

TRAINING CENTRE
600 VOLT SYSTEM.

TWO KINDS OF NOTCHES.

- 1) RESISTANCE NOTCHES.
- 2) RUNNING NOTCHES.

TWO GROUPS OF NOTCHES.

- 1) SERIES NOTCHES.
- 2) PARALLEL NOTCHES.

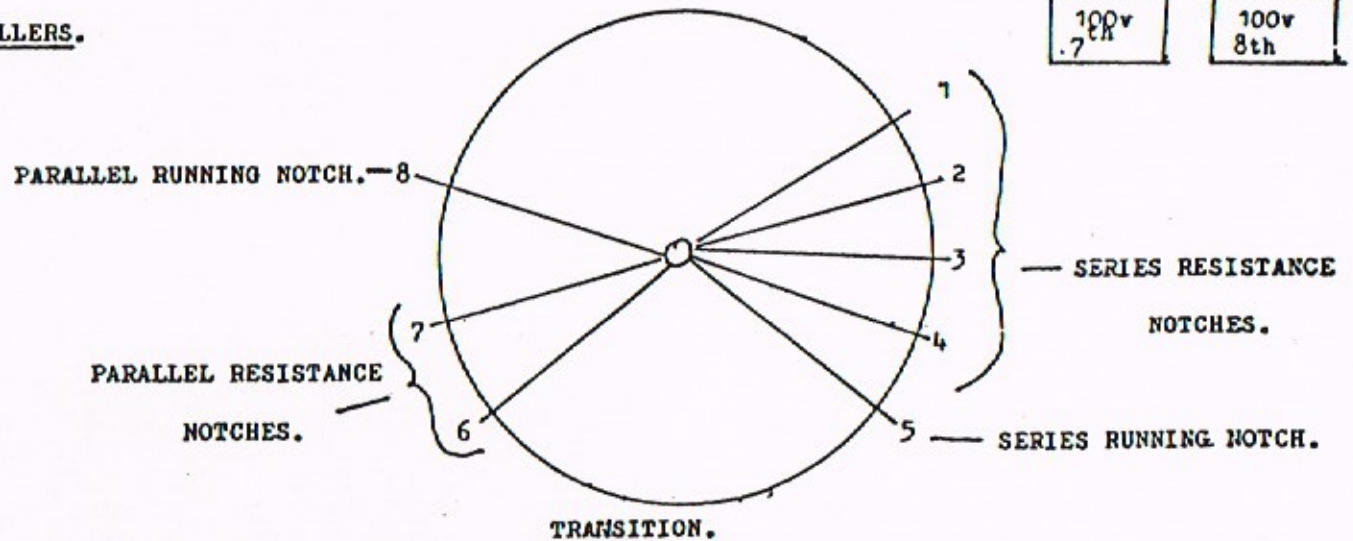
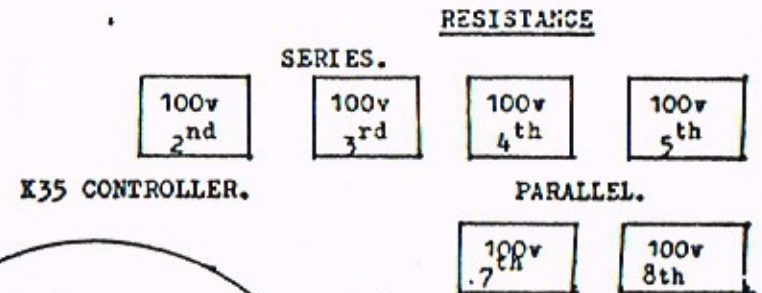
TWO RUNNING NOTCHES.

- 1) FULL SERIES. ($\frac{1}{2}$ speed)
- 2) FULL PARALLEL ($\frac{1}{2}$ to full speed)

THIS BREAKDOWN APPLIES TO ALL CONTROLLERS.

FOUR DIFFERENT CONTROLLERS.

	N	S	P
1) K35 CONTROLLER	8	5	3
2) CLYDE CONTROLLER	10	6	4
3) R.C.1 " "	14	7	7
3) R.C.2 " "	14	7	7



WARNING: 1st NOTCH MOST DANGEROUS TO HOLD TOO LONG AS ALL RESISTANCE OPERATING.

