

# SHOP MANUAL

## **KOMATSU** **D155AX-5**

MACHINE MODEL    SERIAL NUMBER

**D155AX-5**                      **70001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- D155AX-5 mounts the SA6D140E-2 or SA6D140E-3 engine.  
For details of the engine, see the 6D140-2 or 140-3 Series Engine Shop Manual.

# CONTENTS

	No. of page
<b>01 GENERAL .....</b>	<b>01-1</b>
<b>10 STRUCTURE AND FUNCTION .....</b>	<b>10-1</b>
<b>20 TESTING AND ADJUSTING .....</b>	<b>20-1</b>
<b>30 DISASSEMBLY AND ASSEMBLY .....</b>	<b>30-1</b>
<b>40 MAINTENANCE STANDARD .....</b>	<b>40-1</b>
<b>90 OTHERS .....</b>	<b>90-1</b>

The affected pages are indicated by the use of the following marks. It is requested that necessary actions must be taken to these pages according to the list below.

Mark	Indication	Action required
○	Page to be newly added	Add
●	Page to be replaced	Replace
( )	Page to be deleted	Discard

Pages having no marks are not revised at this time.

#### LIST OF REVISED PAGES

Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number
●	00- 1	④		10- 5	③		10-52			10- 96			10-140	
	00- 2	①		10- 6	③		10-53			10- 97			10-141	
●	00- 2-1	④		10- 7			10-54	③		10- 98			10-142	
●	00- 2-2	④		10- 8	③		10-56			10- 99			10-143	
●	00- 2-3	④		10- 9	③		10-57			10-100			10-144	
●	00- 2-4	④		10-10	③		10-58	③		10-101			10-145	
○	00- 2-5	④		10-11			10-59			10-102			10-146	
	00- 3			10-12			10-60	③		10-103			10-147	
	00- 4			10-13			10-61			10-104			10-148	
	00- 5			10-14			10-62			10-105	③		10-149	
	00- 6			10-15			10-63			10-106	③		10-150	
	00- 7			10-16	③		10-64			10-107			10-151	
	00- 8			10-17			10-65			10-108			10-152	
	00- 9			10-19			10-66	③		10-109			10-153	
	00-10			10-20			10-67			10-110			10-154	
	00-11			10-21			10-68			10-111			10-156	
	00-12			10-22			10-69	③		10-112			10-157	
	00-13			10-24			10-70			10-113			10-158	
	00-14			10-25			10-71	③		10-114			10-159	
	00-15			10-26			10-72			10-116			10-160	
	00-16			10-27			10-73			10-117			10-161	
	00-17			10-28			10-74			10-118			10-162	
	00-18			10-29			10-75			10-119			10-163	
	00-19			10-30			10-76			10-120			10-164	
	00-20			10-31			10-77			10-121	③		10-165	
	00-21			10-32			10-78			10-122			10-166	
	01- 1			10-34			10-79			10-124			10-167	
	01- 2			10-35			10-80			10-125			10-168	
	01- 3			10-36			10-81			10-126			10-169	
	01- 4	③		10-37			10-82			10-127			10-170	
	01- 5	③		10-38			10-83			10-128			10-171	
	01- 6	③		10-39			10-84			10-129			10-172	
	01- 7	③		10-40			10-85	③		10-130			10-173	
	01- 8	③		10-41			10-86			10-131			10-174	
	01- 9	③		10-42			10-87			10-132			10-175	
	01-10	③		10-43			10-88			10-133			10-176	
	01-11	③		10-44			10-89			10-134			10-177	
	01-12	③		10-46			10-91			10-135			10-178	
	10- 1			10-47			10-92			10-136			10-179	
	10- 2	③		10-48			10-93	③		10-137			10-180	
	10- 3	③		10-49			10-94			10-138			10-181	
	10- 4	③		10-50	③		10-95			10-139			10-182	

Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number
	10-183			20- 9			20-126		○	20-219-1	④	○	20-258	④
	10-184			20- 10			20-127		○	20-219-2	④	○	20-259	④
	10-185			20- 11			20-128		○	20-219-3	④	○	20-260	④
	10-186 ③			20- 12			20-129		○	20-219-4	④	○	20-261	④
	10-187			20- 13			20-130		○	20-219-5	④	○	20-262	④
	10-188			20- 14			20-131		○	20-219-6	④	●	20-301	④
	10-189			20- 15			20-132			20-220			20-302	
	10-189-1 ③	○	20- 16	④			20-133			20-221			20-303	
	10-189-2 ③	○	20- 17	④			20-134			20-222			20-304	
	10-189-3 ③	○	20- 18	④	●	20-135	④			20-223			20-305	
	10-189-4 ③	○	20- 19	④	●	20-136	④			20-224			20-306	
	10-190	○	20- 20	④		20-137				20-225			20-307	
	10-191	○	20- 21	④		20-138				20-226			20-308	
	10-192	○	20- 22	④	○	20-138-1	④			20-227			20-309	
	10-193 ③	●	20-101	④	○	20-138-2	④			20-228			20-310	
	10-193-1 ③	●	20-102	④	○	20-138-3	④			20-229			20-311	
	10-194 ③	●	20-103	④	●	20-139	④	○	20-229-1	④			20-312	
	10-195 ③	○	20-103-1	④		20-140		○	20-229-2	④			20-313	
	10-196 ③	○	20-103-2	④	○	20-140-1	④	○	20-229-3	④			20-314	
	10-196-1 ③	●	20-104	④	○	20-140-2	④	○	20-229-4	④			20-315	
	10-196-2 ③	○	20-104-1	④	○	20-140-3	④	○	20-229-5	④			20-316	
	10-196-3 ③	●	20-105	④	○	20-140-4	④	○	20-229-6	④			20-317	
	10-197	○	20-105-1	④		20-141		○	20-229-7	④			20-318	
	10-198	●	20-106	④		20-142		○	20-229-8	④			20-319	
	10-199	●	20-107	④		20-143		○	20-229-9	④			20-320	
	10-200	○	20-107-1	④		20-144		●	20-230	④			20-321	
	10-201 ③	●	20-108	④		20-145			20-231				20-322	
	10-202	●	20-109	④	●	20-146	④	○	20-231-1	④	●	20-401	④	
	10-203 ③	○	20-109-1	④		20-147		○	20-231-2	④		20-402		
	10-203-1 ③	●	20-110	④		20-148		●	20-232	④		20-403		
	10-204 ③	○	20-110-1	④		20-149			20-233			20-404		
	10-205 ③	●	20-111	④		20-150			20-234			20-405		
	10-205-1 ③	○	20-111-1	④		20-151			20-235			20-406		
	10-205-2 ③	○	20-111-2	④		20-152		○	20-235-1	④		20-407		
	10-206	○	20-111-3	④		20-153		○	20-235-2	④		20-408		
	10-207	○	20-111-4	④		20-154		○	20-235-3	④		20-409		
	10-208	○	20-111-5	④		20-155		○	20-235-4	④		20-410		
	10-209	○	20-111-6	④		20-156		○	20-235-5	④		20-411		
	10-210 ③	●	20-112	④		20-157		○	20-235-6	④		20-412		
	10-211 ③	○	20-112-1	④	●	20-201	④	○	20-235-7	④		20-413		
	10-211-1 ③	○	20-112-2	④		20-202		○	20-235-8	④		20-414		
	10-212 ③		20-113			20-203		○	20-235-9	④		20-415		
	10-213 ③	○	20-113-1	④		20-204		○	20-235-10	④		20-416		
	10-214 ③	●	20-114	④		20-205		○	20-235-11	④		20-417		
	10-215 ③	●	20-115	④		20-206		○	20-235-12	④		20-418		
	10-215-1 ③	●	20-116	④		20-207			20-236			20-419		
	10-216	●	20-117	④		20-208		●	20-238	④		20-420		
	10-217	○	20-117-1	④		20-209		●	20-239	④		20-421		
	20- 1	●	20-118	④		20-210		●	20-240	④		20-422		
●	20- 2	④	○	20-118-1	④	20-211			20-241			20-423		
○	20- 2-1	④		20-119		20-212		○	20-251	④		20-424		
●	20- 3	④		20-120		●	20-214	④	○	20-252	④		20-425	
	20- 4			20-121			20-215		○	20-253	④		20-426	
	20- 5			20-122			20-216		○	20-254	④		20-427	
	20- 6			20-123			20-217		○	20-255	④		20-428	
	20- 7			20-124			20-218		○	20-256	④		20-429	
●	20- 8	④		20-125			20-219		○	20-257	④		20-430	



Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number
	20-431			20-620		○	20-742	④	○	20-902	④		30- 8	①
	20-432			20-621		○	20-743	④	○	20-903	④		30- 9	①
	20-433			20-622		○	20-744	④	○	20-904	④		30- 10	①
	20-434			20-623		○	20-745	④	○	20-905	④		30- 11	①
	20-435			20-624		○	20-746	④	○	20-906	④		30- 12	②
	20-436			20-625		○	20-801	④	○	20-907	④		30- 13	②
	20-437			20-626		○	20-802	④	○	20-908	④		30- 14	②
	20-438			20-627		○	20-803	④	○	20-909	④		30- 15	②
	20-439			20-628		○	20-804	④	○	20-910	④		30- 16	②
	20-440			20-629		○	20-805	④	○	20-911	④		30- 17	①
	20-441			20-630		○	20-806	④	○	20-912	④		30- 18	①
	20-442			20-632		○	20-807	④	○	20-913	④		30- 19	①
	20-443			20-633		○	20-808	④	○	20-914	④		30- 20	①
	20-444			20-634		○	20-809	④	○	20-915	④		30- 21	①
	20-445			20-635		○	20-810	④	○	20-916	④		30- 22	①
	20-446			20-636		○	20-811	④	○	20-917	④		30- 23	①
	20-447		○	20-701	④	○	20-812	④	○	20-918	④		30- 24	①
	20-448		○	20-702	④	○	20-813	④	○	20-919	④		30- 25	①
	20-501		○	20-703	④	○	20-814	④	○	20-920	④		30- 26	①
	20-502		○	20-704	④	○	20-815	④	○	20-921	④		30- 27	①
	20-503		○	20-705	④	○	20-816	④	○	20-922	④		30- 28	①
	20-504		○	20-706	④	○	20-817	④	○	20-923	④		30- 29	①
	20-505		○	20-707	④	○	20-818	④	○	20-924	④		30- 30	①
	20-506		○	20-708	④	○	20-819	④	○	20-925	④		30- 31	①
	20-507		○	20-709	④	○	20-820	④	○	20-926	④		30- 32	①
	20-508		○	20-710	④	○	20-821	④	○	20-927	④		30- 33	①
	20-509		○	20-711	④	○	20-822	④	○	20-928	④		30- 34	①
	20-510		○	20-712	④	○	20-823	④	○	20-929	④		30- 35	①
	20-511		○	20-713	④	○	20-824	④	○	20-930	④		30- 36	①
	20-512		○	20-714	④	○	20-825	④	○	20-931	④		30- 37	①
	20-513		○	20-715	④	○	20-826	④	○	20-932	④		30- 38	①
	20-514		○	20-716	④	○	20-827	④	○	20-933	④		30- 39	①
	20-515		○	20-717	④	○	20-828	④	○	20-934	④		30- 40	①
	20-516		○	20-718	④	○	20-829	④	○	20-935	④		30- 41	①
	20-517		○	20-719	④	○	20-830	④	○	20-936	④		30- 42	①
	20-518		○	20-720	④	○	20-831	④	○	20-937	④		30- 43	①
	20-519		○	20-721	④	○	20-832	④	○	20-938	④		30- 44	①
	20-520		○	20-722	④	○	20-833	④	○	20-939	④		30- 45	①
●	20-601	④	○	20-723	④	○	20-834	④	○	20-940	④		30- 46	①
	20-602		○	20-724	④	○	20-835	④	○	20-941	④		30- 47	①
	20-603		○	20-725	④	○	20-836	④	○	20-942	④		30- 48	①
	20-604		○	20-726	④	○	20-837	④	○	20-943	④		30- 49	①
	20-605		○	20-727	④	○	20-838	④	○	20-944	④		30- 50	①
	20-606		○	20-728	④	○	20-839	④	○	20-945	④		30- 51	①
	20-607		○	20-729	④	○	20-840	④	○	20-946	④		30- 52	①
	20-608		○	20-730	④	○	20-841	④	○	20-947	④		30- 53	①
	20-609		○	20-731	④	○	20-842	④	○	20-948	④		30- 54	①
	20-610		○	20-732	④	○	20-843	④	○	20-949	④		30- 55	①
	20-611		○	20-733	④	○	20-844	④	○	20-950	④		30- 56	①
	20-612		○	20-734	④	○	20-845	④	○	20-951	④		30- 57	①
	20-613		○	20-735	④	○	20-846	④		30- 1	②		30- 58	①
	20-614		○	20-736	④	○	20-847	④		30- 2	①		30- 59	①
	20-615		○	20-737	④	○	20-848	④		30- 3	①		30- 60	①
	20-616		○	20-738	④	○	20-849	④		30- 4	①		30- 61	①
	20-617		○	20-739	④	○	20-850	④		30- 5	①		30- 62	①
	20-618		○	20-740	④	○	20-851	④		30- 6	①		30- 63	①
	20-619		○	20-741	④	○	20-901	④		30- 7	①		30- 64	①

Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number
30- 65		①	30-122		①	30-162		①	30-220		①	30-277		①
30- 66		①	30-123		①	30-163		①	30-221		①	30-278		①
30- 67		①	30-124		①	30-164		①	30-222		①	30-279		①
30- 68		①	30-125		①	30-165		①	30-223		①	30-280		①
30- 69		①	30-126		①	30-166		①	30-224		①	30-281		①
30- 70		①	30-127		①	30-167		①	30-225		①	30-282		①
30- 71		①	30-128		①	30-168		①	30-226		①	30-283		①
30- 72		①	30-129		①	30-169		①	30-227		①	30-284		①
30- 73		①	30-130		①	30-170		①	30-228		①	30-285		①
30- 74		①	30-131		①	30-171		①	30-229		①	30-286		①
30- 75		①	30-132		①	30-172		①	30-230		①	30-287		①
30- 76		①	30-133		①	30-173		①	30-231		①	30-288		①
30- 77		①	30-134		①	30-174		①	30-232		①	30-289		①
30- 78		①	30-135		①	30-175		①	30-233		①	30-290		①
30- 79		①	30-136		①	30-176		①	30-234		①	30-291		①
30- 80		①	30-137		①	30-177		①	30-235		①	30-292		①
30- 81		①	30-138		①	30-178		①	30-236		①	30-293		①
30- 82		①	30-139		①	30-179		①	30-237		①	30-294		①
30- 83		①	30-140		①	30-180		①	30-238		①	30-295		①
30- 84		①	30-141		①	30-181		①	30-239		①	30-296		①
30- 85		①	30-142		①	30-182		①	30-240		①	30-297		①
30- 86		①	30-143		①	30-183		①	30-241		①	30-298		①
30- 87		①	30-144		①	30-184		①	30-242		①	30-299		①
30- 88		①	30-145		①	30-185		①	30-243		①	30-300		①
30- 89		①	30-146		①	30-186		①	30-244		①	30-301		①
30- 90		①	30-146-1		②	30-187		①	30-245		①	30-302		①
30- 91		①	30-146-2		②	30-188		①	30-246		①	30-303		①
30- 92		①	30-146-3		②	30-189		①	30-247		①	30-304		①
30- 93		①	30-146-4		②	30-190		①	30-248		①	30-305		①
30- 94		①	30-146-5		②	30-191		①	30-249		①	30-306		①
30- 95		①	30-146-6		②	30-192		①	30-250		①	30-307		①
30- 96		①	30-146-7		②	30-193		①	30-251		①	30-308		①
30- 97		①	30-146-8		②	30-194		①	30-252		①	40- 1		③
30- 98		①	30-146-9		②	30-195		①	30-253		①	40- 2		
30- 99		①	30-146-10		②	30-196		①	30-254		①	40- 3		
30-100		①	30-146-11		②	30-197		①	30-255		①	40- 4		
30-101		①	30-146-12		②	30-198		①	30-256		①	40- 6		
30-102		①	30-146-13		②	30-199		①	30-257		①	40- 7		
30-103		①	30-146-14		②	30-200		①	30-258		①	40- 8		
30-104		①	30-146-15		②	30-201		①	30-259		①	40- 10		
30-105		①	30-146-16		②	30-202		①	30-260		①	40- 11		
30-106		①	30-146-17		②	30-203		①	30-261		①	40- 12		
30-107		①	30-147		①	30-204		①	30-262		①	40- 13		
30-108		①	30-148		①	30-205		①	30-263		①	40- 14		
30-109		①	30-149		①	30-207		①	30-264		①	40- 16		③
30-110		①	30-150		①	30-208		①	30-265		①	40- 17		
30-111		①	30-151		①	30-209		①	30-266		①	40- 18		
30-112		①	30-152		①	30-210		①	30-267		①	40- 19		
30-113		①	30-153		①	30-211		①	30-268		①	40- 20		
30-114		①	30-154		①	30-212		①	30-269		①	40- 21		
30-115		①	30-155		①	30-213		①	30-270		①	40- 22		
30-116		①	30-156		①	30-214		①	30-271		①	40- 24		
30-117		①	30-157		①	30-215		①	30-272		①	40- 25		
30-118		①	30-158		①	30-216		①	30-273		①	40- 26		
30-119		①	30-159		①	30-217		①	30-274		①	40- 28		③
30-120		①	30-160		①	30-218		①	30-275		①	40- 29		③
30-121		①	30-161		①	30-219		①	30-276		①	40- 29-1		③

Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number	Mark	Pages	Revision number
	40-29-2	③												
	40-30													
	40-31													
	40-32													
	40-33													
	40-34													
	40-35													
	40-36													
	40-37													
	40-38	③												
	40-39													
	40-40	③												
	40-42	③												
	40-43													
	40-44	③												
	40-46	③												
	40-47													
	40-48	③												
	40-49													
	40-50													
	40-51													
	40-52													
	40-53													
	40-54													
	40-56													
	40-57													
	40-58													
	40-59													
	40-60													
	40-61													
	40-62													
	40-63													
	40-64													
	40-66													
	40-67													
	40-68													
	40-69													
	40-70													
	40-71													
	40-72													
	40-73	③												
	40-74													
	40-75	③												
	40-76													
	40-78													
	40-79													
	90- 1	③												
	90- 3													
	90- 5													
	90- 7	③												
	90- 9	③												
	90-11	③												
	90-13	③												
	90-15	③												
	90-17	③												
	90-19	③												



---


## 20 TESTING AND ADJUSTING

---


### STANDARD VALUE TABLES

Standard value table for engine .....	20- 2
Standard value table for chassis .....	20- 3
Standard value table for electrical parts .....	20- 8
TESTING AND ADJUSTING .....	20-101
TROUBLESHOOTING .....	20-201

- ★ The following precautions are necessary, when using the standard value tables for testing and adjusting, or for troubleshooting .
- 1. The values in the table are for new machines, and are obtained from reference to values when shipping from the factory. Therefore, they should be used as target values for judging the progress of wear, or when repairing the machine.
- 2. The standard values for judging failures are based on the results of various tests when shipping the machine from the factory. These values should be used as reference together with the repair condition and operating record of the machine to make judgements on failures.
- 3. The values in the table should not be used for judging claims.

 **When carrying out testing, adjusting, or troubleshooting, stop the machine on level ground, install the safety pins and block the tracks.**

 **When carrying out work together with other workers, use agreed signals and do not allow unauthorized persons near the machine.**

 **When checking the water level, always wait for the water to cool down. If the radiator cap is removed when the water is still hot, the water will spurt out and cause burns.**

 **Be careful not to get caught in the fan or other rotating parts.**

## STANDARD VALUE TABLE FOR ENGINE

Serial No. 70001 – 75000

Machine model			D155AX-5	
Engine			SA6D140E-2	
Item	Measurement conditions	Unit	Standard value for new machine	Service limit value
Engine speed	High idling	rpm	2,050 ± 50	—
	Low idling		700 <sup>+25</sup> <sub>0</sub>	—
	Rated speed		1,900	—
Air supply pressure	At rated output	kPa {mmHg}	Min. 85.3 {Min. 640}	67.9 {510}
Exhaust temperature	Whole speed range (Ambient temperature: 20°C)	°C	Max. 680	700
Exhaust gas color	At sudden acceleration	Bosch index	Max. 6.0	8.0
	At high idling		Max. 1.0	2.0
Valve clearance (at normal temperature)	Intake valve	mm	0.43	—
	Exhaust valve		0.80	—
Compression pressure (SAE15W-40 or SAE30)	Oil temperature: 40 – 60°C (Engine speed)	MPa {kg/cm <sup>2</sup> } (rpm)	Min. 3.14 {Min.32} (200 – 250)	2.16 {22} (200 – 250)
Blow-by pressure (SAE15W-40 or SAE30)	At rated output (Water temperature: Operating range)	kPa {mmH <sub>2</sub> O}	Max. 0.98 {Max. 100}	1.96 {200}
Oil pressure (Oil temperature: Min. 80°C)	At high idling SAE15W-40 or SAE30 SAE10W	MPa {kg/cm <sup>2</sup> }	0.29 – 0.49 {3.0 – 5.0} 0.25 – 0.44 {2.5 – 4.5}	0.20 {2.0} 0.18 {1.8}
	At low idling SAE15W-40 or SAE30 SAE10W		Min. 0.1 {Min. 1.0} Min. 0.1 {Min. 1.0}	0.07 {0.7} 0.07 {0.7}
Oil temperature	Whole speed range (inside oil pan)	°C	80 – 110	120
Fuel injection timing	Before top dead center	°	15 ± 0.5	15 ± 0.5
Alternator belt tension	Deflection when pressed with finger force of approx. 59 N {6 kg}	mm	15	15
Air conditioner compressor belt tension			10	10

## Serial No. 75001 and up

Machine model			D155AX-5	
Engine			SA6D140E-3	
Item	Measurement conditions	Unit	Standard value for new machine	Service limit value
Engine speed	High idling	rpm	2,100 ± 50	—
	Low idling		740 <sup>+25</sup> <sub>0</sub>	—
	Rated speed		1,900	—
Air supply pressure	At rated output	kPa {mmHg}	Min. 85.3 {Min. 640}	67.9 {510}
Exhaust temperature	Whole speed range (Ambient temperature: 20°C)	°C	Max. 680	700
Exhaust gas color	At sudden acceleration	Bosch index	Max. 4.0	8.0
	At high idling		Max. 1.0	2.0
Valve clearance (at normal temperature)	Intake valve	mm	0.43	—
	Exhaust valve		0.80	—
Compression pressure (SAE15W-40 or SAE30)	Oil temperature: 40 – 60°C (Engine speed)	MPa {kg/cm <sup>2</sup> } (rpm)	Min. 3.14 {Min.32} (200 – 250)	2.16 {22} (200 – 250)
Blow-by pressure (SAE15W-40 or SAE30)	At rated output (Water temperature: Operating range)	kPa {mmH <sub>2</sub> O}	Max. 0.98 {Max. 100}	1.96 {200}
Oil pressure (Oil temperature: Min. 80°C)	At high idling SAE15W-40 or SAE30 SAE10W	MPa {kg/cm <sup>2</sup> }	0.29 – 0.49 {3.0 – 5.0} 0.25 – 0.44 {2.5 – 4.5}	0.20 {2.0} 0.18 {1.8}
	At low idling SAE15W-40 or SAE30 SAE10W		Min. 0.1 {Min. 1.0} Min. 0.1 {Min. 1.0}	0.07 {0.7} 0.07 {0.7}
Oil temperature	Whole speed range (inside oil pan)	°C	80 – 110	120
Fuel injection timing	Before top dead center	°	15 ± 0.5	15 ± 0.5
Alternator belt tension	Deflection when pressed with finger force of approx. 59 N {6 kg}	mm	15	15
Air conditioner compressor belt tension			10	10



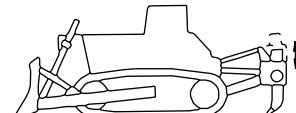
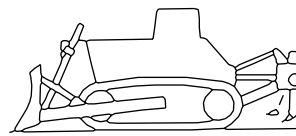


## STANDARD VALUE TABLE FOR CHASSIS

Machine model				D155AX-5			
Cate- gory	Item		Measurement conditions	Unit	Standard value for new machine	Service limit value	
Engine stall speed	Torque converter stall speed		• Engine oil pressure: Within operating range • Engine oil temperature: Within operating range • Hydraulic oil temperature: 45 – 55 °C • F3 • Ripper RAISE stall	rpm	1,580 ± 100	1,420	
	Steering relief + work equipment raise stall speed ※ 1				1,410 ± 100	1,250	
Control lever travel, pedal travel	Fuel control lever		Center of lever knob	Engine low idling → High idling	105 ± 20	105 ± 20	
				Engine low idling → Stop	60 ± 20	60 ± 20	
	Decelerator pedal		Center of pedal		56 ± 15	56 ± 15	
	Joystick	Gear shift	• Engine stopped • Center of lever knob	1st ↔ 2nd	deg.	13 ± 5	13 ± 5
				2nd ↔ 3rd		13 ± 5	13 ± 5
		Directional		N ↔ FORWARD	mm	45 ± 15	45 ± 15
				N ↔ REVERSE		45 ± 15	45 ± 15
		Steering		N → Right turn		57 ± 15	63 ± 15
				N → Left turn		57 ± 15	63 ± 15
	Brake pedal		• Engine at low idling • Center of pedal	Total travel	79 ± 10	79 ± 10	
				Position until brake oil pressure becomes 0	61	61	
	Blade lever		• Engine at low idling • Center of lever knob • Hydraulic oil temperature: 45 – 55°C	HOLD ↔ RAISE, FLOAT	80 ± 15	80 ± 15	
				HOLD ↔ LEFT, RIGHT TILT	60 ± 10	60 ± 10	
	Ripper lever		• Engine at low idling • Center of lever knob • Hydraulic oil temperature: 45 – 55°C	HOLD ↔ RAISE, LOWER	85 ± 15	85 ± 15	
HOLD ↔ Digging angle decrease, increase				85 ± 15	85 ± 15		
Operating force of control lever, pedal	Fuel control lever ※ 1		Center of lever knob	Engine low idling ↔ High idling	98 – 157 {10 – 16}	177 {18}	
				Engine low idling ↔ Stop	98 – 177 {10 – 18}	196 {20}	
	Decelerator pedal		• Engine stopped • Center of pedal		78 ± 29 {8 ± 3}	147 {15}	
	Joystick	Gear shift	• Engine stopped • Center of lever knob	1st → 2nd	Nm {kgm}	216 ± 78 {22 ± 8}	216 ± 78 {22 ± 8}
				2nd → 3rd		372 ± 78 {38 ± 8}	372 ± 78 {38 ± 8}
				2nd → 1st		284 ± 78 {29 ± 8}	284 ± 78 {29 ± 8}
				3rd → 2nd		186 ± 78 {19 ± 8}	186 ± 78 {19 ± 8}

※ 1: Serial No. 70001 – 75000

Machine model					D155AX-5		
Category	Item		Measurement conditions		Unit	Standard value for new machine	Service limit value
Operating effort of control lever, pedal	Joystick	Directional	• Engine stopped	N ↔ FORWARD	N {kg}	53.9 ± 19.1 {5.5 ± 2.0}	78.4 {8.0}
			• Center of lever knob	N ↔ REVERSE		53.9 ± 19.1 {5.5 ± 2.0}	78.4 {8.0}
		Steering	• Engine stopped	N ↔ Left turn		17.6 ± 19.1 {1.8 ± 2.0}	44.1 {4.5}
			• Center of lever knob	N ↔ Right turn		17.6 ± 19.1 {1.8 ± 2.0}	44.1 {4.5}
	Brake pedal		• Engine at low idling • Center of pedal			461 ± 98 {47 ± 10}	608 {62}
	Blade lever	• Engine at low idling	HOLD ↔ RAISE, FLOAT	29.4 ± 9.8 {3.0 ± 1.0}		49.0 {5.0}	
		• Hydraulic oil temperature: 45 – 55°C					
		• Center of lever knob	HOLD ↔ LEFT, RIGHT TILT	29.4 ± 9.8 {2.5 ± 1.0}		44.1 {4.5}	
		Ripper lever	• Engine at low idling	HOLD ↔ RAISE, LOWER		29.4 ± 9.8 {2.5 ± 1.0}	44.1 {4.5}
	• Hydraulic oil temperature: 45 – 55°C						
		• Center of lever knob	HOLD↔Digging angle decrease, increase	29.4 ± 9.8 {2.5 ± 1.0}	44.1 {4.5}		
Power train oil pressure	Torque converter inlet port pressure		• Power train oil temperature: Operating range	Engine at low idling	MPa {kg/cm²}	0.1 <sup>+0.1</sup> <sub>-0.09</sub> {1.0 <sup>+1.0</sup> <sub>-0.9</sub> }	0.1 <sup>+0.1</sup> <sub>-0.09</sub> {1.0 <sup>+1.0</sup> <sub>-0.9</sub> }
				Engine at high idling		0.83 ± 0.15 {8.5 ± 1.5}	0.83 ± 0.15 {8.5 ± 1.5}
	Torque converter outlet port pressure			Engine at low idling		0.1 <sup>+0.1</sup> <sub>-0.09</sub> {1.0 <sup>+1.0</sup> <sub>-0.9</sub> }	0.1 <sup>+0.1</sup> <sub>-0.09</sub> {1.0 <sup>+1.0</sup> <sub>-0.9</sub> }
				Engine at high idling		0.44 ± 0.15 {4.5 ± 1.5}	0.44 ± 0.15 {4.5 ± 1.5}
	Transmission main relief pressure			Engine at high idling		2.94 <sup>+0.29</sup> <sub>0</sub> {30 <sup>+3</sup> <sub>0</sub> }	2.74 {28}
	Transmission modulating pressure			Engine at high idling		2.94 <sup>+0.29</sup> <sub>0</sub> {30 <sup>+3</sup> <sub>0</sub> }	2.74 {28}
	Brake actuating pressure			Engine at low idling		2.75 ± 0.29 {28 ± 3}	2.16 {22}
				Engine at high idling		2.75 ± 0.29 {28 ± 3}	2.16 {22}
HSS circuit oil pressure	HSS main pressure		• Engine at high idling		MPa {kg/cm²}	38.2 – 41.7 {390 – 425}	38.2 – 41.7 {390 – 425}
	HSS charge pressure		• Oil temperature: 45 – 55°C			3.72 ± 0.29 {38 ± 3}	3.24 {33}
	HSS servo charge pressure, PPC relief pressure					4.12 ± 0.29 {42 ± 3}	3.53 {36}
Power train	Travel speed		• Level road surface • Engine water temperature: Within operating range • Run-up distance: 10–30 m • Measurement distance: 20 m	FORWARD 1st	km/h	3.5 ± 0.2	3.5 ± 0.2
				FORWARD 2nd		6.2 ± 0.3	6.2 ± 0.3
				FORWARD 3rd		10.8 ± 0.6	10.8 ± 0.6
				REVERSE 1st		4.8 ± 0.2	4.8 ± 0.2
				REVERSE 2nd		8.4 ± 0.3	8.4 ± 0.3
				REVERSE 3rd		13.9 ± 0.6	13.9 ± 0.6

Machine model					D155AX-5			
Cate- gory	Item		Measurement conditions		Unit	Standard value of new machine	Service limit value	
Work equipment	Work equipment speed	Ripper LIFT	Work equipment posture  TYD00007	LIFT	sec.	2.5 ± 0.5	4.0	
			<ul style="list-style-type: none"><li>• Engine at high idling</li><li>• Hydraulic oil temperature: 45 – 55°C</li><li>• Lowest shank hole</li></ul>	LOWER		3.0 ± 1.0	5.0	
		Ripper TILT	Work equipment posture  TYD00008	Decrease		3.0 ± 0.5	4.5	
			<ul style="list-style-type: none"><li>• Engine at high idling</li><li>• Hydraulic oil temperature: 45 – 55°C</li><li>• Lowest shank hole</li><li>• Digging angle decrease ↔ increase</li></ul>	Increase		2.5 ± 0.5	4.0	
	Time lag	Blade	<ul style="list-style-type: none"><li>• Engine at high idling</li><li>• Hydraulic oil temperature: 45 – 55°C</li><li>• Raise blade to maximum height, then lower blade and measure time taken from point where blade contacts ground to point where idler comes off ground</li></ul>			1.5 ± 0.5	2.5	
		Ripper	<ul style="list-style-type: none"><li>• Engine at high idling</li><li>• Hydraulic oil temperature: 45 – 55°C</li><li>• Raise ripper to maximum height, then lower ripper and measure time taken from point where ripper contacts ground to point where sprocket comes off ground</li></ul>			0 – 1.0	1.5	
	Oil leakage	Cylinder	Blade tilt	<ul style="list-style-type: none"><li>• Hydraulic oil temperature: 45 – 55°C</li><li>• Extend piston rod fully and disconnect hose at head end</li><li>• Engine at high idling</li><li>• Measure oil leakage during one minute of relief</li></ul>		cc/min	Max. 3.0	12
			Ripper lift				Max. 2.7	11
Ripper tilt			Max. 2.7				11	

## STANDARD VALUE TABLE FOR ELECTRICAL PARTS

Serial No. 70001 – 75000

System	Component	Connector No.	Inspection method	Judgement table	Measurement condition																	
HSS system	Engine speed sensor	CN-ENG (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>500 – 1000 Ω</td></tr><tr><td>Between (1), (2) – chassis</td><td>Min.1 MΩ</td></tr></table>	Between (1) – (2)	500 – 1000 Ω	Between (1), (2) – chassis	Min.1 MΩ	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connector.</div>													
			Between (1) – (2)	500 – 1000 Ω																		
	Between (1), (2) – chassis	Min.1 MΩ																				
	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>0.5 – 3.0 V</td></tr></table> <div>★ When using circuit tester, select AC voltage range.</div>	Between (1) – (2)	0.5 – 3.0 V	<div>1) Disconnect connectors.</div> <div>2) Engine running</div>																	
	Between (1) – (2)	0.5 – 3.0 V																				
	Steering potentiometer	CN-STR	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (4) – (1)</td><td>5.0 ± 0.25 V</td></tr><tr><td rowspan="2">Lever fully at left</td><td>Between (3) – (1)</td><td>4.15 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>0.85 ± 0.25 V</td></tr><tr><td rowspan="2">Lever at N</td><td>Between (3) – (1)</td><td>2.5 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>2.5 ± 0.25 V</td></tr><tr><td rowspan="2">Lever fully at right</td><td>Between (3) – (1)</td><td>0.85 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>4.15 ± 0.25 V</td></tr></table>	Between (4) – (1)		5.0 ± 0.25 V	Lever fully at left	Between (3) – (1)	4.15 ± 0.25 V	Between (2) – (1)	0.85 ± 0.25 V	Lever at N	Between (3) – (1)	2.5 ± 0.25 V	Between (2) – (1)	2.5 ± 0.25 V	Lever fully at right	Between (3) – (1)	0.85 ± 0.25 V	Between (2) – (1)	4.15 ± 0.25 V
Between (4) – (1)		5.0 ± 0.25 V																				
Lever fully at left	Between (3) – (1)	4.15 ± 0.25 V																				
	Between (2) – (1)	0.85 ± 0.25 V																				
Lever at N	Between (3) – (1)	2.5 ± 0.25 V																				
	Between (2) – (1)	2.5 ± 0.25 V																				
Lever fully at right	Between (3) – (1)	0.85 ± 0.25 V																				
	Between (2) – (1)	4.15 ± 0.25 V																				
REVERSE sensing potentiometer	CN-RSS	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (3)</td><td>5.0 ± 0.25 V</td></tr><tr><td>Lever at N</td><td rowspan="2">Between (2) – (3)</td><td>Max. 3.5 V</td></tr><tr><td>Lever at REVERSE</td><td>3.5 – 4.4 V</td></tr></table>	Between (1) – (3)		5.0 ± 0.25 V	Lever at N	Between (2) – (3)	Max. 3.5 V	Lever at REVERSE	3.5 – 4.4 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to directional position.</div>										
Between (1) – (3)		5.0 ± 0.25 V																				
Lever at N	Between (2) – (3)	Max. 3.5 V																				
Lever at REVERSE		3.5 – 4.4 V																				
Steering circuit oil pressure sensor A	CN-STHP1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (2) – (1)</td><td>20 – 30 V</td></tr><tr><td rowspan="2">Between (3) – (1)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	Between (2) – (1)		20 – 30 V	Between (3) – (1)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>										
Between (2) – (1)		20 – 30 V																				
Between (3) – (1)	Engine stopped	0.8 – 1.2 V																				
	Engine running + Steering relief	4.0 – 4.6 V																				
Steering circuit oil pressure sensor B	CN-STHP2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (2) – (1)</td><td>20 – 30 V</td></tr><tr><td rowspan="2">Between (3) – (1)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	Between (2) – (1)		20 – 30 V	Between (3) – (1)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>										
Between (2) – (1)		20 – 30 V																				
Between (3) – (1)	Engine stopped	0.8 – 1.2 V																				
	Engine running + Steering relief	4.0 – 4.6 V																				

System	Component	Connector No.	Inspection method	Judgement table	Measurement condition					
Monitor system	Engine oil pressure switch	CN-403 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between terminal – body</td><td>Oil pressure is above 0.05 MPa {0.5 kg/cm²}</td><td>Min. 1 MΩ</td></tr><tr><td>Oil pressure is below 0.05 MPa {0.5 kg/cm²}</td><td>Max. 1 Ω</td></tr></table>	Between terminal – body	Oil pressure is above 0.05 MPa {0.5 kg/cm²}	Min. 1 MΩ	Oil pressure is below 0.05 MPa {0.5 kg/cm²}	Max. 1 Ω	1) Turn starting switch OFF. 2) Disconnect connectors.
	Between terminal – body	Oil pressure is above 0.05 MPa {0.5 kg/cm²}	Min. 1 MΩ							
Oil pressure is below 0.05 MPa {0.5 kg/cm²}		Max. 1 Ω								
	Alternator	CN-112	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between terminal R – chassis</td><td>27.5 – 29.5 V</td></tr></table> <div>★ If the battery is old, or after starting in cold area, the voltage may not rise for some time.</div>	Between terminal R – chassis	27.5 – 29.5 V	1) Run engine. (half throttle or above)			
Between terminal R – chassis	27.5 – 29.5 V									
Others	Neutral safety switch	CN-152 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (1) – (3)</td><td>Lever at N or FORWARD</td><td>Min. 1M Ω</td></tr><tr><td>Lever at REVERSE</td><td>Max. 1 Ω</td></tr></table>	Between (1) – (3)	Lever at N or FORWARD	Min. 1M Ω	Lever at REVERSE	Max. 1 Ω	1) Turn starting switch OFF. 2) Disconnect connectors. 3) Turn joystick to directional position
	Between (1) – (3)	Lever at N or FORWARD	Min. 1M Ω							
		Lever at REVERSE	Max. 1 Ω							
	Blade pitch solenoid	CN-454 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>40 – 80 Ω</td></tr><tr><td>Between (1), (2) – chassis</td><td>Min. 1MΩ</td></tr></table>	Between (1) – (2)	40 – 80 Ω	Between (1), (2) – chassis	Min. 1MΩ	1) Turn starting switch OFF. 2) Disconnect connectors.	
Between (1) – (2)	40 – 80 Ω									
Between (1), (2) – chassis	Min. 1MΩ									
	Pin puller solenoid	CN-246 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>40 – 80 Ω</td></tr><tr><td>Between (1), (2) – chassis</td><td>Min. 1 MΩ</td></tr></table>	Between (1) – (2)	40 – 80 Ω	Between (1), (2) – chassis	Min. 1 MΩ	1) Turn starting switch OFF. 2) Disconnect connectors.	
Between (1) – (2)	40 – 80 Ω									
Between (1), (2) – chassis	Min. 1 MΩ									

## Serial No. 75001 and up

System	Component	Connector No.	Inspection method	Judgement table	Measurement condition																		
HSS system	Engine speed sensor	CN-E07 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>500 – 1000 Ω</td></tr><tr><td>Between (1), (2) – chassis</td><td>Min.1 MΩ</td></tr></table>	Between (1) – (2)	500 – 1000 Ω	Between (1), (2) – chassis	Min.1 MΩ	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connector.</div>														
			Between (1) – (2)	500 – 1000 Ω																			
	Between (1), (2) – chassis	Min.1 MΩ																					
	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1) – (2)</td><td>0.5 – 3.0 V</td></tr></table> <div>★ When using circuit tester, select AC voltage range.</div>	Between (1) – (2)	0.5 – 3.0 V	<div>1) Engine running</div> <div>2) Insert T-adapter.</div>																		
	Between (1) – (2)	0.5 – 3.0 V																					
	Steering potentiometer	CN-STR	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (4) – (1)</td><td>5.0 ± 0.25 V</td></tr><tr><td rowspan="2">Lever fully at left</td><td>Between (3) – (1)</td><td>4.15 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>0.85 ± 0.25 V</td></tr><tr><td rowspan="2">Lever at N</td><td>Between (3) – (1)</td><td>2.5 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>2.5 ± 0.25 V</td></tr><tr><td rowspan="2">Lever fully at right</td><td>Between (3) – (1)</td><td>0.85 ± 0.25 V</td></tr><tr><td>Between (2) – (1)</td><td>4.15 ± 0.25 V</td></tr></table>	Between (4) – (1)		5.0 ± 0.25 V	Lever fully at left	Between (3) – (1)	4.15 ± 0.25 V	Between (2) – (1)	0.85 ± 0.25 V	Lever at N	Between (3) – (1)	2.5 ± 0.25 V	Between (2) – (1)	2.5 ± 0.25 V	Lever fully at right	Between (3) – (1)	0.85 ± 0.25 V	Between (2) – (1)	4.15 ± 0.25 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to steering position.</div>
	Between (4) – (1)		5.0 ± 0.25 V																				
	Lever fully at left	Between (3) – (1)	4.15 ± 0.25 V																				
Between (2) – (1)		0.85 ± 0.25 V																					
Lever at N	Between (3) – (1)	2.5 ± 0.25 V																					
	Between (2) – (1)	2.5 ± 0.25 V																					
Lever fully at right	Between (3) – (1)	0.85 ± 0.25 V																					
	Between (2) – (1)	4.15 ± 0.25 V																					
REVERSE sensing potentiometer	CN-RSS	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (3)</td><td>5.0 ± 0.25 V</td></tr><tr><td>Lever at N</td><td rowspan="2">Between (2) – (3)</td><td>Max. 3.5 V</td></tr><tr><td>Lever at REVERSE</td><td>3.5 – 4.4 V</td></tr></table>	Between (1) – (3)		5.0 ± 0.25 V	Lever at N	Between (2) – (3)	Max. 3.5 V	Lever at REVERSE	3.5 – 4.4 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to directional position.</div>											
Between (1) – (3)		5.0 ± 0.25 V																					
Lever at N	Between (2) – (3)	Max. 3.5 V																					
Lever at REVERSE		3.5 – 4.4 V																					
Steering circuit oil pressure sensor A	CN-ST1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (2) – (1)</td><td>20 – 30 V</td></tr><tr><td rowspan="2">Between (3) – (1)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	Between (2) – (1)		20 – 30 V	Between (3) – (1)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>											
Between (2) – (1)		20 – 30 V																					
Between (3) – (1)	Engine stopped	0.8 – 1.2 V																					
	Engine running + Steering relief	4.0 – 4.6 V																					
Steering circuit oil pressure sensor B	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (2) – (1)</td><td>20 – 30 V</td></tr><tr><td rowspan="2">Between (3) – (1)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	Between (2) – (1)		20 – 30 V	Between (3) – (1)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>											
Between (2) – (1)		20 – 30 V																					
Between (3) – (1)	Engine stopped	0.8 – 1.2 V																					
	Engine running + Steering relief	4.0 – 4.6 V																					
HSS charge circuit oil pressure sensor	CN-406 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (1) – (2)</td><td>Engine stopped</td><td>Min. 1 MΩ</td></tr><tr><td>Engine running</td><td>Max. 1 Ω</td></tr><tr><td colspan="2">Between (1), (2) – chassis</td><td>Min. 1 MΩ</td></tr></table>	Between (1) – (2)	Engine stopped	Min. 1 MΩ	Engine running	Max. 1 Ω	Between (1), (2) – chassis		Min. 1 MΩ	<div>1) Turn starting switch ON.</div> <div>2) Disconnect connector.</div>											
Between (1) – (2)	Engine stopped	Min. 1 MΩ																					
	Engine running	Max. 1 Ω																					
Between (1), (2) – chassis		Min. 1 MΩ																					

System	Component		Connector No.	Inspection method	Judgement table	Measurement condition								
HSS system	Work equipment circuit oil pressure sensor		CN-HHP	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (2) – (1)</td><td>20 – 30 V</td></tr><tr><td rowspan="2">Between (3) – (1)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine started + work equipment relief</td><td>2.4 – 3.0 V</td></tr></table>	Between (2) – (1)		20 – 30 V	Between (3) – (1)	Engine stopped	0.8 – 1.2 V	Engine started + work equipment relief	2.4 – 3.0 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>
	Between (2) – (1)		20 – 30 V											
	Between (3) – (1)	Engine stopped	0.8 – 1.2 V											
		Engine started + work equipment relief	2.4 – 3.0 V											
	Backup alarm switch		CN-251 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (1) – (3)</td><td>Lever at N or FORWARD</td><td>Min. 1 MΩ</td></tr><tr><td>Lever at REVERSE</td><td>Max. 1 Ω</td></tr></table>	Between (1) – (3)	Lever at N or FORWARD	Min. 1 MΩ	Lever at REVERSE	Max. 1 Ω	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connectors.</div> <div>3) Turn joystick to directional position.</div>			
	Between (1) – (3)	Lever at N or FORWARD	Min. 1 MΩ											
		Lever at REVERSE	Max. 1 Ω											
	HSS pump solenoid A		CN-PUPA	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (2)</td><td>10 – 20 Ω</td></tr><tr><td colspan="2">Between (1), (2) – chassis</td><td>Min. 1 MΩ</td></tr></table>	Between (1) – (2)		10 – 20 Ω	Between (1), (2) – chassis		Min. 1 MΩ	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connectors.</div>		
	Between (1) – (2)		10 – 20 Ω											
	Between (1), (2) – chassis		Min. 1 MΩ											
HSS pump solenoid B		CN-PUPB	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (2)</td><td>10 – 20 Ω</td></tr><tr><td colspan="2">Between (1), (2) – chassis</td><td>Min. 1 MΩ</td></tr></table>	Between (1) – (2)		10 – 20 Ω	Between (1), (2) – chassis		Min. 1 MΩ	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connectors.</div>			
Between (1) – (2)		10 – 20 Ω												
Between (1), (2) – chassis		Min. 1 MΩ												
Backup alarm relay		CN-014 (male)	Measure resistance	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (2)</td><td>200 – 400 Ω</td></tr><tr><td colspan="2">Between (3) – (5)</td><td>Min. 1 MΩ</td></tr><tr><td colspan="2">Between (3) – (6)</td><td>Max. 1 Ω</td></tr></table>	Between (1) – (2)		200 – 400 Ω	Between (3) – (5)		Min. 1 MΩ	Between (3) – (6)		Max. 1 Ω	<div>1) Turn starting switch OFF.</div> <div>2) Disconnect connectors.</div>
Between (1) – (2)		200 – 400 Ω												
Between (3) – (5)		Min. 1 MΩ												
Between (3) – (6)		Max. 1 Ω												
HSS controller	Power supply for controller	CN-ST1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (8),(18) – chassis</td><td rowspan="2">20 – 30 V</td></tr><tr><td>Between (8),(18) – (9),(19)</td></tr></table>	Between (8),(18) – chassis	20 – 30 V	Between (8),(18) – (9),(19)	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adaper.</div>						
	Between (8),(18) – chassis	20 – 30 V												
	Between (8),(18) – (9),(19)													
	Power supply for solenoid	CN-ST1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (17) – chassis</td><td rowspan="2">20 – 30 V</td></tr><tr><td>Between (17) – (9),(19)</td></tr></table>	Between (17) – chassis	20 – 30 V	Between (17) – (9),(19)	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adaper.</div>						
Between (17) – chassis	20 – 30 V													
Between (17) – (9),(19)														
Net work (S-NET)	CN-ST1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (1),(12) – (9),(19)</td><td>4 – 8 V</td></tr></table>	Between (1),(12) – (9),(19)	4 – 8 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adaper.</div>								
Between (1),(12) – (9),(19)	4 – 8 V													
Engine speed sensor	CN-ST3	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td>Between (4) – (12)</td><td>0.5 – 3.0 V</td></tr></table> <div>★ When using circuit tester, select AC voltage range.</div>	Between (4) – (12)	0.5 – 3.0 V	<div>1) Engine running</div> <div>2) Insert T-adaper.</div>								
Between (4) – (12)	0.5 – 3.0 V													

System	Component		Connector No.	Inspection method	Judgement table	Measurement condition																		
HSS system	HSS controller	5-V power supply for potentiometer	CN-ST2	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td>Between (10) – (9)</td><td colspan="2">5.0 ± 0.25 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between (10) – (9)	5.0 ± 0.25 V		1) Turn starting switch ON. 2) Insert T-adaper.												
		If the condition is as shown in the table below, it is normal																						
		Between (10) – (9)	5.0 ± 0.25 V																					
		Steering potentiometer	CN-ST2	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Lever fully at right</td><td>Between (19) – (9)</td><td>4.15 ± 0.25 V</td></tr><tr><td>Between (20) – (9)</td><td>0.85 ± 0.25 V</td></tr><tr><td rowspan="2">Lever at N</td><td>Between (19) – (9)</td><td>2.5 ± 0.25 V</td></tr><tr><td>Between (20) – (9)</td><td>2.5 ± 0.25 V</td></tr><tr><td rowspan="2">Lever fully at left</td><td>Between (19) – (9)</td><td>0.85 ± 0.25 V</td></tr><tr><td>Between (20) – (9)</td><td>4.15 ± 0.25 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Lever fully at right	Between (19) – (9)	4.15 ± 0.25 V	Between (20) – (9)	0.85 ± 0.25 V	Lever at N	Between (19) – (9)	2.5 ± 0.25 V	Between (20) – (9)	2.5 ± 0.25 V	Lever fully at left	Between (19) – (9)	0.85 ± 0.25 V	Between (20) – (9)	4.15 ± 0.25 V	1) Turn starting switch ON. 2) Insert T-adapter. 3) Turn joystick to steering position.
		If the condition is as shown in the table below, it is normal																						
		Lever fully at right	Between (19) – (9)	4.15 ± 0.25 V																				
			Between (20) – (9)	0.85 ± 0.25 V																				
		Lever at N	Between (19) – (9)	2.5 ± 0.25 V																				
			Between (20) – (9)	2.5 ± 0.25 V																				
		Lever fully at left	Between (19) – (9)	0.85 ± 0.25 V																				
Between (20) – (9)	4.15 ± 0.25 V																							
Travel REVERSE sensing potentiometer	CN-ST2 CN-ST3	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between CN-ST3(10) – CN-ST2(9)</td><td>Lever at N</td><td>Max. 3.5 V</td></tr><tr><td>Lever at REVERSE</td><td>3.5 – 4.4 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between CN-ST3(10) – CN-ST2(9)	Lever at N	Max. 3.5 V	Lever at REVERSE	3.5 – 4.4 V	1) Turn starting switch ON. 2) Insert T-adapter. 3) Turn joystick to directional position												
If the condition is as shown in the table below, it is normal																								
Between CN-ST3(10) – CN-ST2(9)	Lever at N	Max. 3.5 V																						
	Lever at REVERSE	3.5 – 4.4 V																						
Steering circuit oil pressure sensor A	CN-ST2 CN-ST3	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between CN-ST3(1) – CN-ST2(9)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between CN-ST3(1) – CN-ST2(9)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	1) Turn starting switch ON. 2) Insert T-adapter.												
If the condition is as shown in the table below, it is normal																								
Between CN-ST3(1) – CN-ST2(9)	Engine stopped	0.8 – 1.2 V																						
	Engine running + Steering relief	4.0 – 4.6 V																						
Steering circuit oil pressure sensor B	CN-ST2 CN-ST3	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between CN-ST3(9) – CN-ST2(9)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Steering relief</td><td>4.0 – 4.6 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between CN-ST3(9) – CN-ST2(9)	Engine stopped	0.8 – 1.2 V	Engine running + Steering relief	4.0 – 4.6 V	1) Turn starting switch ON. 2) Insert T-adapter.												
If the condition is as shown in the table below, it is normal																								
Between CN-ST3(9) – CN-ST2(9)	Engine stopped	0.8 – 1.2 V																						
	Engine running + Steering relief	4.0 – 4.6 V																						
HSS charge oil pressure sensor	CN-ST2	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between (8) – chassis</td><td>Engine stopped</td><td>20 – 30 V</td></tr><tr><td>Engine running</td><td>Max. 1 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between (8) – chassis	Engine stopped	20 – 30 V	Engine running	Max. 1 V	1) Turn starting switch ON. 2) Insert T-adapter.												
If the condition is as shown in the table below, it is normal																								
Between (8) – chassis	Engine stopped	20 – 30 V																						
	Engine running	Max. 1 V																						
Work equipment circuit oil pressure sensor	CN-ST2 CN-ST3	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between CN-CH2(2) – CN-CH1(9)</td><td>Engine stopped</td><td>0.8 – 1.2 V</td></tr><tr><td>Engine running + Work equipment relief</td><td>2.4 – 3.0 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between CN-CH2(2) – CN-CH1(9)	Engine stopped	0.8 – 1.2 V	Engine running + Work equipment relief	2.4 – 3.0 V	1) Turn starting switch ON. 2) Insert T-adapter.												
If the condition is as shown in the table below, it is normal																								
Between CN-CH2(2) – CN-CH1(9)	Engine stopped	0.8 – 1.2 V																						
	Engine running + Work equipment relief	2.4 – 3.0 V																						
Backup alarm switch	CN-ST2	Measure voltage	<table><tr><td colspan="3">If the condition is as shown in the table below, it is normal</td></tr><tr><td rowspan="2">Between (7) – chassis</td><td>Lever at N or FORWARD</td><td>20 – 30 V</td></tr><tr><td>Lever at REVERSE</td><td>Max. 1 V</td></tr></table>	If the condition is as shown in the table below, it is normal			Between (7) – chassis	Lever at N or FORWARD	20 – 30 V	Lever at REVERSE	Max. 1 V	1) Turn starting switch ON. 2) Insert T-adapter. 3) Turn joystick to directional position.												
If the condition is as shown in the table below, it is normal																								
Between (7) – chassis	Lever at N or FORWARD	20 – 30 V																						
	Lever at REVERSE	Max. 1 V																						



System	Component		Connector No.	Inspection method	Judgement table	Measurement condition					
HSS system	HSS controller	Backup alarm relay	CN-ST1	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (11) – chassis</td><td>Lever at N or FORWARD</td><td>Max. 1 V</td></tr><tr><td>Lever at REVERSE</td><td>20 – 30 V(※)</td></tr></table> <div>※ Voltage changes 20 – 30 V to below 1V alternatively every one second.</div>	Between (11) – chassis	Lever at N or FORWARD	Max. 1 V	Lever at REVERSE	20 – 30 V(※)	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to directional position.</div>
		Between (11) – chassis	Lever at N or FORWARD	Max. 1 V							
			Lever at REVERSE	20 – 30 V(※)							
		Buzzer cancel switch 1	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(6) – chassis</td><td>Switch ON</td><td>20 – 30 V</td></tr><tr><td>Switch OFF</td><td>Max. 1 V</td></tr></table>	Between ST2(6) – chassis	Switch ON	20 – 30 V	Switch OFF	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>
		Between ST2(6) – chassis	Switch ON	20 – 30 V							
			Switch OFF	Max. 1 V							
		Buzzer cancel switch 2	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(5) – chassis</td><td>Switch ON</td><td>20 – 30 V</td></tr><tr><td>Switch OFF</td><td>Max. 1 V</td></tr></table>	Between ST2(5) – chassis	Switch ON	20 – 30 V	Switch OFF	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>
		Between ST2(5) – chassis	Switch ON	20 – 30 V							
			Switch OFF	Max. 1 V							
Mode selection switch 1	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(18) – chassis</td><td>Switch ON</td><td>20 – 30 V</td></tr><tr><td>Switch OFF</td><td>Max. 1 V</td></tr></table>	Between ST2(18) – chassis	Switch ON	20 – 30 V	Switch OFF	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>		
Between ST2(18) – chassis	Switch ON	20 – 30 V									
	Switch OFF	Max. 1 V									
Mode selection switch 2	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(17) – chassis</td><td>Switch ON</td><td>20 – 30 V</td></tr><tr><td>Switch OFF</td><td>Max. 1 V</td></tr></table>	Between ST2(17) – chassis	Switch ON	20 – 30 V	Switch OFF	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>		
Between ST2(17) – chassis	Switch ON	20 – 30 V									
	Switch OFF	Max. 1 V									
Servise switch	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(4) – chassis</td><td>Switch ON</td><td>20 – 30 V</td></tr><tr><td>Switch OFF</td><td>Max. 1 V</td></tr></table>	Between ST2(4) – chassis	Switch ON	20 – 30 V	Switch OFF	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div>		
Between ST2(4) – chassis	Switch ON	20 – 30 V									
	Switch OFF	Max. 1 V									
1st switch	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(13) – chassis</td><td>Lever at 3rd or 2nd</td><td>20 – 30 V</td></tr><tr><td>Lever at 1st</td><td>Max. 1 V</td></tr></table>	Between ST2(13) – chassis	Lever at 3rd or 2nd	20 – 30 V	Lever at 1st	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to 3rd or 2nd position.</div>		
Between ST2(13) – chassis	Lever at 3rd or 2nd	20 – 30 V									
	Lever at 1st	Max. 1 V									
2nd switch	CN-ST2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between ST2(14) – chassis</td><td>Lever at 1st or 2nd</td><td>20 – 30 V</td></tr><tr><td>Lever at 3rd</td><td>Max. 1 V</td></tr></table>	Between ST2(14) – chassis	Lever at 1st or 2nd	20 – 30 V	Lever at 3rd	Max. 1 V	<div>1) Turn starting switch ON.</div> <div>2) Insert T-adapter.</div> <div>3) Turn joystick to 2nd or 1st position.</div>		
Between ST2(14) – chassis	Lever at 1st or 2nd	20 – 30 V									
	Lever at 3rd	Max. 1 V									

Monitor panel system

System	Component	Connector No.	Inspection method	Judgement table	Measurement condition												
Monitor panel (Caution module)	Power train (Torque converter) oil temperature sensor	453 (male)	Measure resistance	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td rowspan="5">Between (1) – (2)</td><td>When water temperature is 100°C</td><td>Approx. 3.8 kΩ</td></tr><tr><td>When water temperature is 90°C</td><td>Approx. 4.9 kΩ</td></tr><tr><td>When water temperature is 35°C</td><td>Approx. 29 kΩ</td></tr><tr><td>When water temperature is 20°C</td><td>Approx. 52 kΩ</td></tr><tr><td>When water temperature is 10°C</td><td>Approx. 80 kΩ</td></tr></table>	Between (1) – (2)	When water temperature is 100°C	Approx. 3.8 kΩ	When water temperature is 90°C	Approx. 4.9 kΩ	When water temperature is 35°C	Approx. 29 kΩ	When water temperature is 20°C	Approx. 52 kΩ	When water temperature is 10°C	Approx. 80 kΩ	1) Turn starting switch OFF. 2) Disconnect connectors.	
	Between (1) – (2)	When water temperature is 100°C	Approx. 3.8 kΩ														
		When water temperature is 90°C	Approx. 4.9 kΩ														
		When water temperature is 35°C	Approx. 29 kΩ														
		When water temperature is 20°C	Approx. 52 kΩ														
		When water temperature is 10°C	Approx. 80 kΩ														
	Fuel level sensor	423 (male)	Measure resistance	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td rowspan="2">Between (1) – (2)</td><td>At full</td><td>Max. approx. 12 Ω</td></tr><tr><td>At empty</td><td>Approx. 85 – 110 Ω</td></tr></table>	Between (1) – (2)	At full	Max. approx. 12 Ω	At empty	Approx. 85 – 110 Ω	1) Turn starting switch OFF. 2) Disconnect connectors.							
Between (1) – (2)	At full	Max. approx. 12 Ω															
	At empty	Approx. 85 – 110 Ω															
Alternator	ANB	Measure voltage	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td>Between terminal R – chassis</td><td>27.5 – 29.5 V</td></tr></table> <p>★ If the battery is old, or after starting in cold area, the voltage may not rise for some time.</p>	Between terminal R – chassis	27.5 – 29.5 V	1) Run engine. (half throttle or above)											
Between terminal R – chassis	27.5 – 29.5 V																
Hydraulic oil temperature sensor	CN1	Measure resistance	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td rowspan="2">Between (5) – (2)</td><td>When oil temperature is below 105°C</td><td>Max. 1 V</td></tr><tr><td>When oil temperature is above 105°C</td><td>20 – 30 V</td></tr></table>	Between (5) – (2)	When oil temperature is below 105°C	Max. 1 V	When oil temperature is above 105°C	20 – 30 V	1) Insert T-adaptor. 2) Turn starting switch ON.								
Between (5) – (2)	When oil temperature is below 105°C	Max. 1 V															
	When oil temperature is above 105°C	20 – 30 V															
S-NET	CN1	Measure voltage	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td>Between (11) (12) – (10)</td><td>4.0 – 10.0 V</td></tr></table>	Between (11) (12) – (10)	4.0 – 10.0 V	1) Insert T-adaptor. 2) Turn starting switch ON.											
Between (11) (12) – (10)	4.0 – 10.0 V																
Power train (Torque converter) oil temperature sensor	CN1 (female) CN2 (female)	Measure resistance	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td rowspan="6">Between CN2 (2) – CN1 (2)</td><td>Oil temperature: 50°C (Level 1)</td><td>Approx. 17 kΩ</td></tr><tr><td>Oil temperature: 90°C (Level 2)</td><td>Approx. 5 kΩ</td></tr><tr><td>Oil temperature: 110°C (Level 3)</td><td>Approx. 2.9 kΩ</td></tr><tr><td>Oil temperature: 116°C (Level 4)</td><td>Approx. 2.5 kΩ</td></tr><tr><td>Oil temperature: 120°C (Level 5)</td><td>Approx. 2.3 kΩ</td></tr><tr><td>Oil temperature: 130°C (Level 6)</td><td>Approx. 2.3 kΩ</td></tr></table>	Between CN2 (2) – CN1 (2)	Oil temperature: 50°C (Level 1)	Approx. 17 kΩ	Oil temperature: 90°C (Level 2)	Approx. 5 kΩ	Oil temperature: 110°C (Level 3)	Approx. 2.9 kΩ	Oil temperature: 116°C (Level 4)	Approx. 2.5 kΩ	Oil temperature: 120°C (Level 5)	Approx. 2.3 kΩ	Oil temperature: 130°C (Level 6)	Approx. 2.3 kΩ	1) Turn starting switch OFF. 2) Disconnect connectors.
Between CN2 (2) – CN1 (2)	Oil temperature: 50°C (Level 1)	Approx. 17 kΩ															
	Oil temperature: 90°C (Level 2)	Approx. 5 kΩ															
	Oil temperature: 110°C (Level 3)	Approx. 2.9 kΩ															
	Oil temperature: 116°C (Level 4)	Approx. 2.5 kΩ															
	Oil temperature: 120°C (Level 5)	Approx. 2.3 kΩ															
	Oil temperature: 130°C (Level 6)	Approx. 2.3 kΩ															
Fuel level sensor	CN1 (female) CN2 (female)	Measure resistance	<p>If the condition is as shown in the table below, it is normal</p> <table><tr><td rowspan="4">Between CN2 (3) – CN1 (2)</td><td>E</td><td>Approx. 75 kΩ</td></tr><tr><td>Level 3/7</td><td>Approx. 50 kΩ</td></tr><tr><td>Level 5/7</td><td>Approx. 35 kΩ</td></tr><tr><td>F</td><td>Approx. 14 kΩ</td></tr></table>	Between CN2 (3) – CN1 (2)	E	Approx. 75 kΩ	Level 3/7	Approx. 50 kΩ	Level 5/7	Approx. 35 kΩ	F	Approx. 14 kΩ	1) Turn starting switch OFF. 2) Disconnect connectors.				
Between CN2 (3) – CN1 (2)	E	Approx. 75 kΩ															
	Level 3/7	Approx. 50 kΩ															
	Level 5/7	Approx. 35 kΩ															
	F	Approx. 14 kΩ															

System	Component		Connector No.	Inspection method	Judgement table	Measurement condition					
Monitor pannel system	Monitor panel (Caution module)	Preheating signal	CN1 CN2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between CN2 (5) – CN1 (2)</td><td>When preheater is turned ON</td><td>20 – 30 V</td></tr><tr><td>When preheater is turned OFF</td><td>Max. 1 V</td></tr></table>	Between CN2 (5) – CN1 (2)	When preheater is turned ON	20 – 30 V	When preheater is turned OFF	Max. 1 V	1) Insert T-adapter. 2) Turn starting switch ON.
		Between CN2 (5) – CN1 (2)	When preheater is turned ON	20 – 30 V							
			When preheater is turned OFF	Max. 1 V							
		Caution lamp	CN1 CN2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between CN2 (7) – CN1 (2)</td><td>When lamp is turned ON</td><td>Max. 6 V</td></tr><tr><td>When lamp is turned OFF</td><td>20 – 30 V</td></tr></table>	Between CN2 (7) – CN1 (2)	When lamp is turned ON	Max. 6 V	When lamp is turned OFF	20 – 30 V	1) Insert T-adapter. 2) Turn starting switch ON.
	Between CN2 (7) – CN1 (2)	When lamp is turned ON	Max. 6 V								
		When lamp is turned OFF	20 – 30 V								
	Caution Buzzer	CN1 CN2	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between CN2 (8) – CN1 (2)</td><td>When buzzer is turned ON</td><td>Max. 3 V</td></tr><tr><td>When buzzer is turned OFF</td><td>20 – 30 V</td></tr></table>	Between CN2 (8) – CN1 (2)	When buzzer is turned ON	Max. 3 V	When buzzer is turned OFF	20 – 30 V	1) Insert T-adapter. 2) Turn starting switch ON.	
	Between CN2 (8) – CN1 (2)	When buzzer is turned ON	Max. 3 V								
		When buzzer is turned OFF	20 – 30 V								
	Lighting signal	CN4	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (1) – (2)</td><td>When lamp switch is turned OFF</td><td>Max. 1 V</td></tr><tr><td>When lamp switch is turned ON</td><td>20 – 30 V</td></tr></table>	Between (1) – (2)	When lamp switch is turned OFF	Max. 1 V	When lamp switch is turned ON	20 – 30 V	1) Insert T-adapter. 2) Turn starting switch ON.	
	Between (1) – (2)	When lamp switch is turned OFF	Max. 1 V								
When lamp switch is turned ON		20 – 30 V									
Monitor panel (Tachometer module)	Backup power source	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (7) – (2)</td><td>20 – 30 V</td></tr></table>	Between (7) – (2)		20 – 30 V	1) Insert T-adapter. 2) Turn starting switch OFF.			
	Between (7) – (2)		20 – 30 V								
	Starting switch ON signal	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (1) – (2)</td><td>20 – 30 V</td></tr></table>	Between (1) – (2)		20 – 30 V	1) Insert T-adapter. 2) Turn starting switch ON.			
	Between (1) – (2)		20 – 30 V								
	Starting switch STAR signal	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (3) – (2)</td><td>When starting switch is at ON position</td><td>Max. 1 V</td></tr><tr><td>When starting switch is at START position</td><td>20 – 30 V</td></tr></table>	Between (3) – (2)	When starting switch is at ON position	Max. 1 V	When starting switch is at START position	20 – 30 V	1) Insert T-adapter.	
	Between (3) – (2)	When starting switch is at ON position	Max. 1 V								
When starting switch is at START position		20 – 30 V									
Alternator	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (4) – (2)</td><td>While engine is stopped</td><td>Max. 1 V</td></tr><tr><td>While engine is running</td><td>27.5 – 29.5 V</td></tr></table>	Between (4) – (2)	While engine is stopped	Max. 1 V	While engine is running	27.5 – 29.5 V	1) Insert T-adapter.		
Between (4) – (2)	While engine is stopped	Max. 1 V									
	While engine is running	27.5 – 29.5 V									
Service switch	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td rowspan="2">Between (5) – (2)</td><td>When switch is turned OFF</td><td>20 – 30 V</td></tr><tr><td>When switch is turned ON</td><td>Max. 1 V</td></tr></table>	Between (5) – (2)	When switch is turned OFF	20 – 30 V	When switch is turned ON	Max. 1 V	1) Insert T-adapter. 2) Turn starting switch ON.		
Between (5) – (2)	When switch is turned OFF	20 – 30 V									
	When switch is turned ON	Max. 1 V									
S-NET	T01	Measure voltage	<div>If the condition is as shown in the table below, it is normal</div> <table><tr><td colspan="2">Between (9) (10) – (8)</td><td>4.0 – 10.0 V</td></tr></table>	Between (9) (10) – (8)		4.0 – 10.0 V	1) Insert T-adapter. 2) Turn starting switch ON.				
Between (9) (10) – (8)		4.0 – 10.0 V									

System	Component		Connector No.	Inspection method	Judgement table	Measurement condition													
Monitor panel system	Monitor panel (switch module)	Power source	S01	Measure voltage	If the condition is as shown in the table below, it is normal <table><tr><td>Between (1) – (2)</td><td>20 – 30 V</td></tr></table> ★ If the battery is old, or after starting in cold area, the voltage may not rise for some time.	Between (1) – (2)	20 – 30 V	1) Insert T-adapter. 2) Turn starting switch ON.											
					Between (1) – (2)	20 – 30 V													
	Hydraulic oil temperature sensor	452 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table><tr><td rowspan="2">Between (1) – chassis</td><td>When oil temperature is below 105°C</td><td>Max. 1 Ω</td></tr><tr><td>When oil temperature is above 105°C</td><td>Min. 1 MΩ</td></tr></table>	Between (1) – chassis	When oil temperature is below 105°C	Max. 1 Ω	When oil temperature is above 105°C	Min. 1 MΩ	1) Turn starting switch OFF. 2) Disconnect connectors.									
	Between (1) – chassis	When oil temperature is below 105°C	Max. 1 Ω																
		When oil temperature is above 105°C	Min. 1 MΩ																
	Service switch	X1	Measure resistance	If the condition is as shown in the table below, it is normal <table><tr><td>Between (1) – (2)</td><td>OFF</td><td>ON</td></tr><tr><td>Between (2) – (3)</td><td>Max.1 Ω</td><td>Min.1 MΩ</td></tr><tr><td>Between (3) – (4)</td><td>Min.1 MΩ</td><td>Max.1 Ω</td></tr><tr><td>Between (4) – (5)</td><td>Max.1 Ω</td><td>Min.1 MΩ</td></tr><tr><td>Between (5) – (6)</td><td>Min.1 MΩ</td><td>Max.1 Ω</td></tr></table>	Between (1) – (2)	OFF	ON	Between (2) – (3)	Max.1 Ω	Min.1 MΩ	Between (3) – (4)	Min.1 MΩ	Max.1 Ω	Between (4) – (5)	Max.1 Ω	Min.1 MΩ	Between (5) – (6)	Min.1 MΩ	Max.1 Ω
Between (1) – (2)				OFF	ON														
Between (2) – (3)	Max.1 Ω	Min.1 MΩ																	
Between (3) – (4)	Min.1 MΩ	Max.1 Ω																	
Between (4) – (5)	Max.1 Ω	Min.1 MΩ																	
Between (5) – (6)	Min.1 MΩ	Max.1 Ω																	
Ribbon heater relay	HET (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table><tr><td>Between (1) – (2)</td><td>200 – 400 Ω</td></tr><tr><td>Between (3) – (5)</td><td>Min.1 MΩ</td></tr><tr><td>Between (3) – (6)</td><td>Max.1 Ω</td></tr></table>	Between (1) – (2)	200 – 400 Ω	Between (3) – (5)	Min.1 MΩ	Between (3) – (6)	Max.1 Ω	1) Turn starting switch OFF. 2) Disconnect connectors.									
Between (1) – (2)	200 – 400 Ω																		
Between (3) – (5)	Min.1 MΩ																		
Between (3) – (6)	Max.1 Ω																		
Monitor panel (caution module)	Power source	CN1	Measure voltage	If the condition is as shown in the table below, it is normal <table><tr><td>Between (1) – (2)</td><td>4.0 – 10.0 V</td></tr></table>	Between (1) – (2)	4.0 – 10.0 V	1) Insert T-adapter. 2) Turn starting switch ON.												
	Between (1) – (2)	4.0 – 10.0 V																	
	Starting switch START signal	CN1	Measure resistance	If the condition is as shown in the table below, it is normal <table><tr><td rowspan="2">Between (3) – (2)</td><td>When starting switch is at ON position</td><td>Max. 1 Ω</td></tr><tr><td>When starting switch is at START position</td><td>20 – 30 V</td></tr></table>	Between (3) – (2)	When starting switch is at ON position	Max. 1 Ω	When starting switch is at START position	20 – 30 V	1) Insert T-adapter.									
Between (3) – (2)	When starting switch is at ON position	Max. 1 Ω																	
	When starting switch is at START position	20 – 30 V																	
Alternator	CN1	Measure voltage	If the condition is as shown in the table below, it is normal <table><tr><td rowspan="2">Between (4) – (2)</td><td>While engine is stopped</td><td>Max. 1 V</td></tr><tr><td>While engine is running</td><td>27.5 – 29.5 V</td></tr></table>	Between (4) – (2)	While engine is stopped	Max. 1 V	While engine is running	27.5 – 29.5 V	1) Insert T-adapter.										
Between (4) – (2)	While engine is stopped	Max. 1 V																	
	While engine is running	27.5 – 29.5 V																	

# TESTING AND ADJUSTING

Tools for testing, adjusting, and troubleshooting .....	20-102
Measuring engine speed .....	20-103
Measuring intake air pressure (boost pressure) .....	20-104
Measuring exhaust temperature .....	20-105
Measuring exhaust color .....	20-106
Adjusting valve clearance .....	20-107
Measuring compression pressure .....	20-108
Measuring blow-by pressure .....	20-109
Measuring engine oil pressure .....	20-110
Testing and adjusting fuel injection timing .....	20-111
Handling equipment in fuel circuit .....	20-111-1
Rereasing remaining pressure in fuel system .....	20-111-1
Measuring fuel pressure .....	20-111-2
Reduced cylinder mode operation .....	20-111-3
Bleeding air from fuel system .....	20-111-5
Check for leakage in fuel system .....	20-111-6
Testing and adjusting alternator belt tension .....	20-112
Testing and adjusting air conditioner compressor belt tension .....	20-112-1
Testing and adjusting fun belt tension .....	20-112-2
Adjusting engine speed sensor .....	20-113
Handling controller high voltage circuit .....	20-113-1
Adjusting fuel control lever and decelerator pedal .....	20-114
Measuring torque converter stall speed .....	20-117
Measuring full stall speed .....	20-118
Measuring power train oil pressure .....	20-119
Testing and adjusting HSS main oil pressure .....	20-122
Testing and adjusting HSS charge oil pressure .....	20-124
Testing and adjusting HSS servo charge pressure and PPC relief pressure .....	20-126
Bleeding air from HSS pump .....	20-128
Simple procedure for testing brake performance .....	20-129
Adjusting joystick and parking lever .....	20-130
Testing and adjusting travel reverse sensing potentiometer .....	20-133
Adjusting travel reverse limit switch .....	20-134
Adjusting steering neutral position .....	20-135
Procedure for operating emergency steering switch .....	20-139
Adjusting initial current in HSS steering system .....	20-140-3
Adjusting brake pedal .....	20-141
Adjusting clearance of idler .....	20-143
Testing wear of sprocket .....	20-144
Testing and adjusting track shoe tension .....	20-145
Testing and adjusting hydraulic pressure .....	20-146
Measuring PPC valve output pressure .....	20-148
Adjusting play of PPC valve .....	20-150
Measuring solenoid valve output pressure .....	20-151
Testing location causing hydraulic drift of blade and ripper .....	20-152
Measuring leakage inside hydraulic cylinder .....	20-153
Releasing remaining oil pressure in hydraulic cylinder .....	20-154
Bleeding air from hydraulic cylinder .....	20-154
Adjusting work equipment safety lever .....	20-155
Adjusting semi-U tiltadozer .....	20-156

## TOOLS FOR TESTING, ADJUSTING, AND TROUBLESHOOTING

Check or measurement item	Symbol	Part No.	Part Name	Remarks
Engine speed ※1	A	799-203-8001	Multi-tachometer	Digital display L : 60 – 2,000rpm H : 60 – 19,999rpm
Air supply pressure (boost pressure)	B	799-201-2202	Boost gauge kit	–101 – 199.9kPa{–750 – 1,500mmHg}
Temperature of water, oil , and exhaust gas	C	799-101-1502	Digital thermometer	– 99.9 – 1299°C
Exhaust color	D	1 799-201-9000	Handy smoke checker	Discoloration 0 – 70 % (with standard color) (Discoloration x 1/10 ≒ Bosch index)
		2 Commercially available	Smoke meter	
Valve clearance	E	795-125-1210	Feeler gauge	SA6D140E-2 Intake valve: 0.43mm, Exhaust valve: 0.80mm
		Commercially available		SA6D140E-3 Intake valve: 0.35mm, Exhaust valve: 0.57mm
Compression pressure ※1	F	795-502-1205	Compression gauge	0 – 6.9MPa {0 – 70kg/cm <sup>2</sup> }
		• 795-502-1510	• Adapter	
		• 795-502-1520	• Plate	
Blow-by pressure	G	799-201-1504	Blow by checker	0 – 4.9MPa {0 – 500mmH <sub>2</sub> O}
Oil pressure	H	1 799-101-5002	Hydraulic tester	Pressure gauge: 2.5,5.9,39.2,58.8MPa {25,60,400,600kg/cm <sup>2</sup> }
		790-261-1203	Digital hydraulic tester	Pressure gauge: 58.8MPa{600kg/cm <sup>2</sup> }
		799-101-5220	Nipple	10 x 1.25
		07002-11023	O-ring	
	2	799-401-2320	Hydraulic gauge	0.98MPa {10kg/cm <sup>2</sup> }
Wear of sprocket	J	791-627-1160	Wear gauge	
Operating effort	K	79A-264-0021	Push-pull scale	0 – 294N {0 – 30kg}
		79A-264-0091	Push-pull scale	0 – 490N {0 – 50kg}
Stroke, hydraulic drift	L	Commercially available	Scale	
Work equipment speed	M	Commercially available	Stop watch	
Measuring voltage and resistance	N	79A-264-0211	Tester	
Troubleshooting of wiring harnesses	P	799-601-8000	T-adapter	
		799-601-7360	Adapter	For 5 pins relay

※1: SA6D140E-2 engine

## MEASURING ENGINE SPEED

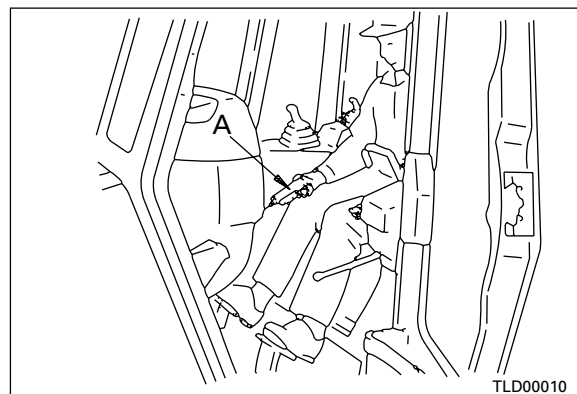
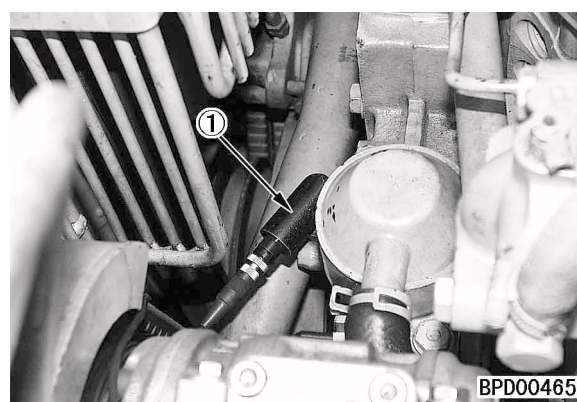
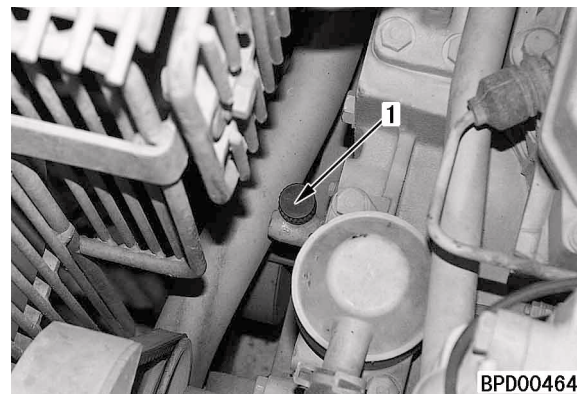
Serial No. 70001 – 75000

**⚠** Be careful not to touch any hot parts when removing or installing the measuring tools.

★ Measure the engine speed under the following conditions.

