DYNAMIC™

DX™ Modular Mobility System

DX Sip `n` Puff
(Part No. DX-SNP)

Installation Manual

Important Notes

1.   Read this Manual carefully before installing or operating your DX control system.

2.   Due to continuous product improvement Dynamic reserves the right to update this Manual. This manual supersedes all previous issues which must not continue to be used.

3.   Any attempt to gain access to or in any way abuse the electronic components and associated assemblies that make up the wheelchair control system renders the Manufacturer's Warranty void and the Manufacturer free from liability.

Contents

1   Introduction

A DX based wheelchair control system may comprise between two and sixteen DX compatible modules depending on the application. Each DX compatible module has its own Installation Manual which describes the installation requirements of that particular module.

This Manual describes the installation of the Sip 'n' Puff Module (SNP) only and should be read in conjunction with the Installation Manuals for all other DX Modules to be used in your system.

Depending on the intended purpose of your DX Sytem, the DX-SNP should only be used in conjunction with the following DX Master Remotes:

For control of driving ONLY.	Any DX Master Remote (including the SCR).
For control of seating.	The SCR is the Remote of choice for seating control and guarantees best seat control for all SNP setups. Non-SCR remotes (e.g., G80, Dolphin) can be used but may have some limitations or restrictions which may compromise the driving and/or seat control. If you intend using a non-SCR remote please refer to Section 4 - 'Operation of the DX-SNP with DX Master Remotes' and ensure these compromises are acceptable for your application.
For control of ECU functions (On or Off chair).	The SCR **must** be used.

Warnings: Since the DX-SNP can be put into latched modes, it is possible to get into potentially dangerous situations.

Therapists and installers must read this manual and fully understand the implications of various set-up options **prior** to commencing installation.

The programming philosophy of this unit differs from other DX modules. Program settings are stored in the module itself, so take care when replacing SNP units that the replacement SNP is programmed correctly before use. Refer to 'Programming Philosophy' for details.

Dynamic Controls Ltd. accepts no responsibility for harm or damage caused by the use, abuse or misuse of this module.

Installation Manual Re-order Information
(Please quote this information when re-ordering this manual)

DX Sip 'n' Puff Installation Manual - GBK64126

2   Product Description

The DX-SNP is a versatile Sip and Puff unit that can be used with any DX system. It is fully programmable to suit any user requirement and has a number of unique features that extend its usefulness and ease of use compared to other units on the market. It has a number of standard programs that make commissioning a chair and training the user very easy and quick.
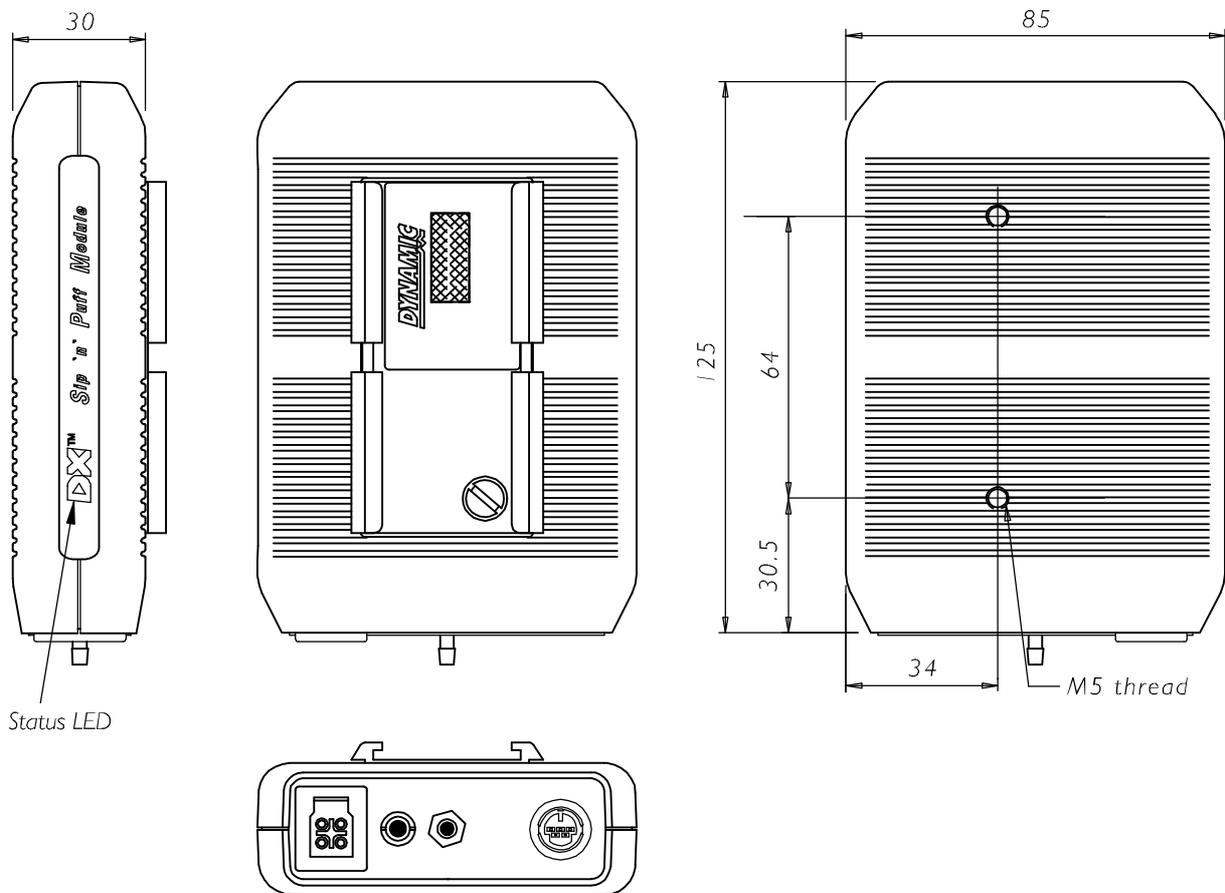
3   Commissioning the SNP

Installing a SNP requires the following steps:

1.   READ THIS MANUAL BEFORE DOING ANYTHING!

2.   MOVE THE CHAIR INTO A LARGE OPEN ENVIRONMENT!

3.   Mount and secure the SNP

4.   Connect DXBUS, Emergency Stop and Hose

5.   Program the DX System's Remote

6.   Program the SNP itself

7.   Trial the system and train the user

Read This Manual Before Doing Anything!