HOW TO ASSESS A TICKETING SYSTEM

- 1. Convenience, attractiveness to passengers.**
- 2. Convenience, attractiveness to special groups :-**
 - older people
 - children
 - people with disabilities
 - people from non-English speaking backgrounds
 - women
 - tourists
 - irregular users
- 3. Acceptability, understandability by staff.**
- 4. Passenger security**
- 5. Vandalism/graffiti**
- 6. Fare evasion**
- 7. Equity (for users, other beneficiaries)**
- 8. Financial cost to PTC**
- 9. Economic cost to society**
- 10. Revenue/patronage information generated.**

PROBLEM CHECK SHEET - "W" CLASS

CUTTING OUT MOTORS

If Line Breaker blows more than once

1. Identify controller
2. Safety test
 - turn line breaker switch off
 - check track is clear
 - cut all power notches
3. Identify cut out switches - put key in neutral
4. Cut out pair of motors
5. If problem still exists, cut out other pair and put back first pair
6. If problem still exists, push
7. Ring Radio Centre

NOTE: Changing ends; same motors to be cut out except RC2; motor cut outs No. 1 end only

POWER ON - TRAM WON'T START

1. Check all switches are on and making good contact
2. Check for power "other end"
3. Test spare fuse in line breaker switch
4. Change fuse driving end
5. Clear track ahead, try series notches
6. Try parallel notches
7. Examine ratchet spring (K35)
8. Push
9. Radio Centre

COMPRESSOR GAUGE UNDER 60LBS

1. Stop tram
2. Check for power (pole on overhead, lights on)
3. Compressor switch (on-off)
4. Change fuse (interchange method)
5. Radio Centre (change-over)

COMPRESSOR GAUGE OVER 90LBS

1. Stop tram (normal service application)
2. Compressor switch off
3. Reduce pressure
4. Remove fuse from compressor switch and put switch on
5. Continue on handbrake
6. Radio Centre (change-over)

NOTE: If drain cock broken; as steps 4 - 6

CHANGING LIGHT FUSE

1. Handbrake on
2. Pole down
3. Change fuse
4. Replace pole
5. Test lights

NOTE: If lights don't burn, ring Radio Centre

LOCKED controller "ON" POSITION

1. Turn Line Breaker switch off
2. Stop tram
3. Arrange to be pushed (forward)
4. Ring Radio Centre

LOCKED CONTROLLER-"OFF" POSITION

1. Check key is forward
2. Put key in neutral
3. Arrange to be pushed
4. Ring Radio Centre

BENT FINGER (K35 CONTROLLER)

1. Line breaker switch off
2. Apply hand brake
3. Pull down pole
4. Open controller - arc shield
5. Cut all notches possible to locate bent finger
6. Straighten or pull back bent finger by using leading pole rope

INSULATED TRAM

1. Warn passengers to remain on tram - apply hand brake
2. Turn lights on
3. Leave tram carefully; not touching stanchions or grab
4. Pole down
5. Ask passengers to leave tram
6. Use water, if unavailable, use point bar
7. If lights burn, drive to clean track
8. If lights don't burn, pull down pole
9. Ring Radio Centre

DAMAGED POLE

1. Apply handbrake
2. Tie pole down
3. Release front pole and both ropes
4. Both ropes and pole to off side
5. Conductor to hold emergency rope
6. Driver to throw his rope to near side
7. Pole to overhead wire
8. Driver throws his rope back
9. Ropes tied separately
10. Ring Radio Centre
11. Speed not over series
12. Cut off early for frogs/insulators
13. Operate automatic points as manual
14. Remain one tram length from tram in front at automatic points



Metropolitan Transit Authority

Tram & Bus Division



TRAINER

TRAINER DRIVERS CHECK LIST Z-A

STUDENT

PREPARING TRAM FOR SERVICE

RUN OUT BOARD.
 RUN NUMBERS & KEYS.
 EMPLOYEES NEAR TRAM.
 CHECK POLES & SIDE MIRRORS.
 NEVER TWO POLES UP.
 BATTERY ON, LIGHTS ON.
 SOUND GONG.
 FORWARD/REVERSE SWITCH ON.
 CHECK CONTROL PANEL.
 CHECK ALL DOORS (RED LIGHT),
 SAND.
 HEAD/TAIL LIGHTS,

