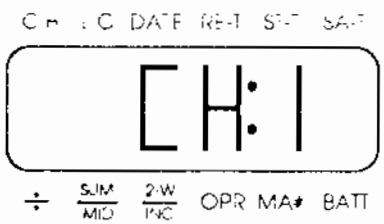
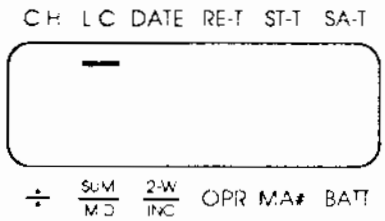
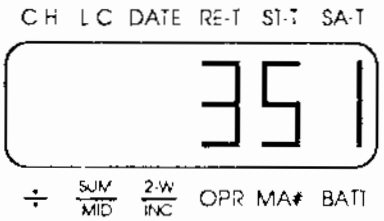
4.1 Volume, Basic One Channel Example

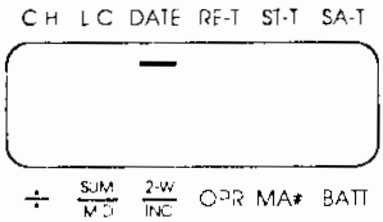
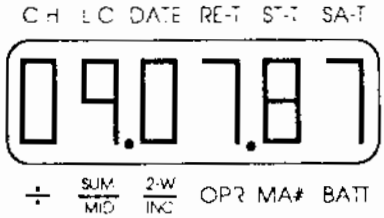
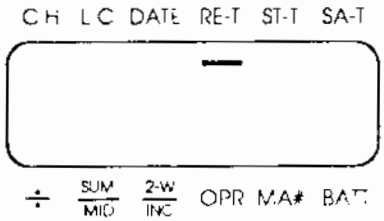
- Connect a road tube, piezo sensor or loop detector output to Channel 1.
- Insert a memory pack in position #1.
- Connect the programmer.

PROGRAMMER	COMMENTS
TEST	
	The programmer is now testing the memory pack. A 10K memory pack will take approximately 18 seconds.
	The memory pack passed the test.
TEST	Enter the test phase before recording.

PROGRAMMER	COMMENTS
	The recorder is asking which mode, speed, volume or classification.
2	Select volume.
	
TEST	Test the input.
	Are you using inductive loops or pneumatic hoses? *(Select hose if you are using piezo sensors.)
2	Select hose input.

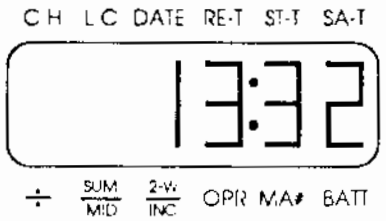
PROGRAMMER	COMMENTS
	Each time a vehicle crosses over the road tube or piezo sensor, the display will increment one count. Simultaneously, a response from the audio alarm will be heard. Because we are using a hose input, every second axle is counted. When satisfied that the installation of the hose, piezo sensor or loop is correct, proceed with parameter entries.
CAN	Cancel the input test.
	The display goes blank.
ENT	Enter the parameter entry phase.

PROGRAMMER	COMMENTS
 ENT	Channel 1 parameters must be entered.
	Location code?
351	Route 35 northbound.
 ENT	

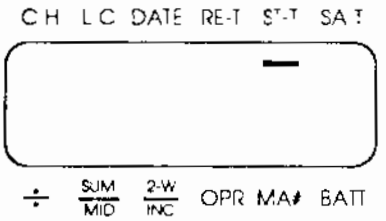
PROGRAMMER	COMMENTS
	What is today's date?
C 9 0 7 8 7	September 7, 1987.
	
E N T	
	What time is it now?
1 3 3 2	1:32 p.m.

PROGRAMMER

COMMENTS



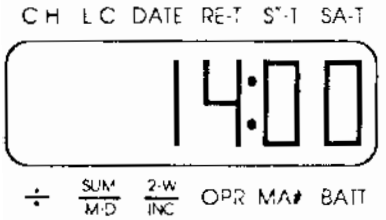
ENT



What time should the recording begin?

1 4 0 0

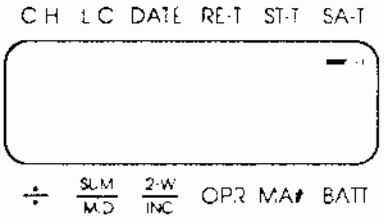
2:00 p.m.



ENT

PROGRAM ITEM

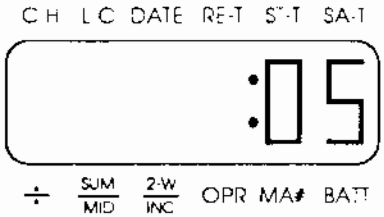
COMMENTS



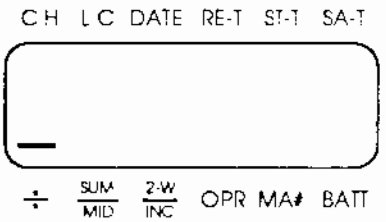
How often should the recorder take counts?

0 5

Every five minutes.



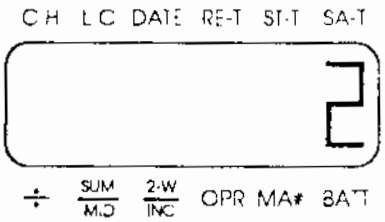
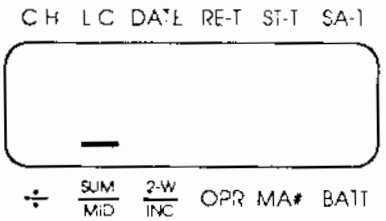
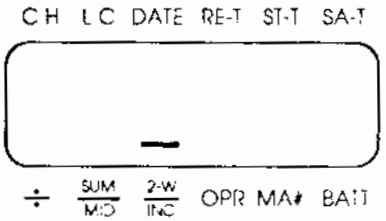
E N T

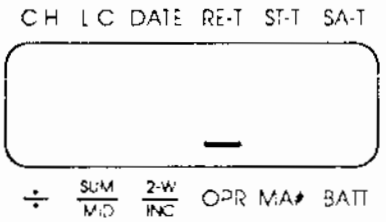
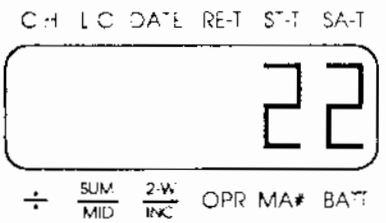
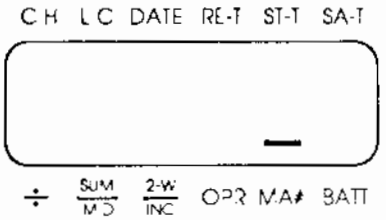


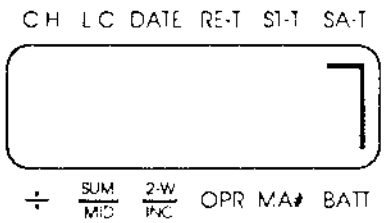
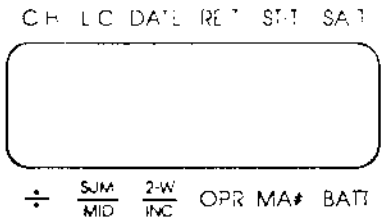
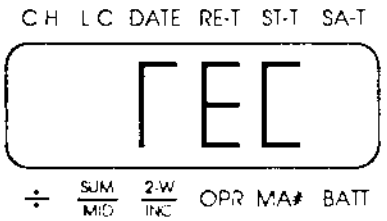
What is the appropriate divide factor?

2

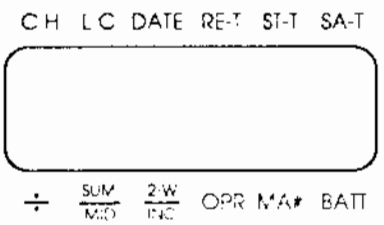
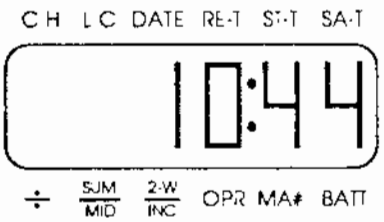
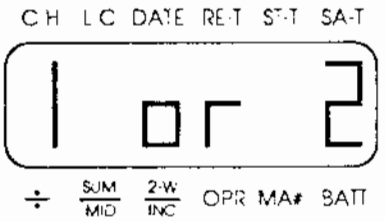
Divide by 2 for road tubes and piezo sensors.

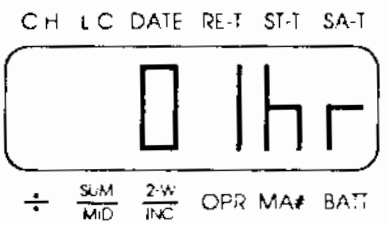
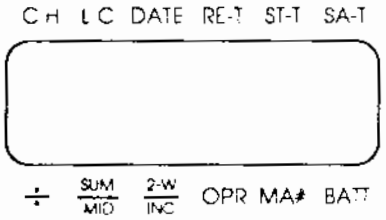
PROGRAMMER	COMMENTS
	
ENT	
	Do you want to sum both inputs into the Channel 1 memory pack?
ENT	No.
	Do you want to use the two-way feature?
ENT	No.

PROGRAMMER	COMMENTS
	What is your operator number?
2 2	Operator number twenty-two.
	
E N T	
	What is the number of this recorder?
7	This is recorder number 7.

PROGRAMMER	COMMENTS
	
ENT	
	The parameter entry phase is finished.
INC	Start the record phase now.
	The recorder is in the record phase.

- At 2:00 p.m. the recorder will start counting vehicles and storing the total in the memory pack every five minutes.
- Remove the programmer. Close and secure the recorder.
- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

PROGRAMMER	COMMENTS
ENT 0	Terminate the recording.
	The display goes blank.
MONT	Verify the correct time.
	It is now 10:44 a.m.
MONT	Check for input failure.
	Do you want to check Channel 1 or Channel 2?
1	Check Channel 1.

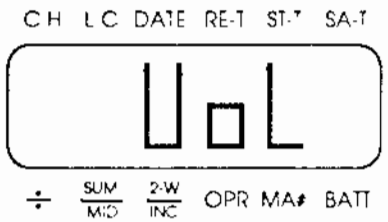
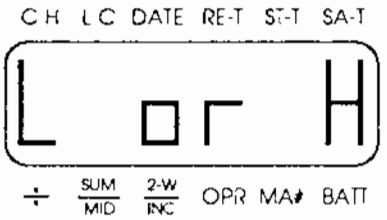
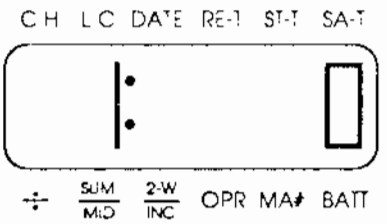
PROGRAMMER	COMMENTS
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
CAN	Cancel the monitor feature.
	The display goes blank.

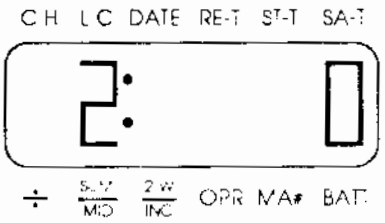
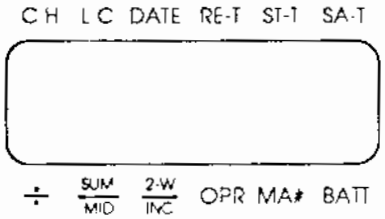
- Remove the memory pack and return it to the office for analysis.

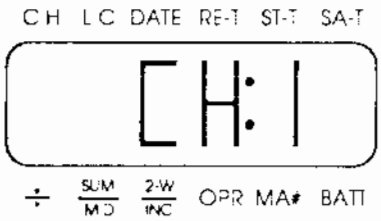
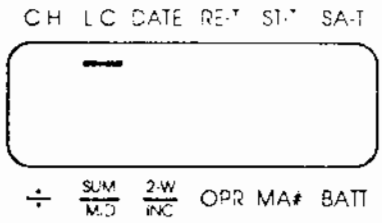
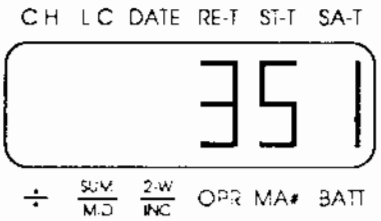
4.2 Volume, Basic Two Channel Example

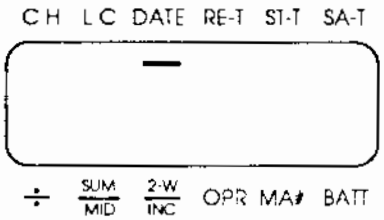
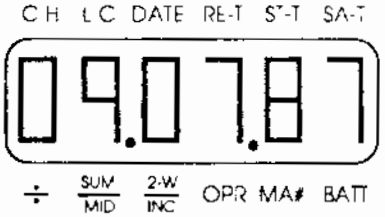
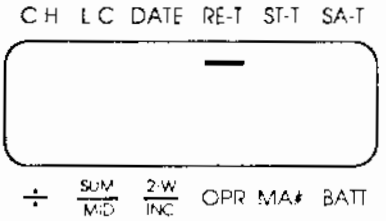
- Connect two road tubes, two piezo sensors or two loop detector outputs to Channel 1 and Channel 2.
- Insert a memory pack in each of the two slots, MP1 and MP2.
- Connect the programmer.

