



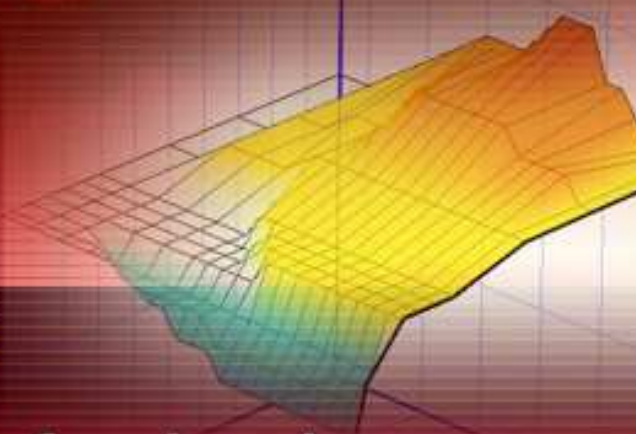
Setting Manual

- English -



Racing ECU
Engine Management Professional

Ver.2.1



Before using the product:

For safe operation, make sure to read this setting manual carefully and become thoroughly familiar with the contents before start using the Racing ECU set (Part No. 490-50A-3000).

This is supplement of instruction manual and explain the product more in details.

It is designed for closed-race circuit or competition use only. Using this product in public roads or highways is strictly prohibited.

As it allows to adjust the setting in a wide range, an extreme attention must be paid.

DANGER!	: Indicates a potential hazard that could result in death, injury or engine breakdown.
CAUTION!	: Indicates a potential hazard that could result in motorcycle damage.
NOTE	: Indicates special information for simplified installation.

— Index —

● Before start setting - Initial setting -	.....	2
● Update of Ver.2.1	.....	4
● Dashboard and switches	.....	5
● Engine setting [Flow chart]	.....	7
● Fuel injection adjustment [Flow chart]	.....	8
● Fuel injection adjustment	.....	9
● ETV ratio adjustment [Flow chart]	.....	10
● ETV ratio adjustment	.....	11
● Engine brake control [Flow chart]	.....	12
● Engine brake control	.....	13
● Shifting up [Flow chart]	.....	14
● Shifting down[Flow chart]	.....	15
● Shifting up and down	.....	16
● Traction control [Flow chart]	.....	17
● Traction control	.....	18

● Before start setting - Initial setting -

Racing ECU makes possible to make wide range of setting adjustment for race use. However it does not work properly without entering correct machine data such as gear ratio or tire circumference.

When the ECU is delivered the default data (based on the original GSX-R1000/R) is already written and **the actual data has to be entered by user**.

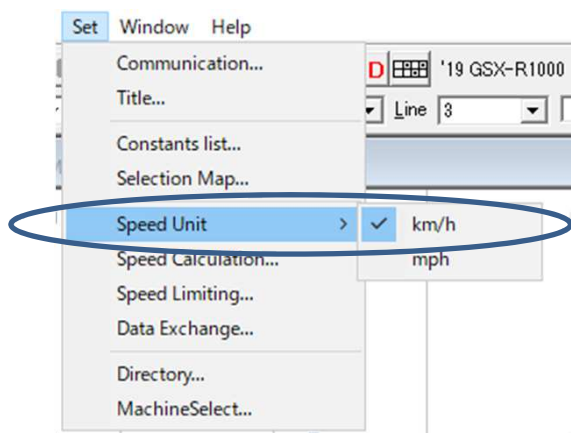
The setup of data logger is also required to make the machine setup.

Followings are required preparation before making the machine setup.

Preparation before making machine setup
1: To setup speed limiter by entering tire circumference, transmission and final ratio at Speed Calculation.
2: Check setup of TC (Traction control), ETV (Throttle Angle Compensation), Over Rev Limit (*1) and Quick shift at Edit Constants list.
3: Write base map to ECU according to the engine spec (SB or ST).
4: Setup data logger to calibrate test data.

*1: Check the engine spec and setup according to the instruction manual.

- Open GSD file from Engine Management Professional.
- Check the correct Speed Unit is selected from [Set].



- Setup speed limit by entering tire circumference, transmission and final ratio at Speed Calculation
The default is set at 60Km/h and it is recommended to test with 58Km/h for the correct work.
- After updating the data, write the data to ECU at [Write to ECU].

	Primary	Drive	46 T	Driven	76 T	Reduction ratio	
Low	Drive	13	T	Driven	41	T	Reduction ratio 2.563
2nd	Drive	19	T	Driven	39	T	Reduction ratio 2.053
3rd	Drive	21	T	Driven	36	T	Reduction ratio 1.714
4th	Drive	24	T	Driven	36	T	Reduction ratio 1.500
5th	Drive	25	T	Driven	34	T	Reduction ratio 1.360
Top	Drive	26	T	Driven	33	T	Reduction ratio 1.269
Final	Drive	17	T	Driven	45	T	Reduction ratio 2.647

Outside dia. of rear tire mm
Outside dia. of front tire mm

Limiting Speed km/h

Speed Limit by Ignition

Low	5517	rpm
2nd	4420	rpm
3rd	3691	rpm
4th	3230	rpm

DANGER!: Make sure to update the [Speed Calculation] and logger setup when changing gear ratio or tires (from slick to rain).

● Before start setting - Initial setting -

- Entering 0 at [Selection of Traction Control] makes TC related setup to be default value and adjustment would be invalid at [Power reduction rate MAP by the spin rate for TC] and [Power reduction rate MAP by the Lean Angle for TC]
Enter 1 to make the TC adjustment.
- Entering 0 at [Selection of Throttle Angle Compensation] makes [Comp.Map for ETV ratio] not effective.
Enter 1 to make the ETV adjustment.
- To raise the engine lev limit to 15,000rpm, 210-50A-0001 ST-R Camshaft set is required.
Check the engine setup before making the lev limit change.

Edit Constants list		
(no group)		
Contents	VALUE	Unit
All Area Fuel Compensation Value	0	%
Selection of Traction Control(0=STD 1=Custom Setup)	1	-
Selection of Throttle Angle Compensation(0=STD 1=Custom Setup)	1	-
OverRev Limit for Ignition	15000	rpm
Maximum power reduction ratio by traction control in wheelie	0	%

- To setup quick shifter, readjustment is required depending on the sensor to use. The default data is set with original Suzuki sensor.
- Entering 0 at [Selection of Quick shift] makes threshold and throttle opening setup to be default value, and the adjustment would be invalid.
Enter 1 to make the quick shift adjustment.

Edit Constants list		
QuickShiftAdjustment		
Contents	VALUE	Unit
Shift switch activation Compensation value(Pull) [5v - VALUE = threshold]	3.30	V
Shift switch activation Compensation value(Push) [0v + VALUE = threshold]	3.81	V
Selection of Quickshift(0=STD 1=Custom Setup)	1	-

● Update of Ver.2.1

***Map grid assignment**

Update axes of fuel injection map,
ignition timing map and lean angle compensation map for easier operation.

*** Adjustment of shift switch sensitivity**

Update threshold base value with better indication.

*** Fuel injection control base map**

Update base fuel injection map with better A/F ratio.

NOTE: It is required to make further setting depending on the environment or engine condition.

*** Change over timing from T-Map to D-Table**

Update switching point from throttle opening at 8% to 3%.

*** ETV ratio**

Update ETV Ratio at ABC Mode to improve operability when wheeling or sliding occurs.

*** Additional function to adjust ETV ratio**

In addition to ABC Mode, +5% compensation maps
are available at B & C Mode (5 selectable maps available in total).
Refer the [+5% ETV correction map ver2.1] for further details.