Since the DX-SNP can be put into latched modes, it is possible to get into potentially dangerous situations. *Therapists and installers must understand the implications of various set-up options prior to commencing.*

Move The Chair Into A Large Open Environment!

Sip and Puff is not the most manoeuvrable or intuitive control method and therefore requires a considerable amount of training for both user and therapist.
In the early tuning stages, this is best done outdoors in an unrestricted area.

Mount and Secure the SNP

The SNP is supplied fitted with a DX Auxiliary Module Mounting Bracket. This allows the SNP to be chassis mounted, tube mounted, or mounted to another DX Auxiliary Module as follows. This should be a position where it will not be mechanically vulnerable or exposed to water ingress.

Plastite Screws (x2)
M3 x 10
GSC 0170

DX Aux. Mod. Lock
(GME 60525)
(supplied with SNP)

DX Aux. Mod. Mounting
Bracket (on SNP)

Square Mounting
Bracket
(18 - 24 mm²)

Round Mounting
Tube (18 - 24 mm Ø)

DX Aux. Mod. Tube
Clamp B : GME 60527)

DX Aux. Mod. Tube
Clamp A : GME 60526

Plastite Screws (x2)
Tubes 18 - 21 mmØ : GSC 0175
Tubes 21 - 24 mmØ : GSC 0180
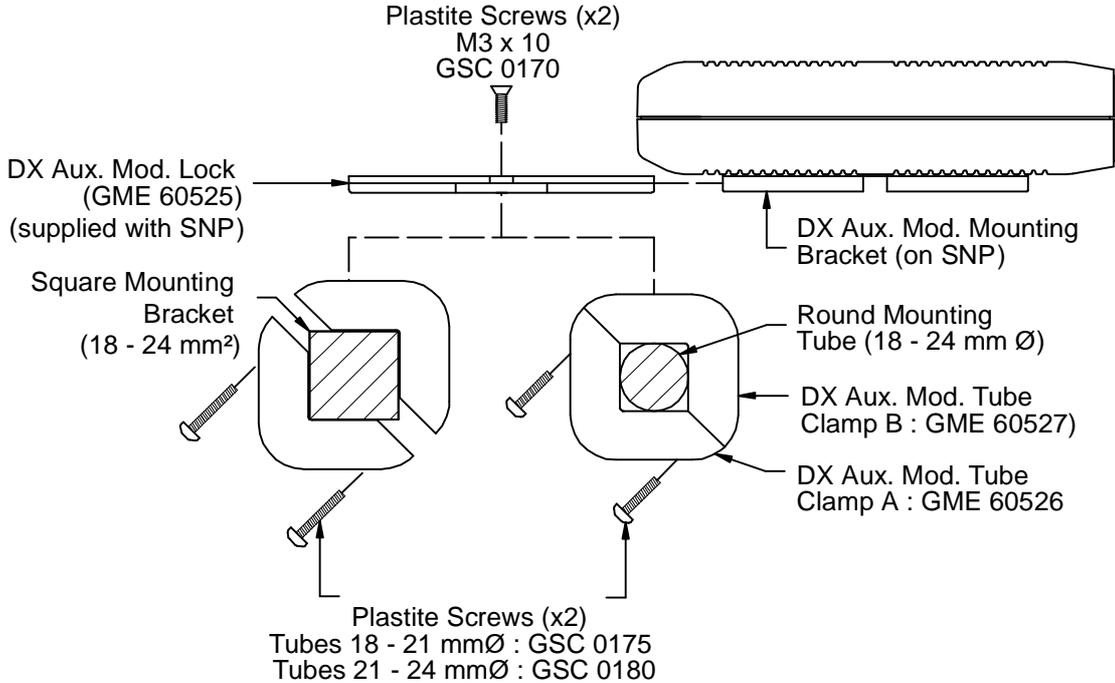
Round or Square Tube Mounting

M5 x 12 CSK Screws (x2)
GSC 0053
(supplied with SNP)

DX Aux. Mod. Mounting
Bracket (on SNP)

Chassis

DX Aux. Mod.Lock
GME 60525
(supplied with SNP)

Chassis Mounting

M5 x 12 CSK (x2)
GSC 0053
(supplied with SNP)

DX Aux. Mod.
Lock GME 60525
(supplied with SNP)

DX Aux. Mod. Mounting
Bracket (on SNP)
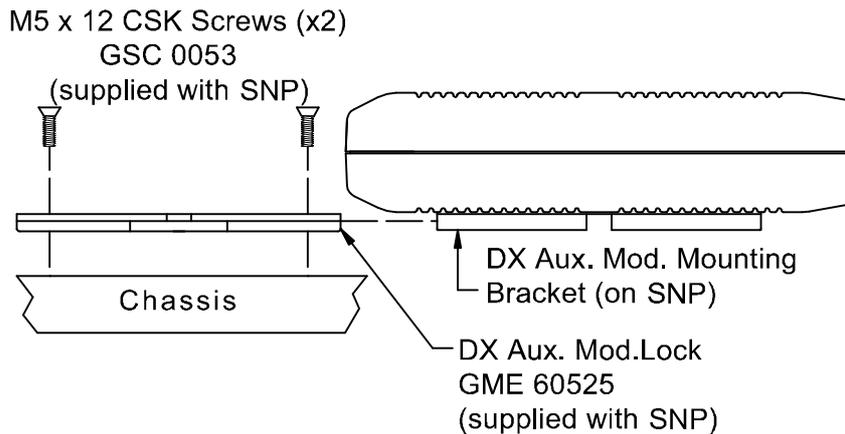
Another DX Auxiliary Module
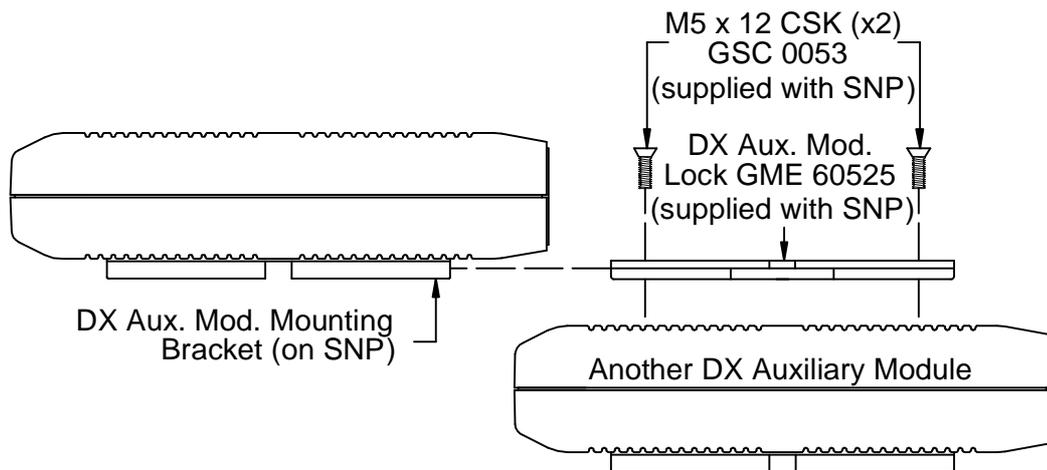
Mounting on other Auxiliary Modules