PROGRAMMER	COMMENTS
TEST	
CH LC DATE RE-T ST-T SA-T – – – – – – ÷ SUM/MID 2-W/INC OPR MA# BATT	The programmer is now testing the memory pack. 10K memory packs will take approximately 18 seconds each.
CH LC DATE RE-T ST-T SA-T Good ÷ SUM/MID 2-W/INC OPR MA# BATT	The memory packs passed the test.
TEST	Enter the test phase before recording.
CH LC DATE RE-T ST-T SA-T S UorC ÷ SUM/MID 2-W/INC OPR MA# BATT	The recorder is asking which mode, speed, volume or classification.

PROGRAMMER	COMMENTS
2	Select volume.
	
TEST	Test the input.
	Are you using inductive loops or pneumatic hoses? *(Select hose if you are using piezo sensors.)
2	Select hose input.
	Each time a vehicle crosses over the road tube or piezo sensor, the display will increment one count. Simultaneously, a response from the audio alarm will be heard. Because we are using a hose input, every second axle is counted.

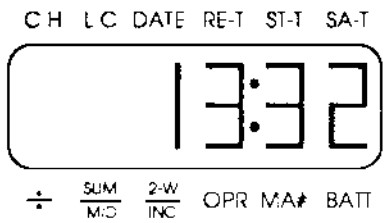
PROGRAMMER	IMENTS
2	Now, select Channel 2.
	The programmer will now indicate vehicles passing over the Channel 2 hose. When satisfied that the installation of the hose, piezo sensor or loop is correct, proceed with parameter entries.
C A N	Cancel the input test.
	The display goes blank.
E N T	Enter the parameter entry phase.

PROGRAMMER	COMMENTS
	Channel 1 parameters must be entered.
ENT	
	What is the location code for Channel 1?
3 5 1	Route 35 northbound.
	
ENT	

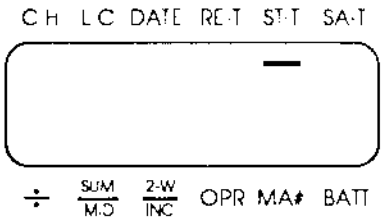
PROGRAM KEYS	COMMENTS
	What is today's date?
0 9 0 7 8 7	September 7, 1987.
	
E N T	
	What time is it now?
1 3 3 2	1:32 p.m.

PROGRAMMER

COMMENTS



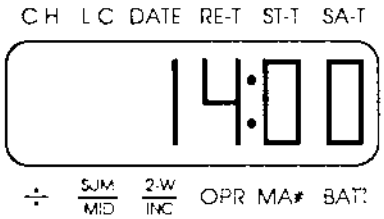
ENT



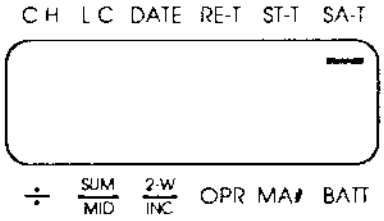
What time should the recording begin?

1400

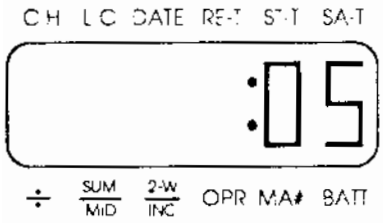
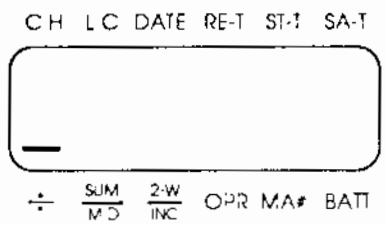
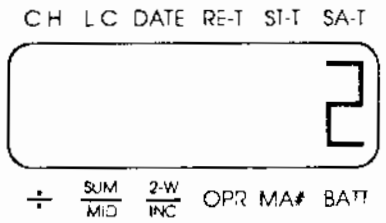
2:00 p.m.

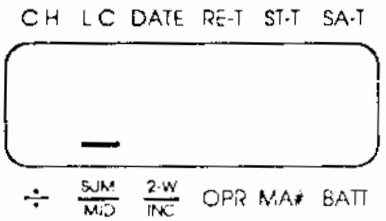
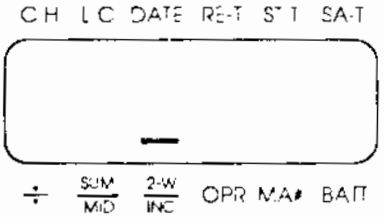
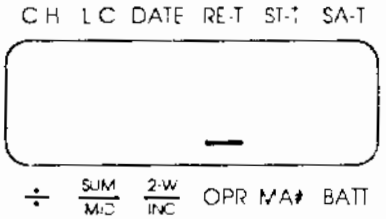
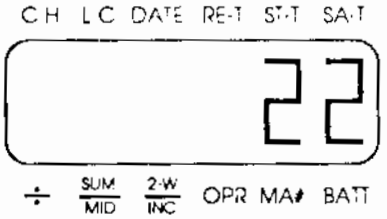


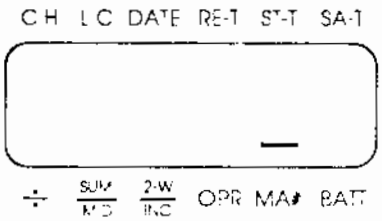
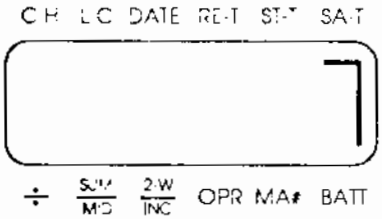
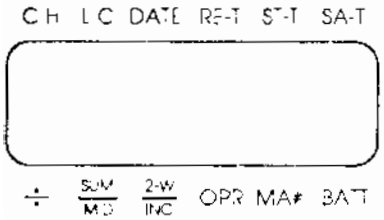
ENT

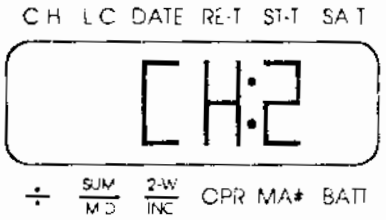
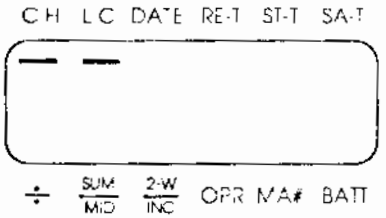
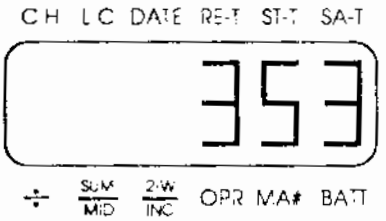
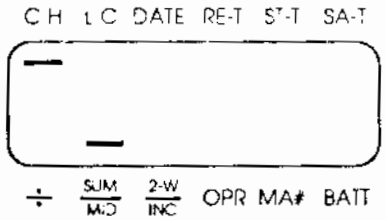


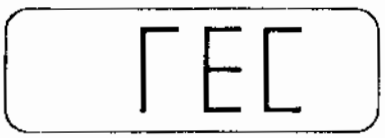
How often should the recorder take counts?

PROGRAMMER	COMMENTS
0 5	Every five minutes.
	
E N T	
	What is the appropriate divide factor?
2	Divide by 2 for road tubes and piezo sensors.
	
E N T	

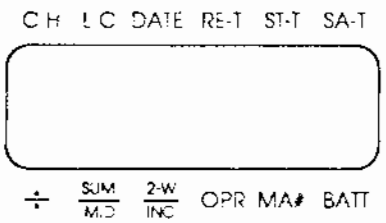
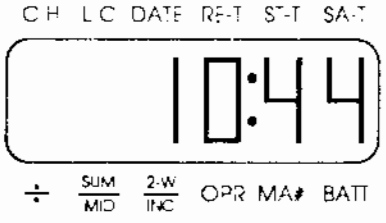
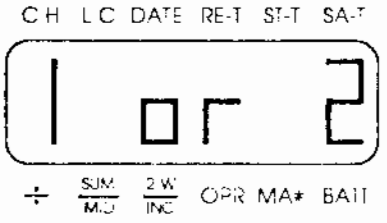
PROGRAMMER	COMMENTS
	Do you want to sum both inputs into the Channel 1 memory pack?
ENT	No.
	Do you want to use the two-way feature?
ENT	No.
	What is your operator number?
2 2	Operator number twenty-two.
	

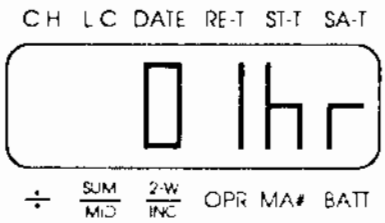
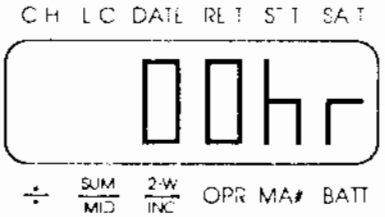
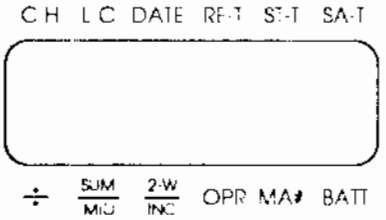
PROGRAMMER	COMMENTS
ENT 0	
	What is the number of this recorder?
7	This is recorder number 7.
	
ENT	
	The Channel 1 parameters have been entered.
ENT	Proceed with the Channel 2 parameters.

PROGRAMMED	COMMENTS
	
ENT	
	What is the Channel 2 location code?
3 5 3	Route 35 southbound.
	
ENT	
	Do you want to sum both inputs into the Channel 2 memory pack?

PROGRAMMER	COMMENTS
ENT	No.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	The Channel 2 parameters have been entered. The rest of the Channel 2 parameters will be the same as Channel 1.
REC	Start the record phase now.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	The recorder is in the record phase.

- At 2:00 p.m. the recorder will start counting vehicles and storing the total in the memory packs every five minutes.
- Remove the programmer. Close and secure the recorder.
- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

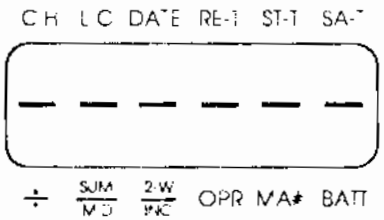
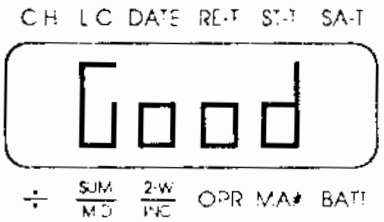
PROGRAMMER	COMMENTS
ENT 6	Terminate the recording.
	The display goes blank.
MONT	Verify the correct time.
	It is now 10:44 a.m.
MONT	Check for input failure.
	Do you want to check Channel 1 or Channel 2?
1	Check Channel 1.

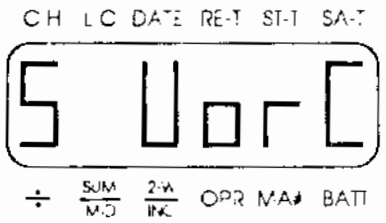
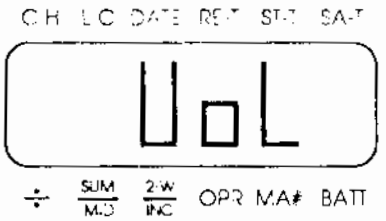
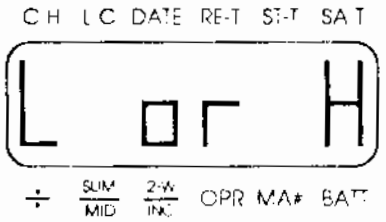
PROGRAMMER	COMMENTS
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
2	Now, check Channel 2.
	There were no hours without input on Channel 2.
CAN	Cancel the monitor feature.
	The display goes blank.

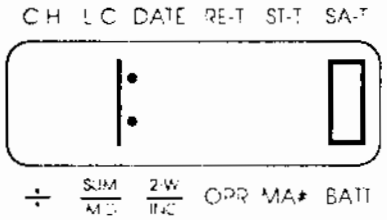
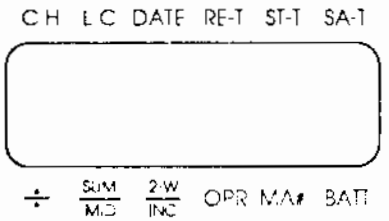
- Remove the memory pack and return it to the office for analysis.