*** Traction control quality**

Update target map to improve functions of traction control.
Update compensation map with maximum lean angle value from 40degrees to 50degrees.

*** Additional file to monitor Traction control operation**

Use [TC conversion ver2.1] to analyze traction control.

*** Bug fix**

● Dashboard and switches

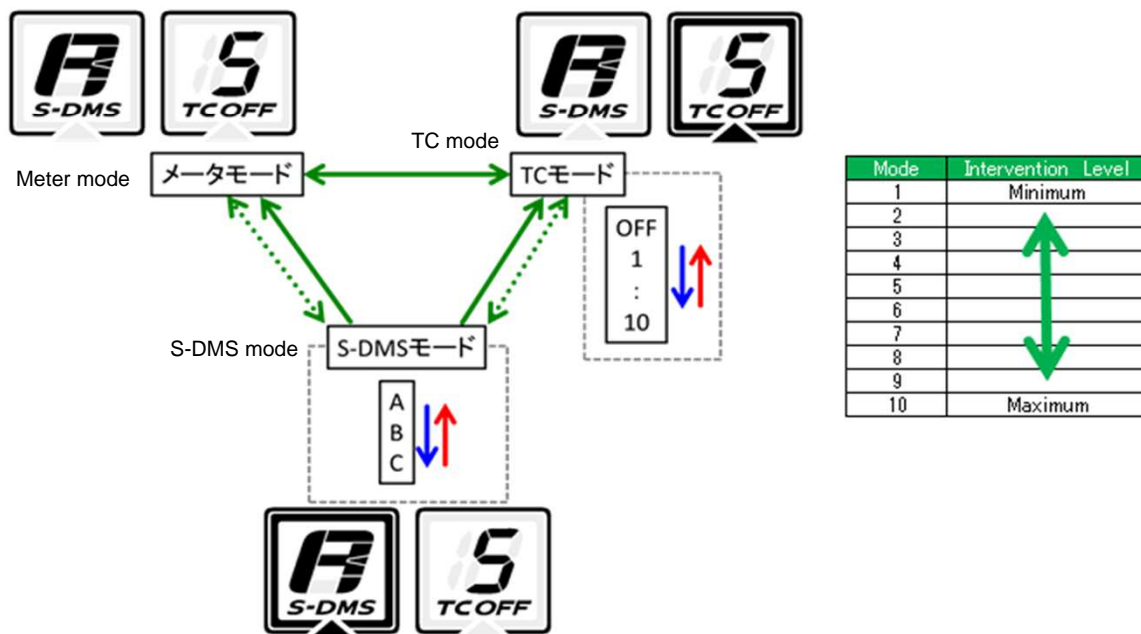
The mode of quick shift (QS), traction control (TC) and S-DMS is possible to change with the left hand handle switches. The selected mode is shown at dashboard.

Changing TC mode & S-DMS mode



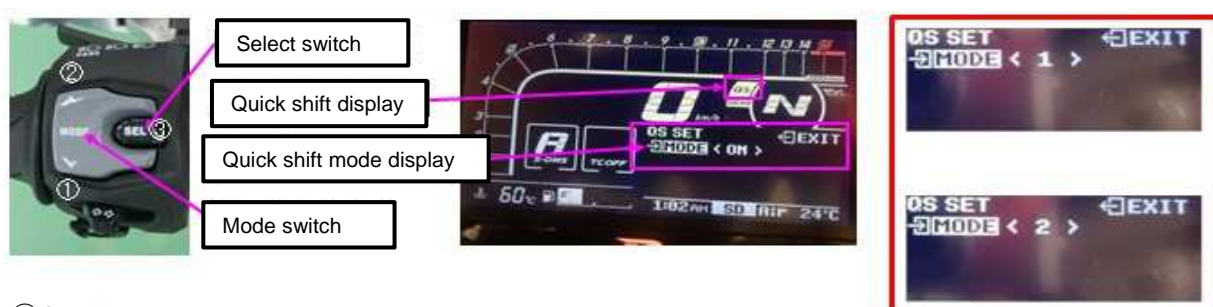
- ① 短押し → Press
長押し → Long press
- ② 短押し → Press
長押し → Long press
- ③ 短押し → Press
長押し → Long press

Select TC mode



Quick shift (QS)

The quick shift system can be selected as OFF, MODE 1 or MODE 2 by left hand handle select switch. The selected mode is shown at dashboard as follows.



② Long press

↓

①, ② Press and select QS menu

↓

① Long press

↓

QS SET

① Long press: Change QS MODE from OFF, MODE 1 to MODE 2.

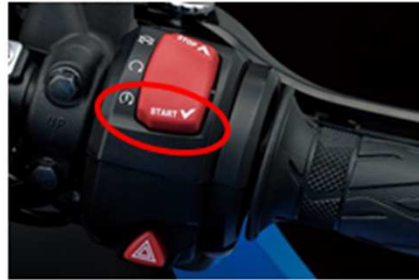
Each Mode details

MODE 1: Higher control threshold value than MODE 2.

MODE 2: Lower control threshold value than MODE 2.

Launch control

After engine to be started and the vehicle is stopped, press and hold the starter switch button for approximately 2 seconds to make launch control (LC) to be on.
The starter will idle but there is no problem.
When launch control (LC) to be on, [L] is shown on the dashboard.



Standard



LC Mode



● Engine setting [Flow chart]

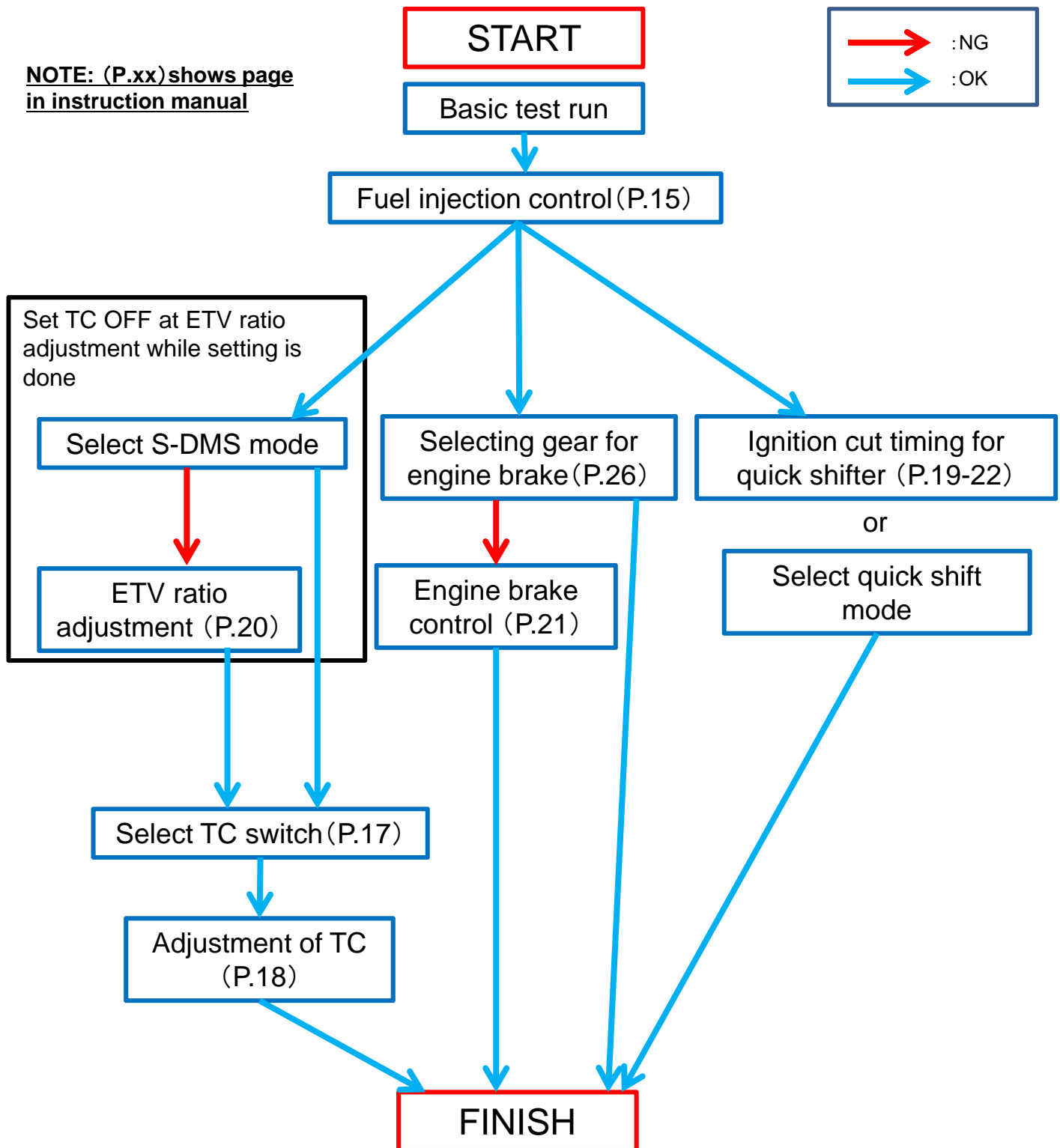
It is important to understand setting procedure as the software makes wide range of adjustment.