- Coolant temperature: Within operating range
- Transmission oil temperature: Within operating range
- Hydraulic temperature: 45 – 55°C

1. Remove cap (1) of the speed pickup port.
  2. Install sensor ① of multi-tachometer **A** to the speed pickup port, then connect to multi-tachometer **A**.
  3. Start the engine and measure the engine speed under the following conditions.
    - 1) Measurement at low idling:
      - i) Set the joystick and work equipment control lever to the neutral position.
      - ii) Set the fuel control lever to the low idling position, then measure the engine speed.
    - 2) Measurement at high idling
      - i) Set the joystick and work equipment control lever to the neutral position.
      - ii) Set the fuel control lever to the high idling position, then measure the engine speed.
- ★ When measuring the “stall speed of torque converter” and “speed to stall the torque converter and relieve the work equipment pump”, see the measurement procedure for them.

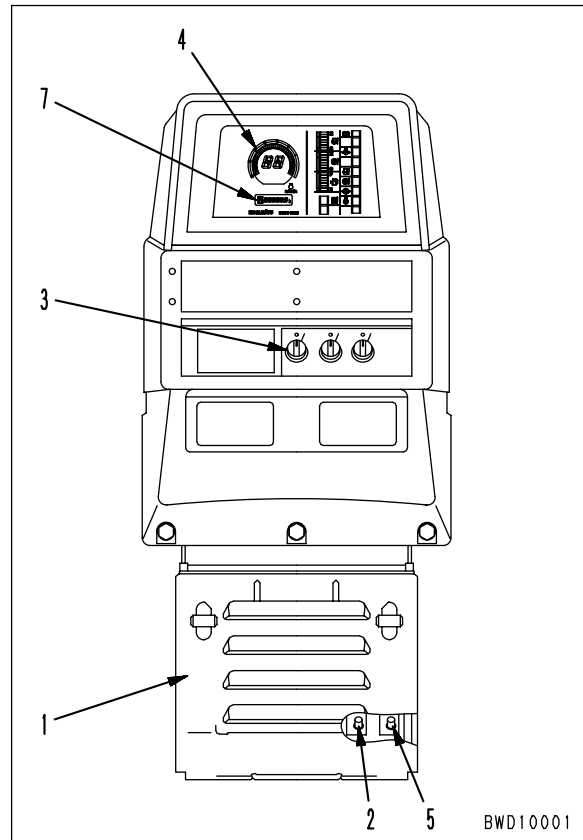


**Serial No. 75001 and up**

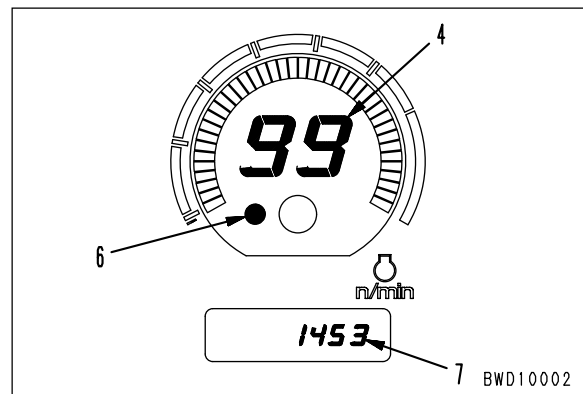
- ★ Measure the engine speed in the monitoring mode and adjusting mode of the monitor panel. For the general explanation of the monitoring mode and adjusting mode, see DISPLAY AND SPECIAL FUNCTIONS OF MONITOR PANEL in TROUBLESHOOTING.

1. Measuring low idling speed and high idling speed
  - 1) Remove cover (1).
  - 2) Turn starting switch ON.
  - 3) Turn service switch (2) ON.
    - ★ The service switch is installed inside the cover.
  - 4) Turn and hold buzzer cancel switch (3) to the right for at least 7 seconds to display the service mode in upper display unit (4).
  - 5) Turn up mode selector switch (5) to display the monitoring mode.
    - ★ The mode selector switch is installed inside the cover.
    - ★ Each time the mode selector switch is turned up, the mode changes.
    - ★ If the monitoring mode is selected, round mark (6) on the left side lights up.
  - 6) Turn buzzer cancel switch (3) to the right to display "99".
  - 7) Start the engine and read its speed under the following conditions indicated in lower display unit (7) of the panel.
    - ★ The engine speed is indicated by the unit of rpm.
    - i) Measuring low idling speed:
 

Set the joystick and work equipment control lever in neutral and set the fuel control dial in the low idling position.



BWD10001



BWD10002



- ii) Measuring high idling speed:  
Set the joystick and work equipment control lever in neutral and set the fuel control dial in the high idling position.
- 8) After measuring the engine speed, turn OFF service switch (2) and set the panel to the ordinary mode.
- 9) Install cover (1).

## MEASURING INTAKE AIR PRESSURE (BOOST PRESSURE)

Serial No. 70001 – 75000

**⚠** Be careful not to touch any hot parts when removing or installing the measuring tools.

★ Measure the intake air pressure under the following conditions.

- Coolant temperature: Within operating range
- Transmission oil temperature: Within operating range
- Hydraulic temperature: 45 – 55 °C

1. Remove intake air pressure pickup plug (1) (PT1/8).

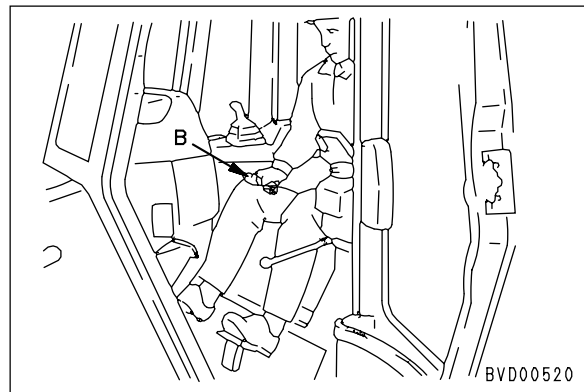
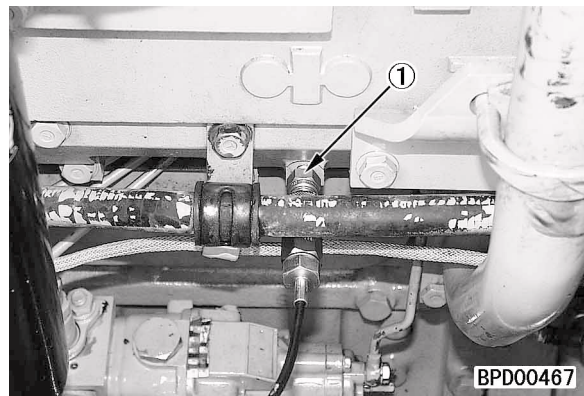
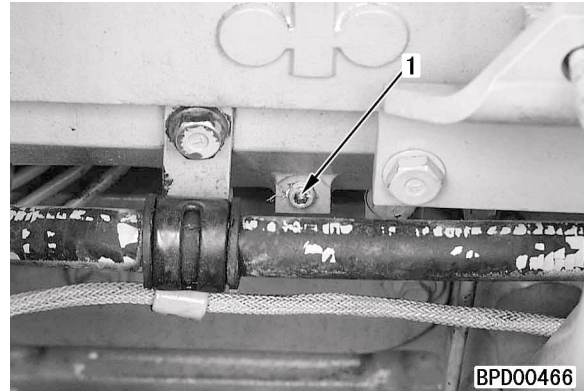
2. Install nipple ① of oil pressure gauge **H1**, then connect to boost gauge **B**.

3. Start and run the engine at a middle or higher speed to drain oil from the hoses.

- ★ Insert the connecting part of the hose in the pressure gauge halfway and open the self-sealing part on the hose side repeatedly to drain the oil.
- ★ If Pm kit (A) is available, the air bleeding coupling (790-261-113) in it may be used.
- ★ If any oil remains in the hoses, the gauge does not operate. Accordingly, drain the oil without fail.

4. Run the engine at high idling and stall the torque converter, and measure the intake air pressure (boost pressure) at this time.

- ★ For the procedure to stall the torque converter, see **MEASURING TORQUE CONVERTER STALL SPEED**.
- ★ The normal intake air pressure (boost pressure) must be measured while the machine is operating at the rated output. An approximate value can be obtained in the field, however, by measuring when the torque converter stalls.



**Serial No. 75001 and up**

**⚠** Be careful not to touch any hot parts when removing or installing the measuring tools.

★ Measure the intake air pressure under the following conditions.

- Coolant temperature: Within operating range
- Transmission oil temperature: Within operating range
- Hydraulic temperature: 45 – 55 °C

1. Remove intake air pressure pickup plug (1) (PT1/8).

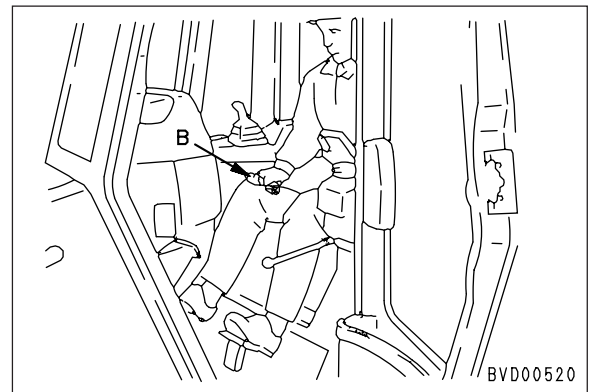
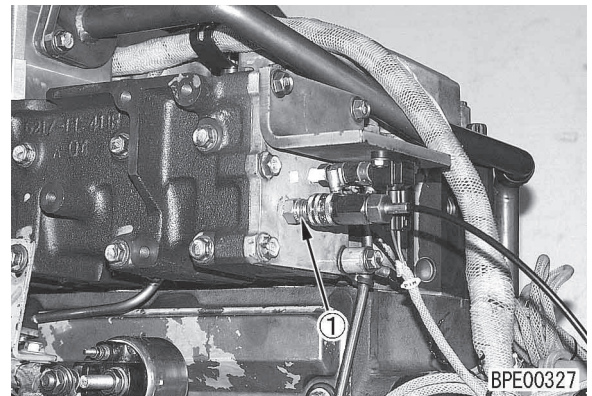
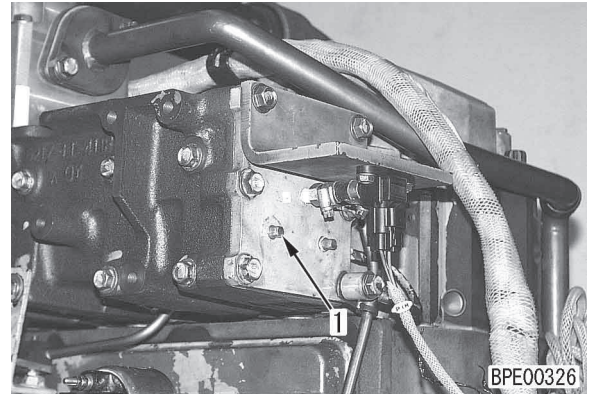
2. Install nipple ① of boost gauge kit **B**, then connect to boost gauge kit.

3. Start and run the engine at a middle or higher speed to drain oil from the hoses.

- ★ Insert the connecting part of the hose in the pressure gauge halfway and open the self-sealing part on the hose side repeatedly to drain the oil.
- ★ If Pm kit (A) is available, the air bleeding coupling (790-261-113) in it may be used.
- ★ If any oil remains in the hoses, the gauge does not operate. Accordingly, drain the oil without fail.

4. Run the engine at high idling and stall the torque converter, and measure the intake air pressure (boost pressure) at this time.

- ★ For the procedure to stall the torque converter, see MEASURING TORQUE CONVERTER STALL SPEED.
- ★ The normal intake air pressure (boost pressure) must be measured while the machine is operating at the rated output. An approximate value can be obtained in the field, however, by measuring when the torque converter stalls.





## MEASURING EXHAUST TEMPERATURE

Serial No. 70001 – 75000

**⚠** Install or remove the temperature sensor after the exhaust manifold is cooled.

★ Measure the exhaust temperature under the following conditions.

- Coolant temperature: Within operating range
- Transmission oil temperature: Within operating range
- Hydraulic temperature: 45 – 55 °C

1. Remove the turbocharger heat insulation cover.

2. Remove exhaust temperature pickup plug (1) (PT1/8).

3. Install sensor ① of digital thermometer **C**, then connect to digital thermometer **C**.

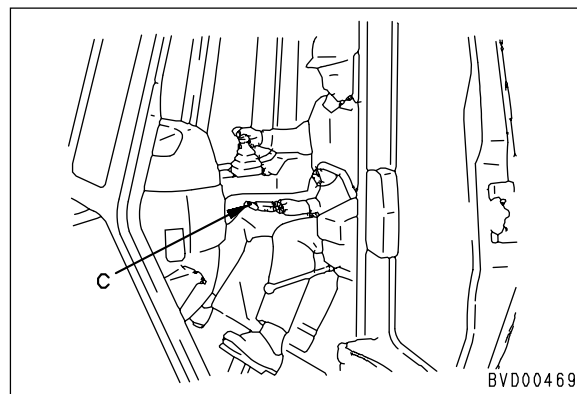
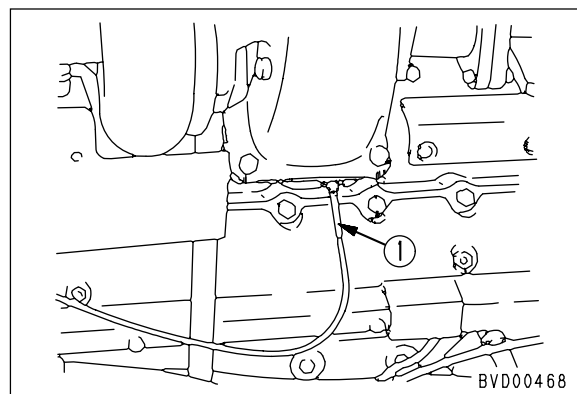
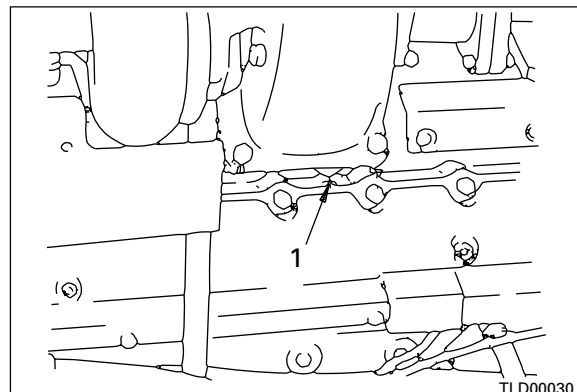
★ Clamp the harness of the thermometer so that it will not touch the hot parts during measurement.

4. Measure the maximum exhaust temperature while the machine is actually operating at high idling.

★ Use the PEAK mode of the digital thermometer.

★ The exhaust temperature largely depends on the ambient air temperature (intake air temperature of the engine). Accordingly, if any abnormal value is obtained, carry out temperature compensation by the following calculation.

- Compensation value [°C] = Measured value + 2 x (20 – Ambient air temperature)



**Serial No. 75001 and up**

**⚠** Install or remove the temperature sensor after the exhaust manifold is cooled.

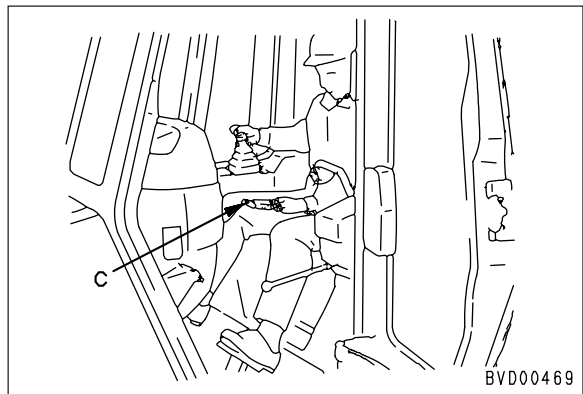
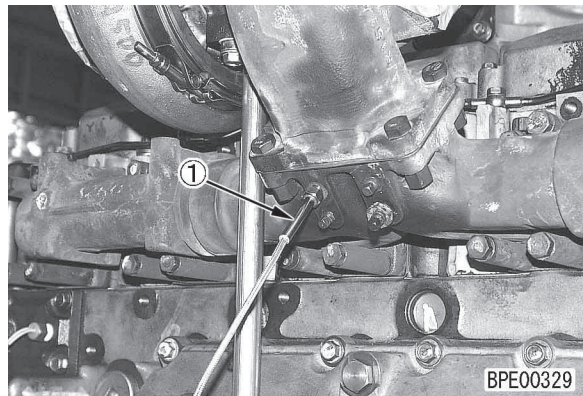
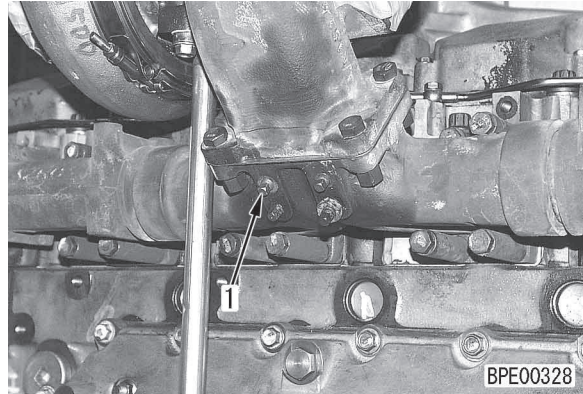
- ★ Measure the exhaust temperature under the following conditions.
  - Coolant temperature: Within operating range
  - Transmission oil temperature: Within operating range
  - Hydraulic temperature: 45 – 55 °C

1. Remove the turbocharger heat insulation cover.
2. Remove exhaust temperature pickup plug (1).
3. Install sensor ① of digital thermometer **C**, then connect to digital thermometer **C**.

- ★ Clamp the harness of the thermometer so that it will not touch the hot parts during measurement.

4. Measure the maximum exhaust temperature while the machine is actually operating at high idling.

- ★ Use the PEAK mode of the digital thermometer.
- ★ The exhaust temperature largely depends on the ambient air temperature (intake air temperature of the engine). Accordingly, if any abnormal value is obtained, carry out temperature compensation by the following calculation.
  - Compensation value [°C] = Measured value + 2 x (20 – Ambient air temperature)





## MEASURING EXHAUST COLOR

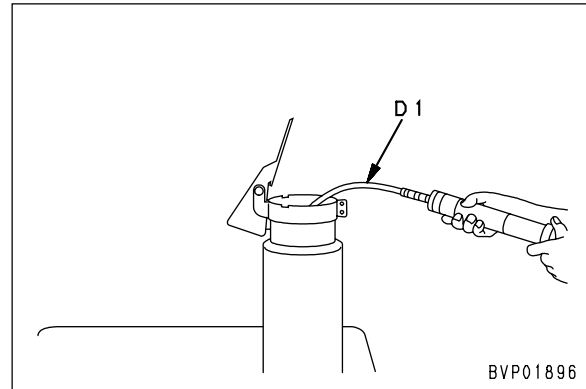
**⚠** Be careful not to touch any hot parts when removing or installing the measuring tools.

- When measuring in the field where there is no air or electric power supply, use Handy Smoke Checker **D1**; when recording formal data, use Smoke Meter **D2**.

★ Raise the coolant temperature to the operating range before measuring.

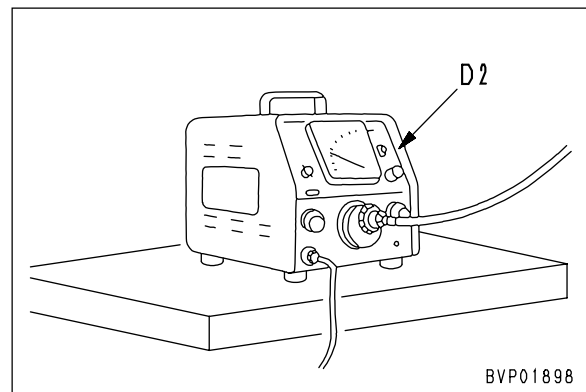
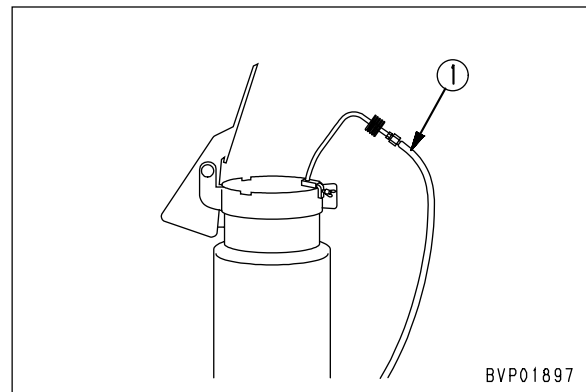
### 1. Measuring with Handy Smoke Checker D1

- 1) Install filter paper to Handy Smoke Checker **D1**.
- 2) Insert the exhaust gas suction port into the exhaust pipe, accelerate the engine suddenly, and operate the handle of Handy Smoke Checker **D1** at the same time to collect the exhaust gas on the filter paper.
- 3) Remove the filter paper and compare it with the scale supplied to judge the condition.



### 2. Measuring with Smoke Meter D2

- 1) Insert the probe ① of Smoke Meter **D2** into the outlet port of the exhaust pipe, and tighten the clip to secure it to the exhaust pipe.
- 2) Connect the air hose and the socket of the probe hose and accelerator switch to Smoke Meter **D2**.
  - ★ Keep the pressure of the air supply below 1.5 MPa {15 kg/cm<sup>2</sup>}.
- 3) Connect the power cord to the AC100V socket.
  - ★ When connecting the cord, check that the power switch of Smoke Meter **D2** is OFF.
- 4) Loosen the cap nut of the suction pump, and fit the filter paper.
  - ★ Fit the filter paper securely so that the exhaust gas cannot leak.
- 5) Turn the power switch of Smoke Meter **D2** ON.
- 6) Accelerate the engine suddenly, and depress the accelerator pedal of Smoke Meter **D2** at the same time to collect the exhaust gas color on the filter.
- 7) Place the filter paper used to catch the exhaust has color on top of at least 10 sheets of unused filter paper inside the filter paper holder, and read the value shown.






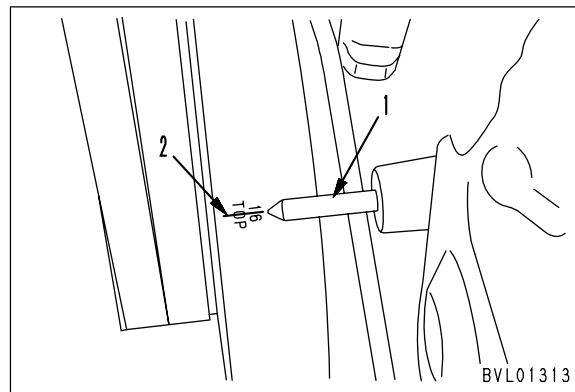
## ADJUSTING VALVE CLEARANCE

Serial No. 70001 – 75000

1. Remove the cylinder head cover.
  - ★ For details, see REMOVAL OF CYLINDER HEAD ASSEMBLY.
2. Rotating the crankshaft in the normal direction and watching the movement of the valve, align the 1.6 TOP line (2) on the crank pulley with pointer (1) to set the No. 1 cylinder to compression top dead center.
  - ★ When the No. 1 cylinder is at the compression top dead center, the rocker arms on both intake side and exhaust side can be moved with the hand. If the rocker arms cannot be moved, the cylinder is not at the compression top dead center. In this case, rotate the crankshaft one more turn and align the 1.6 TOP line.
  - ★ Crank the engine with the hexagon shaft of the water pump pulley.
3. When No. 1 cylinder is at the compression top dead center, adjust the valves marked ● in the table of locations of valves. Next, rotate crankshaft by 360° in the normal direction and adjust the valve clearance of the remaining valves marked ○.
4. To adjust the clearance, insert feeler gauge **E** between rocker arm (3) and crosshead (4), and adjust with adjustment screw (5), then secure it with locknut (6).
 

 Locknut: **45.1 – 51.0Nm {4.6 – 5.2kgm}**

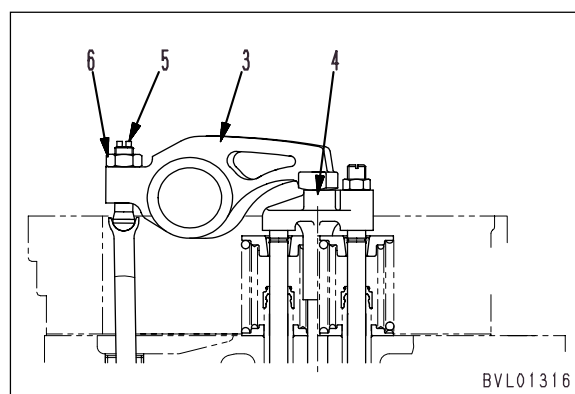
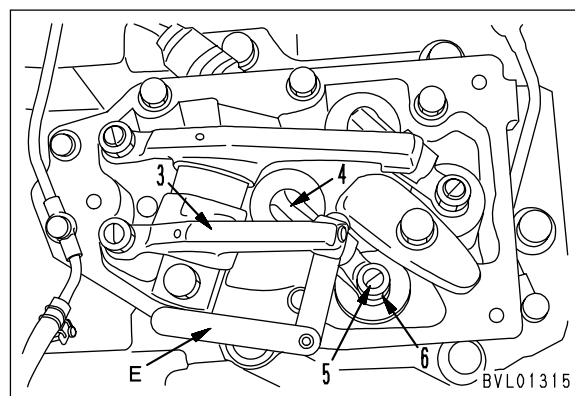
  - ★ After adjusting the No. 1 cylinder at the compression top dead center, it is also possible to turn the crankshaft 120° each time and adjust the clearance of the valves of each cylinder according the firing order.
    - Firing order: 1-5-3-6-2-4
  - ★ After tightening the locknut, check the clearance again.





Valve arrangement

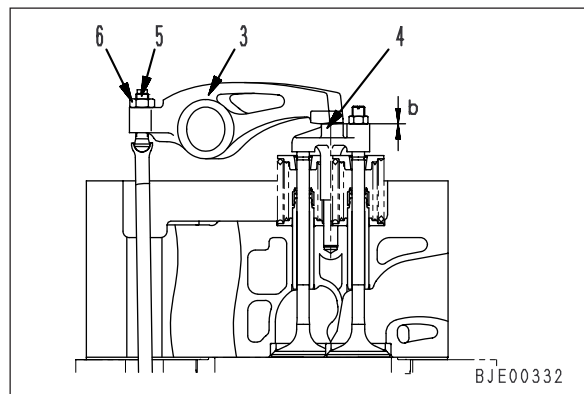
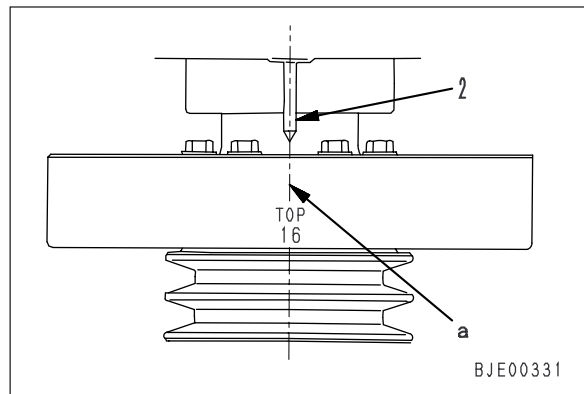
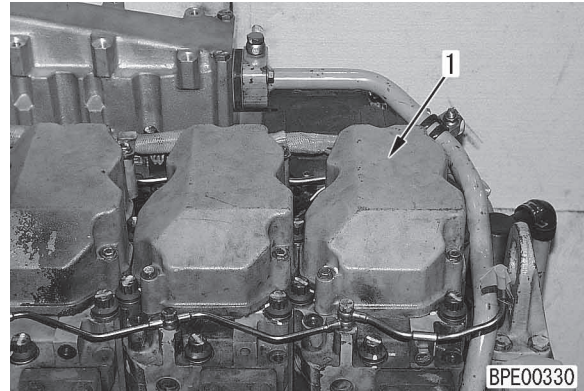
Cylinder No.	1	2	3	4	5	6
Exhaust valve	●	○	●	○	●	○
Intake valve	●	●	○	●	○	○

TDD00714



**Serial No. 75001 and up**

1. Remove cylinder head cover (1).  
★ See REMOVAL OF CYLINDER HEAD ASSEMBLY in DISASSEMBLY AND ASSEMBLY.
2. Rotate the crankshaft in the normal direction to set No. 1 cylinder at compression top dead center, and align pointer (2) with the [1.6] mark **a** on the damper.  
★ Crank the crankshaft with the hexagonal portion at the tip of the water pump drive shaft.  
★ At compression top dead center, the valve rocker arm can be moved by hand by the amount of the valve clearance. If the rocker arm does not move, the crankshaft is not at compression dead center, so rotate it one more turn.
3. To adjust the valve clearance, insert the feeler gauge into clearance **b** between rocker arm (3) and crosshead (4), and adjust the valve clearance with adjustment screw (5).  
★ Insert the feeler gauge and turn adjustment screw (5) until the clearance is a sliding fit.  
★ Valve clearance Intake valve: 0.35 mm  
Exhaust valve: 0.57 mm
4. Tighten locknut (6) to hold adjustment screw (5) in position.  
 Locknut: **53.0 – 64.7 Nm {5.4 – 6.6 kgm}**  
★ After tightening the locknut, check the clearance again.
5. Turn the crankshaft 120° each time in the normal direction and repeat the procedure in Step 2 to 4 to adjust the valves of each cylinder according to the firing order.  
★ Firing order: 1-5-3-6-2-4
6. After completing the measurement, set to the original condition.  
 Cylinder head cover mounting bolt:  
**29.4 – 34.3 Nm {3.0 – 3.5 kgm}**



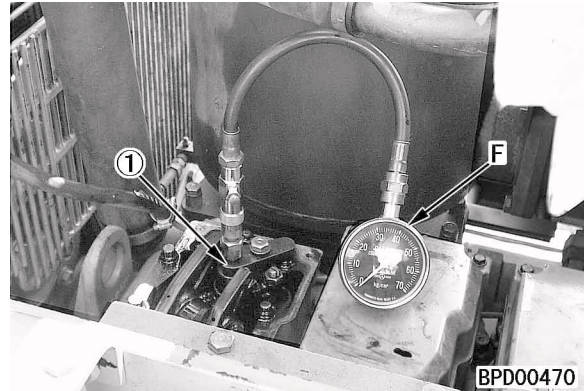


## MEASURING COMPRESSION PRESSURE

Serial No. 70001 – 75000

**⚠** When measuring the compression pressure, be careful not to touch the exhaust manifold or any other hot parts or get caught in the fan belt or any other rotating parts.

1. Adjust the valve clearance.
  - ★ For details, see ADJUSTING VALVE CLEARANCE.
2. Warm up the engine so that the oil temperature is 40 – 60°C.
3. Remove the nozzle holder assembly from the cylinder to be measured.
  - ★ For details, see REMOVAL OF NOZZLE HOLDER ASSEMBLY.
4. Set multi-tachometer **A**.
  - ★ For details, see MEASURING ENGINE SPEED.
5. Install adapter ① of compression gauge **F** to the nozzle holder mount, then connect to compression gauge **F**.
6. Set the fuel control lever to the STOP position.
7. Crank the engine with the starting motor and measure the compression pressure.
  - ★ Measure the compression pressure at the point where the pressure gauge indicator remains steady.
  - ★ When measuring the compression pressure, measure the engine speed to confirm that it is within the specified range.



## MEASURING COMPRESSION PRESSURE

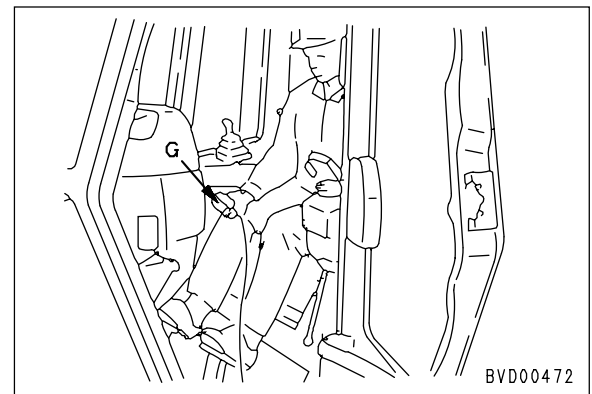
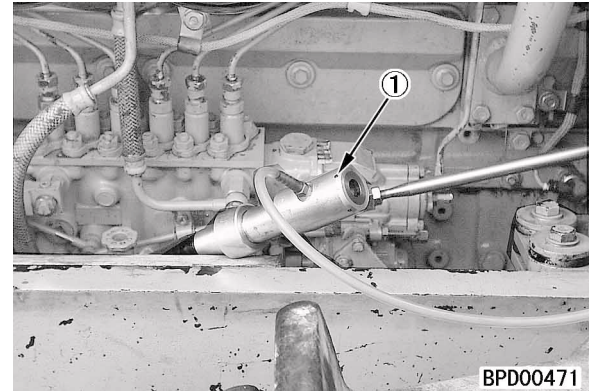
Serial No.: 75001 and up

- ★ For the method of measuring the compression pressure, see the Engine Shop Manual for the 140-3 Series.

## MEASURING BLOW-BY PRESSURE

Serial No. 70001 – 75000

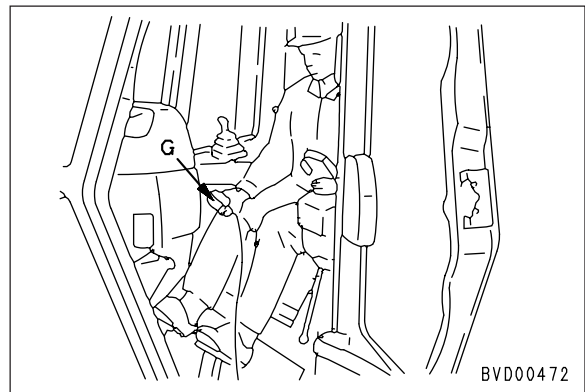
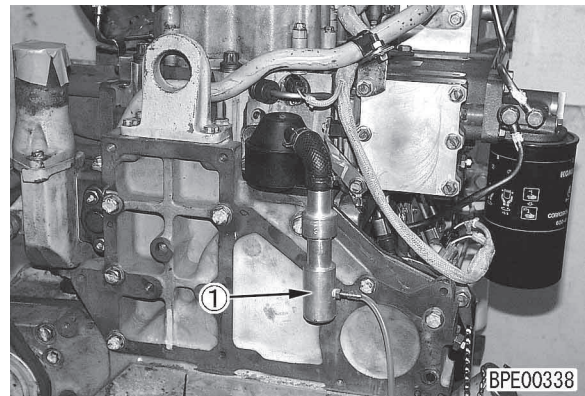
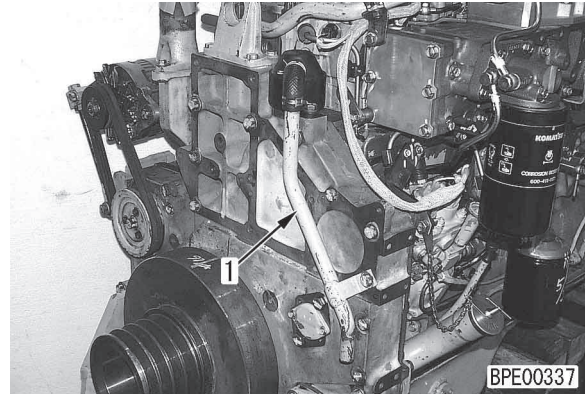
- ★ Measure the blow-by pressure under the following conditions.
  - Coolant temperature: Within operating range
  - Transmission oil temperature: Within operating range
  - Hydraulic temperature: 45 – 55°C
- 1. Install nozzle (1) of blow-by checker **G** to blow-by hose ①.
- 2. Connect nozzle ① to blow-by checker **G**.
- 3. Run the engine at high idling and stall the torque converter, and measure the gauge value at this time.
  - ★ For the procedure to stall the torque converter, see MEASURING TORQUE CONVERTER STALL SPEED.
  - ★ The normal blow-by pressure must be measured while the machine is operating at the rated output. An approximate value can be obtained in the field, however, by measuring when the torque converter stalls.
  - ★ If it is impossible to check at the rated output or at the torque converter stall speed, measure with the engine at high idling. In this case, the blow-by value will be about 80% of the value at the rated output.
  - ★ Blow-by varies greatly according to the condition of the engine. Therefore, if the blow-by value is considered abnormal, check for problems connected with defective blow-by, such as excessive oil consumption, defective exhaust gas color, and prematurely dirty or deteriorated oil.





**Serial No. 75001 and up**

- ★ Measure the blow-by pressure under the following conditions.
  - Coolant temperature: Within operating range
  - Transmission oil temperature: Within operating range
  - Hydraulic temperature: 45 – 55°C
- 1. Remove blow-by tube (1).
  - ★ If a hose is connected to the end of the blow-by tube, it does not need to be removed since the blow-by pressure is measured at the end of that hose.
- 2. Install nozzle ① of blow-by checker **G**, then connect it to the blow-by checker.
- 3. Run the engine at high idling and stall the torque converter, and measure the gauge value at this time.
  - ★ For the procedure to stall the torque converter, see MEASURING TORQUE CONVERTER STALL SPEED.
  - ★ The normal blow-by pressure must be measured while the machine is operating at the rated output. An approximate value can be obtained in the field, however, by measuring when the torque converter stalls.
  - ★ If it is impossible to check at the rated output or at the torque converter stall speed, measure with the engine at high idling. In this case, the blow-by value will be about 80% of the value at the rated output.
  - ★ Blow-by varies greatly according to the condition of the engine. Therefore, if the blow-by value is considered abnormal, check for problems connected with defective blow-by, such as excessive oil consumption, defective exhaust gas color, and prematurely dirty or deteriorated oil.





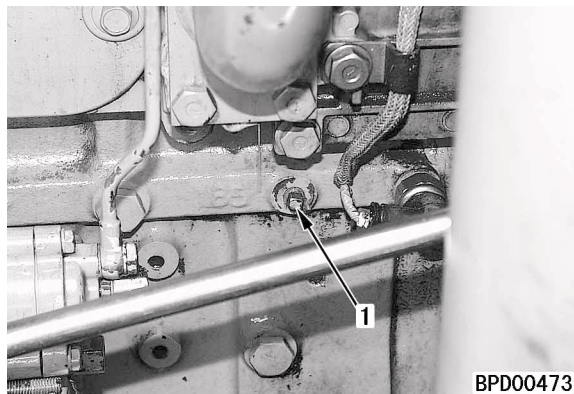
## MEASURING ENGINE OIL PRESSURE

Serial No. 70001 – 75000

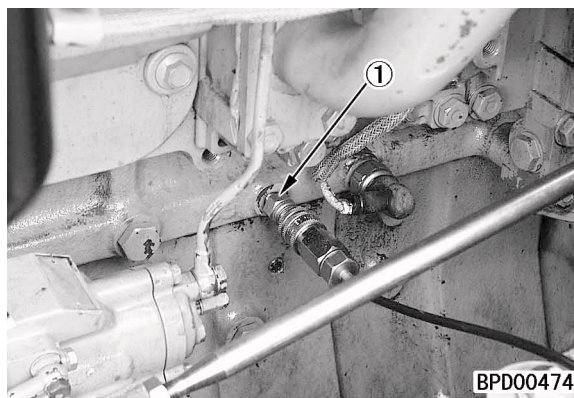
★ Measure the engine oil pressure under the following conditions.

- Coolant temperature: Within operating range

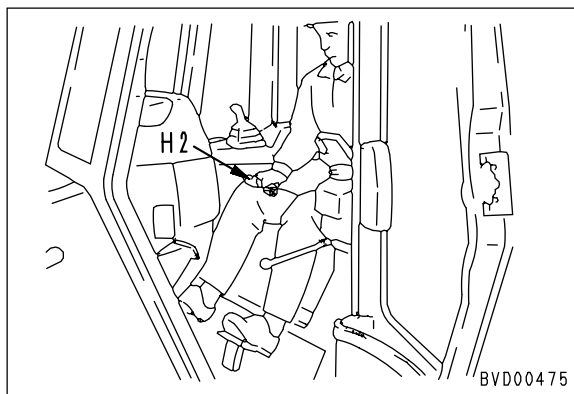
1. Remove engine oil pressure pickup plug (1) (PT1/8).



2. Install nipple ① of oil pressure gauge H1, then connect to oil pressure gauge H2 (0.98MPa {10kg/cm<sup>2</sup>}).



3. Start the engine, and measure the oil pressure with the engine at low idling and high idling.



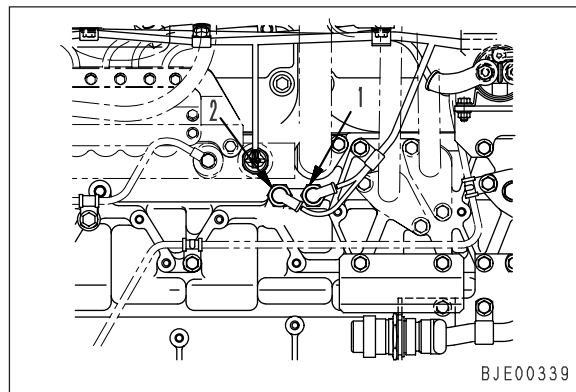


**Serial No. 75001 and up**

- ★ Measure the engine oil pressure under the following condition.
  - Engine water temperature: Within operating range

1. Remove oil pressure low-pressure switch (1) or oil pressure high-pressure switch (2).

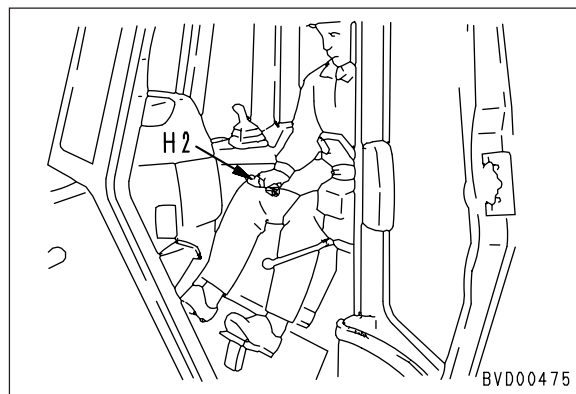
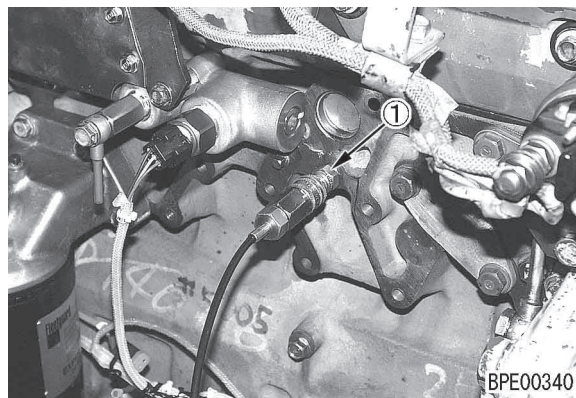
- ★ Wrap the wiring harness of the disconnected switch with tape to prevent it from touching the cylinder block.



2. Install nipple ① of oil pressure gauge **H1** and connect it to the oil pressure gauge **H2** (0.98 MPa {10 kg/cm<sup>2</sup>}).
3. Start the engine and measure the oil pressure when the engine is running at low idling and high idling.
4. After completing the measurement, remove the measurement equipment and set to the original condition.



Oil pressure switch:

**2.9 – 5.9 Nm {0.3 – 0.6 kgm}**

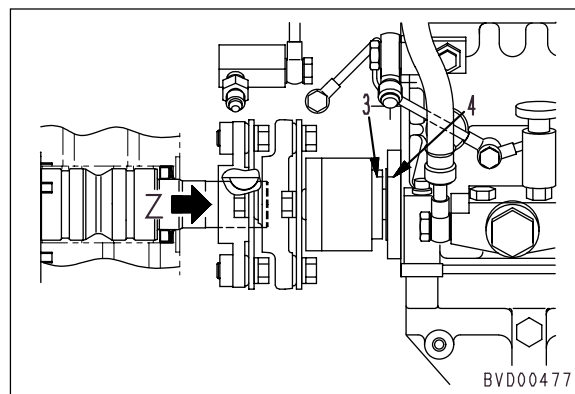
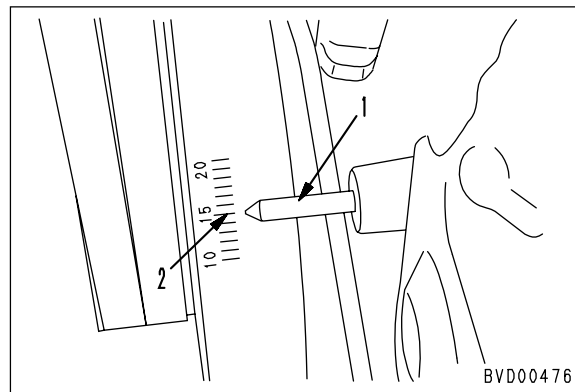


## TESTING AND ADJUSTING FUEL INJECTION TIMING

Serial No. 70001 – 75000

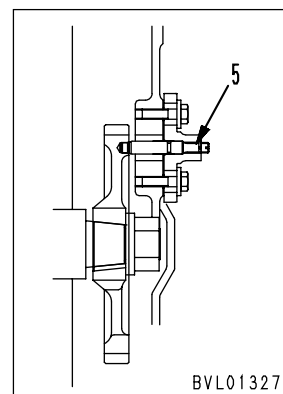
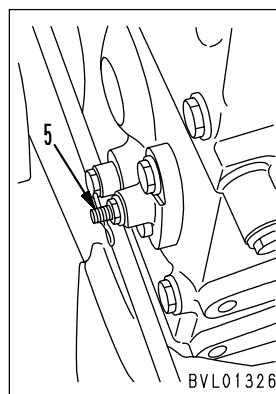
### Testing

1. Rotate the crankshaft in the normal direction and align 15° line (2) on the crankshaft pulley with pointer (1).
  - ★ At this time, check that line (3) on the coupling is near line (4) on the injection pump body. If line (3) on the coupling is not seen, rotate the crankshaft one more turn.
  - ★ Crank the engine with the hexagon shaft of the water pump pulley.
2. Remove the lock pin of timing pin (5) and push in the pin to fix the injection pump drive gear.
  - ★ If the pin does not go in, turn the crankshaft forward or backward a little.
3. Under this condition, check that coupling line (3) is aligned with injection pump line (4).



### Adjusting

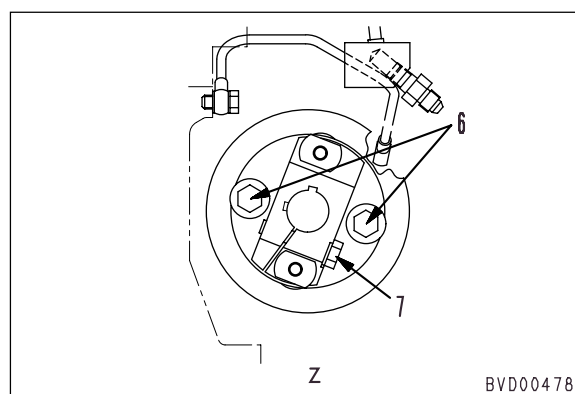
- ★ If the fuel injection timing is not correct, adjust it according to the following procedure.
1. Loosen the two sets of mounting bolt and nut (6) in the oblong holes of the coupling and set bolt (7) to set the coupling free.
  2. Turn the coupling to align coupling line (3) with injection pump line (4).
  3. Tighten set bolt (7) and the two sets of mounting bolt and nut (6).
    - ⚙️ **kgm** Set bolt: **83.8 – 93.1Nm {8.5 – 9.5kgm}**
    - Mounting bolt and nut: **58.5 – 63.7Nm {6.0 – 6.5kgm}**
  4. Pull out the pin of timing pin (5) and secure with the lock pin.



- ★ If the injection pump drive system (crank gear - injection pump shaft) is disassembled and assembled without removing the engine from the machine body, the injection timing must be adjusted accurately from the piston stroke. In this case, see the Engine Shop Manual.

Serial No. 75001 and up

- ★ Since the match mark on the timing gear case is matched to the key way of the supply pump drive shaft, ADJUSTMENT OF FUEL INJECTION TIMMING is not necessary.



## HANDLING EQUIPMENT IN FUEL CIRCUIT

### Serial No. 75001 and up

- ★ Precaution for inspection and maintenance of fuel system

With the common rail type fuel injection system, more precise equipment is used than with the conventional fuel injection pump and nozzle, so problems may occur if dirt or dust get in.

When carrying out installation and maintenance of the fuel system, pay more attention than usual to prevent dirt or dust from getting in. If there is any dirt stuck to any part, use clean fuel to wash it off completely.

- ★ Precautions when replacing fuel filter cartridge  
Always use a genuine Komatsu part for the fuel filter cartridge.

With the common rail type fuel injection system, more precise equipment is used than with the conventional fuel injection pump and nozzle, so a special filter with high efficiency filtering ability is used to prevent dirt or dust from getting in.

For this reason, if any filter is used as a substitute for the genuine filter, there is danger that problems will occur with the fuel system. To prevent this, never use such filters.

## RELEASING REMAINING PRESSURE IN FUEL SYSTEM

### Serial No. 75001 and up


- ★ When the engine is running, pressure is generated in both the low-pressure circuit and high-pressure circuit of the fuel line.

Low-pressure circuit: Feed pump – fuel filter – fuel supply pump

High-pressure circuit: Fuel supply pump – common rail – fuel injector

- ★ For both the low-pressure circuit and high-pressure circuit, the pressure automatically goes down to a safe level 30 seconds after the engine is stopped.

- ★ The remaining pressure in the fuel system must be completely released before carrying out inspection of the fuel system or removal or installation of the equipment. Always follow the following precautions when carrying out the operation.

 When inspecting the fuel line or removing or installing equipment, wait for at least 30 seconds after the engine is stopped to release the remaining pressure in the fuel system before starting the operation. (There is still pressure remaining in the circuit, so do not start operations immediately after the engine is stopped).

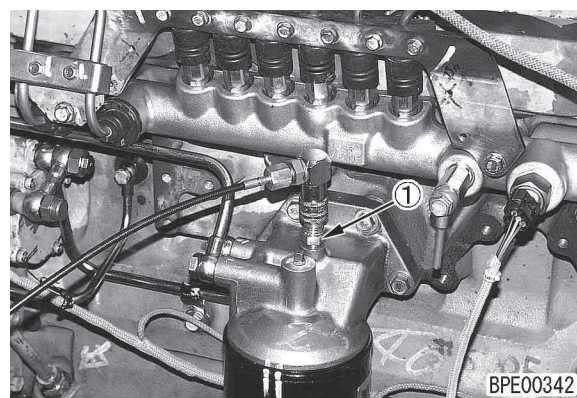
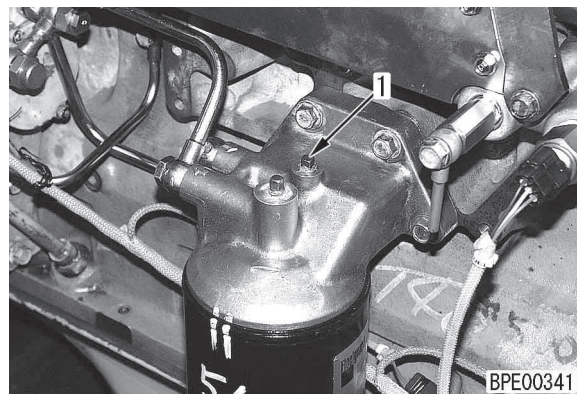
## MEASURING FUEL PRESSURE

Serial No. 75001 and up

★ Measure the fuel pressure only for the low-pressure circuit between the feed pump – fuel filter – fuel supply pump.

⚠ The high-pressure circuit between the fuel supply pump – common rail – fuel injector is under extremely high pressure, so it cannot be measured.

1. Remove fuel pressure measurement plug (1).
2. Fit nipple ① of pressure test kit **A**, then connect to the pressure test kit.
3. Start the engine and measure the fuel pressure at high idling.
4. After completing the measurement, remove the measurement equipment and set to the original condition.



## REDUCED CYLINDER MODE OPERATION

Serial No.: 75001 and up

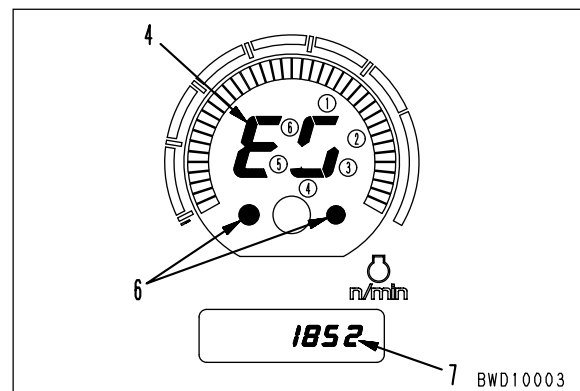
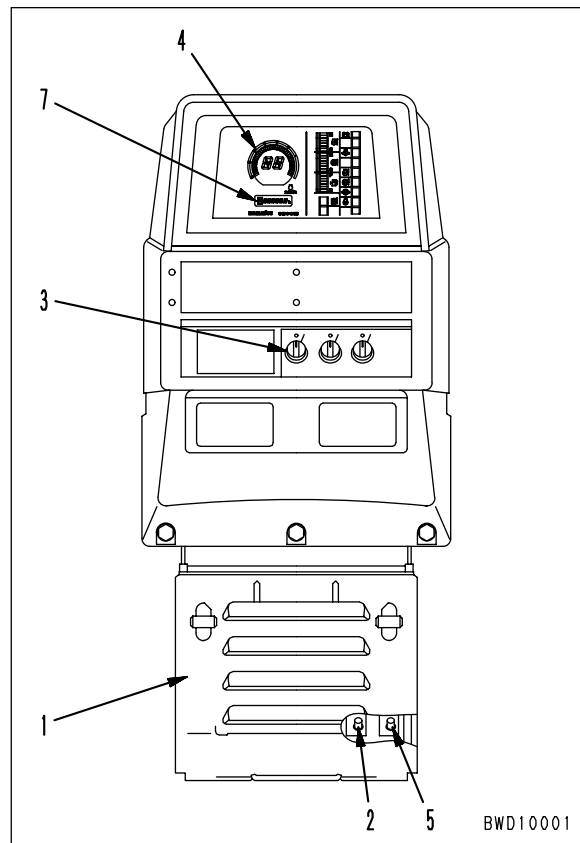
- ★ Reduced cylinder mode operation means to run the engine with 1 or more fuel injectors disabled electrically to reduce the number of effective cylinders. This operation is used to find out a cylinder which does not output power normally (or, combustion in it is abnormal). (For details, see the Engine Shop Manual for the 140-3 Series, too.)
- ★ Perform the reduced cylinder mode operation by using the setting functions of the "reduced cylinder mode" of the monitor panel.  
For details of the functions of the monitor panel, see DISPLAY AND FUNCTIONS OF MONITOR PANEL in TROUBLESHOOTING.

### 1. Selecting of reduced cylinder mode

- 1) Remove cover (1).
- 2) Turn service switch (2) ON.
  - ★ The service switch is installed inside the cover.
- 3) Turn and hold buzzer cancel switch (3) to the right for at least 7 seconds to display the service mode in upper display unit (4).
- 4) Turn up mode selector switch (5) to display the adjustment mode.
  - ★ The mode selector switch is installed inside the cover.
  - ★ Each time the mode selector switch is turned up, the mode changes.
  - ★ If the adjustment mode is selected, round marks (6) on the right and left sides light up.
- 5) Turn buzzer cancel switch (3) to the right to display reduced cylinder mode "E0".

### 2. Method of performing reduced cylinder mode operation

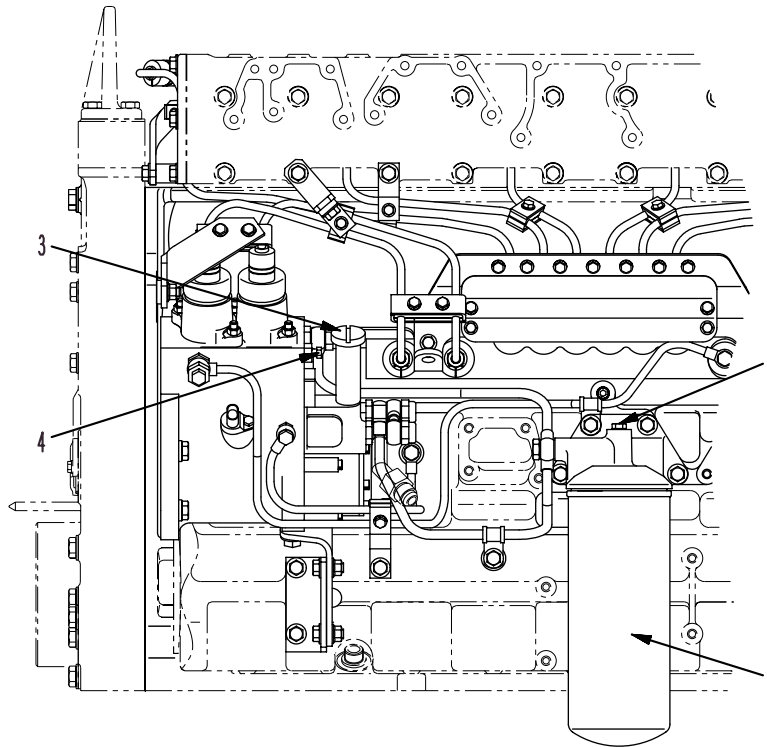
- 1) After adjustment mode "E0" is displayed in gear speed display unit (4), turn buzzer cancel switch (3) to the left to select an injector to be disabled.
  - ★ The flashing bit display unit indicates each injector No.
    - ①: No. 1 injector
    - ②: No. 2 injector
    - ③: No. 3 injector
    - ④: No. 4 injector



- ⑤: No. 5 injector
- ⑥: No. 6 injector
- ★ The injectors are selected in the order of  
① → ② .... ⑥ → ①.
- 2) After selecting 1 or more injectors to be disabled with buzzer cancel switch (3), turn down mode selector switch (5).
  - ★ The flashing speed rises and the selected injector(s) is (are) disabled and the bit display unit goes off.
- 3) To reset (operate) the disabled injector(s), turn down mode selector switch (5) again.
  - ★ The flashing speed becomes normal and the selected injector(s) start(s) operating again.
  - ★ If the system goes out of this mode, the reduced cylinder mode operation is reset.
- 4) Turn OFF service switch (2).
- 5) Install cover (1).


## BLEEDING AIR FROM FUEL SYSTEM


Serial No. 75001 and up



BJE00343

- ★ Bleed the air as follows if the engine has run out of fuel or the fuel circuit equipment has been removed and installed.
1. Remove fuel filter (1), fill with fuel, then install again.
    - ★ When filling, use clean fuel and be careful not to let dirt get in.
    - ★ If clean fuel is not available, do not remove the filter. Operate the priming pump to fill the inside of the filter with fuel.
  2. Remove air bleed plug (2) of the fuel filter and operate priming pump (3).
    - ★ Continue operating the priming pump until fuel flows out from the pump hole. When fuel comes out, install the plug.


 Air bleed plug:  
**7.8 – 9.8 Nm {0.8 – 1.0 kgm}**
  3. Loosen air bleeder (4) of the fuel supply pump and operate priming pump (3) 90 – 100 times.
    - ★ Operate the priming pump until fuel flows out from the bleeder. When the fuel flows out, tighten the bleeder, then operate the priming pump several times until the pump becomes stiff.

 Air bleeder:  
**4.9 – 6.9 Nm {0.5 – 0.7 kgm}**
  4. Crank the engine with the starting motor and start the engine.
    - ★ When the high-pressure circuit is cranked with the engine, the air is automatically bled.
    - ★ If the engine does not start, the air has probably not properly bled from the low-pressure circuit, so repeat the procedure from Step 2.



## CHECK FOR LEAKAGE IN FUEL SYSTEM

Serial No. 75001 and up

-  With the fuel system, the high-pressure circuit is under extremely high pressure, so if fuel leaks when the engine is running, there is danger of fire.  
Check for fuel leakage as follows when checking the fuel circuit or when equipment has been removed and installed.
- ★ To make it easier to check for fuel leakage, wipe the engine itself and the surrounding area clean and remove all oil and grease before starting the inspection.
1. Spray the fuel supply pump, common rail, fuel injector, and high-pressure piping connections with a color checker (developing solution).
  2. Start the engine, run it at under 1000 rpm, and when the speed stabilizes, stop the engine.
  3. Check the fuel piping and equipment for fuel leakage.
    - ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
    - ★ If there is fuel leakage, carry out repairs, then repeat the check from Step 2.
  4. Start the engine and run it at low idling.
  5. Check the fuel piping and equipment for fuel leakage.
    - ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
    - ★ If there is fuel leakage, carry out repairs, then repeat the check from Step 2.
  6. Start the engine and run it at high idling.
  7. Check the fuel piping and equipment for fuel leakage.
    - ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
    - ★ If there is fuel leakage, carry out repairs, then repeat the check from Step 2.
  8. Start the engine, run it at high idling, then apply load to the engine.
    - ★ If this inspection is carried out with the engine mounted on the machine, stall the torque converter or relieve the hydraulic pump.
  9. Check the fuel piping and equipment for fuel leakage.
    - ★ Check the high-pressure circuit for fuel leakage, particularly at the places sprayed with color checker.
    - ★ If there is fuel leakage, carry out repairs, then repeat the check from Step 2.
    - ★ If no fuel leakage is found, the check is complete.

## TESTING AND ADJUSTING ALTERNATOR BELT TENSION

Serial No. 70001 – 75000

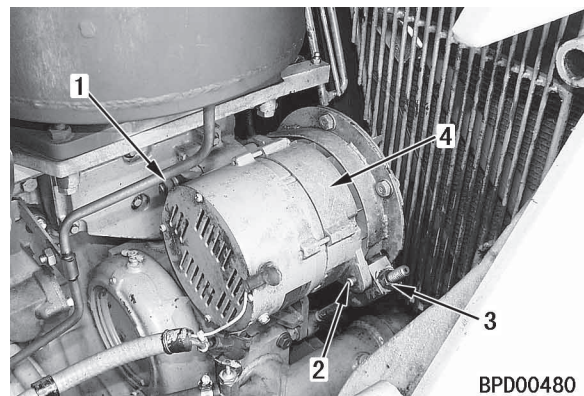
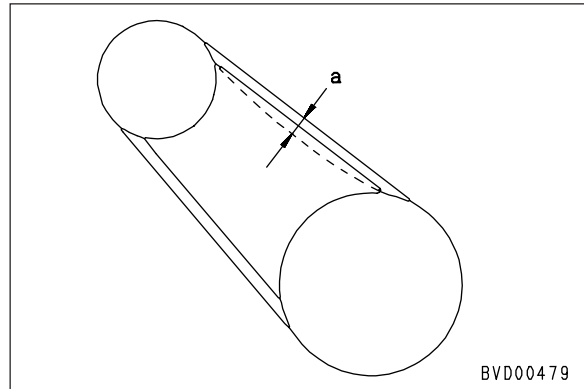
### Testing

- Measure deflection **a** of the belt when it is pushed with a finger force of approx. 58.8 N {approx. 6 kg} at a point midway between the alternator pulley and the water pump pulley. Deflection **a** of V-belt: approx. 15 mm

### Adjusting

- ★ If the deflection of the belt is not normal, adjust it according to the following procedure.

1. Loosen mounting bolt and nut (1), mounting bolt (2) and locknut (3).
2. Turn the adjustment nut and shift alternator (4) to adjust the belt tension.
3. Tighten locknut (3), mounting bolt (2), and mounting bolt and nut (1).



Serial No. 75001 and up

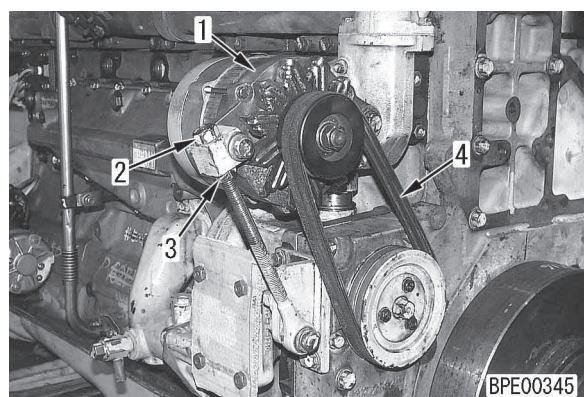
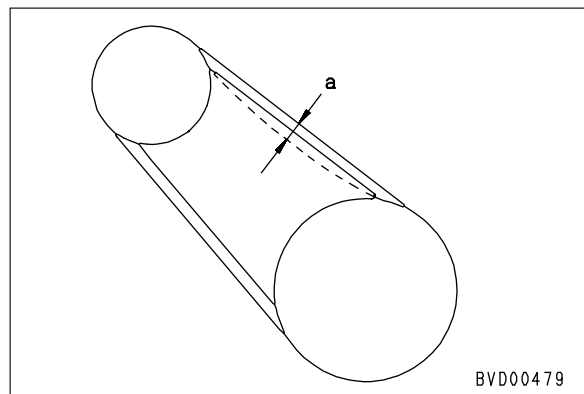
### 1. Inspecting

Measure deflection **a** when the belt is pressed with a finger at a point midway between the alternator pulley and drive pulley.

- ★ Pushing force:  
Approx. 98 Nm {approx. 10 kg}
- ★ Deflection (one belt): 13 – 16 mm

### 2. Adjusting

- ★ This makes a clearance of 0.75 – 1.00 mm between the tip of the sensor and the tip of the gear tooth.
- ★ If the deflection is not within the specified range, adjust as follows.
  - 1) Loosen 2 mounting bolts of alternator (1) and 1 lock bolt of the bar.
  - 2) Loosen locknut (2), move alternator (1) with adjustment nut (3), adjust the tension of belt (4).
- ★ Deflection (one belt): 13 – 16 mm



- 3) Tighten locknut (2).
- 4) Tighten 2 mounting bolts of alternator (1) and 1 lock bolt of the bar.
- ★ After adjusting, check the belt tension again.

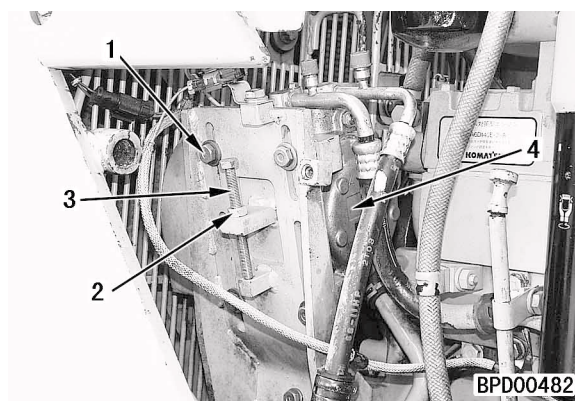
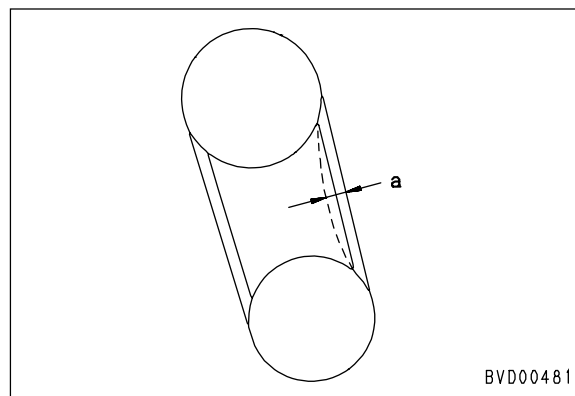
## TESTING AND ADJUSTING AIR CONDITIONER COMPRESSOR BELT TENSION

### Testing

- Measure deflection **a** of the belt when it is pushed with a finger force of approx. 58.8 N {approx. 6 kg} at a point midway between the fan pulley and tension pulley.  
Deflection **a** of V-belt: approx. 10 mm

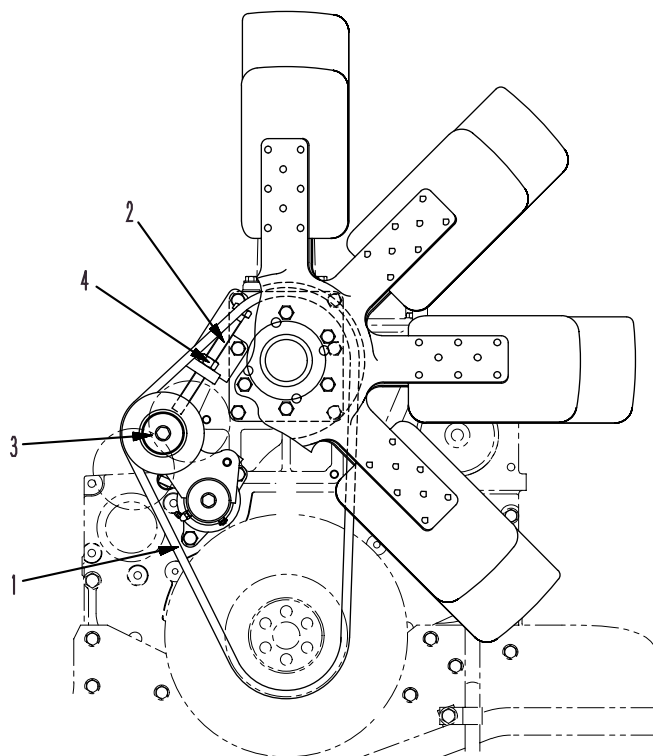
### Adjusting

- ★ If the deflection of the belt is not normal, adjust it according to the following procedure.
1. Loosen four mounting bolts (4) and locknut (2).
  2. Turn adjustment bolt (3) and shift air conditioner compressor assembly (4) to adjust the belt tension.
  3. Tighten locknut (2) and four mounting bolts (1).



## TESTING AND ADJUSTING FUN BELT TENSION

Serial No. 75001 and up



BJE00346

### 1. Inspection

With the semi auto tension type, there is no need to inspect until the belt is replaced.

### 2. Adjusting

1) Install 2 belts (1).

★ Loosen the stopper bolt when installing the belts.

2) Tighten stopper bolt (2) until it contacts bracket (3).

3) Tighten stopper bolt (2) a further 2 turns and hold in position with locknut (4).

 Locknut:

**245.0 – 308.7 Nm {35.0 – 31.5 kgm}**

## ADJUSTING ENGINE SPEED SENSOR

1. Screw in sensor unit (1) until its end comes in contact with ring gear (2).

★ Take care that sensor end will be free from steel chips and will not be damaged.



Threads of sensor:

**Gasket sealant (LG-6)**

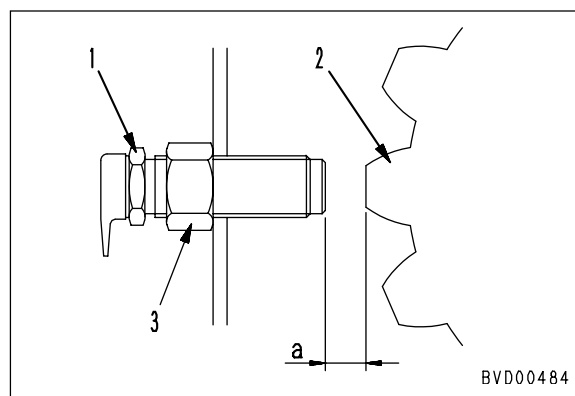
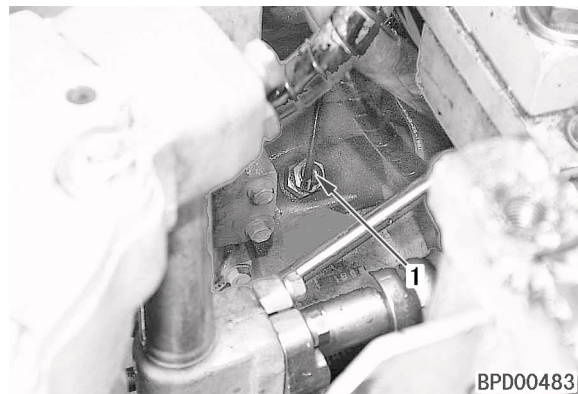
2. Unscrew sensor unit (1) by 1/2 – 2/3 turns from the position where it comes in contact with ring gear (2) to adjust clearance **a**.
  - Clearance a: 0.75 – 1.0mm

3. Tighten locknut (3).



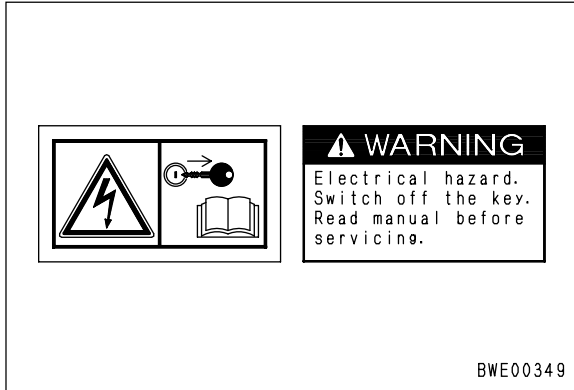
Locknut: **69 – 74Nm {7.0 – 7.5kgm}**

- ★ Install the sensor wiring carefully so that an excessive force will not be applied to it.



## HANDLING CONTROLLER HIGH VOLTAGE CIRCUIT

Serial No. 75001 and up



**⚠** With the controller, a high voltage circuit (110 – 130V) is used for the fuel injector drive. As a result, a high voltage circuit is connected to the wiring harness and connector from the controller to the fuel injector.

★ Normally, high voltage is output from the controller to the fuel injector only when the engine is running. When the engine is stopped, the output stops.

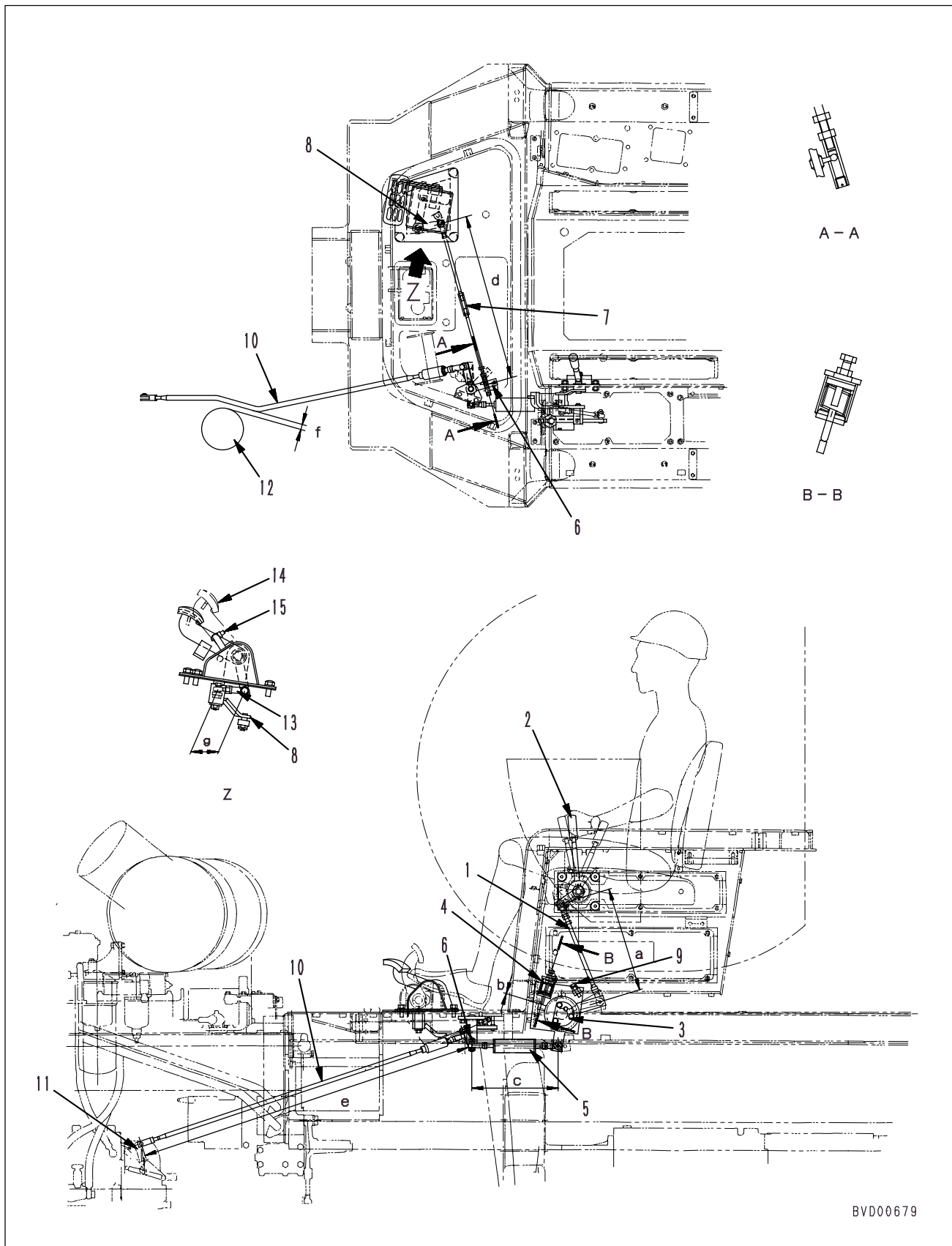
**⚠** If the high voltage circuit is touched directly, there is danger of electrocution, so observe the following precautions when carrying out inspection.

1. The connectors, including these for the high voltage circuit, are as follows.
  - Controller connector: CN6, CN7
  - Intermediate connector: CN-E31, CN-E32, CN-E33, CN-E34, CN-E35, CN-E36
  - Injector connector: IJ1, IJ2, IJ3, IJ4, IJ5, IJ6
  - Terminal at head of injector (inside head cover)
2. When disconnecting or connecting the applicable connector, always turn the starting switch OFF before starting.
3. When a T-adaptor has been inserted or connected to the applicable connector to carry out troubleshooting, never start the engine.
  - ★ If the starting switch is operated, operate it only to OFF or ON. Never turn it to the START position.