Connect DXBUS, Emergency Stop and Hose

DXBUS

Use a DXBUS cable to connect the SNP to any vacant DXBUS socket on the DX system.

Emergency Stop Socket

Any latched mode requires the use of an Emergency Stop Switch. The SNP supports various types and configurations of stop switch. Refer to 'Standard Program Descriptions' for details. If used, simply plug the switch into the SNP jack socket and position the switch in a position suitable for easy activation by the user.

Hose

Connect a suitable hose and saliva trap and route the hose, via an appropriate mounting system, to the point most comfortable for the user. Ensure the saliva trap is in an accessible area as it should be cleaned regularly.

DXBUS socket

Emergency stop socket

Hose socket
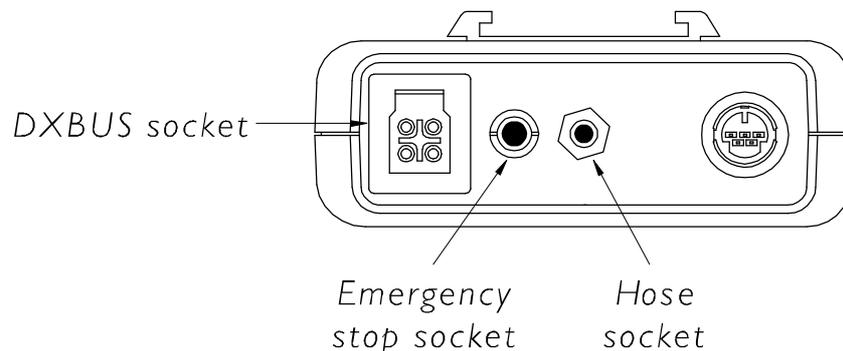
Note : There are no standards that apply solely to wheelchair remote's, however Dynamic Controls Ltd. conducts tests on representative wheelchairs. Considerable performance variances can occur between wheelchair types. It is the responsibility of the wheelchair manufacturer to properly apply the remote to their intended wheelchair and confirm compliance to the appropriate standards for the complete wheelchair and variances.

In particular, the wiring of the control switches for the DX-5SW must be configured such that the wheelchair's operation will not be affected by externally applied electromagnetic fields.

Program the DX System's Remote

Plug a DX Hand Held Programmer (HHP) into the programming socket of the master DX Remote and set the "Local/Remote" option of at least one Drive Program to "Remote". When the system is in any of the drive modes programmed for "Remote" drive, the SNP will be the controlling device (for all other drive programs the controlling device will be the joystick on the DX Remote).

When using the DX-SNP the 'rules' are that for...

Forward and Reverse

Acceleration and deceleration   -   are determined by the SNP module and are programmed at the SNP module itself. The Forward/Reverse acceleration and deceleration parameters in the DX Remote should be set as HIGH as possible, so that they do not interact with those set by the SNP.

Speed   -   is determined by the DX Remote and should be programmed to the required specification at the DX Remote.

Turn

Acceleration, deceleration and speed   -   are all determined by the DX Remote and should be programmed to the required specification at the DX Remote.

A recommended starting point is to set Drive Programs 1, 2 and 3 up in 'Remote' mode and adjust the parameters so that Drive Program 1 is a VERY SLOW or learner mode, Drive Program 2 is slightly faster, and Drive Program 3 is the target mode for that user when training is complete. Drive Programs 4 & 5 should be left in 'Local' mode to allow joystick control during the training period.

A recommended starting point for this strategy is...

Parameter	Drive Program 1	Drive Program 2	Drive Program 3
FWD Speed	25	35	60
FWD Acceleration	AHAP	AHAP	AHAP
FWD Deceleration	AHAP	AHAP	AHAP
REV Speed	20	20	30
REV Acceleration	AHAP	AHAP	AHAP
REV Deceleration	AHAP	AHAP	AHAP
TURN Speed	20	20	20
TURN Acceleration	10	20	20
TURN Deceleration	45	60	60
DAMPING	40	40	40
LOCAL / REMOTE	REMOTE	REMOTE	REMOTE

Notes: AHAP = As High As Possible. It may not be possible to set up to 100% depending on how your HHP has been set up. However, the actual value is not important. Any value 70 or above is fine.

The 'Target' Program, Drive Program 3, depends entirely on the user's abilities and the environment(s) the chair is to be used. There may in fact, be more than one target program (e.g. an indoors and outdoors program).

Note:	It is recommended that therapists use the normal joystick control and experiment themselves to develop the programs that give the performance required by the actual user and insert these in the table above.

Program the SNP itself

Plug the HHP into the programming socket on the SNP.