It is recommended to follow the flow chart, and make setup one by one while checking both logger data and rider's comment.

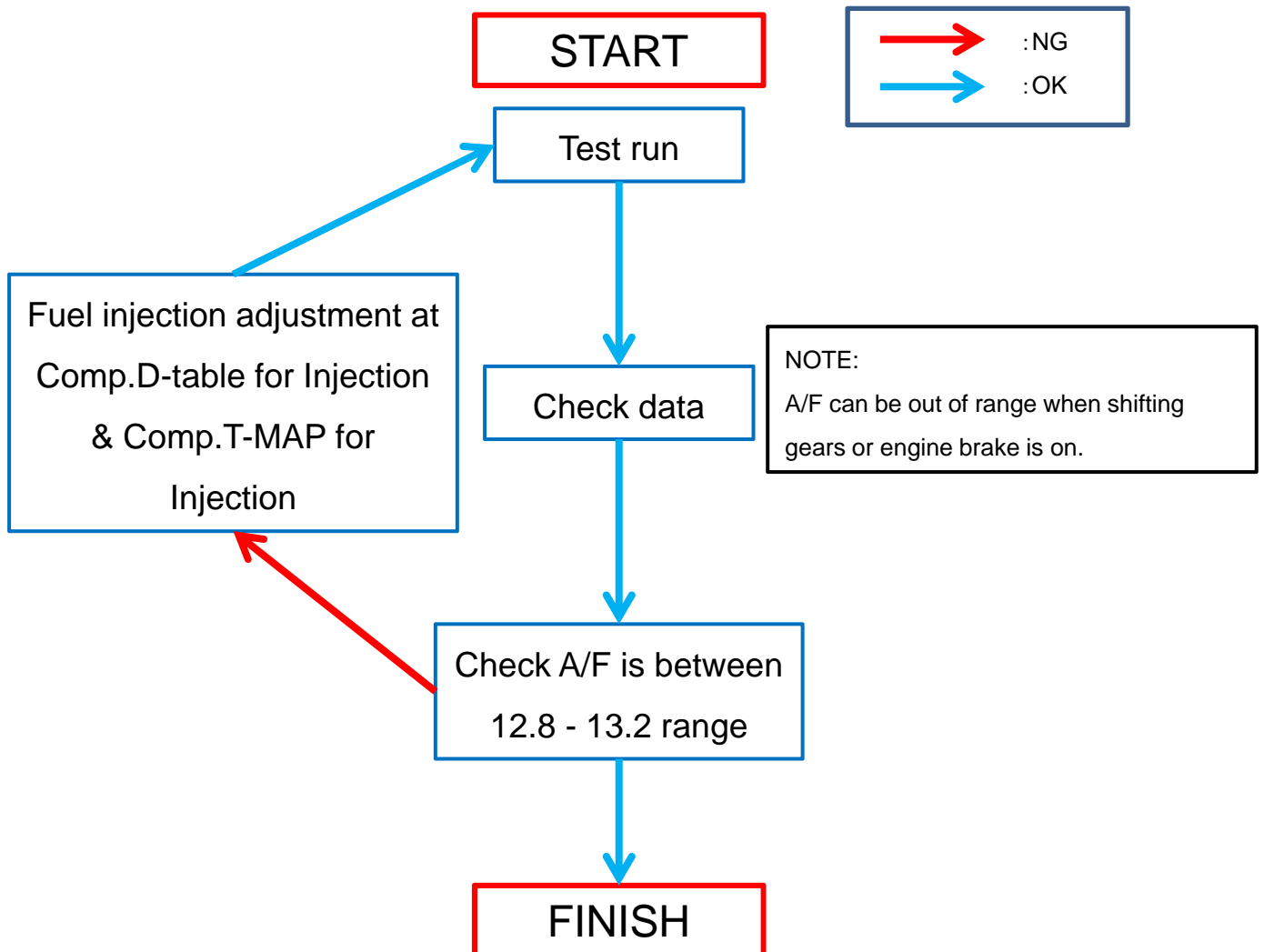
NOTE :

It is recommended to select S-DMS at Mode A and TC is OFF at basic test run.

**NOTE: (P.xx) shows page
in instruction manual**



● Fuel injection adjustment [Flow chart]



● Fuel injection adjustment

- Use [Comp.D-Table for injection] for throttle opening is up to 3% and use [Comp.T-Map for Injection No.1 or No.2] for more than throttle opening is 3%.
- It is recommended to make each adjustment within 1.58% (2 click) when reducing the fuel supply less to avoid engine brake down.
- When making the fuel injection adjustment, make sure A/F data at acceleration area to be 12.8-13.2 range. Starting the setting at the full throttle open (at straight) area is useful.
- A/F data can be out of range when shifting gears, blipping, engine brake is on.
- A/F data may have a small gap (delay) from engine rpm and TPS.
- Adjust map after confirming which gear is selected.

CAUTION:

When A/F value is larger, the fuel mixture is lean while it is rich when the A/F value is smaller.