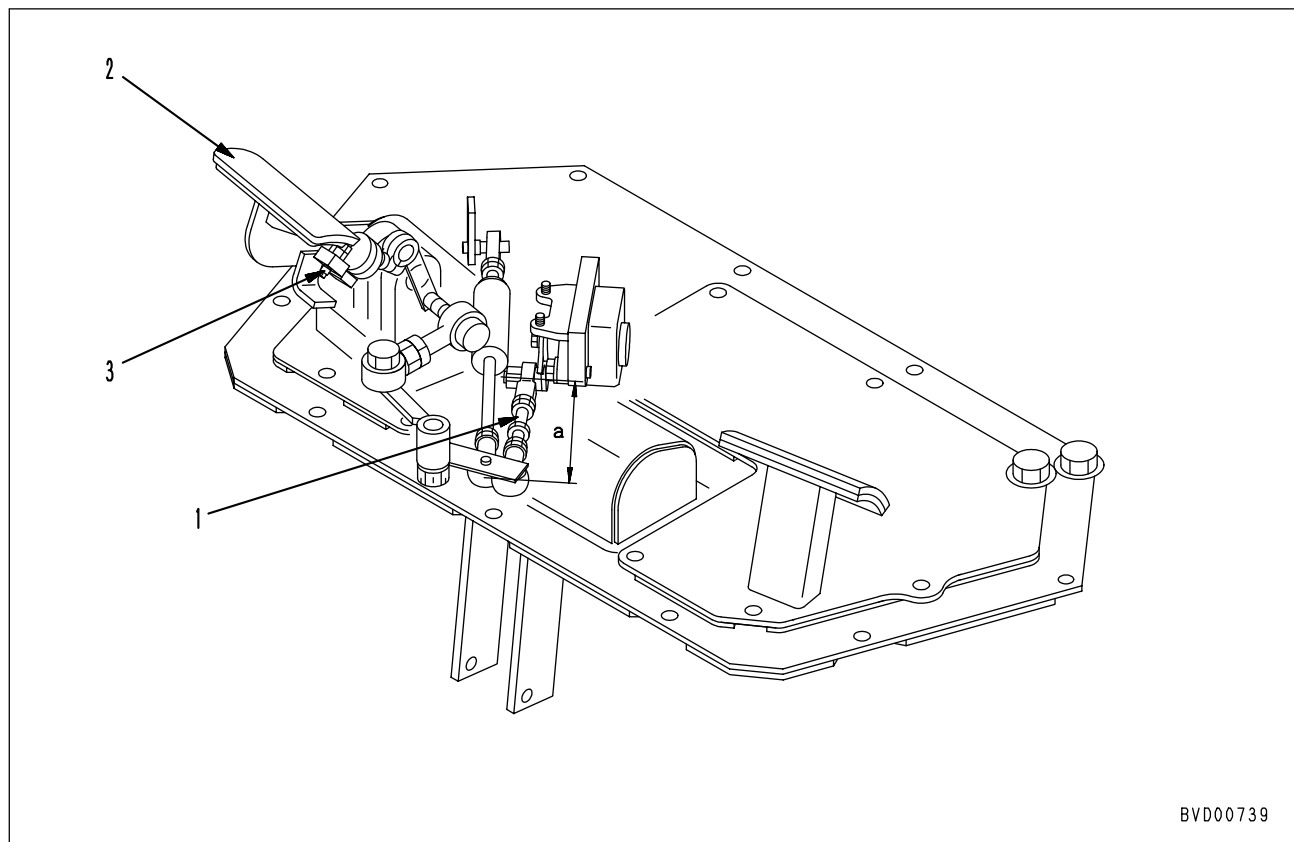
# ADJUSTING FUEL CONTROL LEVER AND DECELERATOR PEDAL

Serial No. 70001 – 75000





Serial No. 75001 and up



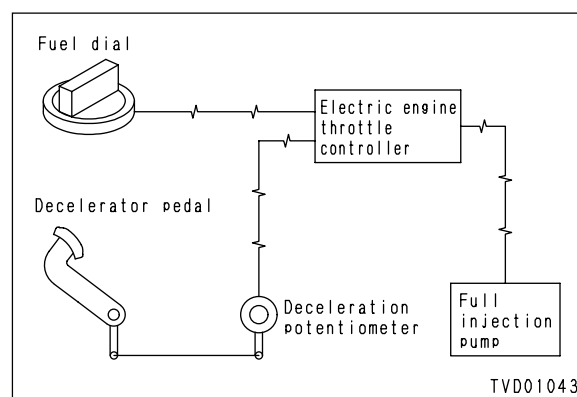
BVD00739

## 1. Outline of fuel control system

- The speed signals from the fuel control dial and the decelerator pedal potentiometers are each input to the engine controller. The engine controller gives priority to the lower speed of the two input signals and sends a command to the fuel injection pump.
- Adjustment of the engine speed is all carried out by the decelerator pedal linkage.

## 2. Preparatory work

- Turn the starting switch on and the monitor panel to monitoring code [99].
  - ★ For details, see MEASURING ENGINE SPEED.
- Start the engine, set the fuel control dial to the FULL position, and check that the engine speed is at least 1000 rpm.
  - ★ If the engine speed is below 1000 rpm, adjust by extending installation dimension *a* of rod (1) to make the engine speed more than 1000 rpm.



TVD01043

**3. Adjusting decelerator pedal speed**

Set the fuel control dial at the high idling position, depress decelerator pedal (2) until it contact the stopper, and check that the decelerator pedal speed is normal.

- Decelerator pedal speed:  $850 \pm 50$  rpm
- ★ If the engine speed is not correct, adjust installation dimension **a** of rod (1).
  - Installation dimension **a**: 122 mm

**4. Adjusting high idling speed**

Set the fuel control dial to the high idling position and check that the high idling speed is correct.

- High idling speed: 2,050 rpm
- ★ If engine speed is too low:  
Adjust the high idling speed with stopper bolt (3).

## MEASURING TORQUE CONVERTER STALL SPEED

Serial No. 70001 – 75000

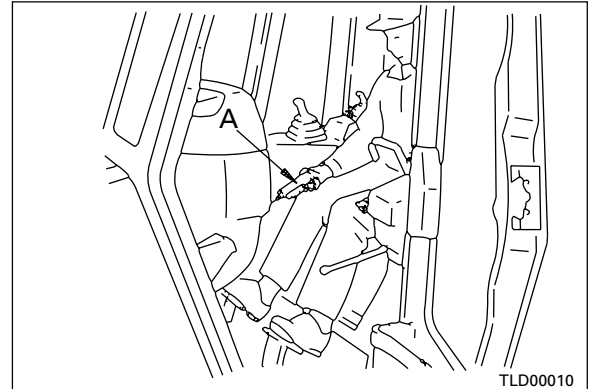
**⚠** When measuring, secure the safety around the machine.

- ★ Measure the torque converter stall speed under the following conditions.
  - Coolant temperature: Within operating range
  - Transmission oil temperature:  
Within operating range
  - Hydraulic temperature: 45 – 55°C

1. Install multi-tachometer **A**.
  - ★ For details, see MEASURING ENGINE SPEED.
2. Start and run the engine at low idling.
3. Depress the brake pedal securely and set the joystick to the third speed and set the directional lever to the forward position.
4. Depress the decelerator pedal and set the fuel control lever to the high idling position.
5. Release the decelerator pedal slowly and stall the torque converter with the engine at high idling.

**⚠** Depress the brake pedal securely and keep your right foot on the decelerator pedal for safety until the work is finished.

6. If the transmission oil thermometer indicates the red range, return the joystick immediately to the neutral position.
7. Repeat above steps 3 through 6 three times.
8. Perform steps 3 through 5 again, and measure the engine speed just when the transmission oil thermometer indicates the red range.
  - ★ After finishing the measurement, return the joystick to the neutral position immediately, then lower the transmission oil temperature with the engine at high idling.



**Serial No. 75001 and up**

- ⚠** Make sure that the area around the machine is safe before starting the operation.
- ★ Measure the torque converter stall speed under the following conditions.
- Coolant temperature: Within operating range
  - Power train oil temperature: Within operating range
  - Hydraulic oil temperature: 45 – 55°C
1. Turn the starting switch ON and set the monitor panel to monitoring code [99].  
★ For details, see MEASURING ENGINE SPEED.
  2. Start the engine and set the fuel control dial to low idling.
  3. Depress the brake pedal firmly, move the full monolever to **3** and the directional lever to **F**.
  4. Depress the decelerator pedal and set the fuel control dial to high idling.
  5. Let the decelerator pedal back slowly, run the engine at high idling, and stall the torque converter.  
**⚠** Depress the brake pedal firmly during operation. For safety reasons, always keep your right foot on the decelerator pedal until the completion of the measurement operation.
  6. When the power train oil temperature gauge enters the red gauge, immediately return the full monolever to neutral.
  7. Repeat Steps **3 – 6** three times.
  8. Repeat Steps **3 – 5** again and measure the engine speed immediately the power train oil temperature gauge enters the red range.  
★ After completion of the measurement, return the full monolever swiftly to neutral, and run the engine at high idling to lower the power train oil temperature.





## MEASURING FULL STALL SPEED

Serial No. 70001 – 75000

**⚠** When measuring, secure the safety around the machine.

★ Measure the full stall speed under the following conditions.

- Coolant temperature: Within operating range
- Transmission oil temperature:  
Within operating range
- Hydraulic temperature: 45 – 55°C

1. Install multi-tachometer **A**.

★ For details, see MEASURING ENGINE SPEED.

2. Start and run the engine at low idling. Raise the ripper lift cylinder to the stroke end.
3. Depress the brake pedal securely and set the joystick to the third speed and set the directional lever to the forward position.
4. Depress the decelerator pedal and set the fuel control lever to the high idling position.
5. Release the decelerator pedal slowly and stall the torque converter with the engine at high idling.

**⚠** Depress the brake pedal securely and keep your right foot on the decelerator pedal for safety until the work is finished.

6. If the transmission oil thermometer indicates the red range, return the joystick immediately to the neutral position.
7. Repeat above steps 3 through 6 three times.
8. Perform steps 3 through 5 again and raise the ripper to relieve its cylinder, and measure the engine speed just when the transmission oil thermometer indicates the red range.
  - ★ After finishing the measurement, return the joystick to the neutral position immediately, then lower the transmission oil temperature with the engine at high idling.



**Serial No. 75001 and up**

**⚠** When measuring, confirm the safety around the machine.

★ Measure the torque converter stall speed under the following condition.

- Engine water temperature: Within operating range
- Power train oil temperature: Within operating range
- Hydraulic oil temperature: 45 – 55°C

1. Turn on the starting switch and set the monitor panel to monitoring code "99".

★ See MEASURING ENGINE SPEED.

2. Start the engine and set the fuel control dial in the low idling position and raise the ripper lift cylinder to the stroke end.

3. Press the brake pedal securely and set the joystick to the 3rd gear speed in the forward direction.

4. Press the decelerator pedal and set the fuel control dial in the high idling position.

5. Return the decelerator pedal slowly to stall the torque converter at high idling.

**⚠** Press the brake pedal securely and keep your right foot on the decelerator pedal for safety until the work is finished.

6. Just after the power train oil temperature gauge reads the red range, return the joystick into neutral.

7. Repeat above steps 3 – 6 3 times.

8. Perform above steps 3 – 5 again and relieve the ripper by raising it or relieve blade by pitching it back and measure the engine speed just when the power train oil temperature gauge reads the red range.

★ After finishing measurement, return the joystick into neutral immediately and lower the power train oil temperature at high idling.

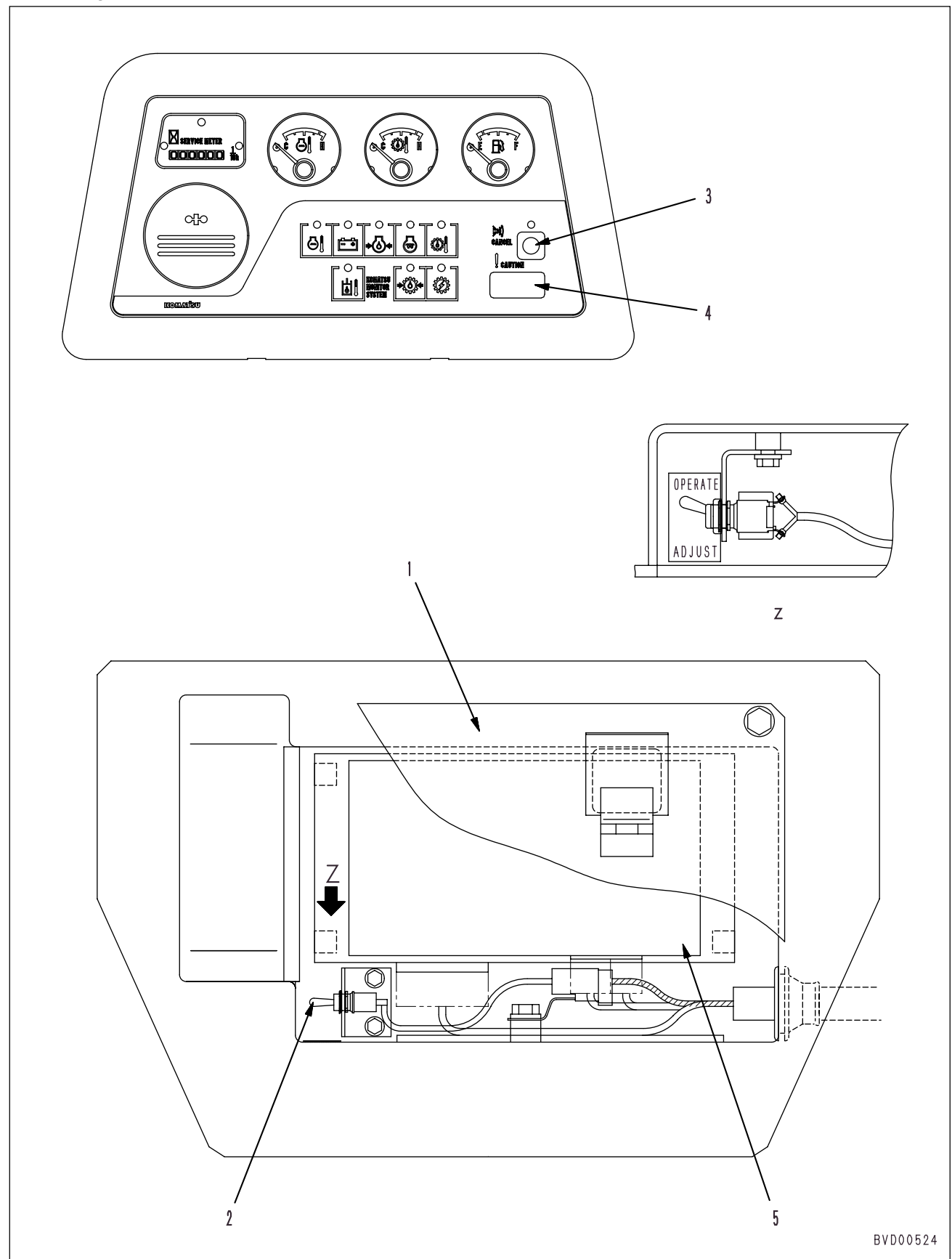






## ADJUSTING STEERING NEUTRAL POSITION

★ The figure shows for serial No. 70001 – 75000.



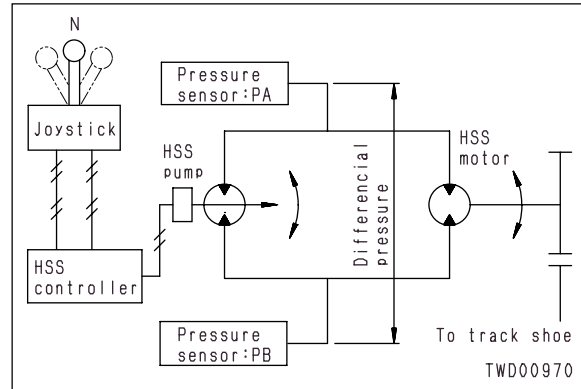
BVD00524

**Serial No. 70001 – 75000**

- ★ If the HSS pump or HSS controller is replaced, adjust the neutral position of the steering system according to the following procedure.

**<Reference> Principle of adjustment of neutral position of steering system**

- If the neutral position of the steering system is not adjusted, even if the joystick is at the neutral position, the HSS pump discharges oil slightly to either PA or PB because of dispersion of the minimum swash plate angle of the HSS pump.
- If the HSS pump discharges oil, the HSS motor rotates to change the speed of the track shoes on both sides. Accordingly, the machine may start or may deviate slightly while traveling straight even if the lever is at the neutral position.
- To prevent the HSS pump from discharging oil while the lever is at the neutral position, the HSS controller controls the current.
- The oil discharging condition of the HSS pump is judged by the differential pressure between two pressure sensors.  
If the HSS pump discharges a large quantity of oil, the differential pressure becomes large. If the former does not discharge oil at all, the latter becomes 0.
- The HSS controller controls the current so that the differential pressure will be kept below 0.98MPa {10kg/cm<sup>2</sup>} to minimize the discharge from the HSS pump when the lever is at the neutral position.

**1. Preparation work**

Lift up the machine body to raise the track shoes above the ground by using the blade and ripper.

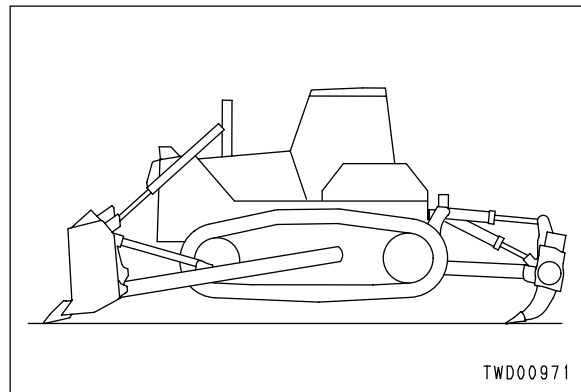
⚠ Set the parking brake lever to the lock position so that the track shoes will not turn while lifting up the machine body.

⚠ If the machine body cannot be lifted up, the work may be performed without lifting it up. In this case, if the engine starts, the machine starts a spin-turn slowly. Secure the safety around the machine.

- ★ After lifting up the machine body, stop the engine.

**2. Setting machine to adjustment mode**

- 1) Remove controller cover (1).

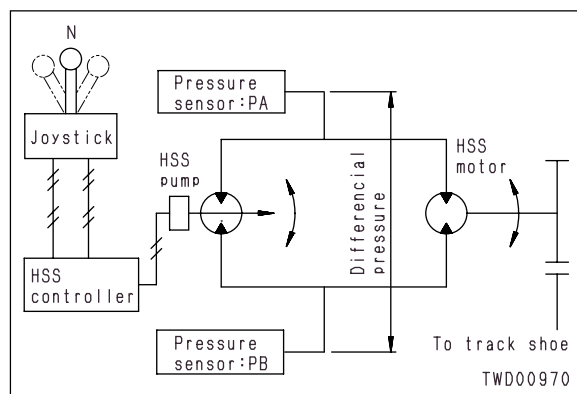


**Serial No. 75001 and up**

- ★ If the HSS pump or HSS controller is replaced, adjust the neutral position of the steering system according to the following procedure.

**<Reference> Principle of adjustment of neutral position of steering system**

- If the neutral position of the steering system is not adjusted, even if the joystick is at the neutral position, the HSS pump discharges oil slightly to either PA or PB because of dispersion of the minimum swash plate angle of the HSS pump.
- If the HSS pump discharges oil, the HSS motor rotates to change the speed of the track shoes on both sides. Accordingly, the machine may start or may deviate slightly while traveling straight even if the lever is at the neutral position.
- To prevent the HSS pump from discharging oil while the lever is at the neutral position, the HSS controller controls the current.
- The oil discharging condition of the HSS pump is judged by the differential pressure between two pressure sensors.  
If the HSS pump discharges a large quantity of oil, the differential pressure becomes large. If the former does not discharge oil at all, the latter becomes 0.
- The HSS controller controls the current so that the differential pressure will be kept below 0.98MPa {10kg/cm<sup>2</sup>} to minimize the discharge from the HSS pump when the lever is at the neutral position.

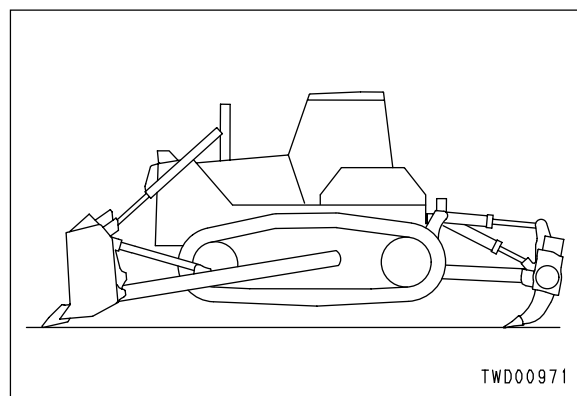
**1. Preparation work**

Lift up the machine body to raise the track shoes above the ground by using the blade and ripper.

⚠ Set the parking brake lever to the lock position so that the track shoes will not turn while lifting up the machine body.

⚠ If the machine body cannot be lifted up, the work may be performed without lifting it up. In this case, if the engine starts, the machine starts a spin-turn slowly. Secure the safety around the machine.

- ★ After lifting up the machine body, stop the engine.

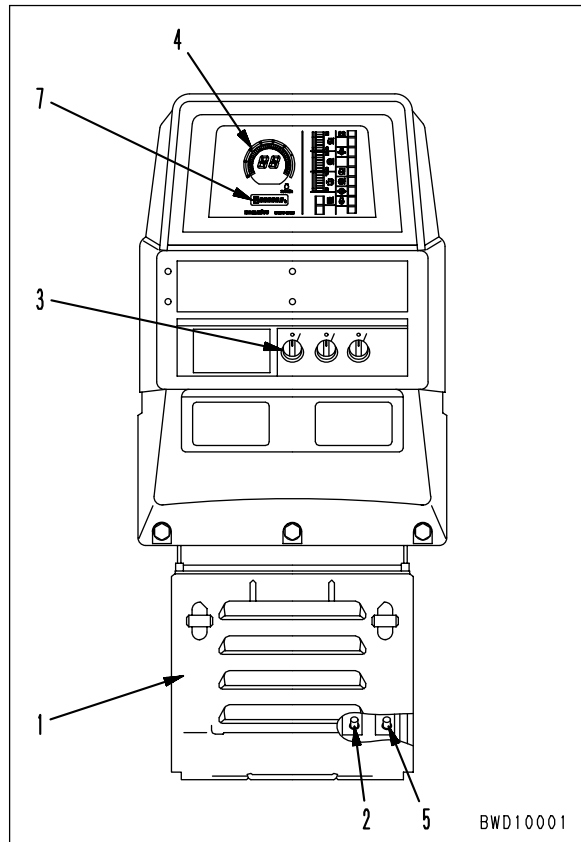


## 2. Selecting HSS neutral adjustment mode

- ★ Adjust the steering system in the monitoring mode and adjusting mode of the monitor panel.

For the general explanation of the monitoring mode and adjusting mode, see DISPLAY AND SPECIAL FUNCTIONS OF MONITOR PANEL in TROUBLESHOOTING.

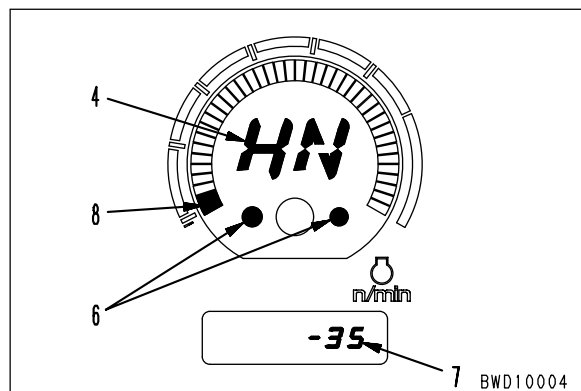
- 1) Remove cover (1).
- 2) Turn starting switch ON.
- 3) Set the engine speed to Hi and turn service switch (2) ON.
  - ★ The service switch is installed inside the cover.
- 4) Turn and hold buzzer cancel switch (3) to the right for at least 7 seconds to display the service mode in upper display unit (4).
- 5) Turn up mode selector switch (5) to display the adjustment mode.
  - ★ The mode selector switch is installed inside the cover.
  - ★ Each time the mode selector switch is turned up, the mode changes.
  - ★ If the adjustment mode is selected, round mark (6) on the right and left side light up.
- 6) Turn buzzer cancel switch (3) to the right to display HSS neutral adjustment mode "HN".



## 3. Operation in HSS neutral adjustment mode

- ★ The differential pressure indicated in this mode is not offset. For confirmation of the differential pressure after adjustment, select "J5" in the monitoring mode (See the display functions in the monitoring mode).

- 1) After adjustment mode "NH" is displayed, turn the steering lever to the left end and return it into neutral and measure value (7) at this time. Similarly, turn the steering lever to the right end and return it into neutral and measure value (7) at this time. Compare these values with each other.



- ★ It can be confirmed that the machine turns in the direction having the larger value.
- 2) Turn the lever in the direction having smaller value (7) and turn buzzer cancel switch (3) to the left.
  - ★ The buzzer makes a pip.
  - ★ The segments of gauge (8) are turned on 1 by 1 and all of them are turned on again when adjustment is finished.
  - ★ The number of segments of the gauge is normally 5 - 7.
- 3) How to clear adjustment value  
Set the control lever in neutral and turn buzzer cancel switch (3) to the left.
  - ★ The buzzer makes a pip.
- 4. How to confirm travel deviation direction**  
How to confirm by movement of track shoe
  - 1) Set the parking brake lever in the free position and check which track shoe moves in reverse to see the travel deviation direction.
    - ★ If the left track shoe moves in reverse, the machine deviates to the left. If the right track shoe moves in reverse, the machine deviates to the right.
  - 2) After confirming the travel deviation direction, lower the machine body to the ground by using the blade and ripper.
- 5. Finishing adjustment mode**
  - 1) Turn service switch (2) OFF.
  - 2) Install cover (1).



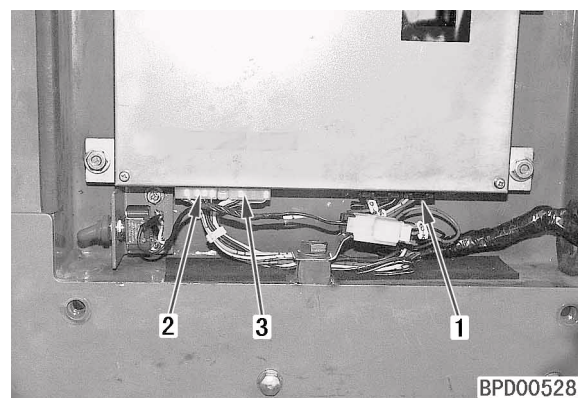
## PROCEDURE FOR OPERATING EMERGENCY STEERING SWITCH

Serial No. 70001 – 75000

- ★ If the machine cannot be steered because of a trouble in the HSS controller or steering potentiometer, it can be moved to a safe place by using the emergency steering switch according to the following procedure.
- ★ Since this switch is for the minimum necessary steering control, use it only for moving to a safe place.

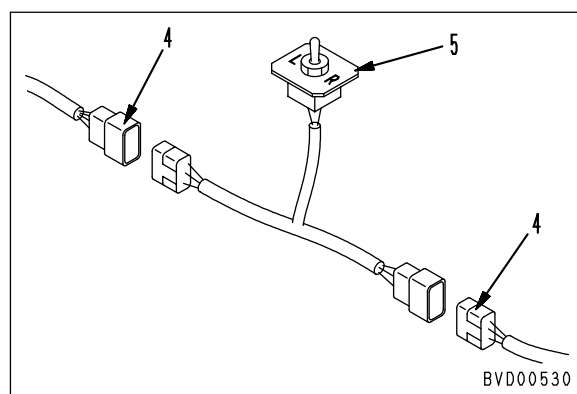
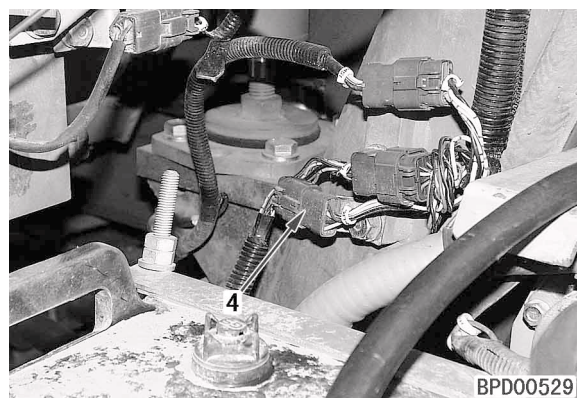
### 1. Condition of machine for using switch

- 1) The machine cannot be steered because of a trouble in the steering potentiometer.
  - ★ The LED of the HSS controller indicates error code [E-62], [E-61], [E-6E], or [E-23].
- 2) The machine cannot be steered because of a trouble in the HSS controller.
  - ★ The LED of the HSS controller indicates error code [E-57] or nothing.
  - ★ If the LED indicates nothing, the electric system of the controller may have trouble. In this case, check the electric system, too.



### 2. Connection method of switch

- 1) Turn off the starting switch.
- 2) Disconnect CN1 connector (1), CN-2H1 connector (2), and CN-2H2 connector (3) from the HSS controller.
- 3) Disconnect CN-LPL connector (4) from the ROPS bracket, then connect the emergency steering switch (5) to the male connector and female connector.



**3. Precautions for using switch**

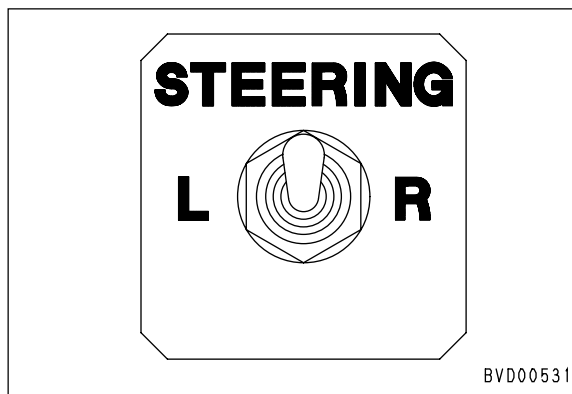
- 1) Before using the switch, insulate it with vinyl tape, etc. to prevent a short circuit between the terminals on its back side and the machine body.
- 2) Since the emergency steering switch allows only ON-OFF operation, unlike the joystick, keep the engine speed as low as possible during operation.

**⚠** If the switch is operated while the engine is running at a high speed, the steering system operates sharply.

- 3) Note that the machine moves inversely to the operation of the switch during reverse travel, unlike when the joystick is used.

★ Operating directions of switch and steering directions

Position	Forward	Reverse
L	Steering to left	Steering to right
R	Steering to right	Steering to left



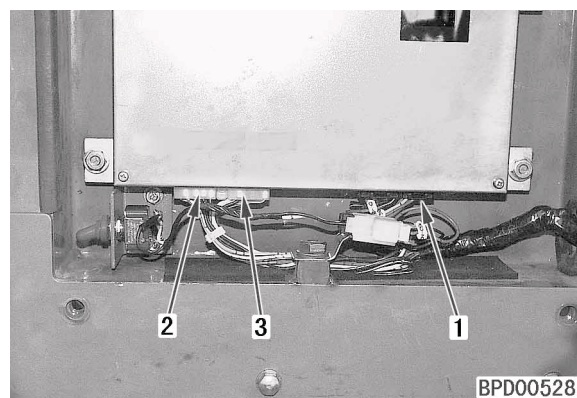


**Serial No. 75001 and up**

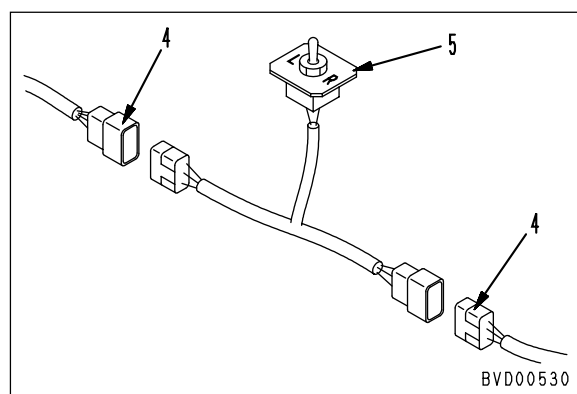
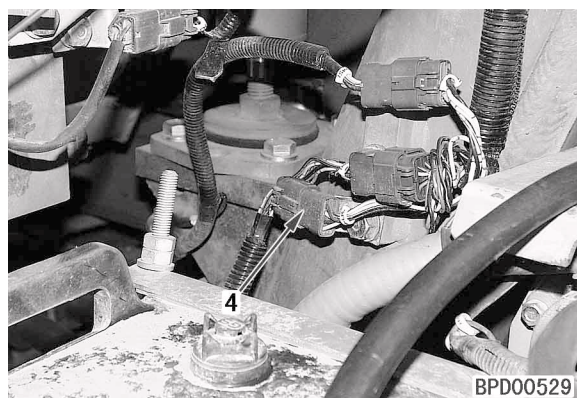
- ★ If the machine cannot be steered because of a trouble in the HSS controller or steering potentiometer, it can be moved to a safe place by using the emergency steering switch according to the following procedure.
- ★ Since this switch is for the minimum necessary steering control, use it only for moving to a safe place.

**1. Condition of machine for using switch**

- 1) The machine cannot be steered because of a trouble in the steering potentiometer.
  - ★ The monitor panel indicates error code [E0730], [E0731], [E0732], [E0733], [E0734], or [E0735].
- 2) The machine cannot be steered because of a trouble in the HSS controller.
  - ★ The monitor panel indicates error code [E0113] or nothing.
  - ★ If the monitor panel indicates nothing, the electric system of the controller may have trouble. In this case, check the electric system, too.

**2. Connection method of switch**

- 1) Turn off the starting switch.
- 2) Disconnect CN-ST1 connector (1), CN-ST3 connector (2), and CN-ST2 connector (3) from the HSS controller.
- 3) Disconnect CN-LPL connector (4) from the ROPS bracket, then connect the emergency steering switch (5) to the male connector and female connector.



**3. Precautions for using switch**

- 1) Before using the switch, insulate it with vinyl tape, etc. to prevent a short circuit between the terminals on its back side and the machine body.
- 2) Since the emergency steering switch allows only ON-OFF operation, unlike the joystick, keep the engine speed as low as possible during operation.

**⚠** If the switch is operated while the engine is running at a high speed, the steering system operates sharply.

- 3) Note that the machine moves inversely to the operation of the switch during reverse travel, unlike when the joystick is used.

★ Operating directions of switch and steering directions

Position	Forward	Reverse
L	Steering to left	Steering to right
R	Steering to right	Steering to left



## ADJUSTING INITIAL CURRENT IN HSS STEERING SYSTEM

### Serial No. 75001 and up

- ★ When the operator steers the machine equipped with the HSS steering system, he (she) may feel the steering condition differently between the steering directions in the initial period of steering. This problem is solved by changing the initial current in the HSS steering system in the adjustment mode.
- ★ Set the rise current freely in the adjustment mode and save the data in the non-volatile ROM.

#### 1. Selecting initial current adjustment mode

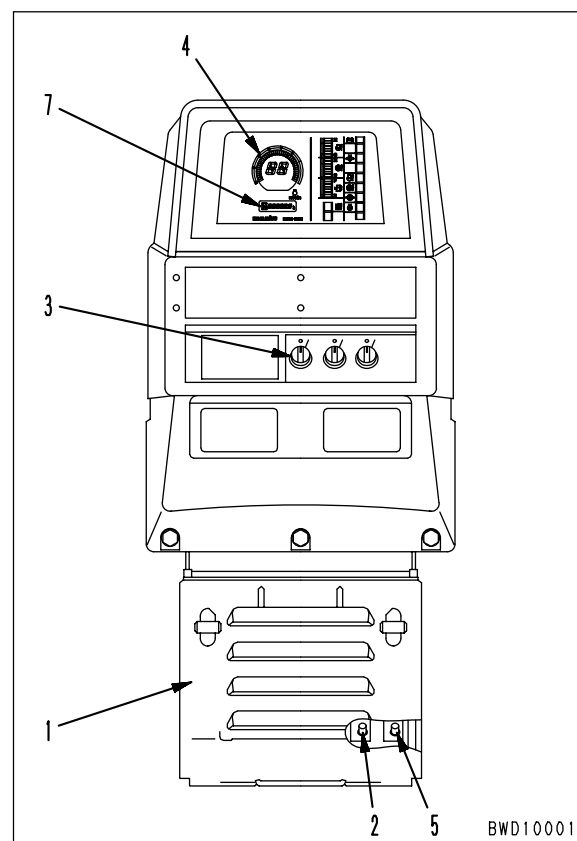
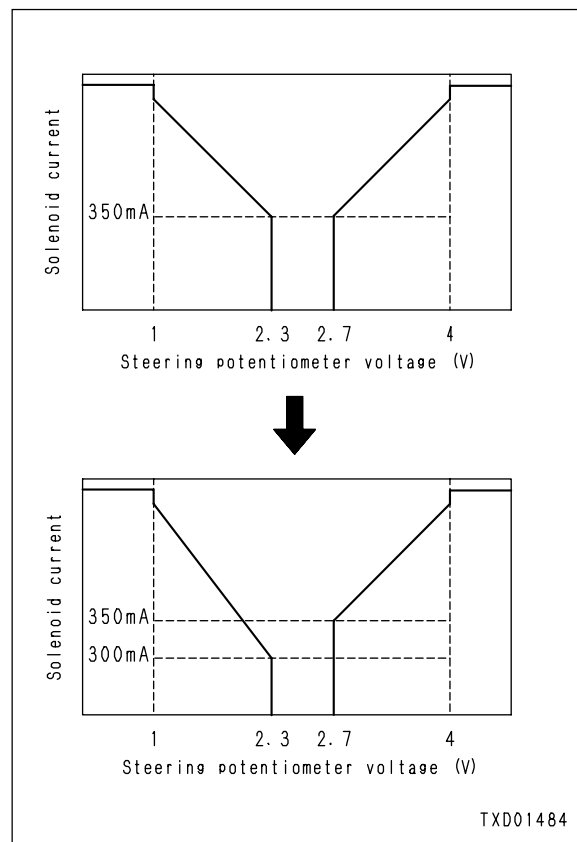
- ★ Adjust the initial current in the monitoring mode and adjusting mode of the monitor panel.

For the general explanation of the monitoring mode and adjusting mode, see DISPLAY AND SPECIAL FUNCTIONS OF MONITOR PANEL in TROUBLESHOOTING.

- 1) Remove cover (1).
- 2) Turn service switch (2) ON.
  - ★ The service switch is installed inside the cover.
- 3) Turn and hold buzzer cancel switch (3) to the right for at least 7 seconds to display the service mode in upper display unit (4).
- 4) Turn up mode selector switch (5) to display the adjustment mode.
  - ★ The mode selector switch is installed inside the cover.
  - ★ Each time the mode selector switch is turned up, the mode changes.
  - ★ If the adjustment mode is selected, round mark (6) on the right and left side light up.
- 5) Turn buzzer cancel switch (3) to the right to display initial current adjustment mode "CC".

#### 2. Operation in initial current adjustment mode

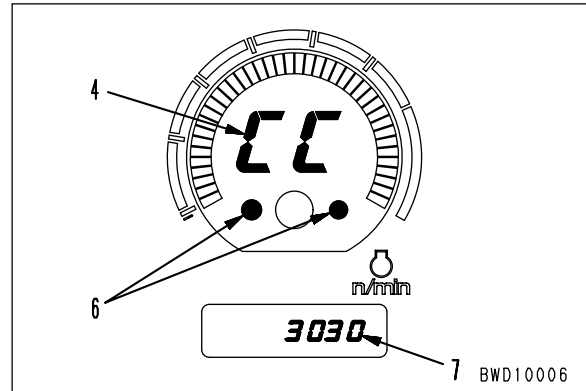
- 1) After adjustment mode "CC" is displayed, turn the lever in the direction to change the initial current.
- 2) Lever current (7) in mV is displayed.



- ★ Neutral value: Approx. 2,500 mV
- 3) After the target current is obtained, turn buzzer cancel switch (3) to the right to save the value.
- ★ The buzzer makes a pip.

### 3. Finishing adjustment mode

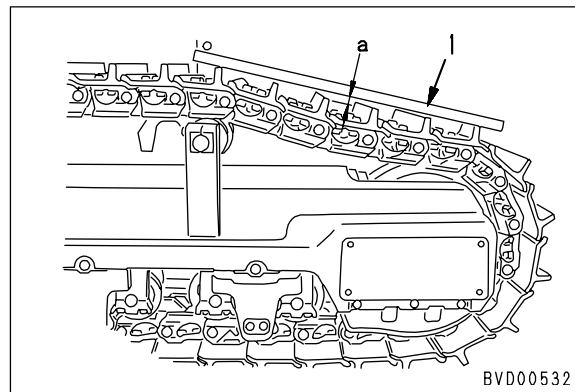
- 1) Turn service switch (2) OFF.
- 2) Install cover (1).



## TESTING AND ADJUSTING TRACK SHOE TENSION

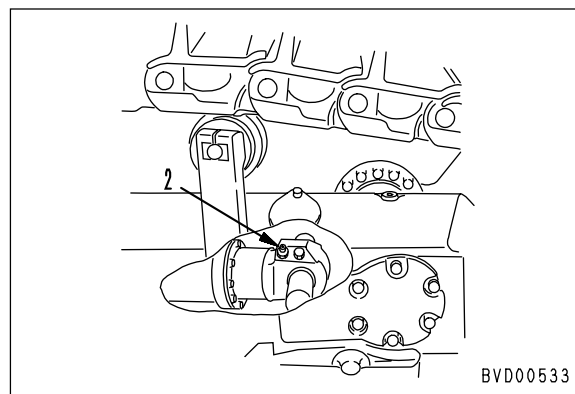
### Testing

1. Drive the machine forward on a level ground, then stop it.
  - ★ Do not apply the brake when stopping the machine.
2. Place a straight steel bar (1) between the idler and carrier roller, and measure clearance *a* between the bottom of the steel bar and grouser of the track shoe.
  - Standard clearance *a*: 20 – 30mm



### Adjusting

- ★ If the track shoe tension is abnormal, adjust it according to the following procedure.
1. When tension is too high  
Loosen valve (2) to discharge grease.
    - ⚠ Since the valve may jump out because of the internal grease at high pressure, do not loosen it more than one turn.
  2. When tension is low  
Supply grease through valve (2).
    - ★ If the track shoe is not tensed well, slowly move the machine forward and backward.
- ★ After adjusting the tension, check it again according to the testing procedure shown above.

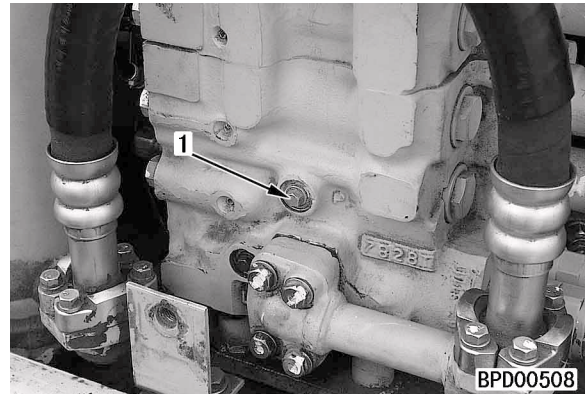


## TESTING AND ADJUSTING HYDRAULIC PRESSURE

### Measuring

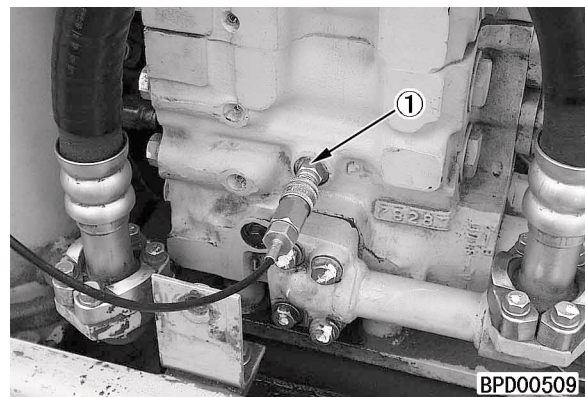
**⚠** Stop the machine on level ground and lower the work equipment completely to the ground, then set the parking brake lever and safety lever to the respective lock positions.

- ★ Measure the hydraulic pressure under the following conditions.
  - Hydraulic temperature: 45 – 55°C

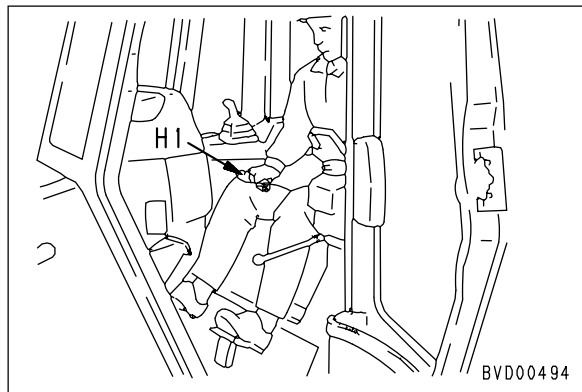


### 1. Measuring main relief pressure

- 1) Remove the control valve cover.
  - 2) Remove oil pressure pickup plug (1) (10 x 1.25).
  - 3) Install nipple (1) of oil pressure gauge **H1** (58.8MPa {600kg/cm<sup>2</sup>}), and connect oil pressure gauge **H1**.
    - ★ The work equipment oil pressure can be measured in monitoring mode "HA". (See DISPLAY AND SPECIAL FUNCTIONS OF MONITOR PANEL.)
- Serial No.: 75001 and up

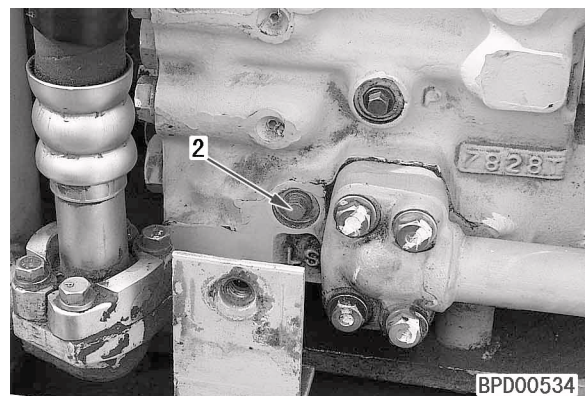


- 4) Start the engine and set the safety lever to the free position.
- 5) Run the engine at high idling, and operate the blade lever and ripper lever to relief each cylinder at the stroke end, and measure the oil pressure at this time.



### 2. Measuring load sensing pressure







- 1) Remove the control valve cover.
- 2) Remove oil pressure pickup plug (2) (10 x 1.25).



# TROUBLESHOOTING

Points to remember when troubleshooting .....	20-202
Sequence of events in troubleshooting .....	20-203
Points to remember when carrying out maintenance .....	20-204
Checks before troubleshooting .....	20-212
Type of connector and position of installation .....	20-214
Connection table for connector pin numbers .....	20-220
Function of electronic control system .....	20-230
Display of HSS controller .....	20-232
Display and special functions of monitor panel .....	20-235-1
How to read judgment table .....	20-236
Judgment table for engine system, hydraulic and mechanical system, and electrical system ....	20-238
Method of using troubleshooting charts .....	20-240
Troubleshooting of network system (N mode) .....	20-251
Troubleshooting of engine system (S mode) .....	20-301
Troubleshooting of HSS controller and electrical system (E mode) (Serial No. 70001 – 75000) .....	20-401
Troubleshooting of hydraulic and mechanical system (H mode) .....	20-501
Troubleshooting of monitor system (M mode) (Serial No. 70001 – 75000) .....	20-601
Troubleshooting of monitor system (M mode) (Serial No. 75001 and up) .....	20-701
Troubleshooting of engine controller system (G mode) .....	20-801
Troubleshooting of HSS controller and electrical system (E mode) (Serial No. 75001 and up) .....	20-901

## POINTS TO REMEMBER WHEN TROUBLESHOOTING

-  Stop the machine in a level place, and check that the safety pin, blocks, and parking brake are securely fitted.
-  When carrying out the operation with two or more workers, keep strictly to the agreed signals, and do not allow any unauthorized person to come near.
-  If the radiator cap is removed when the engine is hot, hot water may spurt out and cause burns, so wait for the engine to cool down before starting troubleshooting.
-  Be extremely careful not to touch any hot parts or to get caught in any rotating parts.
-  When disconnecting wiring, always disconnect the negative (–) terminal of the battery first.
-  When removing the plug or cap from a location which is under pressure from oil, water, or air, always release the internal pressure first. When installing measuring equipment, be sure to connect it properly.

The aim of troubleshooting is to pinpoint the basic cause of the failure, to carry out repairs swiftly, and to prevent reoccurrence of the failure.

When carrying out troubleshooting, an important point is of course to understand the structure and function. However, a short cut to effective troubleshooting is to ask the operator various questions to form some idea of possible causes of the failure that would produce the reported symptoms.

1. When carrying out troubleshooting, do not hurry to disassemble the components.  
If components are disassembled immediately any failure occurs:
  - Parts that have no connection with the failure or other unnecessary parts will be disassembled.
  - It will become impossible to find the cause of the failure.

It will also cause a waste of manhours, parts, or oil or grease, and at the same time, will also lose the confidence of the user or operator.

For this reason, when carrying out troubleshooting, it is necessary to carry out thorough prior investigation and to carry out troubleshooting in accordance with the fixed procedure.
2. Points to ask user or operator
  - 1) Have any other problems occurred apart from the problem that has been reported?
  - 2) Was there anything strange about the machine before the failure occurred?
  - 3) Did the failure occur suddenly, or were there problems with the machine condition before this?
  - 4) Under what conditions did the failure occur?
  - 5) Had any repairs been carried out before the failure?  
When were these repairs carried out?
  - 6) Has the same kind of failure occurred before?
3. Check before troubleshooting
  - 1) Check for symptoms of any abnormality in the machine.
  - 2) Check the CHECKS BEFORE STARTING items.
  - 3) Other inspection items.
  - 4) Other maintenance items can be checked externally, so check any item that is considered to be necessary.
4. Confirming failure  
Confirm the extent of the failure yourself, and judge whether to handle it as a real failure or as a problem with the method of operation, etc.
  - ★ When operating the machine to reenact the troubleshooting symptoms, do not carry out any investigation or measurement that may make the problem worse.
5. Troubleshooting  
Use the results of the investigation and inspection in Items 2 – 4 to narrow down the causes of failure, then use the troubleshooting flowchart to locate the position of the failure exactly.
  - ★ The basic procedure for troubleshooting is as follows.
    - 1) Start from the simple points.
    - 2) Start from the most likely points.
    - 3) Investigate other related parts or information.
6. Measures to remove root cause of failure  
Even if the failure is repaired, if the root cause of the failure is not repaired, the same failure will occur again.  
To prevent this, always investigate why the problem occurred. Then, remove the root cause.



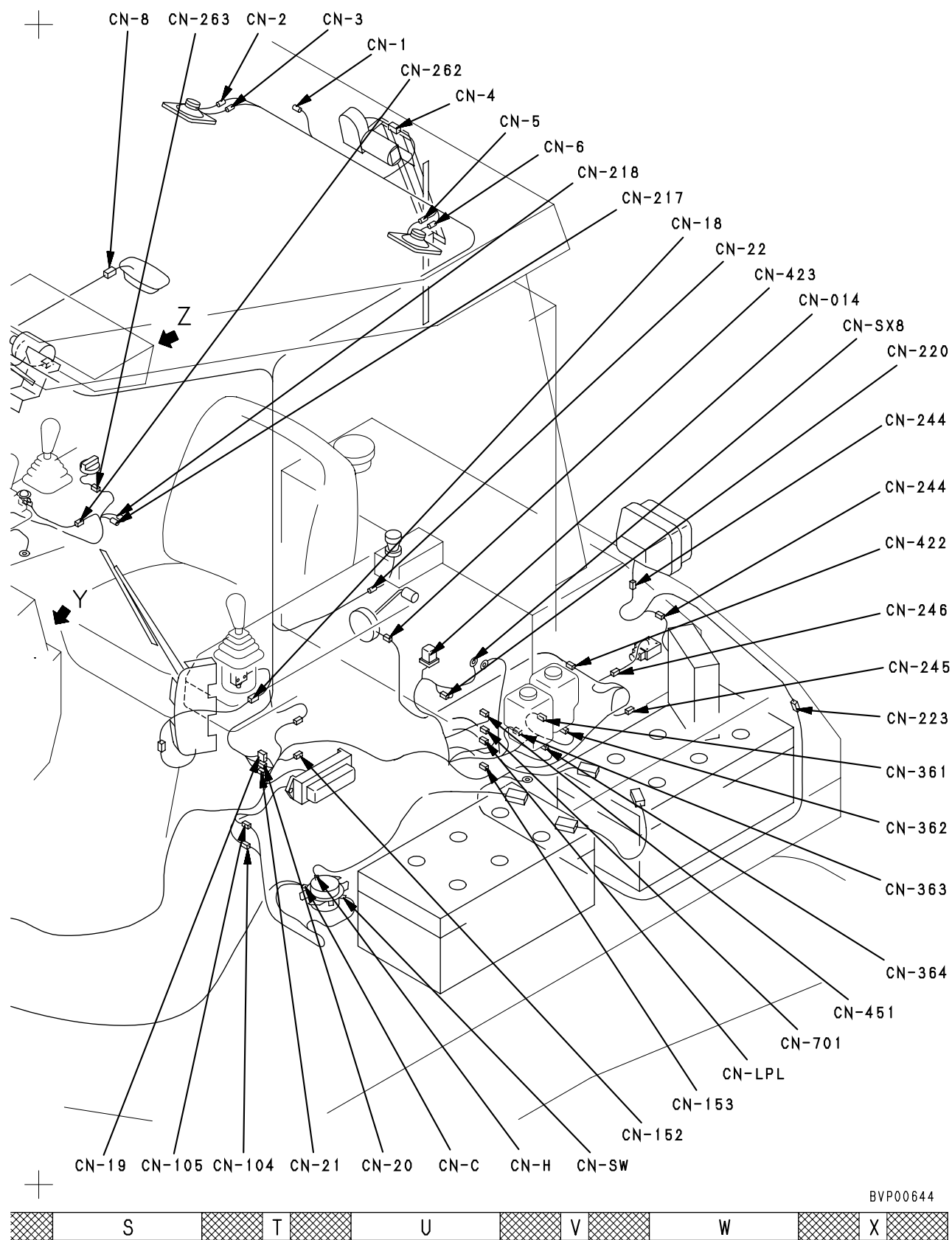


## TYPE OF CONNECTOR AND POSITION OF INSTALLATION

Serial No. 70001 – 75000

Connector No.	Connector type	No. of pins	Place of use	Address
CN-1	MIC	21	HSS controller	V-8
CN-1	Single pin connector	1	Additional lamp connector	U-9
CN-2	Single pin connector	1	Rear speaker (Right)	T-9
CN-3	Single pin connector	1	Rear speaker (Right)	T-9
CN-4		4	Rear wiper motor	U-9
CN-5	Single pin connector	1	Rear speaker (Left)	V-9
CN-6	Single pin connector	1	Rear speaker (Left)	V-8
CN-7	Single pin connector	1	Additional lamp connector	Q-8
CN-8	Single pin connector	1	Room lamp	S-9
CN-9		6	Front wiper motor	Q-8
CN-10		9	Radio	M-2
CN-11		6	Left wiper switch	M-2
CN-12		6	Front wiper switch	N-3
CN-13		6	Right wiper switch	N-3
CN-14		6	Rear wiper switch	N-3
CN-15		2	Cab front lamp switch	O-3
CN-16		2	Cab rear lamp switch	O-3
CN-17		4	Intermediate connector	P-5
CN-18		4	Intermediate connector	X-7
CN-19		4	Intermediate connector	S-1
CN-20	Single pin connector	1	Intermediate connector	S-1
CN-21	Single pin connector	1	Intermediate connector	T-1
CN-22	Single pin connector	1	Cigarette lighter	W-7
CN-101	SWP	12	Intermediate connector	H-2 P-3
CN-103	X	2	Starting motor terminal R/S	C-1
CN-104	M	2	Intermediate connector	T-1
CN-105	X	2	Intermediate connector	T-1
CN-106	—	1	Starting motor terminal B	E-8
CN-107	—	1	Heater relay terminal A	A-9
CN-108	—	1	Heater relay terminal B	C-8
CN-109	—	1	Heater relay terminal C	A-9
CN-110	Single pin connector	1	Intermediate connector	D-7

Connector No.	Connector type	No. of pins	Place of use	Address
CN-111	—	1	Alternator terminal B	B-2
CN-112	—	1	Alternator terminal R	C-2
CN-152	X	3	Neutral safety switch	V-1
CN-153	SWP	6	Intermediate connector	L-5 W-2
CN-201	X	1	Intermediate connector	D-1
CN-203	M	1	Right head lamp	C-7
CN-204	M	1	Left head lamp	B-4
CN-205	Single pin connector	1	Horn	B-6
CN-206	—	1	Chassis ground	M-5
CN-211	KES	4	Rear lamp switch	P-7
CN-212	KES	3	Bimetal timer	N-4
CN-213	KES	4	Glow switch	P-7
CN-214	SWP	16	Intermediate connector	M-6 Q-1
CN-215	S	8	Intermediate connector	M-6 P-2
CN-216	KES	4	Head lamp switch	P-6
CN-217	M	2	Monitor alarm	P-7
CN-217	Single pin connector	1	Alarm buzzer spare connector	V-8
CN-218	Single pin connector	1	Alarm buzzer spare connector	V-9
CN-220	M	2	Diode (For starting circuit)	X-6
CN-223	X	2	Intermediate connector	X-4
CN-224	X	1	Rear lamp	X-6
CN-243	X	1	Ripper lamp	I-9
CN-244	Single pin connector	1	Backup alarm	X-5
CN-245	X	2	Intermediate connector	L-6 X-4
CN-246	X	2	Ripper pin-puller solenoid valve	X-5
CN-248	X	1	Ripper pin lamp	L-8
CN-250	—	1	Starting switch terminal B	—
CN-251	X	3	Backup alarm switch	L-4
CN-260	—	1	Starting switch terminal BR	—
CN-262	X	2	Intermediate connector	V-9
CN-263	X	2	Ripper pin-puller switch	S-9
CN-264	SWP	6	Intermediate connector	Q-7



**Serial No.: 75001 and up**

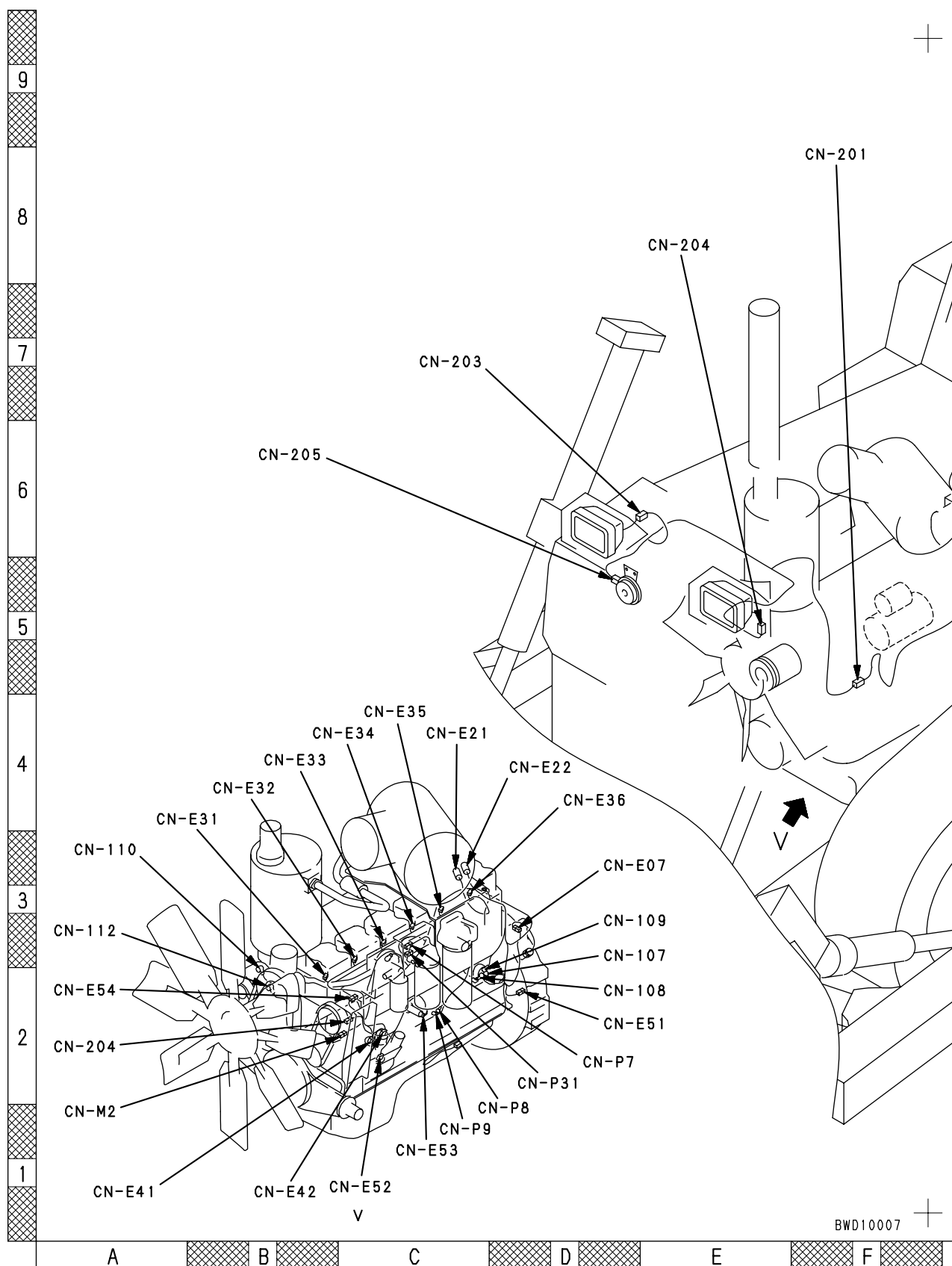
★ The addresses in the following table refer to the locations of the connectors in the actual view drawing.

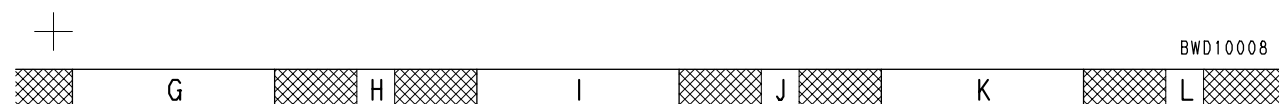
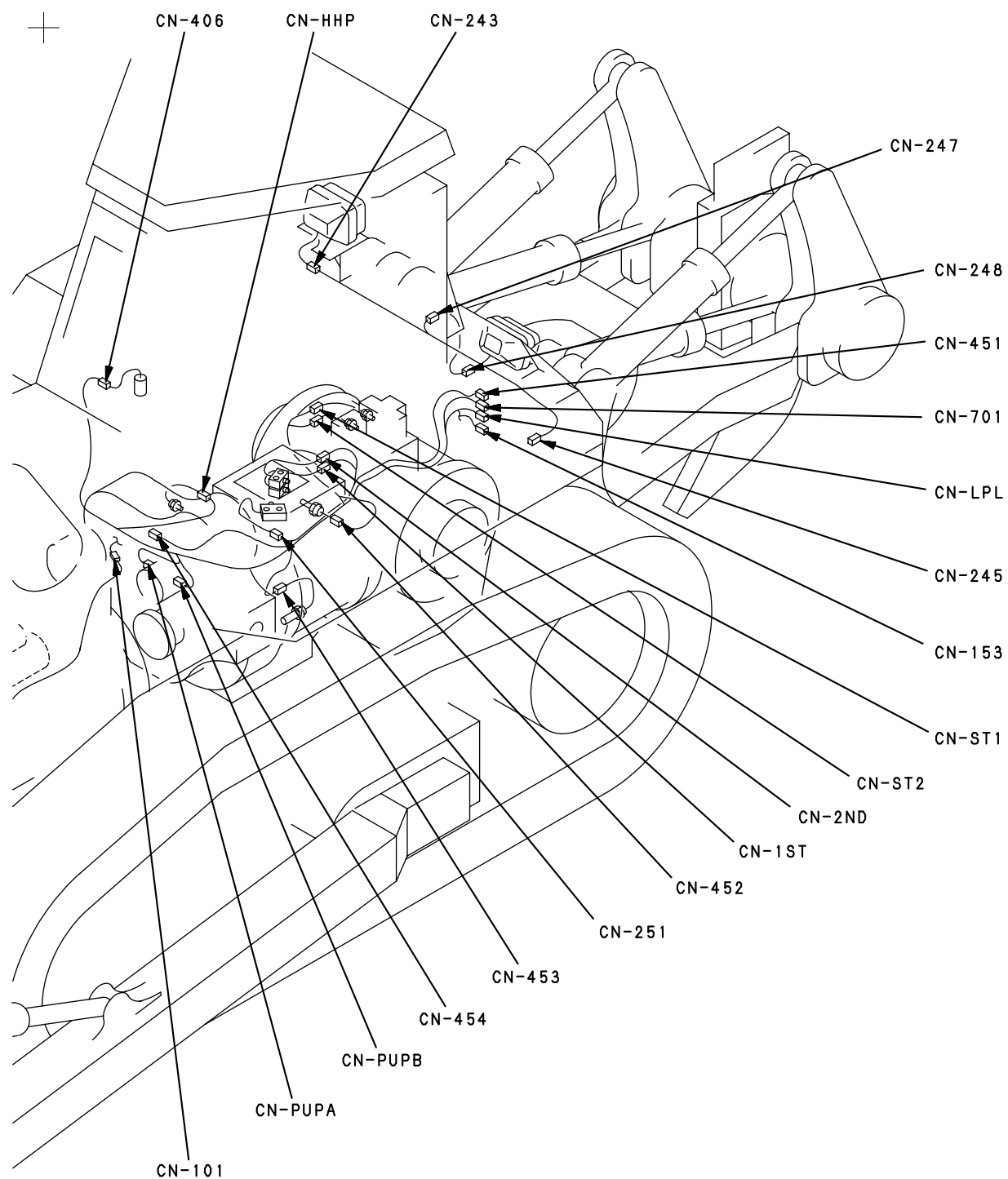
Connector No.	Connector type	No. of pins	Place of use	Address
CN-014	R	5	Backup alarm relay	X-7
CN1	AMP	5	Monitor panel	O-9
CN-1	—	12	Engine controller	N-1
CN-1	1-pin connector	1	Connector for additional lamp	U-9
CN-10	—	9	Radio	M-4
CN-101	X	4	Intermediate connector	G-2
CN-104	L	2	Intermediate connector	T-1
CN-105	X	2	Intermediate connector	U-1
CN-106	—	1	Starting motor terminal B	P-1
CN-107	—	1	Heater relay terminal A	D-3
CN-108	—	1	Heater relay terminal B	D-2
CN-109	—	1	Heater relay terminal C	D-3
CN-11	KES	6	wiper switch	M-4
CN-110	—	1	Alternator terminal B	A-3
CN-112	—	1	Alternator terminal R	A-3
CN-12	KES	6	Front wiper switch	M-4
CN-13	KES	6	Right wiper switch	N-4
CN-14	KES	6	Rear wiper switch	N-4
CN-15	M	2	Cab front lamp switch	N-4
CN-152	DT	3	Transmission lock switch	X-3
CN-153	DT	12	Intermediate connector	L-5
CN-16	M	2	Cab rear lamp switch	O-4
CN-17	KES	4	Right door wiper motor	P-5
CN-18	KES	4	Left door wiper motor	W-8
CN-19	M	4	For washer	U-1
CN-1ST	DT	3	Gear speed switch 1	K-4
CN2	AMP	8	Monitor panel	N-9
CN-2	—	8	Engine controller	O-1
CN-2	1-pin connector	1	Rear speaker (Right)	T-9
CN-20	DT	1	Intermediate connector	T-1
CN-201	X	4	Intermediate connector	F-8
CN-203	M	1	Right headlamp	C-7
CN-204	M	1	Left headlamp	E-8
CN-204	X	1	Air conditioner compressor	A-2
CN-205	1-pin connector	1	Horn	B-6

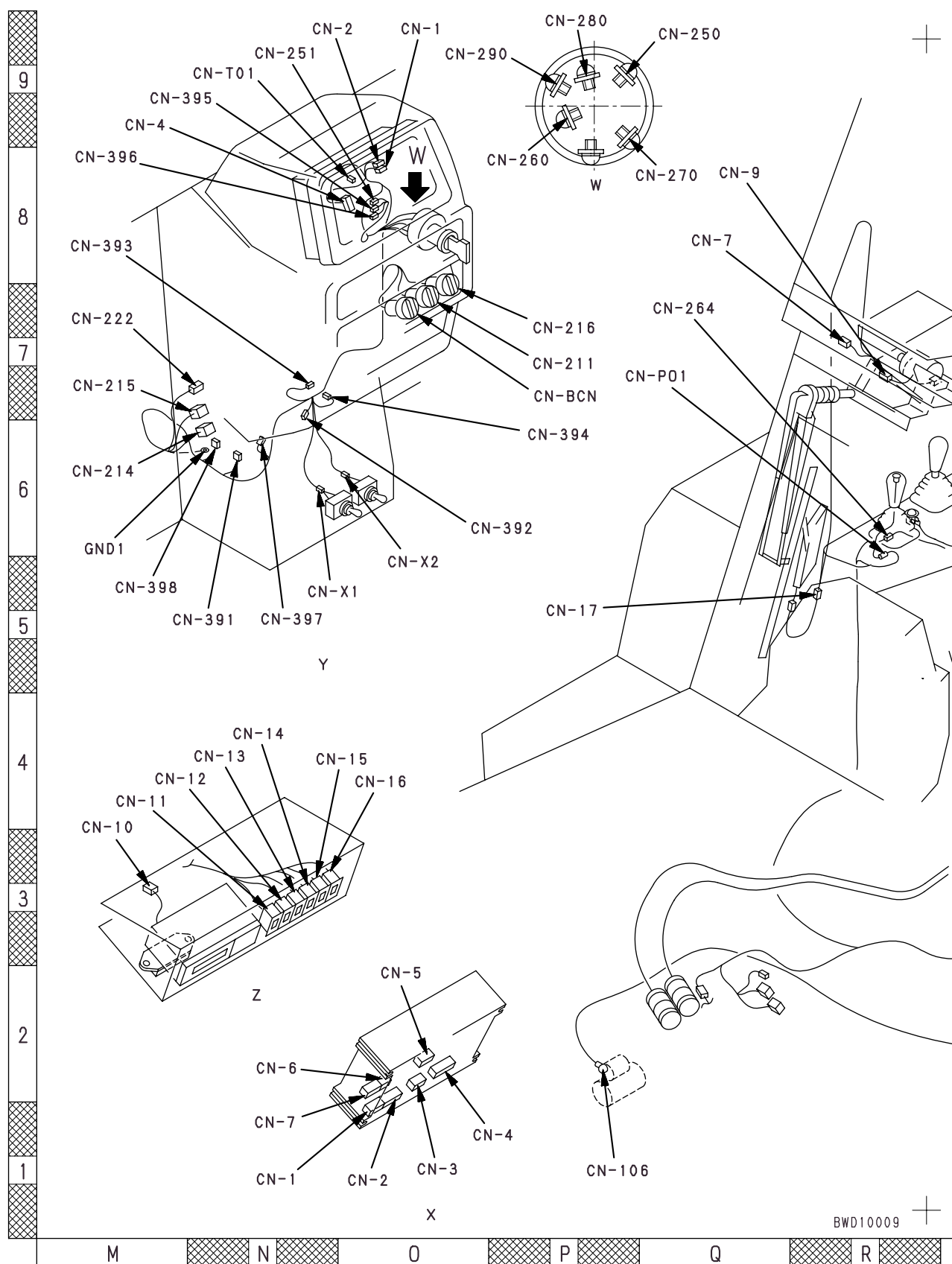
Connector No.	Connector type	No. of pins	Place of use	Address
CN-21	DT	1	Intermediate connector	U-1
CN-211	ML	4	Headlamp switch	P-7
CN-214	DT	12	Intermediate connector	M-6
CN-215	DT	12	Intermediate connector	M-7
CN-216	ML	4	Rear lamp switch	P-7
CN-21A	DT	2	Monitor alarm	W-7
CN-22	1-pin connector	1	Cigarette lighter	W-8
CN-220	DT	2	Diode (For starting circuit)	V-1
CN-222	DT	12	Intermediate connector	M-7
CN-223	X	3	Intermediate connector	X-4
CN-224	M	1	Rear lamp (Left)	X-6
CN-243	M	1	Rear lamp (Right)	I-9
CN-244	DT	2	Backup alarm	X-5
CN-245	X	2	Intermediate connector	L-6
CN-246	X	2	Ripper pin puller solenoid	X-5
CN-247	X	1	Intermediate connector	L-9
CN-248	M	1	Ripper point lamp	L-8
CN-250	—	1	Starting switch terminal B	Q-9
CN-251	M	4	Caution lamp	N-9
CN-260	—	1	Starting switch terminal BR	P-8
CN-262	X	2	Horn switch	U-9
CN-263	X	2	Ripper pin puller switch	S-9
CN-270	—	1	Starting switch terminal R1	Q-8
CN-280	—	1	Starting switch terminal C	P-9
CN-290	—	1	Starting switch terminal ACC	O-9
CN-2ND	DT	3	Gear speed switch 2	K-4
CN-3	—	3	Engine controller	O-1
CN-3	1-pin connector	1	Rear speaker (Left)	T-9
CN-361	M	2	Windshield washer (Front)	X-4
CN-362	M	2	Windshield washer (Left)	X-4
CN-363	M	2	Windshield washer (Right)	X-3
CN-364	M	2	Windshield washer (Rear)	X-3
CN-391	ML	4	Air conditioner relay	N-5
CN-392	M	2	Air conditioner blower motor	O-6
CN-393	ML	4	Air conditioner thermostat & dual pressure switch	M-8

Connector No.	Connector type	No. of pins	Place of use	Address
CN-394	ML	3	Air conditioner resistor	P-6
CN-395	ML	4	Air conditioner blower switch	M-9
CN-396	ML	3	Air conditioner switch	M-8
CN-397	ML	2	Diode (For air conditioner)	N-5
CN-398	ML	4	Air conditioner clutch relay	M-5
CN4	M	2	Monitor panel	M-9
CN-4	–	20	Engine controller	O-1
CN-4	KES	4	Rear wiper motor	U-9
CN-406	DT	2	HSS charge oil pressure sensor	G-9
CN-422	X	2	Intermediate connector	X-5
CN-423	X	2	Fuel level sensor	X-7
CN-451	DT	12	Intermediate connector	L-7
CN-452	DT	2	Hydraulic oil temperature sensor	J-4
CN-453	DT	2	Transmission oil temperature sensor	I-3
CN-454	X	2	Blade pitch solenoid	I-3
CN-5	–	16	Engine controller	O-2
CN-5	1-pin connector	1	Rear speaker (Left)	U-9
CN-6	–	10	Engine controller	N-2
CN-6	1-pin connector	1	Rear speaker (Left)	U-9
CN-7	–	14	Engine controller	N-1
CN-7	1-pin connector	1	Connector for additional lamp	Q-7
CN-701	DT	12	Intermediate connector	L-7
CN-8	1-pin connector	1	Room lamp	S-9
CN-9	KES	6	Front wiper motor	Q-8
CN-ARC	X	2	Air conditioner condenser	W-1
CN-BCN	ML	3	Buzzer cancel switch	P-7
CN-C	–	1	Battery relay	V-1
CN-CPR	–	5	Engine controller relay	W-7
CN-E07	DT	2	Engine speed sensor	D-3
CN-E21	HD30	31	Intermediate connector	C-4
CN-E22	HD30	31	Intermediate connector	D-4
CN-E31	DT	2	Injector #1	A-4
CN-E32	DT	2	Injector #2	B-4
CN-E33	DT	2	Injector #3	B-4
CN-E34	DT	2	Injector #4	B-4
CN-E35	DT	2	Injector #5	C-4
CN-E36	DT	2	Injector #6	D-4

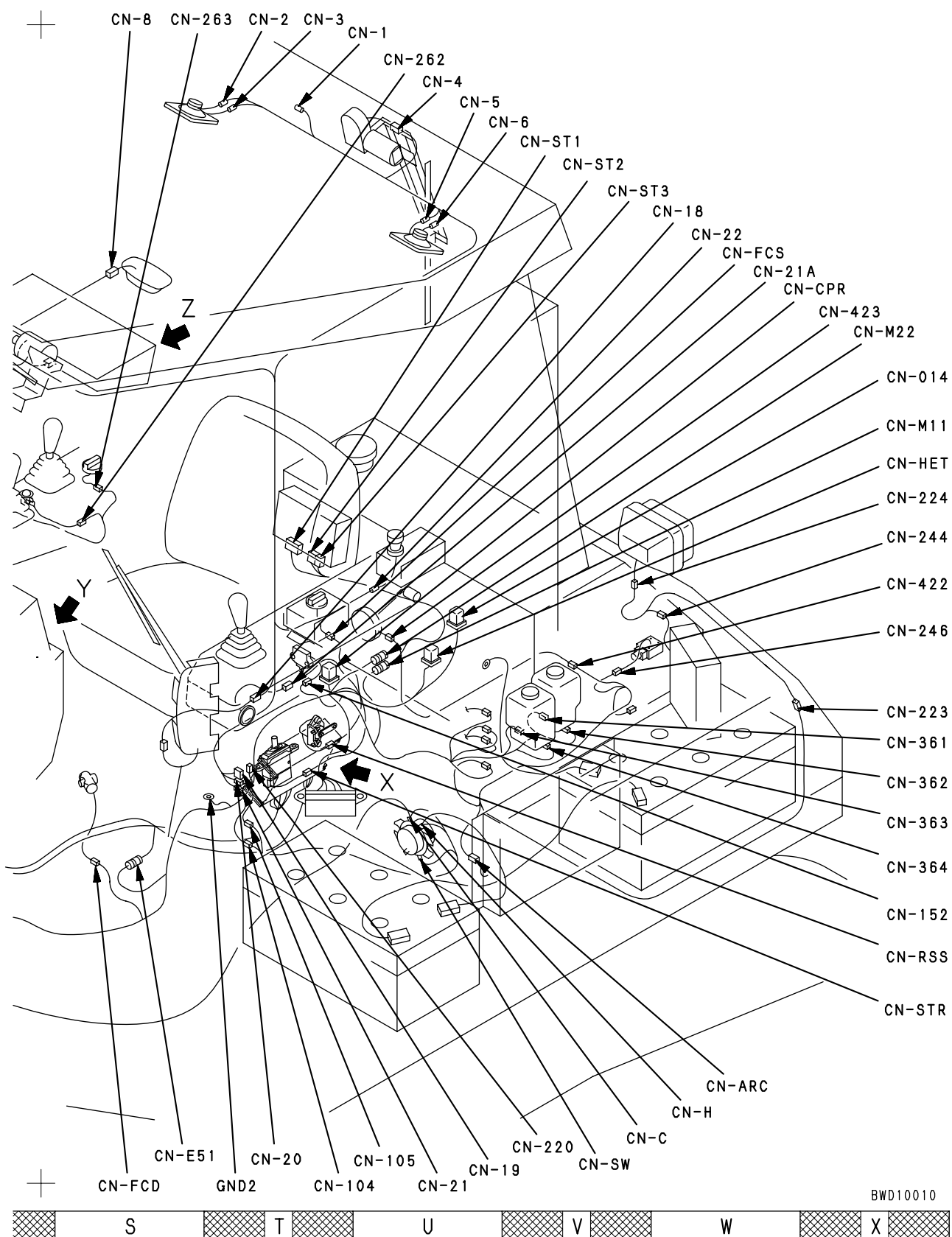
Connector No.	Connector type	No. of pins	Place of use	Address
CN-E41	DT	2	Supply pump 1	A-1
CN-E42	DT	2	Supply pump 2	B-1
CN-E51	HD30	31	Intermediate connector	S-1
CN-E51	DT	2	Ne sensor	D-2
CN-E52	DT	2	G sensor	C-1
CN-E53	DT	3	Common rail pressure sensor	C-1
CN-E54	DT	3	Boost pressure sensor	A-2
CN-FCD	DT	3	Decelerator pedal	S-1
CN-FCS	M	3	Fuel control dial	W-8
GND1	–	1	Chassis ground	M-6
GND2	–	1	Chassis ground	T-1
CN-H	–	1	Battery relay	W-1
CN-HET	–	5	Preheater relay	X-6
CN-HHP	DT	3	Work equipment circuit pressure sensor	H-9
CN-LPL	DT	8	Intermediate connector	L-6
CN-M11	HD30	P	Intermediate connector	X-6
CN-M2	DT	2	Starting motor terminals R, S"	A-1
CN-M22	HD30	X	Intermediate connector	X-7
CN-P01	–	2	Blade pitch switch	Q-7
CN-P31	DT	2	Engine water temperature sensor (Low)	D-2
CN-P7	DT	2	Engine water temperature sensor (High)	D-2
CN-P8	–	1	Engine oil pressure switch (Low)	D-1
CN-P9	–	1	Engine oil pressure switch (High)	C-1
CN-PUPA	DT	2	HSS pump solenoid A	H-2
CN-PUPB	DT	2	HSS pump solenoid B	H-2
CN-RSS	DT	3	Reverse sensing potentiometer	X-2
CN-ST1	DT	3	Steering oil pressure sensor 1	L-5
CN-ST2	DT	3	Steering oil pressure sensor 2	K-4
CN-STR	DT	4	Steering potentiometer	X-2
CN-SW	–	1	Battery relay	V-1
CN-X1	–	6	Service switch	N-5
CN-X2	–	6	Mode selector switch	O-5
CN-ST1	–	21	HSS controller	V-8
CN-ST2	–	20	HSS controller	V-8
CN-ST3	–	16	HSS controller	V-8
CN-T01	AMP	16	Monitor panel	N-9





