3R MACHINE WITH TABLET PC AND SCANNING TOOL FOR CAR MAINTENANCE BUSINESS.

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EXTENDED ABSTRACT

1. INTRODUCTION

Recently, a tendency to adopt a heat pump with a large amount of refrigerant enclosed in an electrified vehicle (BEV/ PHV/ HV) has been increasing. As a result, the pipes of air conditioner are complicated, and in order to clarify whether there are differences in the recovery volume and working hours depending on the working methods in the refrigerant recovery and charge in the maintenance of air conditioners, DENGEN verified by using a scanning tool together with a new type of automatic refrigerant recover/recycle/recharge machine "CS-YF134WS-T" (hereafter, “this machine”) applied for both R134a and R1234yf refrigerants, which is the first domestically produced being capable of remotely operating with an accessory tablet PC.

2. EXPERIMENT METHOD

Taking Toyota Prius [*] PHV (model:6LA-MXWH61) 2023 (Refrigerant: R1234yf, Fill Volume:1500g±30g) as an object, after preparing this machine by connecting it to a port of air conditioner piping of Prius, refrigerant was recovered from an air conditioner and quantitatively filled using a tablet PC and a scanning tool for this machine.

Recovery method: Only repeated-recovery (recovery method to reduce the refrigerant stagnation) and recovery are carried out twice. Leaving for one hour from 30 minutes after the end of the first recovery work, after the pressure rises by dissolving the refrigerant stagnation that could not be recovered in the first time, the second recovery work is performed.

Scanning Tool: Tool planet's “nanoBT” [**]

Automatic refrigerant recovery/recycle/recharge machine: CS-YF134WS-T

Ambient temperature: 33.4°C, RH: 37%, Reference Material: FAINES [1]

3. RESULT

Table 1. List of work settings, recovery time, and recovery volume.

No.	Work Settings	Total		1st recovery		2nd recovery		Effect
		Recovery time (min)	Amount recovered (g)	Recovery time (min)	Amount recovered (g)	Recovery time (min)	Amount recovered (g)	
1	Maintenance-mode IG “on” with the scanning tool	31	1486	19	1406	12	80	◎
2	Panel-operated maintenance-mode IG “on”	30	1478	18	1401	12	77	◎
3	Maintenance-mode IG “off” with the scanning tool	45	1452	31	1233	14	219	○
4	Normal operation (no maintenance-mode, IG“off”)	47	1469	34	1300	13	169	○

IG: Abbreviation for ignition, refers to the starting condition of a car.

Effect : ◎···Short recovery time ○···Long recovery time

3.1 Comparison with and without maintenance-mode

a.) When the work setting (No. 1) is compared with (No. 4), the maintenance-mode tends to have a shorter first recovery time and a larger amount of recovery.

b.) In the maintenance-mode (No.1) and (No. 2), the first recovery amount is large. In the normal operation (No.4), the difference was able to be recovered by the second recovery, and the large difference was not observed in the final recovery quantity.

c.) The maintenance-mode using the scanning tool (No.1) and the panel-operated maintenance-mode (No.2) showed almost the same recovery time and amount recovered.

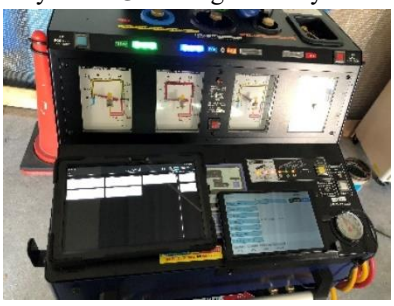

Photo.1 Tablet PC of this machine (right) and Tool planet (left) in use.

3.2 Checking for differences in IG “on”/”off”

It was found that although the amount of recovery was similar, both the work settings (No. 1) and (No. 2) took around 30 minutes to recover when IG was turned “on” in the maintenance-mode. When the work setting (No.3) and (No. 4) with IG “off” took around 45 minutes to recover.

REFRENCES

[1] FAINES, maintenance manual, the Japan Automobile Service Promotion Association (JASPA)

[*] Toyota Prius is a registered trademark owned by Toyota Motor Corporation.

[**] nanoBT is a registered trademark owned by Tool planet Co., Ltd.