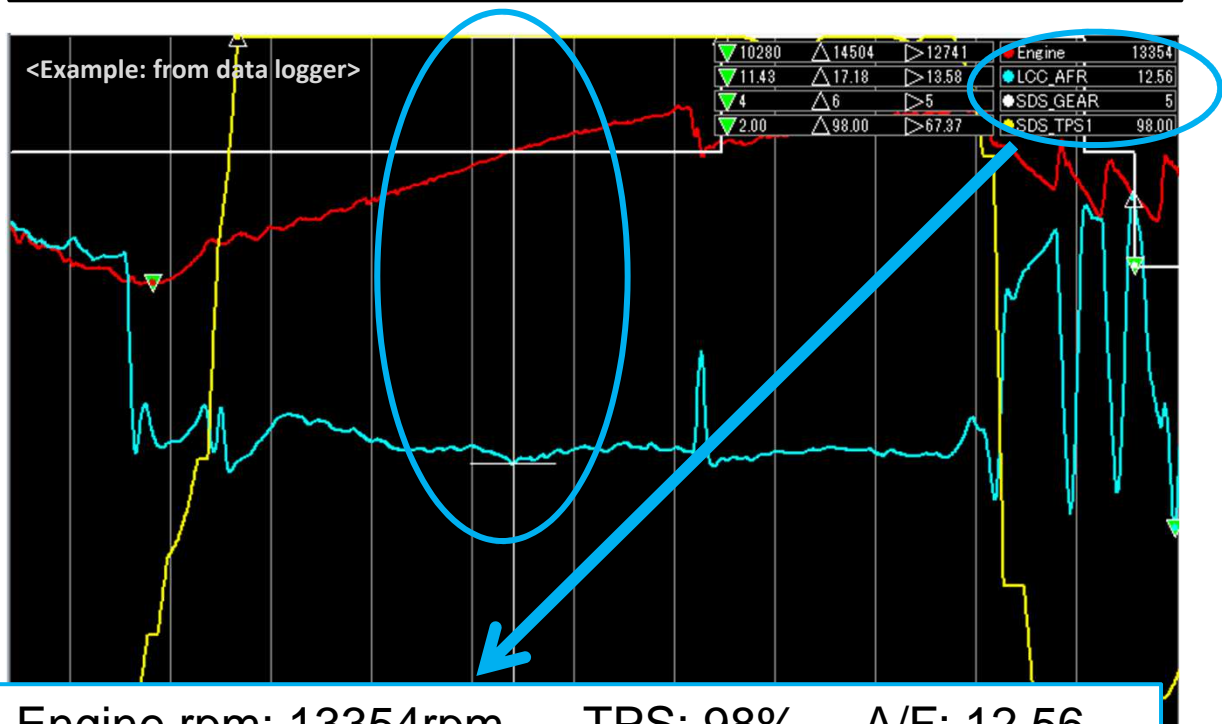


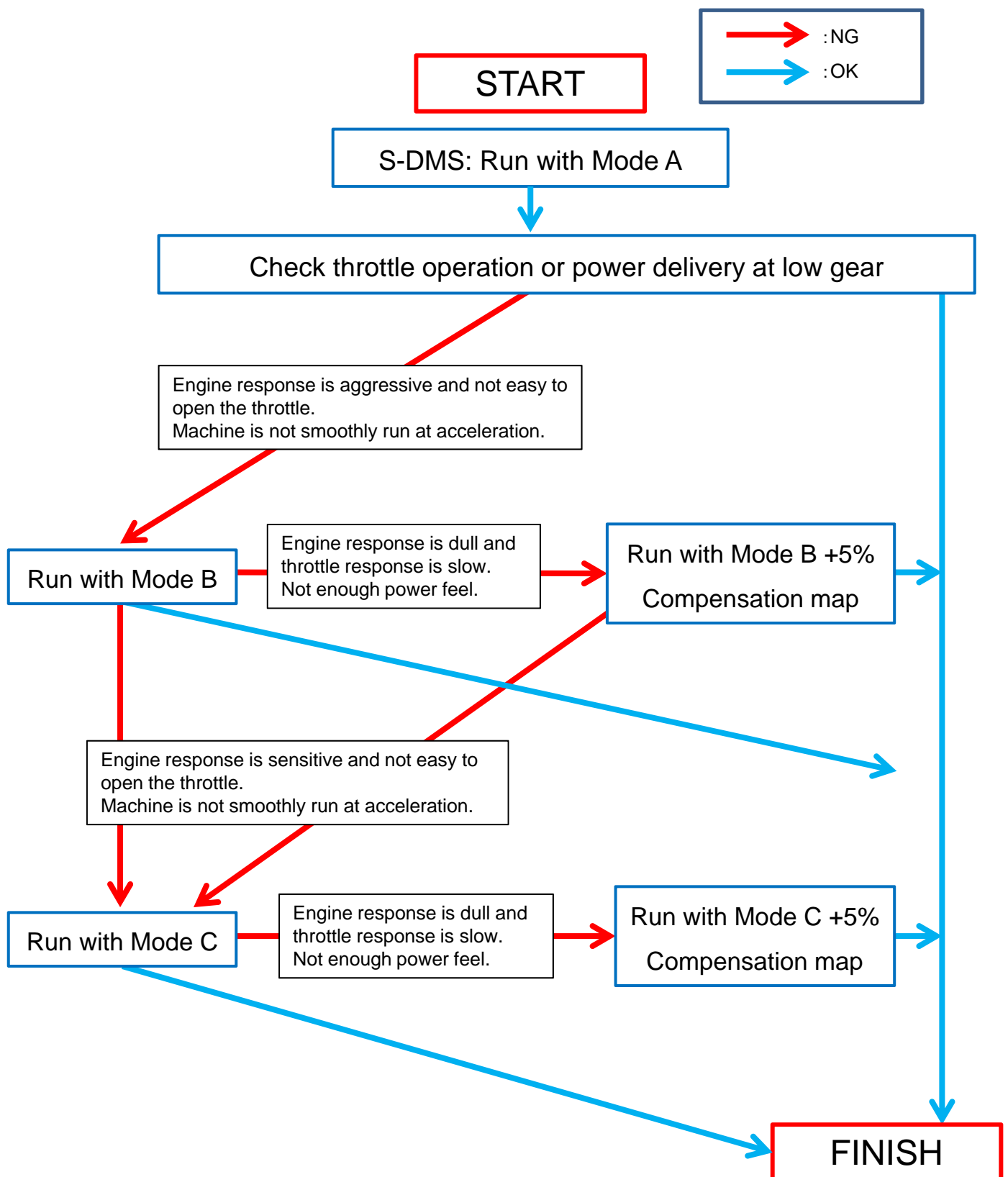
TABLE - Comp.T-Map for Injection No.1

	2000	3000	4000	5000	6000	7000	8000	8500	9000	9500	10000	10500	11000	11500	12000	12500	13000	13500	14000	14500
2.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
70.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Refer the A/F at the close area when adjusting the fuel map.

The red framed area is relevant part but check the close area and adjust together.

● ETV ratio adjustment [Flow chart]



● ETV ratio adjustment

- Based on the full powered Mode A, there are Mode B and Mode C in S-DMS mode and they are set with power output at low gear controlled.
- Comp.Map for ETV (MODE B or Mode C) B/C is compensation map with +5% from original mode. Mode A is full powered at every gears and do not make any adjustment.
- Use excel tool [+5% ETV compensation map ver2.1], copy and paste data for safety and smooth torque delivery.
- Do not enter the value directly and use [+5% ETV compensation map ver2.1] by pasting the map. It is necessary to keep the map within safe area and to avoid unexpected throttle opening.
- It is recommended to set TC OFF when making the ETV ratio adjustment.
- While TC is on, it is difficult to judge either TC or ETV ratio causes engine torque change. Too much TC affects to engine power output, fuel consumption or machine durability.