Programmer socket
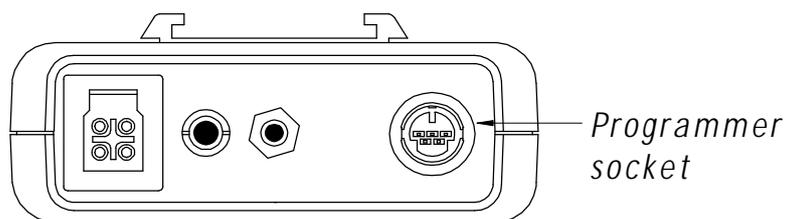
Turn the DX system ON (The O/I button on the DX Remote).

The HHP will show:

```
   YOU ARE IN
   ????? mode


CAL  TUNE        CHANGE
```

where "?????" is one of...

Single Speed Momentary mode
3 Speed Momentary mode
5 Speed Momentary mode
Single Speed latched mode
3 Speed latched mode
5 Speed latched mode
Analog latched mode

or, if any of the standard programs have been tuned...

...Custom Momentary mode
Custom latch mode.

SNP's are shipped from Dynamic set to 'Single Speed Momentary mode'. However, if the module has been used before, or is a replacement, someone may have changed the programming set-up. Since it could have been changed to a latched or inappropriate mode, you should ALWAYS CHECK WHAT THE MODE IS WHEN INSTALLING A SNP BEFORE OPERATING AND CHANGE ACCORDINGLY.

The first 7 (non-custom) programs are standard programs supplied by Dynamic and one of these will probably suit your application with little or no further tuning. Refer Standard Program Descriptions for details.

Pressing the HHP's "Change" button will scroll through these and once displayed, that mode is automatically selected - if this is the mode you require, you now proceed directly to the Sip and Puff pressure calibration by pressing "CAL".

If none of these standard modes is suitable, choose the one that is nearest and press the "TUNE" button - this will take you into a series of screens that will allow you to tune the performance in any way you want.

If you choose to do this, the next time you plug the HHP in, it will tell you that you are in one of...

> ...Custom Momentary mode
> Custom latch mode...

...depending on how you set up those options.

Once you have selected the right mode for your user, proceed to the Sip and Puff Pressure Calibration screen by pressing the "CAL" button.

The HHP will show:

```
┌─────────────────────────────┐
│      SET UP PRESSURES       │
│  Sip=XXX        Puff=YYY     │
│              ZZZ             │
│  EXIT           SIP   PUFF   │
└─────────────────────────────┘
```

"ZZZ" is the actual pressure currently seen by the module. If you are not sipping or puffing it will be "00", if you are, the harder you sip or puff, the higher the number will get.

"XXX" is the SIP pressure above which the module will interpret as a HARD SIP. A sip below this pressure will be interpreted as a SOFT SIP. If you want to change the pressure that defines the soft to hard transition, simply sip at the pressure you want and press the "SIP" button - the "XXX" value will change accordingly.

"YYY" is the PUFF pressure above which the module will interpret as a HARD PUFF. A puff below this pressure will be interpreted as a SOFT PUFF. If you want to change the pressure that defines the soft to hard transition, simply puff at the pressure you want and press the "PUFF" button - the "YYY" value will change accordingly.

Trial the system and train the user

You are now ready to start trialing the system. Transfer the HHP to the DX Remote since it is likely that these parameters will need to be tuned first. Shift the chair to a wide open space to facilitate training.

Basic Sip and Puff pressure interpretation is...

HARD PUFF	-	Forward
SOFT PUFF	-	Right
SOFT SIP	-	Left
HARD SIP	-	Reverse

Adjust the various DX Remote and SNP parameters as required to tune the performance to the user - the HHP may be left plugged into either unit to facilitate quick tuning.

Note:	The chair will not drive while you are in the calibration screen of the HHP.

4   SNP Programming

The following chapter describes in detail, the default modes and their programmable parameters in detail.

Programming Philosophy

The DX-SNP is unusual for a DX module in that it has its own programmer socket which allows it to be fully programmed using an HHP without requiring the Dynamic Wizard. This means that the SNP's settings reside in the module itself and are not part of a "Chair Program" downloaded from a Wizard.

The HHP allows selection from 7 standard programs:
•   Single Speed Momentary mode;
•   3 Speed Momentary mode;
•   5 Speed Momentary mode;
•   Single Speed Latched mode;
•   3 Speed Latched mode;
•   5 Speed Latched mode;
•   Analog Latched mode.

When one of these standard programs is selected, any programmable parameters will be overwritten by the program defaults. It is advisable to load a standard program that is nearest to requirements before fine tuning any parameters.

Note:	Parameters should not be tuned before loading a standard program as all tuned parameters will be overwritten.

Unlike swapping most other DX Modules, replacing one SNP for another does not cause the Remote to automatically download the programming details of the old SNP to the new one. Therefore, take particular care when swapping SNPs, that the new SNP is programmed correctly for the user.

As well as using the HHP, it is also possible to plug the Wizard directly into the SNP programming socket and either edit the existing program or overwrite it "en masse" with a pre-set SNP program.

Warning : If a wheelchair is programmed with settings other than default, under some very rare fault conditions default settings could be automatically restored, thereby changing driving characteristics. This in turn could lead to a chair moving in a direction or speed that is not intended. Programmers should consider this risk when programming settings other than default.

Standard Program Descriptions

Single Speed Momentary Mode

Momentary modes with Sip and Puff are normally restricted to environments where limited continuous forward travel is required and therefore latched mode does not add much value, or for training purposes prior to switching to latched mode.

All of the standard momentary modes allow steering while moving forward. This is achieved by delaying deceleration of the forward signal for a very short time so that the chair does not slow down while the user changes from a forward command to a turn command. The default time for a user to change from one command to the other is 0.5 seconds but may be adjusted, if necessary, to suit the user's capabilities. For restricted indoor use it may be useful to tune the "decel delay" parameter to zero. Lengthening the "decel delay" should be done with discretion as it will also cause the chair's stop distance to increase.

In this mode, a hard puff causes the speed to ramp up to the full speed as set by the remote's "Max Forward Speed" parameter for the selected Drive Program.