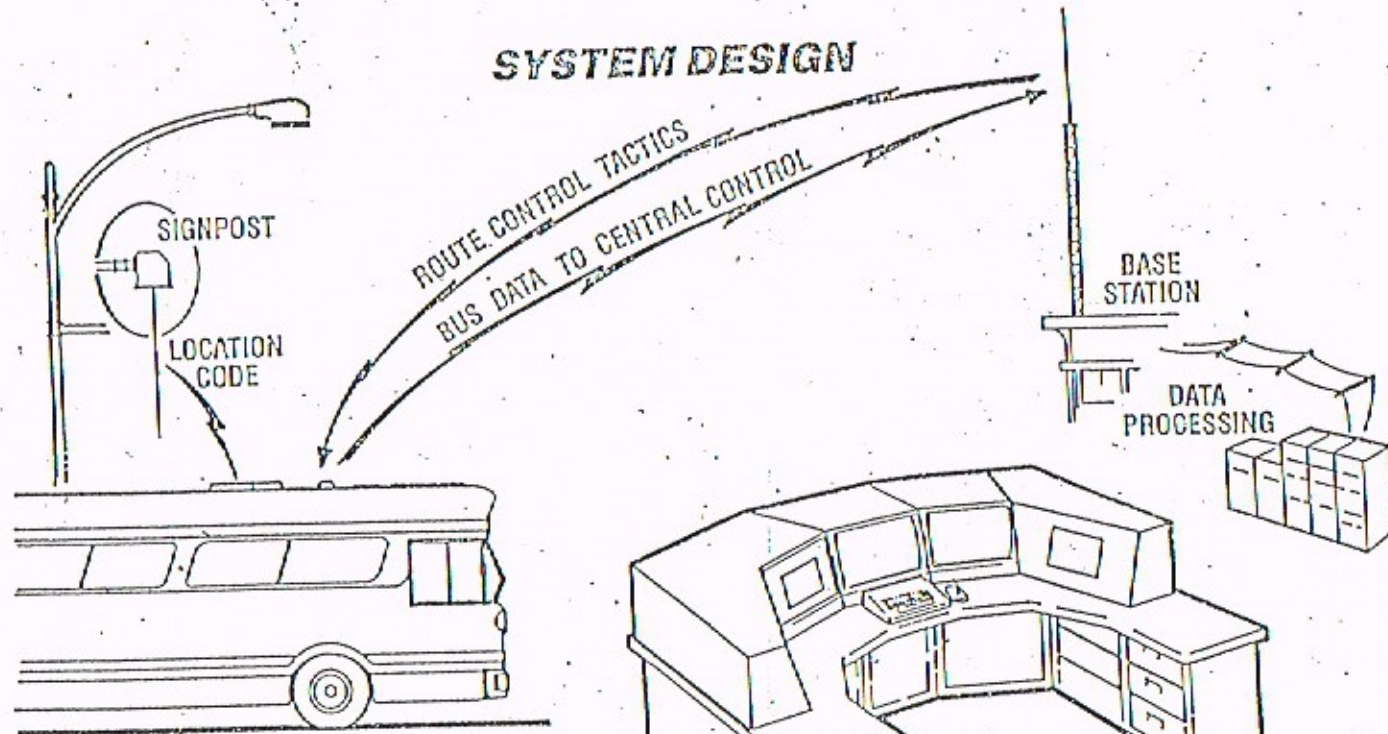
DAMAGE.
 TRACK BRAKE.
 SENSITIVE SWITCHES (DOORS).
 CIRCUIT CUPBOARD/LOCKER.
 DESTINATION (NO. END)
 POINT BAR
 OTHER END.
 GONG/TEST BRAKES (8 K.P.H.).
 FOULING STUDS.
 RUN OUT TIME.
 POWER LIMIT SWITCH (Z3)
 SAFETY PEDAL BEFORE ACCELERATO

ON ROAD

ACCELERATION
 BRAKING
 STOPPING DISTANCES
 ANTICIPATION
 ROADSENSE
 ATTITUDE TO OTHER ROAD USERS
 ATTITUDE TO PASSENGERS
 ATTITUDE TO LATE RUNNING
 CUTTING OFF FOR FROGS/INSULATORS
 POINTS - MANUAL/AUTOMATIC
 COMPULSORY STOPS
 APPEARANCE (SHAVE ETC.)
 MEMORY (RETENTION OF KNOWLEDGE)
 COMPREHENSION
 FAULT FINDING
 GENERAL SAFETY
 ROAD RULES
 TRAM DRIVERS' RULES (DO'S & DON'TS)

GOOD	FAIR	POOR

SYSTEM DESIGN



VEHICLE

- LOCATION
- PASSENGER COUNT
- SILENT ALARM
- IN-VEHICLE DISPLAY

CONTROL CONSOLE

- ROUTE CONTROL
- RADIO CONTROL
- EMERGENCY RESPONSE
- TROUBLE REPORTS

PUBLIC TRANSPORT CORPORATION

AUTOMATIC VEHICLE MONITORING SYSTEM

OPERATION

The Automatic Vehicle Monitoring (AVM) system utilises sophisticated computer and radio communications technology to enable efficient tram and bus fleet management and the provision of enhanced passenger and crew safety.