Refer the chart below and flow chart on page 10, find and select suitable S-DMS mode

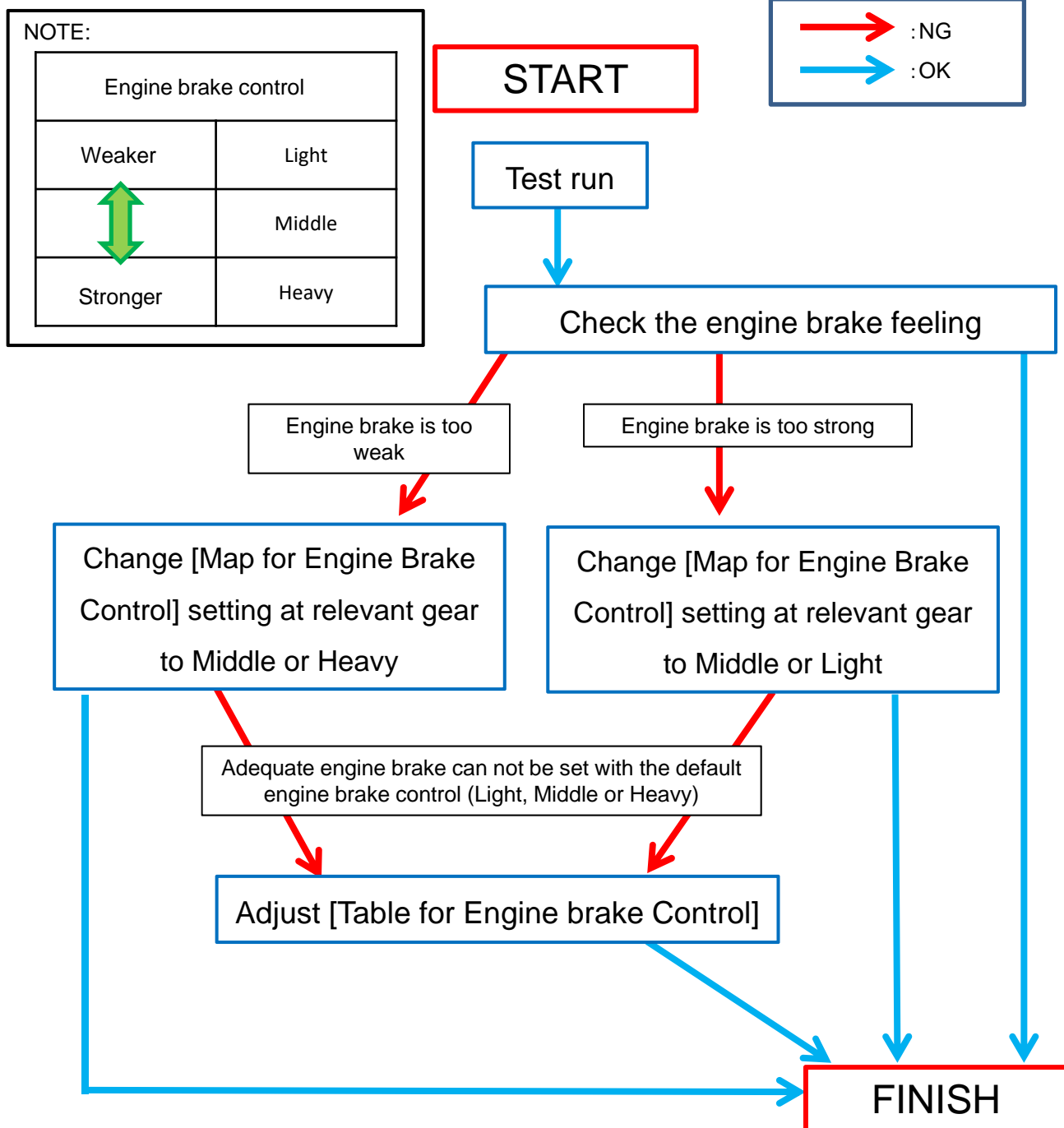
		GEAR			
		1st	2nd	3rd	4~6th
S-DMS	A	± 0%	± 0%	± 0%	± 0%
	B	-15%	-10%	± 0%	± 0%
	C	-20%	-20%	-10%	± 0%



+5% compensation map

		GEAR			
		1st	2nd	3rd	4~6th
S-DMS	A	± 0%	± 0%	± 0%	± 0%
	B+5%	-10%	-5%	± 0%	± 0%
	C+5%	-15%	-15%	-5%	± 0%

● Engine brake control [Flow chart]



NOTE:

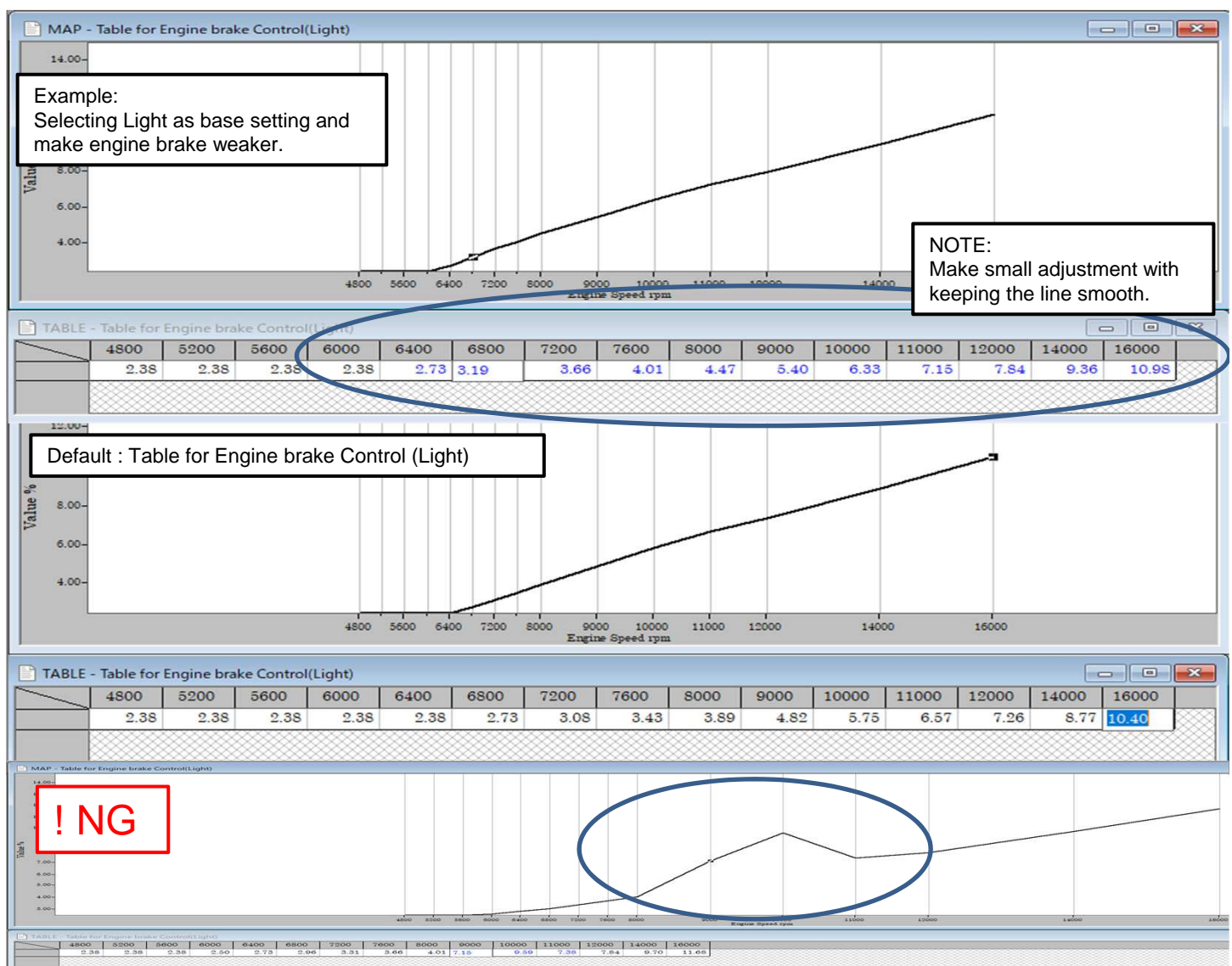
When adjusting the setting at [Table for Engine Brake Control], it is required to check the gear allocation at [Map for Engine Brake Control] again.