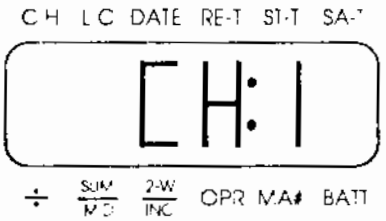
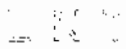
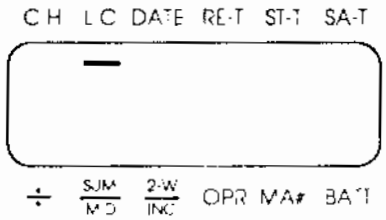
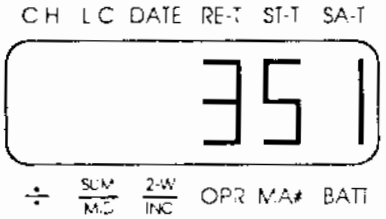
4.3 Volume, Two Channel with Summation, Example

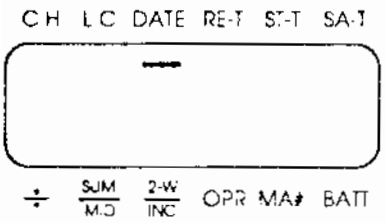
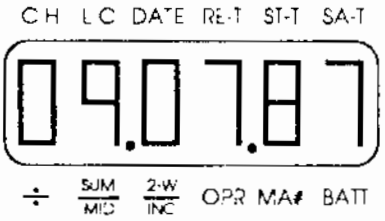
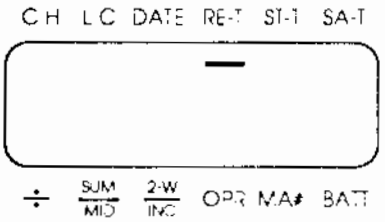
- Connect two road tubes, two piezo sensors or two loop detector outputs to Channel 1 and Channel 2.
- Insert a memory pack in slot MP1.
- Connect the programmer.

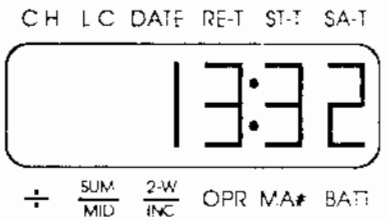
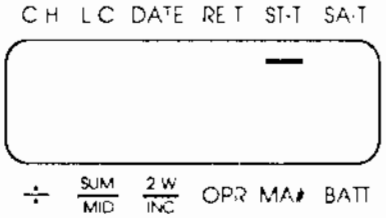
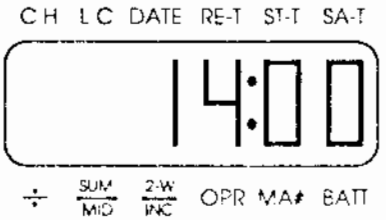
PROGRAMMER	COMMENTS
TEST	
	The programmer is now testing the memory pack. A 10K memory pack will take approximately 18 seconds.
	The memory pack passed the test.
TEST	Enter the test phase before recording.

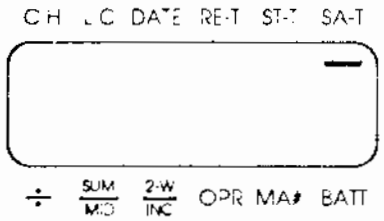
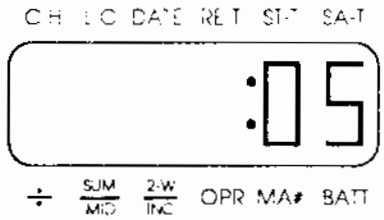
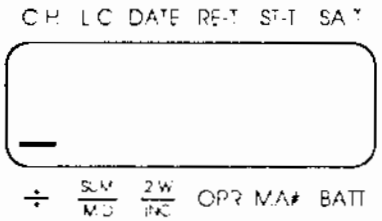
PROGRAMMER	COMMENTS
	The recorder is asking which mode, speed, volume or classification.
2	Select volume.
	
T-ST	Test the input.
	Are you using inductive loops or pneumatic hoses? *(Select hose if you are using piezo sensors.)
2	Select hose input.

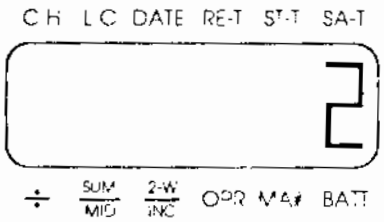
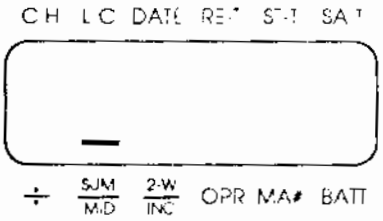
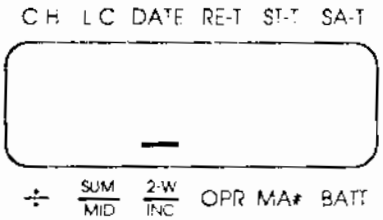
PROGRAMMER	COMMENTS
	Each time a vehicle crosses over the road tube or piezo sensor, the display will increment one count. Simultaneously, a response from the audio alarm will be heard. Because we are using a hose input, every second axle is counted. When satisfied that the installation of the hose, piezo sensor, or loop is correct, proceed with parameter entries.
CAN	Cancel the input test.
	The display goes blank.
ENT	Enter the parameter entry phase.

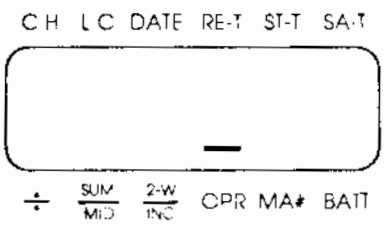
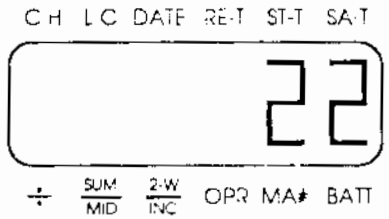
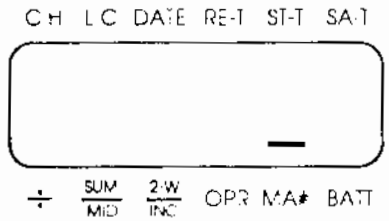
PROGRAMMER	COMMENTS
	Channel 1 parameters must be entered.
	
	Location code?
	Route 35 northbound.
	
	

PROGRAMMER	COMMENTS
	What is today's date?
C S C 7 S 7	September 7, 1987.
	
E N T	
	What time is it now?
1 3 3 2	1:32 p.m.

PROGRAMMER	COMMENTS
	
ENT	
	What time should the recording begin?
1 4 0 0	2:00 p.m.
	
ENT	

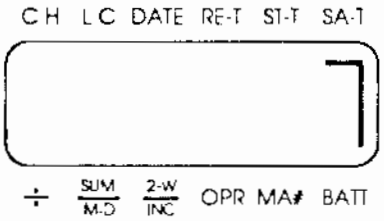
PROGRAMMER	COMMENTS
	How often should the recorder take counts?
C S	Every five minutes.
	
ENT	
	What is the appropriate divide factor?
2	Divide by 2 for road tubes and piezo sensors.

PROGRAMMER	COMMENTS
	
E N T	
	Do you want to sum both inputs into the Channel 1 memory pack?
S U M / M I D	Yes.
	Do you want to use the two-way feature?
E N T	No.

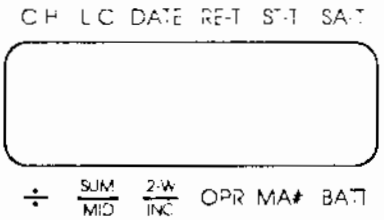
PROGRAMMER	COMMENTS
	What is your operator number?
? ?	Operator number twenty-two.
	
ENT	
	What is the number of this recorder?
7	This is recorder number 7.

PROGRAMMER

COMMENTS



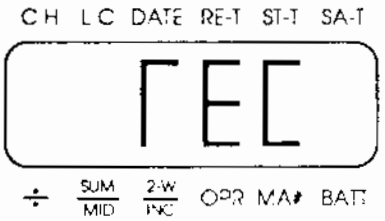
ENT



The parameter entry phase is finished.

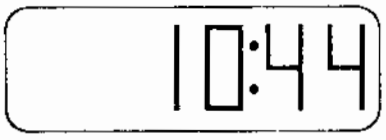
INC

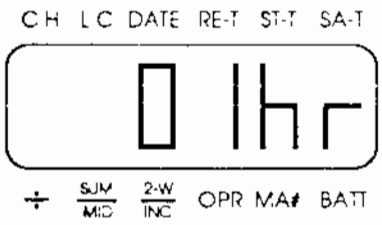
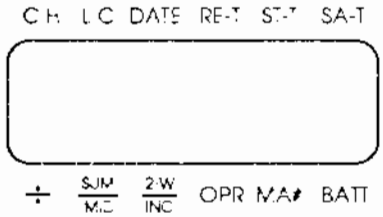
Start the record phase now.



The recorder is in the record phase.

- At 2:00 p.m. the recorder will start counting vehicles and storing the total in the memory pack every five minutes.
- Remove the programmer. Close and secure the recorder.
- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

PROGRAMMER	COMMENTS
ENT C	Terminate the recording.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	The display goes blank.
MONT	Verify the correct time.
CH LC DATE RE-T ST-T SA-T  10:44 ÷ SUM/MID 2-W/INC OPR MA# BATT	It is now 10:44 a.m.
MCNT	Check for input failure.
CH LC DATE RE-T ST-T SA-T  1 or 2 ÷ SUM/MID 2-W/INC OPR MA# BATT	Do you want to check Channel 1 or Channel 2?
	Check Channel 1.

PROGRAMMED	COMMENTS
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
CAN	Cancel the monitor feature.
	The display goes blank.

- Remove the memory pack and return it to the office for analysis.

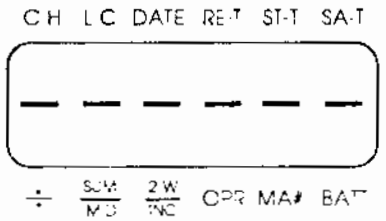
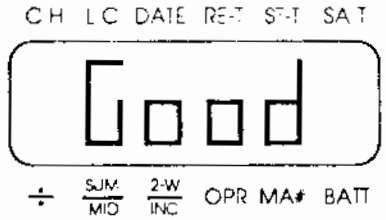
4.4 Volume, Two Channel with Two-Way, Example

- Connect two road tubes in accordance with the desired two-way configuration described in Section 3.1.3.

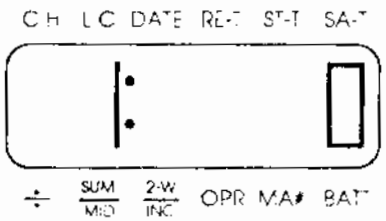
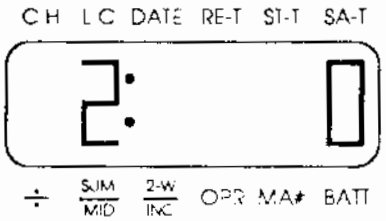
-- NOTE --

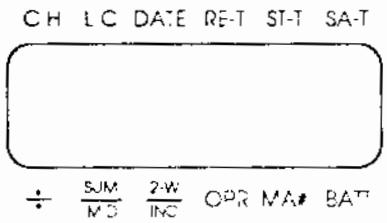
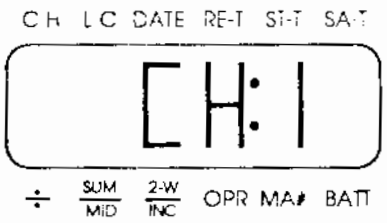
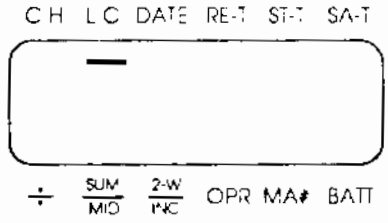
It is important to connect the long hose to Channel 2 and the short hose to Channel 1.

- Insert a memory pack in each of the two slots, MP1 and MP2.
- Connect the programmer.

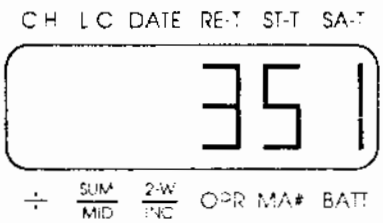
PROGRAMMER	COMMENTS
TEST	
	The programmer is now testing the memory pack. 10K memory packs will take approximately 18 seconds each.
	The memory packs passed the test.

PROGRAMMER	COMMENTS
TEST	Enter the test phase before recording.
CH LC DATE RE-T ST-T SA-T S UorC ÷ SUM/MID 2-W/INC OPR MA# BATT	The recorder is asking which mode, speed, volume or classification.
?	Select volume.
CH LC DATE RE-T ST-T SA-T UoL ÷ SUM/MID 2-W/INC OPR MA# BATT	
TEST	Test the input.
CH LC DATE RE-T ST-T SA-T L orH ÷ SUM/MID 2-W/INC OPR MA# BATT	Are you using inductive loops or pneumatic hoses?

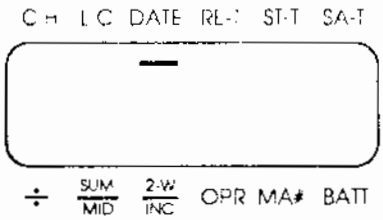
PROGRAMMER	COMMENTS
?	Select hose input
	Each time a vehicle crosses over the road tube, the display will increment one count. Simultaneously, a response from the audio alarm will be heard. Because we are using a hose input, every second axle is counted.
?	Now, select Channel 2.
	The programmer will now indicate vehicles passing over the Channel 2 hose. When satisfied that the installation of the hose or loop is correct, proceed with parameter entries.

PROGRAMMER	COMMENTS
C A N	Cancel the input test.
	The display goes blank.
E N T	Enter the parameter entry phase.
	Channel 1 parameters must be entered.
E N T	
	What is the location code for Channel 1?

PROGRAMME	COMMENTS
3 5 1	Route 35 northbound.