The AVM system locates buses and trams with pinpoint accuracy and instantaneously.

The AVM system consists of a Central Computer at Fleet Operation Centre (FOC) which performs data acquisition tasks and to process vehicle data as they are received from vehicles. The data is transmitted to and from the vehicles via a two-way data and voice radio network distributed throughout the metropolitan area.

The location signposts (low power radio transmitters), which are installed at schedule time-points along each route, provide basic location information to the transit vehicle. This information after processing by on-board AVM equipment in the vehicle, is transmitted to the FOC. The central computer then processes the information to determine the vehicle's schedule adherence (running early, on-time or late). The schedule adherence information is also transmitted back to the vehicle for display to the driver.

The central processor continuously updates the graphics display to show the status and location of all AVM vehicles in the fleet.

By assessing the location and status of vehicles, the control centre operator (CCO) can decide whether control tactics should be applied so that operational problems can be minimized or avoided.

The radio-communication capabilities of the AVM system allows the CCO to communicate directly with the vehicle driver and to issue public address announcements.

A key feature of the AVM system is its efficient emergency alarm system. Whenever a silent alarm switch (concealed) in a vehicle is activated by the driver, the emergency alarm will be relayed to the FOC within 10 seconds. The CCO can notify the Police, or any emergency services through direct phone links.

The AVM system also has the capability to process the transit operational data collected on a day to day basis. The processed data are available as management information reports which are used for revising schedules so that the frequency of on-time running can be maximized.

SYSTEM DIMENSION AND EXPANSION CAPABILITIES

Under AVM Stage 1, 200 Trams and 300 buses have been fitted with AVM vehicular equipment. The remaining vehicles are scheduled to be equipped in the second stage of the project. The total system capacity is for 2,000 vehicles incorporating approximately 10 data and 10 voice radio channels.

MAIN BENEFITS

Management information reports are generated and used for scheduling and rostering and for route and service planning purposes.

Enhances safety and security for crew and passengers through its efficient emergency alarm system.

Passenger service can be improved and efficiency of operation can be enhanced resulting from better schedule adherence and vehicle headway.

TECHNICAL DETAILS

System Type

Computer based radio-communication, command and control system which automatically determines the location and status of vehicles in a transit fleet.

Vehicular Equipment

- Mobile Data Unit
- Control Head
- Mobile Radio
- Public Address Amplifier
- Emergency alarm unit

Fleet Operation Centre (FOC)

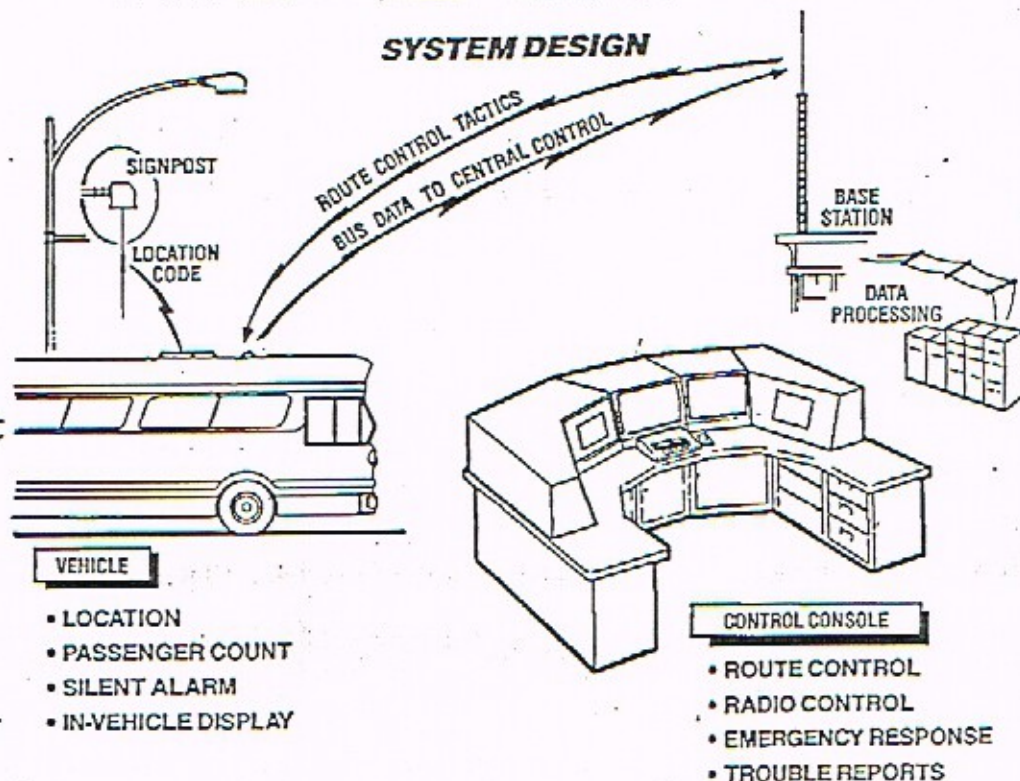
- Duplicated computer system
- Display processor system
- Graphic display system
- Alphanumeric and colour graphic display control consoles