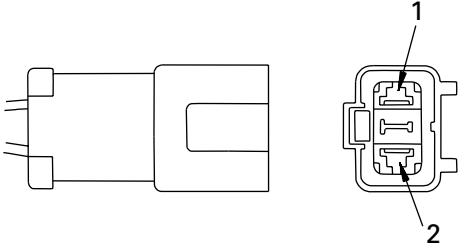
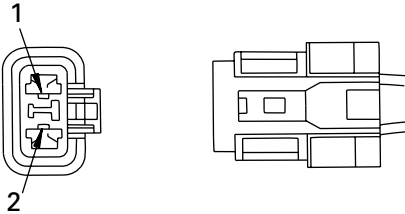
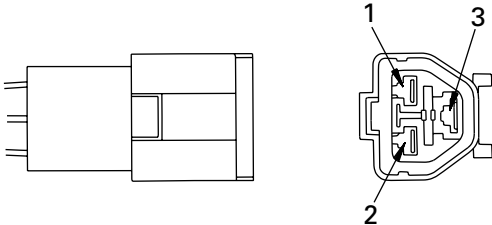
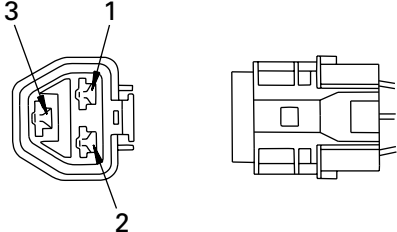
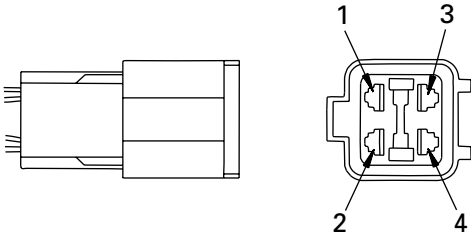
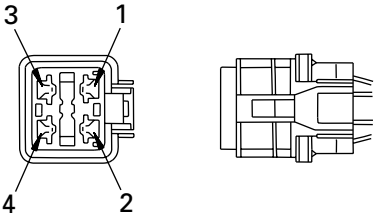


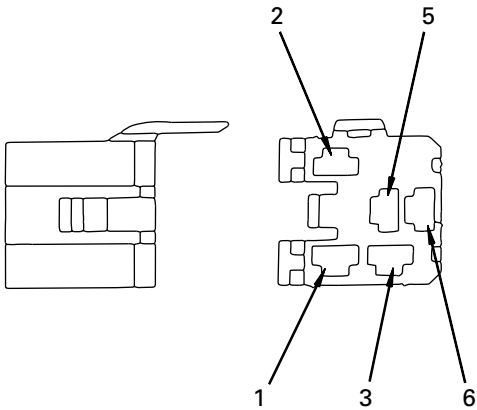
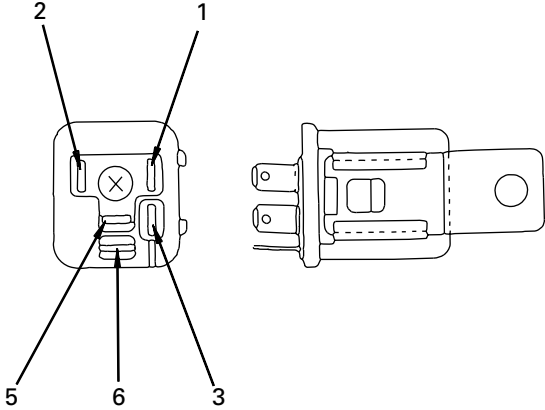
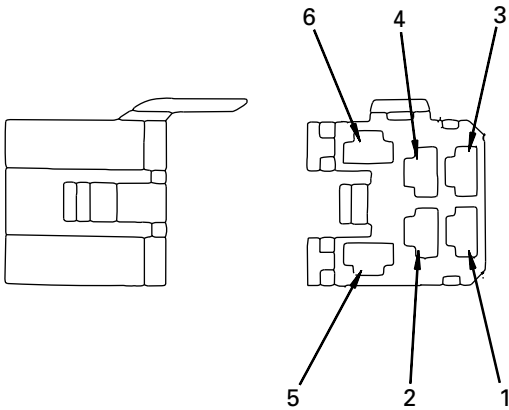
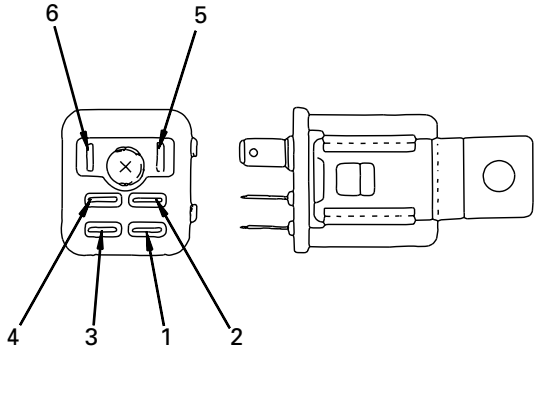


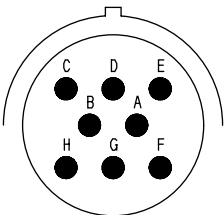
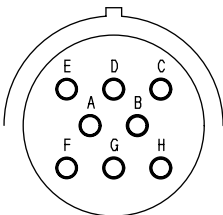
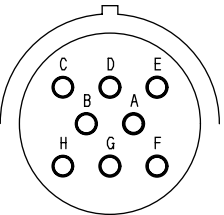
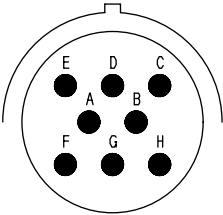
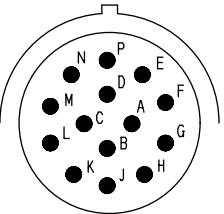
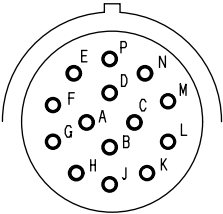
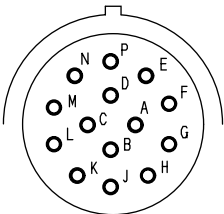
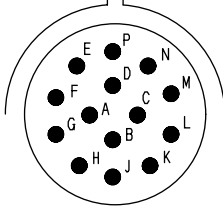


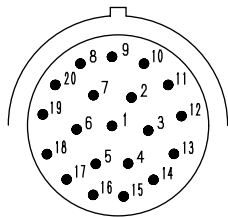
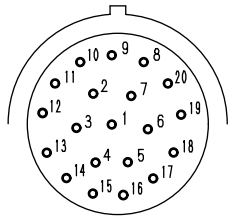
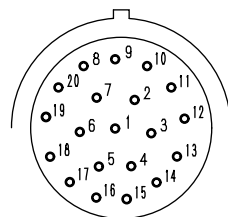
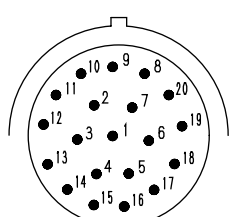
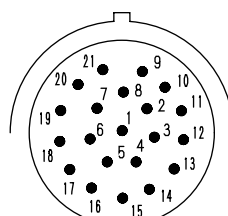
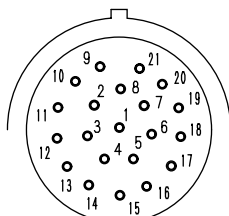
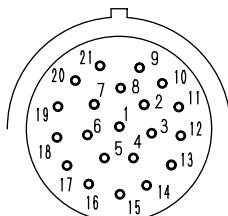
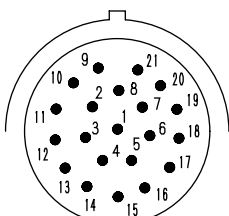
CONNECTION TABLE FOR CONNECTOR PIN NUMBERS

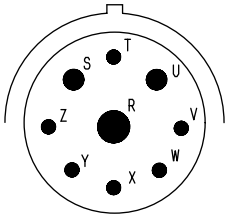
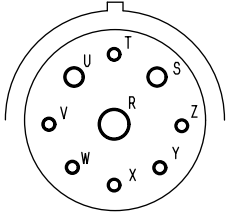
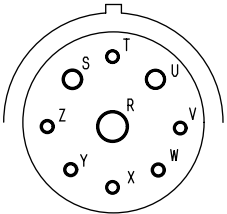
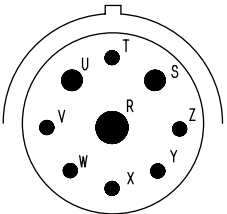
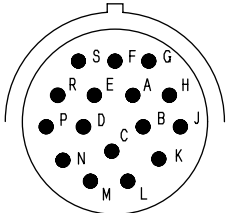
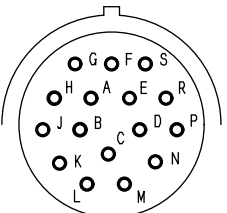
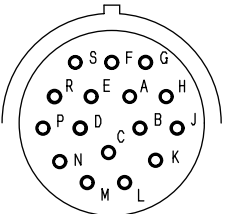
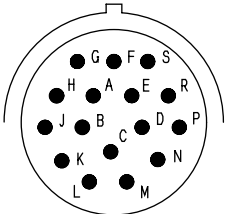
★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

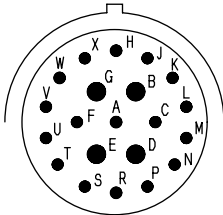
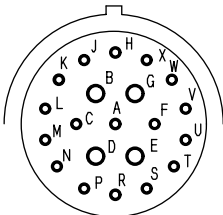
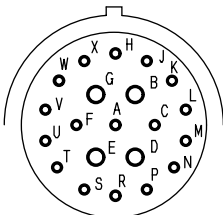
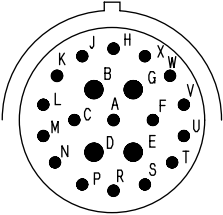
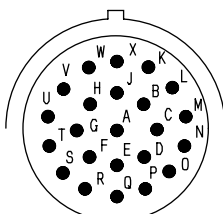
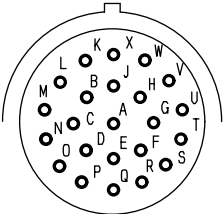
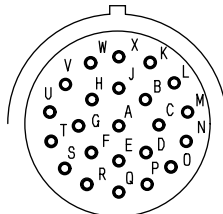
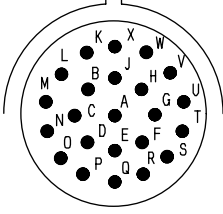
No. of pins	X type connector	
	Male (female housing)	Female (male housing)
2	<div>  </div> <div>TEW00221</div>	<div>  </div> <div>TEW00222</div>
3	<div>  </div> <div>TEW00223</div>	<div>  </div> <div>TEW00224</div>
4	<div>  </div> <div>TEW00225</div>	<div>  </div> <div>TEW00226</div>

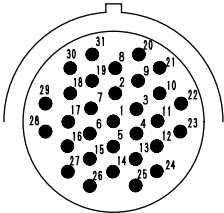
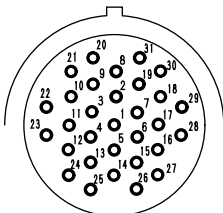
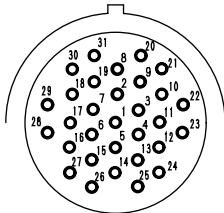
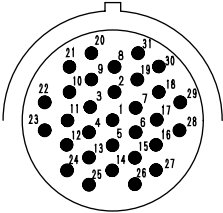
No. of pins	Relay connector	
	Male (female housing)	Female (male housing)
5	 <p>BLP00073</p>	 <p>BLP00074</p>
6	 <p>BLP00075</p>	 <p>BLP00076</p>

Type Shell size code	HD30 series connector	
	Body (Plug)	Body (Receptacle)
18-8 (1)	Pin (male terminal)	Pin (female terminal)
	 BWP05001	 BWP05002
	Pin (female terminal)	Pin (male terminal)
	 BWP05003	 BWP05004
18-14 (2)	Pin (male terminal)	Pin (female terminal)
	 BWP05005	 BWP05006
	Pin (female terminal)	Pin (male terminal)
	 BWP05007	 BWP05008

Type Shell size code	HD30 series connector	
	Body (Plug)	Body (Receptacle)
18-20 (3)	Pin (male terminal)	Pin (female terminal)
	 BWP05009	 BWP05010
	Pin (female terminal)	Pin (male terminal)
	 BWP05011	 BWP05012
18-21 (4)	Pin (male terminal)	Pin (female terminal)
	 BWP05013	 BWP05014
	Pin (female terminal)	Pin (male terminal)
	 BWP05015	 BWP05016

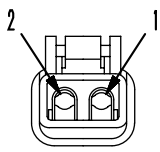
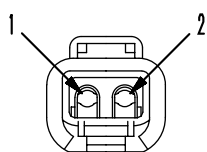
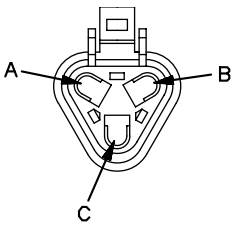
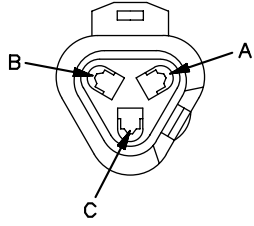
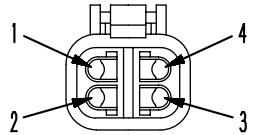
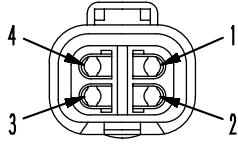
Type Shell size code	HD30 series connector	
	Body (Plug)	Body (Receptacle)
24-9 (5)	Pin (male terminal)	Pin (female terminal)
	 <div>BWP05017</div>	 <div>BWP05018</div>
	Pin (female terminal)	Pin (male terminal)
	 <div>BWP05019</div>	 <div>BWP05020</div>
24-16 (6)	Pin (male terminal)	Pin (female terminal)
	 <div>BWP05021</div>	 <div>BWP05022</div>
	Pin (female terminal)	Pin (male terminal)
	 <div>BWP05023</div>	 <div>BWP05024</div>

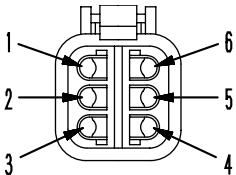
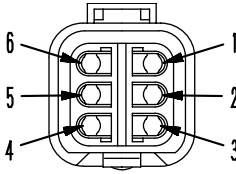
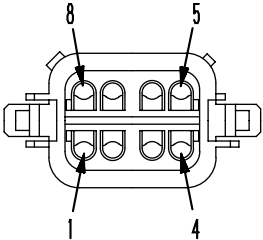
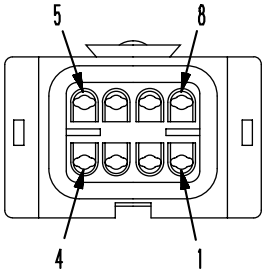
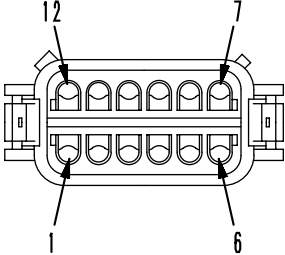
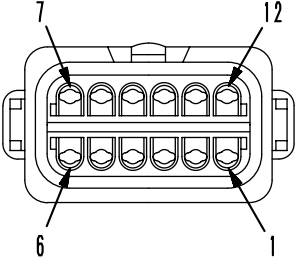
Type Shell size code	HD30 series connector	
	Body (Plug)	Body (Receptacle)
24-21 (7)	Pin (male terminal)	Pin (female terminal)
	 BWP05025	 BWP05026
	Pin (female terminal)	Pin (male terminal)
	 BWP05027	 BWP05028
24-23 (8)	Pin (male terminal)	Pin (female terminal)
	 BWP05029	 BWP05030
	Pin (female terminal)	Pin (male terminal)
	 BWP05031	 BWP05032

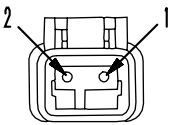
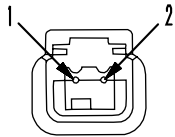
Type Shell size code	HD30 series connector	
	Body (Plug)	Body (Receptacle)
24-31 (9)	Pin (male terminal)	Pin (female terminal)
	 <div>BWP05033</div>	 <div>BWP05034</div>
	Pin (female terminal)	Pin (male terminal)
	 <div>BWP05035</div>	 <div>BWP05036</div>

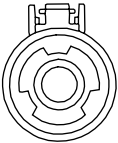



[Number is printed on each connector (Wire inserting end).]

No. of pins	DT, DT-T series connector	
	Body (Plug)	Body (Receptacle)
2	 <p>BWP05037</p>	 <p>BWP05038</p>
3	 <p>BWP05039</p>	 <p>BWP05040</p>
4	 <p>BWP05041</p>	 <p>BWP05042</p>

[Number is printed on each connector (Wire inserting end).]		
No. of pins	DT, DT-T series connector	
	Body (Plug)	Body (Receptacle)
6	<div>  <p>BWP05043</p> </div>	<div>  <p>BWP05044</p> </div>
8	<div>  <p>BWP05045</p> </div>	<div>  <p>BWP05046</p> </div>
12	<div>  <p>BWP05047</p> </div>	<div>  <p>BWP05048</p> </div>

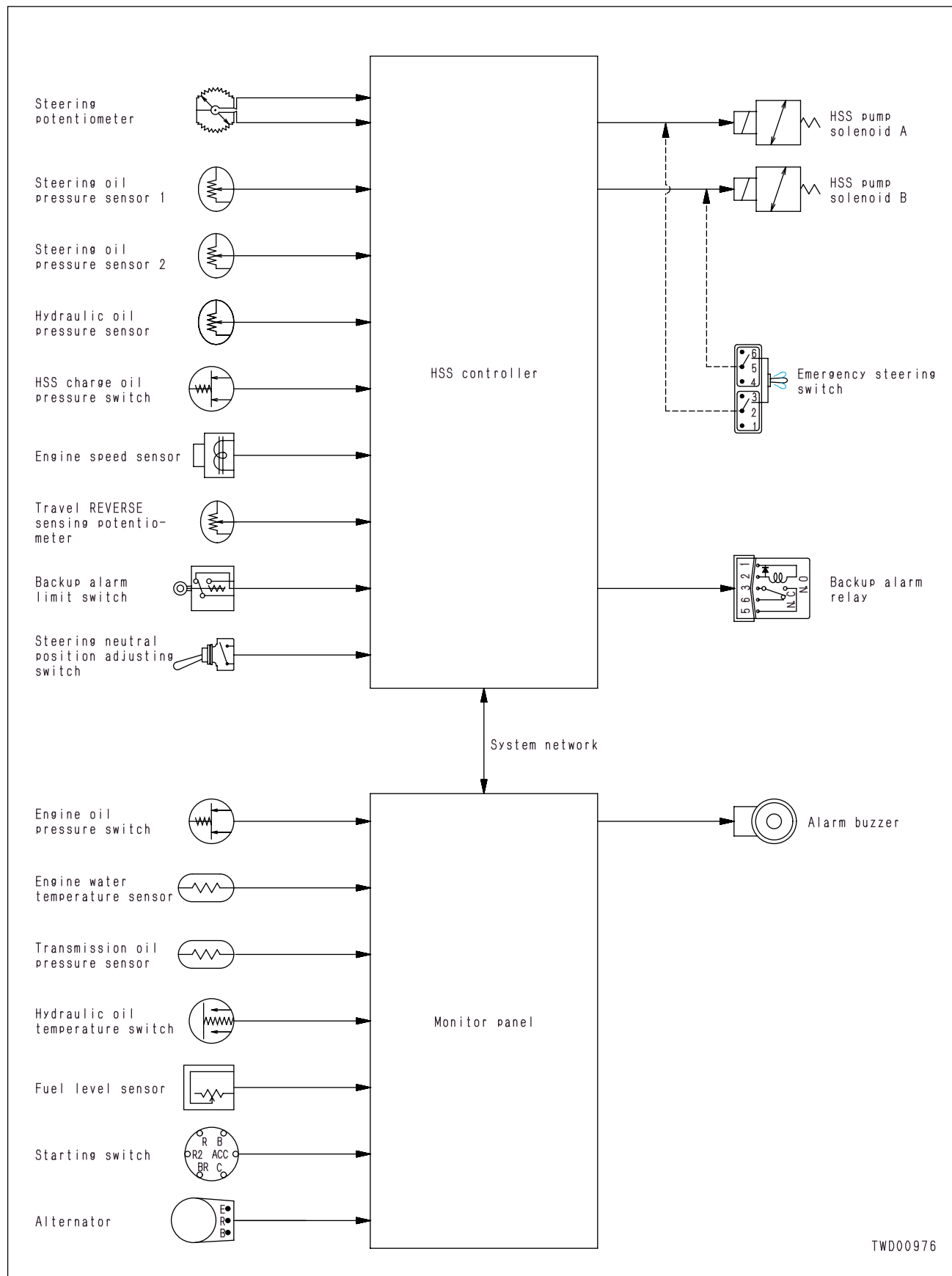
[Number is printed on each connector (Wire inserting end).]		
No. of pins	DTM series connector	
	Body (Plug)	Body (Receptacle)
2	<div>  <p>BWP05049</p> </div>	<div>  <p>BWP05050</p> </div>

No. of pins	DTHD series connector	
	Body (Plug)	Body (Receptacle)
1	<div>  <div>BWP05051</div> </div>	<div>  <div>BWP05052</div> </div>



# FUNCTION OF ELECTRONIC CONTROL SYSTEM

Serial No. 70001 – 75000



**Functions of HSS system**

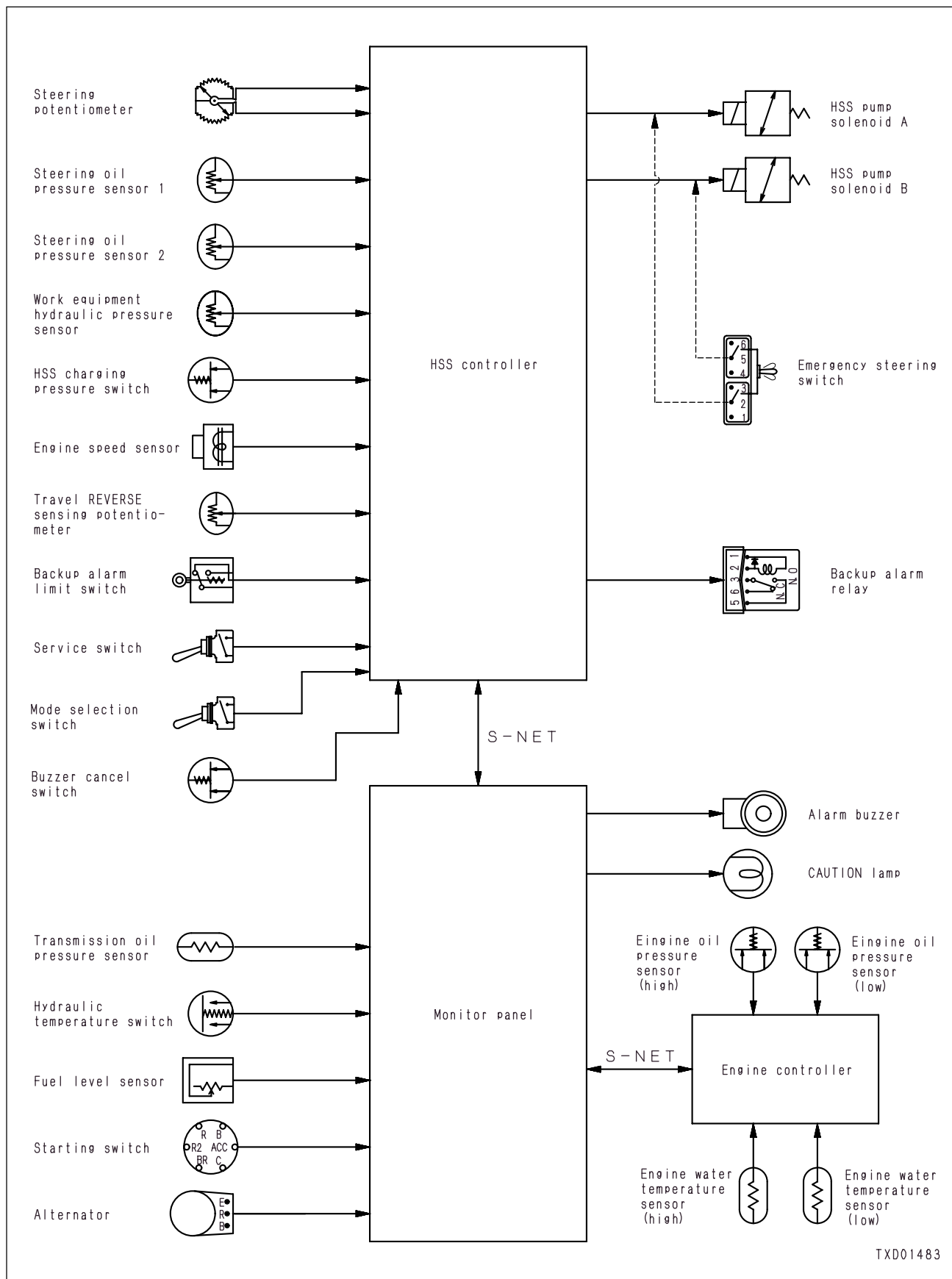
- The HSS system consists of an HSS controller, sensors, switches, solenoid valves, relays, and a monitor panel.
- The HSS controller receives input signals from each sensor and switch, and calculates them, then sends them to each solenoid valve and relay to control the HSS system. At the same time, the HSS controller communicates information with the monitor panel through the network circuit (S-NET).
- The steering potentiometer measures the quantity of operation of the joystick in the steering direction, and inputs analog signals to the HSS controller.
- The steering oil pressure sensor senses the operating pressure of both steering circuit, and inputs analog signals to the HSS controller.
- The work equipment circuit oil pressure sensor senses the operating pressure of the work equipment circuit, and inputs analog signals to the HSS controller.
- The HSS charge pressure sensor senses the oil pressure in the HSS charge circuit, and inputs ON/OFF signals to the HSS controller.
- The engine rotation sensor senses engine rotation, and inputs pulse signals to the HSS controller.
- The travel reverse sensing potentiometer senses the reverse position of the joystick, and inputs analog signals to the HSS controller.
- The backup alarm limit switch detects the reverse position of the directional lever of the transmission valve, and inputs ON/OFF signals to the HSS controller.
- The steering neutral position adjustment switch detects changes of the adjustment mode and working mode, and inputs ON/OFF signals to the HSS controller.
- The HSS pump solenoid valve receives analog signals from the HSS controller, and controls the swash plate angle of the HSS pump.
- The backup alarm relay receives ON/OFF signals from the HSS controller, and changes the backup alarm circuit.
- The monitor panel communicates with the HSS controller through the network circuit (S-NET). Upon receiving an abnormality signal from the HSS controller, the monitor panel turns on the electric system caution lamp and alarm buzzer.

- The emergency steering switch is installed when the HSS system has trouble. It sends signals directly to the HSS pump solenoid valve without passing through the HSS controller to steering the machine in an emergency.

**Functions of monitor panel**

- The monitor panel receives input signals from each sensor and switch, and calculates them, then turns on the gauges and lamps of itself and sends output signals to the alarm buzzer to control the monitor panel system. At the same time, the monitor panel communicates information with the HSS controller through the network circuit (S-NET).
- The engine oil pressure switch senses engine oil pressure, and inputs ON/OFF signals to the monitor panel.
- The engine coolant temperature sensor senses the engine coolant temperature, and inputs analog signals to the monitor panel.
- The transmission oil temperature sensor senses transmission oil temperature, and inputs analog signals to the monitor panel.
- The fuel level sensor senses quantity of the remaining fuel, and input analog signals to the monitor panel.
- If the starting switch is turned to the preheating position or another position, it inputs ON/OFF signals to the monitor panel.
- The alternator inputs the voltage generated by itself to the monitor panel.
- The alarm buzzer receives ON/OFF signals from the monitor panel, and turns on and off itself.

## Serial No. 75001 and up





**Functions of HSS system**

- The HSS system consists of an HSS controller, sensors, switches, solenoid valves, relays, and a monitor panel.
- The HSS controller receives input signals from each sensor and switch, and calculates them, then sends them to each solenoid valve and relay to control the HSS system. At the same time, the HSS controller communicates information with the monitor panel through the network circuit (S-NET).
- The steering potentiometer measures the quantity of operation of the joystick in the steering direction, and inputs analog signals to the HSS controller.
- The steering oil pressure sensor senses the operating pressure of both steering circuit, and inputs analog signals to the HSS controller.
- The work equipment circuit oil pressure sensor senses the operating pressure of the work equipment circuit, and inputs analog signals to the HSS controller.
- The HSS charge pressure sensor senses the oil pressure in the HSS charge circuit, and inputs ON/OFF signals to the HSS controller.
- The engine rotation sensor senses engine rotation, and inputs pulse signals to the HSS controller.
- The travel reverse sensing potentiometer senses the reverse position of the joystick, and inputs analog signals to the HSS controller.
- The backup alarm limit switch detects the reverse position of the directional lever of the transmission valve, and inputs ON/OFF signals to the HSS controller.
- The service switch, mode selector switch, and buzzer cancel switch are used to input the data for the monitoring function and adjustment mode.
- The HSS pump solenoid valve receives analog signals from the HSS controller, and controls the swash plate angle of the HSS pump.
- The backup alarm relay receives ON/OFF signals from the HSS controller, and changes the backup alarm circuit.
- The monitor panel communicates with the HSS controller through the network circuit (S-NET). Upon receiving an abnormality signal from the HSS controller, the monitor panel turns on the electric system caution lamp and alarm buzzer.

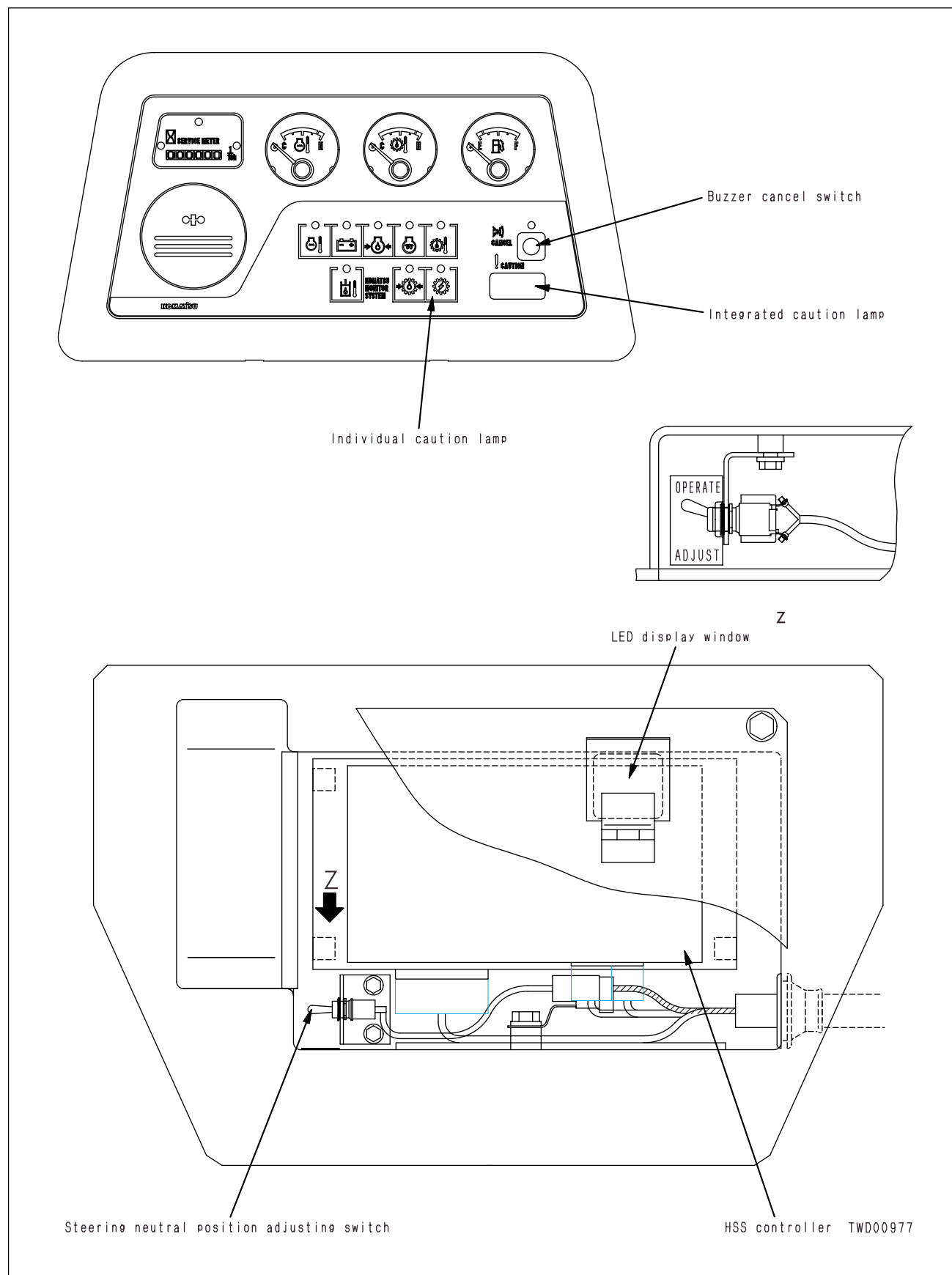
- The emergency steering switch is installed when the HSS system has trouble. It sends signals directly to the HSS pump solenoid valve without passing through the HSS controller to steering the machine in an emergency.

**Functions of monitor panel**

- The monitor panel receives input signals from each sensor and switch, and calculates them, then turns on the gauges and lamps of itself and sends output signals to the alarm buzzer to control the monitor panel system. At the same time, the monitor panel communicates information with the HSS controller through the network circuit (S-NET).
- The engine oil pressure switch senses engine oil pressure, and inputs ON/OFF signals to the monitor panel.
- The engine coolant temperature sensor senses the engine coolant temperature, and inputs analog signals to the monitor panel.
- The transmission oil temperature sensor senses transmission oil temperature, and inputs analog signals to the monitor panel.
- The fuel level sensor senses quantity of the remaining fuel, and input analog signals to the monitor panel.
- If the starting switch is turned to the preheating position or another position, it inputs ON/OFF signals to the monitor panel.
- The alternator inputs the voltage generated by itself to the monitor panel.
- The alarm buzzer receives ON/OFF signals from the monitor panel, and turns on and off itself.
- The engine oil pressure and engine water temperature are input to the engine controller to control the engine and transmitted as caution information through the communication system to the monitor panel.

## DISPLAY OF HSS CONTROLLER

Serial No. 70001 – 75000



## Error codes and contents of troubles

Error code	Troubled system and contents of trouble	Alarm lamp	Alarm buzzer	Reproducing operation
19	Short circuit in steering oil pressure sensor system A	●	●	E+
20	Disconnection in steering oil pressure sensor system A	●	●	E+
21	Short circuit in steering oil pressure sensor system B	●	●	E+
22	Disconnection in steering oil pressure sensor system B	●	●	E+
23	Trouble of steering potentiometer systems 1 and 2	●	●	S+
24	Disconnection in steering potentiometer system 1	●	●	S+
25	Short circuit in steering potentiometer system 1	●	●	S+
26	Disconnection in steering potentiometer system 2	●	●	S+
27	Short circuit in steering potentiometer system 2	●	●	S+
29	Trouble of engine rotation sensor system	x	x	E
51	Short circuit in travel reverse sensing potentiometer system	●	●	S+
52	Disconnection in travel reverse sensing potentiometer system	●	●	S+
53	Disconnection in backup alarm relay system	x	x	S+
54	Short circuit in backup alarm relay system	x	x	S+
57	Lowering of source voltage of controller	●	●	S
62	Excessive difference of signal value between steering potentiometer systems 1 and 2 [I]	●	●	S
6d	Excessive difference of signal value between steering potentiometer systems 1 and 2 [II]	●	●	S+
6E	Trouble of either steering potentiometer system and excessive deviation of either system from neutral point	●	●	S
64	Disconnection in HSS pump solenoid valve system A	●	●	S+
65	Short circuit in HSS pump solenoid valve system A	●	●	S+
66	Disconnection in HSS pump solenoid valve system B	●	●	S+
67	Short circuit in HSS pump solenoid valve system B	●	●	S+
70	Disconnection in work equipment circuit oil pressure sensor system	x	x	E+
71	Short circuit in work equipment circuit oil pressure sensor system	x	x	E+
8d	S-NET communication error	●	●	S
99	Disagreement of reverse sensing potentiometer and backup alarm switch signals with each other	●	●	S
E0	Trouble of offset current memory	●	●	S

★ The symbols of the reproducing operation denote the following operations.

S: Turn the starting switch to the ON position.

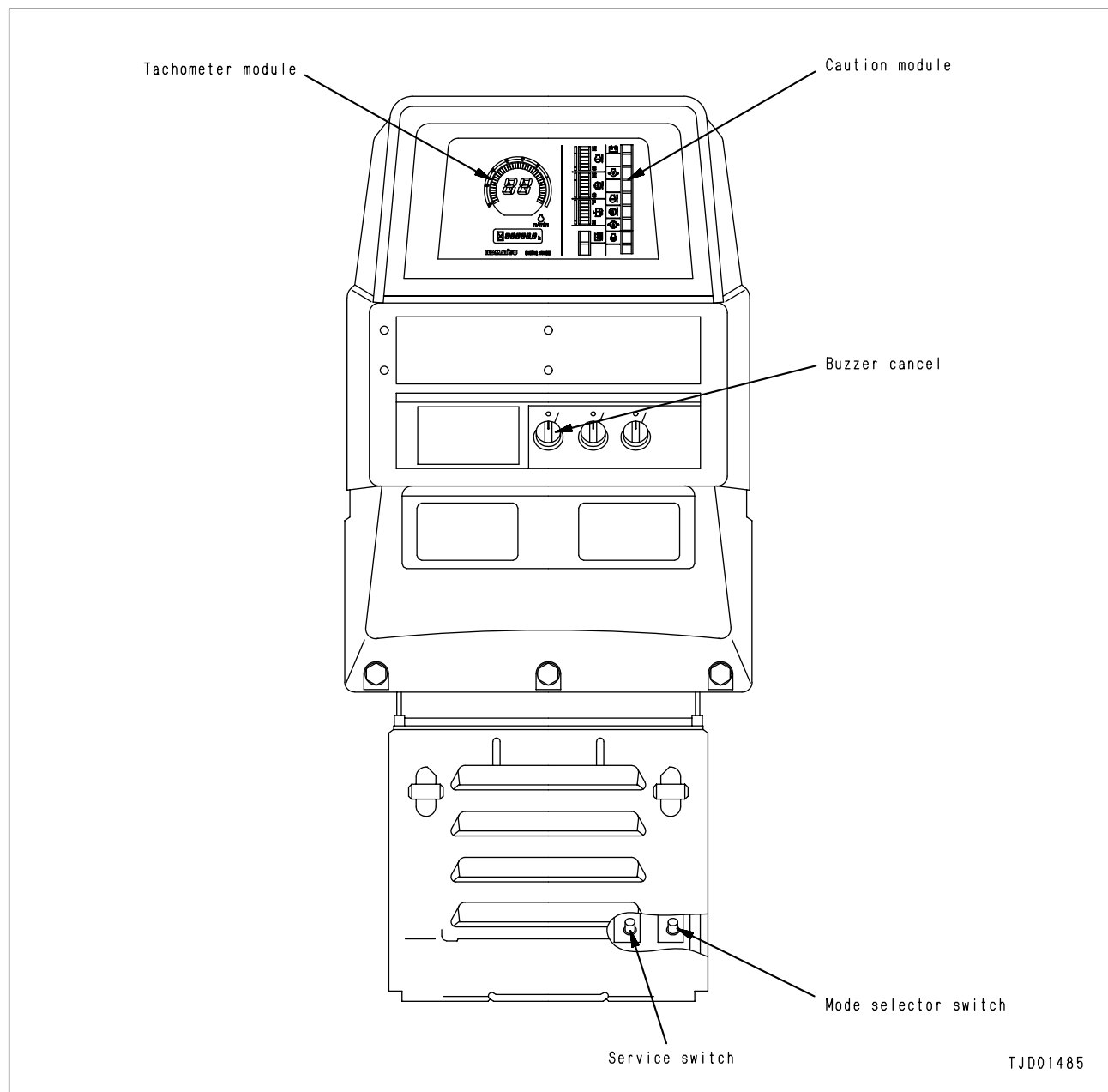
S+: Turn the starting switch to the ON position, then operate the concerned switch or lever.

E: Start the engine.

E+: Start the engine, then operate the concerned switch or lever.

## DISPLAY AND SPECIAL FUNCTIONS OF MONITOR PANEL

Serial No. 75001 and up



★1: Monitoring mode

Sending and returning of items = Buzzer cancel switch

★2: Service code mode

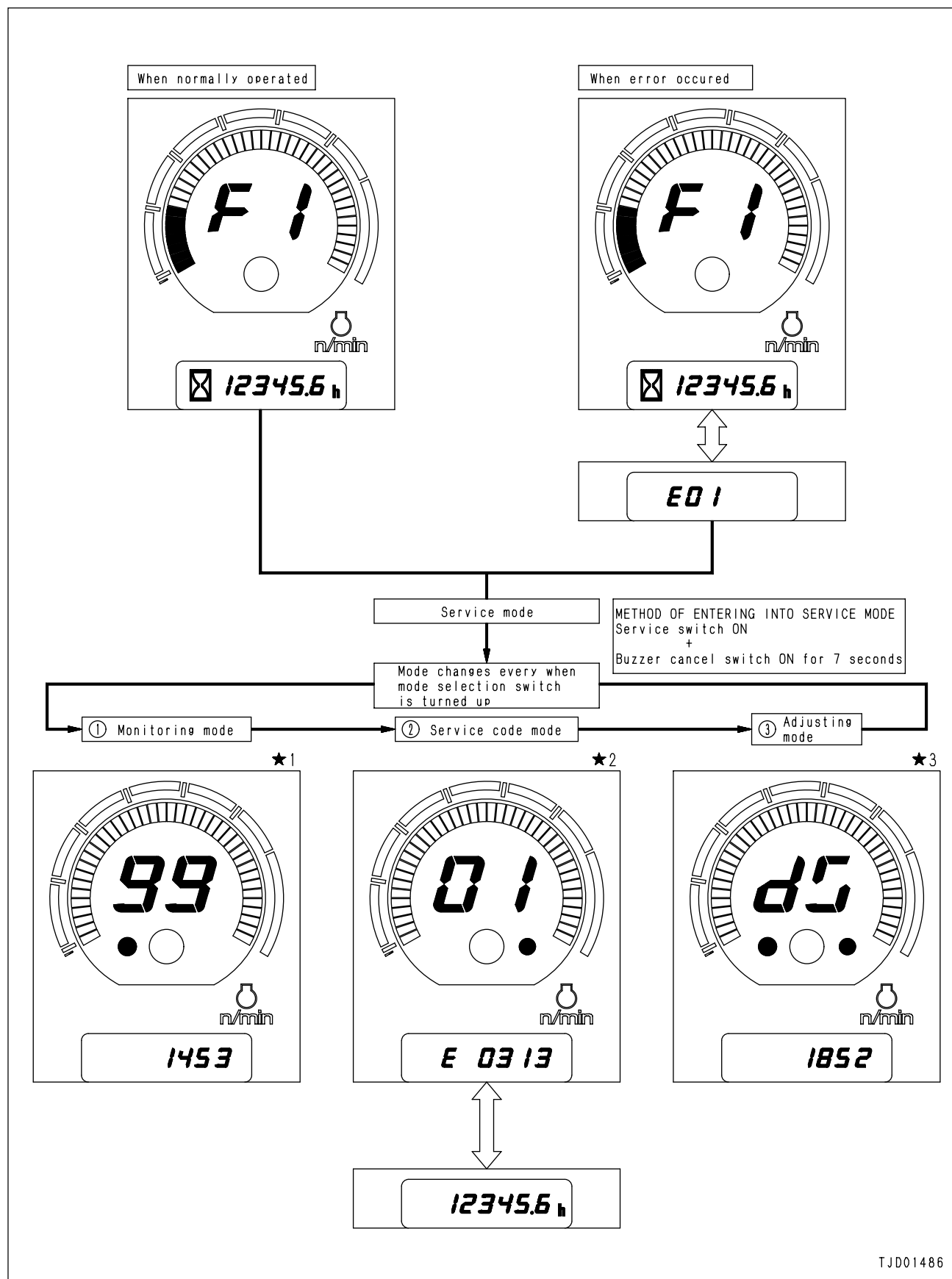
E: Error which is occurring currently, P: Error which occurred in past = Code and service meter reading at time of occurrence of error are displayed alternately.

Sending of items = Buzzer cancel switch, Clearing code (history) = Mode selector switch

★3: Adjustment mode

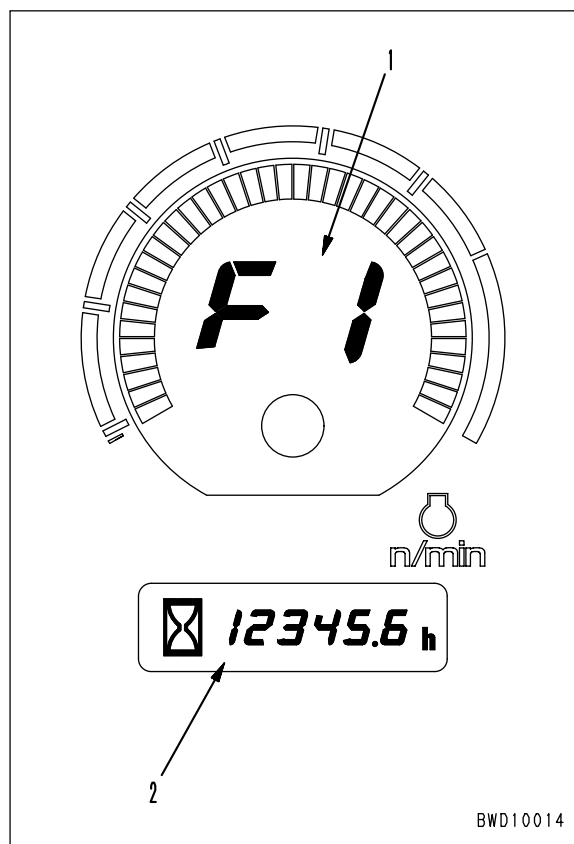
Sending of items = Buzzer cancel switch

## Selection of each mode



### 1. Ordinary display function

Gear speed (1) is displayed in the upper display unit and service meter (2) is displayed in the lower display unit during ordinary work.



### 2. Function of displaying user code when error occurs

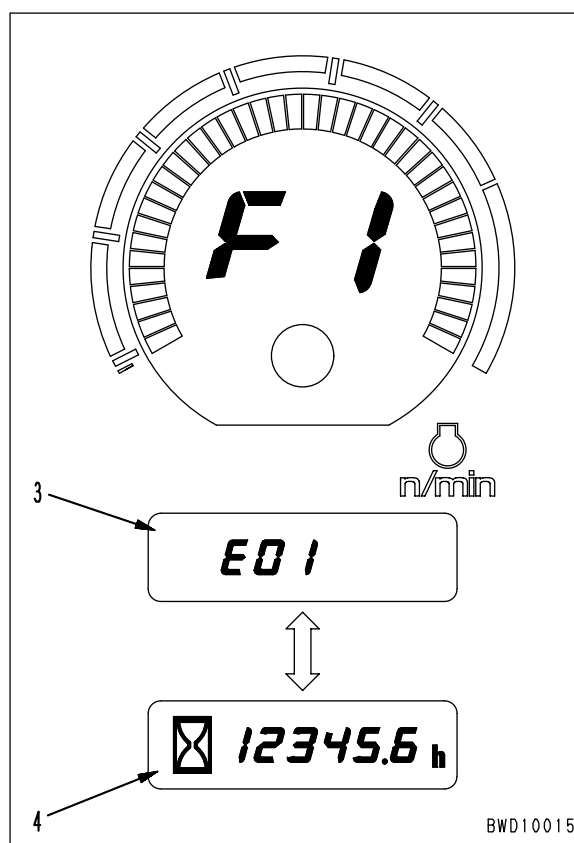
If any error to be notified to the operator occurs during work, user code (3) and service meter (4) are displayed alternately in the lower display unit.

When a user code of high importance is displayed, the caution lamp flashes and caution buzzer sounds.

<Reference>

A user code is displayed only when an error of high importance is detected.

An error may have occurred even if a user code is not displayed. Accordingly, if you feel any abnormality, be sure to check for a service code in the service code display mode.



User codes and abnormal phenomena (Which indicate actions to be taken by operator)

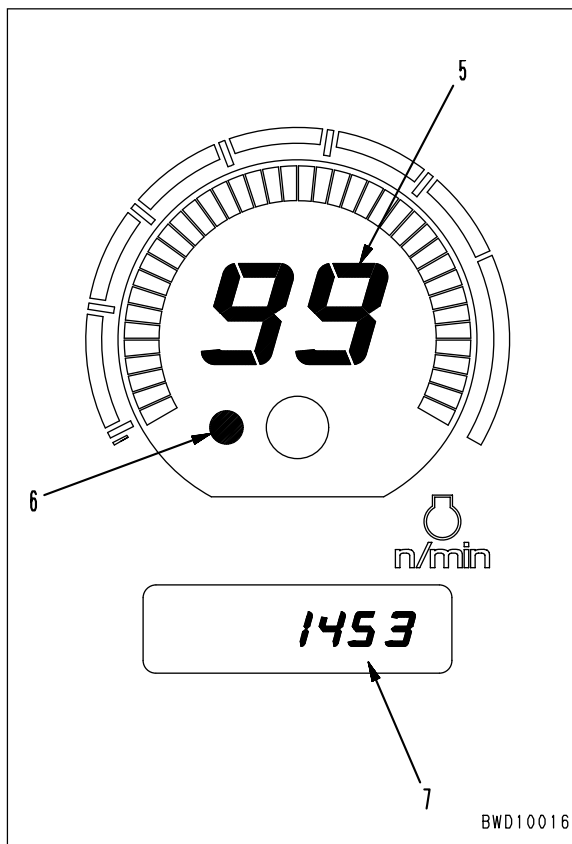
User code	Abnormal phenomenon	Caution lamp	Caution buzzer
E01	Work can be continued with some functions stopped. <ul style="list-style-type: none"> <li>• Abnormality in backup alarm relay</li> <li>• Abnormality in engine speed sensor of monitor panel</li> <li>• Abnormality in buzzer cancel switch</li> </ul>	—	—
E02	Some functions, including limiting function, etc. are stopped (Work can be continued with care). <ul style="list-style-type: none"> <li>• Abnormality in water temperature sensor</li> <li>• Abnormality in power distribution control function of HSS</li> </ul>	○	○
CALL03	Move to a safe place and call a serviceman. <ul style="list-style-type: none"> <li>• Abnormality in injector</li> <li>• Abnormality in steering position 1 system</li> <li>• Abnormality in forward-reverse travel sensor</li> </ul>	○	○
CALL	Stop the machine immediately and call a serviceman. <ul style="list-style-type: none"> <li>• Abnormality in control power source</li> <li>• Abnormality in steering position 2 system</li> <li>• Abnormality in engine pump</li> </ul>	○	○

**3. Function of displaying in monitoring mode**

The condition of each part of the machine can be checked on the monitor panel by the signals from the sensors installed to various parts of the machine.

Among the monitored information items, the engine speed, voltage, current, etc. are indicated by values and the other items are indicated by bits as the condition of pressure switches.

- 1) Monitoring code (5)
- 2) Monitoring mode mark (6) (Lamp on the left side) lights up.
- 3) Monitor information (7)





Monitoring code Nos. and indicated items

★ For details of an item, the indication unit of which is bit, see "Details of items indicated by bits".

Code No.	Monitoring item	Indication unit	Component
99	Engine speed	rpm	HSS controller
bA	Battery voltage	mV	Monitor panel
HA	Work equipment hydraulic pressure	kg/cm <sup>2</sup>	HSS controller
J5	HSS pump (A-B) differential pressure	kg/cm <sup>2</sup>	HSS controller
JA	HSS pump A oil pressure	kg/cm <sup>2</sup>	HSS controller
Jb	HSS pump B oil pressure	kg/cm <sup>2</sup>	HSS controller
PA	HSS pump A output current	mA	HSS controller
CA	HSS pump feedback current	mA	HSS controller
Pb	HSS pump B output current	mA	HSS controller
L1	Steering lever position voltage 1	mV	HSS controller
L2	Steering lever position voltage 2	mV	HSS controller
RU	Reverse travel signal potentiometer voltage	mV	HSS controller
7H	Transmission switch input condition	bit	HSS controller
75	High engine water temperature sensor	°C	Engine controller
76	Low engine water temperature sensor	°C	Engine controller
77	Torque converter oil temperature sensor voltage	°C	Monitor panel
Fd	Fuel control dial voltage	mV	Engine controller
FA	Acceleration percentage	%	Engine controller
dU	Decelerator voltage	mV	Engine controller
FC	Throttle correction percentage	%	Engine controller
CP	Common rail pressure	MPa	Engine controller
CO	Common rail command pressure	MPa	Engine controller
bP	Boost pressure	kPa	Engine controller
HE	Transmission switch input condition	bit	HSS controller
EC	Engine control mode	–	Engine controller
EO	Engine Q regulator command value	–	Engine controller
C7	Injecting timing command	–	Engine controller
F1	Fuel injection rate command value	mm <sup>2</sup> /st	Engine controller
FP	Converted torque	%	Engine controller
67	Fuel temperature	°C	Engine controller
IE	Engine speed	rpm	Engine controller
5N	Indication of condition of S-NET	bit	Monitor panel
U1	Engine controller program version	–	Engine controller
U2	Monitor panel tachometer module program version	–	Monitor panel
U4	Monitor panel caution module program version	–	Monitor panel
U5	HSS controller program version	–	HSS controller
FL	Fuel level sensor voltage	mV	Monitor panel

Details of items indicated by bits

★ An example of indication by bit is shown in the figure at right.

①, ③, and ⑤ indicate the OFF state.

②, ④, and ⑥ indicate the ON state.

HE: Transmission switch input condition (Neutral)

①: Neutral stage 1

②: Neutral stage 2

③: (Unused)

④: (Unused)

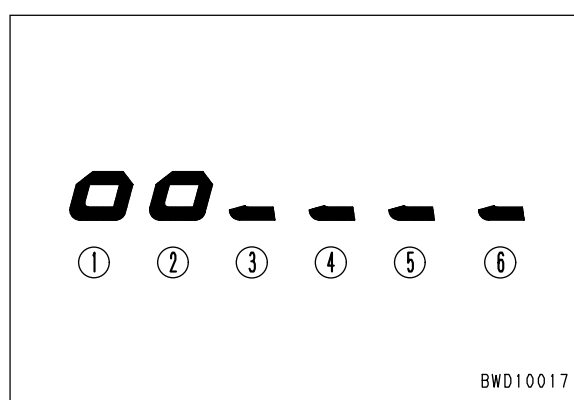
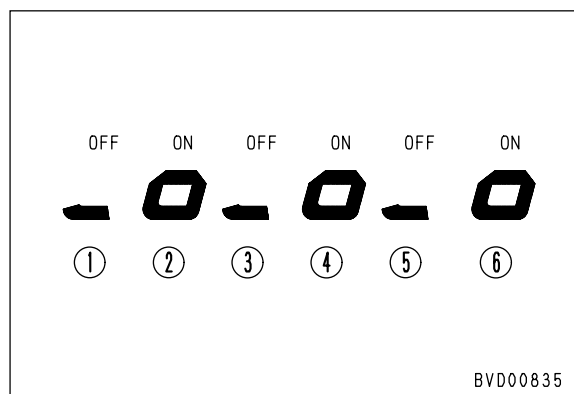
⑤: (Unused)

⑥: (Unused)

★ The neutral state is shown in the figure at right.

① and ② are always in the same state. Difference between them in indication shows an abnormality.

★ The HSS controller notifies the engine controller whether the transmission is in neutral with this signal.



7H: Transmission command condition

①: Forward travel command

②: Reverse travel command

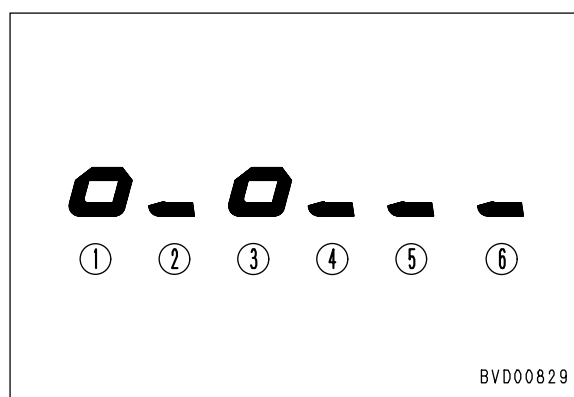
③: 1st gear speed command

④: 2nd gear speed command

⑤: 3rd gear speed command

⑥: (Unused)

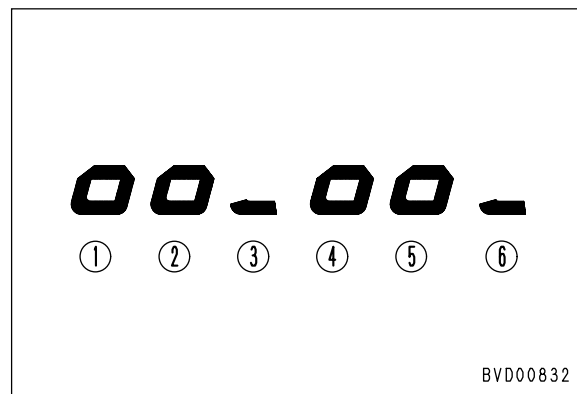
★ The state of the "forward 1st gear speed" is shown as an example in the figure at right.



5N: Condition of connection of S-NET

- ①: Engine controller
- ②: Monitor panel (Tachometer module)
- ③: (Unused)
- ④: HSS controller
- ⑤: Monitor panel (Caution module)
- ⑥: (Unused)

★ Indication under the normal condition is shown in the figure at right. (All are turned ON.)



#### 4. Function of indicating service code

The engine controller, machine controller, or monitor panel detects abnormalities in the electric system and saves the contents and occurrence time of the abnormalities in the monitor panel in the order of occurrence.

In this mode, the saved service codes and the service meter readings at the times when those codes were output are displayed alternately.

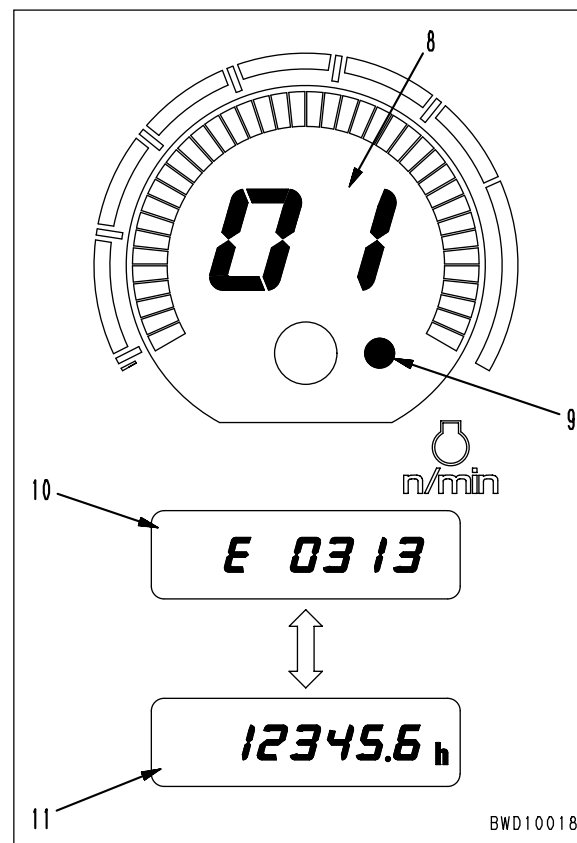
If the letter at the left end of a service code is

- E, the abnormality is not corrected yet.
- P, the abnormality is corrected.

Up to 20 service codes can be saved.

If any service code is not saved, "--" is displayed in the upper display unit.

- 1) Output error No. is displayed (8).
- 2) Service code mark (9) lights up.
- 3) Service code (10).
- 4) Time when error occurred is displayed (11).



## Service codes and abnormal systems

Service code	Contents of abnormality	Reproduction method	Trouble-shooting mode	User code
E0101	Abnormality in network system (engine controller system)	S	N mode	CALL03
E0104	Abnormality in network system (monitor panel system)	S	N mode	CALL03
E0105	Abnormality in network system (HSS controller system)	S	N mode	CALL03
E0113	Lowering of HSS controller power source voltage	S	E mode	CALL03
E0120	Abnormality in monitor panel caution lamp system	S	M mode	CALL03
E0121	Abnormality in monitor panel caution buzzer system	S	M mode	CALL03
E0143	Abnormality in HSS controller 5-V power source	S	E mode	CALL03
E0145	Abnormality in HSS controller sensor power source	S	E mode	CALL03
E0152	Abnormality in network system (HSS controller system)	S	N mode	CALL03
E0161	Abnormality in saving of offset current	S	E mode	CALL03
E0165	Error in network communication	S	N mode	CALL03
E0211	Abnormality in power train (torque converter) oil temperature	E	M mode	–
E0221	Abnormality in gear speed switch system	S+	E mode	–
E0233	Abnormality in reverse sensing potentiometer system	S+	E mode	CALL03
E0237	Abnormality in transmission neutral signal	S+	E mode	E01
E0272	Nonconformity of reverse sensing potentiometer and backup alarm switch signal	S+	E mode	E02
E0329	Abnormality in HSS oil charging pressure	E	M mode	E01
E0360	Disconnection in work equipment circuit oil pressure sensor system	E+	E mode	E01
E0361	Short circuit in work equipment circuit oil pressure sensor system	E+	E mode	E01
E0401	Abnormality in engine controller power source	S	G mode	CALL
E0402	Abnormality in engine controller	S	G mode	CALL
E0405	Abnormality in fuel control dial system	S	G mode	CALL03
E0406	Abnormality in decelerator potentiometer system	S	G mode	CALL03
E0409	Abnormality in engine Ne speed sensor system	E	G mode	CALL03
E0410	Abnormality in engine G speed sensor system	E	G mode	CALL03
E0430	Abnormality in engine oil pressure	E	M mode	CALL
E0432	Abnormality in engine water temperature	E	M mode	E01
E0436	Abnormality in network system (engine controller)	S	N mode	CALL03
E0458	Short circuit in fuel injector No. 1/No. 2/No. 3 system	S	G mode	CALL03
E0459	Short circuit in fuel injector No. 4/No. 5/No. 6 system	S	G mode	CALL03
E0460	Abnormality in controller drive circuit	S	G mode	CALL03
E0461	Disconnection in fuel injector No. 1 system	S	G mode	E02
E0462	Disconnection in fuel injector No. 2 system	S	G mode	E02
E0463	Disconnection in fuel injector No. 3 system	S	G mode	E02
E0464	Disconnection in fuel injector No. 4 system	S	G mode	E02
E0465	Disconnection in fuel injector No. 5 system	S	G mode	E02
E0466	Disconnection in fuel injector No. 6 system	S	G mode	E02
E0468	Overcurrent in fuel supply pump PCV1 system	S	G mode	CALL03

Service code	Contents of abnormality	Reproduction method	Trouble-shooting mode	User code
E0469	Disconnection in fuel supply pump PCV1 system	S	G mode	CALL03
E0470	Overcurrent in fuel supply pump PCV2 system	S	G mode	CALL03
E0471	Disconnection in fuel supply pump PCV2 system	S	G mode	CALL03
E0472	Abnormality in boost pressure sensor system	E	G mode	E02
E0474	Abnormality in common rail fuel pressure sensor system	E	G mode	CALL03
E0476	Abnormality in high engine water temperature sensor system	E	G mode	E01
E0478	Abnormality in low engine water temperature sensor system	E	G mode	E02
E0480	Abnormality in common rail fuel pressure	E	G mode	CALL03
E0481	Abnormality in high common rail fuel pressure 1	E	G mode	CALL03
E0482	Abnormality in high common rail fuel pressure 2	E	G mode	CALL03
E0483	No-pressure feed by fuel supply pump 1	E	G mode	CALL03
E0484	No-pressure feed by fuel supply pump 2	E	G mode	CALL03
E0487	Abnormality in engine oil pressure switch system	E	G mode	E01
E0488	Abnormality in power source system 1	S	G mode	CALL
E0489	Abnormality in power source system 2	S	G mode	E02
E0490	Abnormality in Q regulator switch signal	S	G mode	E02
E0491	Short circuit in starting switch C system	E	G mode	CALL
E0493	Abnormality in fuel temperature sensor system	E	G mode	E01
E0610	Disconnection in backup alarm relay system	S+	E mode	E01
E0611	Short circuit in backup alarm relay system	S+	E mode	E01
E0730	Abnormality in both steering potentiometer systems 1 and 2	E+	E mode	CALL03
E0731	Large difference between signal values of steering potentiometer systems 1 and 2 I	E+	E mode	CALL03
E0732	Abnormality in one steering potentiometer system and large deviation of neutral position of other system	E+	E mode	CALL03
E0733	Abnormality in steering potentiometer system 1	E+	E mode	CALL03
E0734	Abnormality in steering potentiometer system 2	E+	E mode	CALL03
E0735	Large difference between signal values of steering potentiometer systems 1 and 2 II	E+	E mode	CALL03
E0768	Disconnection in steering oil pressure sensor A system	E+	E mode	CALL03
E0769	Short circuit in steering oil pressure sensor A system	E+	E mode	CALL03
E0770	Disconnection in steering oil pressure sensor B system	E+	E mode	CALL03
E0771	Short circuit in steering oil pressure sensor B system	E+	E mode	CALL03
E0772	Disconnection in HSS pump solenoid A system	S+	E mode	CALL03
E0773	Short circuit in HSS pump solenoid A system	S+	E mode	CALL03
E0774	Disconnection in HSS pump solenoid B system	S+	E mode	CALL03
E0775	Short circuit in HSS pump solenoid B system	S+	E mode	CALL03
E0930	Abnormality in engine speed sensor system	E+	E mode	E01

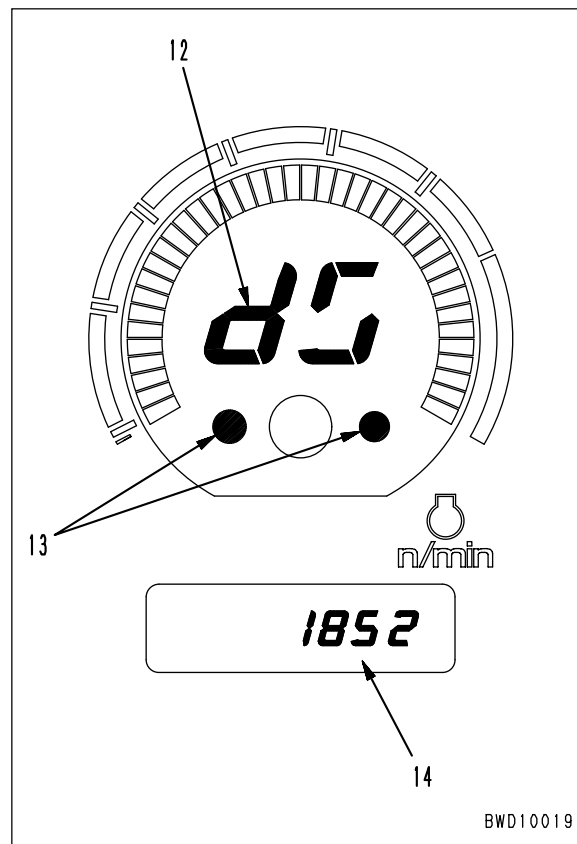
- ★ Reproduction method
  - S: Service code reproduced by turning the starting switch ON
  - S+: Service code reproduced by turning the starting switch ON and operating the corresponding switch or lever
  - E: Service code reproduced by starting the engine
  - E+: Service code reproduced by starting the engine and operating the corresponding switch or lever
- ★ Troubleshooting mode
  - N mode: Troubleshooting of network system (N mode)
  - G mode: Troubleshooting of engine controller system (G mode)
  - E mode: Troubleshooting of HSS controller system and electric system (E mode)
  - M mode: Troubleshooting of monitor panel system (M mode)
- ★ Method of reproducing service codes and confirming resetting of them

Reproduce the service codes and confirm resetting of them after the repair according to the following procedure.

  - 1) Select the service code display mode and check the displayed service codes.
    - ★ Record the all service codes.
  - 2) Delete the service codes.
    - ★ Turn mode selector switch downwards.
  - 3) Reproduce the all service codes which have been displayed.
    - ★ For the reproduction method, see the above list or the text of troubleshooting.
  - 4) Confirm that the service codes are "displayed" or "not displayed" in the service code display unit.

**5. Display function in adjustment mode**

- 1) Adjustment items (12) are displayed.
- 2) Adjustment mode marks (13) light up (on both sides).
- 3) Adjustment value (14) is displayed.
  - i) HSS neutral adjustment mode "HN" is displayed.
  - ii) HSS initial current adjustment mode "CC" is displayed.
  - iii) Reduced cylinder mode (EO) is displayed.

**Adjustment code Nos. and adjustment items**

Code No.	Adjustment item	Contents
HN	HSS neutral adjustment mode	A machine equipped with the HSS steering system may turn in either direction while the lever is in neutral because of dispersion of the pump output, etc. This mode is used to slant the swash plate to prevent the machine from turning while the lever is in neutral. (For details of usage of this mode, see TESTING AND ADJUSTING.)
CC	HSS initial current adjustment mode	When an operator steers a machine equipped with the HSS steering system, he (she) may feel the steering condition differently between the steering directions in the initial period of steering. This mode is used to change the initial current for the period just after steering is started to solve the above problem. (For details of usage of this mode, see TESTING AND ADJUSTING.)
E0	Reduced cylinder mode	This mode is used to stop one or more injectors of a common rail engine to find out an abnormal injector. (For details of usage of this mode, see TESTING AND ADJUSTING.)

## HOW TO READ JUDGMENT TABLE

This judgment table is used to see if each machine trouble is caused by a fault of the engine system, hydraulic and mechanical system or electrical system, then go to the troubleshooting code (S-○○, E-○○, H-○○) matched to the trouble.

- ★ Trouble with the monitor panel are not contained in this judgment table.  
If the monitor panel has any trouble, go to "TROUBLESHOOTING FOR MONITOR PANEL SYSTEM (M-MODE)" directly.

<Using procedure>

1. Specify each machine trouble in the column of Trouble (Trouble code), then go to the right section of the table.
2. If there is ● or ◆ in a box of the table, judge by the item in the upper box to determine the moving direction.  
When there is ●: Referring to "INDICATION ON LED OF HSS CONTROLLER", check the error code displayed by the HSS controller.  
When there is ◆: Insert a T-branch in the blade pitch solenoid valve (CN-454) or ripper pin-puller solenoid valve (CN-246), and see if the operation of the blade pitch switch or ripper pin-puller switch and the ON/OFF operation of the solenoid valve input voltage are normal.
3. Go to the trouble code at the bottom of the judgment table according to the judgment result or go to the right of the table further.  
When there is ●: If the concerned error code is displayed, go to the trouble code at the bottom of the judgment table.  
If the concerned error code is not displayed, go to the right of the table further.  
When there is ◆: If the solenoid valve input voltage is not turned on/off normally, go to the trouble code at the bottom of the judgment table.  
If the solenoid valve input voltage is turned on/off normally, go to the right of the table further.





# JUDGMENT TABLE FOR ENGINE SYSTEM, HYDRAULIC AND MECHANICAL SYSTEM, AND ELECTRICAL SYSTEM

<div> <div>Judgment item</div> <div>Trouble (Trouble code)</div> </div>		Indication by LED of HSS controller (Error code)								
		19	20	21	22	23	24	25	26	27
Engine system	Engine does not start easily (It always takes long time to start engine).									
	Engine does not start.	Engine does not rotate.								
		Engine rotates but does not discharge exhaust gas.								
		Engine discharges exhaust gas but does not start (Fuel is injected).								
	Engine speed does not rise sharply.									
	Engine stops during operation.									
	Engine rotation is irregular (hunts).									
	Output is insufficient or power is low.									
	Exhaust gas black (Incomplete combustion)									
	Oil consumption is excessive or exhaust gas is blue.									
	Oil becomes dirty prematurely.									
	Fuel consumption is excessive.									
	Coolant contains oil, blows back or reduces.									
	Oil pressure caution lamp lights up.									
	Oil level rises (Oil contains water or fuel).									
	Coolant temperature rises too high (Overheating).									
	Abnormal sound is generated.									
	There is excessive vibration.									
Power train system	Machine does not move or moves slowly at any gear speed in each direction.									
	Machine does not move or travel power is low in one direction.									
	Machine does not move or moves slowly at specific gear speed.									
	Long time lag is made in changing travel direction or gear speed.									
	Travel power (Drawbar pull) is low.									
	Machine cannot be steered (to one direction).					●				
	Steering speed or power is low.	●	●	●	●					
	Steering direction is reversed in reverse travel.									
	Machine steers by itself in neutral position (during travel or at standstill).					●				
	If machine is steered, engine stops.	●	●	●	●					
	Abnormal sound comes out of HSS pump or HSS motor.									
	Brake does not work.									
	Power train oil overheats.									
	Backup alarm does not sound.									
Work equipment system	Work equipment does not work at all.									
	Work equipment speed or power is low.									
	Blade lifting speed or power is low.									
	Blade tilting speed or power is low.									
	Ripper lifting speed or power is low.									
	Ripper tilting speed or power is low.									
	Hydraulic drift is large in blade lifting direction.									
	Hydraulic drift is large in blade tilting direction.									
	Hydraulic drift is large in ripper lifting direction.									
	Blade pitch does not work normally (When equipped with pitch dozer).									
	Ripper pin puller does not work normally (When equipped with giant ripper).									
	Abnormal sound comes out of work equipment pump.									
Troubleshooting code		E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9

Indication by LED of HSS controller (Error code)																		Blade pitch solenoid valve	Ripper pin-puller solenoid valve	Troubleshooting code
29	51	52	53	54	57	62	6d	6E	64	65	66	67	70	71	8d	99	E0	Measure- ment of voltage	Measure- ment of voltage	
																				S-1
																				E-31
																				S-2
																				S-3
																				S-4
																				S-5
																				S-6
																				S-7
																				S-8
																				S-9
																				S-10
																				S-11
																				S-12
																				S-13
																				S-14
																				S-15
																				S-16
																				H-1
																				H-2
																				H-3
																				H-4
																				H-5
						●	●	●	●	●	●	●								H-6
													●	●						H-7
																●				-
●						●	●	●	●	●	●	●					●			-
													●	●						-
●																				H-8
																				H-9
																				H-10
			●	●																E-28
																				H-11
																				H-12
																				H-13
																				H-14
																				H-15
																				H-16
																				H-17
																				H-18
																				H-19
																		◆		H-20
																			◆	H-21
																				H-22
E-10	E-11	E-12	E-13	E-14	E-15	E-16	E-17	E-18	E-19	E-20	E-21	E-22	E-23	E-24	E-25	E-26	E-27	E-29	E-30	

## METHOD OF USING TROUBLESHOOTING CHARTS

### 1. Category of troubleshooting code number

Serial No. 70001 – 75000

Troubleshooting code No.	Component
S-〇〇	Troubleshooting of engine
E-〇〇	Troubleshooting of HSS controller and electrical system
H-〇〇	Troubleshooting of hydraulic and mechanical system
M-〇〇	Troubleshooting of monitor system

Serial No. 75001 and up

Troubleshooting code No.	Component
N-〇〇	Troubleshooting of network system
G-〇〇	Troubleshooting of engine controller system
E-〇〇	Troubleshooting of HSS controller system and electric system
H-〇〇	Troubleshooting of hydraulic system and mechanical systems
M-〇〇	Troubleshooting of monitor panel system and electric parts system

### 2. Method of using troubleshooting table for each troubleshooting mode

#### ① Troubleshooting code number and problem

The title of the troubleshooting chart gives the troubleshooting code and failure mode (problem with the machine).

#### ② General precautions

When carrying out troubleshooting for the failure mode (problem), precautions that apply to all items are given at the top of the page and marked with ★.

The precautions marked ★ are not given in the , but must always be followed when carrying out the check inside the .

#### ③ Distinguishing conditions

Even with the same failure mode (problem), the method of troubleshooting may differ according to the model, component, or problem. In such cases, the failure mode (problem) is further divided into sections marked with small letters (for example, a), b)), so go to the appropriate section to carry out troubleshooting.

If the troubleshooting table is not divided into sections, start troubleshooting from the first check item in the failure mode.

#### ④ Method of following troubleshooting chart

- Check or measure the item inside 

YES  
NO

, and according to the answer follow either the YES line or the NO line to go to the next . (Note: The number written at the top right corner of the  is an index number; it does not indicate the order to follow.)
- Following the YES or NO lines according to the results of the check or measurement will lead finally to the Cause column.  
Check the cause and take the action given in the Remedy column on the right.
- Below the  there are the methods for inspection or measurement, and the judgement values. If the judgement values below the  are correct or the answer to the question inside the  is YES, follow the YES line; if the judgement value is not correct, or the answer to the question is NO, follow the NO line.
- Below the  is given the preparatory work needed for inspection and measurement, and the judgement values. If this preparatory work is neglected, or the method of operation or handling is mistaken, there is danger that it may cause mistaken judgement, or the equipment may be damaged. Therefore, before starting inspection or measurement, always read the instructions carefully, and carry out the work in the correct order.

#### ⑤ Troubleshooting tools

When carrying out the troubleshooting, prepare the necessary troubleshooting tools. For details, see TOOLS FOR TESTING, ADJUSTING, AND TROUBLESHOOTING.

#### ⑥ Installation position, pin number

A diagram or chart is given for the connector type, installation position, and connector pin number connection. When carrying out troubleshooting, see this chart for details of the connector pin number and location for inspection and measurement of the wiring connector number appearing in the troubleshooting flow chart for each failure mode (problem).