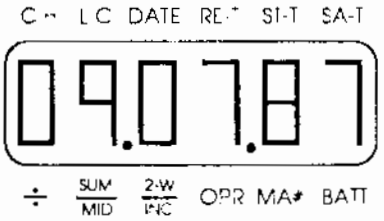


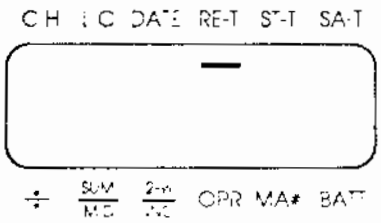
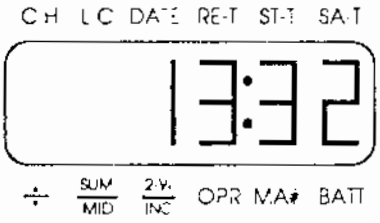
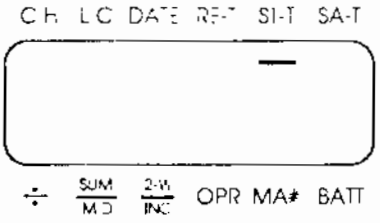
ENT

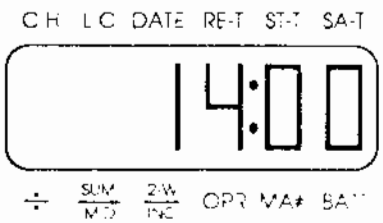
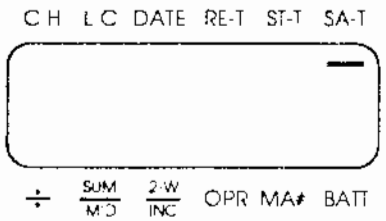
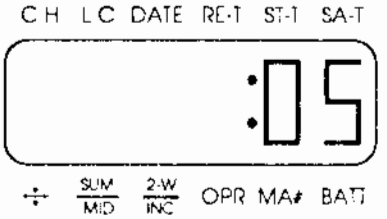


What is today's date?

0 9 0 7 8 7	September 7, 1987.



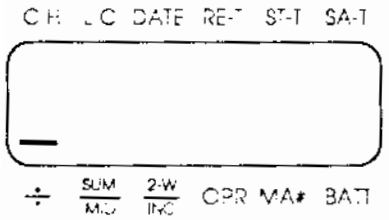
PROGRAMMER	COMMENTS
[illegible]	
	What time is it now?
1 3 3 2	1:32 p.m.
	
[illegible]	
	What time should the recording begin?

PROGRAMMER	COMMENTS
1 4 0 0	2:00 p.m.
	
E N T	
	How often should the recorder take counts?
0 5	Every five minutes.
	

PROGRAMMER

COMMENTS

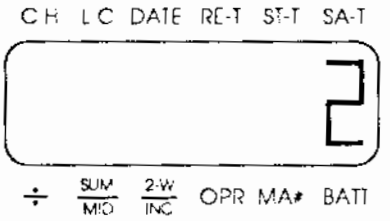
ENT



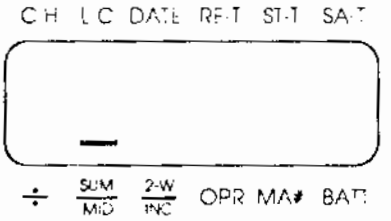
What is the appropriate divide factor?

2

Divide by 2 for road tubes.

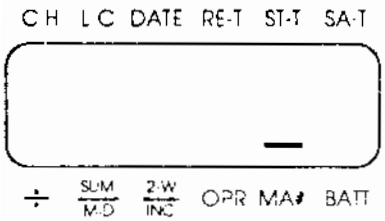
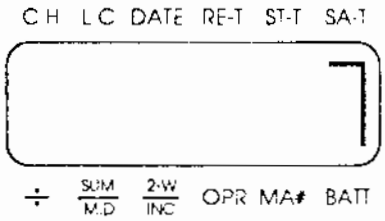
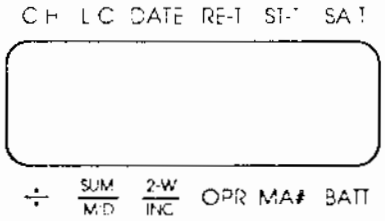


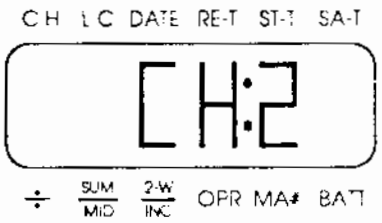
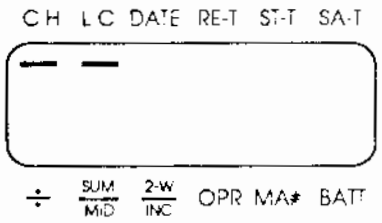
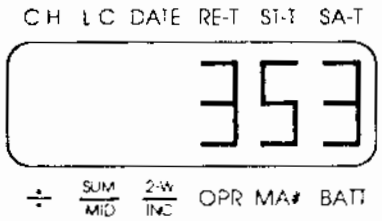
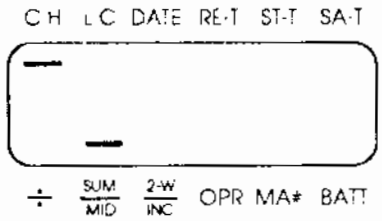
ENT



Do you want to sum both inputs into the Channel 1 memory pack?

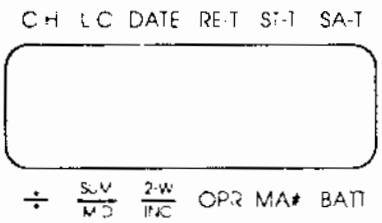
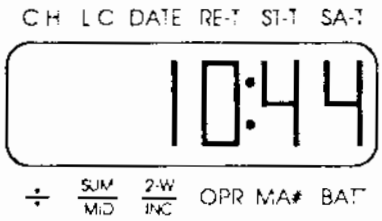
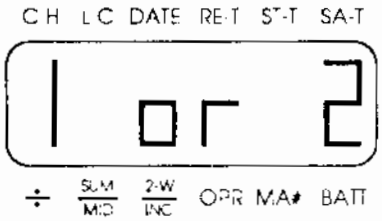
PROGRAMMER	COMMENTS
ENT	No.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	Do you want to use the two-way feature?
2-W / ING	Yes.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	What is your operator number?
2 2	Operator number twenty-two.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	
ENT	

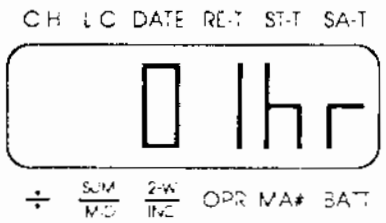
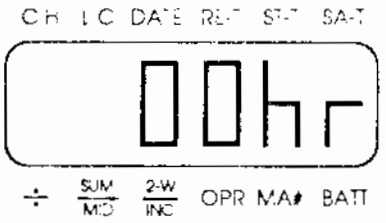
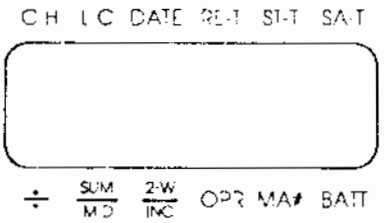
PROGRAMME	COMMENTS
	What is the number of this recorder?
7	This is recorder number 7.
	
ENT	
	The Channel 1 parameters have been entered.
ENT	Proceed with the Channel 2 parameters.

PROGRAMMER	COMMENTS
	
ENT	
	What is the Channel 2 location code?
3 5 S	Route 35 southbound.
	
ENT	
	Do you want to sum both inputs into the Channel 2 memory pack?

PROGRAMMER	COMMENTS
ENT	No.
CH LC DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	The Channel 2 parameters have been entered. The rest of the Channel 2 parameters will be the same as Channel 1.
REC	Start the record phase now.
CH LC DATE RE-T ST-T SA-T  REC ÷ SUM/MID 2-W/INC OPR MA# BATT	The recorder is in the record phase.

- At 2:00 p.m. the recorder will start counting vehicles and storing the total in the memory packs every five minutes.
- Remove the programmer. Close and secure the recorder.
- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

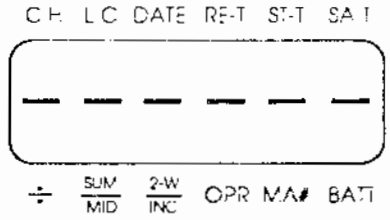
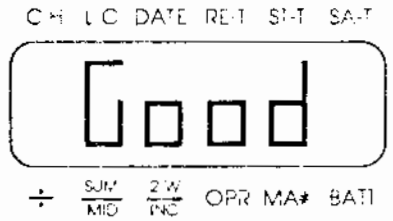
PROGRAMMER	COMMENTS
ENT C	Terminate the recording.
	The display goes blank.
MONT	Verify the correct time.
	It is now 10:44 a.m.
MONT	Check for input failure.
	Do you want to check Channel 1 or Channel 2?
	Check Channel 1.

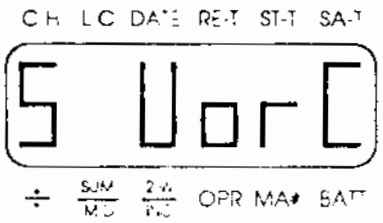
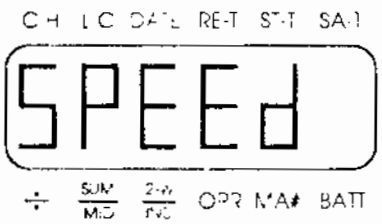
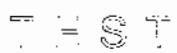
PROGRAMMER	COMMENT
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
2	Now, check Channel 2.
	There were no hours without input on Channel 2.
CAN	Cancel the monitor feature.
	The display goes blank.

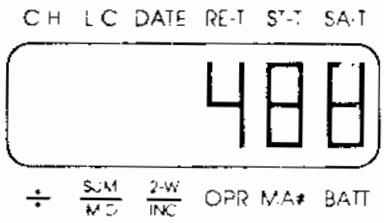
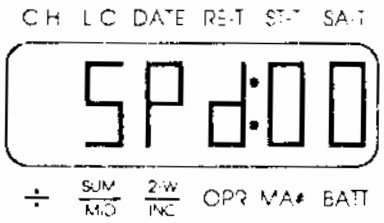
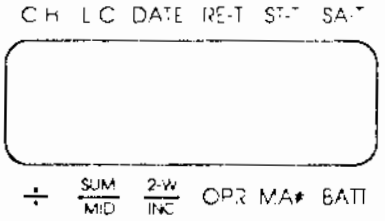
- Remove the memory pack and return it to the office for analysis.

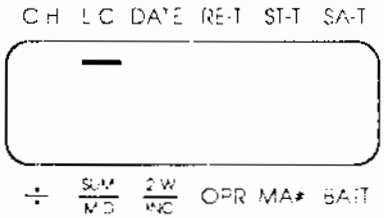
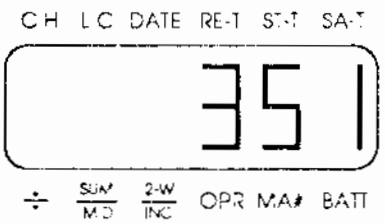
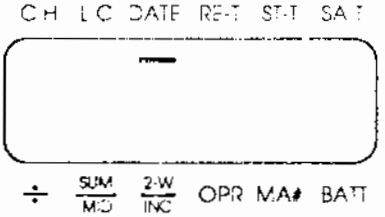
4.5 Speed, Example

- Connect two road tubes, two piezo sensors, or two loop detector outputs to Channel 1 and Channel 2. The vehicle crosses Channel 1 first, then Channel 2.
- Insert a memory pack (minimum 4K bytes) in slot MP1.
- Connect the programmer.

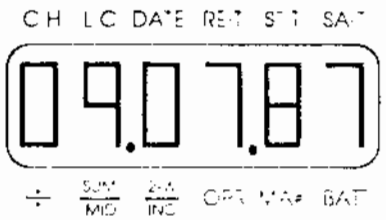
PROGRAMMER	COMMENTS
TEST	
	The programmer is now testing the memory pack. A 10K memory pack will take approximately 18 seconds.
	The memory pack passed the test.
TEST	Enter the test phase before recording.

PROGRAMMER	COMMENTS
	The recorder is asking which mode, speed, volume or classification.
	Select speed.
	
	Test the input.
	How far apart are the two hoses, piezo sensors, or loops?
	488 centimeters (16 feet).

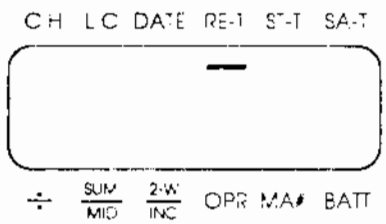
PROGRAM [illegible]	COMMENTS
	
ENT	Each time a vehicle crosses over the road tube or piezo sensor, the display will show the speed in MPH. The audio alarm will sound as the vehicle crosses each channel. When satisfied that the installation of the hose, piezo sensor or loop is correct, proceed with parameter entries.
	
CAN	Cancel the input test.
	The display goes blank.

PROGRAMMER	COMMENTS
ENT	Enter the parameter entry phase.
	What is the location code?
3 5 1	Route 35 northbound.
	
ENT	
	What is today's date?

PROGRAMMER	COMMENTS
0 9 0 7 8 7	September 7, 1987.