Radio Network

Data and voice communications is provided via a UHF radio network from two city and two suburban radio base station sites (Stage One).

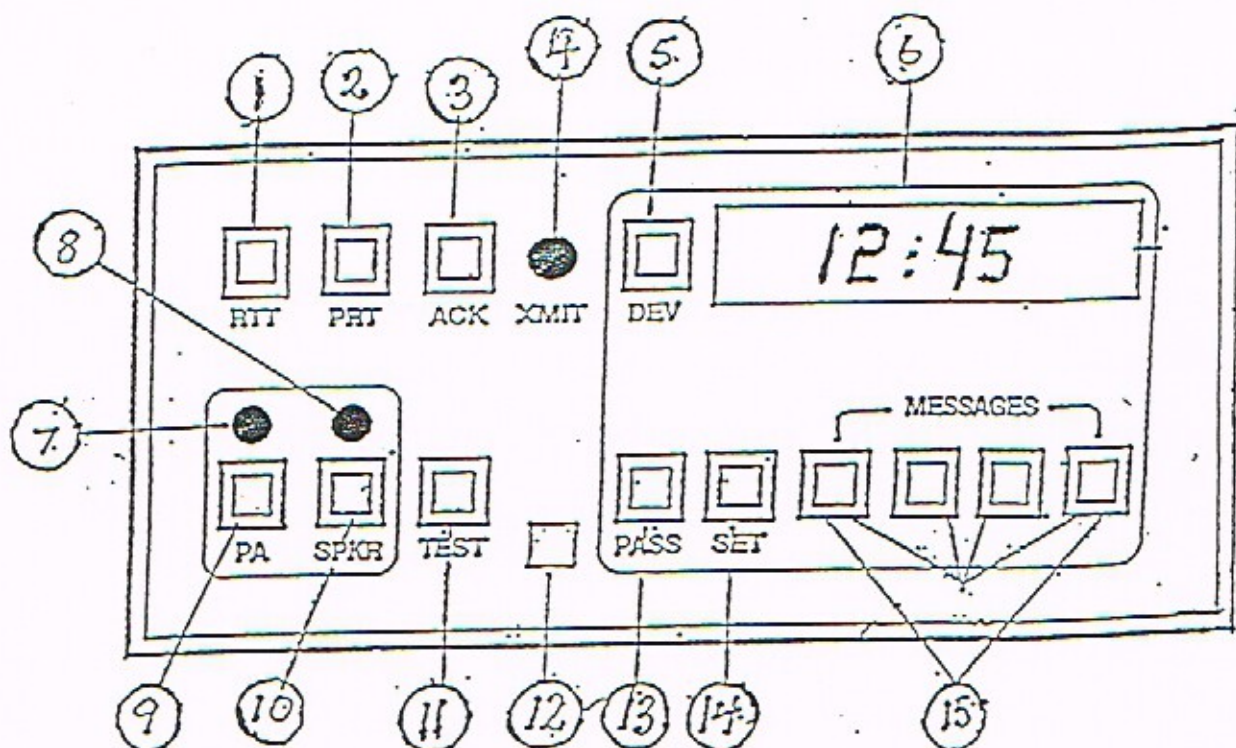
Signposts

250 low power radio transmitter signposts are installed with battery life approximately five years.