# TROUBLESHOOTING OF NETWORK SYSTEM (N MODE)

[Serial No. 75001 and up]

Action taken by controller when abnormality occurs and problems on machine .....	20-252
N mode system electrical circuit diagram .....	20-254
Service codes of network system .....	20-255
N-1 [E0101] (Abnormality in network system: engine controller system) is displayed .....	20-256
N-2 [E0104] (Abnormality in network system: monitor panel system) is displayed .....	20-257
N-3 [E0105] (Abnormality in network system: HSS controller system) is displayed .....	20-258
N-4 [E0101], [E0104], and [E0105] (Abnormality in network system) are displayed at same time ....	20-259
N-5 [E0152] (Abnormality in network system: HSS controller system) is displayed .....	20-260
N-6 [E0165] (Error in network communication) is displayed .....	20-261
N-7 [E0436] (Abnormality in network system: engine controller) is displayed .....	20-262

- ★ This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the monitor code display returns to normal, the problem has been removed.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

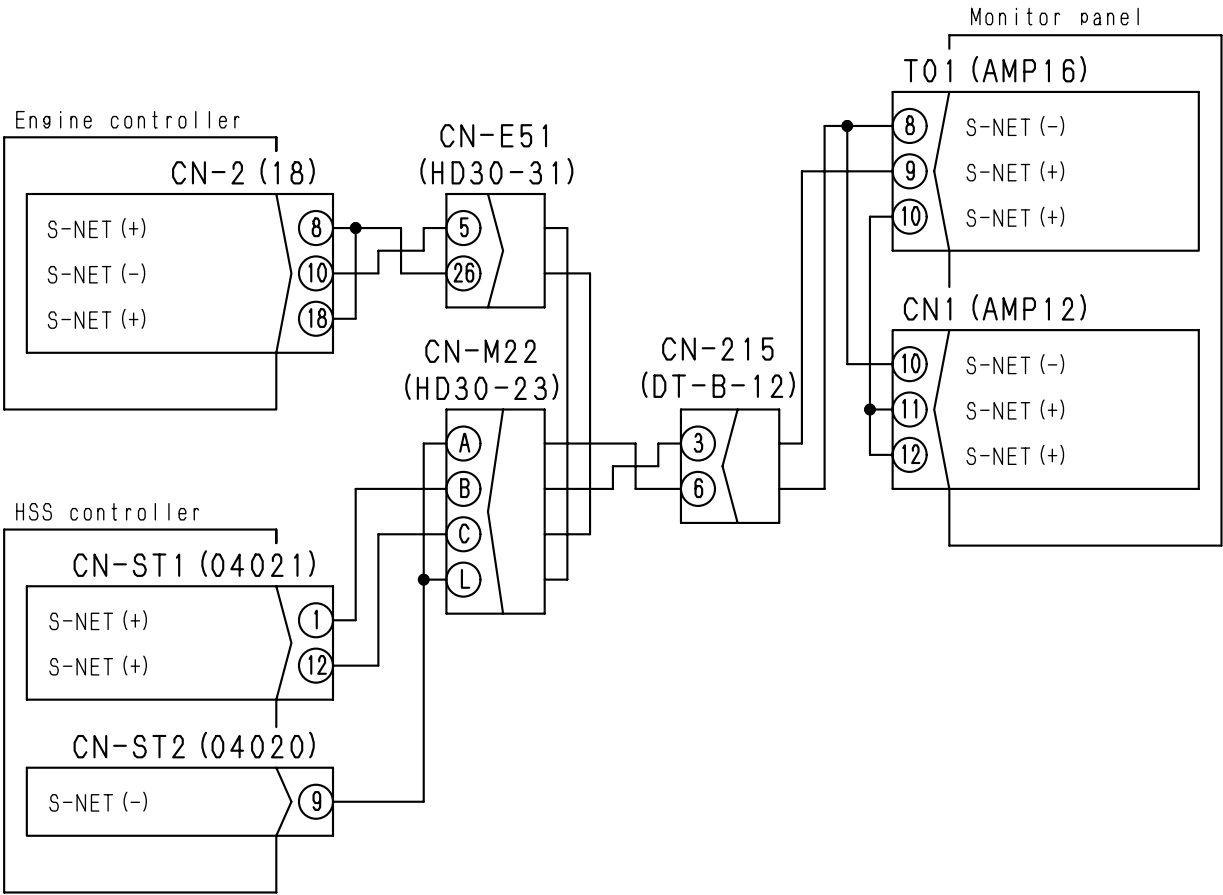
ACTION TAKEN BY CONTROLLER WHEN ABNORMALITY  
OCCURS AND PROBLEMS ON MACHINE

User code	Service code	Abnormal system	Contents of abnormality
CALL03	E0101	Abnormality in network system (engine controller system)	※ When monitor panel detects abnormality in network of engine controller system <ul style="list-style-type: none"> <li>When service code E0101 is displayed singly               <ol style="list-style-type: none"> <li>Disconnection or defective contact in wiring harness between monitor panel T01 (9) - engine controller CN-2 (8), (18)</li> <li>Defective engine controller</li> </ol> </li> <li>When service code E0101 is displayed together with E0104 and E0105               <ol style="list-style-type: none"> <li>Disconnection, defective contact, short circuit with chassis ground, or short circuit with power source in wiring harness between monitor panel T01 (10) - monitor panel CN1 (11), (12) - monitor panel T01 (9) - HSS controller CN-ST1 (1) - HSS controller CN-ST1 (12) - engine controller CN-2 (8), (18)</li> <li>Defective monitor panel (Tachometer module)</li> </ol> </li> </ul>
	E0104	Abnormality in network system (monitor panel system)	※ When monitor panel detects abnormality in network of monitor panel (caution module) system <ul style="list-style-type: none"> <li>When service code E0104 is displayed singly               <ol style="list-style-type: none"> <li>Disconnection or defective contact in wiring harness between monitor panel T01 (10) - monitor panel CN1 (11), (12)</li> <li>Defective monitor panel (caution module)</li> </ol> </li> <li>When service code E0104 is displayed together with E0101 and E0105               <ol style="list-style-type: none"> <li>Disconnection, defective contact, short circuit with chassis ground, or short circuit with power source in wiring harness between monitor panel T01 (10) - monitor panel CN1 (11), (12) - monitor panel T01 (9) - HSS controller CN-ST1 (1) - HSS controller CN-ST1 (12) - engine controller CN-2 (8), (18)</li> <li>Defective monitor panel (Tachometer module)</li> </ol> </li> </ul>
	E0105	Abnormality in network system (HSS controller system)	※ When monitor panel detects abnormality in network of HSS controller system <ul style="list-style-type: none"> <li>When service code E0105 is displayed singly               <ol style="list-style-type: none"> <li>Disconnection or defective contact in wiring harness between monitor panel T01 (9) - HSS controller CN-ST1 (1)</li> <li>Defective HSS controller</li> </ol> </li> <li>When service code E0105 is displayed together with E0101 and E0104               <ol style="list-style-type: none"> <li>Disconnection, defective contact, short circuit with chassis ground, or short circuit with power source in wiring harness between monitor panel T01 (9) - HSS controller CN-ST1 (1), (12) - engine controller CN-2 (8), (18)</li> <li>Defective monitor panel (Tachometer module)</li> </ol> </li> </ul>
	E0152	Abnormality in network system	※ When HSS controller detects abnormality in network <ul style="list-style-type: none"> <li>When service code E0152 is displayed singly               <ol style="list-style-type: none"> <li>Defective HSS controller</li> </ol> </li> <li>When service code E0152 is displayed together with E0101, E0104, and E0105               <ul style="list-style-type: none"> <li>★ Same as each service code</li> </ul> </li> </ul>
	E0165	Error in network communication	<ol style="list-style-type: none"> <li>Defective monitor panel</li> <li>Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST1 (1) - monitor panel T01 (9)</li> </ol>
	E0436	Abnormality in network system	※ When engine controller detects abnormality in network <ul style="list-style-type: none"> <li>When service code E0436 is displayed singly               <ol style="list-style-type: none"> <li>Defective engine controller</li> </ol> </li> <li>When service code E0436 is displayed together with E0101, E0104, and E0105               <ul style="list-style-type: none"> <li>★ Same as each service code</li> </ul> </li> </ul>

Normal condition (Voltage, current, resistance)	Action taken by controller when abnormality occurs	Problems on machine
	1. Flashes caution lamp. 2. Turns on caution buzzer.	
	1. Flashes caution lamp. 2. Turns on caution buzzer.	
	1. Flashes caution lamp. 2. Turns on caution buzzer.	1. Gear speed cannot be displayed. 2. Tachometer is not displayed. 3. Lock-up lamp goes off.
		1. Gear speed cannot be displayed. 2. Tachometer is not displayed. 3. Lock-up lamp goes off.
		1. Gear speed cannot be displayed. 2. Tachometer is not displayed. 3. Warning lamp and buzzer do not work.

N MODE SYSTEM ELECTRICAL CIRCUIT DIAGRAM

Engine controller system



BJD10043



## SERVICE CODES OF NETWORK SYSTEM

The monitor panel, engine controller, and HSS controller form a network as shown in the "N mode system electrical circuit diagram".

The monitor panel, engine controller, and HSS controller monitor the communication condition of the network respectively. If any abnormality occurs, these controllers display the service code corresponding to that abnormality.

1) Monitor panel

The monitor panel monitors the communication condition of the network components and displays the following service codes when an abnormality occurs.

- (1) E0101: When abnormality occurs in the engine controller system
- (2) E0104: When abnormality occurs in the monitor panel (caution module)
- (3) E0105: When abnormality occurs in the HSS controller

2) Engine controller

The engine controller monitors the communication condition of the whole network and displays the following service codes when an abnormality occurs.

- (4) E0152: When abnormality occurs in any system in the whole network (The abnormal system is not specified)

3) HSS controller

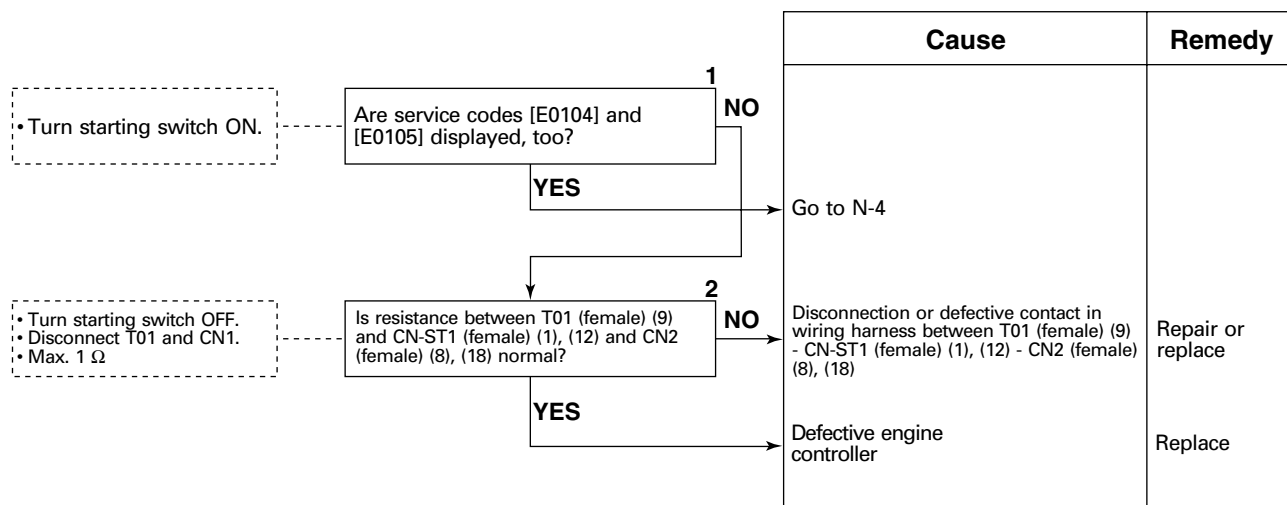
The HSS controller monitors the communication condition of the whole network and displays the following service codes when an abnormality occurs.

- (4) E0436: When abnormality occurs in any system in the whole network (The abnormal system is not specified)

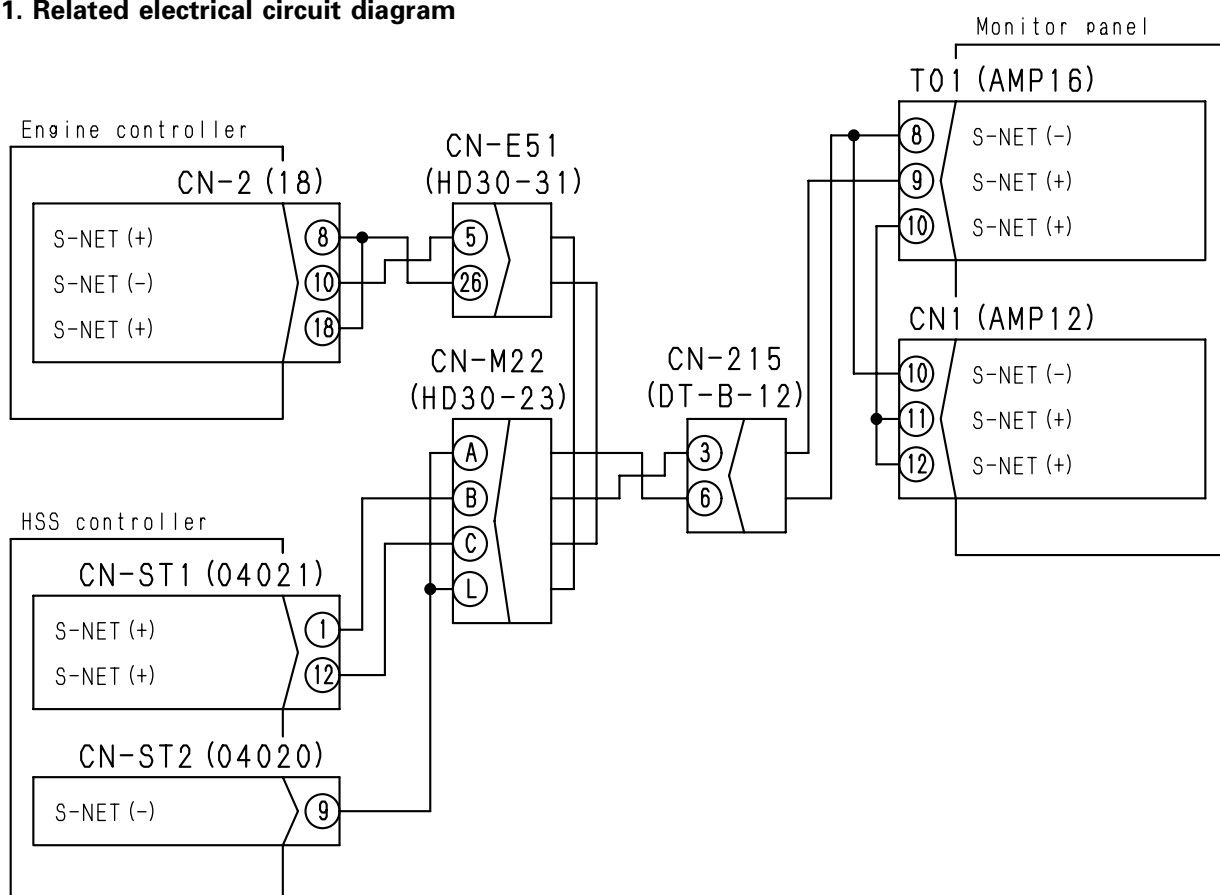
As the network is monitored by multiple devices as explained above, if any abnormality occurs in the network system, multiple service codes are displayed simultaneously.

It is important to understand which system each service code indicates by using the monitoring mode, etc. before starting troubleshooting.

**N-1 [E0101] (Abnormality in network system: engine controller system) is displayed**



**N-1. Related electrical circuit diagram**



BJD10043

N-2 [E0104] (Abnormality in network system: monitor panel system) is displayed

• Turn starting switch ON.

Are service codes [E0101] and [E0105] displayed, too?

1

YES

NO

• Turn starting switch OFF.  
• Disconnect T01 and CN1.  
• Max. 1 Ω

Is resistance between T01 (female) (10) and T01 (female) (11), (12) normal?

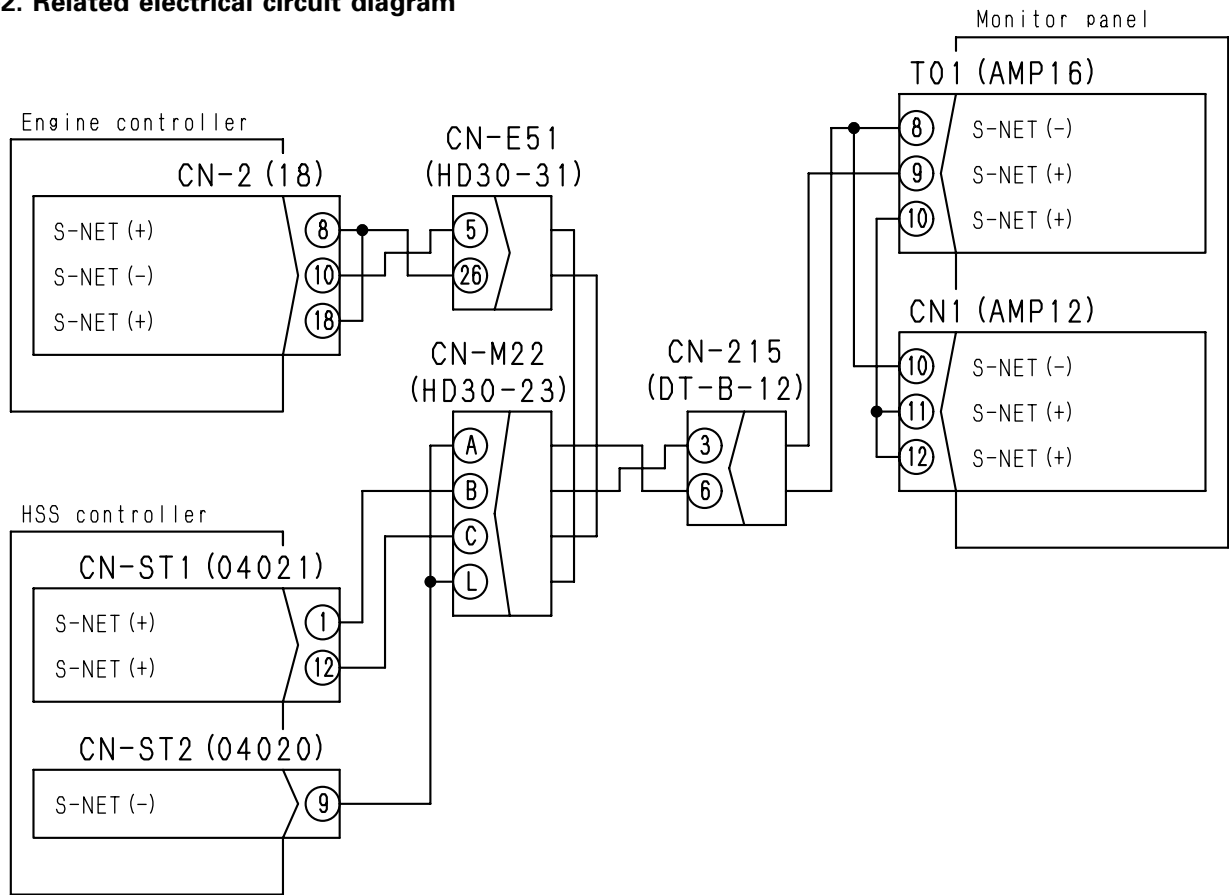
2

YES

NO

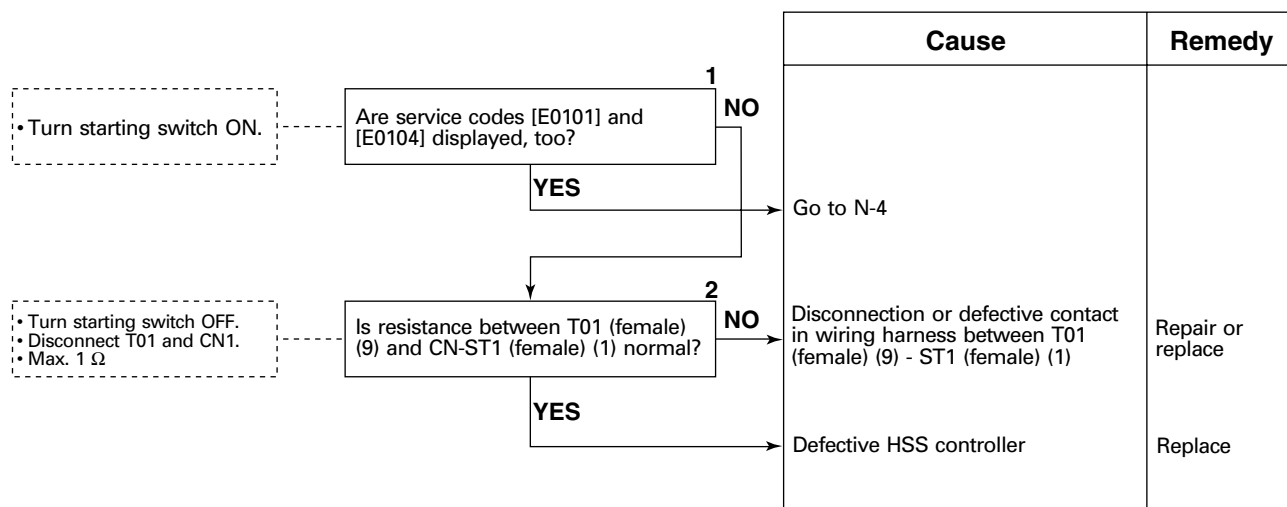
Cause	Remedy
Go to N-4	
Disconnection or defective contact in wiring harness between T01 (female) (10) - T01 (female) (11), (12)	Repair or replace
Defective monitor panel (caution module)	Replace

N-2. Related electrical circuit diagram

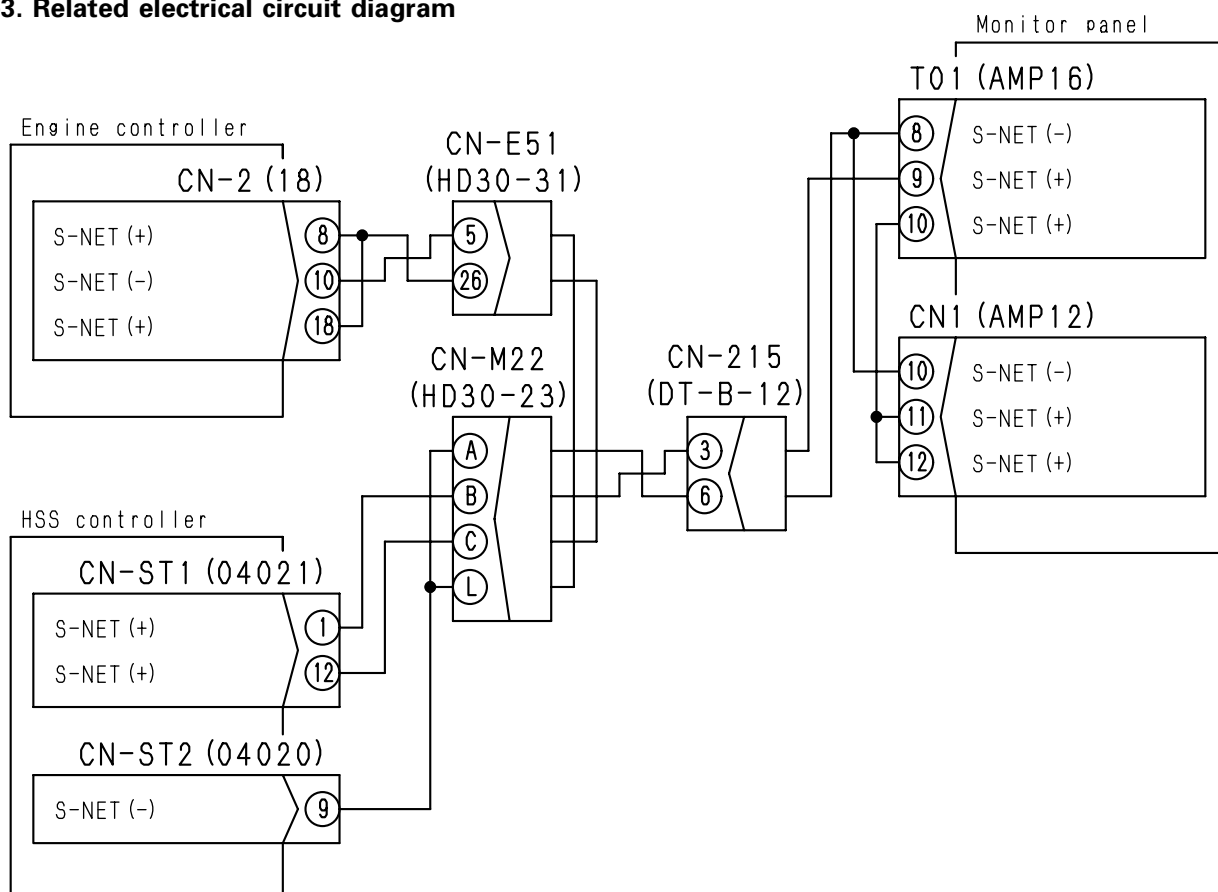


BJD10043

**N-3 [E0105] (Abnormality in network system: HSS controller system) is displayed**



### N-3. Related electrical circuit diagram

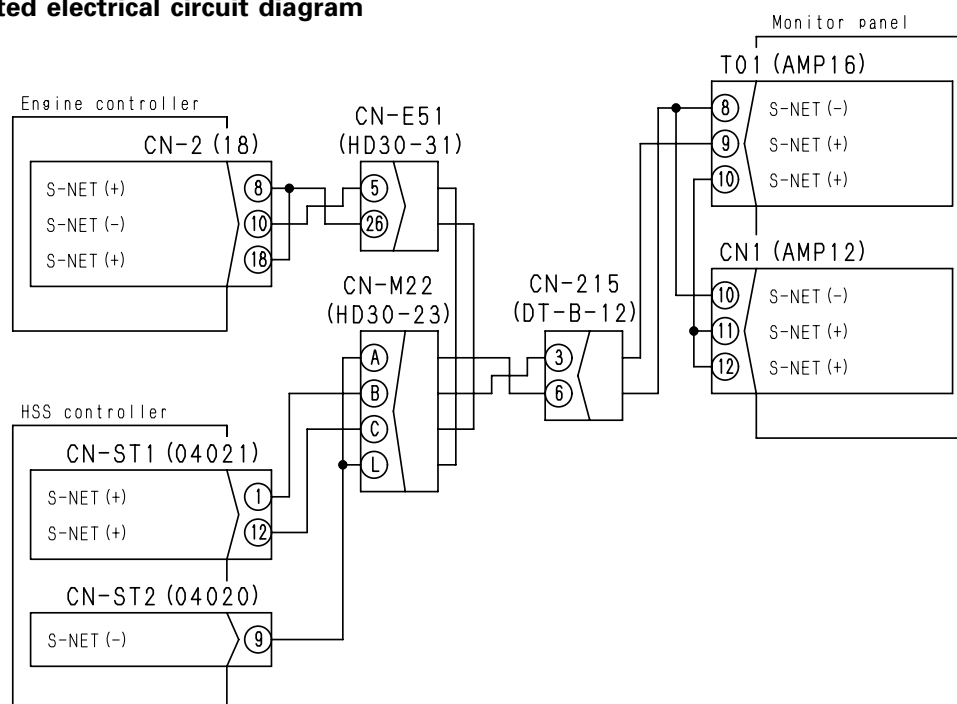


BJD10043

## N-4 [E0101], [E0104], and [E0105] (Abnormality in network system) are displayed at same time

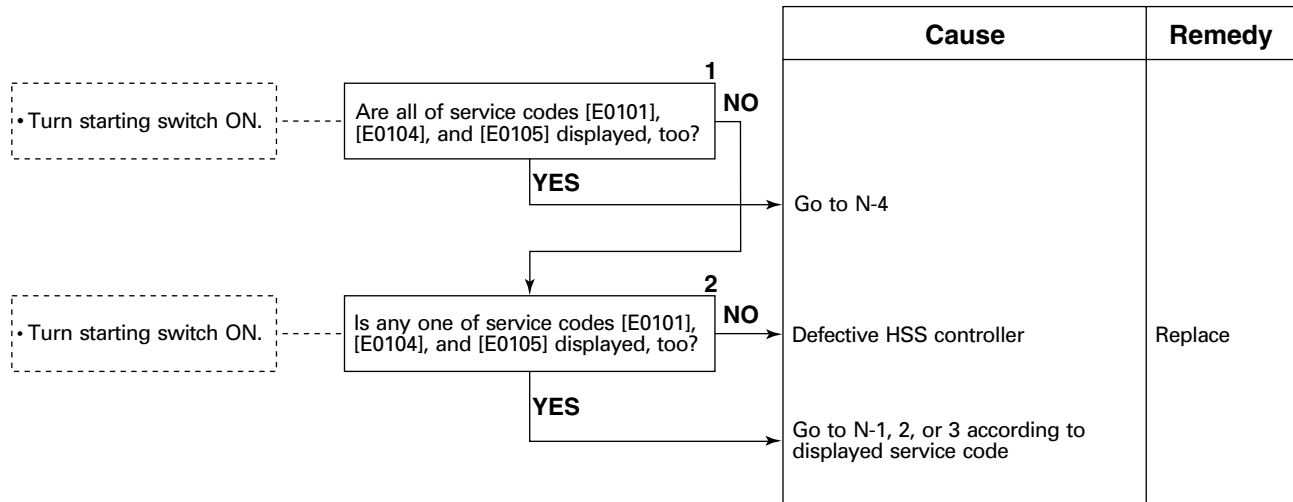
		Cause	Remedy
<div> <div> <ul style="list-style-type: none"> <li>Disconnect CN1.</li> <li>Turn starting switch ON.</li> </ul> </div> <div>When CN1 is disconnected, are all service codes turned off?</div> <div>1</div> </div> <div> <div> <ul style="list-style-type: none"> <li>Disconnect CN-ST1.</li> <li>Turn starting switch ON.</li> </ul> </div> <div>When CN-ST1 is disconnected, are all service codes turned off?</div> <div>2</div> </div> <div> <div> <ul style="list-style-type: none"> <li>Disconnect CN-2.</li> <li>Turn starting switch ON.</li> </ul> </div> <div>When CN-2 is disconnected, are all service codes turned off?</div> <div>3</div> </div> <div> <div> <ul style="list-style-type: none"> <li>Disconnect T01.</li> <li>Turn starting switch ON.</li> <li>Min. 7.5 V</li> </ul> </div> <div>Is voltage between T01 (female) (9) and chassis ground normal?</div> <div>4</div> </div>	<div>NO</div> <div>YES</div> <div>NO</div> <div>YES</div> <div>NO</div> <div>YES</div> <div>NO</div> <div>YES</div>	Defective monitor panel (caution module)	Replace
		Defective HSS controller	Replace
		Defective engine controller	Replace
		Disconnection, defective contact, or short circuit with chassis ground in wiring harness between T01 (10) - CN1 (female) (11), (12) or between T01 (9) - CN-ST1 (female) (1), or between CN-ST1 (female) (12) - CN-2 (female) (8), (13)	Repair or replace
	YES	Defective monitor panel (tachometer module)	Replace

### N-4. Related electrical circuit diagram



BJD10043

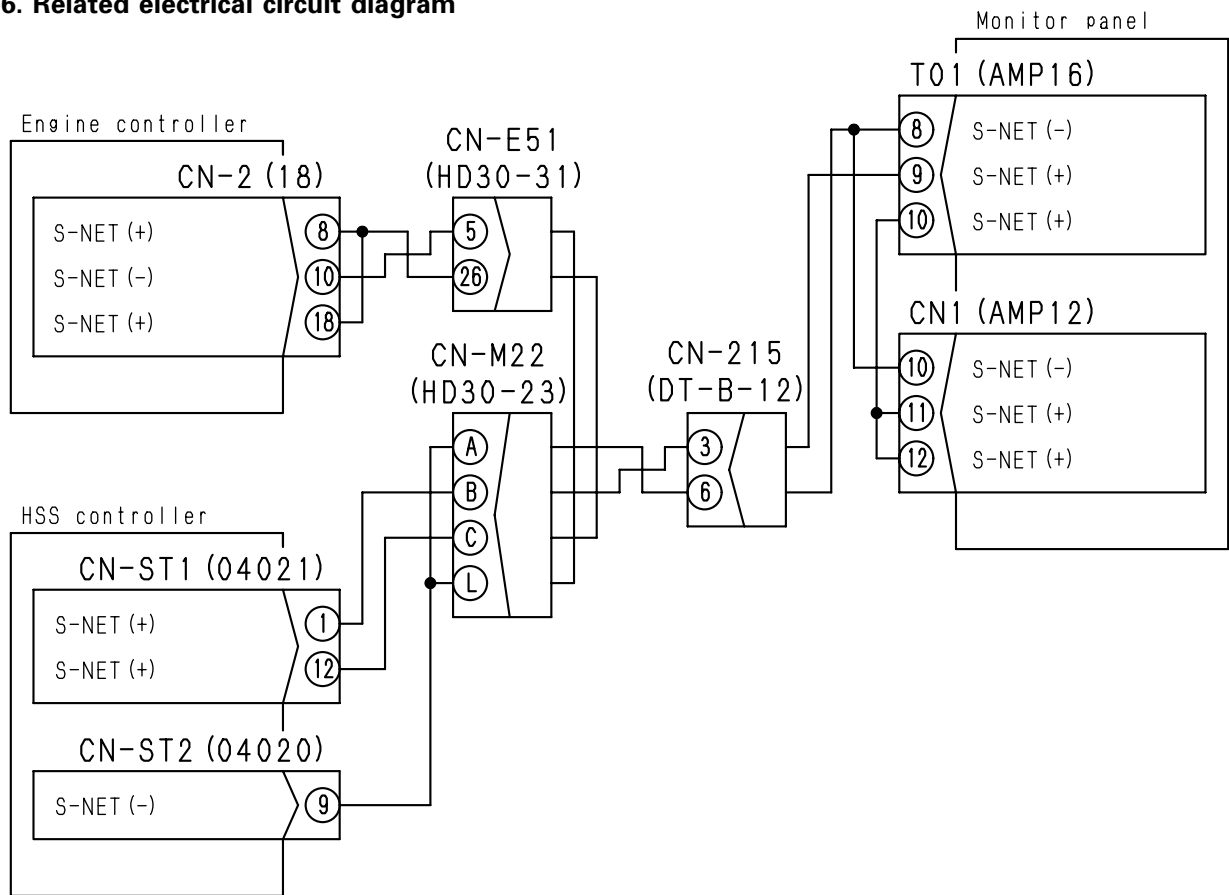
**N-5 [E0152] (Abnormality in network system: HSS controller system) is displayed**



N-6 [E0165] (Error in network communication) is displayed

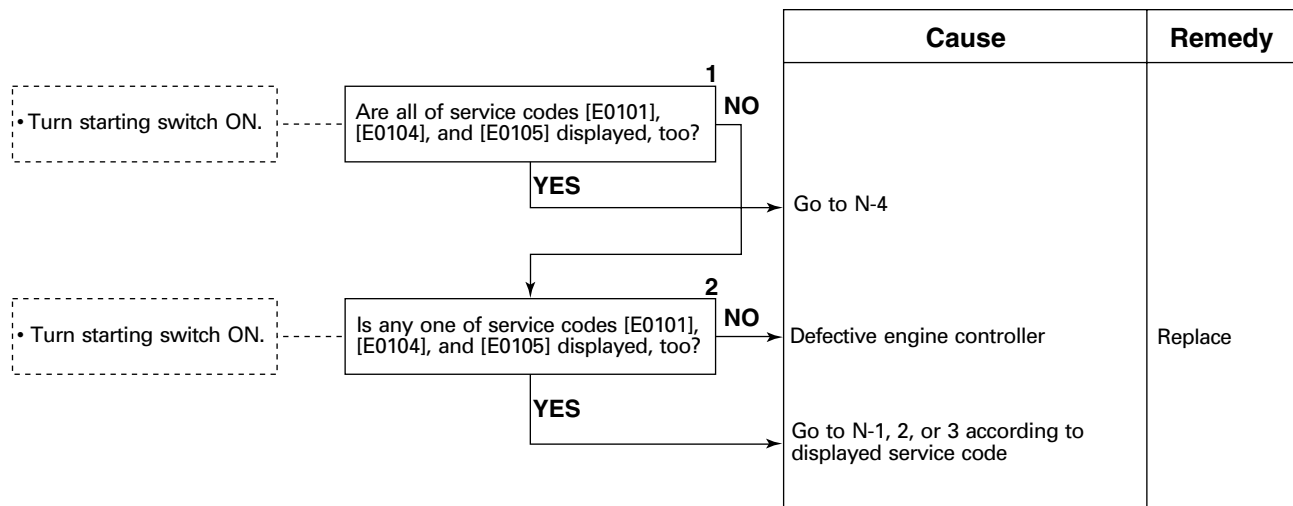
		Cause	Remedy
<div>• Turn starting switch ON.</div>	<div>1</div> <div>Does monitor panel display normally?</div>	NO	Defective monitor panel  Replace
	YES		
<div>• Turn starting switch OFF. • Disconnect T01 and CN-ST1. • Max. 1 Ω</div>	<div>2</div> <div>Is resistance between T01 (female) (9) and CN-ST1 (female) (1) normal?</div>	NO	Disconnection or defective contact in wiring harness between T01 (female) (9) and CN-ST1 (female) (1)  Repair or replace
	YES		Defective HSS controller  Replace

N-6. Related electrical circuit diagram



BJD10043

**N-7 [E0436] (Abnormality in network system: engine controller) is displayed**





# TROUBLESHOOTING OF ENGINE SYSTEM (S MODE)

[Serial No. 70001 – 75000]

Method of using troubleshooting charts .....	20-302
S- 1 Starting performance is poor (starting always takes time) .....	20-306
S- 2 Engine does not start .....	20-307
① Engine turns but exhaust gas does not comes out (fuel is not being injected) .....	20-307
② Exhaust gas comes out but engine does not start (fuel is being injected) .....	20-308
S- 3 Engine does not pick up smoothly (follow-up is poor) .....	20-309
S- 4 Engine stops during operation .....	20-310
S- 5 Engine does not rotate smoothly (hunting) .....	20-311
S- 6 Engine lacks power .....	20-312
S- 7 Exhaust gas is black (incomplete combustion) .....	20-313
S- 8 Oil consumption is excessive (or exhaust gas is blue) .....	20-314
S- 9 Oil becomes contaminated quickly .....	20-315
S-10 Fuel consumption is excessive .....	20-316
S-11 Oil is in cooling water, or water spurts back, or water level goes down .....	20-317
S-12 Oil pressure caution lamp lights up (drop in oil pressure) .....	20-318
S-13 Oil level rises (water or fuel mixed with oil) .....	20-319
S-14 Water temperature becomes too high (overheating) .....	20-320
S-15 Abnormal noise is made .....	20-321
S-16 Vibration is excessive .....	20-322

★ Serial No. 75001 and up: See 140-3 series engine shop manual.

METHOD OF USING TROUBLESHOOTING CHARTS

This troubleshooting chart is divided into three sections: **questions, check items, and troubleshooting**. The questions and check items are used to pinpoint high probability causes that can be located from the failure symptoms or simple inspection without using troubleshooting tools.

Next, troubleshooting tools or direct inspection are used to check the high probability causes to make final confirmation.

[Questions]

Sections ㉠ + ㉢ in the chart on the right correspond to the items where answers can be obtained from the user. The items in ㉢ are items that can be obtained from the user, depending on the user's level.

[Check items]

The serviceman carries out simple inspection to narrow down the causes. The items under ㉣ in the chart on the right correspond to this.

The serviceman narrows down the causes from information ㉠ that he has obtained from the user and the results of ㉣ that he has obtained from his own inspection.

[Troubleshooting]

Troubleshooting is carried out in the order of probability, starting with the causes that have been marked as having the highest probability from information gained from [Questions] and [Check items].

		Causes		
		(1)	(2)	(3)
Question	(a)	○		
	(b)			◎
	(c)		◎	
	(d)	○		
	(e)			○
Check item				
Trouble-shooting	i	●		
	ii		●	
	iii			●

# TROUBLESHOOTING OF HSS CONTROLLER AND ELECTRICAL SYSTEM (E MODE)

[Serial No. 70001 – 75000]

Action taken by controller when abnormality occurs and problems on machine .....	20-402
Electrical circuit diagram for E mode .....	20-410
E-1. [19] (Short circuit in steering oil pressure sensor system A) is displayed .....	20-412
E-2. [20] (Disconnection in steering oil pressure sensor system A) is displayed .....	20-413
E-3. [21] (Short circuit in steering oil pressure sensor system B) is displayed .....	20-414
E-4. [22] (Disconnection in steering oil pressure sensor system B) is displayed .....	20-415
E-5. [23] (Trouble of steering potentiometer systems 1 and 2) is displayed .....	20-416
E-6. [24] (Disconnection in steering potentiometer system 1) is displayed .....	20-417
E-7. [25] (Short circuit in steering potentiometer system 1) is displayed .....	20-418
E-8. [26] (Disconnection in steering potentiometer system 2) is displayed .....	20-419
E-9. [25] (Short circuit in steering potentiometer system 2) is displayed .....	20-420
E-10. [29] (Trouble of engine rotation sensor system) is displayed .....	20-421
E-11. [51] (Short circuit in travel reverse sensing potentiometer system) is displayed .....	20-422
E-12. [52] (Disconnection in travel reverse sensing potentiometer system) is displayed .....	20-423
E-13. [53] (Disconnection in backup alarm relay system) is displayed .....	20-425
E-14. [54] (Short circuit in backup alarm relay system) is displayed .....	20-426
E-15. [57] (Low voltage of controller) is displayed .....	20-427
E-16. [62] (Excessive difference of signal value between steering potentiometer systems 1 and 2) is displayed [I] .....	20-428
E-17. [6d] (Excessive difference of signal value between steering potentiometer systems 1 and 2) is displayed [II] .....	20-429
E-18. [6E] (Trouble of either abnormality in steering potentiometer system and excessive deviation of neutral point) is indicated .....	20-430
E-19. [64] (Disconnection in HSS pump solenoid valve system A) is displayed .....	20-431
E-20. [65] (Short circuit in HSS pump solenoid valve system A) is displayed .....	20-432
E-21. [66] (Disconnection in HSS pump solenoid valve system B) is displayed .....	20-433
E-22. [67] (Short circuit in HSS pump solenoid valve system B) is displayed .....	20-434
E-23. [70] (Short circuit in work equipment circuit oil pressure sensor system) is displayed ....	20-435
E-24. [71] (Disconnection in work equipment circuit oil pressure sensor system) is displayed ....	20-436
E-25. [8d] (System network communication error) is displayed .....	20-437
E-26. [99] (Disagreement of reverse sensing potentiometer and backup alarm switch signals with each other) is displayed .....	20-438
E-27. [E0] (Trouble of offset current memory) is displayed .....	20-440
E-28. Backup alarm does not sound .....	20-441
E-29. Blade pitch does not work normally (When equipped with pitch dozer) .....	20-442
E-30. Ripper pin puller does not work normally (When equipped with giant ripper) .....	20-444
E-31. Engine does not start (Engine does not rotate) .....	20-446

ACTION TAKEN BY CONTROLLER WHEN ABNORMALITY  
OCCURS AND PROBLEMS ON MACHINE

Error code	Abnormal system	Nature of abnormality	Condition when normal (voltage, current, resistance)
19	Short circuit in steering oil pressure sensor system A	※ When signal voltage of oil pressure sensor A exceeds 6.000V 1. Defective steering oil pressure sensor A 2. Short circuit with power source in wiring harness between controller CN-2H2 (1) – oil pressure sensor STHP1 (3) 3. Defective contact or disconnection in wiring harness between controller CN-2H1 (9) – oil pressure sensor STHP1 (1) 4. Defective HSS controller	• Voltage between CN-2H2 (1) – CN-2H1 (9) When steering system is in neutral: 0.90 – 1.50V When steering system is relieved: 3.95 – 4.60V (Both sides)
20	Disconnection in steering oil pressure sensor system A	※ When signal voltage of oil pressure sensor A drops below 0.500V 1. Defective steering oil pressure sensor A 2. Defective contact or disconnection in wiring harness between fuse 5 – oil pressure sensor STHP1 (2) 3. Defective contact, disconnection or short circuit with chassis ground in wiring harness between controller CN-2H2 (1) – oil pressure sensor STHP1 (2) 4. Defective HSS controller	• Voltage between CN-2H2 (1) – CN-2H1 (9) When steering system is in neutral: 0.90 – 1.50V When steering system is relieved: 3.95 – 4.60V (Both sides)
21	Short circuit in steering oil pressure sensor system B	※ When signal voltage of oil pressure sensor A exceeds 6.000V 1. Defective steering oil pressure sensor B 2. Short circuit with power source in wiring harness between controller CN-2H2 (9) – oil pressure sensor STHP2 (3) 3. Defective contact or disconnection in wiring harness between controller CN-2H1 (9) – oil pressure sensor STHP2 (1) 4. Defective HSS controller	• Voltage between CN-2H2 (9) – CN-2H1 (9) When steering system is in neutral: 0.90 – 1.50V When steering system is relieved: 3.95 – 4.60V (Both sides)
22	Disconnection in steering oil pressure sensor system B	※ When signal voltage of oil pressure sensor B lowers below 0.500V 1. Defective steering oil pressure sensor B 2. Defective contact or disconnection in wiring harness between fuse 5 – oil pressure sensor STHP2 (2) 3. Defective contact, disconnection or short circuit with chassis ground in wiring harness between controller CN-2H2 (9) – oil pressure sensor STHP2 (3) 4. Defective HSS controller	• Voltage between CN-2H2 (9) – CN-2H1 (9) When steering system is in neutral: 0.90 – 1.50V When steering system is relieved: 3.95 – 4.60V (Both sides)
23	Trouble of steering potentiometer systems 1 and 2	※ When signal voltages of both steering potentiometer systems 1 and 2 lower below 0.500V or exceed 4.500V	• Voltage between CN-2H1 (19) – (9) (System 1) When steering system is in neutral: 2.4 – 2.6V When machine is fully steered to left: 4.1 – 4.3V When machine is fully steered to right: 0.73 – 0.89V • Voltage between CN-2H1 (20) – (9) (System 2) When steering system is in neutral: 2.4 – 2.6V When machine is fully steered to left: 0.6 – 1.1V When machine is fully steered to right: 3.9 – 4.4V • Sum of above signal voltages of systems 1 and 2 (V <sub>SUM</sub> ) 4.6V ← V <sub>SUM</sub> ← 5.4V
24	Disconnection in steering potentiometer system 1	※ When signal voltage of steering potentiometer system 1 exceeds 4.500V 1. Defective steering potentiometer 2. Defective contact, disconnection or short circuit with power source in wiring harness between controller CN-2H1 (19) – potentiometer CN-STR (3) 3. Defective contact or disconnection in wiring harness between controller CN-2H1 (9) – potentiometer CN-STR (1) 4. Defective HSS controller	• Voltage between CN-2H1 (19) – (9) When steering system is in neutral: 2.4 – 2.6V When machine is fully steered to left: 4.1 – 4.3V When machine is fully steered to right: 0.73 – 0.89V

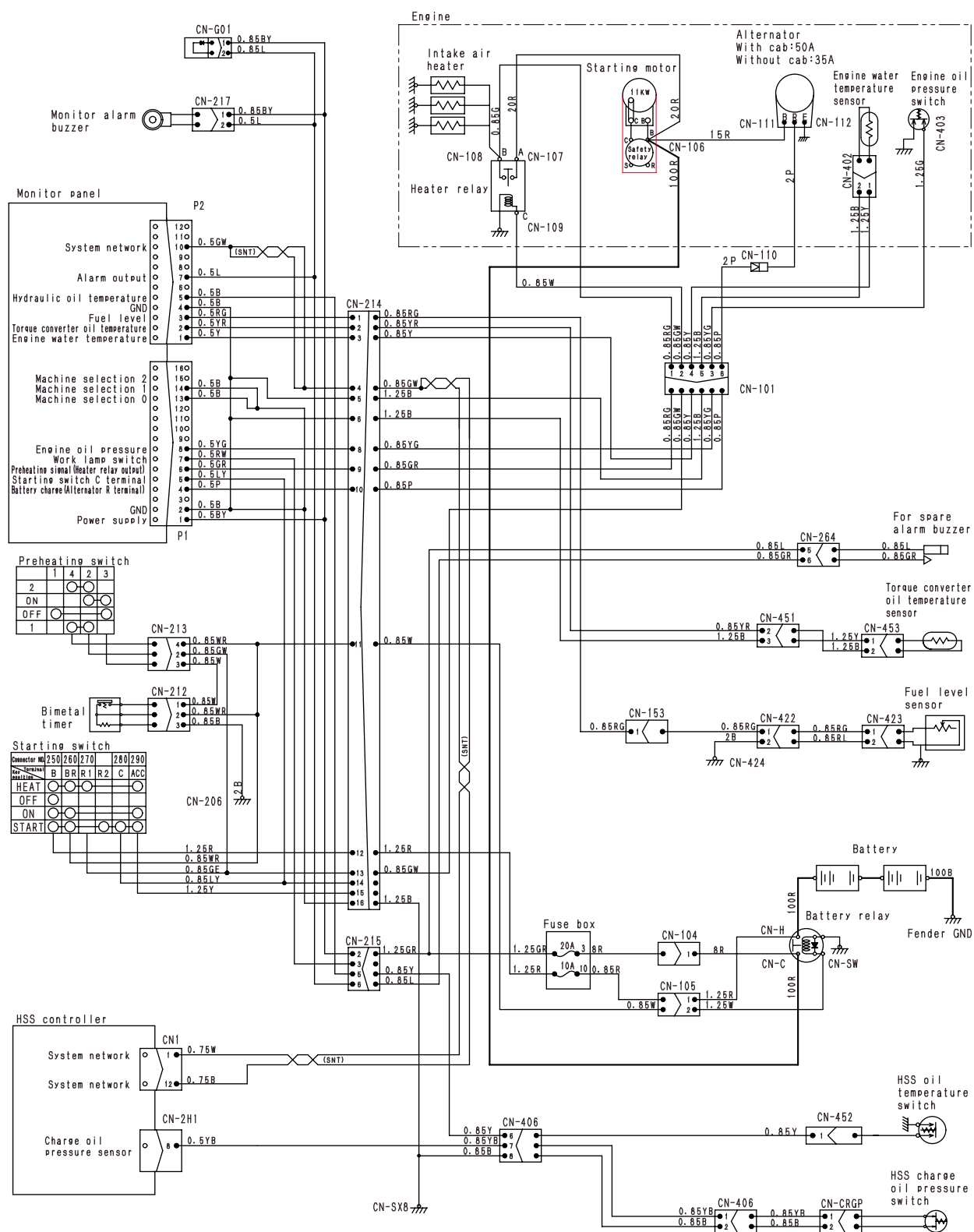
# TROUBLESHOOTING OF MONITOR SYSTEM (M MODE)

[Serial No. 70001 – 75000]

Electrical circuit diagram for M mode .....	20-602
M- 1. Monitor lamps do not light up for 3 seconds when starting switch is turned ON .....	20-603
M- 2. When starting switch is turned ON, monitor lamps all light up but do not go out .....	20-603
M- 3. Abnormality in preheating monitor lamp .....	20-604
M- 4. Abnormality in battery charge lamp .....	20-606
M- 5. Abnormality in engine oil pressure caution lamp .....	20-608
M- 6. Engine water temperature caution lamp flashes .....	20-610
M- 7. Transmission oil temperature caution lamp flashes .....	20-610
M- 8. HSS oil temperature caution lamp flashes .....	20-611
M- 9. HSS charge oil pressure caution lamp flashes .....	20-612
M-10. Electronic system caution lamp on monitor panel does not work in accordance with LED display on HSS controller .....	20-613
M-11. Monitor caution lamp on monitor panel does not work in accordance with each caution lamp .....	20-613
M-12. Alarm buzzer does not sound or sounds continuously .....	20-614
M-13. Abnormality in engine water temperature gauge .....	20-616
M-14. Abnormality in transmission oil temperature gauge .....	20-618
M-15. Abnormality in fuel level gauge .....	20-620
M-16. Service meter does not work after engine is started .....	20-622
M-17. Monitor panel night lighting does not light up when head lamp switch is turned on .....	20-623
M-18. Head lamps or rear lamps do not light up .....	20-624
M-19. Automatic preheating is not carried out when preheating switch is turned to AUTO ..	20-626
M-20. Window wipers and window washers do not work .....	20-628
M-21. Air conditioner does not work .....	20-632

## ELECTRICAL CIRCUIT DIAGRAM FOR M MODE

## Monitor panel system



TWD01001

# TROUBLESHOOTING OF MONITOR SYSTEM (M MODE)

[Serial No. 75001 and up]

Action taken by controller when abnormality occurs and problems on machine .....	20-702
M mode system electrical circuit diagram .....	20-704
M-1. [E0120] (Abnormality in monitor panel caution lamp system) is displayed .....	20-706
M-2. [E0121] (Abnormality in monitor panel caution buzzer system) is displayed .....	20-707
M-3. [E0211] (Abnormality in oil temperature of power line: torque converter) is displayed .....	20-708
M-4. [E0329] (Abnormality in HSS oil temperature) is displayed .....	20-708
M-5. [E0430] (Abnormality in engine oil pressure) is displayed .....	20-709
M-6. [E0432] (Abnormality in engine water temperature) is displayed .....	20-709
M-7. When starting switch is turned ON, all segments of monitor panel do not light up .....	20-710
M-8. When starting switch is turned ON, all segments of monitor panel light up but do not go out. ....	20-712
M-9. When starting switch is turned ON (with engine stopped), caution items (excluding battery charge level and engine oil pressure) flash .....	20-713
M-10. When engine is started, caution items flash (daily check items and engine related items are normal) .....	20-715
M-11. HSS charging oil pressure caution lamp flashes .....	20-718
M-12. Preheater lamp does not light up or stays lighted up .....	20-719
M-13. Abnormality in caution buzzer .....	20-720
M-14. Abnormality in CAUTION lamp .....	20-722
M-15. Abnormality in engine water temperature gauge .....	20-724
M-16. Abnormality in power train (torque converter) oil pressure gauge .....	20-725
M-17. Abnormality in fuel level gauge .....	20-727
M-18. Gear speed display segments indicate [– –], and engine speed is not displayed .....	20-729
M-19. Service meter does not advance while engine is running .....	20-729
M-20. Abnormality in service mode display .....	20-730
M-21. Monitor panel lighting does not light up (though headlamps and working lamps light up) .....	20-732
M-22. When head lamp switch is turned on, monitor panel lighting does not light up .....	20-734
M-23. Head lamps or rear lamps do not light up .....	20-735
M-24. Electric intake air heater does not work .....	20-737
M-25. Windshield wiper or washer does not work .....	20-739
M-26. Air conditioner does not work .....	20-742

- ★ This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the monitor code display returns to normal, the problem has been removed.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

## ACTION TAKEN BY CONTROLLER WHEN ABNORMALITY OCCURS AND PROBLEMS ON MACHINE

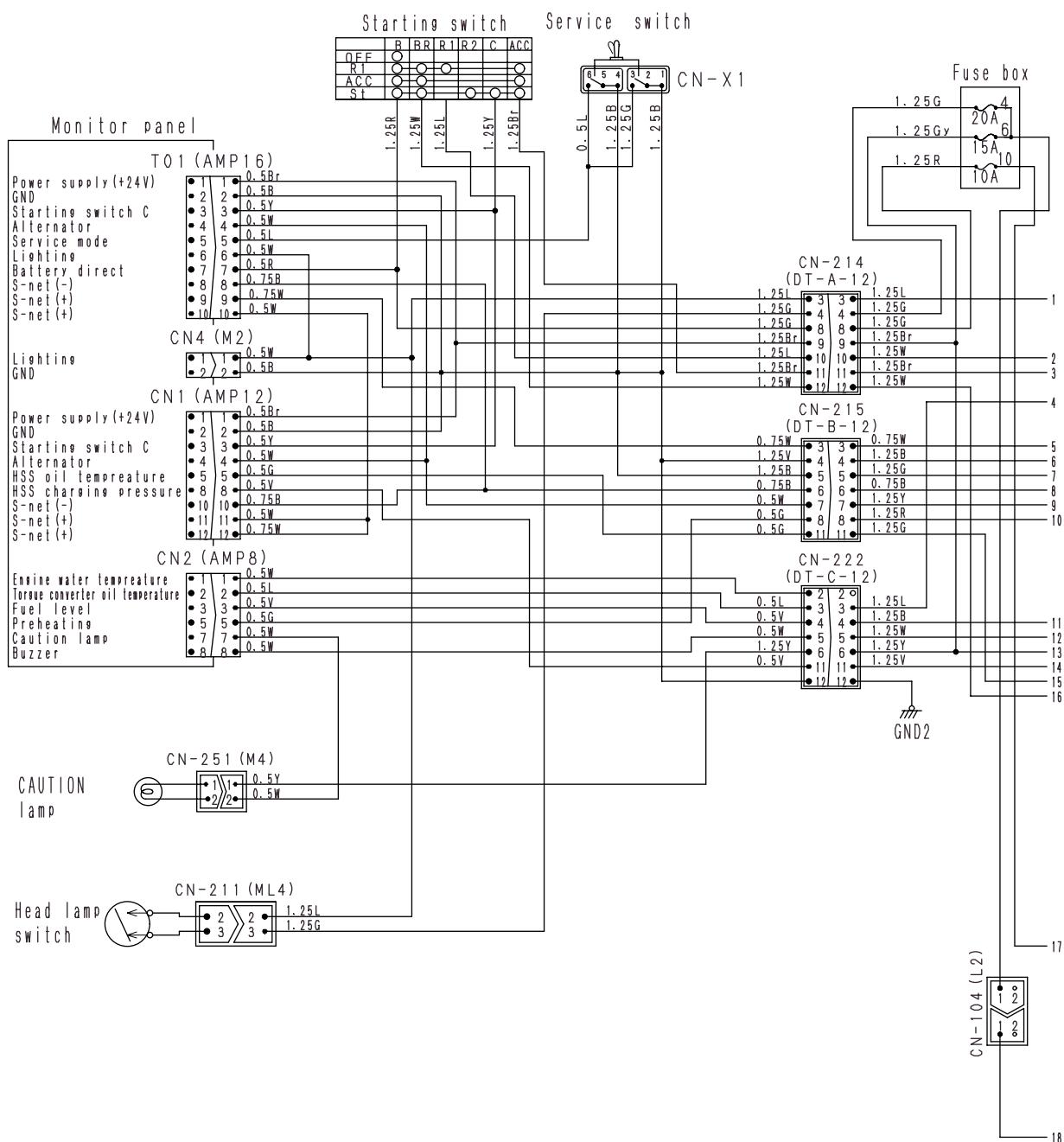
User code	Service code	Abnormal system	Contents of abnormality
CALL 03	E0120	Abnormality in monitor panel caution lamp system	※ When ground output voltage to caution lamp is high 1. Defective caution lamp 2. Short circuit with power source in wiring harness between monitor panel CN2 (7) - caution lamp CN-251 (2) 3. Defective monitor panel
	E0121	Abnormality in monitor panel caution buzzer system	※ When ground output voltage to caution buzzer is high 1. Defective caution buzzer 2. Short circuit with power source in wiring harness between monitor panel CN2 (8) - caution buzzer CN-21A (1) 3. Defective monitor panel
—	E0211	Abnormality in power train (torque converter) oil temperature	※ When torque converter oil temperature caution lamp on monitor panel flashes 1. Torque converter oil temperature rises above about 80°C 2. Defective torque converter oil temperature sensor
E01	E0329	Abnormality in HSS charging oil pressure	※ When HSS oil temperature caution lamp on monitor panel flashes 1. HSS oil temperature rises above about 108°C 2. Disconnection or defective contact in wiring harness between monitor panel CN1 (5) - sensor 452 (1) 3. Defective HSS oil temperature sensor
CALL	E0430	Abnormality in engine oil pressure	※ When engine oil pressure caution lamp on monitor panel flashes 1. Lowering of engine oil pressure 2. Defective engine oil pressure sensor
E01	E0432	Abnormality in engine water temperature	※ When engine water temperature caution lamp on monitor panel flashes 1. Defective engine water temperature sensor



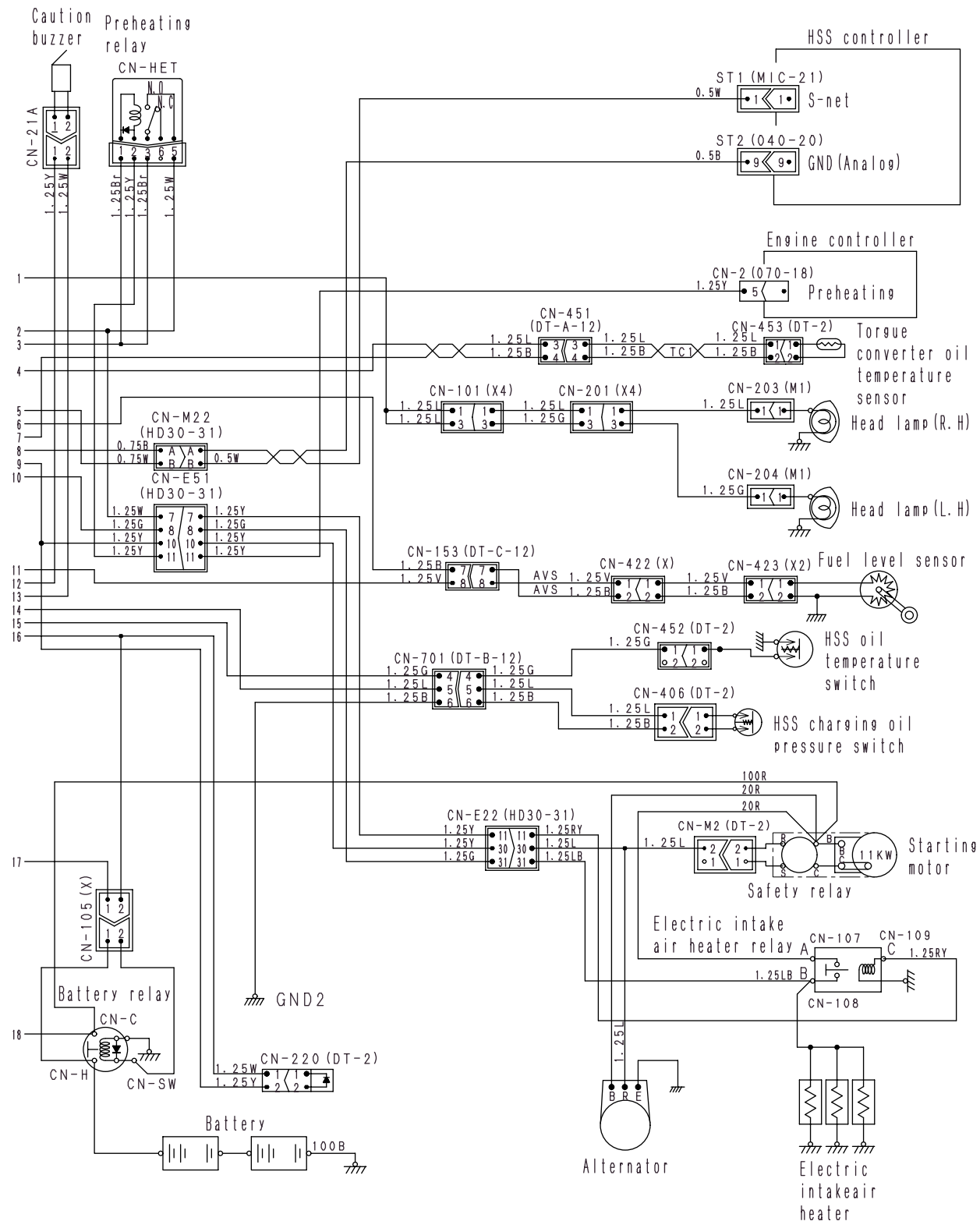
Normal condition (Voltage, current, resistance)	Action taken by controller when abnormality occurs	Problems on machine
<ul style="list-style-type: none"> <li>Voltage between CN2 (7) - chassis ground: Max. 6 V (When lamp lights up)</li> </ul>	1. Turns on caution buzzer.	1. Caution lamp does not light up.
<ul style="list-style-type: none"> <li>Voltage between CN2 (8) - chassis ground: Max. 3 V (When buzzer sounds)</li> </ul>	1. Turns on caution lamp.	1. Caution buzzer does not sound.
<ul style="list-style-type: none"> <li>Resistance between 453 (1) - (2) At 100°C: Approx. 3.8 k<math>\Omega</math> At 90°C: Approx. 4.9 k<math>\Omega</math> At 35°C: Approx. 29 k<math>\Omega</math> At 20°C: Approx. 52 k<math>\Omega</math> At 10°C: Approx. 80 k<math>\Omega</math></li> </ul>	1. Turns on caution lamp and caution buzzer.	
<ul style="list-style-type: none"> <li>When voltage sensor between 452 (1) (CN1 (5)) and chassis ground is turned ON (hydraulic oil temperature is below about 104°C): Max. 1 V</li> <li>When sensor is turned OFF (hydraulic oil temperature is above about 108°C): 20 - 30 V</li> </ul>	1. Turns on caution lamp and caution buzzer.	
<ul style="list-style-type: none"> <li>Low-pressure switch resistance When engine is stopped: Max. 1 <math>\Omega</math> When engine speed is above about 600 rpm: Min. 1 M<math>\Omega</math></li> <li>High-pressure switch resistance When engine is stopped: Max. 1 <math>\Omega</math> When engine speed is above about 1,300 rpm: Min. 1 M<math>\Omega</math></li> </ul>	1. Turns on caution lamp and caution buzzer.	
<ul style="list-style-type: none"> <li>Sensor resistance (10 - 100°C) High-temperature sensor: 90 k - 3.5 <math>\Omega</math> Low-temperature sensor: 9 k - 0.3 <math>\Omega</math></li> </ul>	1. Turns on caution lamp and caution buzzer.	

# M MODE SYSTEM ELECTRICAL CIRCUIT DIAGRAM

## Monitor panel system



TJD01487

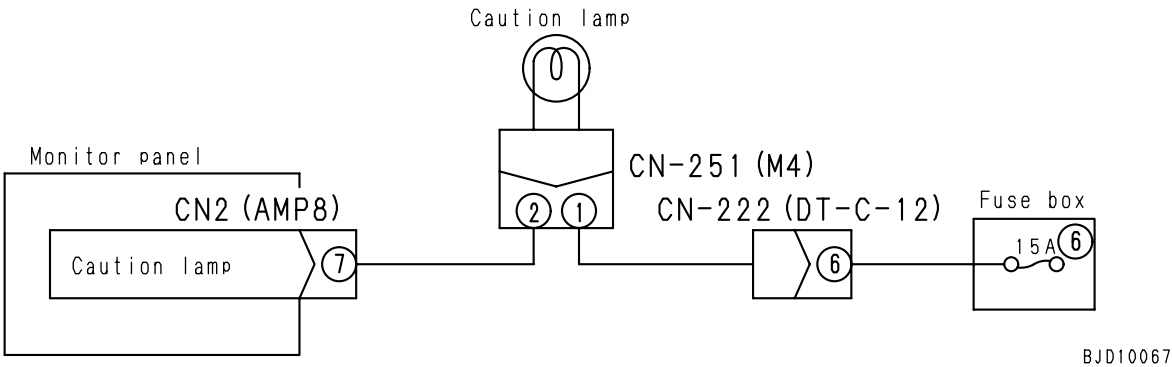


TJD01488

**M-1. [E0120] (Abnormality in monitor panel caution lamp system) is displayed**

		Cause	Remedy
<div> <div>           • Turn starting switch OFF.            • Disconnect 251.            • 100 - 400Ω         </div> <div>           Is resistance between 251 (male) (1) and 2 normal?         </div> </div>	1 NO	Defective caution lamp	Replace
	YES		
<div> <div>           • Disconnect 251 and CN2.            • Turn starting switch ON.            • Max. 1 V         </div> <div>           When 251 is disconnected, is voltage between CN2 (female) (7) and chassis ground normal?         </div> </div>	2 NO	Short circuit with power source in wiring harness between CN2 (female) (7) - 251 (female) (2)	Repair or replace
	YES	Defective monitor panel (caution module)	Replace

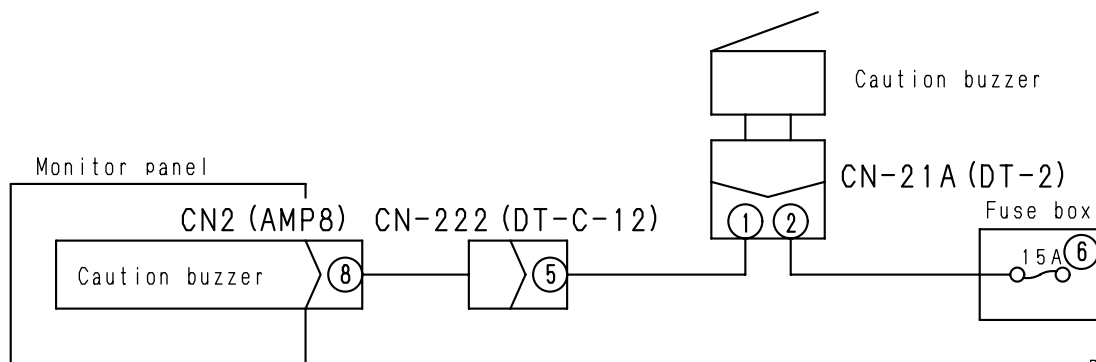
**M-1. Related electrical circuit diagram**



## M-2. [E0121] (Abnormality in monitor panel caution buzzer system) is displayed

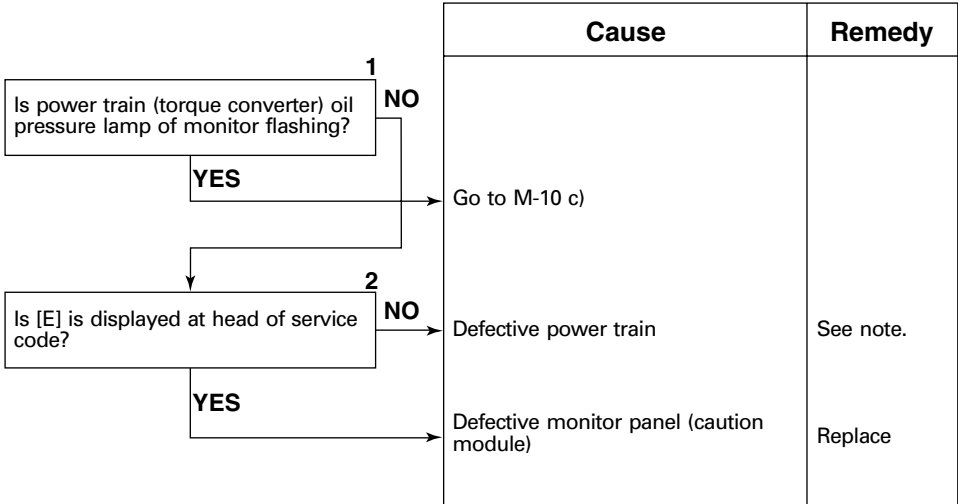
		Cause	Remedy
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect 21A.</li> <li>• Min. 200Ω</li> </ul>	1	Is resistance between terminals of 21A (buzzer side) normal?	NO
		Defective caution lamp	Replace
<ul style="list-style-type: none"> <li>• Disconnect 21A and CN2.</li> <li>• Turn starting switch ON.</li> <li>• Max. 1 V</li> </ul>	2	When 21A is disconnected, is voltage between CN2 (female) (8) and chassis ground normal?	NO
		Short circuit with power source in wiring harness between CN2 (female) (8) - 222 (5) - 21A (female) (1)	Repair or replace
		Defective monitor panel (caution module)	Replace

### M-2. Related electrical circuit diagram



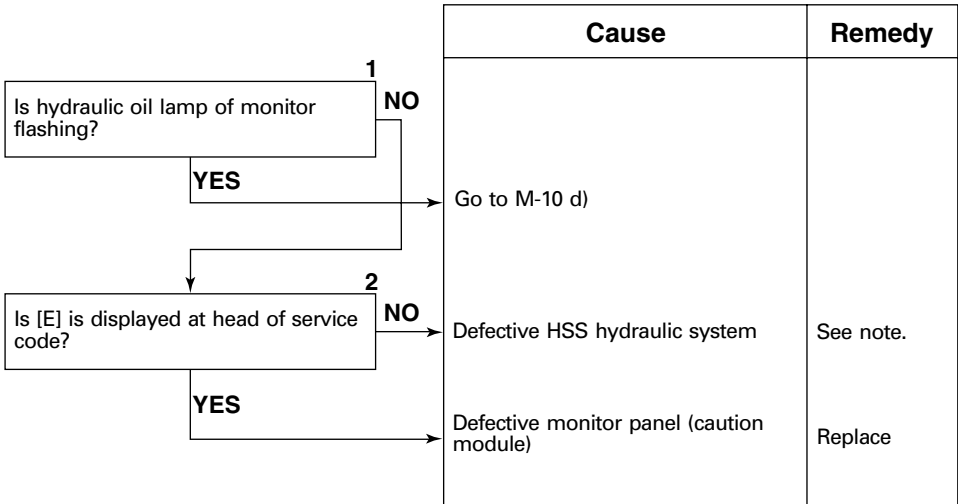
BJD10068

M-3. [E0211] (Abnormality in oil temperature of power line: torque converter) is displayed



**Note:** This means that the power train oil temperature sensor has detected abnormal temperature but the display of the monitor panel has become normal. Accordingly, inspect the power train and remove the cause of the abnormal temperature.

M-4. [E0329] (Abnormality in HSS oil temperature) is displayed



**Note:** This means that the HSS oil temperature sensor has detected abnormal temperature but the display of the monitor panel has become normal. Accordingly, inspect the HSS oil temperature system and remove the cause of the abnormal temperature.

## M-5. [E0430] (Abnormality in engine oil pressure) is displayed

★ If an error in N mode is detected, inspect in N mode first.

	Cause	Remedy
<div>1</div> <div>Is engine oil pressure lamp of monitor flashing?</div> <div>NO</div> <div>YES</div>	Go to M-10 b)	
<div>2</div> <div>Is [E] is displayed at head of service code?</div> <div>NO</div> <div>YES</div>	Defective engine	See note.
	Defective monitor panel (caution module)	Replace

**Note:** This means that the engine oil pressure sensor has detected abnormal oil pressure but the display of the monitor panel has become normal. Accordingly, inspect the engine and remove the cause of the abnormal pressure.

## M-6. [E0432] (Abnormality in engine water temperature) is displayed

★ If an error in N mode is detected, inspect in N mode first.

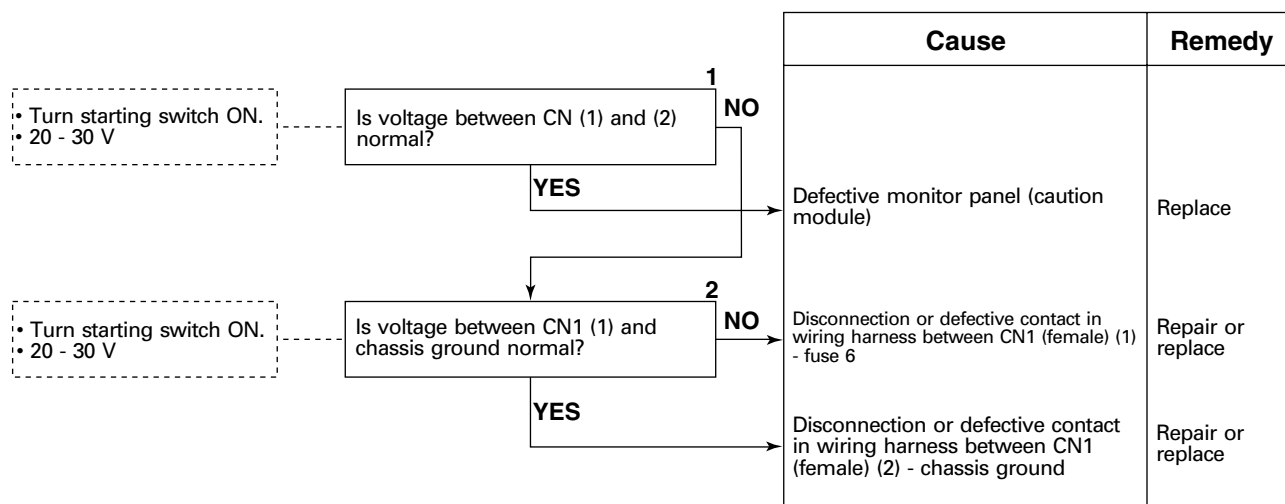
	Cause	Remedy
<div>1</div> <div>Is engine water temperature lamp of monitor flashing?</div> <div>NO</div> <div>YES</div>	Go to M-10 b)	Replace
<div>2</div> <div>Is [E] is displayed at head of service code?</div> <div>NO</div> <div>YES</div>	Defective engine	See note.
	Defective monitor panel (caution module)	Replace

**Note:** This means that the engine water temperature sensor has detected abnormal temperature but the display of the monitor panel has become normal. Accordingly, inspect the engine and remove the cause of the abnormal temperature.