● Engine brake control

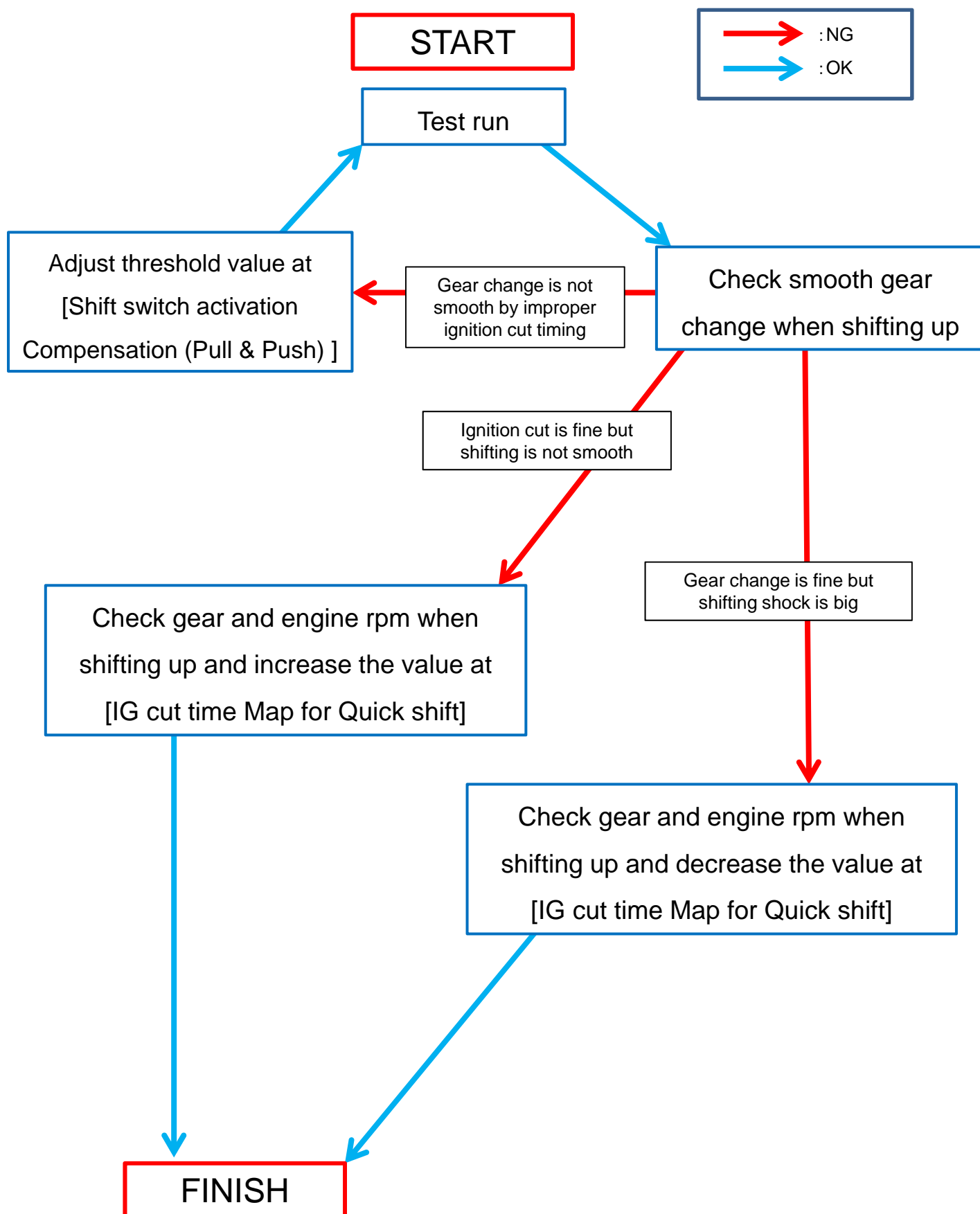
- Select engine brake map for each gear from 3 default setting (Light, Middle or Heavy).
Select Heavy for stronger engine brake and select Light for weaker engine brake setting.
- When engine brake adjustment is required, check logger data and find which gear is used and adjust the value at [Table for Engine brake Control]. Do not mixed up with allocated map and editing map.
- The engine rpm at horizontal axis is calculated value from front wheel speed.
Front wheel speed is calculated by $[F \text{ Speed (Km/h)} / F \text{ tire circumference} / 60 * \text{Final reduction ratio}]$.
- When changing the engine brake character by modifying default engine brake setting (Light, Middle or Heavy) and make it stronger, put smaller value to make throttle to be closed.
- It is recommended to keep the line smooth as the below graph shows.
- Readjustment of blip control may be required after setup the engine brake control due to the change of engine rpm at down shifting.

DANGER!: Do not exceed the value [TH%] in each rpm when making the engine brake control adjustment.
If neglected, engine rpm may not go down enough for braking.

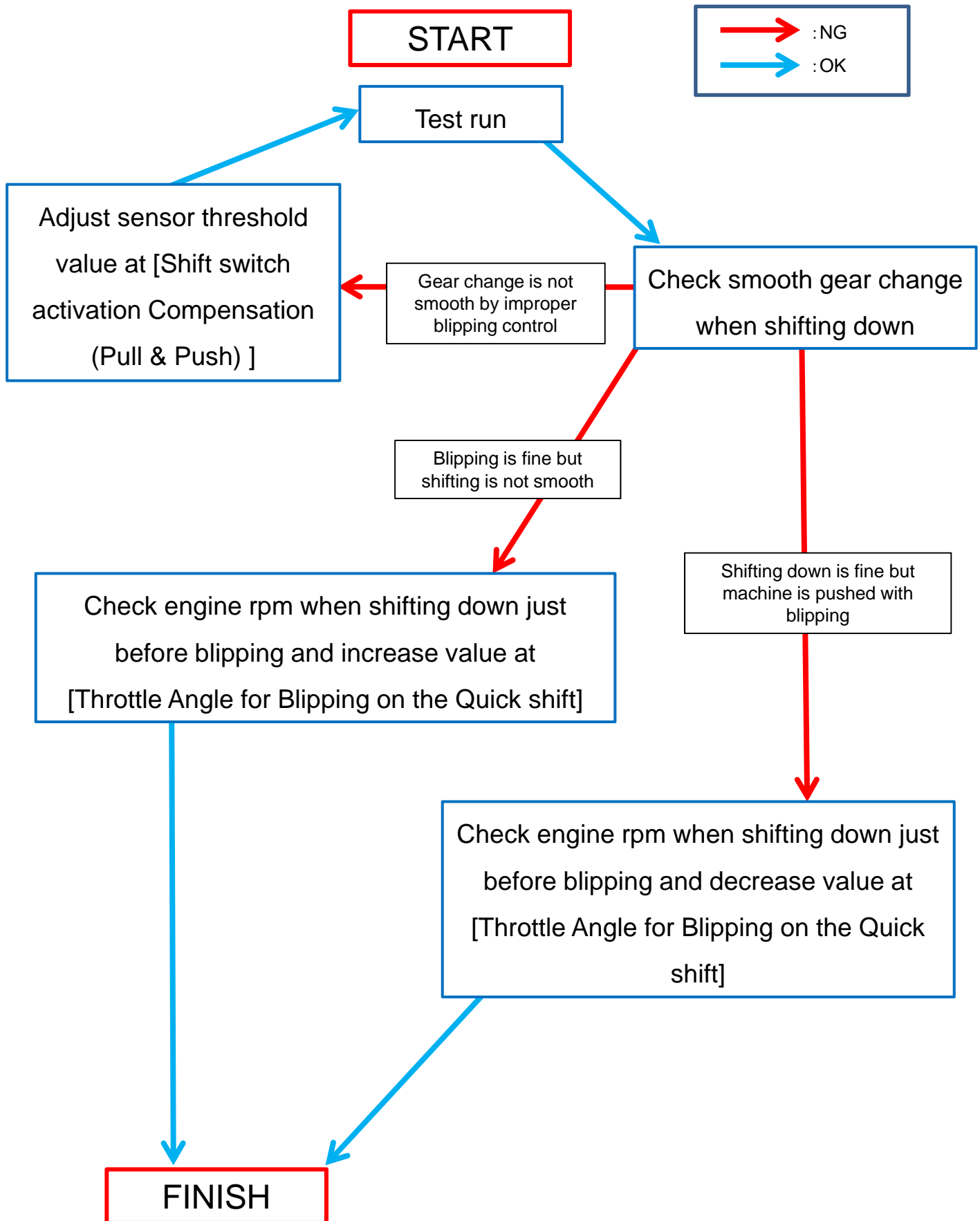
rpm	4800	5200	5600	6000	6400	6800	7200	7600	8000	9000	10000	11000	12000	14000	16000
TH%	4.01	4.24	4.59	4.94	5.29	5.64	5.98	6.33	6.68	7.61	8.54	9.59	10.98	13.77	14.24