AVM CONTROL HEAD

Revised July 1989



1. REQUEST TO TALK: Push for request to talk with C.C.O.
2. PRIORITY REQUEST TO TALK: Push for priority to talk with C.C.O.
3. ACKNOWLEDGE: Push to acknowledge a display message eg.CALL, will not clear OFF HOOK,TALK,and CONTROL HEAD OFF.
4. TRANSMIT: This light is present whenever A.V.M. is talking with F.O.C.
5. DEVIATION: Press to display schedule deviation to +&- 60 minutes.
6. CONTROL HEAD DISPLAY.
7. PUBLIC ADDRESS LIGHT: This light is present when P.A. is pressed.
8. DRIVER SPEAKER LIGHT: This light is present when SPKR is pressed.
9. PUBLIC ADDRESS: Press to talk to public in bus through handset.
10. DRIVER SPEAKER: Press to hear verbal message over speaker and handset.
11. TEST: Press to initiate internal tests between equipment. e.g.Emergency alarm etc.
12. LIGHT SENSING DEVICE: Has no external function.
13. PASSENGER COUNT: Press to update and display current passenger count.
14. SET PASSENGER COUNT: Press to set passenger count. e.g.1/3, 2/3 or full
15. NOT IN USE.
16. NOT IN USE.
17. NOT IN USE.
18. NOT IN USE.

TACTICAL MESSAGE

Tactical message on the control head indicates certain action to be taken by vehicle operator, sent by the C.C.O. (Control Centre Operator)

START: Start. Start trip sent when C.C.O. wants driver to commence trip.

OBS SCHD: Observe schedule. Sent to drivers when running ahead of time.

DSCH PASS: Discharge passengers. Sent when vehicle turned short.

NON STOP: Non stop. Run special. No pick-ups.

SKIP STOP: Skip stop. Skip every second stop.

TURN SHRT: Turn short. Turn short of destination. (Followed by voice contact)

PASS CNT: Passenger count. To be updated & sent back for C.C.O. information.

WAIT: Delay departure from present location.

CONT TRP: Continue trip. Usually sent following a wait message.

* NOTE *

SYS FAIL: Informs the operator that the vehicle equipment system has a failure
ACTION; If this message appears on control head, notify C.C.O. as soon as possible.

RTT ACK: Displayed after pressing the R.T.T. button and informs the operator that request to talk has been received by the computers and placed in a queue to be answered by C.C.O.

TALK: Informs the operator to go off hook and engage in conversation with C.C.O.
ACTION: Pick up handset, press button on handset, follow communication

PRT ACK: Displayed after pushing the P.R.T. button and informs the operator that a priority request to talk has been received by the computer and placed at head of queue to be answered by C.C.O.

DEV+-MIN: Displayed after depressing DEV. button in +&- minutes. informs operator of schedule deviation

RUN CARD: 1. Informs the operator that the run card reader does not have a run card inserted.
2. Run card is inserted incorrectly.
3. Run card or run card holder is damaged.
ACTION ; 1. Obtain and insert run card into holder correctly.
2. Report damage to run card holder or run card on sign off sheet, Depot Officer or C.C.O.

RCR: Run card has failed.
ACTION; Inform F.O.C. of the failure.

CALL: C.C.O. requires you to communicate with them.
ACTION; Push RTT button and wait for "TALK" Message.

CH OFF: Informs Operator that control head is no longer
operational.
ACTION; Inform C.C.O. that control head is inoperative if message
appears.

EMR TEST: Displayed during test mode and informs operator that S.A.S.
switch can now be tested.
If "EMR OK" does not appear after S.A.S. activation, DO NOT
run vehicle out, obtain another vehicle from depot yard.

EMER OK: Displayed during the test mode in response to successful
S.A.S. switch activation.

MAN RAD: Informs operator that the system has lost data
communication & has switched to a voice channel.
* NOTE*
Monitor the voice channel for instructions. Do not
attempt to talk on the hand set unless there is an emergency
or specifically instructed to do so.

OFF HOOK: Informs the operator that the handset has been left off-hook
for more than thirty seconds.
ACTION; Return the handset to the on-hook position or depress
momentarily if in the "MAN RAD" mode.