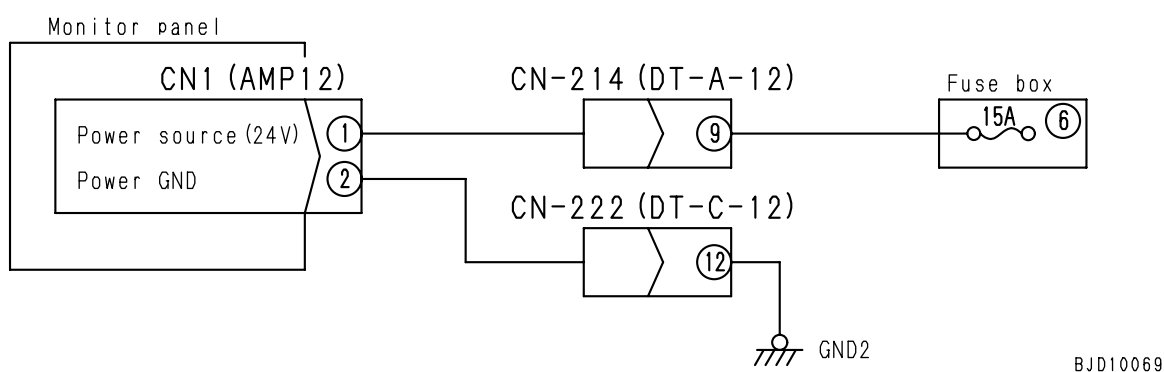
**M-7. When starting switch is turned ON, all segments of monitor panel do not light up**

**a) The caution module (gauge and lamp display unit) does not light up.**

- ★ Check that fuse 6 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)



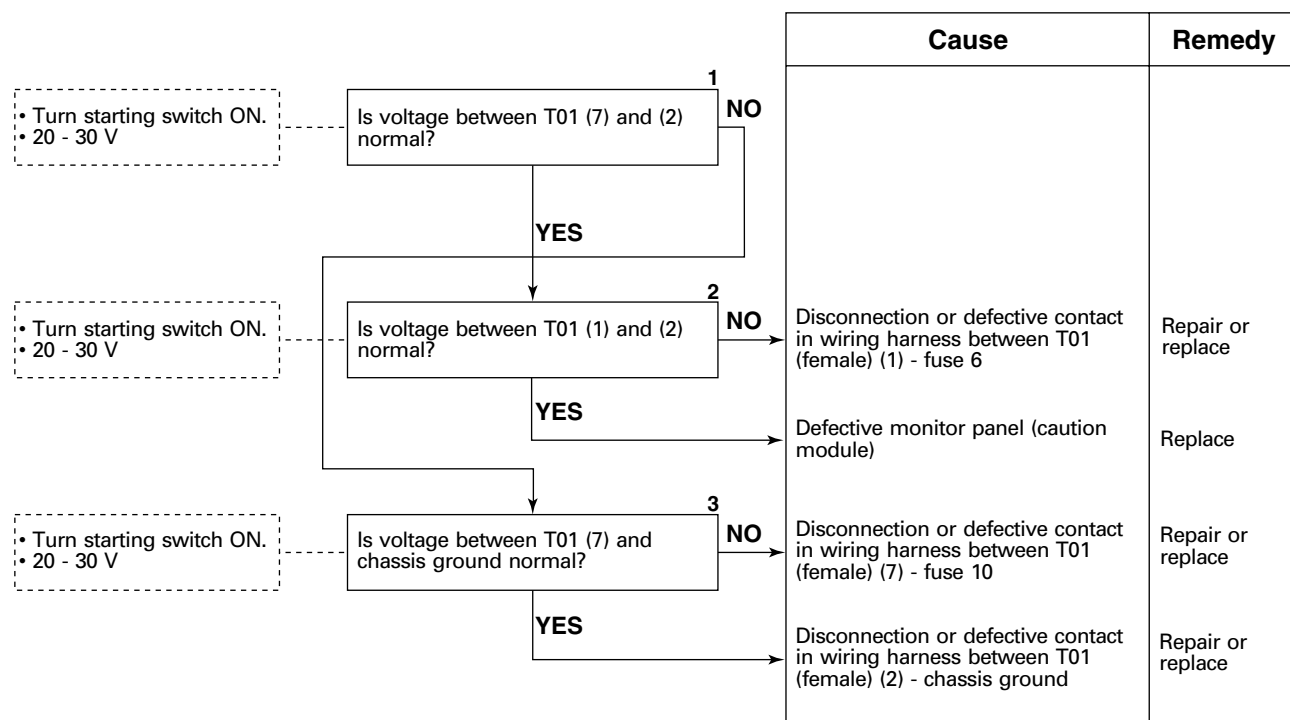
**M-7 a). Related electrical circuit diagram**



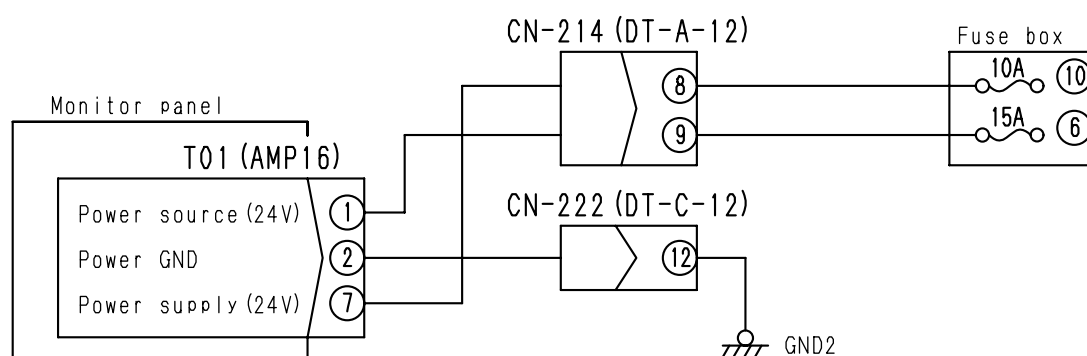


**b) The tachometer module (tachometer and service meter display unit) does not light up.**

- ★ Check that fuses 6 and 10 are normal. (If they are broken, check the circuit related to them for short circuit with chassis ground.)



**M-7 b). Related electrical circuit diagram**



BJD10070

**M-8. When starting switch is turned ON, all segments of monitor panel light up but do not go out.**

**a) Caution module (Gage and lamp display unit) does not go off.**

	Cause	Remedy
→	Defective monitor panel (caution module)	Replace

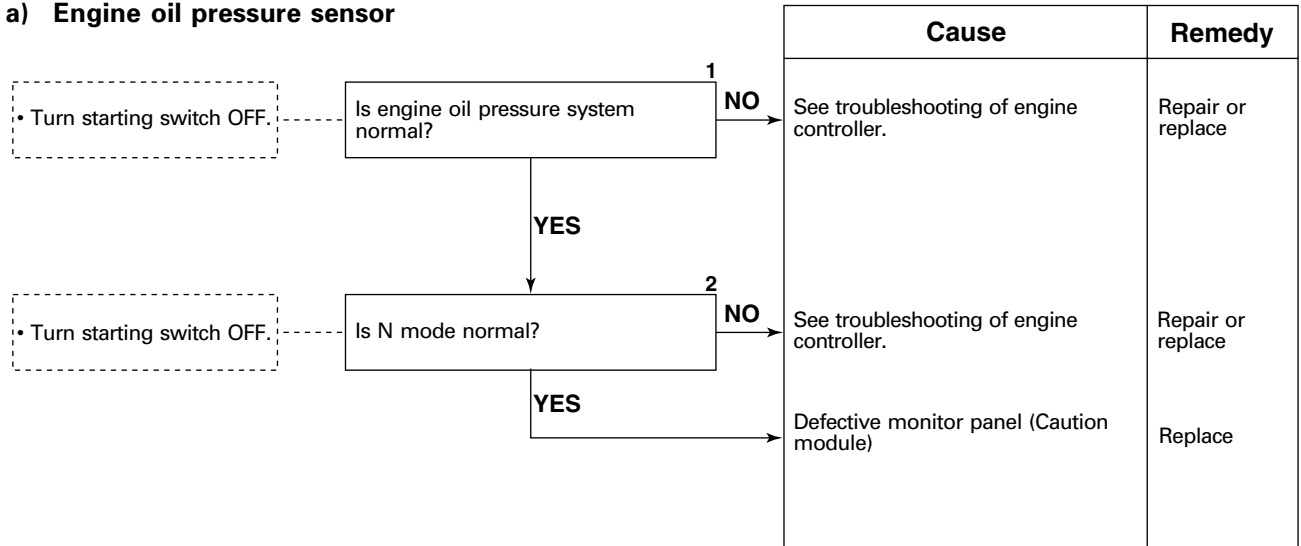
**b) The tachometer module (tachometer and service meter display unit) does not go off.**

	Cause	Remedy
→	Defective monitor panel (caution module)	Replace

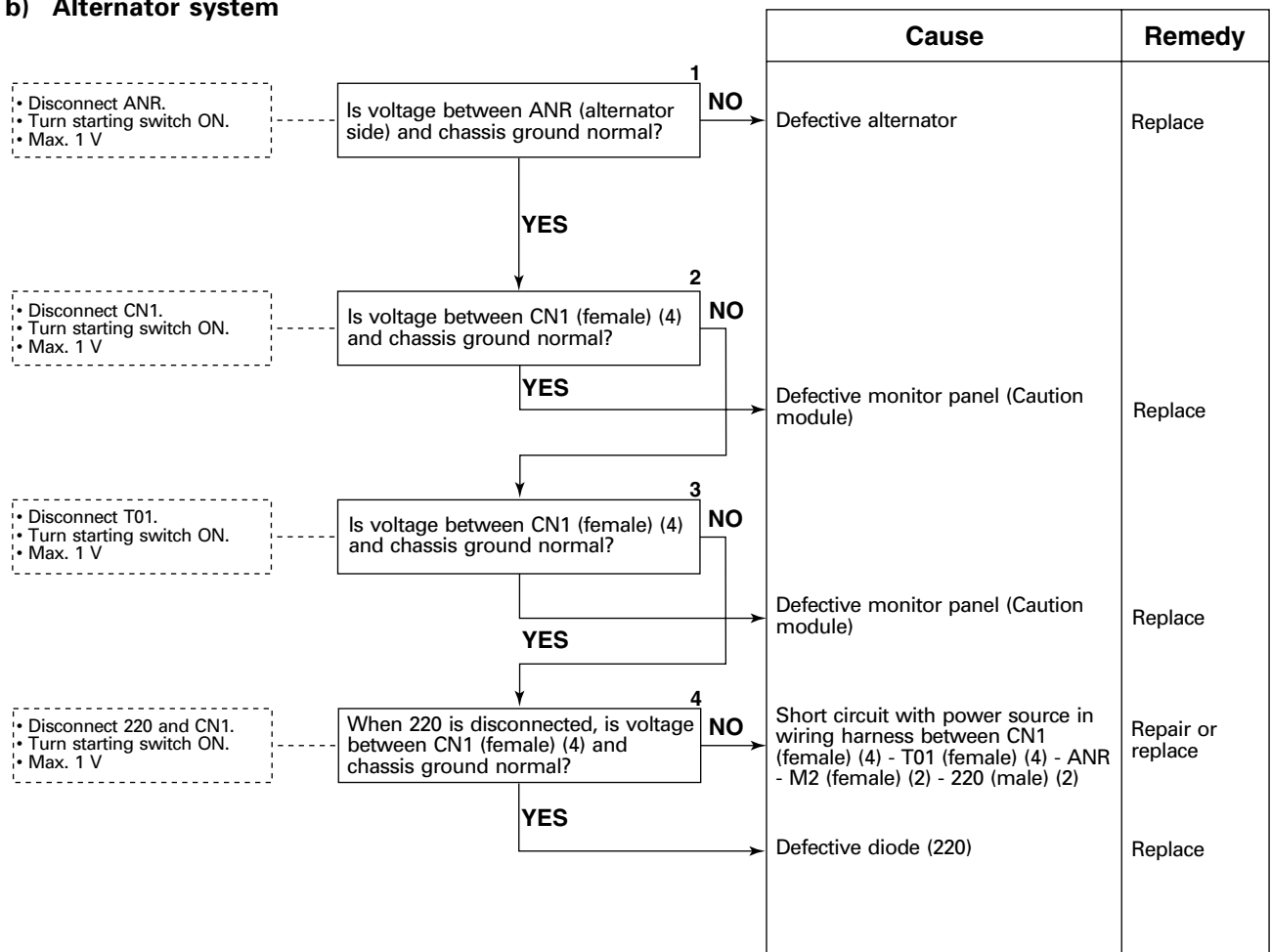
## M-9. When starting switch is turned ON (with engine stopped), caution items (excluding battery charge level and engine oil pressure) flash

- ★ Any error in N mode must not be detected at this time.
- ★ Inspect both of the engine oil pressure sensor system and alternator system.

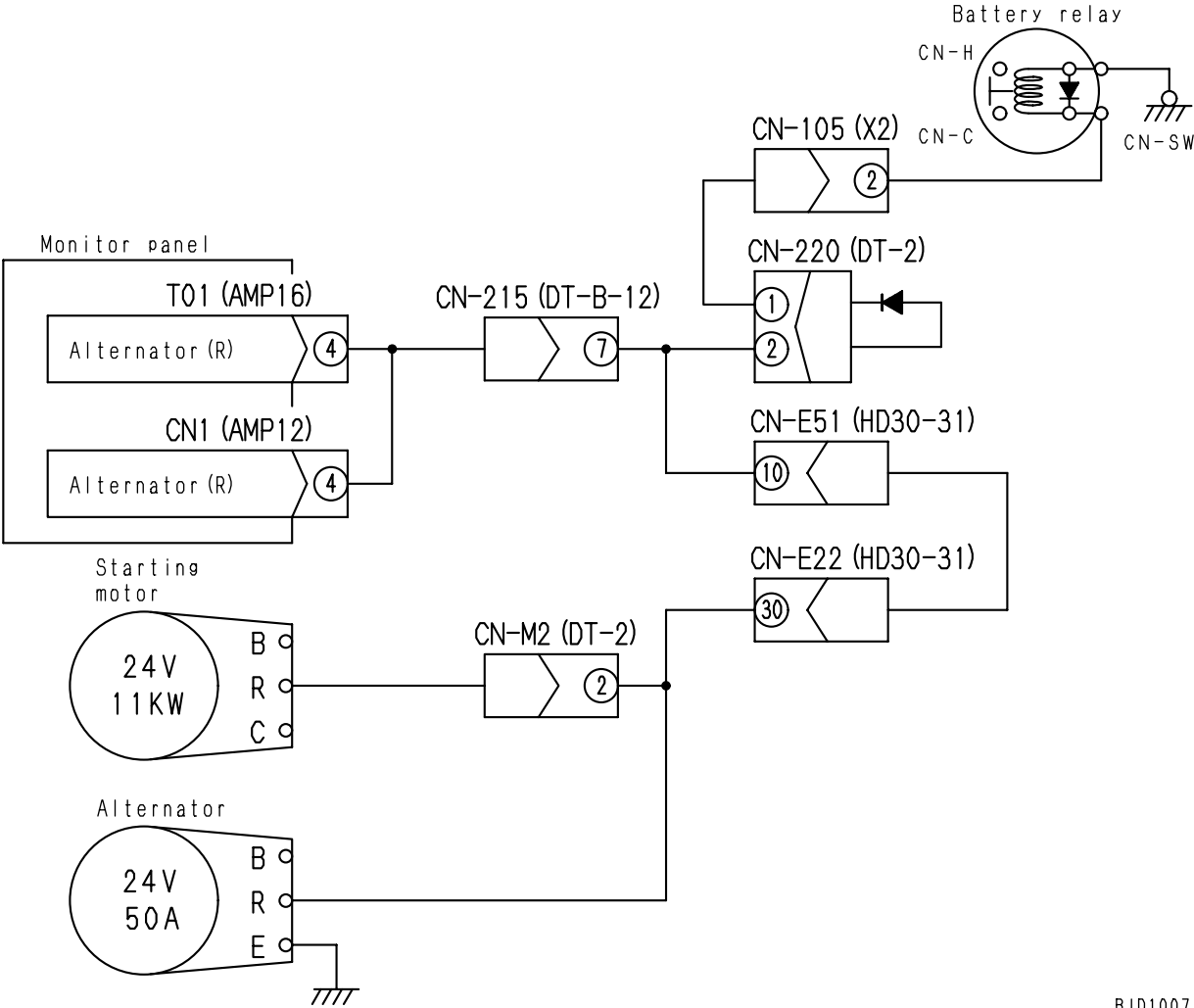
### a) Engine oil pressure sensor



### b) Alternator system



M-9 b). Related electrical circuit diagram



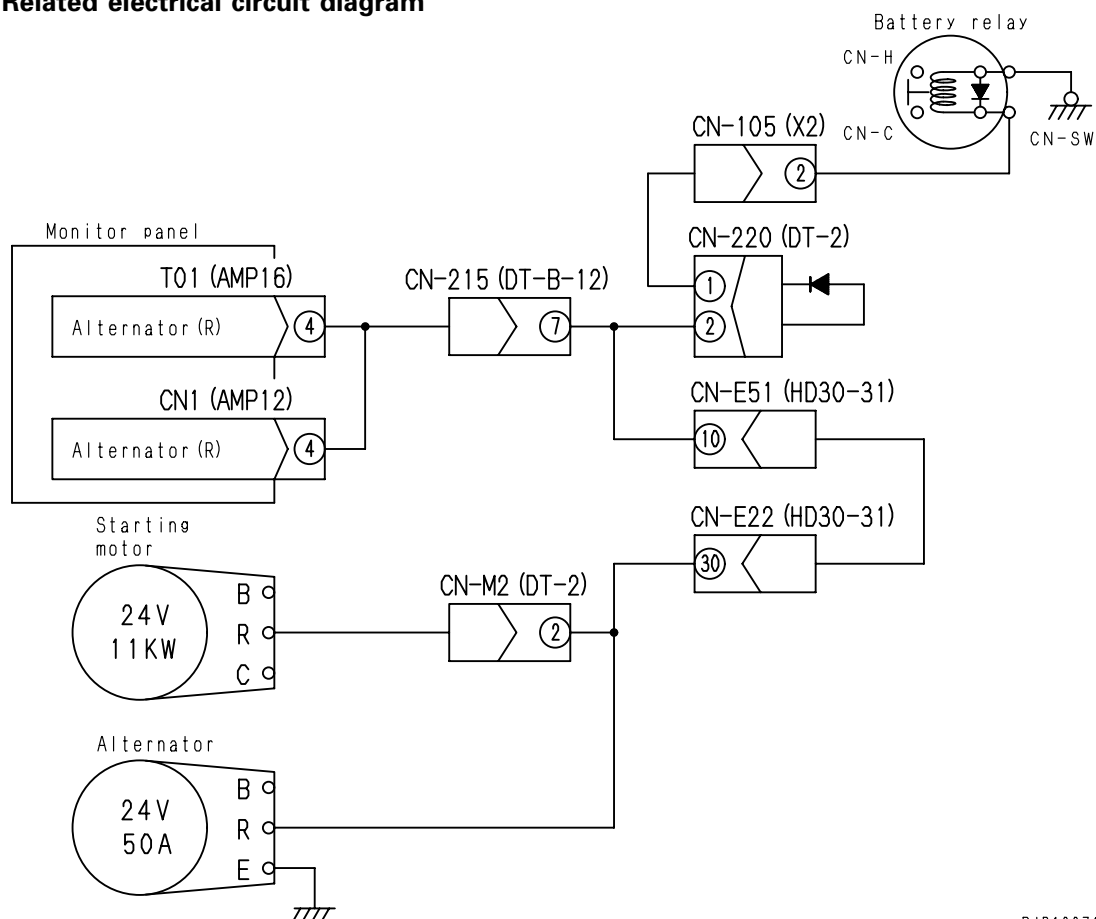
BJD10071

## M-10. When engine is started, caution items flash (daily check items and engine related items are normal)

### a) Charge level lamp flashes

<ul style="list-style-type: none"> <li>• Disconnect ANR.</li> <li>• Start engine (at medium or higher speed).</li> <li>• 20 - 30 V</li> </ul>	Is voltage between ANR (alternator side) and chassis ground normal?	1	Cause	Remedy
		NO	Defective alternator	Replace
	YES			
<ul style="list-style-type: none"> <li>• Disconnect CN1.</li> <li>• Start engine (at medium or higher speed).</li> <li>• 20 - 30 V</li> </ul>	Is voltage between CN-1 (female) (4) and chassis ground normal?	2		
		NO	Defective monitor panel (Caution module)	Replace
	YES			
<ul style="list-style-type: none"> <li>• Disconnect T01, CN1.</li> <li>• Start engine (at medium or higher speed).</li> <li>• 20 - 30 V</li> </ul>	When T01 is disconnected, is voltage between CN1 (female) (4) and chassis ground normal?	3		
		NO	Delta connection CN1 (female) (4) - ANR	Repair or replace
	YES		Defective monitor panel (Tachometer module)	Replace

### M-10 a). Related electrical circuit diagram

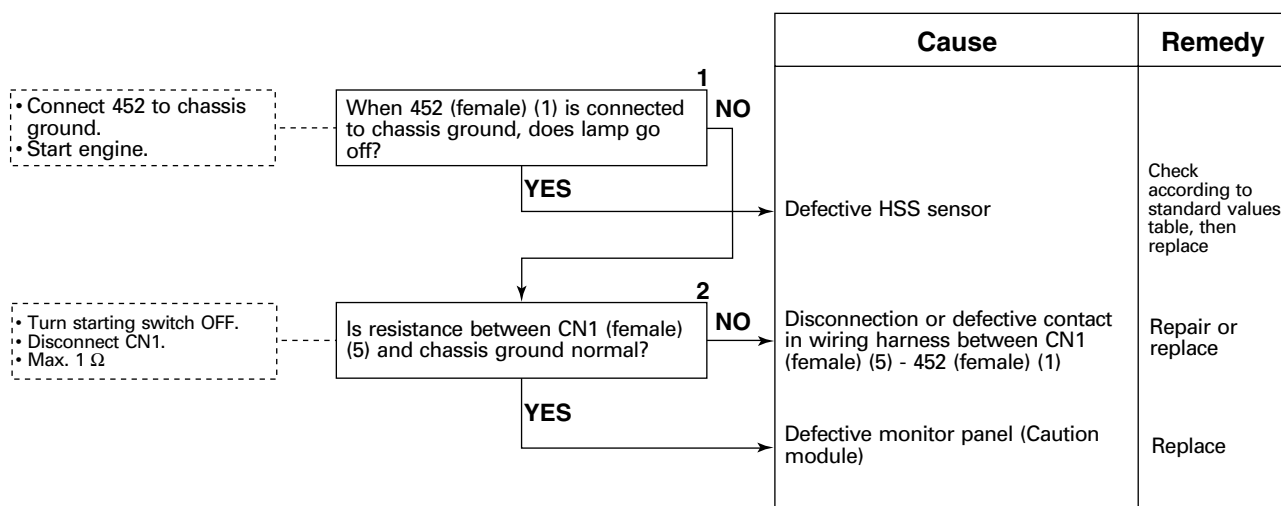
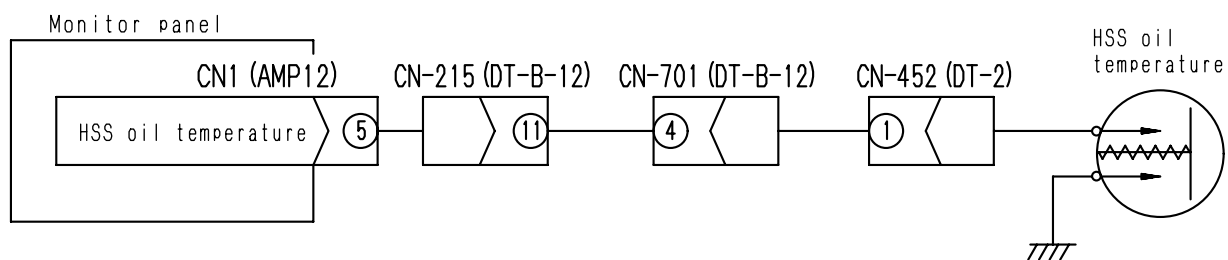


BJD10071



**d) HSS oil temperature lamp flashes**

★ Check that the hydraulic oil temperature is normal before troubleshooting.

**M-10 d). Related electrical circuit diagram**

BJD10073

M-11. HSS charging oil pressure caution lamp flashes

★ Check that the HSS charge oil pressure is normal before troubleshooting (The caution lamp flashes when the HSS charge oil pressure lowers below about 0.78 MPa {8 kg/cm<sup>2</sup>}).

• Disconnect CN1.  
• Start engine.  
• Max. 1 Ω

Is resistance between CN1 (female) (8) and chassis ground normal?

1

NO

Defective monitor panel

Replace

YES

Is resistance between CN-406 (male) (1) and (2) normal?

2

NO

Defective HSS charge pressure sensor

Replace

YES

Is resistance between CN-406 (female) and chassis ground normal?

3

NO

Disconnection or defective contact in wiring harness between CN-406 (female) (2) - GND2 (chassis ground)

Repair or replace

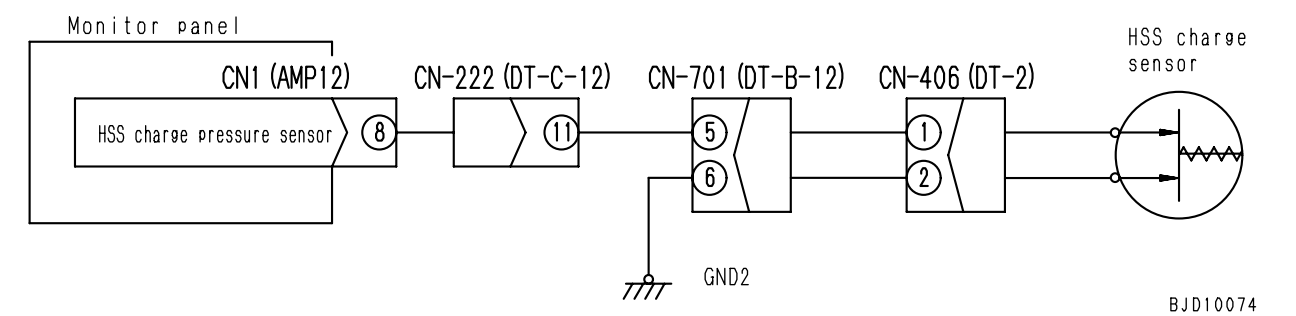
YES

Disconnection or defective contact in wiring harness between CN1 (female) (8) - CN-406 (female) (1)

Repair or replace

Cause	Remedy
Defective monitor panel	Replace
Defective HSS charge pressure sensor	Replace
Disconnection or defective contact in wiring harness between CN-406 (female) (2) - GND2 (chassis ground)	Repair or replace
Disconnection or defective contact in wiring harness between CN1 (female) (8) - CN-406 (female) (1)	Repair or replace

M-11. Related electrical circuit diagram

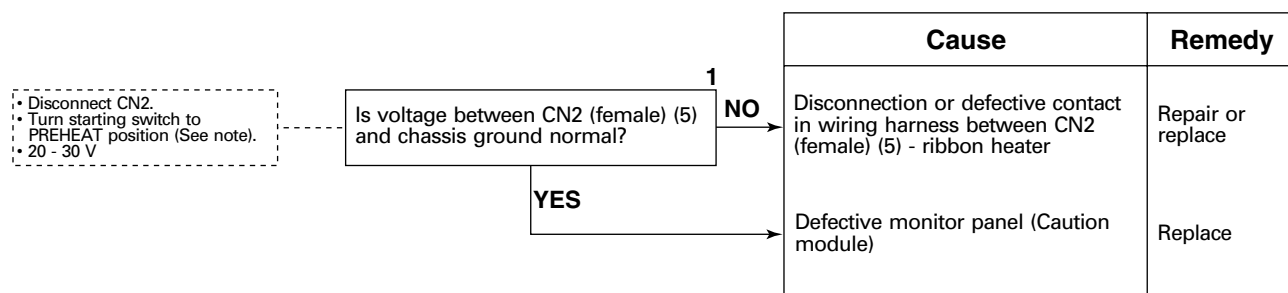




## M-12. Preheater lamp does not light up or stays lighted up

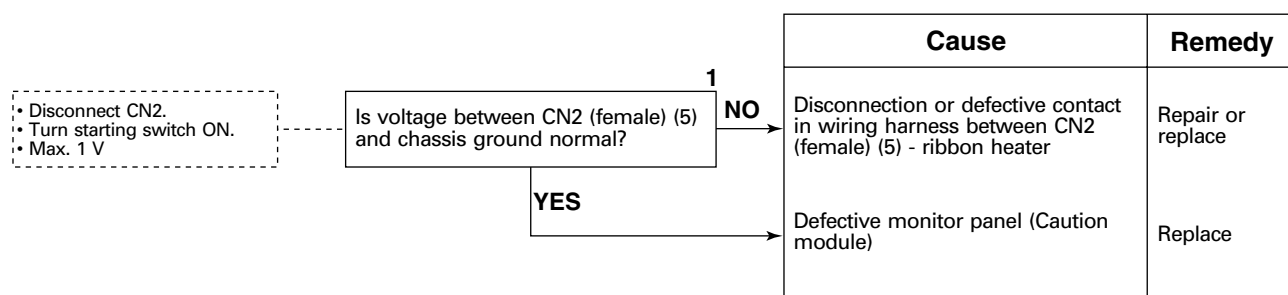
★ Check that the preheater is normal.

### a) The preheater lamp does not light up during the preheating operation

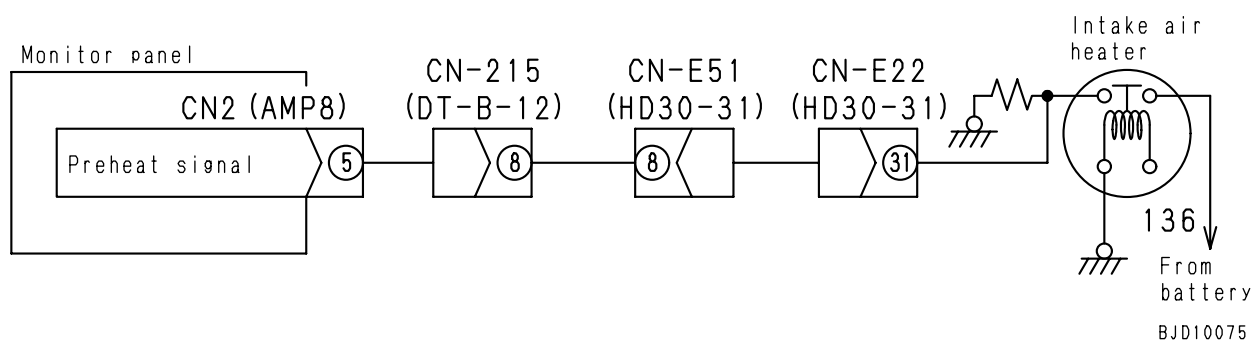


**Note:** Turn the starting switch in the opposite direction to the ON position and hold it.

### b) The preheater lamp lights up while preheater is turned off



## M-12. Related electrical circuit diagram

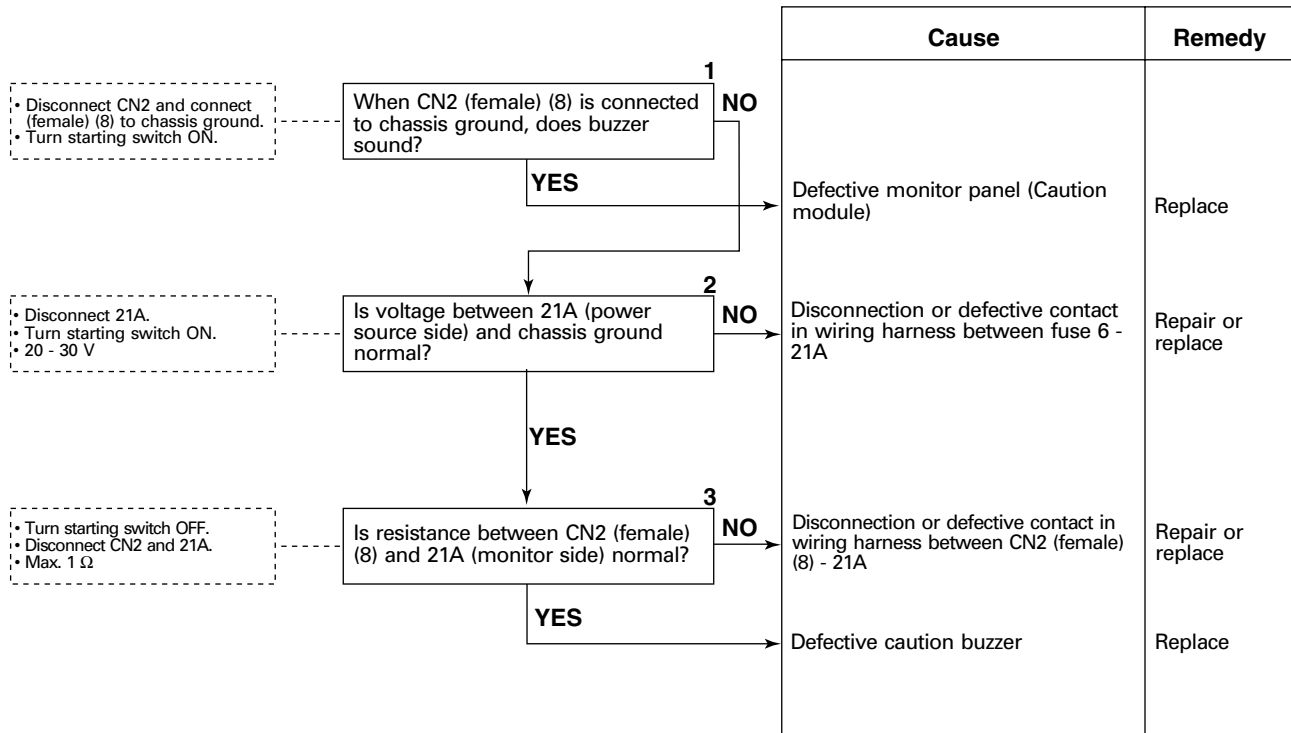


### M-13. Abnormality in caution buzzer

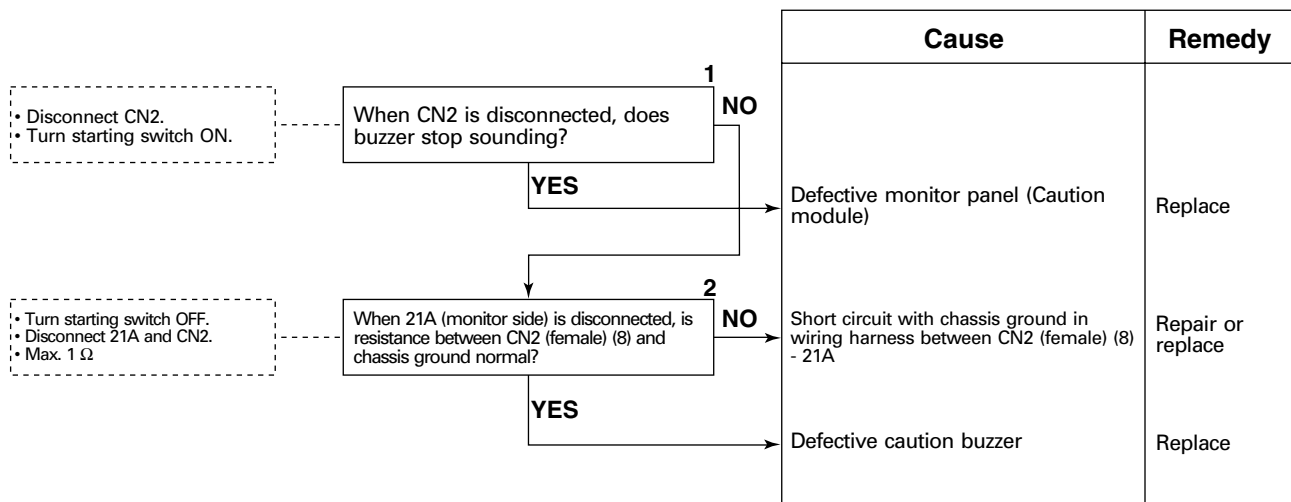
- ★ Check that any service code is not displayed (If any one is displayed, troubleshoot according to it).
- ★ Even if the charge level lamp among the caution items flashes, the caution buzzer does not sound.

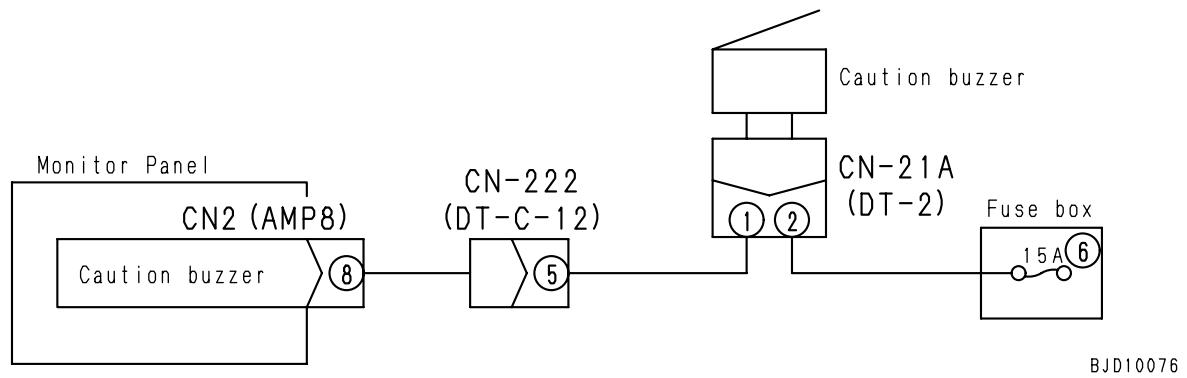
**a) The buzzer does not sound for 1 second after the starting switch is turned on**

- ★ Check that fuse 6 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)



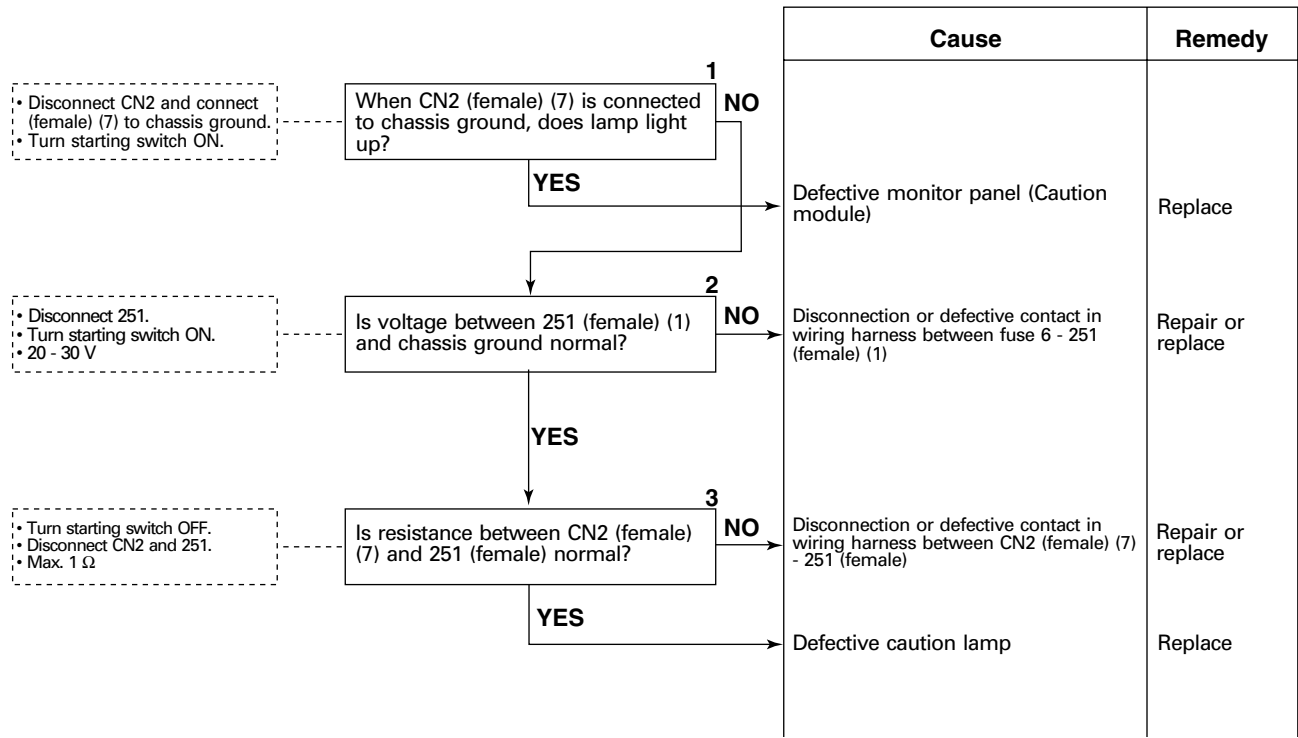
**b) The buzzer sounds while monitor is displaying normally**



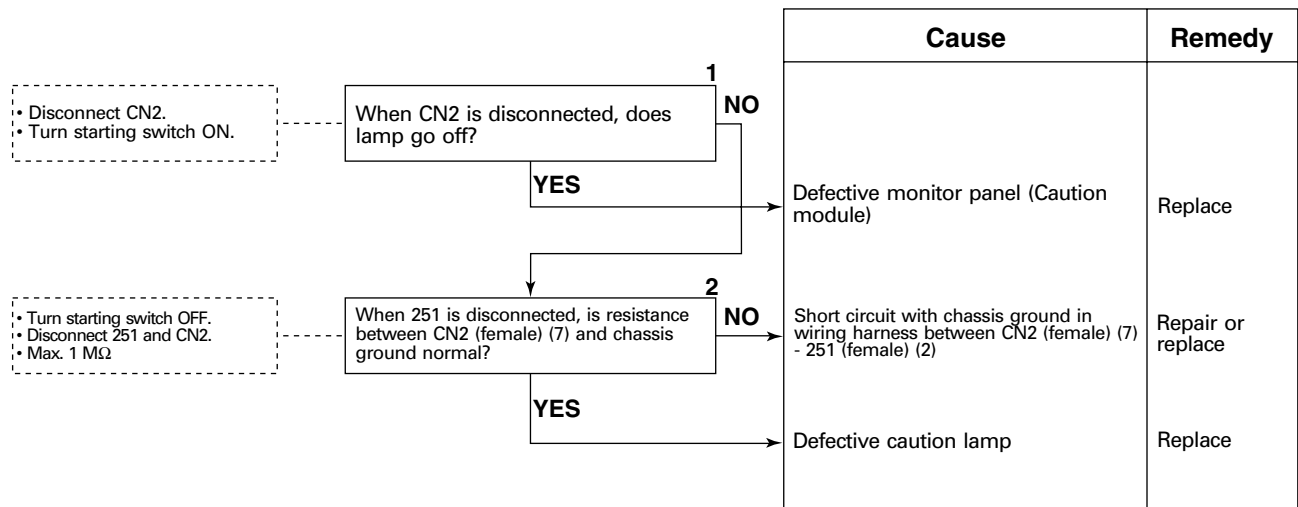
**M-13. Related electrical circuit diagram**

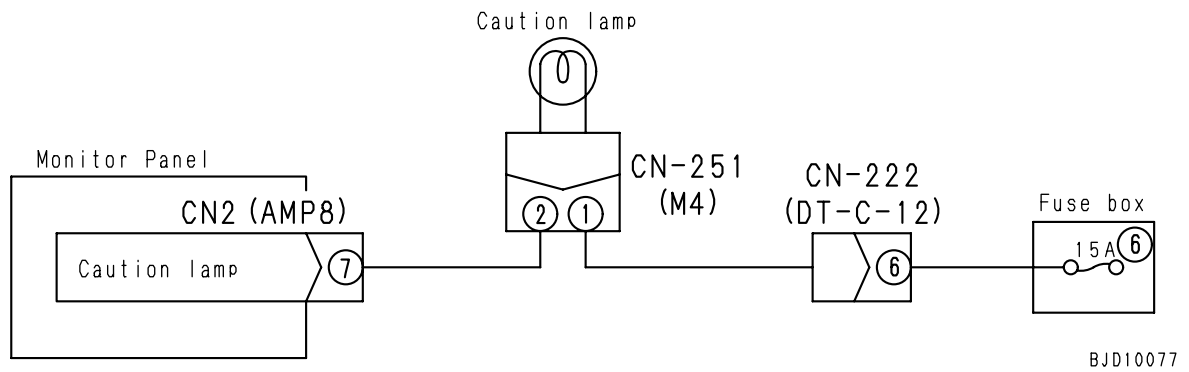
M-14. Abnormality in CAUTION lamp

- ★ Check that any service code is not displayed (If any one is displayed, troubleshoot according to it).
- a) **The lamp does not light up for 2 seconds after the starting switch is turned on or it does not light up while a caution item is flashing**
  - ★ Check that fuse 6 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)



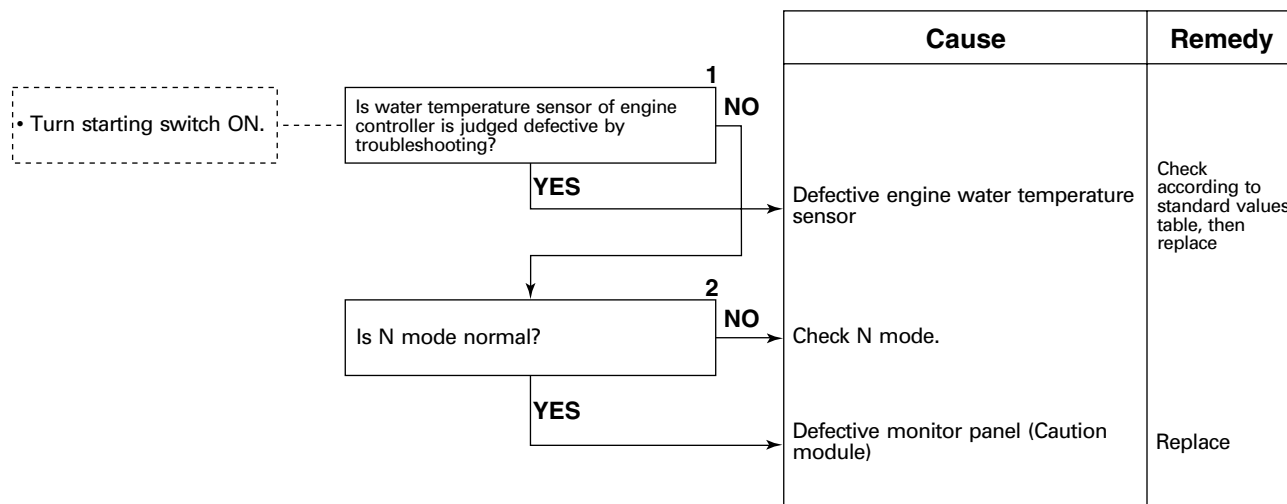
b) **The lamp light up while monitor is displaying normally**



**M-14. Related electrical circuit diagram**

### M-15. Abnormality in engine water temperature gauge

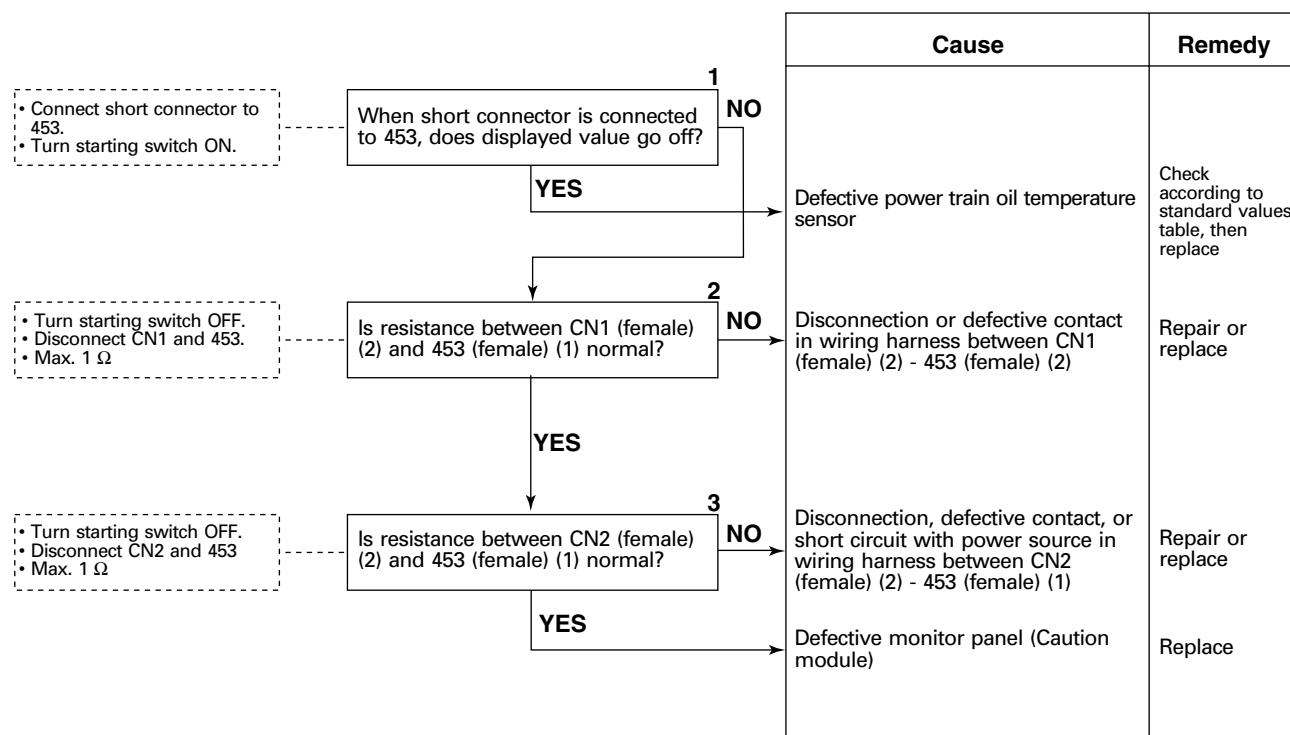
- ★ Check that the engine water temperature is normal (If it is abnormal, troubleshoot the engine).
- ★ The following troubleshooting procedure is prepared on the assumption that the engine controller is operating normally.



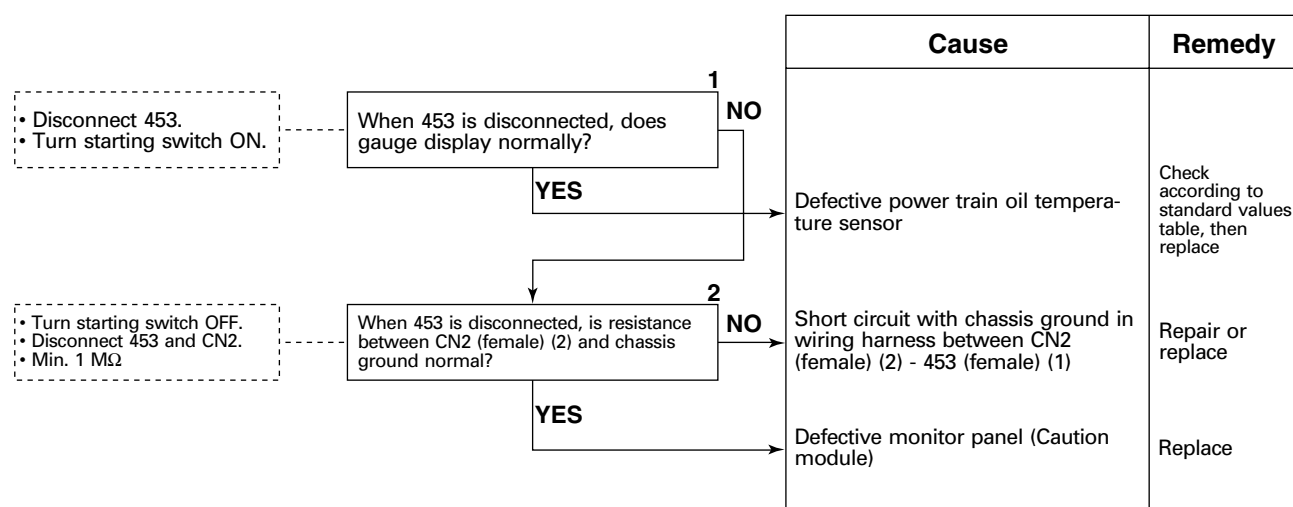
## M-16. Abnormality in power train (torque converter) oil pressure gauge

- ★ Check that the power train oil temperature is normal (If it is abnormal, troubleshoot the power train).

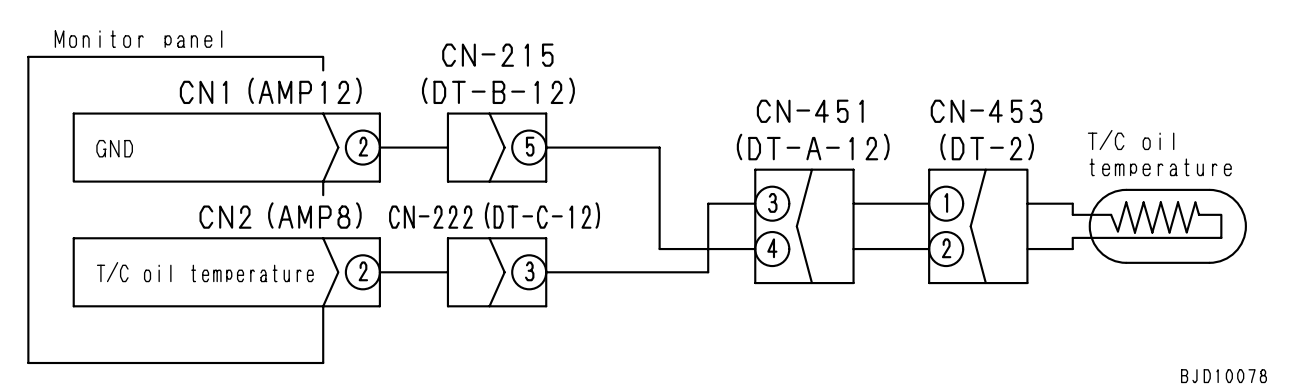
### a) The power train oil temperature gauge displays abnormally low temperature



### b) The power train oil temperature gauge does not display (even 1 bar)



M-16. Related electrical circuit diagram

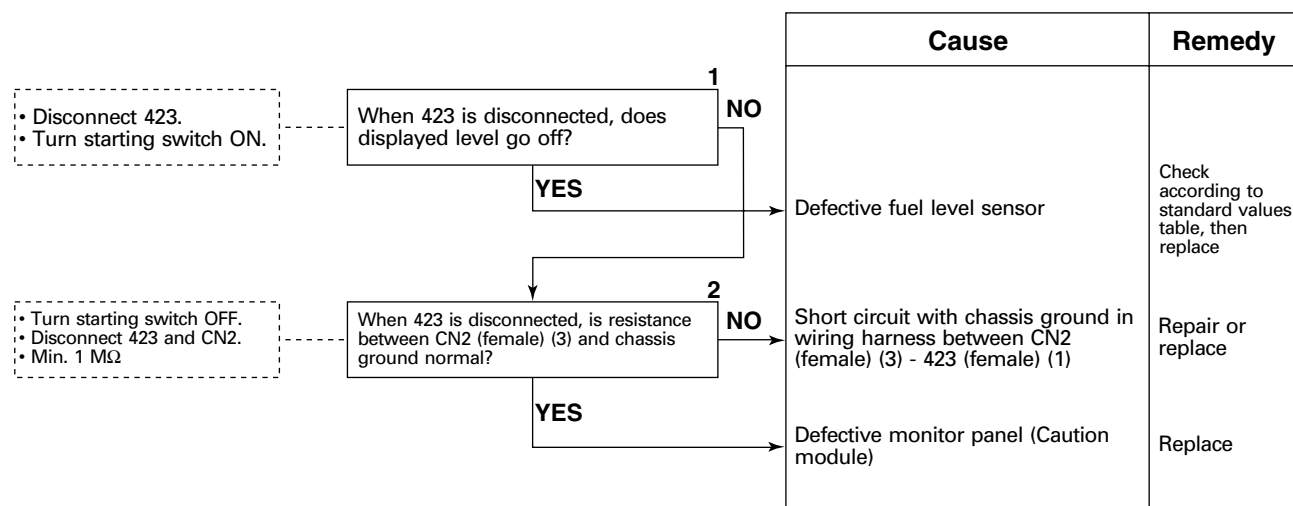




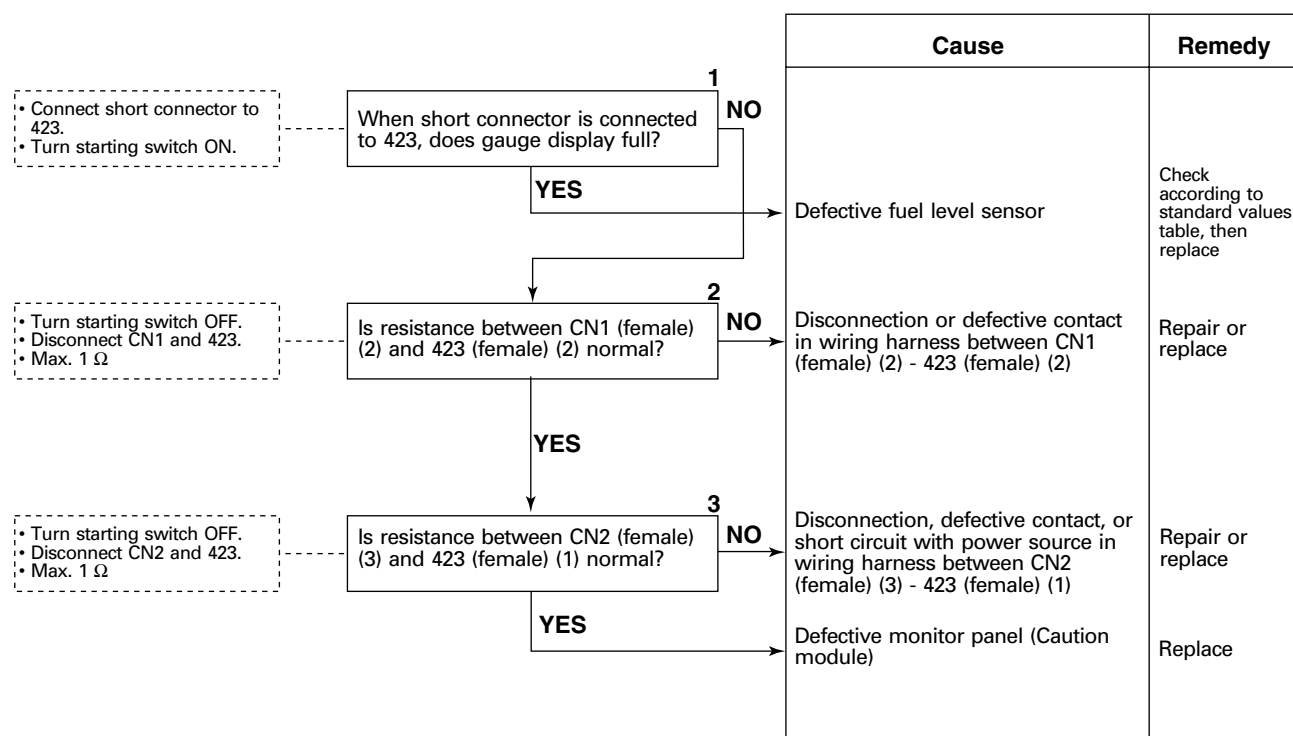
## M-17. Abnormality in fuel level gauge

★ Check that the fuel level is sufficiently high.

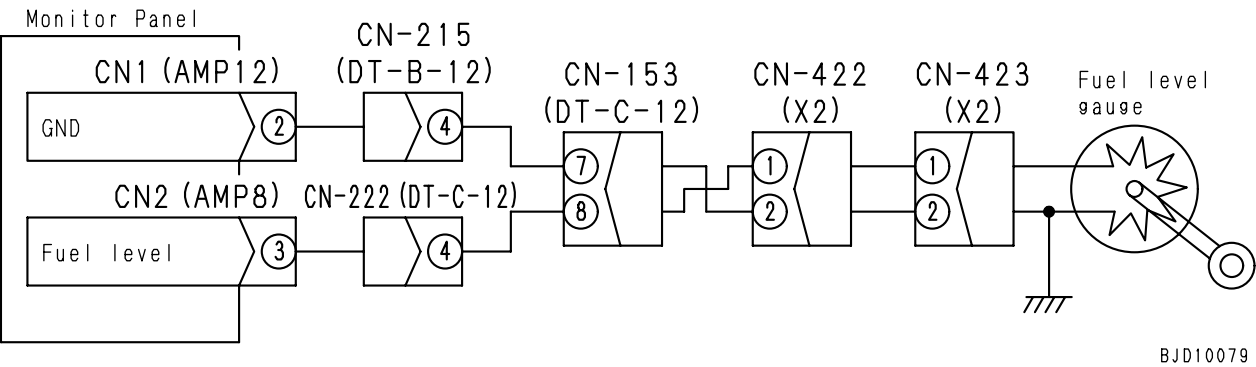
### a) The fuel level gauge always displays full



### b) The fuel level gauge does not display (even 1 bar)



M-17. Related electrical circuit diagram



**M-18. Gear speed display segments indicate [– –], and engine speed is not displayed**

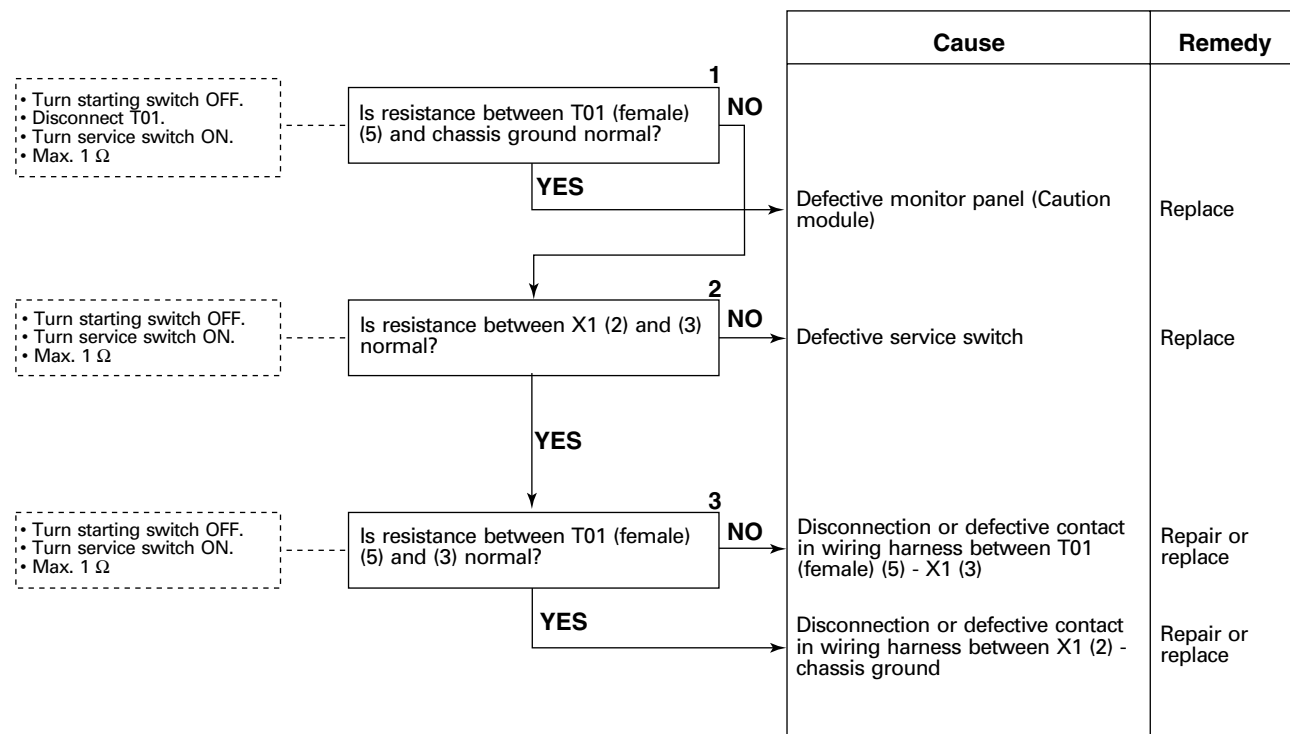
	Cause	Remedy
	Abnormality in network system	Go to N-3

**M-19. Service meter does not advance while engine is running**

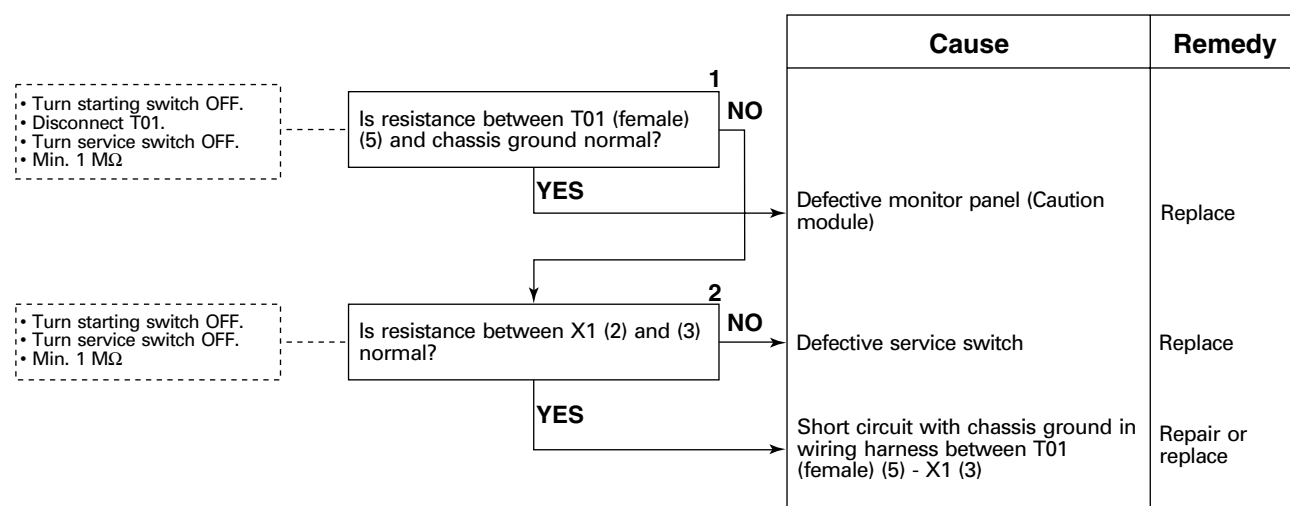
		Cause	Remedy
<div>• Start engine.</div> <div>Is sandglass displayed in service meter unit?</div>	NO	Go to M10 a)	
	YES	Defective monitor panel (Tachometer module)	Replace

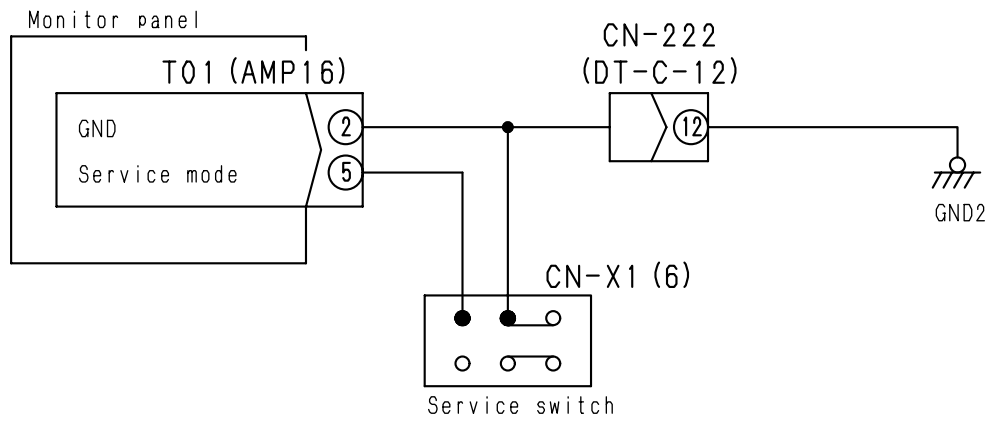
## M-20. Abnormality in service mode display

**a) When service switch is turned on, the service mode is not displayed**



**b) When the service switch is turned off, the service mode does not change to the normal mode**



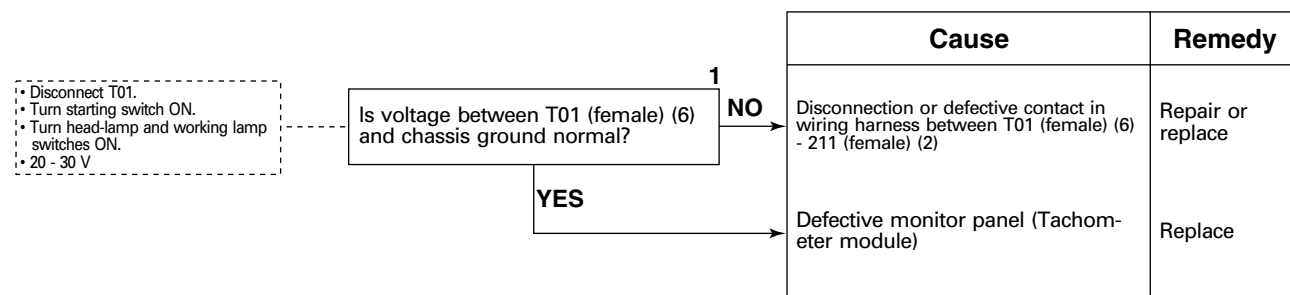
**M-20. Related electrical circuit diagram**

BJD10080

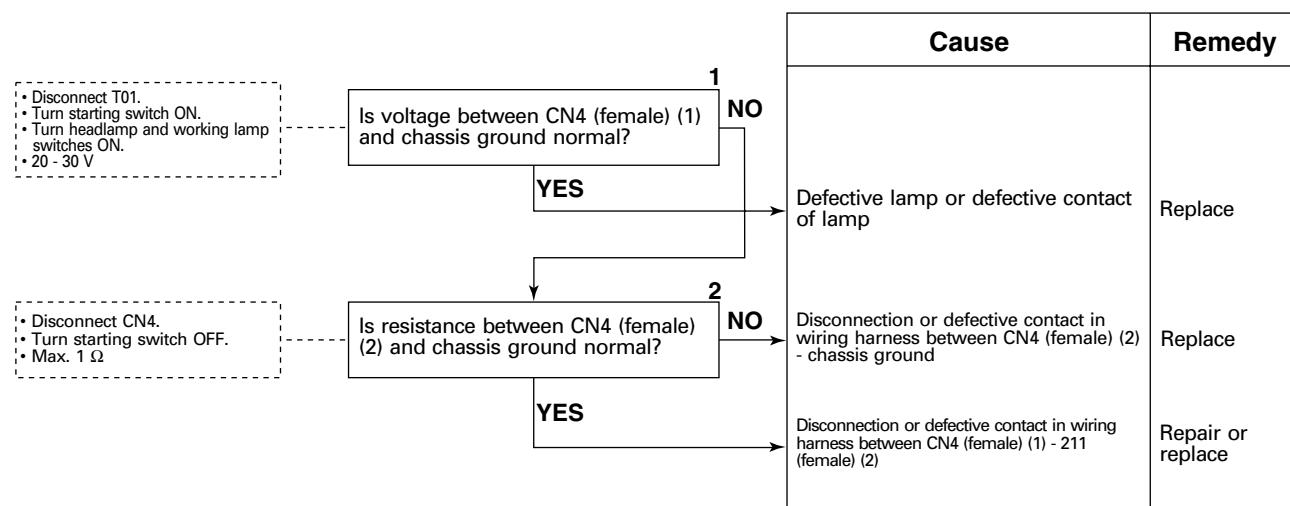
**M-21. Monitor panel lighting does not light up (though headlamps and working lamps light up)**

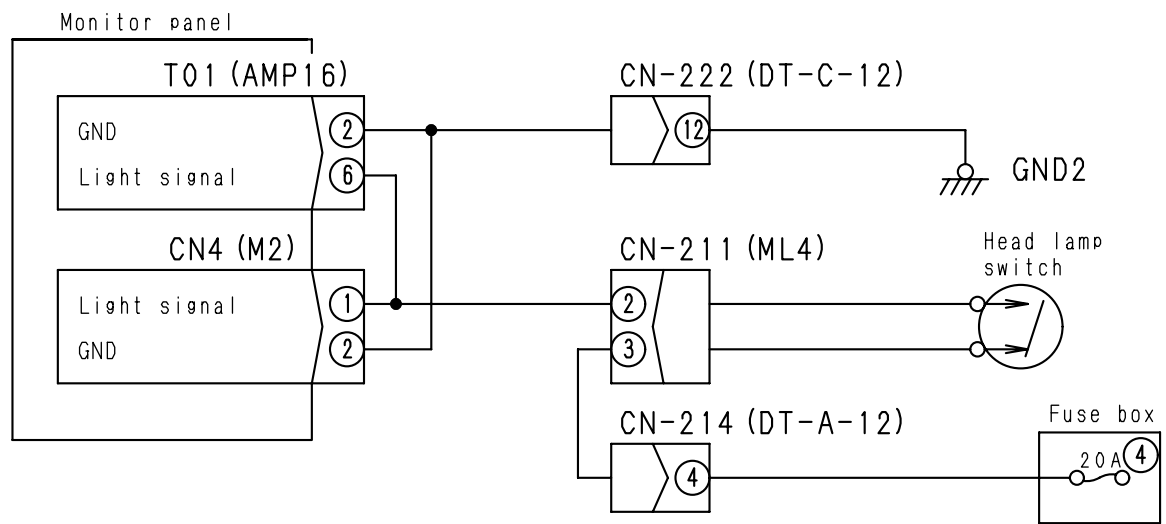
- ★ Check that the bulb is not broken (If it is broken, replace it).
- ★ Check that fuse 4 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

**a) The panel lamp of the tachometer module does not light up**



**b) The panel lamp of the caution module does not light up**

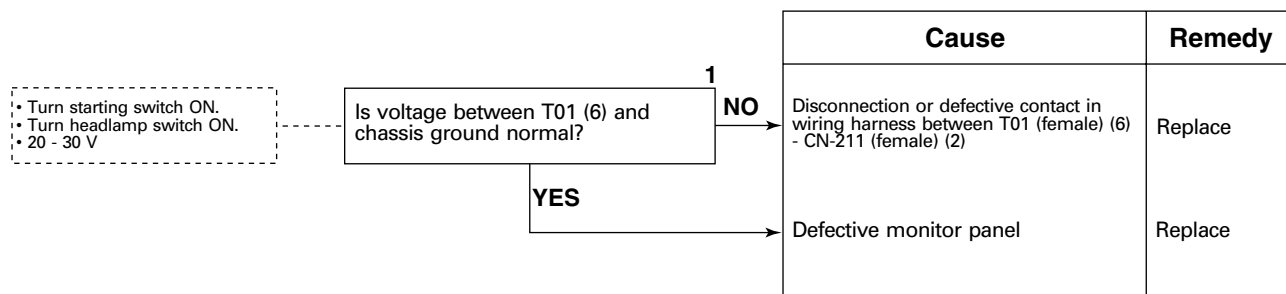


**M-21. Related electrical circuit diagram**

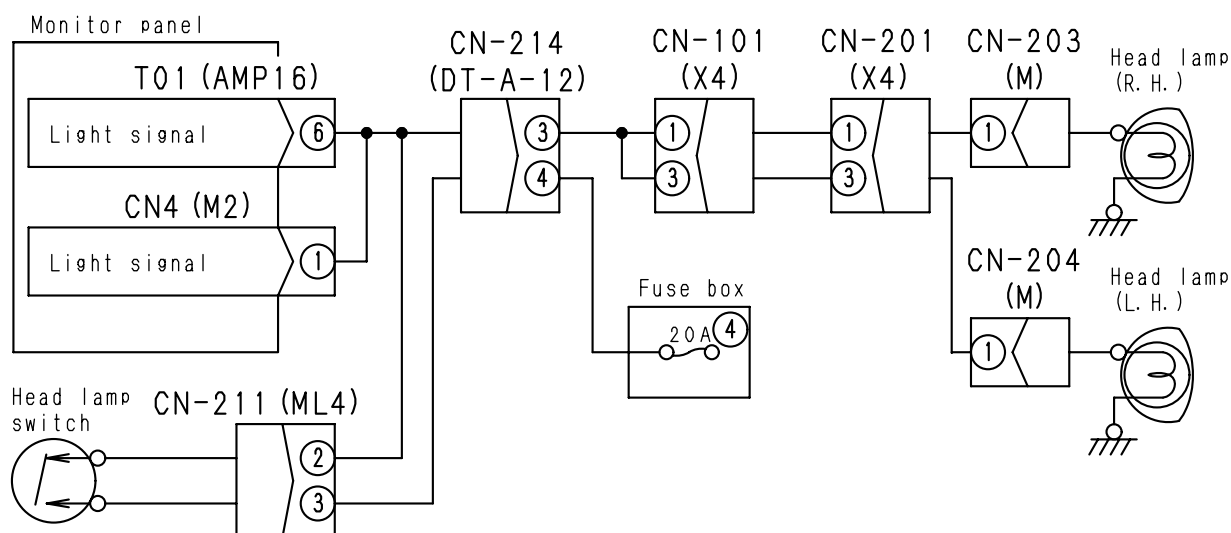
BJD10081

**M-22. When head lamp switch is turned on, monitor panel lighting does not light up**

- ★ Check that the headlamp light up normally before troubleshooting (If it does not light up, perform M-23).