● Shifting up [Flow chart]



● Shifting down [Flow chart]



● Shifting up and down

Setup shift sensor

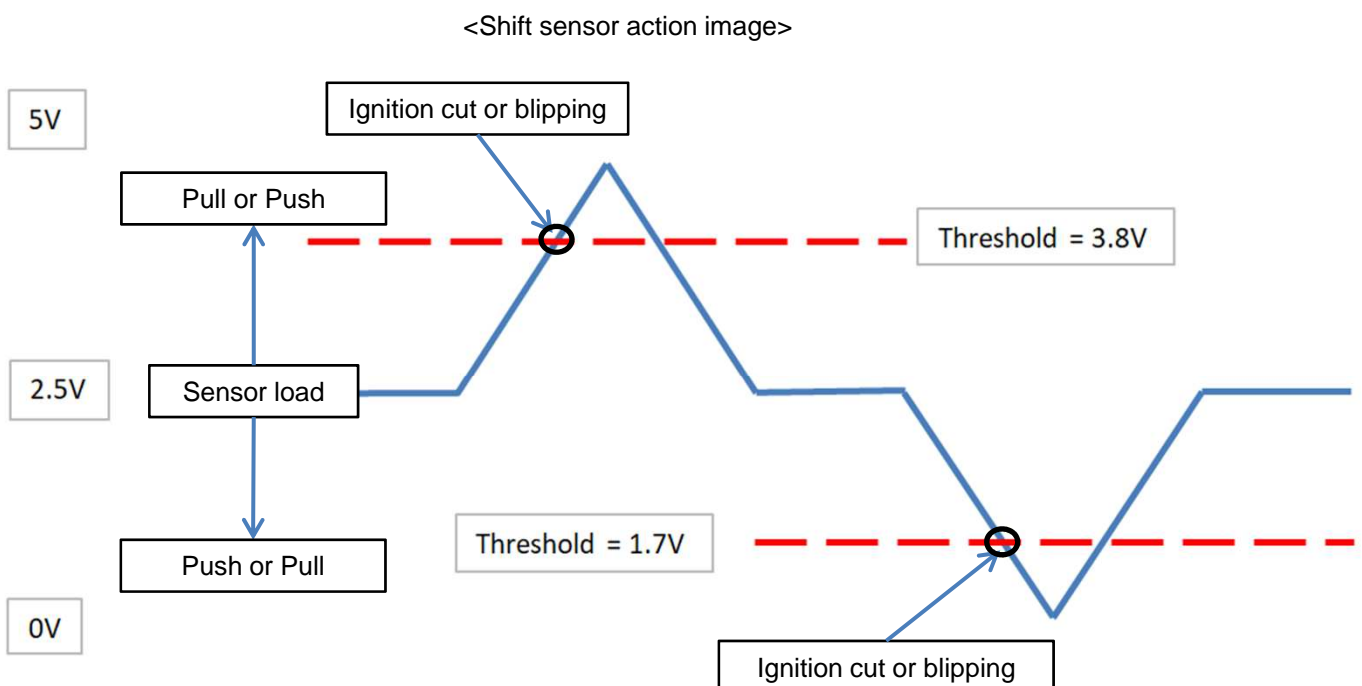
- The value to enter at [Shift switch activation Compensation (Pull & Push)] is set from calculated threshold.
The default value is set with original (standard) sensor and resetting is required when using other shift sensor.
- Refer the shift sensor action image below and adjust threshold when having gearing problem by improper ignition cut.

Shifting up

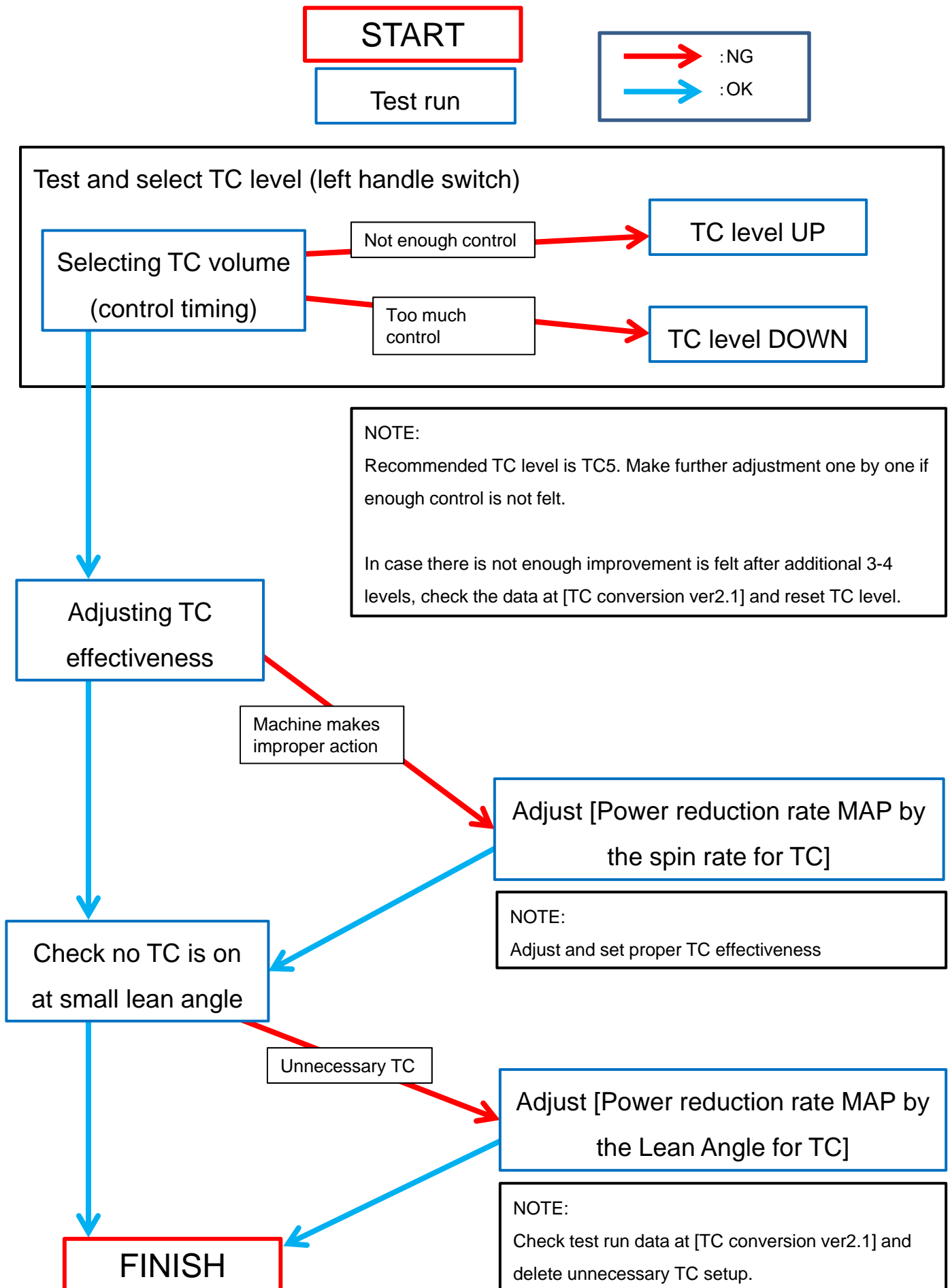
- Selecting 1 at [Selection of Quick shift] makes possible to edit [IG cut time Map for Quick shift].
0 is default map which is already set in the ECU.
- Basic idea is to set ignition cut longer at low gear and low engine rpm, and set ignition cut timing shorter at high gear and high engine rpm.
- When having gearing problem, check logger data and set ignition cut timing longer at relevant gear and engine rpm.
Set ignition cut timing shorter when engine stall occurs or shifting shock is big.
- It is recommended to make adjustment in each 4-8ms.