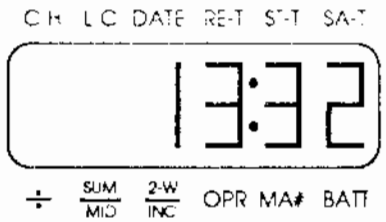
L N T



What time is it now?

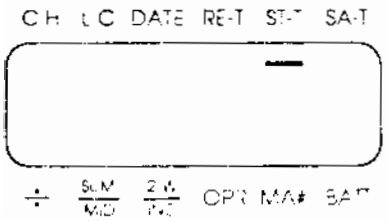
1 3 3 2

1:32 p.m.



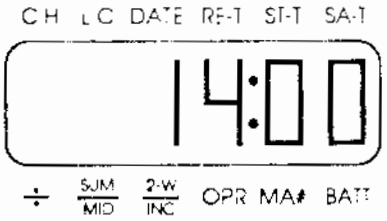
PROGRAMMER

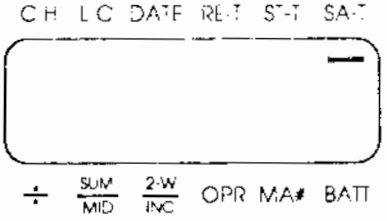
IMENTS



What time should the recording begin?

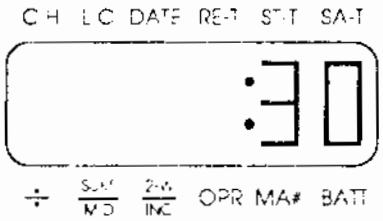
2:00 p.m.



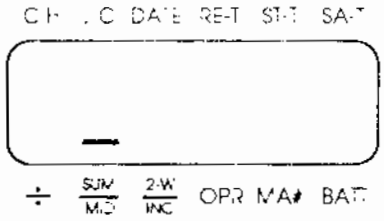


How often should the recorder take counts?

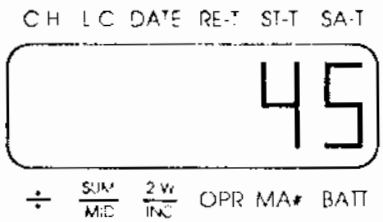
PROGRAMMER	COMMENTS
3 0	Every half hour.



[illegible]	

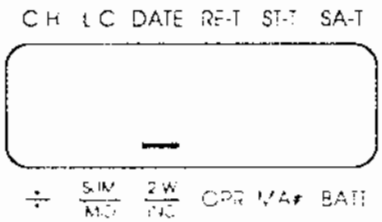


	What is the midpoint speed? (35, 45, 55 or 65 MPH)
4 5	45 MPH.



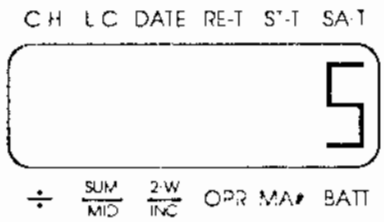
PROGRAM

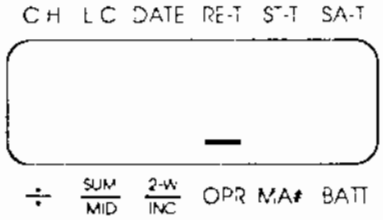
COMMENTS



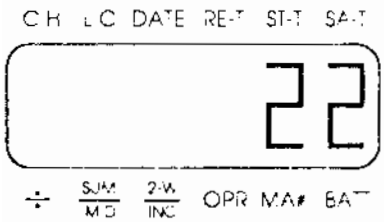
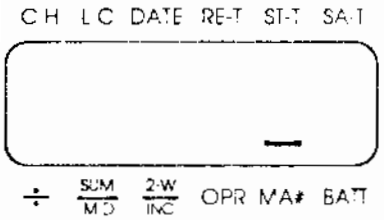
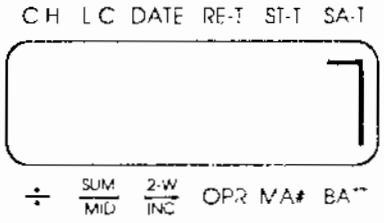
What is the bin increment or size? (2 or 5 MPH)

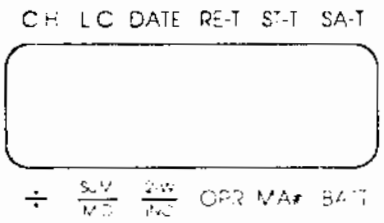
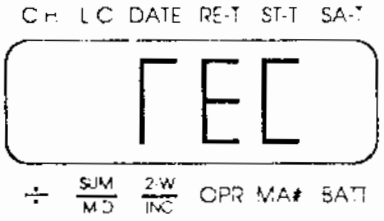
Each bin covers a 5 MPH span.



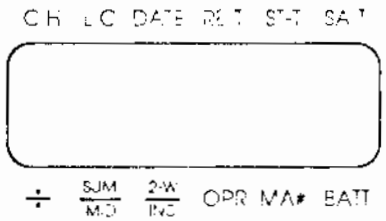
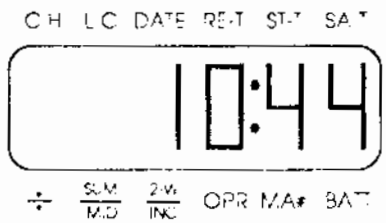
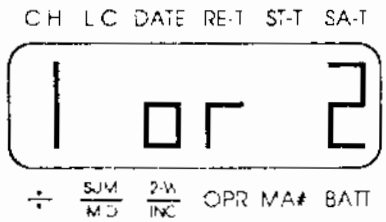


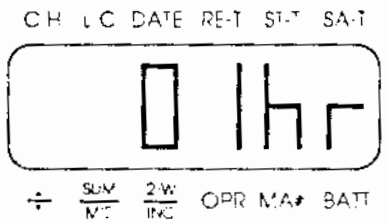
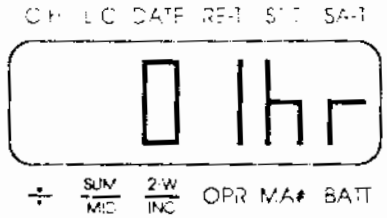
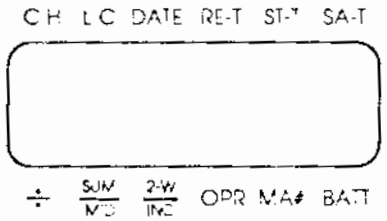
What is your operator number?

PROGRAMMER	COMMENTS
2 2	Operator number twenty-two.
	
ENT	
	What is the number of this recorder?
7	This is recorder number 7.
	

PROGRAMMER	COMMENTS
ENT	
	The parameter entry phase is finished.
REC	Start the record phase now.
	The recorder is in the record phase.

- At 2:00 p.m. the recorder will start measuring vehicle speeds and counting them in the appropriate bins. Every half-hour, the bin totals will be stored in the memory pack.
- Remove the programmer. Close and secure the recorder.
- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

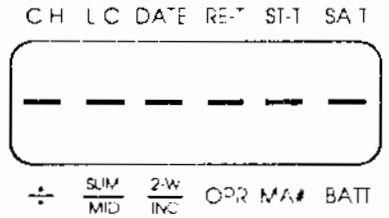
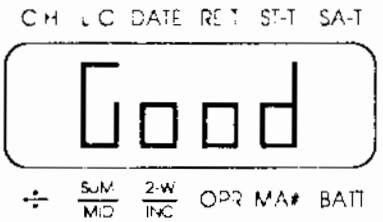
PROGRAMMER	COMMENTS
E N T E	Terminate the recording.
	The display goes blank.
M O N T	Verify the correct time.
	It is now 10:44 a.m.
M O N T	Check for input failure.
	Do you want to check Channel 1 or Channel 2?
1	Check Channel 1.

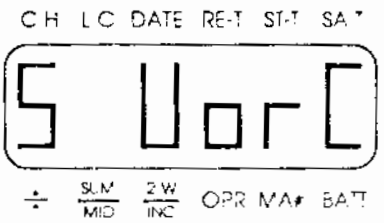
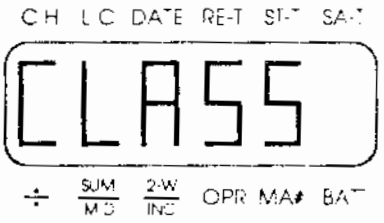
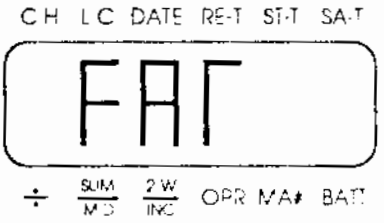
PROGRAMMER	COMMENTS
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
2	Now, check Channel 2.
	Channel 2 also shows one hour of input failure. Since the two channels agree, it is likely due to lack of traffic.
CAN	Cancel the monitor feature.
	The display goes blank.

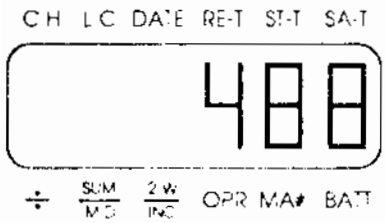
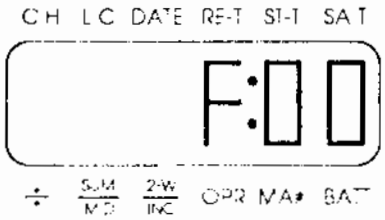
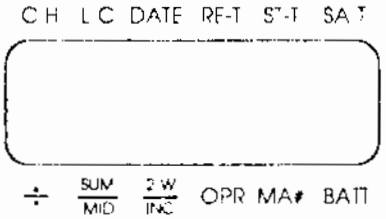
- Remove the memory pack and return it to the office for analysis.

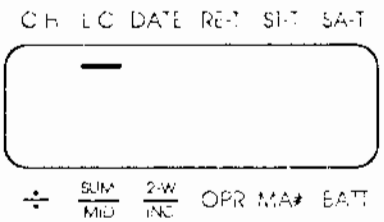
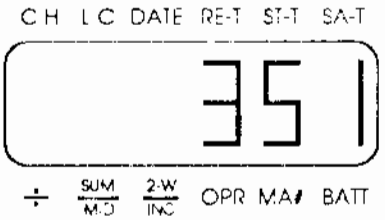
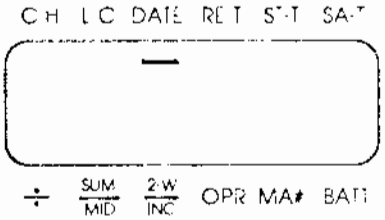
4.6 Classification Example

- Connect two road tubes or two piezo sensors to Channel 1 and Channel 2. The vehicle crosses Channel 1 first, then Channel 2.
- Insert a memory pack in slot MP1.
- Connect the programmer.

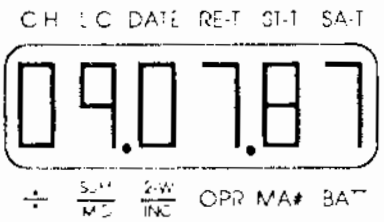
PROGRAMMER	COMMENTS
T E S T	
	The programmer is now testing the memory pack. A 10K memory pack will take approximately 18 seconds.
	The memory pack passed the test.
T E S T	Enter the test phase before recording.

PROGRAMMER	COMMENTS
	The recorder is asking which mode, speed, volume or classification.
S	Select classification.
	
TEST	Test the input.
	How far apart are the two hoses, piezo sensors or loops?
488	488 centimeters (16 feet).

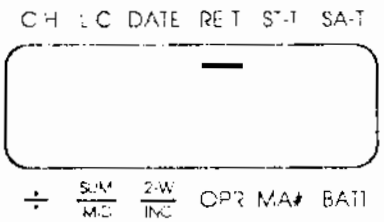
PROGRAMMER	COMMENTS
	
[illegible]	
	Each time a vehicle crosses over the road tube or piezo sensor, the display will show the FWHA "F" scheme classi-fication. The audio alarm will sound as each axle passes. When satisfied that the installation of the hose or piezo sensor is correct, proceed with
CAN	Cancel the input test.
	The display goes blank.

PROGRAMMER	COMMENTS
ENT	Enter the parameter entry phase.
	What is the location code?
35	Route 35 northbound.
	
ENT	
	What is today's date?

PROGRAMMER	COMMENTS
C S 0 7 8 7	September 7, 1987.



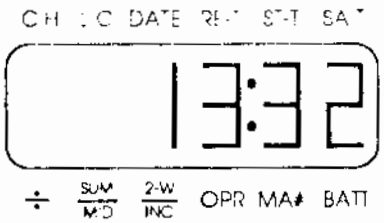
L N T



What time is it now?

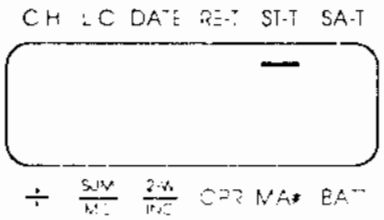
1 3 3 2

1:32 p.m.



PROGRAMME

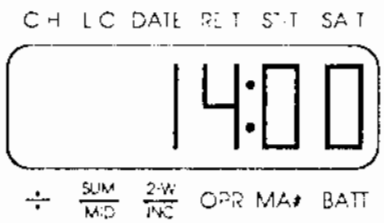
COMMENTS



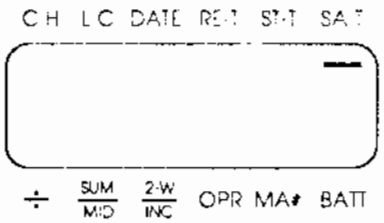
What time should the recording begin?