**M-22. Related electrical circuit diagram**



BJD10082



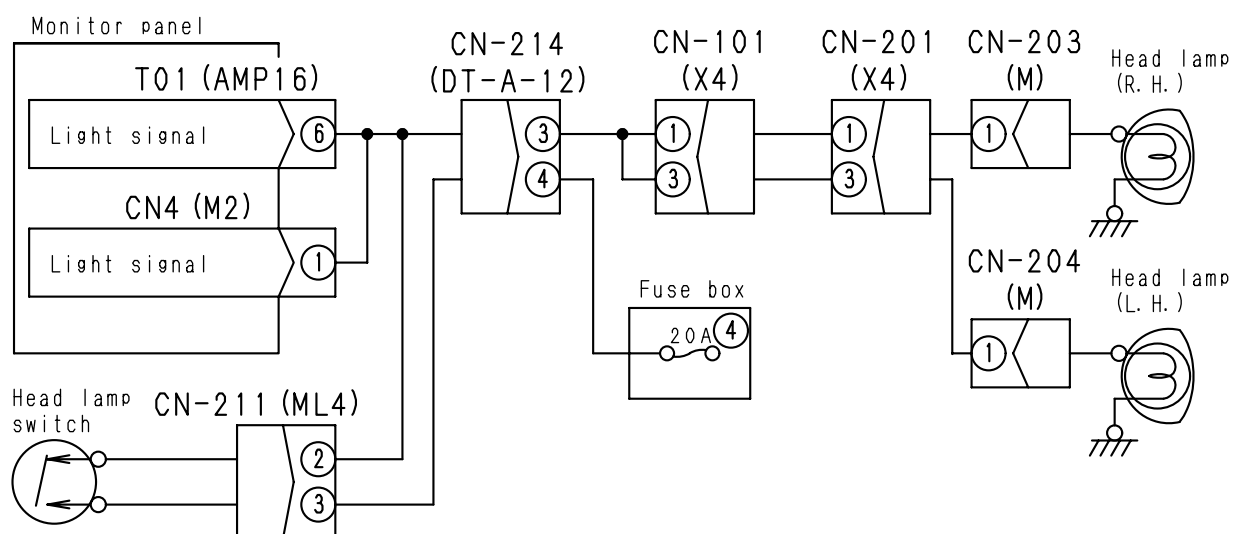
## M-23. Head lamps or rear lamps do not light up

### a) The headlamp does not light up

- ★ Check that fuse 4 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

		Cause	Remedy
<ul style="list-style-type: none"> <li>• Disconnect CN-203 and CN-204.</li> <li>• Turn starting switch ON.</li> <li>• Turn headlamp switch ON.</li> <li>• 20 - 30 V</li> </ul>	1 Is voltage between CN-203, CN-204 (female) (1) and chassis ground normal?	NO Defective bulb	Replace
	YES		
<ul style="list-style-type: none"> <li>• Disconnect CN-211.</li> <li>• Turn starting switch ON.</li> <li>• 20 - 30 V</li> </ul>	2 Is voltage between CN-211 (female) (3) and chassis ground normal?	NO Disconnection or defective contact in wiring harness between fuse 4 - CN-211 (female) (3)	Repair or replace
	YES		
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect CN-211.</li> <li>• Turn headlamp switch ON.</li> <li>• Max. 1 <math>\Omega</math></li> </ul>	3 Is resistance between CN-211 (male) (2) and (3) normal?	NO Defective headlamp switch	Replace
	YES	Disconnection or defective contact in wiring harness between CN-211 (female) (2) - CN-203 (female) (1) or CN-204 (female) (1)	Repair or replace

### M-23 a). Related electrical circuit diagram



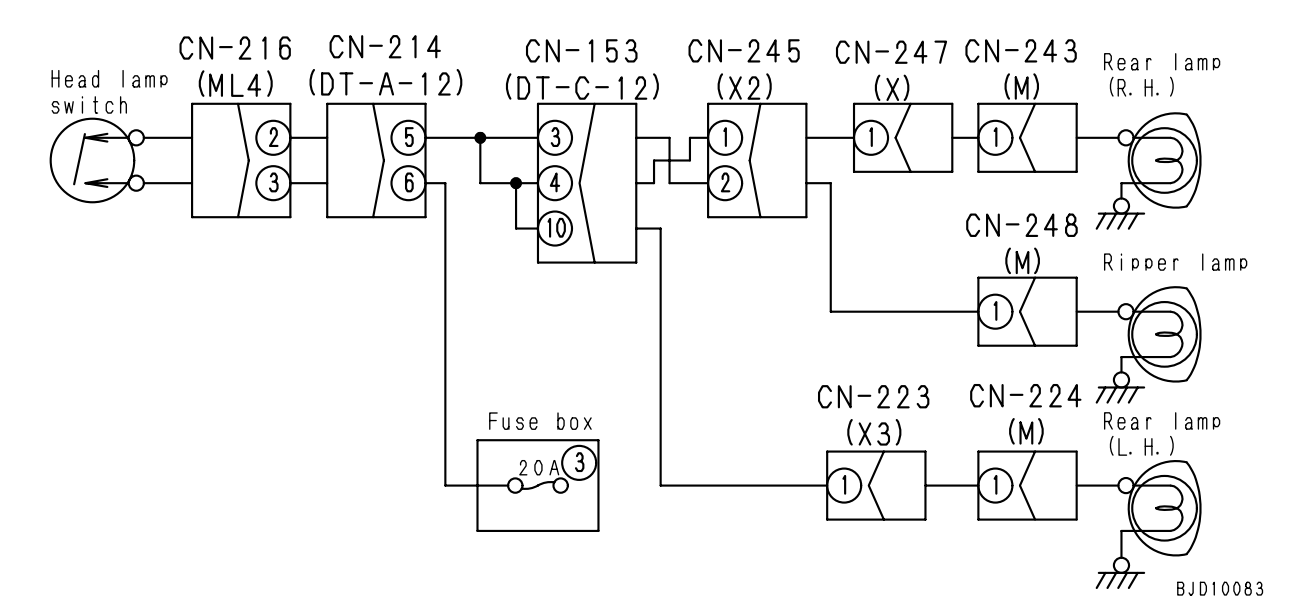
BJD10082

b) The rear lamp does not light up

- ★ Check that fuse 3 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

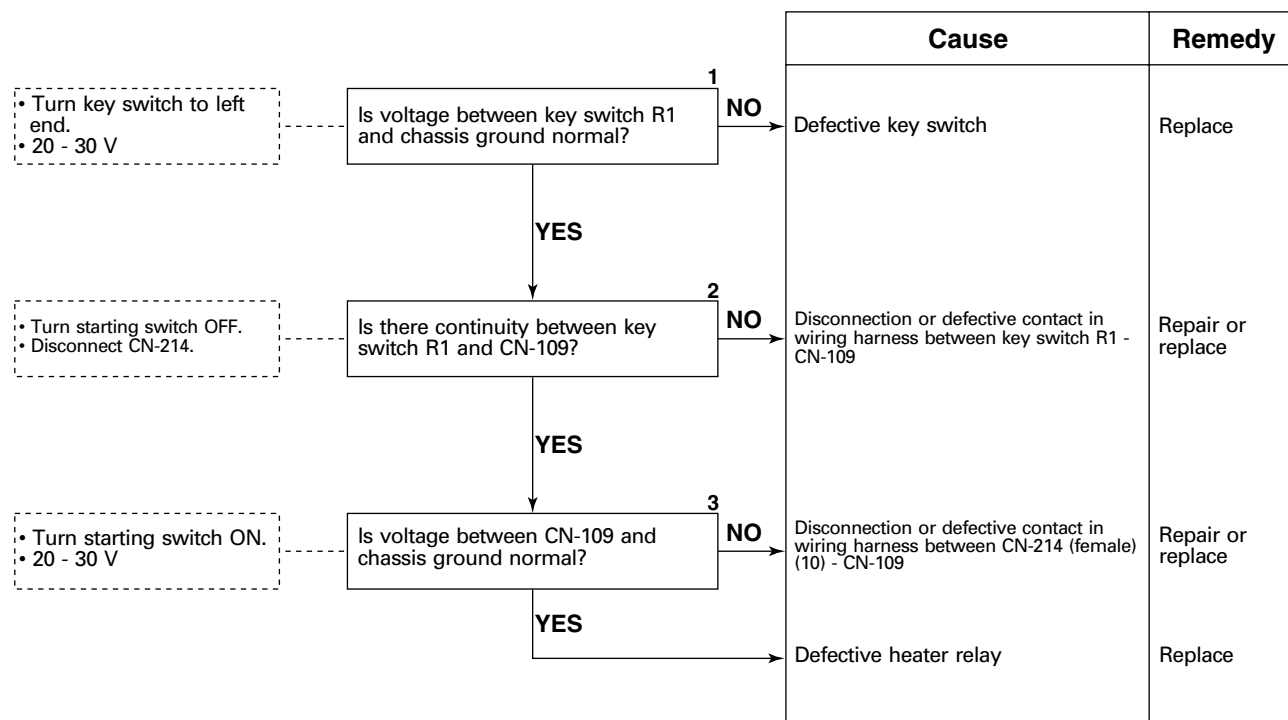
		Cause	Remedy
<div>           Disconnect CN-224, CN-243, and CN-248.            Turn starting switch ON.            Turn rear lamp switch ON.            20 - 30 V         </div>	<div>           Is voltage between CN-224, CN-243, CN-248 (female) (1) and chassis ground normal?            YES            NO         </div>	Defective bulb	Replace
	<div>           Is voltage between CN-216 (female) (3) and chassis ground normal?            YES            NO         </div>	Disconnection or defective contact in wiring harness between fuse 3 - CN-216 (female) (3)	Repair or replace
<div>           Disconnect CN-216.            Turn starting switch ON.            20 - 30 V         </div>	<div>           Is resistance between CN-216 (male) (2) and (3) normal?            YES            NO         </div>	Defective rear lamp switch	Replace
	<div>           Turn starting switch OFF.            Disconnect CN-216.            Turn rear lamp switch ON.            Max. 1 Ω         </div>	Disconnection or defective contact in wiring harness between CN-216 (female) (2) - CN-224 (female) (1) or CN-248 (female) (1)	Repair or replace

M-23 b). Related electrical circuit diagram

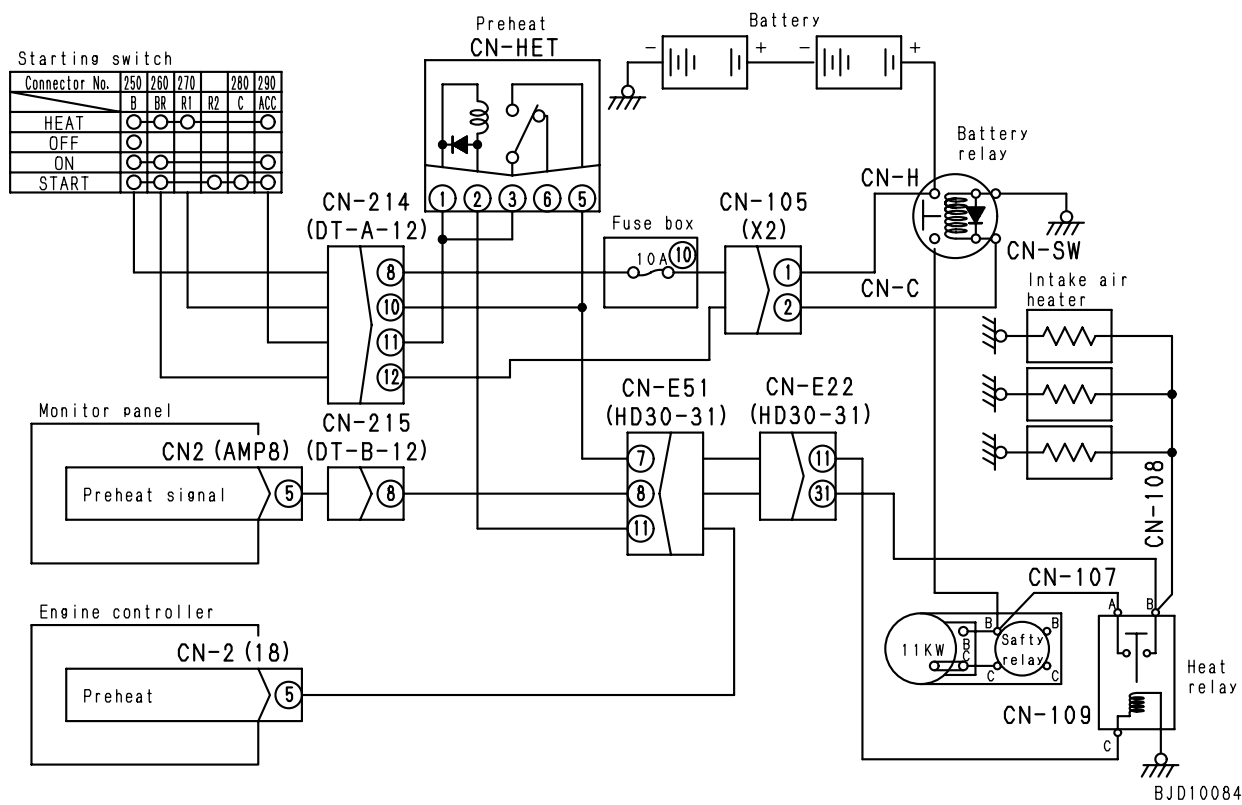


## M-24. Electric intake air heater does not work

- ★ The automatic preheater works only when the coolant temperature is low.
- ★ In this troubleshooting, only manual preheating with the key switch is inspected.



M-24. Related electrical circuit diagram



## M-25. Windshield wiper or washer does not work

### a) All windshield wipers and windshield washers do not operate

Cause	Remedy
Disconnection or defective contact in wiring harness between CN-C - cab fuse box	Repair or replace

### b) Front windshield wiper does not operate

Cause	Remedy
Defective wiper switch	Replace
Disconnection or defective contact in wiring harness between cab fuse box - motor connector (female) (5)	Repair or replace
Disconnection or defective contact in wiring harness between switch connector (female) (3) - chassis ground	Repair or replace
Disconnection or defective contact in wiring harness between switch connector (female) (4) - motor connector (female) (2)	Repair or replace
Defective wiper motor	Replace

• Turn starting switch ON.

When switch is replaced with another one, does wiper operate normally?

YES

NO

• Turn starting switch ON.  
• 20 - 30 V

Is voltage between motor connector (5) and chassis ground normal?

YES

NO

• Turn starting switch OFF.  
• Disconnect connector.  
• Max. 1 Ω

Is resistance between switch connector (female) (3) and chassis ground normal?

YES

NO

• Turn starting switch OFF.  
• Disconnect connector.  
• Max. 1 Ω

Is resistance between switch connector (female) (4) and motor connector (female) (2) normal?

YES

NO

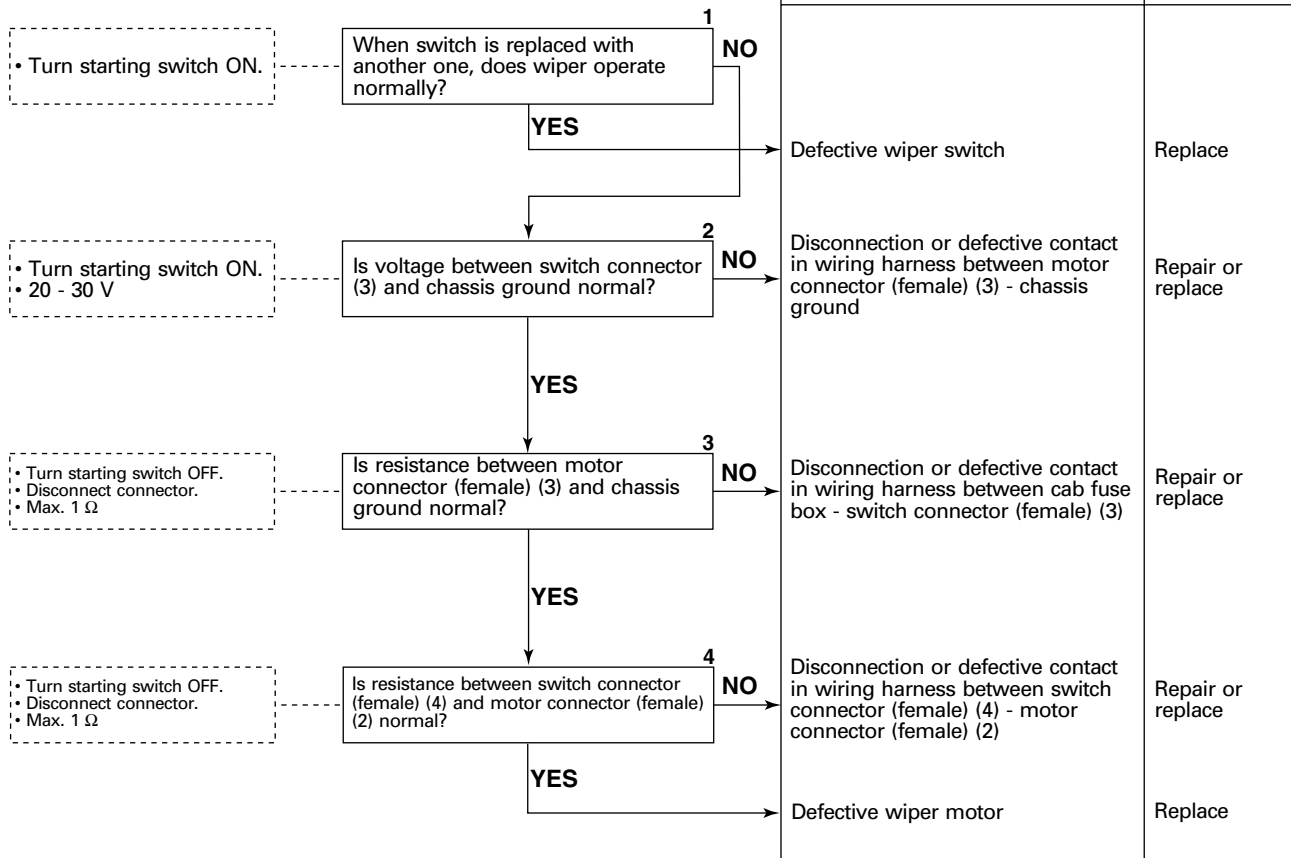
1

2

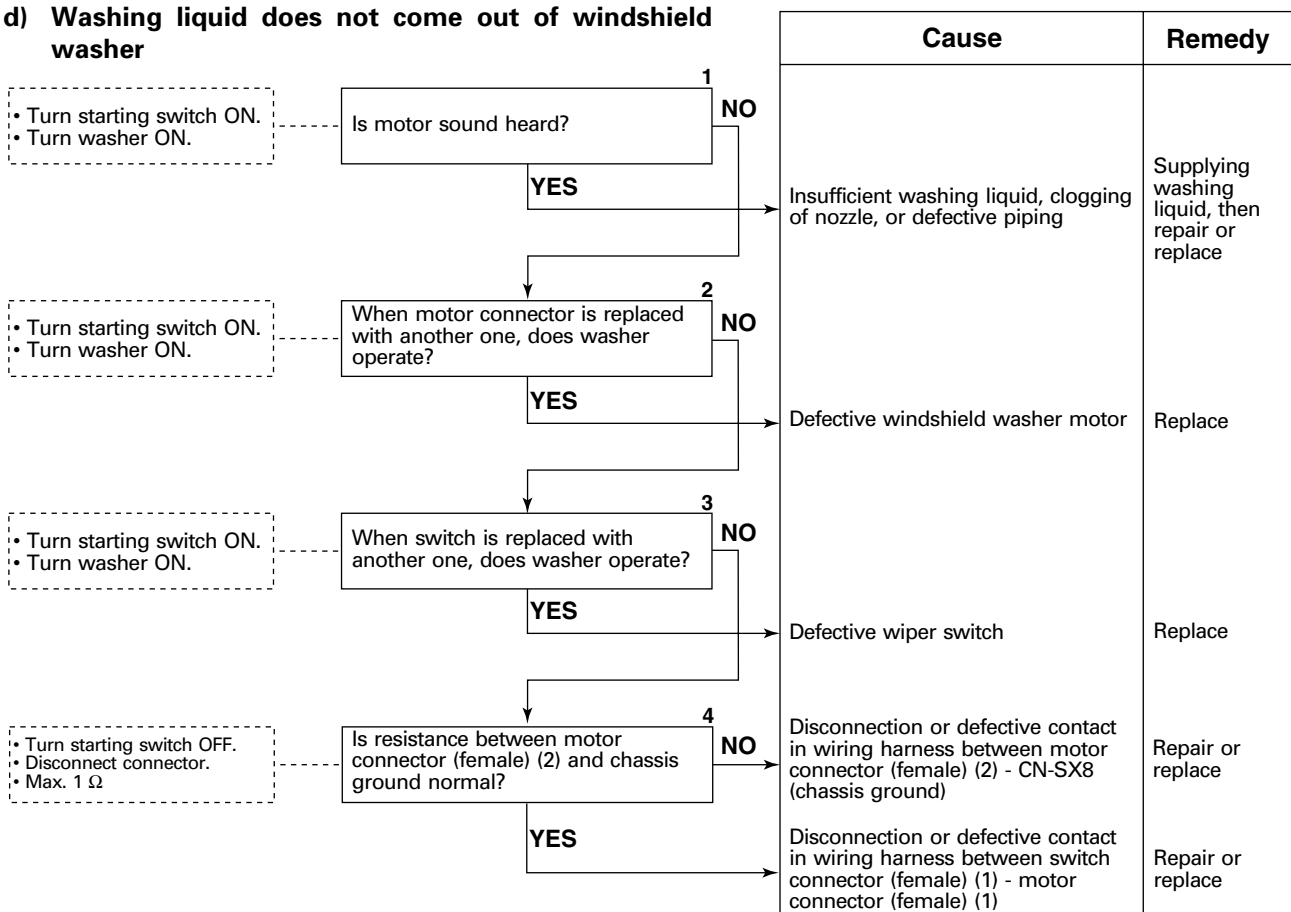
3

4

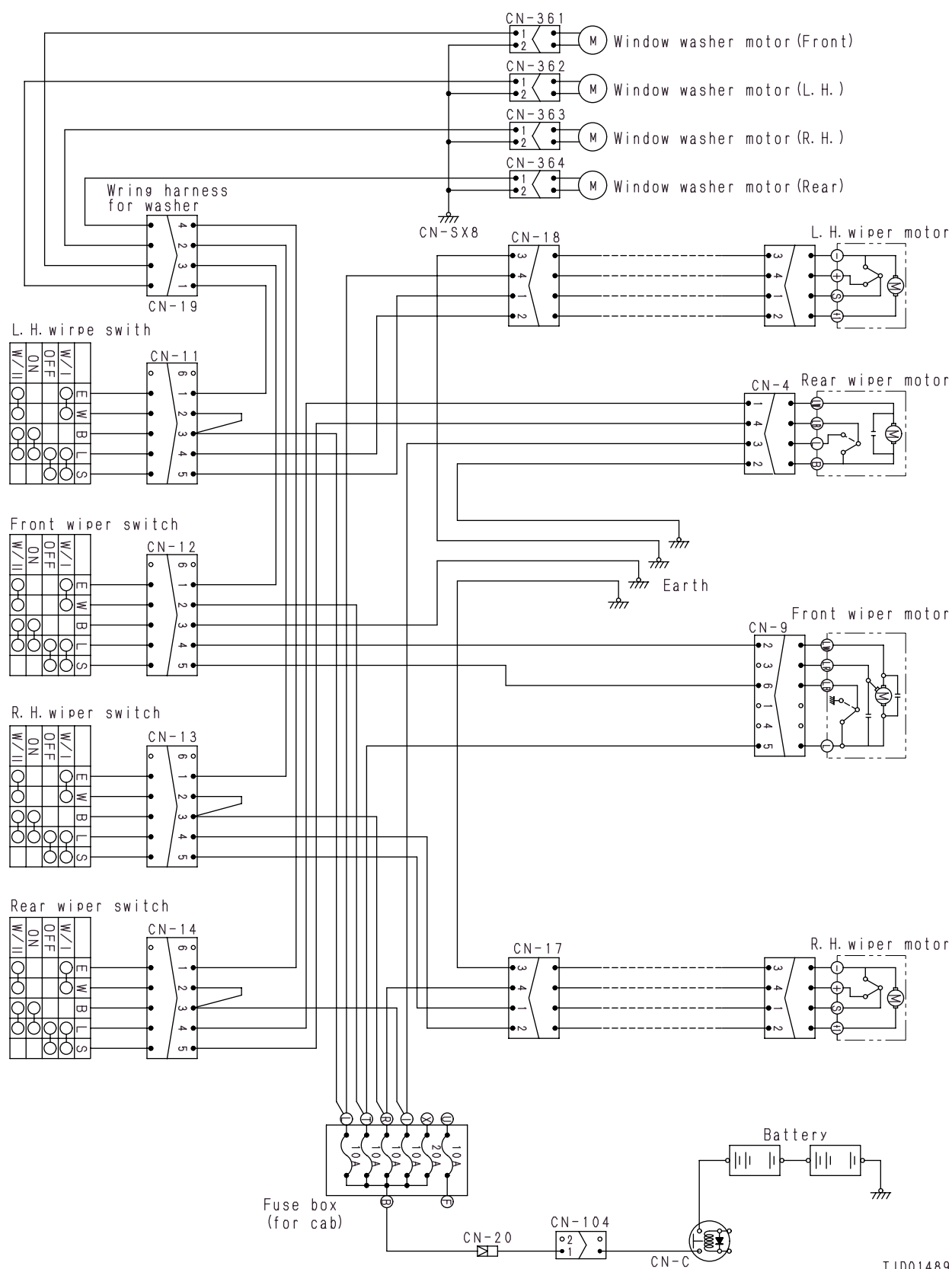
**c) The left windshield wiper, right windshield wiper, or rear wiper does not operate**



**d) Washing liquid does not come out of windshield washer**



M-25. Related electrical circuit diagram



TJD01489

**M-26. Air conditioner does not work**

- ★ Check that fuse 8 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

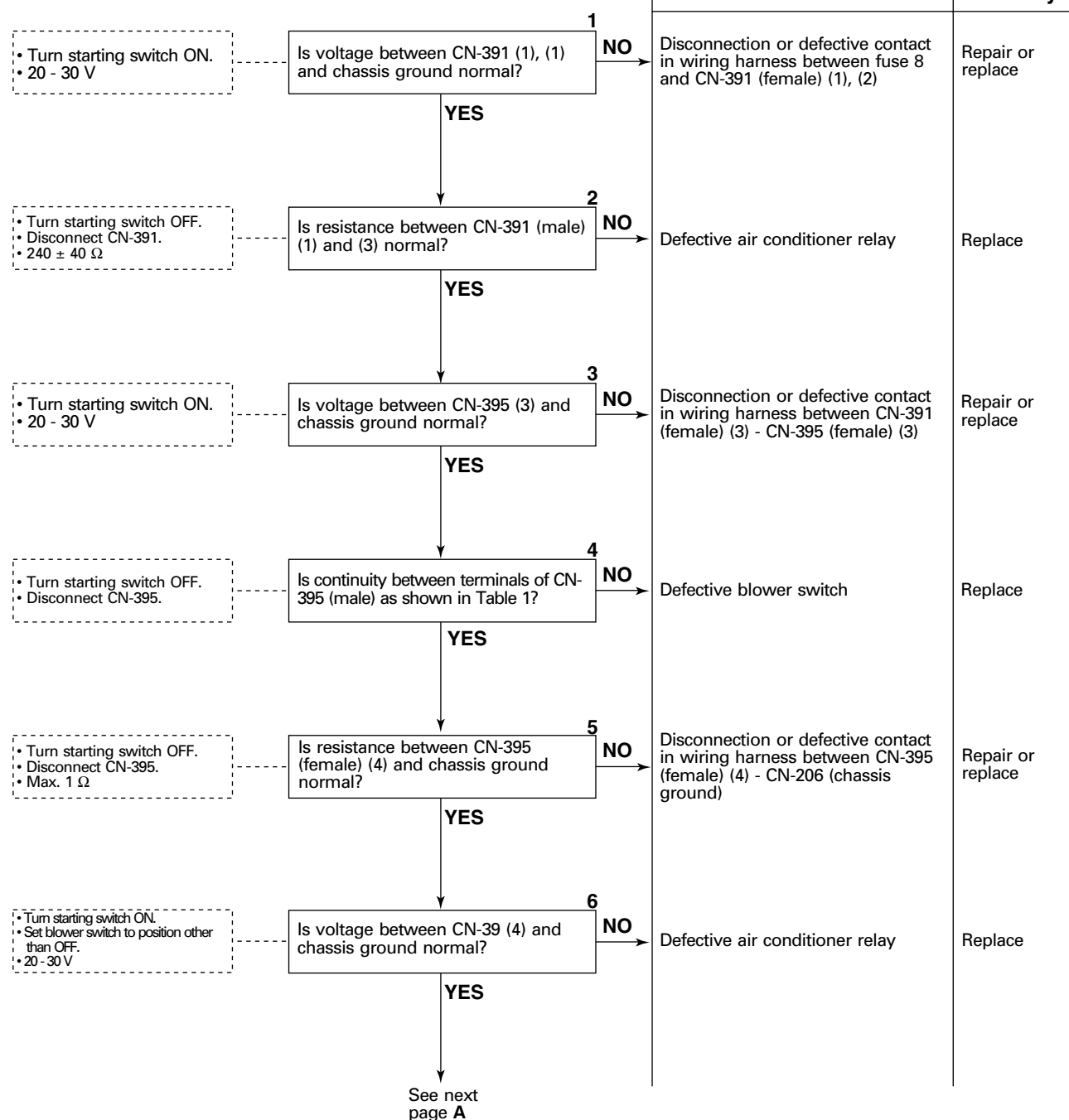
**a) Air does not blow out**

Table 1

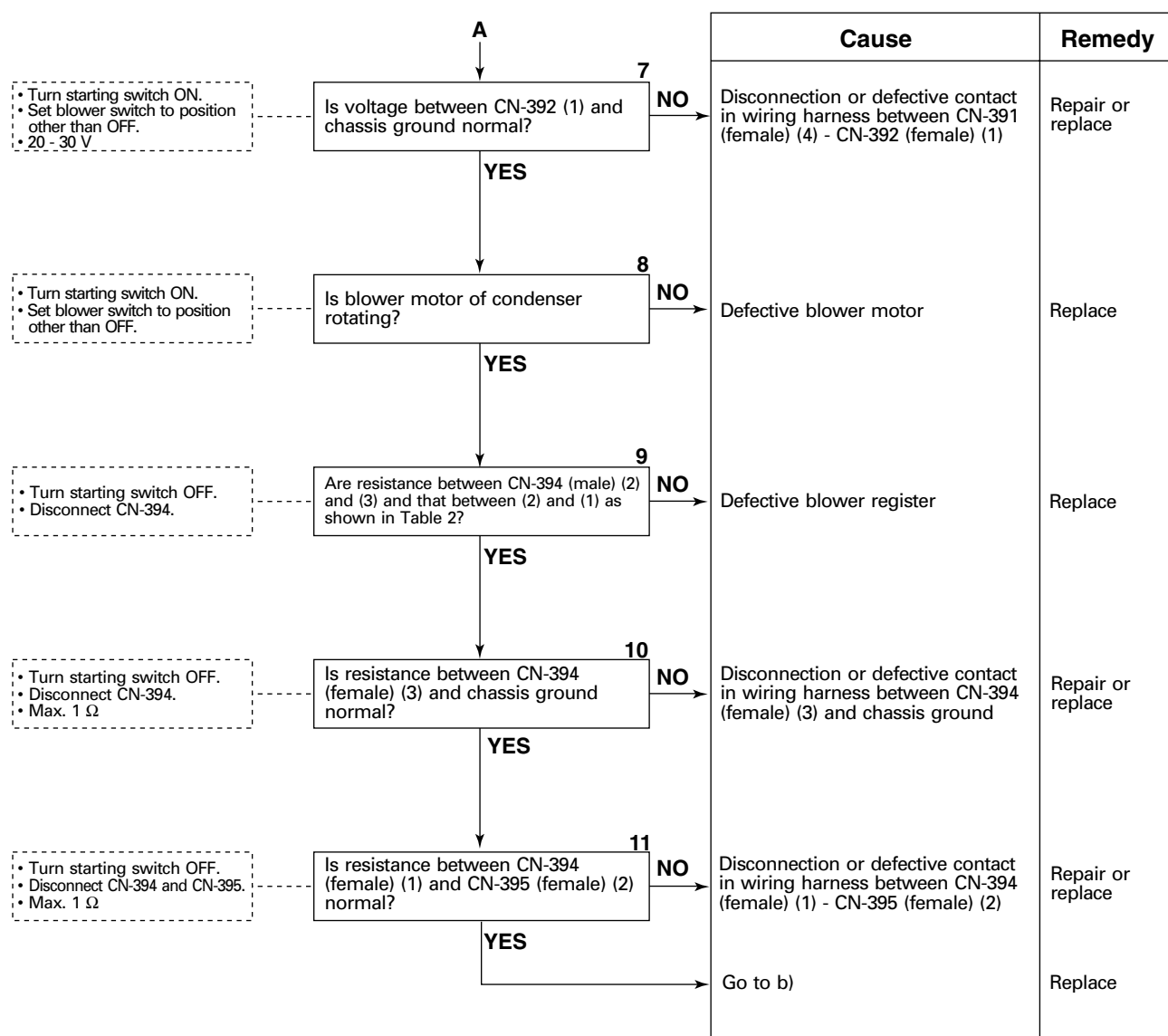
Terminal Position	①	②	③	④
0	○			
1	○	○		
2	○	○	○	
3	○	○		○

Table 2

CN-394 (male)	Resistance
Between (2) – (3)	$3 \pm 0.5 \Omega$
Between (2) – (1)	$1 \pm 0.1 \Omega$



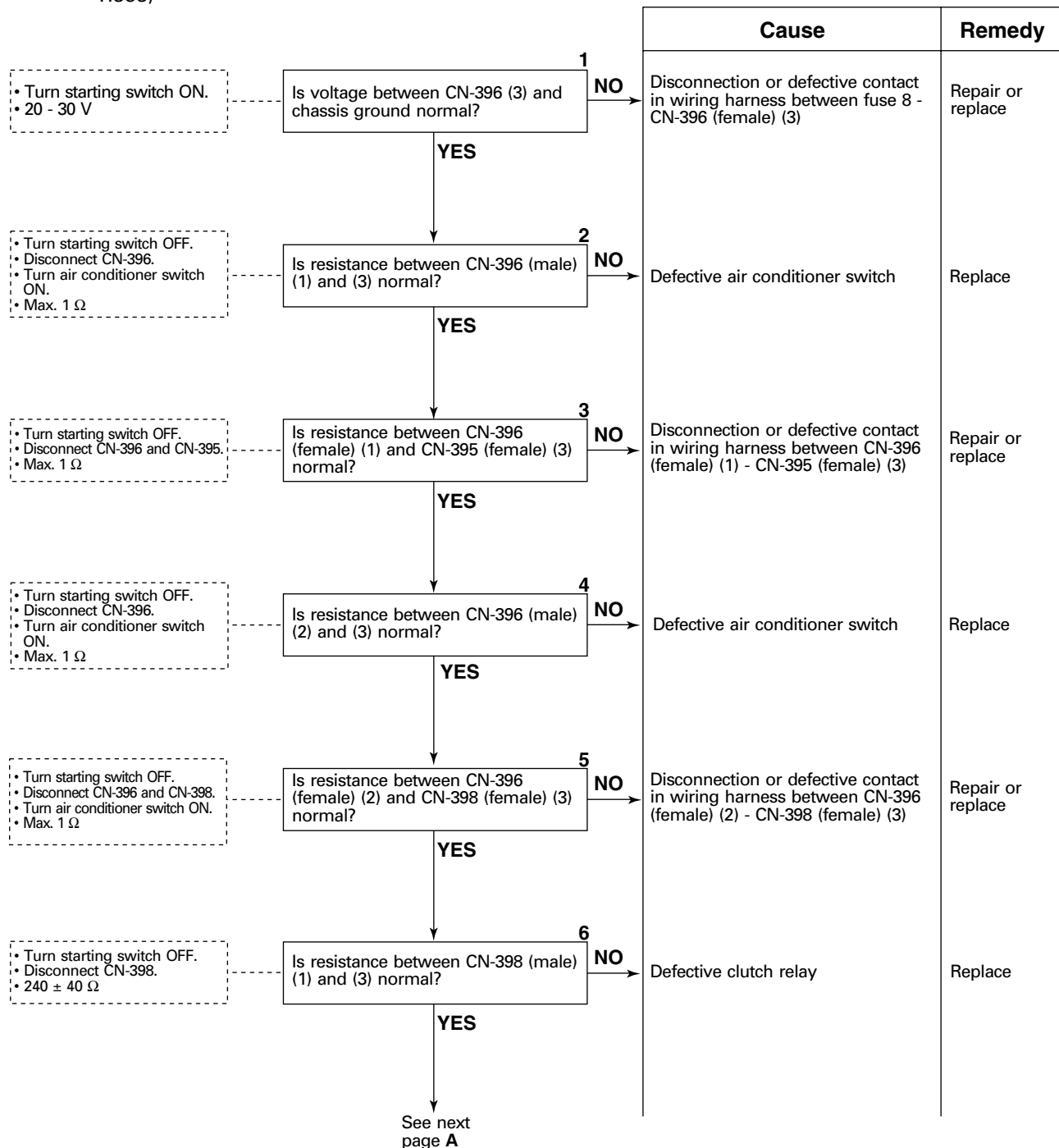


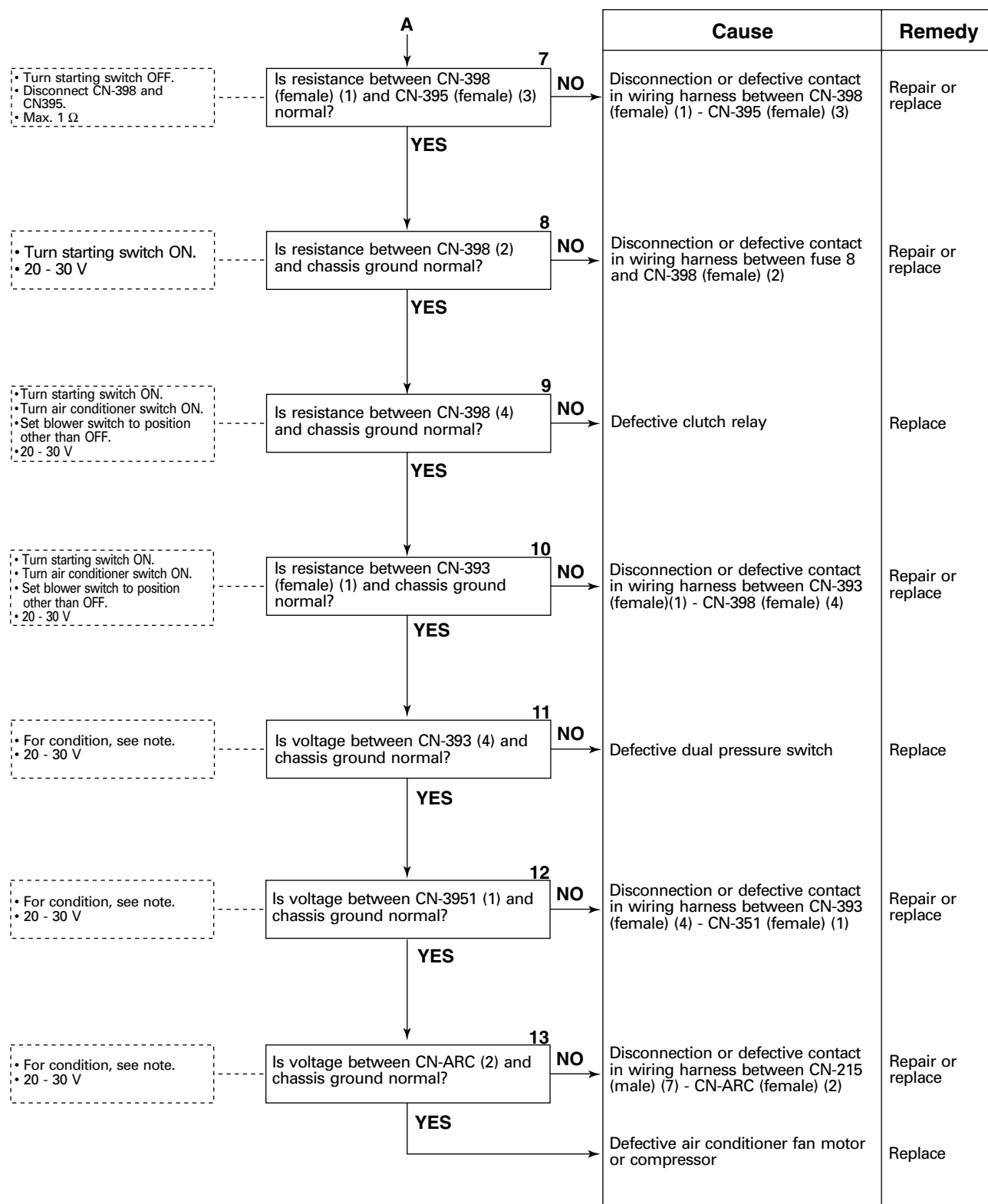


**b) b) Air does not blow out (Air conditioner does not operate)**

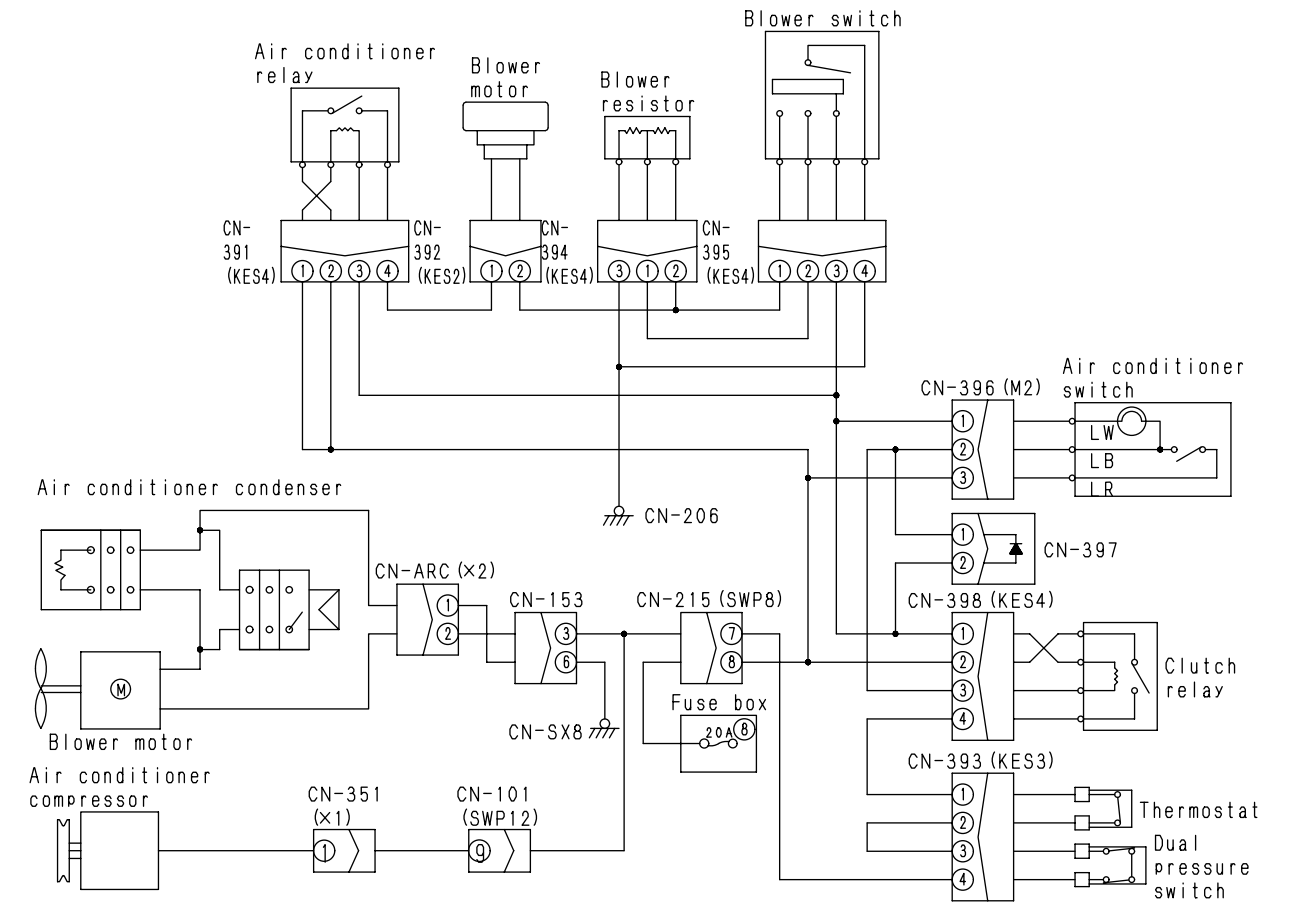
**Note:** Measure the voltage after the dual pressure switch and thermostat switch are turned ON.

- Switching pressure of dual pressure switch (Refrigerant circuit pressure):  
High pressure side: Turned ON at 2.06 MPa {21 kg/cm<sup>2</sup>} (when pressure lowers) and turned OFF at 2.65 MPa {27 kg/cm<sup>2</sup>} (when pressure rises)  
Low pressure side: Turned ON at 0.23 MPa {2.35 kg/cm<sup>2</sup>} (when pressure rises) and turned OFF at 0.21 MPa {2.1 kg/cm<sup>2</sup>} (when pressure lowers)
- Switching temperature of thermostat switch (Evaporator discharge temperature):  
Turned ON at 4.5°C (when temperature lowers) and turned OFF at 1°C (when temperature rises)





M-26. Related electrical circuit diagram



# TROUBLESHOOTING OF ENGINE CONTROLLER (G MODE)

[Serial No. 75001 and up]

Action taken by controller when abnormality occurs and problems on machine .....	20-802
Judgment table for engine controller and engine .....	20-810
G mode system electrical circuit diagram .....	20-812
G-1. [E0401] (Abnormality in engine controller power supply) is displayed .....	20-814
G-2. [E0402] (Abnormality in engine controller) is displayed .....	20-815
G-3. [E0405] (Abnormality in fuel control dial system) is displayed .....	20-816
G-4. [E0406] (Abnormality in decelerator potentiometer system) is displayed .....	20-817
G-5. [E0409] (Abnormality in Ne speed sensor system) is displayed .....	20-818
G-6. [E0410] (Abnormality in G speed sensor system) is displayed .....	20-819
G-7. [E0458] (Short circuit in fuel injector No. 1, No. 2, No. 3 system) is displayed .....	20-820
G-8. [E0459] (Short circuit in fuel injector No. 4, No. 5, No. 6 system) is displayed .....	20-823
G-9. [E0460] (Abnormality in controller chassis ground circuit) is displayed .....	20-826
G-10. [E0461] (Disconnection in fuel injector No. 1 system) is displayed .....	20-827
G-11. [E0462] (Disconnection in fuel injector No. 2 system) is displayed .....	20-828
G-12. [E0463] (Disconnection in fuel injector No. 3 system) is displayed .....	20-829
G-13. [E0464] (Disconnection in fuel injector No. 4 system) is displayed .....	20-830
G-14. [E0465] (Disconnection in fuel injector No. 5 system) is displayed .....	20-831
G-15. [E0466] (Disconnection in fuel injector No. 6 system) is displayed .....	20-832
G-16. [E0468] (Overcurrent in fuel supply pump PCV1 system) is displayed .....	20-833
G-17. [E0469] (Disconnection in fuel supply pump PCV1 system) is displayed .....	20-834
G-18. [E0470] (Overcurrent in fuel supply pump PCV2 system) is displayed .....	20-835
G-19. [E0471] (Disconnection in fuel supply pump PCV2 system) is displayed .....	20-836
G-20. [E0472] (Abnormality in boost pressure sensor system) is displayed .....	20-837
G-21. [E0474] (Abnormality in common rail fuel pressure sensor system) is displayed .....	20-838
G-22. [E0476] (Abnormality in high engine water temperature sensor system) is displayed .....	20-839
G-23. [E0478] (Abnormality in low engine water temperature sensor system) is displayed .....	20-840
G-24. [E0480] (Abnormality in common rail fuel pressure system) is displayed .....	20-841
G-25. [E0481] (Abnormality in high common rail fuel pressure 1 system) is displayed	
[E0482] (Abnormality in high common rail fuel pressure 2 system) is displayed .....	20-842
G-26. [E0483] (No-pressure feed by fuel supply pump 1) is displayed	
[E0484] (No-pressure feed by fuel supply pump 2) is displayed .....	20-843
G-27. [E0487] (Abnormality in engine oil pressure switch system) is displayed .....	20-845
G-28. [E0488] (Abnormality in power supply system 1) is displayed .....	20-847
G-29. [E0489] (Abnormality in power supply system 2) is displayed .....	20-849
G-30. [E0490] (Abnormality in Q regulator switch signal) is displayed .....	20-850
G-31. [E0491] (Short circuit in starting switch C system) is displayed .....	20-851

- ★ This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the monitor code display returns to normal, the problem has been removed.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

## ACTION TAKEN BY CONTROLLER WHEN ABNORMALITY OCCURS AND PROBLEMS ON MACHINE

Service code	Abnormal system	Contents of abnormality
E0405	Abnormality in fuel control dial system	<ol style="list-style-type: none"> <li>1. Disconnection, defective contact, short circuit, or short circuit with chassis ground in fuel control dial</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (4) (power source) - fuel control dial CN-FCS (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (6) (signal) - fuel control dial CN-FCS (2)</li> <li>4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (10) (ground) - fuel control dial CN-FCS (3)</li> <li>5. Defective engine controller</li> </ol>
E0406	Abnormality in decelerator potentiometer system	<ol style="list-style-type: none"> <li>1. Disconnection, defective contact, short circuit, or short circuit with chassis ground in decelerator potentiometer</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (4) (power source) - decelerator potentiometer CN-FCD (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (7) (signal) - decelerator potentiometer CN-FCD (2)</li> <li>4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (10) (ground) - decelerator potentiometer CN-FCS (3)</li> <li>5. Defective engine controller</li> </ol>
E0409	Abnormality in Ne speed sensor system	<ol style="list-style-type: none"> <li>1. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between Ne speed sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (5) (+ side) - Ne speed sensor CN-E51 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (12) (- side) - Ne speed sensor CN-E51 (2)</li> <li>4. Defective engine controller</li> </ol>
E0410	Abnormality in G speed sensor system	<ol style="list-style-type: none"> <li>1. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between G speed sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (1) (+ side) - G speed sensor CN-E52 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (9) (- side) - G speed sensor CN-E52 (2)</li> <li>4. Defective engine controller</li> </ol>
E0458	Short circuit in No. 1, No. 2, No. 3 fuel injector system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 1</li> <li>2. Defective fuel injector No. 2</li> <li>3. Defective fuel injector No. 3</li> <li>4. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (7) (+ side) - injector No. 1 (1)</li> <li>5. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (8) (- side) - injector No. 1 (2)</li> <li>6. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (4) (+ side) - injector No. 2 (1)</li> <li>7. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (10) (- side) - injector No. 2 (2)</li> <li>8. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (3) (+ side) - injector No. 3 (1)</li> <li>9. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (9) (- side) - injector No. 3 (2)</li> <li>10. Disconnection or defective contact in wiring harness between controller CN-7 (5), (13) - chassis ground</li> <li>11. Defective engine controller</li> </ol>
E0459	Short circuit in No. 4, No. 5, No. 6 fuel injector system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 4</li> <li>2. Defective fuel injector No. 5</li> <li>3. Defective fuel injector No. 6</li> <li>4. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (3) (+ side) - injector No. 4 (1)</li> <li>5. Short circuit with chassis ground or power source in wiring harness between controller CN-9 (9) (- side) - injector No. 4 (2)</li> <li>6. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (1) (+ side) - injector No. 5 (1)</li> <li>7. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (7) (- side) - injector No. 5 (2)</li> <li>8. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (2) (+ side) - injector No. 6 (1)</li> <li>9. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (9) (- side) - injector No. 6 (2)</li> <li>10. Disconnection or defective contact in wiring harness between controller CN-7 (5), (13) - chassis ground</li> <li>11. Defective engine controller</li> </ol>

Normal condition	Action taken by controller	Problems on machine
<ul style="list-style-type: none"> <li>• Sensor source voltage Between CN-1 (4) - CN-2 (10): 4.6 - 5.4 V</li> <li>• Sensor signal voltage CN-1 (6) - CN-2 (10): 0.3 - 4.5 V</li> </ul>	1. Holds present voltage until transmission is set in "neutral" and lowers speed command value to 1,300 rpm after transmission is set in "neutral"	1. When fuel control dial is operated, set speed does not change
<ul style="list-style-type: none"> <li>• Sensor source voltage Between CN-1 (4) - CN-2 (10): 4.6 - 5.4 V</li> <li>• Sensor signal voltage CN-1 (7) - CN-2 (10): 0.3 - 4.5 V</li> </ul>	1. Holds present voltage until transmission is set in "neutral" and lowers speed command value to 1,300 rpm after transmission is set in "neutral"	1. When decelerator is operated, set speed does not change
<ul style="list-style-type: none"> <li>• Sensor resistance Between CN-E51 (1) - (2): 85 - 210 <math>\Omega</math></li> </ul>	1. Operates machine with output limited	1. Output is lowered.
<ul style="list-style-type: none"> <li>• Sensor resistance Between CN-E52 (1) - (2): 1 k - 2 k<math>\Omega</math></li> </ul>	1. Operates machine with output limited	1. Output is lowered.
<ul style="list-style-type: none"> <li>• Injector No. 1 resistance Between CN-E31 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> <li>• Injector No. 2 resistance Between CN-E32 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> <li>• Injector No. 3 resistance Between CN-E33 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> </ul>	1. Stops outputting to fuel injectors No. 1, No. 2 and No. 3 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0459 is also displayed)	1. Output is lowered largely (When error is displayed singly) 2. Engine stops (When E0459 is also displayed)
<ul style="list-style-type: none"> <li>• Injector No. 4 resistance Between CN-E34 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> <li>• Injector No. 5 resistance Between CN-E35 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> <li>• Injector No. 6 resistance Between CN-E36 (1) - (2): 0.4 - 1.1 <math>\Omega</math></li> </ul>	1. Stops outputting to fuel injectors No. 4, No. 5 and No. 6 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0458 is also displayed)	1. Output is lowered largely (When error is displayed singly) 2. Engine stops (When E0458 is also displayed)

Service code	Abnormal system	Contents of abnormality
E0460	Abnormality in controller drive circuit	<ol style="list-style-type: none"> <li>1. Disconnection or defective contact in wiring harness between controller CN-7 (5), (13) - chassis ground (When E0458 and E0459 are also displayed)</li> <li>2. Defective engine controller</li> </ol>
E0461	Disconnection in fuel injector No. 1 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 1</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (7) (+ side) - fuel injector No. 1 CN-E31 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (8) (- side) - fuel injector No. 1 CN-E31 (2)</li> <li>4. Defective engine controller</li> </ol>
E0462	Disconnection in fuel injector No. 2 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 2</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (4) (+ side) - fuel injector No. 2 CN-E32 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (10) (- side) - fuel injector No. 2 CN-E32 (2)</li> <li>4. Defective engine controller</li> </ol>
E0463	Disconnection in fuel injector No. 3 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 3</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (3) (+ side) - fuel injector No. 3 CN-E33 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-6 (9) (- side) - fuel injector No. 3 CN-E33 (2)</li> <li>4. Defective engine controller</li> </ol>
E0464	Disconnection in fuel injector No. 4 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 4</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (3) (+ side) - fuel injector No. 4 CN-E34 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (9) (- side) - fuel injector No. 4 CN-E34 (2)</li> <li>4. Defective engine controller</li> </ol>
E0465	Disconnection in fuel injector No. 5 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 5</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (1) (+ side) - fuel injector No. 5 CN-E35 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (7) (- side) - fuel injector No. 5 CN-E35 (2)</li> <li>4. Defective engine controller</li> </ol>
E0466	Disconnection in fuel injector No. 6 system	<ol style="list-style-type: none"> <li>1. Defective fuel injector No. 6</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (2) (+ side) - fuel injector No. 6 CN-E36 (1)</li> <li>3. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (8) (- side) - fuel injector No. 6 CN-E36 (2)</li> <li>4. Defective engine controller</li> </ol>
E0468	Overcurrent in fuel supply pump PCV1 system	<ol style="list-style-type: none"> <li>1. Defective fuel supply pump PCV1</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (10) (+ side) - PCV1 solenoid CN-E41 (1)</li> <li>3. Short circuit with power source in wiring harness between controller CN-7 (11) (- side) - PCV1 solenoid CN-E41 (2)</li> <li>4. Defective engine controller</li> </ol>
E0459	Disconnection in fuel supply pump PCV1 system	<ol style="list-style-type: none"> <li>1. Defective fuel supply pump PCV1</li> <li>2. Disconnection or defective contact in wiring harness between controller CN-7 (10) (+ side) - PCV1 solenoid CN-E41 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-7 (11) (- side) - PCV1 solenoid CN-E41 (2)</li> <li>4. Defective engine controller</li> </ol>
E0470	Overcurrent in fuel supply pump PCV2 system	<ol style="list-style-type: none"> <li>1. Defective fuel supply pump PCV2</li> <li>2. Short circuit with chassis ground or power source in wiring harness between controller CN-7 (4) (+ side) - PCV2 solenoid CN-E42 (1)</li> <li>3. Short circuit with power source in wiring harness between controller CN-7 (12) (- side) - PCV2 solenoid CN-E42 (2)</li> <li>4. Defective engine controller</li> </ol>



Normal condition	Action taken by controller	Problems on machine
	1. Operates machine with output limited	1. Engine speed does not rise to high idling with no load applied 2. If high load is applied, engine stops 3. Engine stops during operation 4. Engine does not start
• Injector No. 1 resistance Between CN-E31 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 1 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Injector No. 2 resistance Between CN-E32 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 2 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Injector No. 3 resistance Between CN-E33 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 3 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Injector No. 4 resistance Between CN-E34 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 4 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Injector No. 5 resistance Between CN-E35 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 5 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Injector No. 6 resistance Between CN-E36 (1) - (2): 0.4 - 1.1 $\Omega$	1. Stops outputting to fuel injector No. 6 (When error is displayed singly) 2. Stops outputting to fuel supply pump and all fuel injectors (When E0462 - E0466 are also displayed)	1. Output is lowered (When error is displayed singly) 2. Engine stops (When E0462 - E0466 are also displayed)
• Solenoid resistance Between CN-E41 (1) - (2): 2.3 - 5.3 $\Omega$	1. Stops outputting to PCV1 (When error is displayed singly) 2. Stops outputting to PCV1 and PCV2 (When E0470 is also displayed)	1. Machine can be operated normally (When error is displayed singly) 2. Engine stops (When E0470 is also displayed)
• Solenoid resistance Between CN-E41 (1) - (2): 2.3 - 5.3 $\Omega$	1. Stops outputting to PCV1 (When error is displayed singly) 2. Stops outputting to PCV1 and PCV2 (When E0470 is also displayed)	1. Machine can be operated normally (When error is displayed singly) 2. Engine stops (When E0470 is also displayed)
• Solenoid resistance Between CN-E42 (1) - (2): 2.3 - 5.3 $\Omega$	1. Stops outputting to PCV2 (When error is displayed singly) 2. Stops outputting to PCV1 and PCV2 (When E0469 is also displayed)	1. Machine can be operated normally (When error is displayed singly) 2. Engine stops (When E0469 is also displayed)

Service code	Abnormal system	Contents of abnormality
E0471	Disconnection in fuel supply pump PCV2 system	<ol style="list-style-type: none"> <li>1. Defective fuel supply pump PCV2</li> <li>2. Disconnection or defective contact in wiring harness between controller CN-7 (7) (+ side) - PCV2 solenoid CN-E42 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-7 (12) (- side) - PCV2 solenoid CN-E42 (2)</li> <li>4. Defective engine controller</li> </ol>
E0472	Abnormality in boost pressure sensor system	<ol style="list-style-type: none"> <li>1. Defective boost pressure sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (2) (power source) - boost pressure sensor CN-E54 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (3) (signal) - boost pressure sensor CN-E54 (2)"</li> <li>4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (10) (ground) - boost pressure sensor CN-E54 (3)</li> <li>5. Defective engine controller</li> </ol>
E0474	Abnormality in common rail fuel pressure sensor system	<ol style="list-style-type: none"> <li>1. Defective common rail fuel pressure sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (2) (power source) - fuel pressure sensor CN-E53 (1)</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-1 (1) (signal) - fuel pressure sensor CN-E53 (2)</li> <li>4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (10) (ground) - fuel pressure sensor CN-E53 (3)</li> <li>5. Defective engine controller</li> </ol>
E0476	Abnormality in high water temperature sensor system	<ol style="list-style-type: none"> <li>1. Defective high water temperature sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (4) (signal) - high water temperature sensor CN-P7 (1)</li> <li>3. Disconnection or defective contact in wiring harness between controller CN-2 (10) (ground) - high water temperature sensor CN-P7 (2)</li> <li>4. Defective engine controller</li> </ol>
E0478	Abnormality in low water temperature sensor system	<ol style="list-style-type: none"> <li>1. Defective low water temperature sensor</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-2 (3) (signal) - low water temperature sensor CN-P31 (1)</li> <li>3. Disconnection or defective contact in wiring harness between controller CN-2 (10) (ground) - low water temperature sensor CN-P31 (2)</li> <li>4. Defective engine controller</li> </ol>
E0480	Abnormality in common rail fuel pressure	★ See E0481 and E0482
E0481	High common rail fuel pressure 1	<ol style="list-style-type: none"> <li>1. Fuel viscosity is high (Improper fuel)</li> <li>2. Overflow valve</li> <li>3. Defective pressure limiter</li> <li>4. Defective common rail fuel pressure sensor</li> <li>5. Clogging of overflow piping</li> </ol>
E0482	High common rail fuel pressure 2	★ See E0481
E0483	No-pressure feed by fuel supply pump 1	<ol style="list-style-type: none"> <li>1. Defective low-pressure fuel circuit</li> <li>2. Defective fuel supply pump PCV</li> <li>3. Defective pressure limiter</li> <li>4. Defective common rail fuel pressure sensor</li> <li>5. Defective fuel injector</li> <li>6. Leakage from high-pressure fuel piping</li> </ol>

Normal condition	Action taken by controller	Problems on machine
<ul style="list-style-type: none"> <li>Solenoid resistance Between CN-E42 (1) - (2): 2.3 - 5.3 <math>\Omega</math></li> </ul>	<ol style="list-style-type: none"> <li>Stops outputting to PCV2 (When error is displayed singly)</li> <li>Stops outputting to PCV1 and PCV2 (When E0469 is also displayed)</li> </ol>	<ol style="list-style-type: none"> <li>Machine can be operated normally (When error is displayed singly)</li> <li>Engine stops (When E0469 is also displayed)</li> </ol>
<ul style="list-style-type: none"> <li>Sensor source voltage Between CN-E54 (3) - (1): 4.6 - 5.4 V</li> <li>Sensor signal voltage Between CN-E54 (2) - (1): 0.3 - 4.7 V</li> </ul>	<ol style="list-style-type: none"> <li>Operates in normal control mode</li> </ol>	<ol style="list-style-type: none"> <li>Machine can be operated normally</li> </ol>
<ul style="list-style-type: none"> <li>Sensor source voltage Between CN-E53 (3) - (1): 4.6 - 5.4 V</li> <li>Sensor signal voltage Between CN-E53 (2) - (1): 0.3 - 4.7 V</li> </ul>	<ol style="list-style-type: none"> <li>Limits output in open control mode</li> </ol>	<ol style="list-style-type: none"> <li>Output is lowered</li> </ol>
<ul style="list-style-type: none"> <li>Sensor resistance (When water temperature is 10 - 100°C) Between CN-P7 (1) - (2): 90 k - 3.5 <math>\Omega</math></li> </ul>	<ol style="list-style-type: none"> <li>Operates in normal control mode</li> </ol>	<ol style="list-style-type: none"> <li>Water temperature signal output on monitor panel is fixed to 90°C</li> </ol>
<ul style="list-style-type: none"> <li>Sensor resistance (When water temperature is 10 - 100°C) Between CN-P31 (1) - (2): 9 k - 0.3 <math>\Omega</math></li> </ul>	<ol style="list-style-type: none"> <li>Operates in normal control mode</li> </ol>	<ol style="list-style-type: none"> <li>Exhaust gas color is bad when temperature is low</li> <li>Engine does not start easily when temperature is low</li> </ol>
	<ol style="list-style-type: none"> <li>Operates in normal control mode</li> </ol>	<ol style="list-style-type: none"> <li>Output is lowered</li> </ol>
	<ol style="list-style-type: none"> <li>Operates machine with output limited</li> </ol>	<ol style="list-style-type: none"> <li>Output is lowered</li> </ol>
	<ol style="list-style-type: none"> <li>Stops outputting to fuel supply pump</li> <li>Stops outputting to fuel injector</li> </ol>	<ol style="list-style-type: none"> <li>Output is lowered</li> </ol>
	<ol style="list-style-type: none"> <li>Derates engine output</li> <li>Operates machine with output limited</li> </ol>	<ol style="list-style-type: none"> <li>Output is lowered</li> </ol>

Service code	Abnormal system	Contents of abnormality
E0484	No-pressure feed by fuel supply pump 2	★ See E0483
E0487	Abnormality in oil pressure switch system	<ol style="list-style-type: none"> <li>1. Defective low oil pressure sensor</li> <li>2. Defective high oil pressure sensor</li> <li>3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-4 (5) (low pressure) - low oil pressure sensor CN-P8</li> <li>4. Disconnection or defective contact in wiring harness between controller CN-4 (6) (high pressure) - high oil pressure sensor CN-P9</li> <li>5. Defective engine controller</li> </ol>
E0488	Abnormality in power supply system 1	<ol style="list-style-type: none"> <li>1. Defective power source relay</li> <li>2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between starting switch terminal ACC - power source relay CN-CPR (1)</li> <li>3. Disconnection or defective contact in wiring harness between power source relay CN-CPR (2) - chassis ground</li> <li>4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-7 (6), (14) - power source relay CN-CPR (3)</li> <li>5. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between battery relay terminal B - power source relay CN-CPR (5)</li> <li>6. Defective engine controller</li> </ol>
E0489	Abnormality in power supply system 2	<ol style="list-style-type: none"> <li>1. Defective power source relay</li> <li>2. Short circuit with power source in wiring harness between controller CN-7 (6), (14) - power source relay CN-CPR (3)</li> <li>3. Defective engine controller</li> </ol>
E0490	Abnormality in Q regulator switch signal	<ol style="list-style-type: none"> <li>1. Defective setting of Q regulator switch</li> <li>2. Defective engine controller</li> </ol>
E0491	Short circuit in starting switch C system	<ol style="list-style-type: none"> <li>1. Defective starting switch</li> <li>2. Short circuit with power source in wiring harness between controller CN-4 (2) - starting switch terminal C</li> <li>3. Defective engine controller</li> </ol>

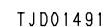
Normal condition	Action taken by controller	Problems on machine
	1. Stops outputting to fuel supply pump 2. Stops outputting to fuel injector	1. Engine stops.
<ul style="list-style-type: none"> <li>Low-pressure switch resistance Between CN-P8 - chassis ground When engine is stopped: Max. 1 <math>\Omega</math> When engine speed is above 600 rpm: Min. 1 M<math>\Omega</math></li> <li>High-pressure switch resistance Between CN-P9 - chassis ground When engine is stopped: Max. 1 <math>\Omega</math> When engine speed is above 1,300 rpm: Min. 1 M<math>\Omega</math></li> </ul>	1. Operates in normal control mode	1. Machine can be operated normally
<ul style="list-style-type: none"> <li>Source voltage Between CN-7 (6), (14) - (5), (13) When starting switch is turned ON: 20 - 30 V</li> </ul>		1. Engine stops during operation 2. Engine cannot be started.
<ul style="list-style-type: none"> <li>Source voltage Between CN-7 (6), (14) - (5), (13) When starting switch is turned OFF: Max. 8 V</li> </ul>	1. Operates in normal control mode	1. Machine can be operated normally
<ul style="list-style-type: none"> <li>Either of Q regulator switches 1 and 2 of controller is set to "F"</li> </ul>	1. Operates in normal control mode	1. Setting of Q regulator cannot be changed
<ul style="list-style-type: none"> <li>Starting switch C signal voltage Voltage between CN-4 (2) - chassis ground When starting switch is turned ON: Max. 1 V When starting switch is turned to START position: 20 - 30 V</li> </ul>	1. Operates in normal control mode	1. Machine can be operated normally 10 seconds after started

## JUDGMENT TABLE FOR ENGINE CONTROLLER AND ENGINE

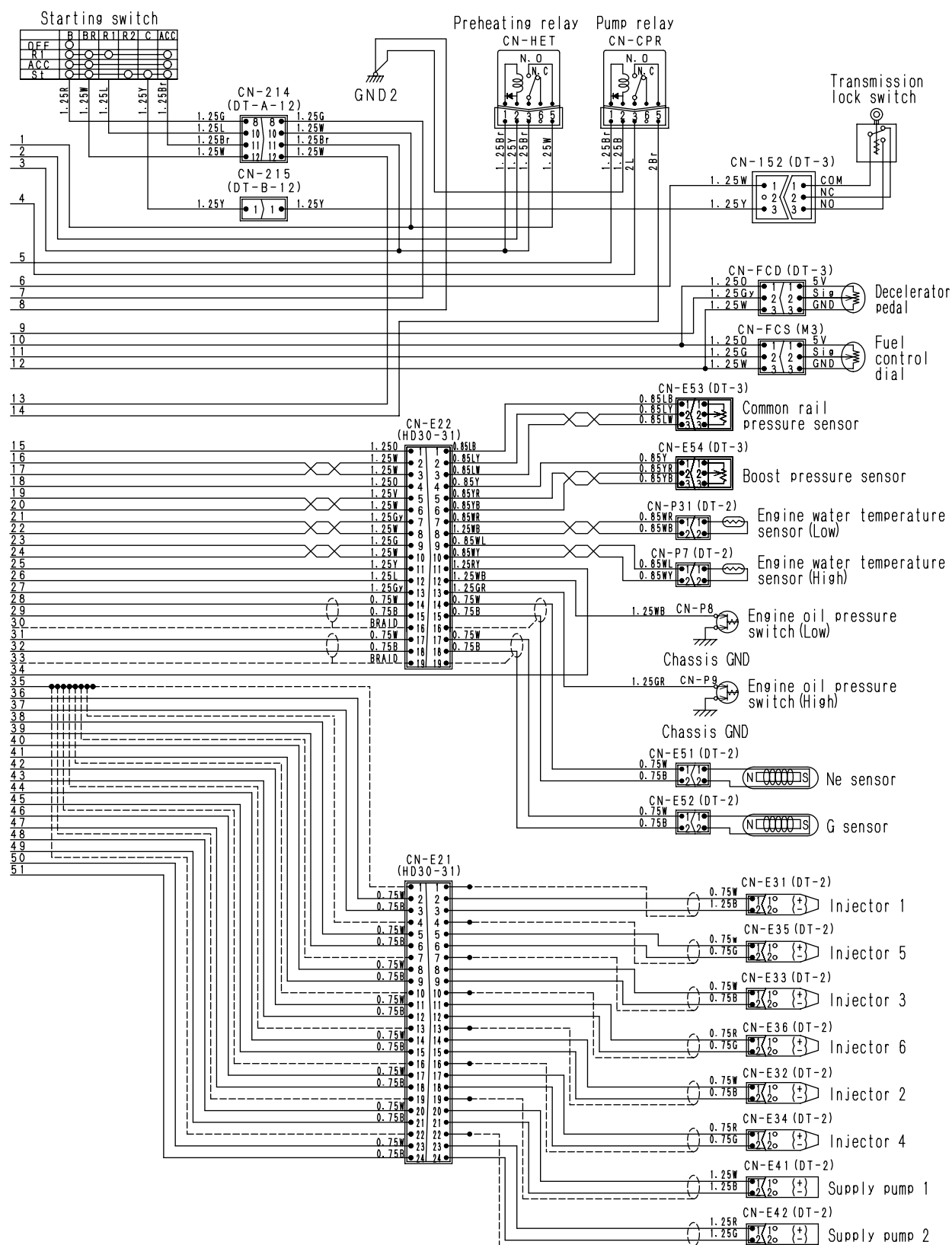
			Self-diagnosis display											
			User code	Abnormality in engine controller power supply	Abnormality in engine controller	Abnormality in fuel control dial system	Abnormality in decelerator potentiometer system	Abnormality in Ne speed sensor system	Abnormality in G speed sensor system	Short circuit in fuel injector No. 1, No. 2, No. 3 system	Short circuit in fuel injector No. 4, No. 5, No. 6 system	Abnormality in controller drive circuit	Disconnection in fuel injector No. 1 system	Disconnection in fuel injector No. 2 system
			Service code	CALL	CALL	CALL03	CALL03	CALL03	CALL03	CALL03	CALL03	CALL03	E02	E02
Trouble mode														
1	Engine does not start							●	●					
2	Engine does not start easily	Exhaust gas is discharged but engine does not start (does not start easily)								●	●		●	●
		Exhaust gas is not discharged												
3	Engine stops during operation					●	●							
4	Output is insufficient									●	●		●	●
5	Acceleration is low													
6	Engine speed keeps at low idling and does not follow up fuel control dial	Exhaust gas is normal				●	●							
		Exhaust gas is very black												
7	Engine speed rises to high idling of itself	Engine speed rises immediately when error is displayed												
		Engine speed rises while error is displayed												
8	Engine speed cannot be set to low idling	Engine speed is not set to low-low idling												
		Engine speed is not set to high-low idling												
9	Much fuel is consumed	Exhaust gas is normal												
		Exhaust gas is very black												
10	Engine speed cannot be set to high idling	Engine speed does not rise to high idling								●	●		●	●
		Engine speed rises to high idling but returns to low idling												
11	Automatic warm-up operation is abnormal													
12	Automatic decelerator does not work					●								
13	Engine speed does not change when working mode is changed													
14	Engine does not stop	Engine speed does not lower												
		Engine keeps running at low idling even after starting switch is turned off												
15	Hunting in engine speed													
16	Much oil is consumed or exhaust gas color is bad													
17	Oil becomes dirty soon													
18	Cooling water contains oil													
19	Oil pressure caution lamp lights up													
20	Oil level rises													
21	Water temperature rises too high													
22	Abnormal sound is made									●	●		●	●
23	Vibration is too high									●	●		●	●
			Trouble-shooting code	G-1	G-2	G-3	G-4	G-5	G-6	G-7	G-8	G-9	G-10	G-11

[illegible]

## 20-812





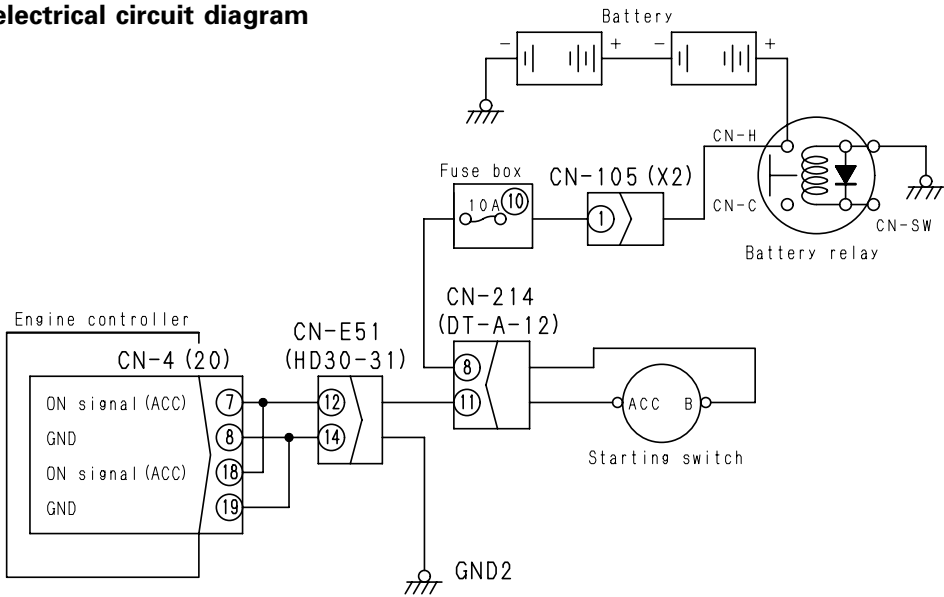


TJD01492

**G-1. [E0401] (Abnormality in engine controller power supply) is displayed**

		Cause	Remedy
<div> <ul style="list-style-type: none"> <li>Disconnect CN-4.</li> <li>Turn starting switch ON.</li> <li>20 - 30 V</li> </ul> </div>	<div> <div>1</div> <div>Is voltage between CN-4 (female) (7), (18) and (8), (19) normal?</div> <div>NO</div> </div>	Defective engine controller	Replace
	<div> <div>YES</div> </div>		
<div> <ul style="list-style-type: none"> <li>Disconnect CN-E51.</li> <li>Turn starting switch ON.</li> <li>20 - 30 V</li> </ul> </div>	<div> <div>2</div> <div>Is voltage between CN-E51 (female) (12) and (14) normal?</div> <div>NO</div> </div>	Defective wiring harness between CN4 - CN-E51	Replace
	<div> <div>YES</div> </div>		
<div> <ul style="list-style-type: none"> <li>Disconnect CN-E51.</li> <li>Turn starting switch ON.</li> <li>0 Ω</li> </ul> </div>	<div> <div>3</div> <div>Is resistance between CN-E51 (14) and chassis ground normal?</div> <div>NO</div> </div>	Defective wiring harness between CN-E51 (14) - GND2	Repair or replace
	<div> <div>YES</div> </div>		
<div> <ul style="list-style-type: none"> <li>Disconnect CN-214.</li> <li>Turn starting switch ON.</li> <li>20 - 30 V</li> </ul> </div>	<div> <div>4</div> <div>Is voltage between CN-214 (male) (11) and chassis ground normal?</div> <div>NO</div> </div>	Defective wiring harness between CN-E51 (female) (12) - CN-214 (female) (11)	Repair or replace
	<div> <div>YES</div> </div>		
<div> <ul style="list-style-type: none"> <li>Disconnect CN-214.</li> <li>Turn starting switch ON.</li> <li>20 - 30 V</li> </ul> </div>	<div> <div>5</div> <div>Is voltage between CN-214 (male) (8) and chassis ground normal?</div> <div>NO</div> </div>	Defective wiring harness between CN-214 (8) - battery	Repair or replace
	<div> <div>YES</div> </div>	Defective wiring harness between CN-214 (8) - (11) or defective starting switch	Repair or replace

**G-1. Related electrical circuit diagram**

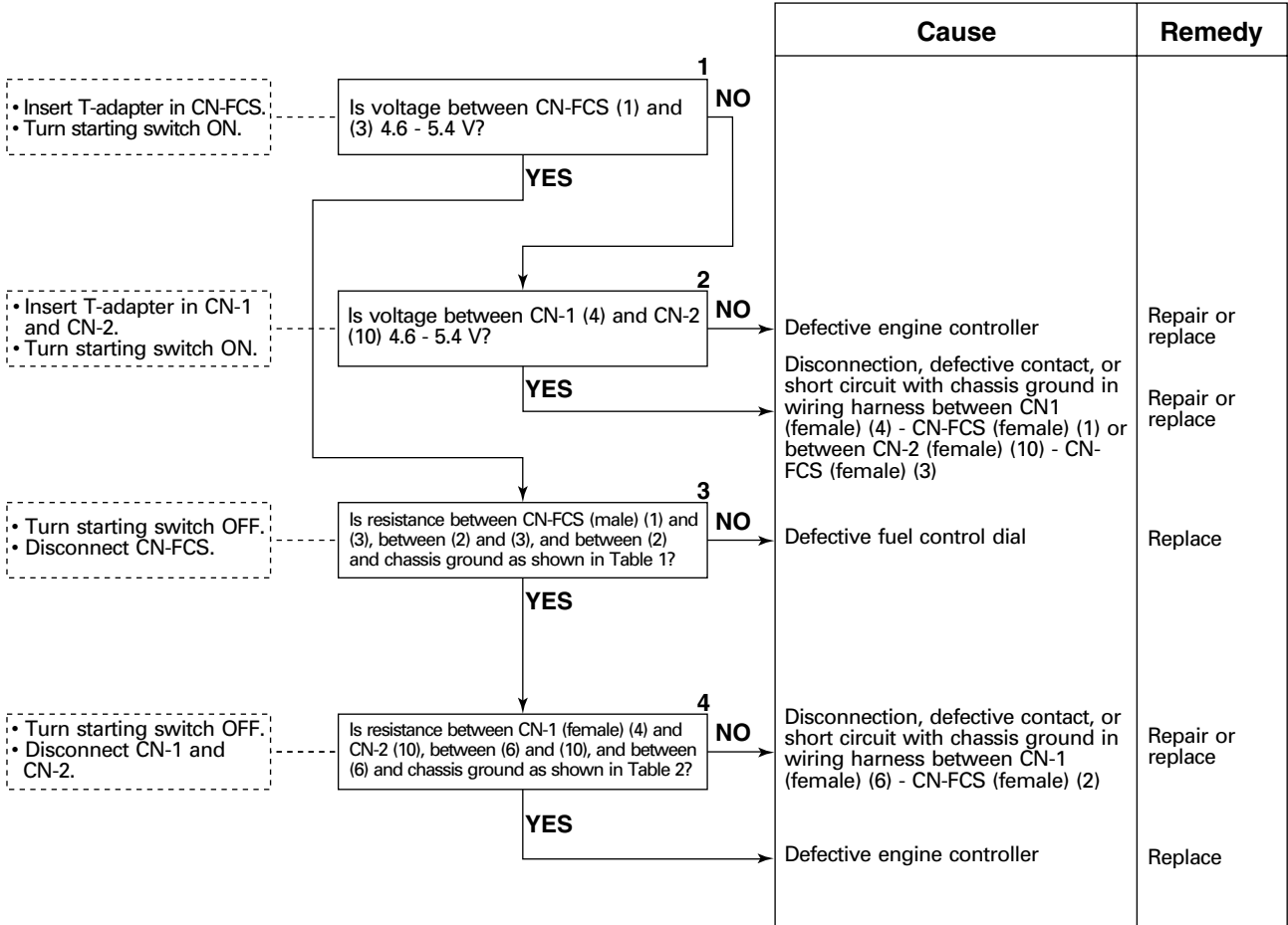


BJD10022

**G-2. [E0402] (Abnormality in engine controller) is displayed**

- ★ Go to troubleshooting of error code [E0460].