Shifting down

- Selecting 1 at [Selection of Quick shift] makes possible to edit [IG cut time Map for Quick shift] and [Throttle Angle for Blipping on the Quick shift (DOWN shift)].
0 is default map which is already set in the ECU.
- Basic idea is to set blipping smaller at low rpm and set blipping bigger at high rpm.
- When having gearing problem, check logger data and increase auto-blipping rpm range (throttle opening) and engine rpm.
Decrease throttle opening value when machine is pushed at shifting down or machine makes unexpected action.
- Changing engine brake control setup may require adjustment of blipping control setup.



● Traction control [Flow chart]



● Traction control

Detect front and rear wheels rotation gap, and reduce rear tire spinning by ignition timing retard.

Make the setup from TC OFF to avoid engine power loss or exhaust damage. After enough test run, confirm the engine and chassis characters, make adjustment with ETV ratio as much as possible and then cover the area where enough adjustment is not done with TC.

Use [TC conversion ver2.1] to make TC target visible.

However use the data only for the reference as the evaluated data is 10Hz.

Output SDS2 data (ECU signal from K-Line) is differential value of [SDS_SPIN_RT_TC] F/R wheel slipping rate and differential value between [SDS_SPIN_RATE_TC] target when TC functioning and [SDS_SPIN_RT_TC]. The value of [SDS_SPIN_RATE_TC] is horizontal axis at [Power reduction rate MAP by the spin rate for Traction Control] and it becomes target when [TC conversion ver2.1] is not used.

However use the data only for the reference as the evaluated data is 10Hz.

TC conversion ver2.1		TPS [%]	Gear	Lean angle[deg]	SpinRate[%]	F_Speed[km/h]	TC Target	Power reduction rate MAP by the spinrate for TC - SpinRate [%]	Power reduction rate MAP by the spinrate for TC - Value [%]
9.6	5290.6	22.0	2.0	-0.1	3.3	60.7	6.5	0.0	0.0
9.7	5970.8	24.0	2.0	13.7	3.2	62.0	5.8	0.0	0.0
9.8	6122.3	26.4	2.0	24.9	3.1	63.9	5.2	0.0	0.0
9.9	6305.5	29.1	2.0	31.0	3.2	66.0	5.5	0.0	0.0
10.0	6770.8	32.0	2.0	34.7	8.8	68.1	4.7	4.0	2.8
10.1	6777.9	32.1	2.0	35.6	5.5	72.1	3.6	1.9	1.1

TABLE - Power reduction rate MAP by the spin rate for Traction Control						
	0.0	2.0	4.0	6.0	8.0	10.0
	0.00	5.08	10.16	14.84	14.84	14.84

NOTE:

TC target is calculated in [TC conversion ver2.1].

There is no output from regular SDS2.

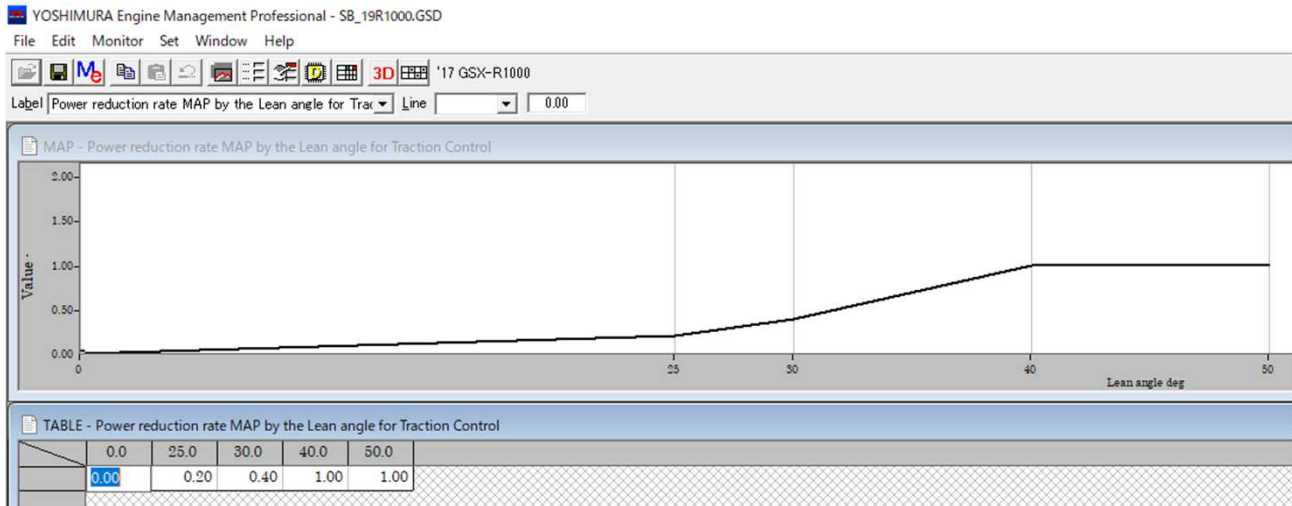
[SDS_SPIN_RT_TC] and [SDS_SPIN_RATE_TC] are not output when TC is OFF.

Refer instruction at [TC conversion ver2.1].

TC is only supplemental function. Too much control makes power loss or ignition timing retard affect exhaust gas temperature extremely high and it causes breakage.

[Power reduction rate MAP by the Lean Angle for TC] makes multiplier compensation in different lean angle.

In the map below shows engine power output cut by TC is not effective when machine lean angle is at [0.0deg] and [Power reduction rate MAP by the spin rate for TC] is [0.00]. At [25.0deg] is 20% engine power out put cut and [Power reduction rate MAP by the spin rate for TC] is [0.20]. At [40.0-50.0deg] is [1.00].



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Follow each race regulation to use these race parts.

Racing Kit Parts are intended for closed-course riding or competition only and are not intended to be used on public roads.

Racing Kit Parts might alter the vehicle's emission or noise related components, which could violate laws and can result in fines and penalties if used on public roads.

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