1 4 0 0

2:00 p.m.

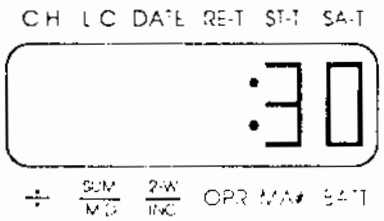


= N T

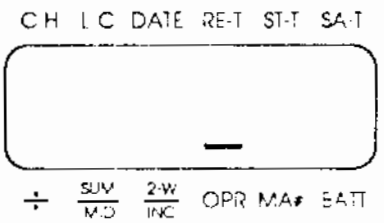


How often should the recorder take counts?

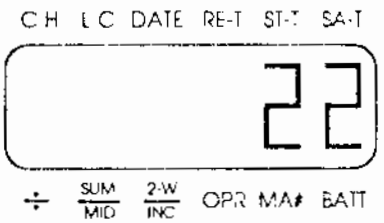
PROGRAMMER	COMMENTS
3 0	Every half hour.



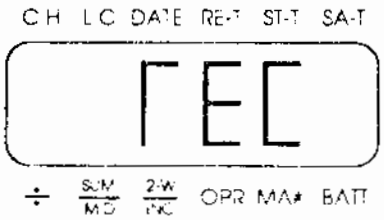
ENT	



	What is your operator number?
2 2	Operator number twenty-two.



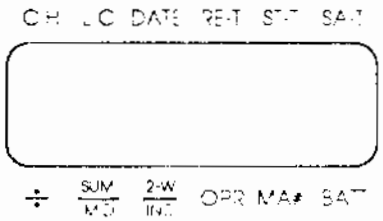
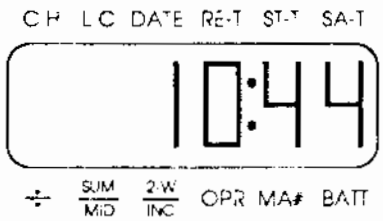
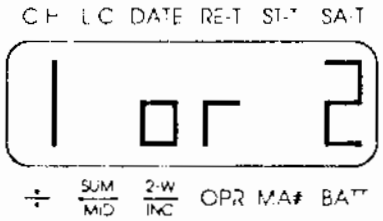
PROGRAMMER	COMMENTS
E N T	
C H L C DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	What is the number of this recorder?
7	This is recorder number 7.
C H L C DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	
E N T	
C H L C DATE RE-T ST-T SA-T  ÷ SUM/MID 2-W/INC OPR MA# BATT	The parameter entry phase is finished.

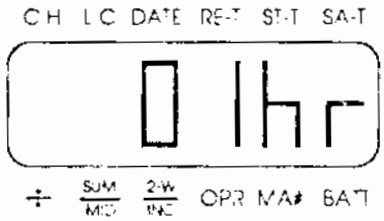
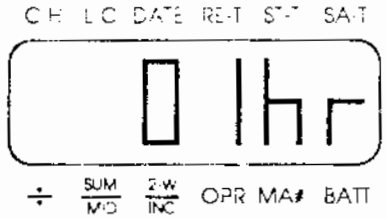
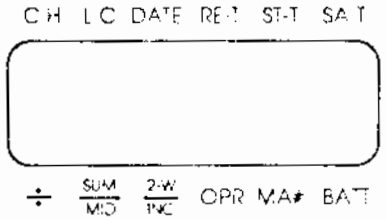
PROGRAMMER	COMMENTS
REC	Start the record phase now.
	The recorder is in the record phase.

- At 2:00 p.m. the recorder will start classifying vehicles and counting them in the appropriate bins. Every half-hour, the bin totals will be stored in the memory pack.

- Remove the programmer. Close and secure the recorder.

- After the record interval, open the recorder and connect the programmer. Terminate the recording using the following steps:

PROGRAMMER	COMMENTS
ENT 0	Terminate the recording.
	The display goes blank.
MONT	Verify the correct time.
	It is now 10:44 a.m.
MONT	Check for input failure.
	Do you want to check Channel 1 or Channel 2?
1	Check Channel 1.

PROGRAM MEMORY	COMMENTS
	There was one hour in which no input was detected. This could be due to lack of traffic or a damaged hose.
2	Now, check Channel 2.
	Channel 2 also shows one hour of input failure. Since the two channels agree, it is likely due to lack of traffic.
CAN	Cancel the monitor feature.
	The display goes blank.

- Remove the memory pack and return it to the office for analysis.

LOOP DETECTOR CABLES

Prior to installing the recorder, cable harnesses are required to connect the recorder to the loop detector. The MSC 3000 Recorder is designed to interface to loop detectors with relays and solid state output circuits.

Cable Connections for Relay Output

Using the prewired, four-pin female connector supplied, connect three wires long enough in length to connect the two units together in accordance with Figure #1.

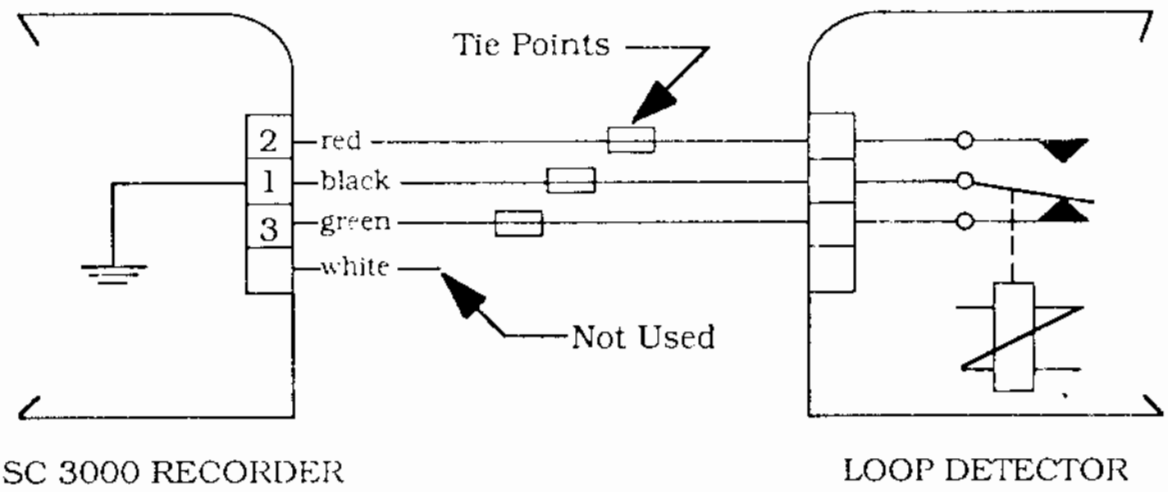


Fig. 1

Cable Connection for Solid State Output

Using the prewired, four-pin female connector supplied, connect two wires long enough in length to connect the two units together in accordance with Figure #2.

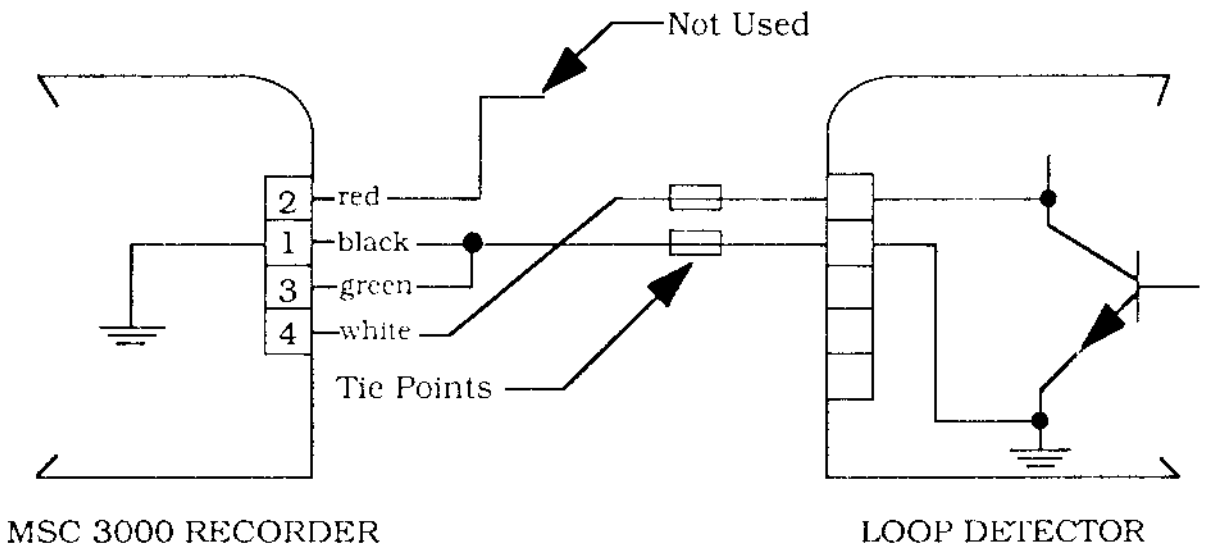


Fig. 2

-- NOTE --

The unused wire or wires in the four-pin female connector should be insulated with tape to prevent short circuits.

INCH TO CENTIMETER CONVERSION TABLE

Inches	Feet & Inches	Centimeters	Inches	Feet & Inches	Centimeters
48	4 0	122	144	12 0	366
49	4 1	124	146	12 2	371
50	4 2	127	148	12 4	376
51	4 3	130	150	12 6	381
52	4 4	132	153	12 9	389
53	4 5	135	156	13 0	396
54	4 6	137	159	13 3	404
55	4 7	140	162	13 6	411
56	4 8	142	165	13 9	419
57	4 9	145	168	14 0	427
58	4 10	147	171	14 3	434
60	5 0	152	174	14 6	442
62	5 2	157	177	14 9	450
64	5 4	163	180	15 0	457
66	5 6	168	183	15 3	465
68	5 8	173	186	15 6	472
70	5 10	178	189	15 9	480
72	6 0	183	192	16 0	488
74	6 2	188	195	16 3	495
76	6 4	193	198	16 6	503
78	6 6	198	201	16 9	511
80	6 8	203	205	17 1	521
82	6 10	208	209	17 5	531
84	7 0	213	213	17 9	541
86	7 2	218	217	18 1	551
89	7 5	226	221	18 5	561
92	7 8	234	225	18 9	572
95	7 11	241	229	19 1	582
98	8 2	249	233	19 5	592
101	8 5	257	237	19 9	602
104	8 8	264	241	20 1	612
107	8 11	272	245	20 5	622
110	9 2	279	249	20 9	632
113	9 5	287	253	21 1	643
116	9 8	295	258	21 6	655
120	10 0	305	263	21 11	668
124	10 4	315	268	22 4	681
128	10 8	325	273	22 9	693
132	11 0	335	278	23 2	706
136	11 4	345	283	23 7	719
140	11 8	356	288	24 0	732

PENNSYLVANIA DOT SCHEME "PA" VEHICLE CLASSIFICATIONS

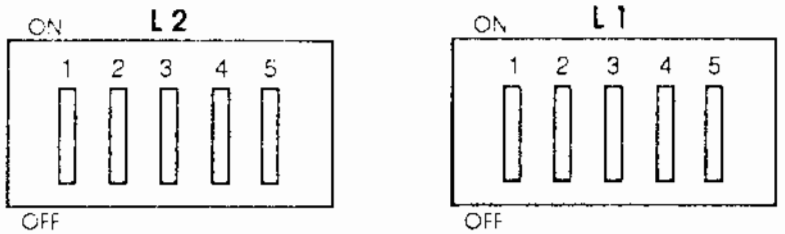
PA1	Motorcycles, Automobiles, Pickups and Vans with or without Trailers
PA2	Two-Axle, Light Trucks and Buses longer than 11.5 feet
PA3	Three-Axle Straight Units
PA4	Three-Axle Semi-Trailers
PA5	Four-Axle Straight Units
PA6	Four-Axle Semi-Trailers
PA7	Five-Axle Semi-Trailers
PA8	Five-Axle Twin-Trailers
PA9	Six-Axle Semi-Trailers
PA10	Six-Axle Twin-Trailers
PA11	Seven-Axles or more

FHWA SCHEME "F" VEHICLE CLASSIFICATIONS

F1	Motorcycles
F2	Passenger Cars
F3	Other Two-Axle, Four-Tire Single-Unit Vehicles
F4	Buses
F5	Two-Axle, Six-Tire Single-Unit Trucks
F6	Three-Axle, Single-Unit Trucks
F7	Four or More Axle, Single-Unit Trucks
F8	Four or Less Axle, Single-Trailer Trucks
F9	Five-Axle, Single-Trailer Trucks
F10	Six or More Axle, Single-Trailer Trucks
F11	Five or Less Axle, Multi-Trailer Trucks
F12	Six-Axle, Multi-Trailer Trucks
F13	Seven or More Axle, Multi-Trailer Trucks

PIEZO THRESHOLD SELECTION for MSC 3000

Threshold (Volt)	S1	S2	S3	S4	S5
.041					On
.250	On	On	On	On	
.261		On	On	On	
.269	On		On	On	
.281			On	On	
.308	On	On		On	
.325		On		On	
.337	On			On	
.357				On	
.562	On	On	On		
.621		On	On		
.666	On		On		
.749			On		
.977	On	On			
1.167		On			
1.337	On				
1.720					



CHANNEL 2 CHANNEL 1

Switch Depressed on Number Side is "ON".