3 Speed Momentary Mode

In this mode, each successive hard puff command causes the chair to accelerate to the next of three pre-programmed speeds (Speeds 1, 2 and 3 equal 30, 60 and 100% of the full speed, as set by the remote's "Max Forward Speed" parameter for the selected Drive Program). Similarly, while driving forward, each successive hard suck reduces the forward speed to the next lower speed - however, the hard suck to do this must be less than 0.5 seconds or it will be interpreted as an Emergency Stop.

5 Speed Momentary Mode

As '3 Speed Momentary Mode', but with 5 speeds (20, 40, 60 80 and 100% of the full speed, as set by the remote's "Max Forward Speed" parameter for the selected Drive Program).

Single Speed Latched Mode

In this mode a single forward command causes the chair to accelerate to 100% of the full speed (as set by the remote's "Max Forward Speed" parameter for the selected Drive Program) and stay at that speed for 8 seconds. Any subsequent forward or turn command maintains the forward speed for a further 8 seconds. Turn and reverse commands are momentary only. Since forward driving is latched, this mode requires the use of an Emergency Stop switch.

3 Speed Latched Mode

In this mode each successive forward command causes the chair to accelerate to the next of 3 preprogrammed speeds (Speeds 1, 2 and 3 equal 30, 60 and 100% of the full speed, as set by the remote's "Max Forward Speed" parameter for the selected Drive Program).

At any speed the following rules apply:

- a "short" reverse command at any time will ramp the speed to the next lower speed.
- a "long" reverse command at any time is an Emergency Stop and ramps the speed quickly to zero.
- a forward command of any duration will ramp the speed to the next higher speed.
- activation of the Emergency Stop input at any time ramps the speed quickly to zero.

Turn and reverse commands are momentary only. Since forward driving is latched, this mode requires the use of an Emergency Stop switch.

5 Speed Latched Mode

As '3 Speed Latched Mode', but with 5 speeds (20, 40, 60, 80 and 100% of the full speed, as set by the remote's "Max Forward Speed" parameter for the selected Drive Program).

Analog Latched Mode

This mode has a slow acceleration rate that allows the user to select any forward speed by activating forward until the desired speed is reached and releasing the forward command. Similarly decelerating to any speed is by activating reverse until the desired speed is reached - however, the hard sip to do this must be less than 1.0 seconds or it will be interrupted as an emergency stop.

Turn and reverse commands are momentary only. Since forward driving is latched, this mode requires the use of an Emergency Stop switch.

HHP Menu Structure

Program Menu Structure

Choosing the "TUNE" option leads to the following series of programmable options....

EDIT FORWARD /
REVERSE

YES ⟹ *Allows tuning of all settings related to the type of control (latched or momentary), and related speed and acceleration/deceleration parameters.*

⇓ **NEXT**

EDIT TURN SETTINGS

YES ⟹ *Allow tuning of turn parameters.*

⇓ **NEXT**

SET UP EMERGENCY
SOCKET

YES ⟹ *Allows set up of all Emergency Stop related features.*

⇓ **NEXT**

SELECT MODE
CONTROL

YES ⟹ *Allows enabling of the "Mode Control" feature.*

⇓ **NEXT**

cycles back to top

Programmable Parameters in detail

Edit Forward/Reverse Settings (in order of appearance)

"SET FORWARD MODE" - pressing "CHANGE" cycles through:

Momentary	-	The chair will move forward only as long as the user exerts a Hard Puff. The chair accelerates to the first programmed speed. The chair will accelerate to the next higher speed with a short break in the Hard Puffing. A short Hard Sip will decelerate the chair to the next lower speed.
Step Latched	-	Forward control is started by a Hard Puff and is latched. Further Hard Puffs cause the chair to step to the next higher speed. Hard Sips cause the chair to decelerate to the next lower speed.
Analog Latched	-	Forward control is started by a Hard Puff and the resulting speed is determined by the duration of that Hard Puff in combination with the acceleration rate. The chair will decelerate for the duration of the short Hard Sips.
Momentary/Step Latch	-	This is a hybrid mode that allows the user to change between momentary and latched modes at any time according to the situation. For instance, momentary modes may be more practical indoors while latched mode is preferred outside. If this mode is selected then starting with a continuous Hard Puff will put the chair into a momentary mode and the chair will move forward only as long as that Hard Puff is maintained.

However starting with a quick double Hard Puff tells the unit that a latched mode is required and a further Hard Puff within 5 seconds of the double puff will start the chair moving in the selected latched mode. Every time the chair stops the mode is reset and the chair may be started in either momentary or latched mode as required. If this particular mode is chosen the latched mode will be of the "stepped" type, as described above.

Momentary/Analog Latch   -   As above, except the latch mode will be of the "Analog Latch" type as described for the "Analog Latch" mode.

"SET REVERSE MODE" - pressing "CHANGE" cycles through:

Momentary   -   The chair will move backwards only as long as the user exerts a Hard Sip - this is the most commonly used reverse mode. This operates in the same way as the Forward mode.

Step Latched   -   If selected will use the same latched algorithm selected for the forward mode. Use with caution.

Analog Latched   -   If selected will use the same latched algorithm selected for the forward mode. Use with caution.

"SET SPEEDS FOR"   -   Only relevant if the Stepped latch or
(Step Latched mode)   momentary mode been selected. Use "NEXT" to cycle through all 5 speeds, and "UP" and "DOWN" to adjust. Any number of speeds between 1 and 5 can be selected by programming identical speeds for each step.

eg, setting speeds to...   SPEED 1 = 30
                                             SPEED 2 = 30
                                             SPEED 3 = 60
                                             SPEED 4 = 60
                                           SPEED 5 = 100

...would give a 3 speed system in which:

- forward command 1 ramps to 30%,
- forward command 2 ramps to 60%,
- forward command 3 ramps to 100%

(where 100 % is as defined by the "MAX FWD SPEED" defined in the DX Remote for that Drive Program)

"SET ACCELERATION"   -   Determines the rate of increase in both forward and rev speed. This may be relatively fast in Stepped latch or momentary mode but should be set low for Analog latch mode.

"SET DECELERATION"   -   Determines the rate of decrease in both forward and rev speed. Again this may be relatively fast in Stepped latch or momentary mode but should be set low for Analog latch mode.