MSC 3000

TRANSLATOR

WARRANTY

Mitron Systems Corporation warrants the MSC 3000 Translator to be free from defects in materials and workmanship for a period of one year. Liability under this warranty is limited to repair or replacement of defective parts when the equipment is shipped prepaid to Mitron's factory in Columbia, Maryland. Mitron reserves the right to perform any necessary repairs or modification on the customer's premises.

Mitron does not assume any liability for consequential damages or damage due to misuse or unauthorized attachments. In no event shall Mitron be liable for any damages, including loss of profits, lost savings or other incidental or consequential damages resulting from the use or inability to use the MSC 3000 products. Mitron cannot assume responsibility for damage due to use of any electrical circuit other than specified. In any event, Mitron's liability shall not exceed the original purchase price.

SERVICE

Questions with regard to Mitron's warranty and service program and requests for repairs and replacement parts should be directed to Mitron Systems Corporation. A service representative may be reached by calling:

410/992-7700
or
800/638-9665 (8:00am - 5:00pm Eastern Time)

Should it become necessary to return equipment to Mitron for repair, call 800/638-9665 and request a Return Material Authorization number, RMA #. The RMA # should be prominently displayed on the outside of the box. It is very important that a note explaining the nature of the equipment problem be included in the package. This note should provide the contact name and telephone number as well. Following these simple procedures will save several days of turn-around time.

TABLE OF CONTENTS

1.0 INTRODUCTION

The MSC 3000 Translator is part of Mitron Systems traffic product line. When used in conjunction with the MSC 3000 Recorder and the EPSON FX-80 Printer, traffic engineering volume report is generated from data collected at field locations. It also allows transferring the data to an IBM Personal Computer for storage, analysis and printing. In addition, the translator is used to clear memory packs for reuse.

The operation consists of inserting retrieved memory packs into connectors and pressing a button. The memory packs will be read automatically. The formatted output data will be sent to the printer or computer to generate traffic engineering reports based on the traffic data collected while the memory packs were in a recorder at the field location.

IBM Personal Computer™ is a trademark of the International Business Machines Corporation. Epson FX-80 ™ is a trademark of Epson America, Inc.

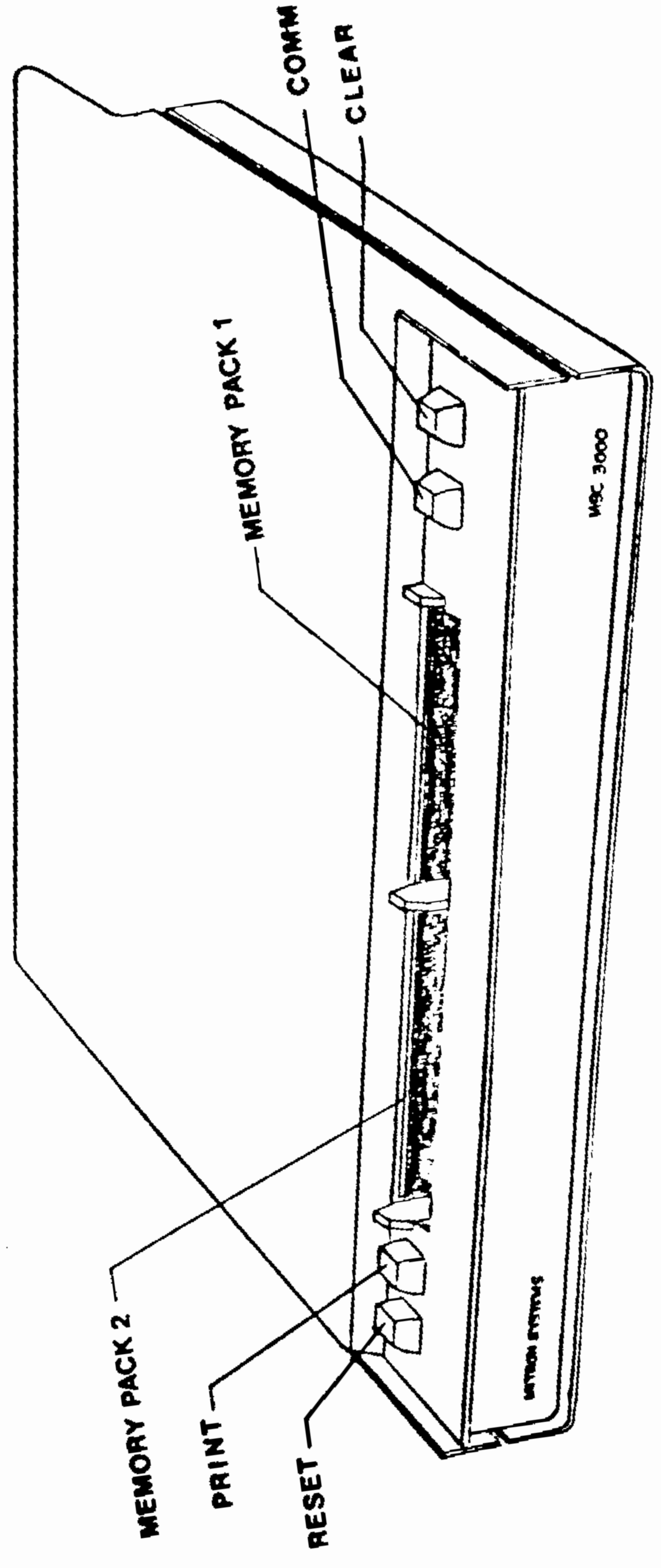
2.0 FUNCTIONAL DESCRIPTIONS

2.1 MSC 3000 Translator

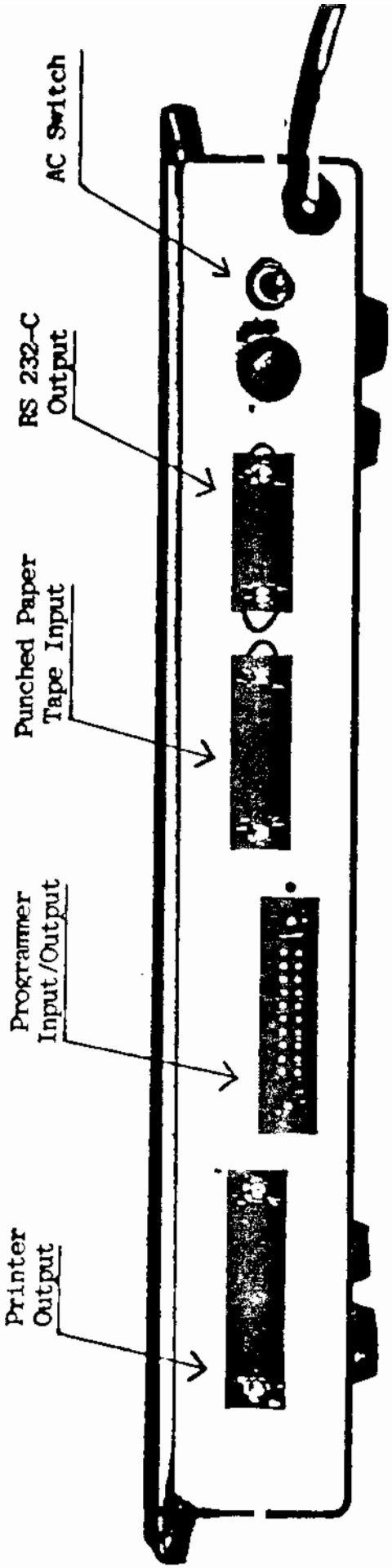
The primary function of the translator is to serve as an interface between MSC 3000 Recorder (memory packs) and two output devices (EPSON Printer and IBM Personal Computer).

This translator utilizes a Z80 microcomputer which has been programmed to meet the requirements. This microcomputer has an internal system diagnostic routine for validating all input data. Also, hardware diagnostics have been designed into the system as an aid for servicing. A "Clear" feature is available to test and prepare the memory packs for subsequent use.

This unit consists of a steel enclosure, four mode keys, two memory pack connectors, one output parallel port for the printer, and one output port for the personal computer. An AC power switch and power cord are located at the rear of this unit adjacent to the input/output connectors. (See Figure 1.) Three 8-position dip switches are located in the center of the right side of the printed circuit electronics card inside the enclosure. These switches are normally set at the factory to determine the system's configuration.



MSC 3000 TRANSLATOR



MSC 3000 TRANSLATOR REAR PANEL

FIGURE 1

2.2 EPSON FX-80 Printer

The primary function of the EPSON FX-80 Dot Matrix Printer is to generate hard copy printout of collected traffic counts formatted by the MSC 3000 Translator. The printer is connected to the translator via an interface cable and is configured to print 132 characters per line.

The printer consists of a high impact plastic enclosure, three mode keys, four indicators, a power switch, electronic logic, a paper feed drive and a nine dot print head. (See EPSON's FX-80 Operational Manual for additional information.)

2.3 IBM Personal Computer

The primary function of the IBM Personal Computer is to analyze traffic count data and print the results quickly and accurately. The computer is connected to the MSC 3000 Translator via an interface cable to receive unformatted traffic counts read from memory packs. Special application software has been written for the computer to store, edit, process and print the results. The programs were designed to be user friendly with prompts and menus.

See the MSC 3000 Computer Software User's Manual for additional information.

2.4 Configuration Control Switches

The primary function of the Configuration Control Switches is to configure the MSC 3000 Translator System to meet the needs of the customer's requirements. Three 8-position DIP Switches have been

provided for this purpose. These switches are located in the center of the right side on the printed circuit electronics card inside the translator enclosure.

A printout of the existing selected positions of each switch is possible by connecting the Epson FX-80 printer to the translator. With the AC printer power on and the AC translator off, hold the CLEAR switch down while turning the AC power to the translator. The printer will automatically list the configuration settings. (See Figure 2.)

Figure 3 represents the function of each switch position. Figure 4 represents their physical location on the printed circuit electronics card.

2.5 Memory Pack

The primary function of the memory pack is to store operator entered header information and accumulated traffic counts or speed or classification data. One memory pack per channel is inserted into the recorder. At the end of the recording period, the memory pack(s) is removed and returned to the office where it is inserted into the translator which prints a traffic engineering report based on data collected while the unit was operating at the field location. If the operator is satisfied with the printed hard copy, the CLEAR feature is used to electronically test and prepare the memory pack for subsequent use.

The memory pack is enclosed in a small protective enclosure for ease of insertion into the translator. It is mechanically keyed to guarantee proper insertion orientation.

MSC3000 TRANSLATOR SPECIFICATION

SOFTWARE RELEASE 1.9

PRINTER FORMAT OPTIONS

* SUBTOTALS

* AM/PM UNDERLINE

  24 HOUR MOVING TOTALS

ASYNC COMMUNICATION OPTIONS

BAUD RATE

  110
  300
  1200
  2400
  4800
* 9600
  19200
  SPECIAL

PARITY

  ODD
* EVEN

PROTOCOL

  CONTINUOUS
  CTS
* XON/XOFF

DATA FORMAT

  STRAIGHT
  CR/LF INSERTION
* ASCII HEX

DIAGNOSTIC OPTIONS

  HEX DUMP

  LOAD PACS

FIGURE 2

Should it be necessary to change a switch position, consult with MITRON personnel prior to making the change. In any event, no switch change should be made while A.C. power is "ON".