"SET EMERGENCY DECELERATION"   -   Determines the rate of decrease in both both forward and reverse speed in response to either an Emergency Stop command or a long reverse command. This should be set to stop at the quickest rate that is still safe for the user at the highest speed setting.

"SET LATCH TIMEOUT"   -   This can be used to give a hybrid between latched and momentary mode to give the best of both modes. The time entered is the time the forward command will be latched unless the time is reset by any other command.

For instance, if set to 5 seconds the chair will automatically start to decelerate at the normal rate if it has not received a further command within 5 seconds. If the user gives another command at say 3 seconds, the forward command will be extended by a further 5 seconds from that time. The user can either routinely give commands say every 3 seconds, in which case the timer will never time out, or give a command every time he feels the chair decelerate on timeout. The later approach favours a slow deceleration rate if this is compatible with other requirements.

"DECELERATION DELAY   - IN MOMENTARY MODE"   This is the time delay between removing a forward command and the chair decelerating when in momentary mode. Best responsiveness would normally dictate this be set to zero but for an input device such as Sip and Puff where it is not possible to simultaneously request forward and turn, setting this to zero implies that the chair decelerates whenever an attempt is made to turn. Setting this to a small non-zero value (eg, .5 sec) gives a good compromise between a fast deceleration when coming to stop and the ability to turn while moving forward.

"EMERGENCY STOP DELAY"-   This determines the duration of 'hard sip' that must be applied while driving forward to cause an emergency stop. A small amount of delay is necessary so that short reverse commands intended as 'decelerate to the next lower speed' are not interpreted as an 'Emergency Stop'. This delay should be kept as low as possible while allowing easy and repeatable speed selection.

Edit Turn Settings

"DELAY TO FULLTURN"   -   The SNP has a special turn algorithm that is gentle enough to give smooth and precise veering while still allowing fast turning when required. This is achieved by halving the turn speed for the short turn commands used for veer correction and increasing to the full turn speed, only after the turn command has been present for a programmable time. For instance, if the TURN SPEED programmed in the master remote is 30%, and the "DELAY TO FULL TURN" is set to 1000 msec, then turn commands shorter than 1 second will be actioned at a turn speed of 15%, allowing gentle veer correction. If the turn command is maintained for greater than a second, the turn speed ramps quickly to 30% giving a much tighter turn suitable for changing direction or avoiding obstacles.

"ROLLBACK FWD SPEED   -   This parameter allows very smooth, safe
WHILE TURNING TO"   and tight turns, irrespective of the initial forward speed when requesting a turn. Speed rollback begins simultaneously with the turn speed becoming its full value (ie, after the programmed "DELAY TO FULL TURN"). If the ROLLBACK is set to 0%, the chair will decelerate to 0% at the SNP's programmed rate, and effectively execute a turn on the spot for as long as the turn command is present. When the required new direction is reached the turn command can be released and the forward speed will automatically ramp back up to the value it was prior to executing the turn. The combination of a "DELAY TO FULL TURN" and "ROLLBACK FWD SPEED WHILE TURNING" is extremely powerful and gives exceptional maneuverability in practically all environments.

Set Up Emergency Stop

"EMERGENCY STOP TYPE" -   Pressing "CHANGE" cycles through the two options "Normally Open" and "Normally Closed".

"STOP SW MONITORING"   -   Use of an emergency stop switch is mandatory in any latched mode but optional in any momentary mode.
Pressing "CHANGE" cycles through the following options...

None   -   Since the stop switch is not checked for it may be used or removed as required.

Resistor   -   this requires the use of a stop switch with resistors fitted as described below...

Stop switch may be Normally Open or Normally Closed
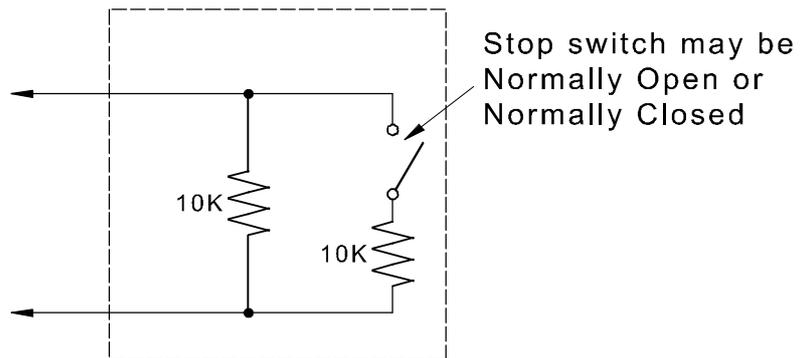
The addition of resistors allows the switch circuit to be continuously monitored, giving a much more secure system - this is by far the most preferred method of emergency stop switch monitoring.
Ideally, the two resistors should be as close to the actual switch as possible (e.g. inside the switch assembly).
This allows short circuit and open circuit switches to be detected. The Status LED on the module will display a flash code if a fault is detected. Flash code 1 for a short circuit. Flash code 2 for an open circuit.

Refer to 'Flash Codes' for details.

"SEE STOP SWITCH AT   -   Set to YES if you require the user to test
POWER UP (Momentary)"   the Emergency Stop switch by pressing it
                                   every time the system is powered up when
                                   a momentary mode is used (testing the
                                   switch on power up is mandatory in all
                                   latch modes, although continued monitoring
                                   of the switch is optional for both latched
                                   and momentary modes, as selected using
                                   the "STP SW MONITORING" program
                                   option).
                                   The Status LED will flash if the unit is
                                   waiting for a stop switch to be seen.

Select Mode Control

Defines the method used to step through the DX "MODE" system to select
alternative driving and non-driving modes (e.g., seating control, environmental
control, etc.). Options are:

"STOP Switch"   -   The STOP switch plugged into the
                                  Emergency Stop jack socket acts as a
                                  MODE switch when the wheelchair is
                                  stationary. When the chair is driving
                                  operating the STOP switch will cause the
                                  chair to stop.

"Double Left"   -   If this feature is enabled a quick "double
                                  soft sip" will cause the DX system's MODE
                                  to step up (i.e., successive double sips will
                                  cycle through the 5 drive programs). This
                                  enables the user to move between drive
                                  modes suited to different environments (eg,
                                  indoors and outdoors modes) as well as
                                  seating control (Mode 0 if used).