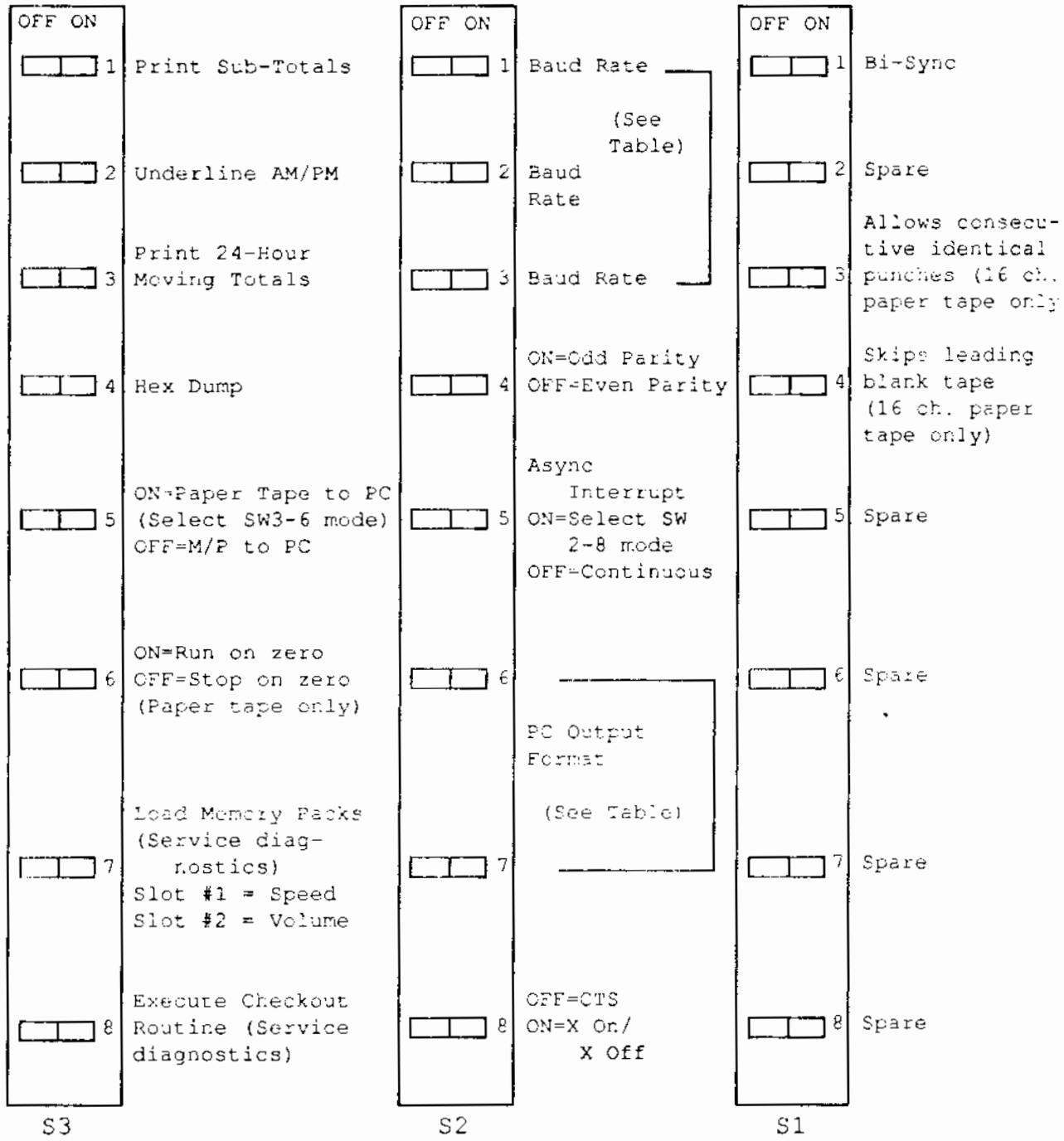


FIGURE 3

BAUD RATE TABLE			
Switch 2	-1	-2	-3
110	OFF	OFF	OFF
300	ON	OFF	OFF
1200	OFF	ON	OFF
2400	ON	ON	OFF
4800	OFF	OFF	ON
9600	ON	OFF	ON
19,200	OFF	ON	ON
Special	ON	ON	ON

PC OUTPUT FORMAT				
INPUTS	Paper Tape		Memory Packs	
Switch 2	-6	-7	-6	-7
Counts Only	OFF	OFF	OFF	OFF
CR/LF after each reading	ON	OFF	N/A	N/A
16 Readings, 16 Spaces, CR/LF	OFF	ON	ON	OFF
Volume, Speed, Classification ASCII HEX (Software Version 1.2 or later)	N/A	N/A	ON	ON

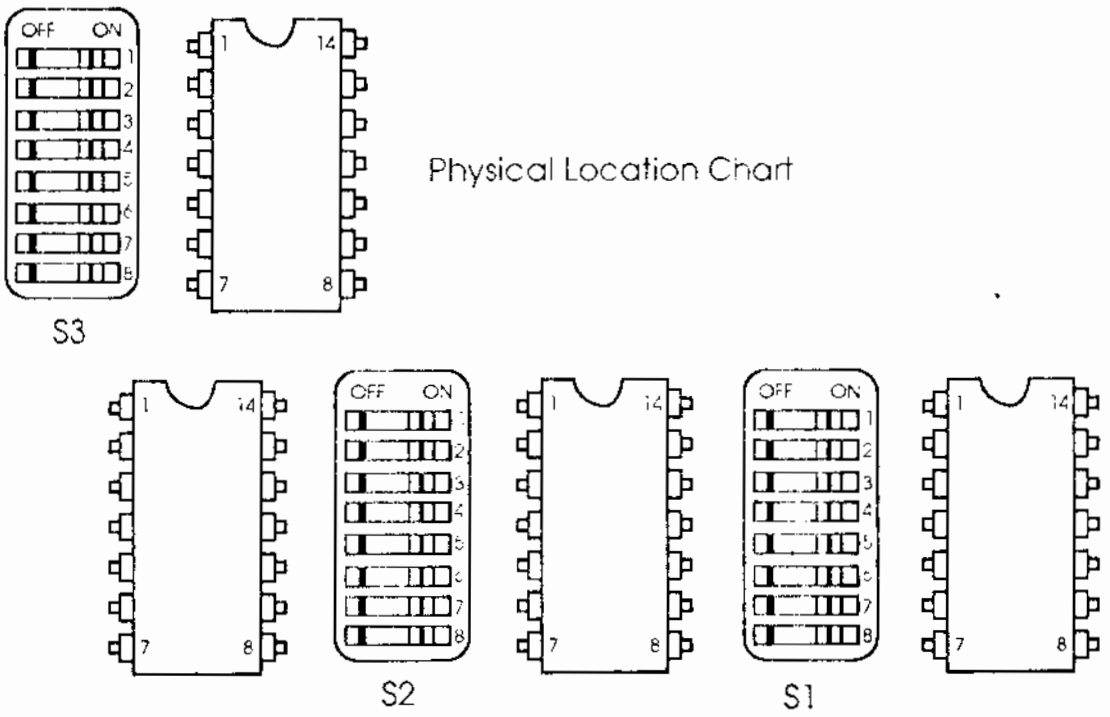


FIGURE 4

3.0 OPERATIONAL MODE DESCRIPTIONS

3.1 Power and Signal Cable Connections

The MSC 3000 Translator System could consist of a Translator, FX-80 Printer, and an IBM Personal Computer or any combination thereof. Signal cable connectors with unique pin configurations are supplied on the rear panel of the translator to guarantee proper interconnection. Connect the selected equipment to a 115 VAC/60HZ electrical outlet. Power "ON" switches on all Mitron equipment can be found on the rear panels.

-- NOTE --

AC power switches should be in the "OFF" position on both units.

3.2 Memory Pack Read to Printer

1) Connect printer signal cable between printer and translator. Connect both units to an AC outlet.

2) With the paper in the printer, manually turn the paper feed knob to place the paper perforation above (1/4") the print line.

3) Turn on AC power to both units.

4) Depress RESET on the translator.

5) Depress ON-LINE on the printer.

6) Insert memory pack(s).

7) Depress PRINT.
Printer will begin printing out the data stored in the memory pack(s). It will stop when all recorded data has been printed. Tear off hard copy results. (See example - Figure 5.)

-- NOTE --

If system fails to print contents of memory packs, read printed error message and refer to Section 3.4 (Error Message Table) for corrective action.

-- NOTE --

To stop system, depress the PRINT key.

WARNING: TURNING AC POWER ON OR OFF WITH MEMORY PACKS INSERTED MAY ERASE OR DAMAGE THE TRAFFIC COUNTS STORED IN THESE PACKS.

8) After verifying the data is ok, you may clear and test the memory pack(s) by depressing and holding the CLEAR switch in while depressing the RESET switch. The printer will print an acknowledgement message: "MEMORY TEST HAS BEEN COMPLETED AND MEMORY PACKS HAVE BEEN CLEARED."

MEMORY PACK IN SLOT 1 HAS (NUMBER) BYTES OF STORAGE

MEMORY PACK IN SLOT 2 HAS (NUMBER) BYTES OF STORAGE

9) Remove memory packs and repeat procedure if more packs are to be read.

VOLUME COUNTING PROGRAM NITRON SYSTEMS CORPORATION - NSC3000

CHANNEL NUMBER	1	2
LOCATION CODE	3743	3735
DATE	10/10/83	10/10/83
REAL TIME	1342	1343
START TIME	1400	1400
SAMPLE TIME	5	5
DIVIDE	2	2
SUMMATION	NO	NO
2-WAY	NO	NO
OPERATOR NUMBER	22	22
MACHINE NUMBER	17	17

PLEASE NOTE: YOU HAVE PLACED CHANNEL1 IN SLOT1 AND CHANNEL2 IN SLOT2.

10/10/83

0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	1014.5
														610	588	999	530	327	225	206	175	80	36	632a
														67	86	76	49	33	17	16	17	4	3	
														61	87	102	65	29	14	18	14	5	5	
														67	107	110	67	24	20	14	13	2	2	
														66	97	90	56	32	26	24	11	11	5	
														52	90	96	46	32	27	26	13	5	4	
														63	69	87	56	42	17	21	8	9	4	
														64	56	85	47	36	18	27	7	8	3	
														69	97	92	52	29	21	17	12	12	4	
														78	91	74	32	22	26	10	8	7	3	
														65	72	67	27	19	20	10	7	4	1	
														64	70	61	34	11	13	8	7	4	1	
														77	52	59	29	17	10	24	10	8	1	

Hourly Totals

5 minute Sub-totals

Channel 1 Traffic Counts

24 Hour Total

0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	1014.5
														794	1041	1129	635	356	155	133	66	30	11	4294
														54	74	109	79	35	16	10	9	2	0	
														83	115	107	96	36	15	12	4	4	2	
														54	210	114	81	35	17	16	8	4	3	
														69	77	107	47	33	14	12	12	2	3	
														74	82	99	50	41	10	10	4	1	0	
														55	90	82	47	44	12	17	5	3	0	
														55	84	87	41	36	14	10	3	4	0	
														87	103	84	49	18	16	22	7	3	1	
														72	85	78	47	24	18	19	5	2	1	
														82	77	101	27	19	11	17	3	1	0	
														69	76	86	24	15	9	15	4	0	1	
														64	74	73	33	15	10	11	4	2	0	

Highest PM Reading

Channel 2 Traffic Counts

CHANNEL1 TRAFFIC CHECK-SUM IS
CHANNEL2 TRAFFIC CHECK-SUM IS

FIGURE 5

3.3 Memory Pack Read to PC

1) Connect the cable from the translator's RS232-C port to the ASYNC communication port on the PC.

2) Remove the cover on the translator and set the configuration control switches to the desired positions. The following must be selected (see Section 2, Paragraph 2.4):

   a) Baud rate

   b) Parity

   c) Protocol

   d) PC output format

-- NOTE --

Normally these switches are set at the factory. Prior to changing them, call your Mitron representative for the proper procedure.

3) Turn on AC power to all units.

4) Insert memory pack(s) with vehicle counts into translator slot(s).

5) Configure the PC to receive data via the ASYNC RS232-C port.

6) Depress the COM switch on the translator and the data transmission will start.

7) When the transmission has ended, an audible tone from within the translator will be heard.

3.4 Error Message Table

When the following error messages are printed, the printing of all data will be prohibited.

IDENTICAL CHANNEL NUMBER
The system will not print out two memory packs simultaneously that have the same channel numbers.

PACKS DO NOT START ON THE SAME DAY OR SAME TIME
The system will not print out two memory packs simultaneously that do not have the same day and/or same starting time recorded within the header field.

CHANNEL 1 SAMPLE TIME IS INVALID.
Use only 5, 10, 30 or 60 minutes.

CHANNEL 2 SAMPLE TIME IS INVALID.
Use only 5, 10, 30 or 60 minutes.

3.5 Warning Message Table

When the following messages are printed, they represent a warning that a problem exists in the data being printed.

CHANNEL 1 PARAMETER CHECK-SUM IS INCORRECT.
CHANNEL 2 PARAMETER CHECK-SUM IS INCORRECT.

CHANNEL 1 TRAFFIC CHECK-SUM IS INCORRECT.
CHANNEL 2 TRAFFIC CHECK-SUM IS INCORRECT.
Any of these could be caused by a hardware failure in either the memory pack, the recorder or the translator. They could also be caused by a static electricity discharge that change data in the memory pack.

DATE IS INVALID.
The operator has keyed into the memory pack the wrong date.

MEMORY PACK IN SLOT 1 FAILED MEMORY TEST.
Hardware problem in either the memory pack or the translator.

MEMORY PACK IN SLOT 2 FAILED MEMORY TEST.
Hardware problem in either the memory pack or the translator.

3.6 General Message Table

The following messages are printed out during normal operation:

PLEASE NOTE YOU HAVE PLACED CHANNEL 1 IN SLOT 1 AND CHANNEL 2 IN SLOT 2

PLEASE NOTE YOU HAVE PLACED CHANNEL 2 IN SLOT 1 AND CHANNEL 1 IN SLOT 2

MEMORY TEST HAS BEEN COMPLETED AND MEMORY PACKS HAVE BEEN CLEARED.

MEMORY PACK IN SLOT 1 HAS (NUMBER) BYTES OF STORAGE

MEMORY PACK IN SLOT 2 HAS (NUMBER) BYTES OF STORAGE

CHANNEL 1 TRAFFIC CHECK-SUM OK

CHANNEL 2 TRAFFIC CHECK-SUM OK

3.7 Memory Test and Clear

The memory test and clear feature performs two functions:

1) The clear feature erases the existing data stored in the pack and clears it for use in the recorder. (Remember, the recorder will not accept memory packs with stored data. It only accepts cleared packs.)

2) The memory test feature conducts an electronic test of the memory pack's components to determine if a marginal component has developed since its last test.

   Perform the following:

   a) Insert one or two memory packs in the translator's slots.

   b) If a printer is being used, connect it to the translator and select ON-LINE mode.

   c) Depress and hold the CLEAR switch; then depress the RESET switch. The printer will print an acknowledgement message. (See Message Table.)

   If a printer is not available, follow the same procedure removing the packs a minimum of 10 seconds after depressing the RESET switch.