                                  If enabled there may be a slight perceived
                                  reduction in turn response due to the
                                  filtering required to implement this mode. A
                                  "soft sip" is chosen for this function since
                                  this gives the least chance of a user
                                  selecting a latched forward mode if the
                                  users timing is poorly executed.

"None"   -   In this case there will be no MODE control
available through the DX-SNP Module.
The STOP switch will cause the chair to
stop if activated while driving, but will have
no effect while the chair is stopped. MODE
control via the Master Remote is still
possible. For example, via the MODE jack
socket on a RemG80A, or via the STOP
jack socket of a DX-SCR Remote.

Operation of the DX-SNP with Master Remotes

Care should be taken when operating the DX-SNP module with standard DX
Master Remotes (e.g., G80, Dolphin etc). There are two situations where the DX-
SNP may not perform as expected:

1.   When operating switched functions, such as lighing or actuator control
2.   When selecting actuators using the "non-drive profile".

Operating switched functions

When operating switched functions, the "joystick" must be deflected more than 50%
of full stroke in a direction for that deflection to be taken as a "switch" closure.
Depending on the current operating mode of the DX-SNP module, there may be a
delay before this threshold is reached, or it may not be reached at all.

Examples:
- In "Step Latched Mode", with steps of 20, 40, 60, 80 and 100%. To extend
an actuator, the wheelchair user will need to puff 3 times, to step the output
to more than 50% to close the switch.
- In "Analog Latched Mode". To extend an actuator, the wheelchair user will
need to puff for some period of time, until the "forward" signal has ramped
to over 50%. This will be perceived as a delay in operating the actuator.

To optimise the operation of the DX-SNP module for switched functions, the Step
size or Acceleration Rate should be set as high as possible, although the effect of
this on driving performance will need to be considered. In general, the maximum
output from the DX-SNP module should always be set to 100%, and the maximum
chair speed should be set using the Maximum Speed settings in the Master Remote.

Selecting Actuators using "Non-Drive Profile"

The DX-SNP module has a "Mode" control which may be triggered by various means - such as pressing the Stop switch when the chair is not moving, or giving a double soft sip. This mode control is used to select drive profiles in sequence, much the same as the "Profile Up" switch on the Master Remote keypad.

For remotes with "Non-drive Profile" actuator control (such as the G805), the Profile sequence is 1 - 2 - 3 - 4 - 5 - A - 1 etc. The "A" Profile is for actuator control, and the Remote's digit display will show a letter or symbol corresponding to the currently selected actuator. "Joystick" forward and reverse will drive the actuator, while left and right will select a different actuator. Pressing the "Profile Up" switch will deselect the currently selected actuator and step to drive profile 1.

The DX-SNP Mode control is not able to deselect actuators. For this reason, DX-SNP modules cannot be used for actuator control using the Non-drive profile as the mode control can be used to step into Actuator Control mode, but cannot be used to step back into driving.

An exception to this is the Europa G805 (and its variants G80A, G80T) manufactured after March 1998 (from serial number 98D59645). These remotes have an extra "Actuator" selection for lighting control (the digit display shows L). In this mode "joystick" forward and reverse will toggle Sidelights and Hazard lights respectively, and **the DX-SNP mode control can be used to step back into driving**.

To control actuators, the wheelchair user must take the following steps:
- Utilise the DX-SNP Mode control to activate Actuator control
- Move the "Joystick" left and right to select the desired actuator
- Move the "Joystick" forward and backward to position the actuator
- Move the"Joystick" left and right to select "L"
- Utilise the DX-SNP Mode control to activate driving.

The DX-SCR (Specialty Control Remote) allows more effective use of the DX-SNP module by use of "Non-Drive Operation". This fully automatic mechanism instructs the DX-SNP to scale its outputs to maximum and disable ramping when not driving, with the result that switched functions are controlled immediately and reliably. All DX remotes will have the "Non-Drive Operation" feature in the near future.

Flash Codes

Any fault condition on the DX-SNP module will cause the Status LED on the DX-SNP module to flash. Flashing occurs in bursts of flashes separated by a two second pause. The number of flashes in each burst is referred to as the Flash Code and indicates the nature of the fault.

DX-SNP Status LED Flash Code	Fault Description
1	Switch short circuit (will also cause DX System Status LED(s) to report Flash Code 1)
2	Switch open circuit (will also cause UCM to report an RJM fault)
3	EEPROM fault
4	EEPROM fault

5   Product Disclaimer

Dynamic Controls Ltd. products built today allow our customers' vehicles to conform to national and international requirements. In particular to:

ISO7176 - 9	Climatic Tests for Electric Wheelchairs
ISO7176 - 14	Power and Control Systems for Electric Wheelchairs
ISO7176 - 21	Requirements and Test Methods for Electromagnetic Compatibility of Electric Powered Wheelchairs and Scooters

However the performance of controllers fitted to wheelchairs and scooters is very dependant on the design of the wheelchair or scooter. Final compliance must be obtained by the vehicle manufacturer for their particular vehicle. No component certificate issued by Dynamic Controls Ltd. relieves a wheelchair or scooter manufacturer from compliance testing their particular vehicle.

If Dynamic Controls Ltd. controllers are fitted to vehicles or applications other than wheelchairs and scooters, testing to appropriate standards for the particular application must be completed as ISO7176 may be inappropriate.

6   Electromagnetic Compatibility (EMC)

Dynamic Electronic Controllers have been tested on typical vehicles to confirm compliance with the following appropriate EMC standards:

Emissions: CISPR22, class B
Susceptibility: IEC1000-4-3
ESD: IEC1000-4-2
Compliance levels and set-up as per ISO 7176, part 21.

National and international directives require confirmation of compliance on particular vehicles. Since EMC is dependant on a particular installation, each variation must be tested. The guidelines in this section are written to assist with meeting EMC requirements.

Minimising Emissions

Motors :   Motor brushes generate electromagnetic emissions. It may be necessary to fit capacitors between the brush holders and motor case. Ensure the leads are kept as short as possible.
A suitable capacitor is 4n7, 250V Ceramic.

Wiring :   Keep wire lengths as short as practical for a tidy layout.
Minimise any wire loops, particularly loops of single wires as opposed to wire pairs.
Endeavour to run wires in pairs or bunches.
Where practical, tie cables to wheelchair frame.

Immunity to Radiated Fields

Follow the wiring recommendations for minimising emissions.

Immunity to ESD

Follow the wiring recommendations for minimising emissions.
Ensure all vehicle sub-frames are electrically connected.
Ensure speed setting potentiometers are electrically connected to the vehicle frame.
Do not leave connections unnecessarily exposed.

7   Maintenance

- The DX-SNP itself has no adjustable or maintainable parts, however it is very important for hygiene reasons and to avoid saliva entering the SNP, for the hose and saliva trap to be emptied and treated in the appropriate fashion.

- The DX System should be regularly checked for integrity. Loose, damaged or corroded connectors or terminals, or damaged cabling should be replaced.

- All switchable functions on the DX System should be regularly tested to ensure they function correctly.

- All DX System components should be kept free of dust, dirt and liquids. If necessary wipe with a cloth dampened with warm water or alcohol. **Do not** use solvents or abrasive cleaners.

- Where any doubt exists, consult your nearest Service Centre or Agent.

- There are no user-serviceable parts in any DX System component - do not attempt to open any case.

Warning: If any DX component is damaged in any way, or if internal damage may have occurred (for example by being dropped), have it checked by qualified personnel before operating.

8   Safety and Misuse Warnings

Do not install, maintain or operate this equipment without reading, understanding and following the proper instructions and manuals, otherwise injury or damage may result.

The completed installation must be thoroughly checked, and all programmable options must be correctly adjusted for safe operation prior to use.

A warning must be conveyed to the wheelchair operator that the controller could cause the chair to come to a sudden stop. In situations where this may affect the safety of the user, this will require the fitting and wearing of a seat belt.

Performance adjustments should only be made by professionals of the health care field or persons fully conversant with this process and the drivers capabilities. Incorrect settings could cause injury to the driver or bystanders, or damage to the wheelchair or surrounding property.

After the wheelchair has been set up, check to make sure that the wheelchair performs to the specifications entered in the programming procedure. If the wheelchair does not perform to specifications, turn the wheelchair off immediately and re-program. Repeat procedure until the wheelchair performs to specifications.

Do not operate the DX System if it behaves erratically, or shows abnormal response, heating, smoke or arcing. Turn the system off at once and consult your Service Agent.

Do not operate your DX System if the battery is nearly flat as a dangerous situation may result due to loss of power in an inopportune place.

Ensure the controller is turned off when not in use.

No connector pins should be touched, as contamination or damage due to electrostatic discharge may result.

Most electronic equipment is influenced by Radio Frequency Interference (RFI). Caution should be exercised with regard to the use of portable communications equipment in the area around such equipment. While the manufacturer has made every effort to ensure that RFI does not cause problems, very strong signals could still cause a problem. If RFI causes erratic behaviour, shut the wheelchair off immediately. Leave off while transmission is in progress.

In the event of a fault indicator flashing while driving (battery gauge and/or Status LED), the user must ensure that the system is behaving normally. If not, the system must be turned off and a service agent contacted.

Report any malfunctions immediately to your Service Agent.

9   Warranty

All equipment supplied by Dynamic Controls Ltd is warranted by the company to be free from faulty materials or workmanship. If any defect is found within the warranty period, the company will repair the equipment, or at its discretion, replace the equipment without charge for materials and labour.

The Warranty is subject to the provisions that the equipment:

- Has been correctly installed.

- Has been used solely in accordance with this manual.

- Has been properly connected to a suitable power supply in accordance with this manual.

- Has not been subjected to misuse or accident, or been modified or repaired by any person other than someone authorised by Dynamic Controls Ltd.

- Has been used solely for the driving of electrically powered wheelchairs in accordance with the wheelchair manufacturer's recommendations.

10   Sales and Service Information

For Sales and Service advice, or in case of any difficulty, please contact:

Head Office
Dynamic Controls Limited
Print Place
Christchurch
New Zealand

Telephone: Int. 64 3 338 0016
Fax: Int. 64 3 338 3283

Australia
Electronic Mobile Service (EMS)
46 Berripa Close
North Ryde, Sydney
NSW Australia 2113

Tel 24 hours: Int. 61 2 9887 2824
Pager: Int. 61 2 9963 1778
Fax: Int. 61 2 9887 2114

North America
Dynamic North America
31335 Industrial Parkway, Suite 2
North Olmsted, Ohio 44070
USA
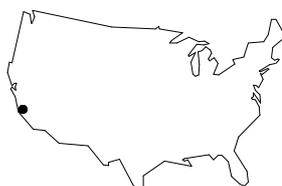
Telephone: Int. 1 440 979 0657
Fax: Int. 1 440 979 1028

Rosstron Inc
1521 W. 259th St
Harbor City, CA 90710
USA

Telephone: Int. 1 310 539 6293
Fax: Int. 1 310 539 4078

Europe
Controls Dynamic Ltd
Lisle Avenue
Kidderminster
DY11 7DL
United Kingdom

Telephone: Int. 44 1562 820 055
Fax: Int. 44 1562 742 720

Note: The controller should be clearly labelled with the manufacturer's service agent's telephone number.

Appendix A : Change Record

This section lists the changes implemented into this manual from previous revisions.

Page / Section	Change	Approval
Page 1	DX-SNP usage added	
Page 6	Note added	
Page 12	Default Programs warning added	PCO 2786
Pages 24 - 25	"Select Mode Control" section re-written	
Page 25 - 26	"Operation of the DX-SNP with DX Master Remotes" section added	
Section 5	Product Disclaimer Section added	PCO 2766
Section 6	EMC Section added	PCO 2766
Section 8	Safety and Misuse Warnings rewritten	PCO 2766
Section 9	Warranty period redefined	
Section 10	EMS contact details changed	PCO 2754
Section 10	Dynamic North America added	PCO 3021
Appendix A	Change Record Section added	