G-3. [E0405] (Abnormality in fuel control dial system) is displayed



## G-4. [E0406] (Abnormality in decelerator potentiometer system) is displayed

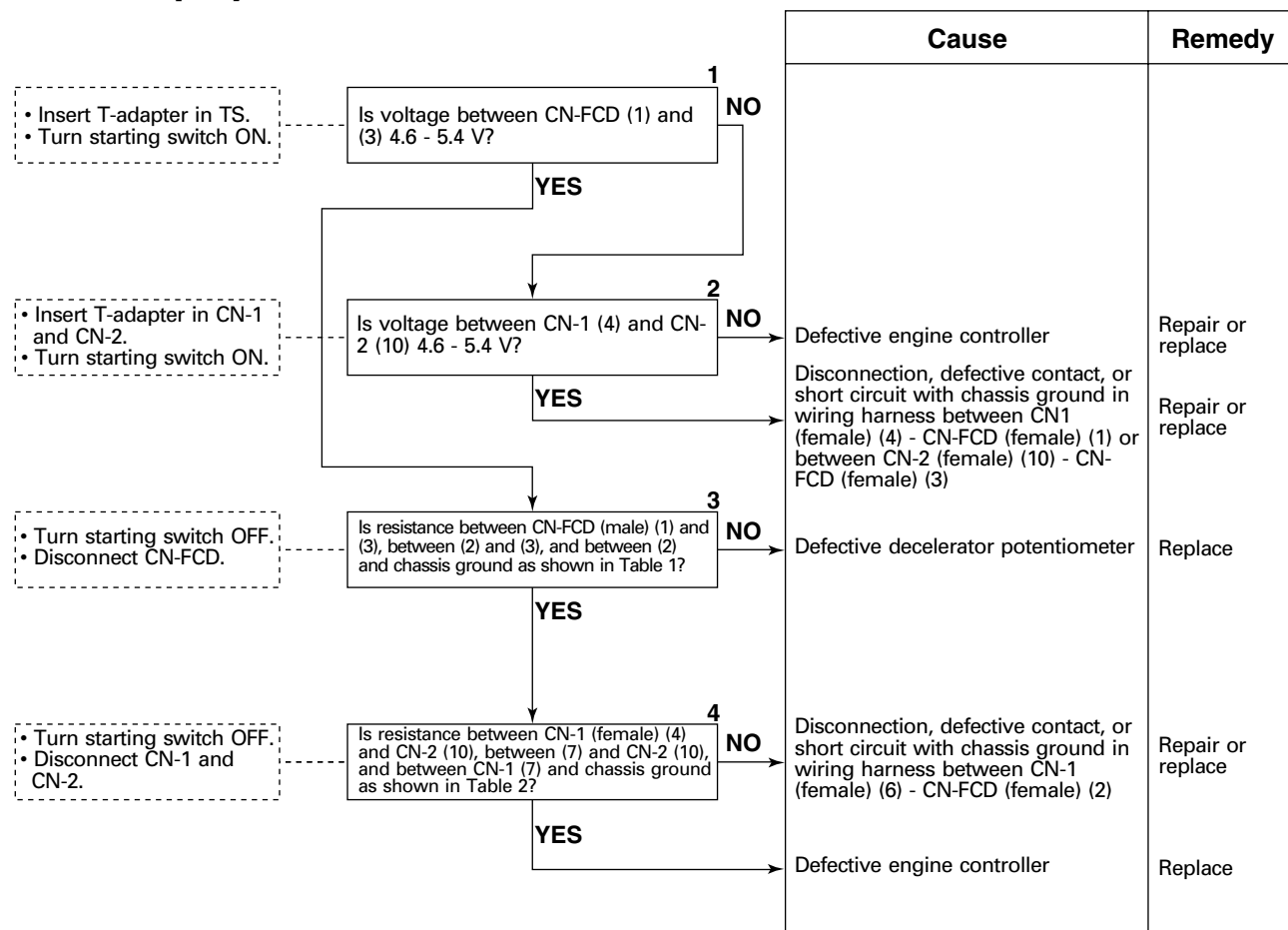


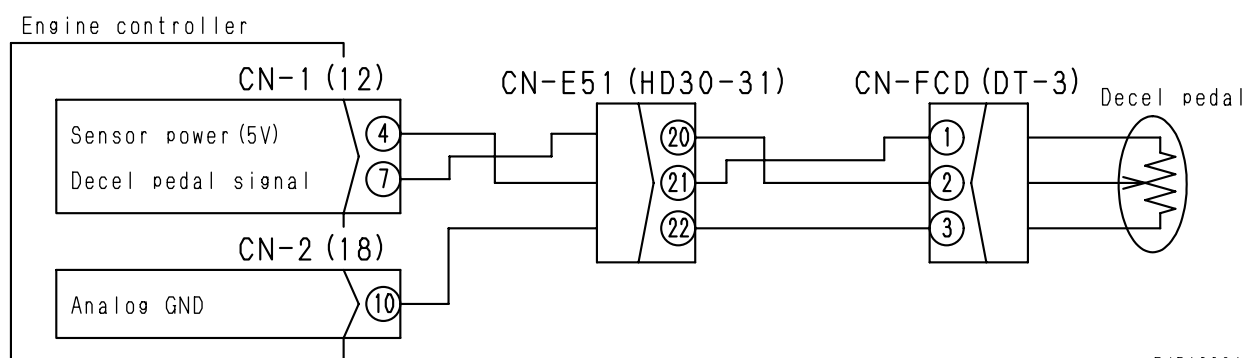
Table 1

CN-FCD (male)	Resistance
Between (1) - (3)	4.0 - 6.0 kΩ
Between (2) - (3)	0.24 - 7.0 kΩ
Between (2) - GND	Min. 1MΩ

Table 2

CN-1, CN-2 (male)	Resistance
Between CN-1 (4) - CN-2 (10)	4.0 - 6.0 kΩ
Between CN-1 (7) - CN-2 (10)	0.24 - 7.0 kΩ
Between CN-1 (7) - GND	Min. 1MΩ

### G-4. Related electrical circuit diagram



BJD10024

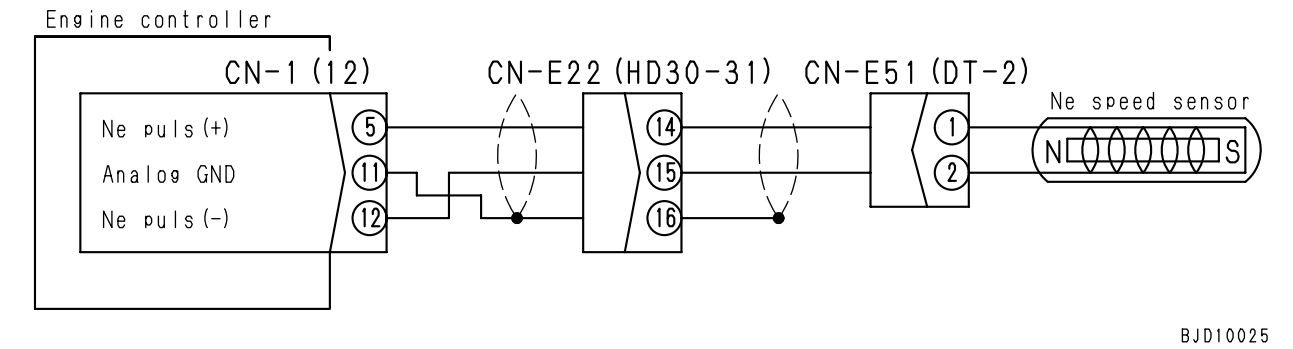
**G-5. [E0409] (Abnormality in Ne speed sensor system) is displayed**

		Cause	Remedy
<div> <div>           • Turn starting switch OFF.            • Disconnect CN-E51.         </div> <div>           • Turn starting switch OFF.            • Disconnect CN-1.         </div> <div>           • Turn starting switch OFF.            • Disconnect CN-1 and CN-E51.         </div> </div>	<div> <div>1</div> <div>Is resistance between CN-E51 (male) (1) and (2) and between (1), (2) and chassis ground as shown in Table 1?</div> <div>YES</div> <div>NO</div> </div>	Defective Ne speed sensor	Replace
	<div> <div>2</div> <div>Is resistance between CN-1 (female) (5) and (12) 85 - 210 Ω</div> <div>YES</div> <div>NO</div> </div>	Disconnection or defective contact in wiring harness between CN-1 (female) (5) - CN-E51 (female) (1) or between CN-1 (female) (12) - CN-E51 (female) (2)	Repair or replace
	<div> <div>3</div> <div>Is resistance between CN-1 (female) (5) and (12) above 1 MΩ?</div> <div>YES</div> <div>NO</div> </div>	Short circuit with chassis ground in wiring harness between CN-1 (female) (5) - CN-E51 (female) (1) or between CN-1 (female) (12) - CN-E51 (female) (2)  Defective engine controller	Repair or replace  Replace

Table 1

CN-E51 (male)	Resistance
Between (1) – (2)	85 – 210 Ω
Between (1) (2) – GND	Min. 1MΩ

**G-5. Related electrical circuit diagram**



## G-6. [E0410] (Abnormality in G speed sensor system) is displayed

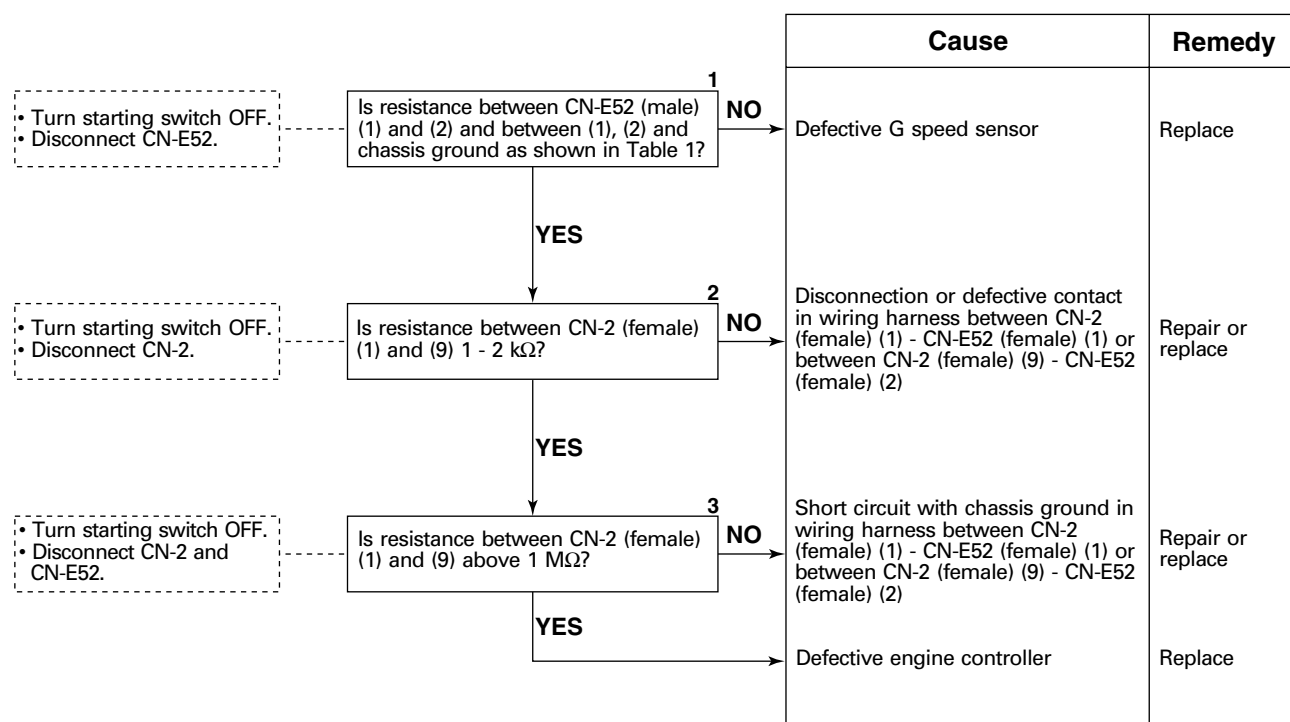
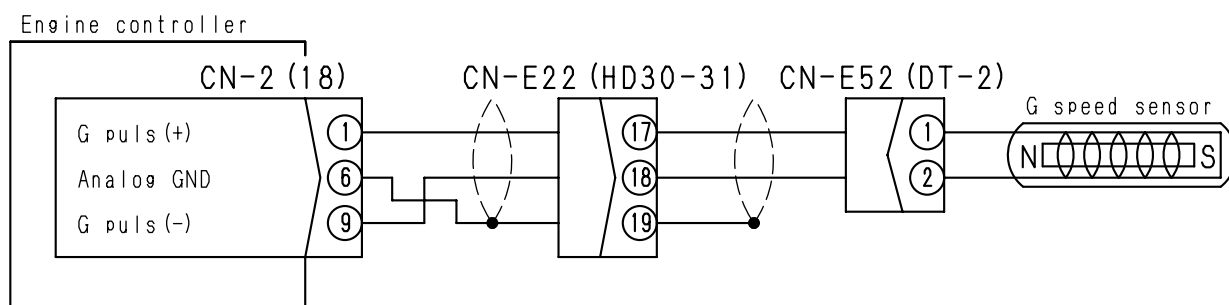


Table 1

CN-E52 (male)	Resistance
Between (1) - (2)	1 - 2 kΩ
Between (1) (2) - GND	Min. 1MΩ

### G-6). Related electrical circuit diagram



BJD10026

## G-7. [E0458] (Short circuit in fuel injector No. 1, No. 2, No. 3 system) is displayed

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".

### a) Judgment of abnormal system

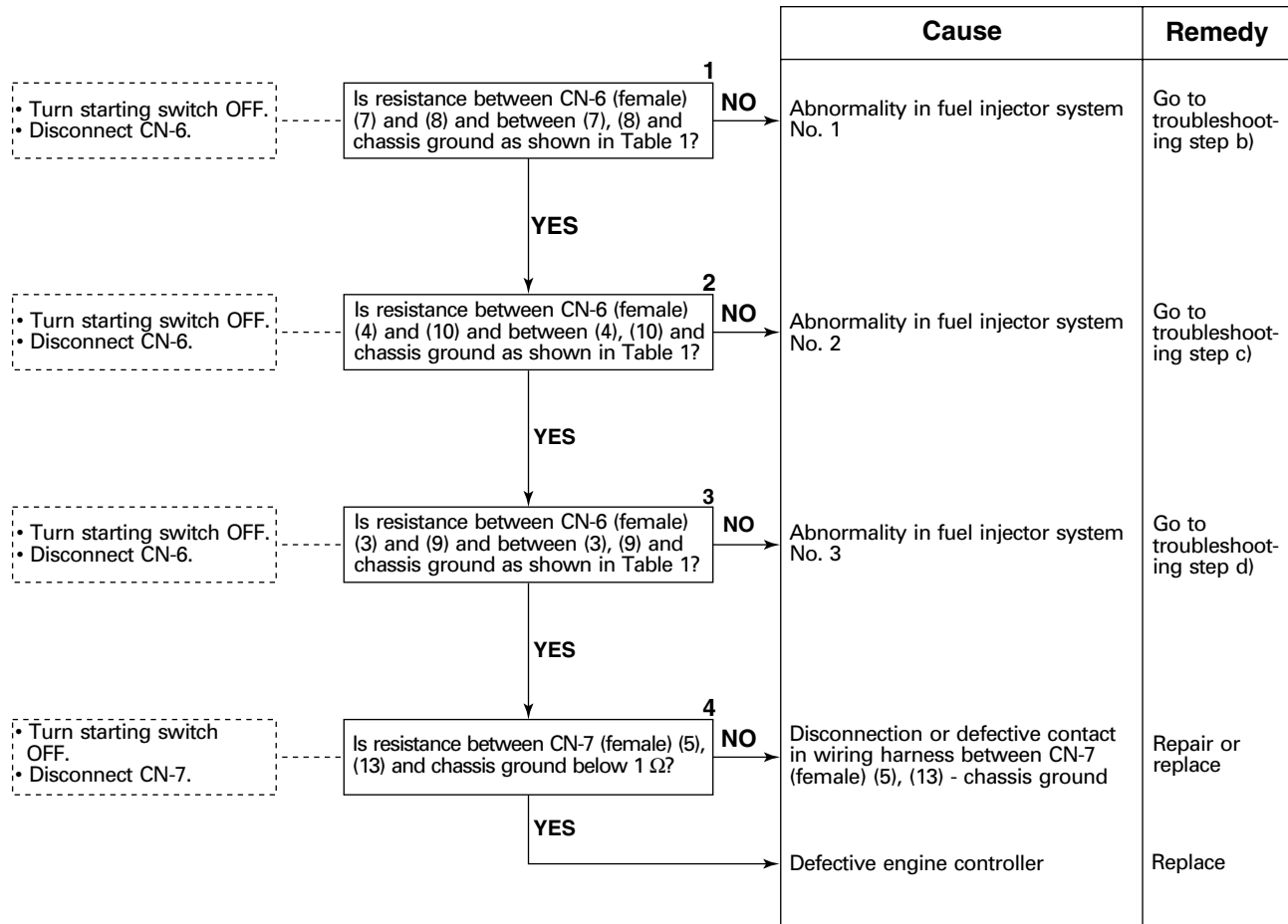


Table 1

CN-6 (female)	CN-6 (female)	CN-6 (female)	Resistance
Between (7) – (8)	Between (4) – (10)	Between (3) – (9)	0.4 – 1.1 Ω
Between (7) (8) – GND	Between (4) (10) – GND	Between (3) (9) – GND	Min. 1MΩ



## b) Troubleshooting of fuel injector No. 1 system

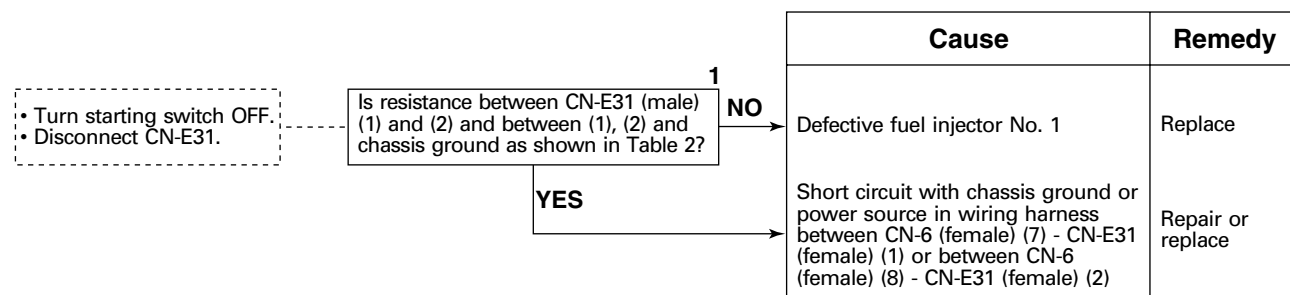


Table 2

CN-E31 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

## c) Troubleshooting of fuel injector No. 2 system

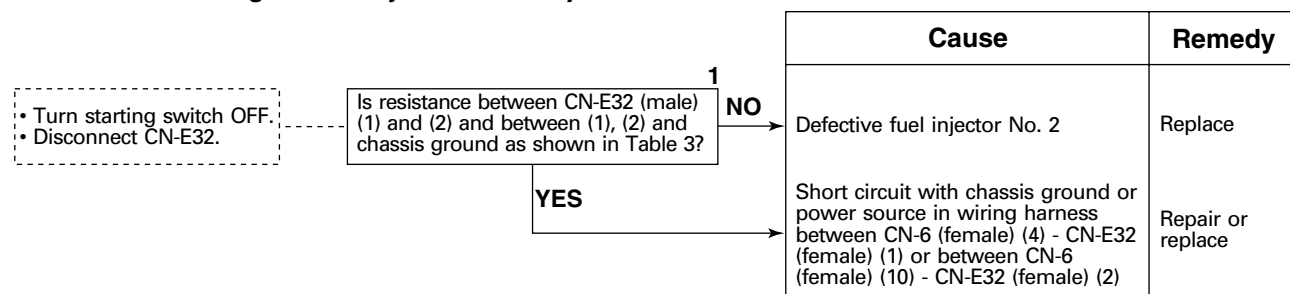


Table 2

CN-E32 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

## d) Troubleshooting of fuel injector No. 3 system

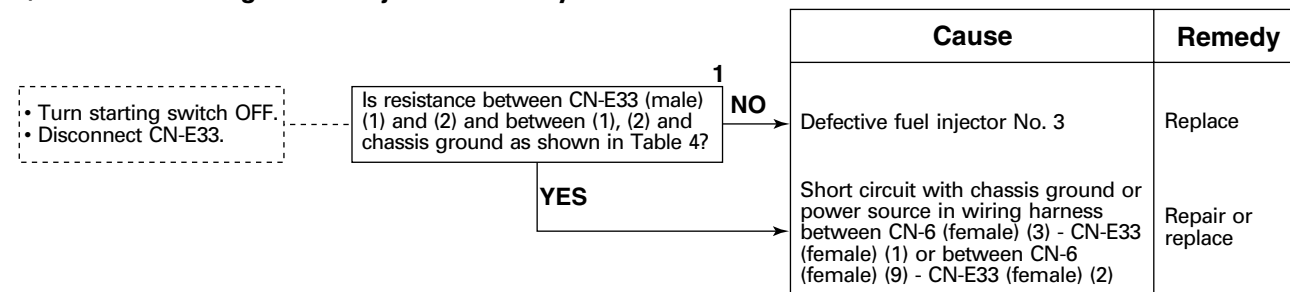
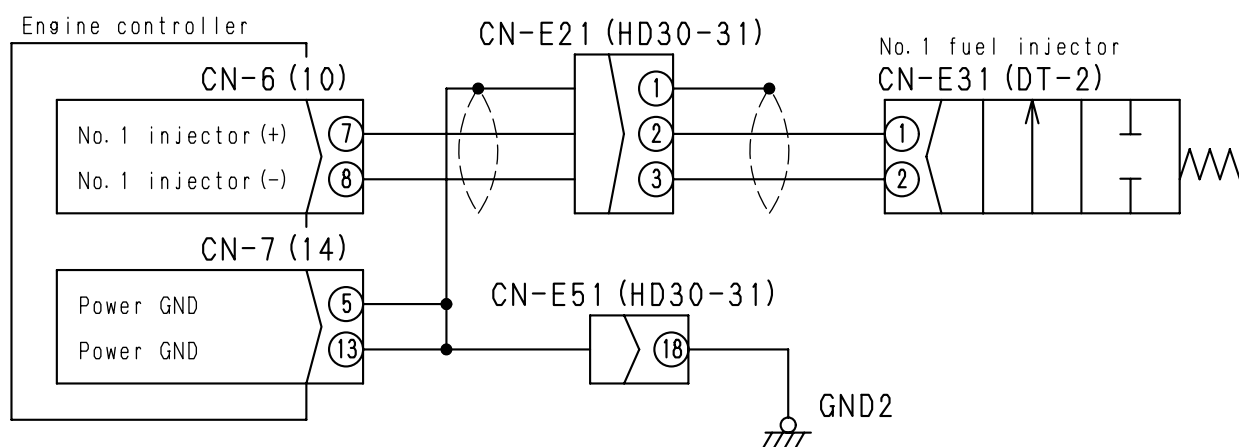
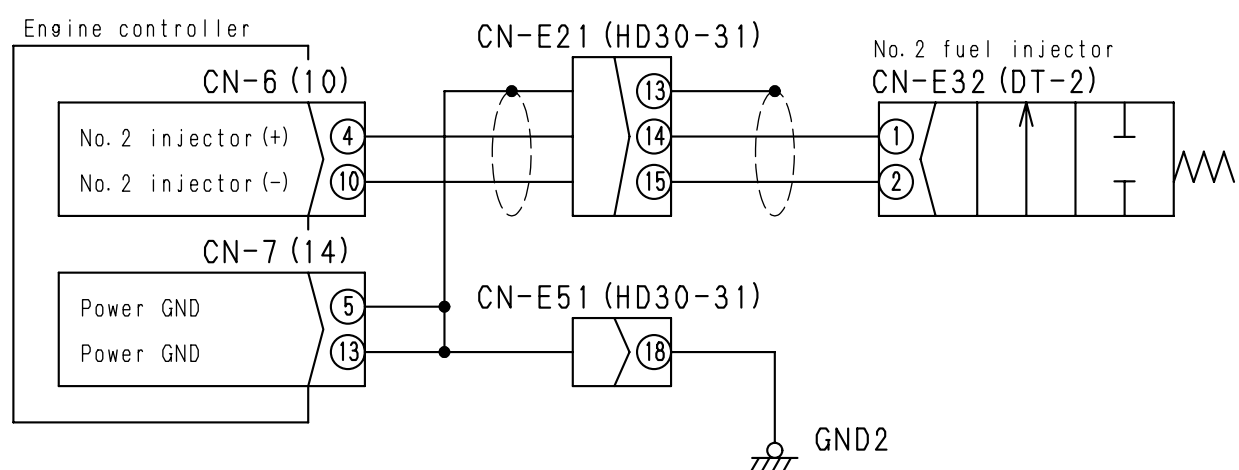


Table 2

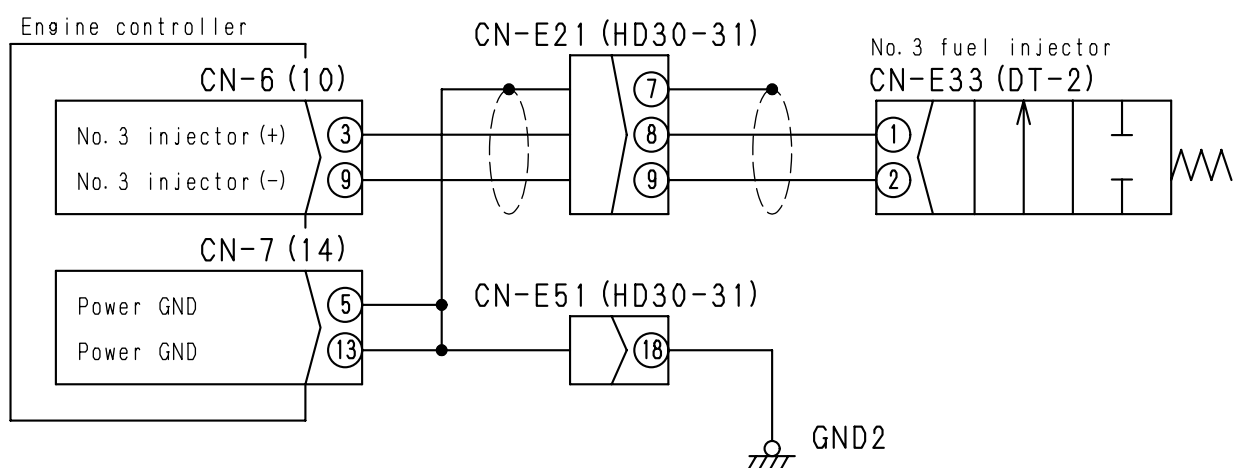
CN-E33 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

**G-7 a), b). Related electrical circuit diagram**

BJD10027

**G-7 a), c). Related electrical circuit diagram**

BJD10028

**G-7 a), d). Related electrical circuit diagram**

BJD10029

## G-8. [E0459] (Short circuit in fuel injector No. 4, No. 5, No. 6 system) is displayed

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".

### a) Judgment of abnormal system

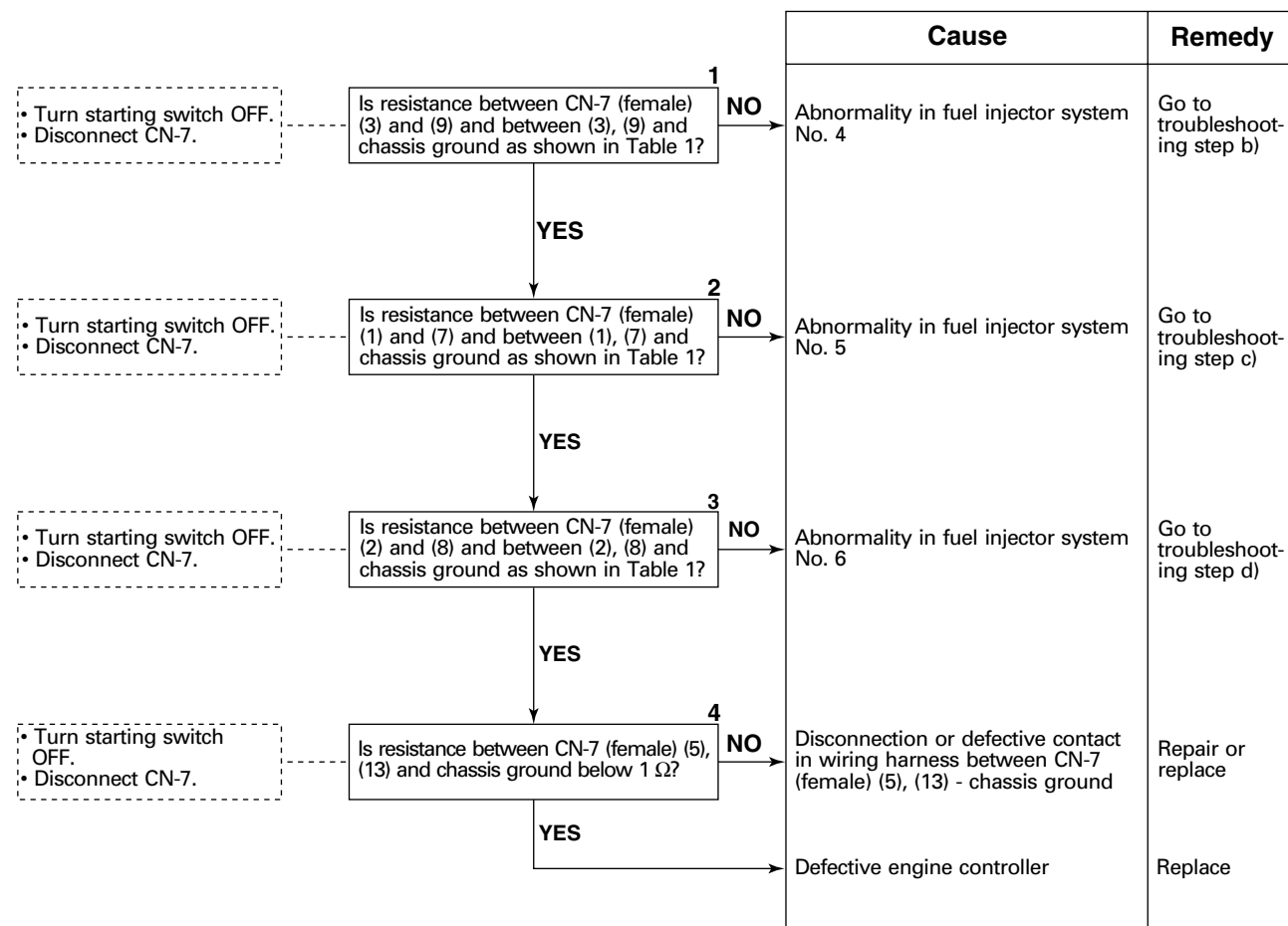


Table 1

CN-7 (female)	CN-7 (female)	CN-7 (female)	Resistance
Between (3) – (9)	Between (1) – (7)	Between (2) – (8)	0.4 – 1.1 Ω
Between (3) (9) – GND	Between (1) (7) – GND	Between (2) (8) – GND	Min. 1MΩ

## b) Troubleshooting of fuel injector No. 4 system

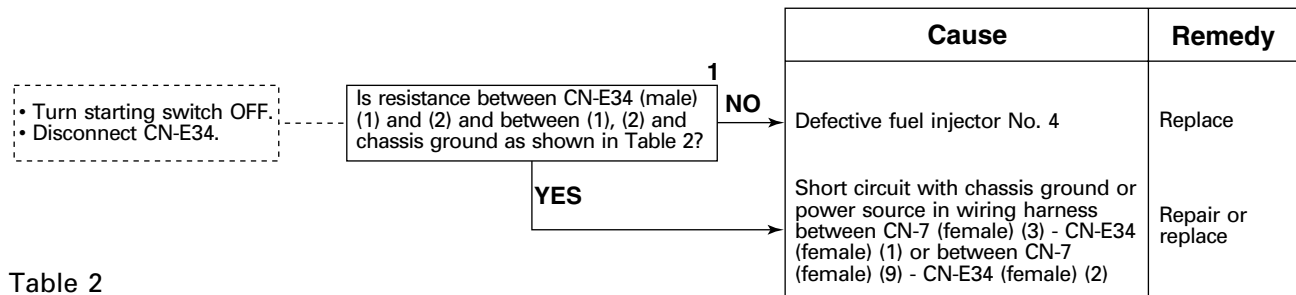


Table 2

CN-E34 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

## c) Troubleshooting of fuel injector No. 5 system

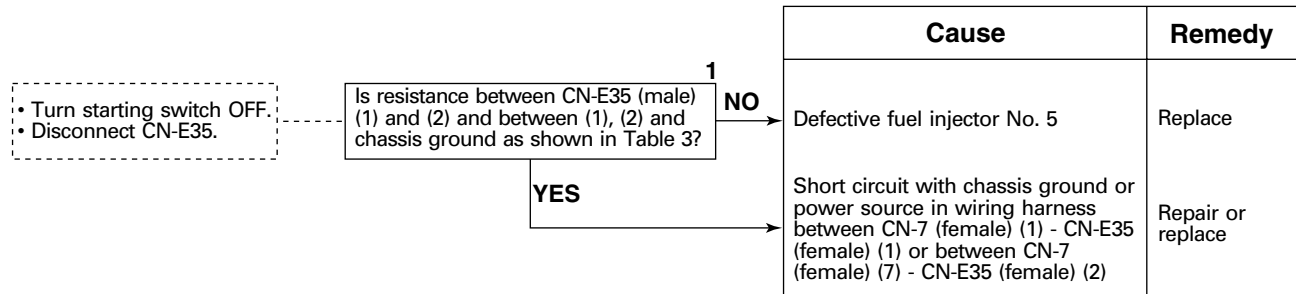


Table 3

CN-E35 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

## d) Troubleshooting of fuel injector No. 6 system

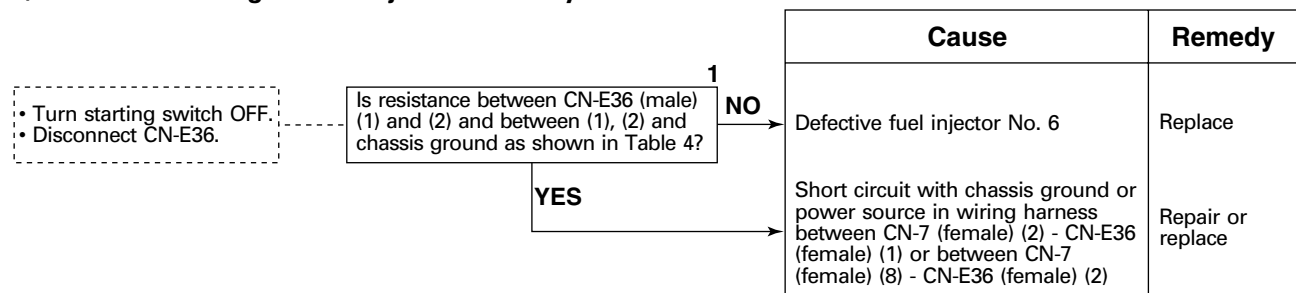
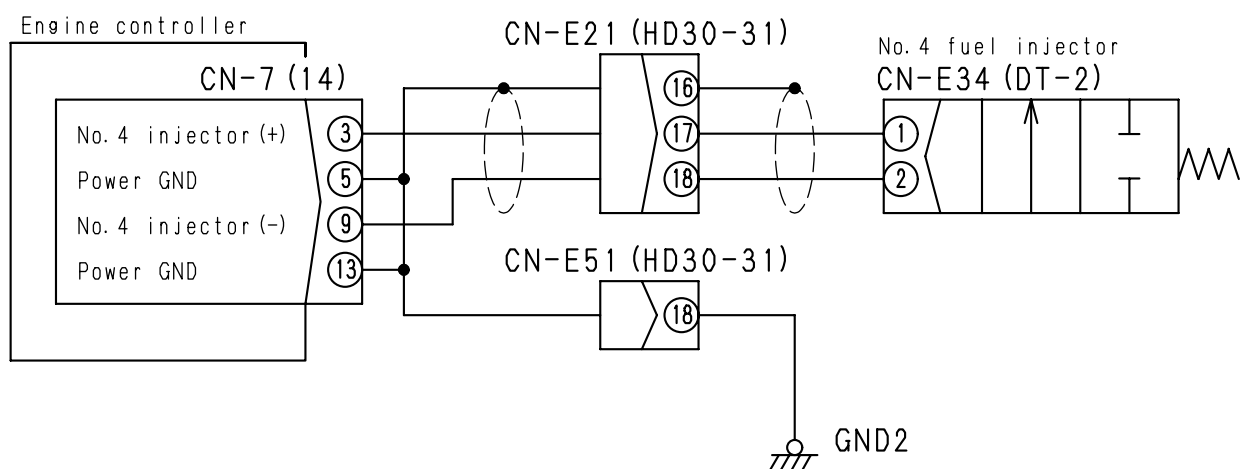
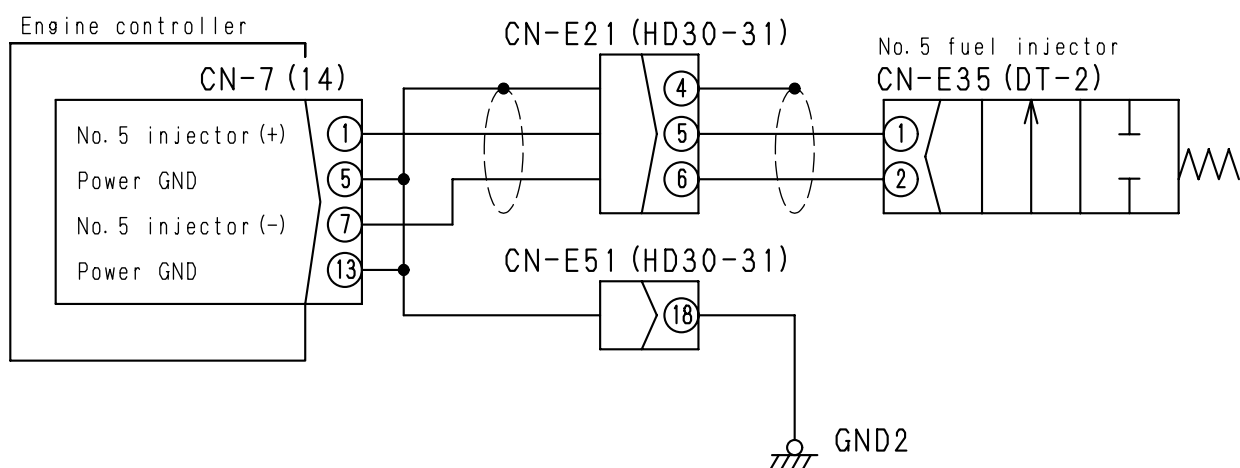


Table 4

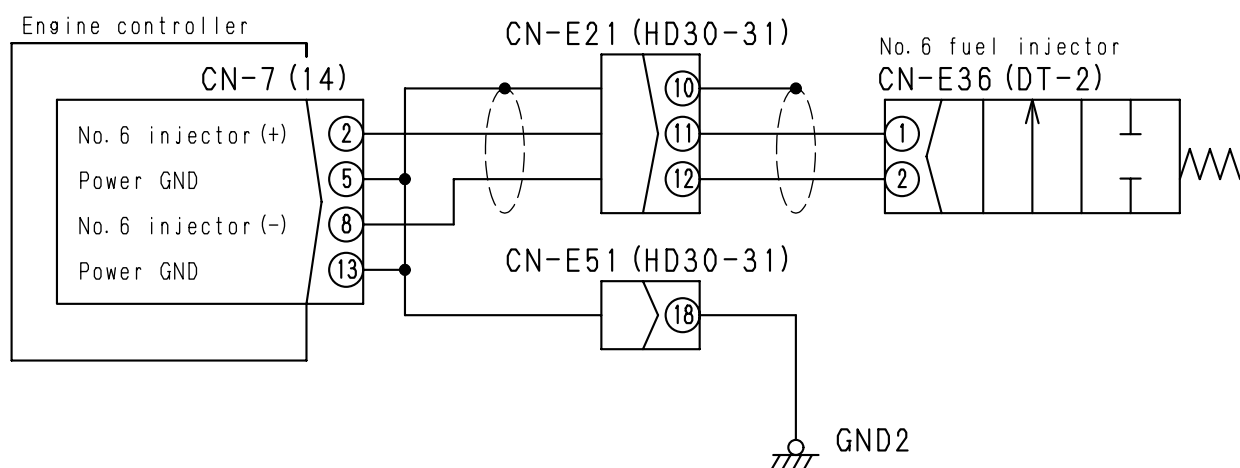
CN-E36 (female)	Resistance
Between (1) – (2)	0.4 – 1.1 $\Omega$
Between (1) (2) – GND	Min. 1M $\Omega$

**G-8 a), b). Related electrical circuit diagram**

BJD10030

**G-8 a), c). Related electrical circuit diagram**

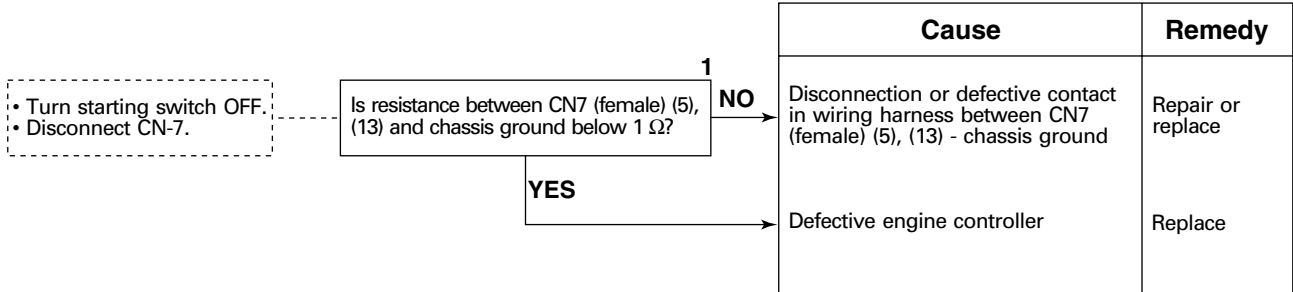
BJD10031

**G-8 a), d). Related electrical circuit diagram**

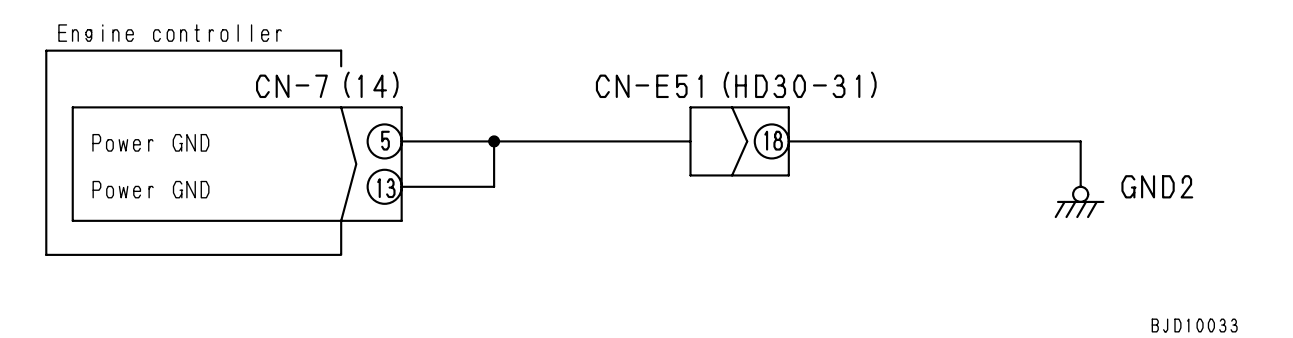
BJD10032

G-9. [E0460] (Abnormality in controller chassis ground circuit) is displayed

★ When starting switch is turned on, error codes [E0458] and [E0459] are displayed, too.

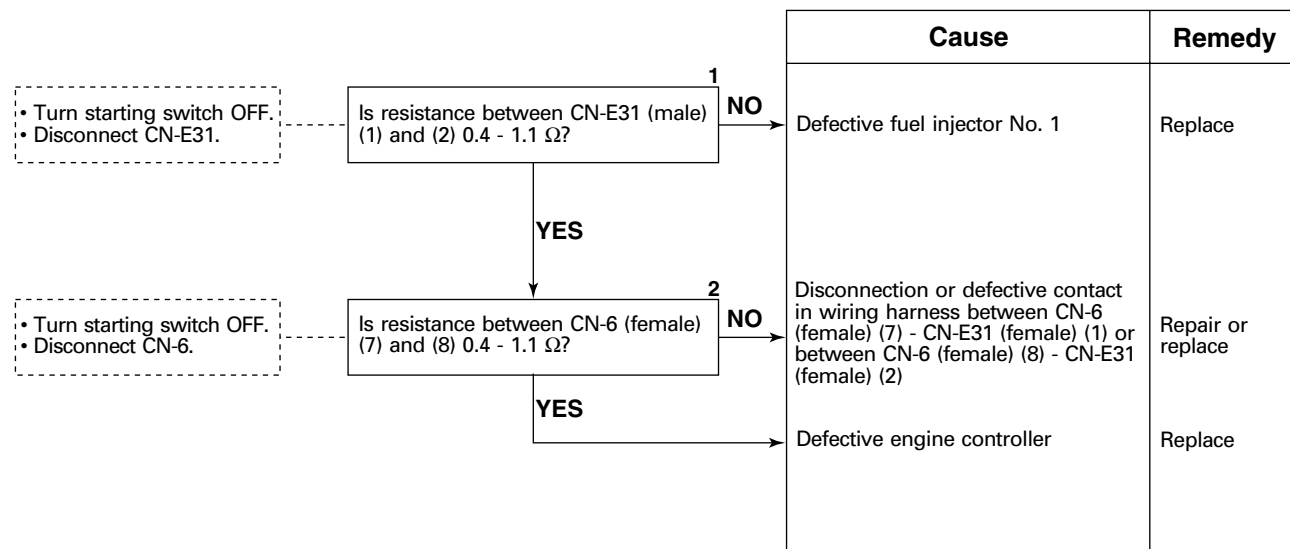


G-9. Related electrical circuit diagram

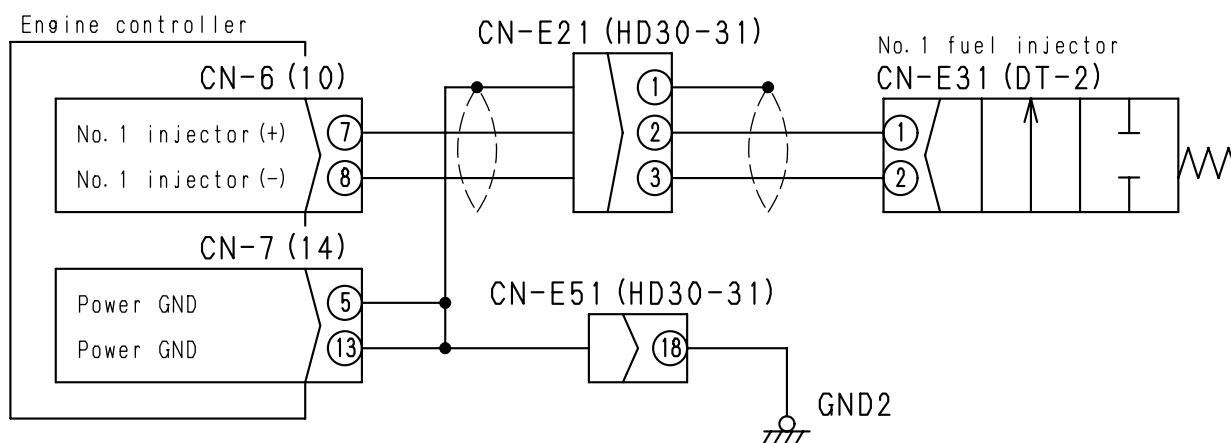


## G-10. [E0461] (Disconnection in fuel injector No. 1 system) is displayed

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".



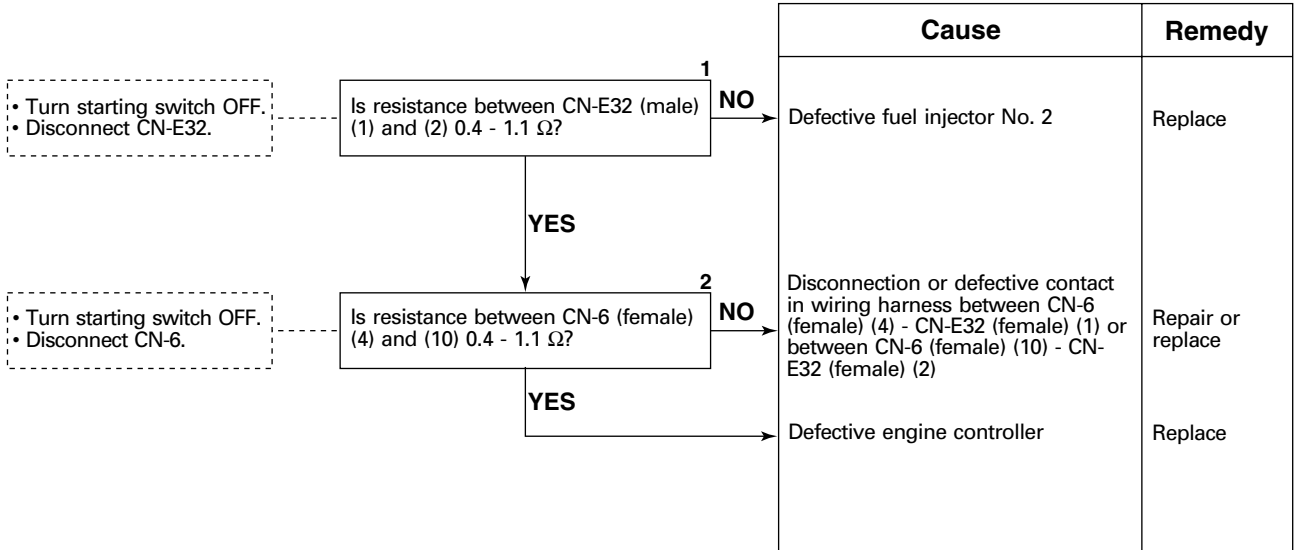
### G-10. Related electrical circuit diagram



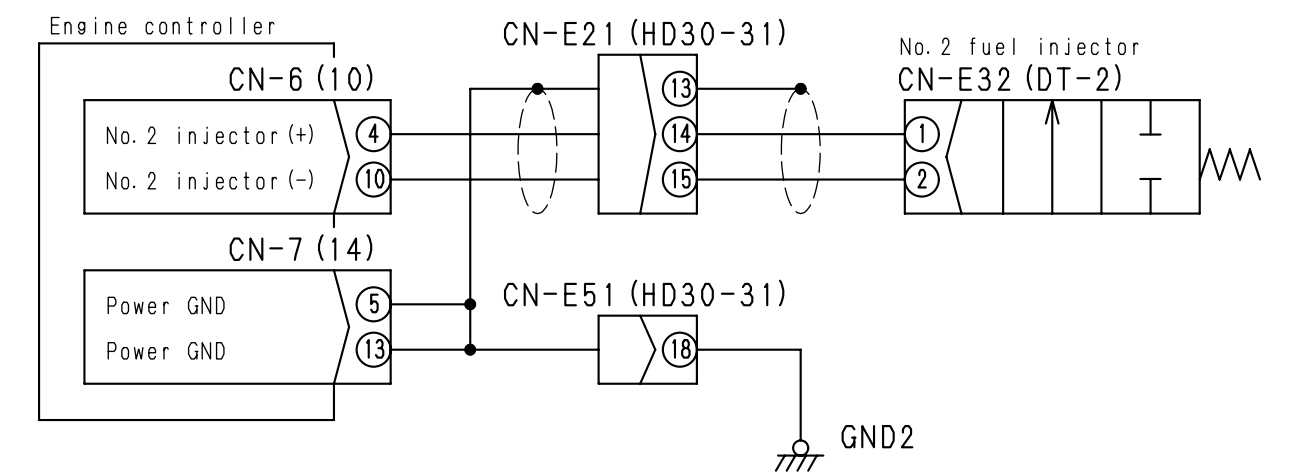
BJD10027

**G-11. [E0462] (Disconnection in fuel injector No. 2 system) is displayed**

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".



**G-11. Related electrical circuit diagram**

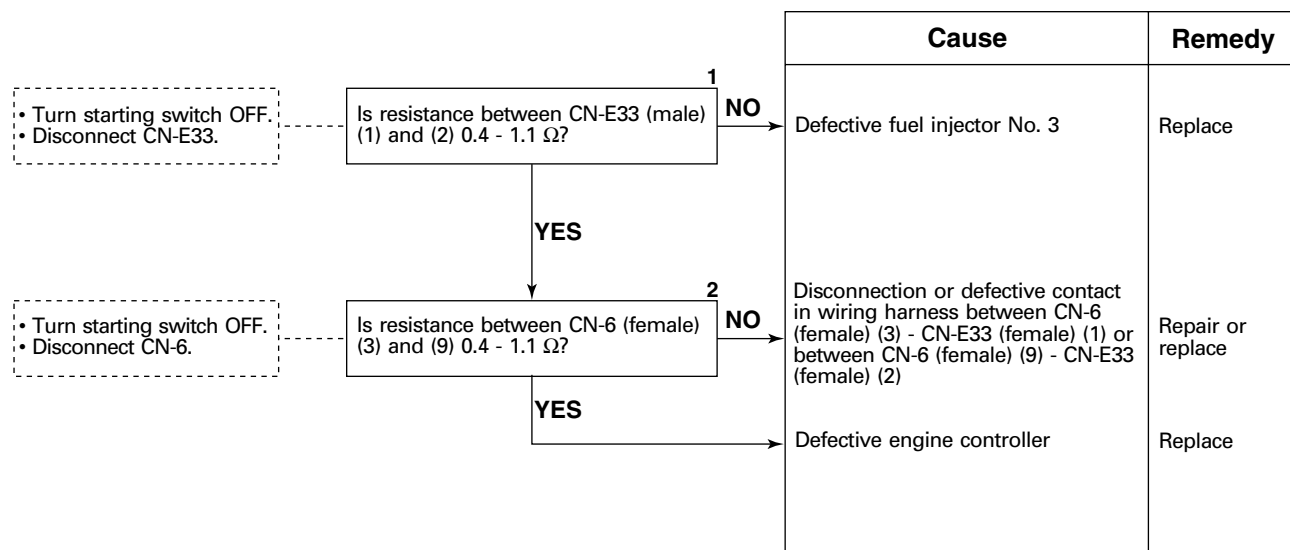


BJD10028

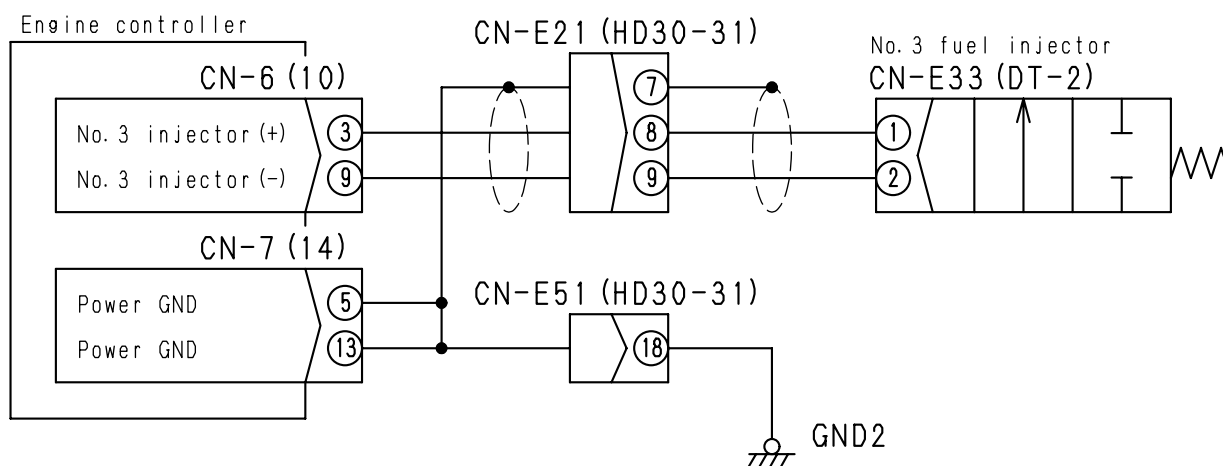


## G-12. [E0463] (Disconnection in fuel injector No. 3 system) is displayed

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".



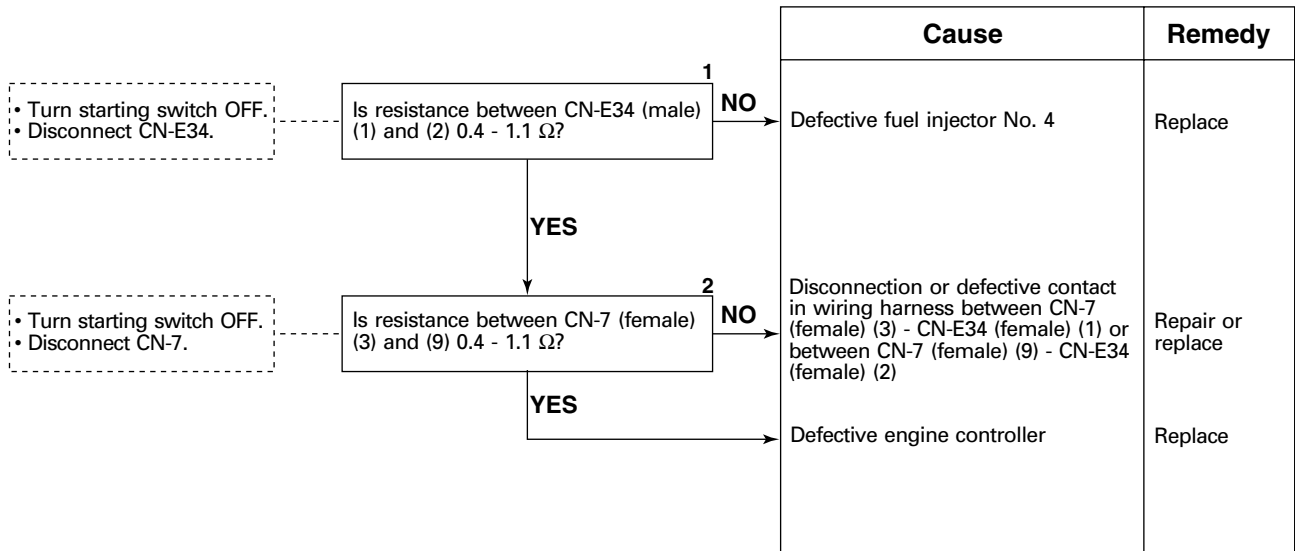
### G-12. Related electrical circuit diagram



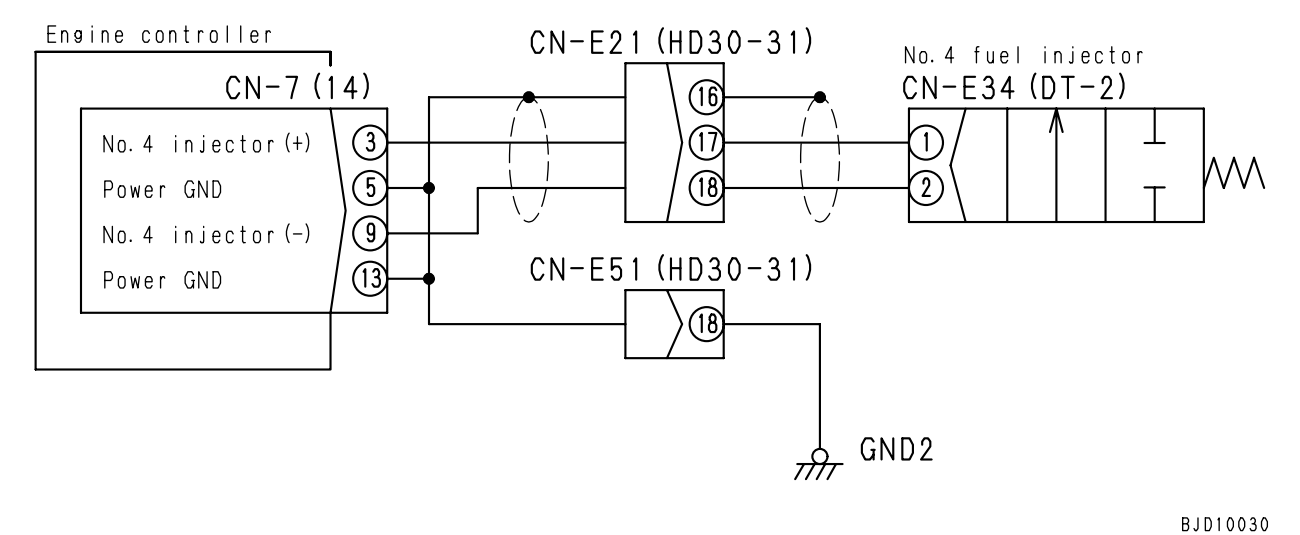
BJD10029

**G-13. [E0464] (Disconnection in fuel injector No. 4 system) is displayed**

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".

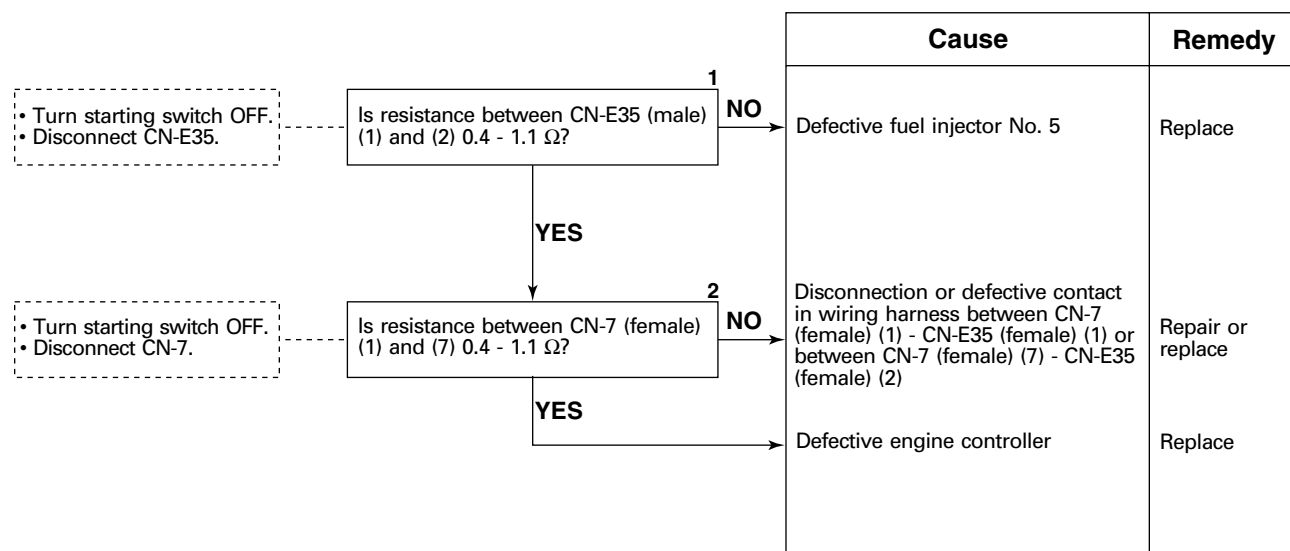


**G-13. Related electrical circuit diagram**

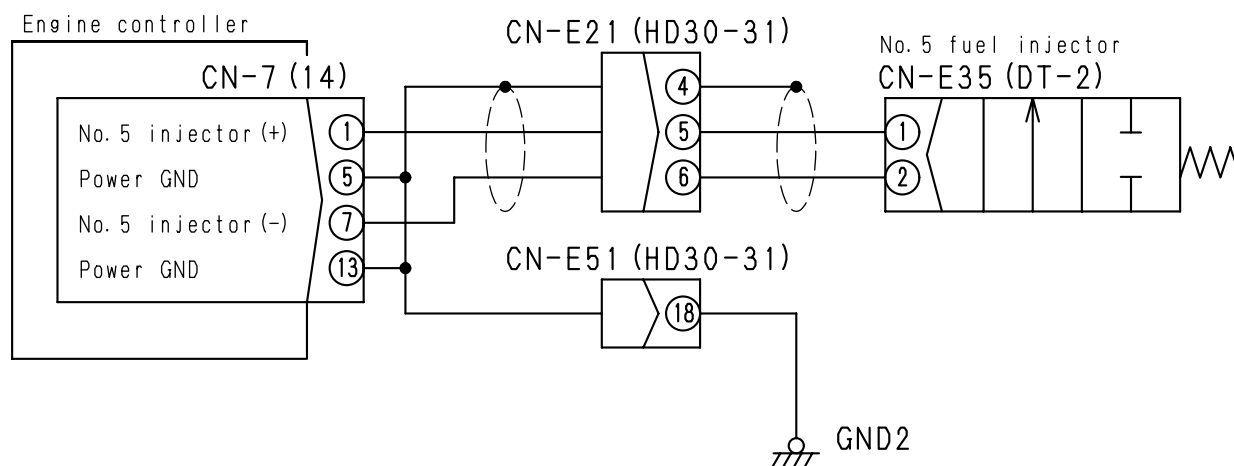


## G-14. [E0465] (Disconnection in fuel injector No. 5 system) is displayed

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".



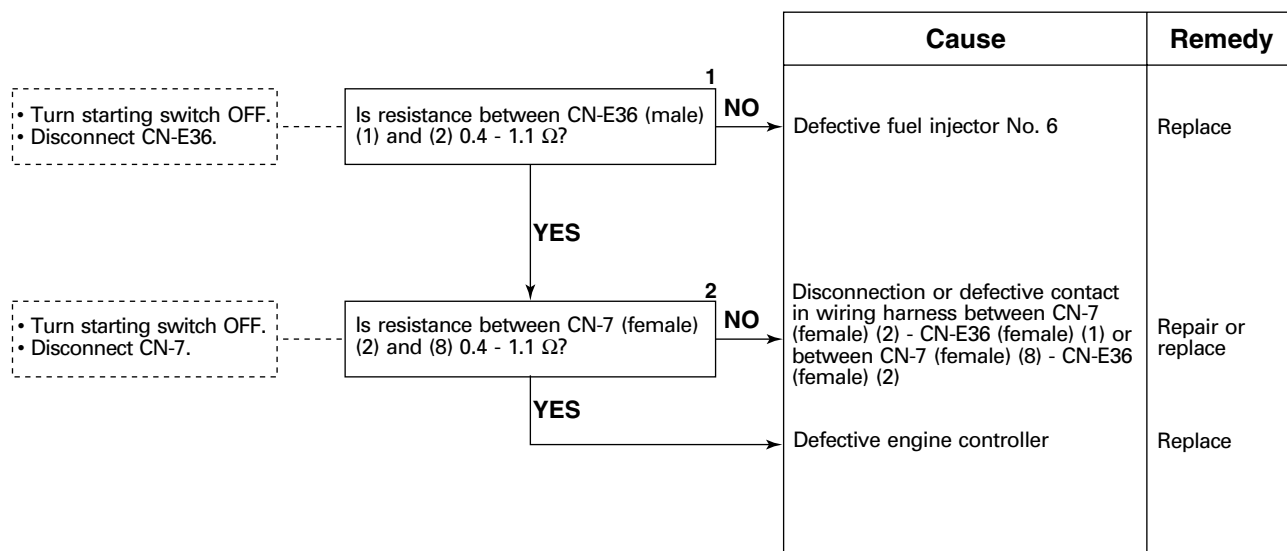
### G-14. Related electrical circuit diagram



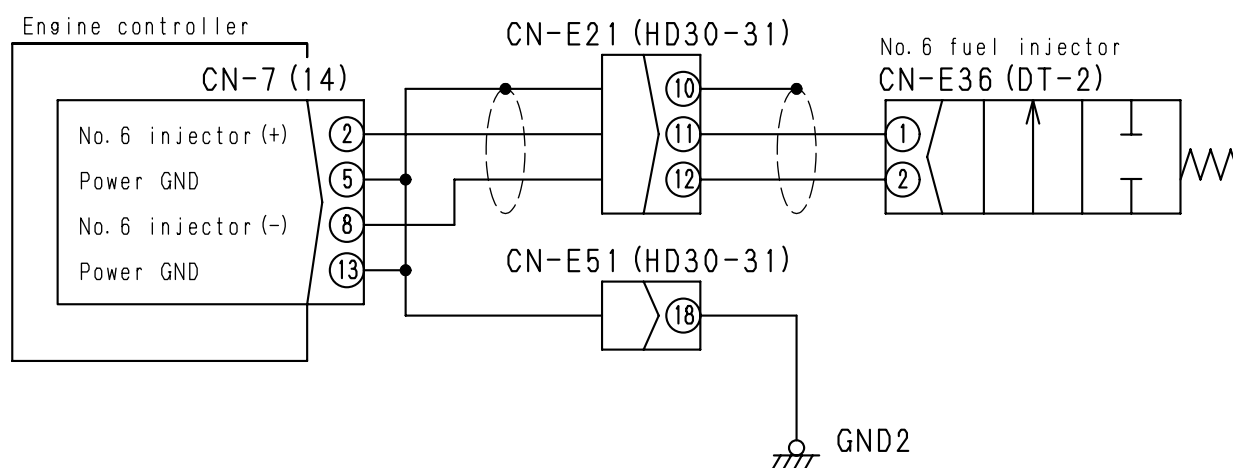
BJD10031

**G-15. [E0466] (Disconnection in fuel injector No. 6 system) is displayed**

**⚠** Since high voltage (110 - 130 V) is used for the electric circuit of the fuel injector, take care of an electric shock and electric leakage, referring to TESTING AND ADJUSTING, "Handling of high-voltage controller circuit".



**G-15. Related electrical circuit diagram**



BJD10032

## G-16. [E0468] (Overcurrent in fuel supply pump PCV1 system) is displayed

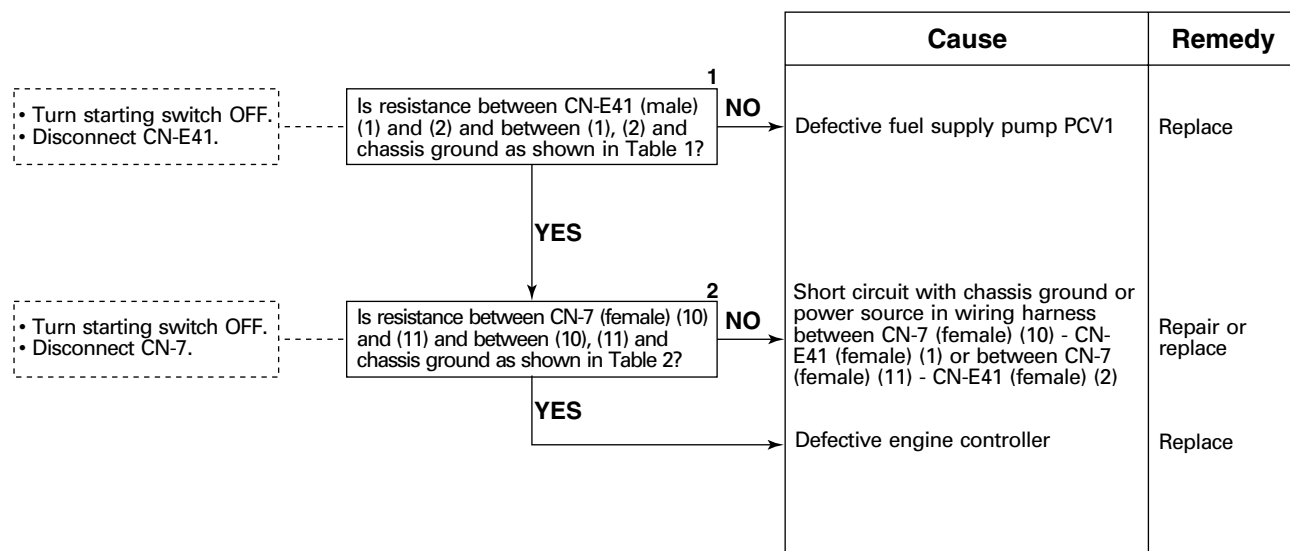


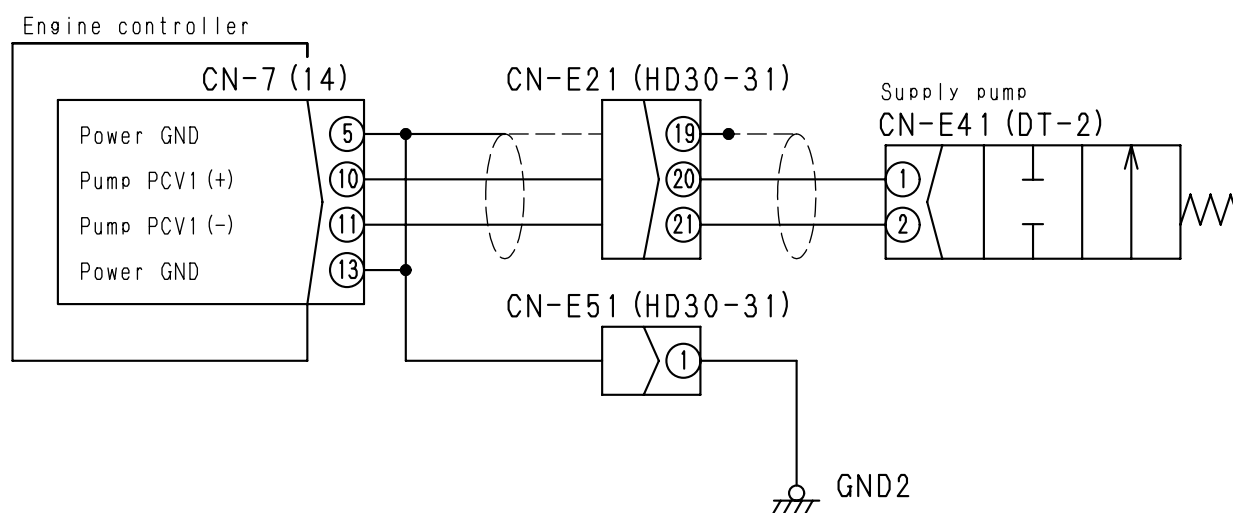
Table 1

CN-E41 (male)	Resistance
Between (1) – (2)	2.3 – 5.3 Ω
Between (1), (2) - chassis ground	Min. 1MΩ

Table 2

CN-7 (male)	Resistance
Between (10) – (11)	2.3 – 5.3 Ω
Between (10), (11) - chassis ground	Min. 1MΩ

### G-16. Related electrical circuit diagram



**G-17. [E0469] (Disconnection in fuel supply pump PCV1 system) is displayed**

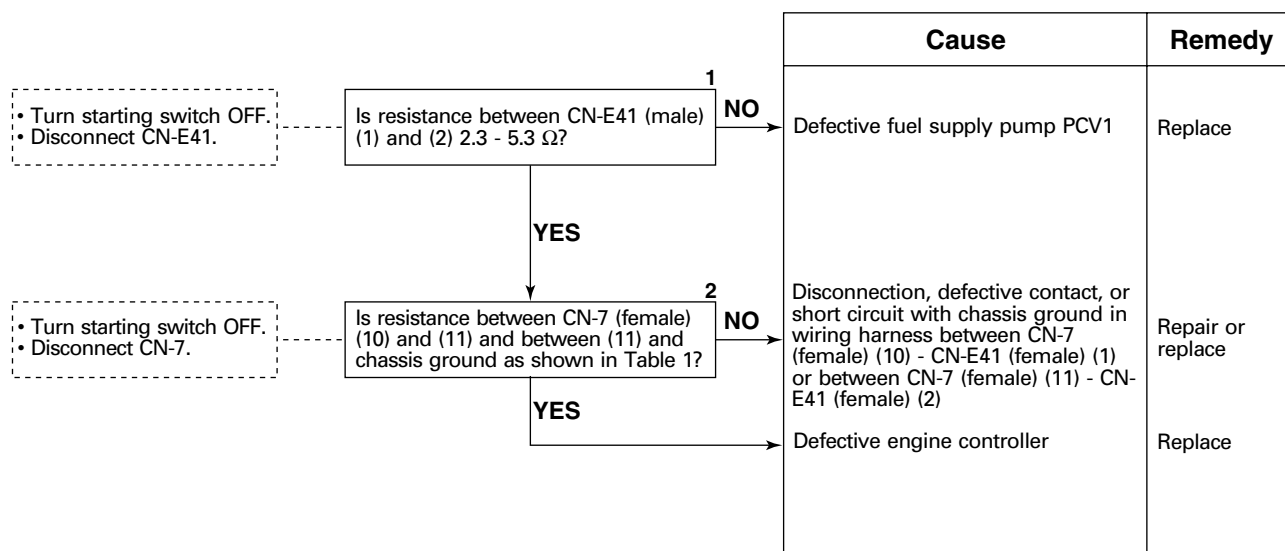
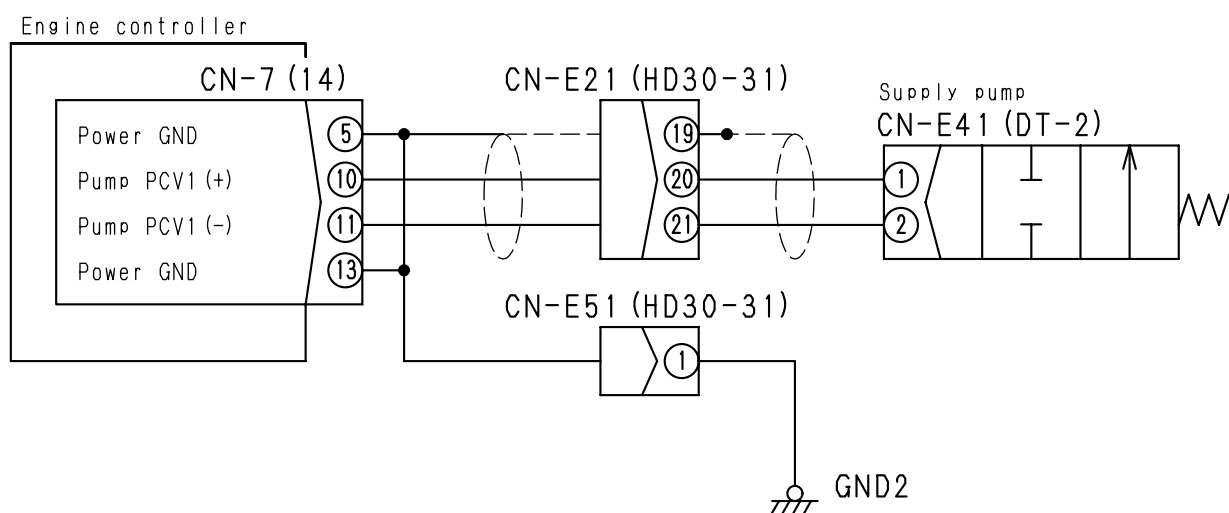


Table 1

CN-7 (male)	Resistance
Between (10) – (11)	2.3 – 5.3 Ω
Between (11) - chassis ground	Min. 1MΩ

### G-17. Related electrical circuit diagram



BJD10034

## G-18. [E0470] (Overcurrent in fuel supply pump PCV2 system) is displayed

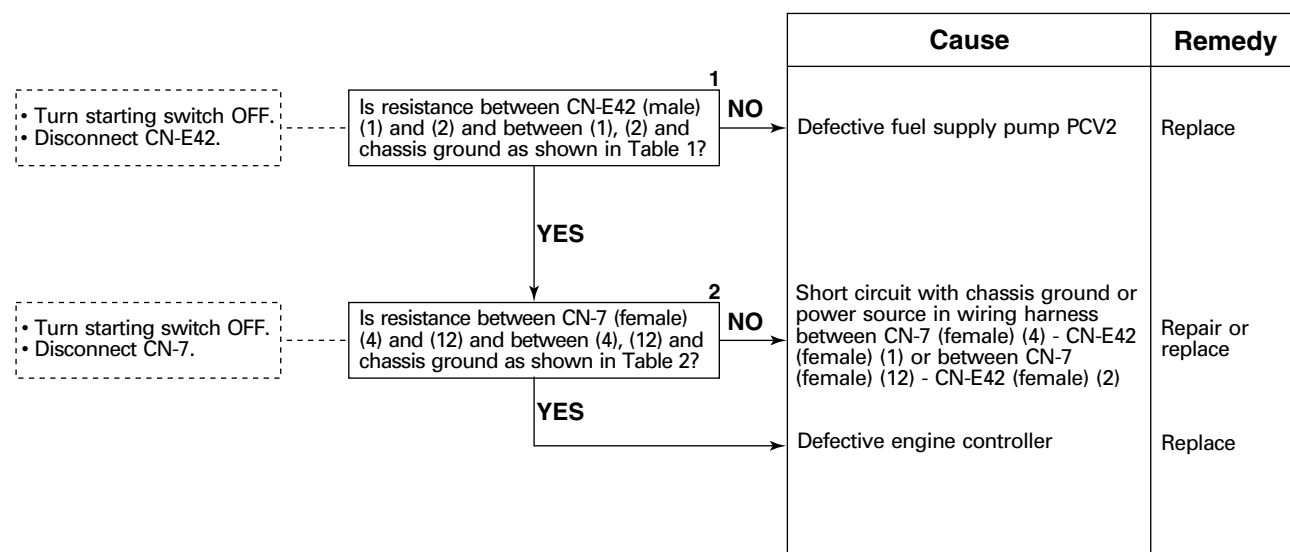


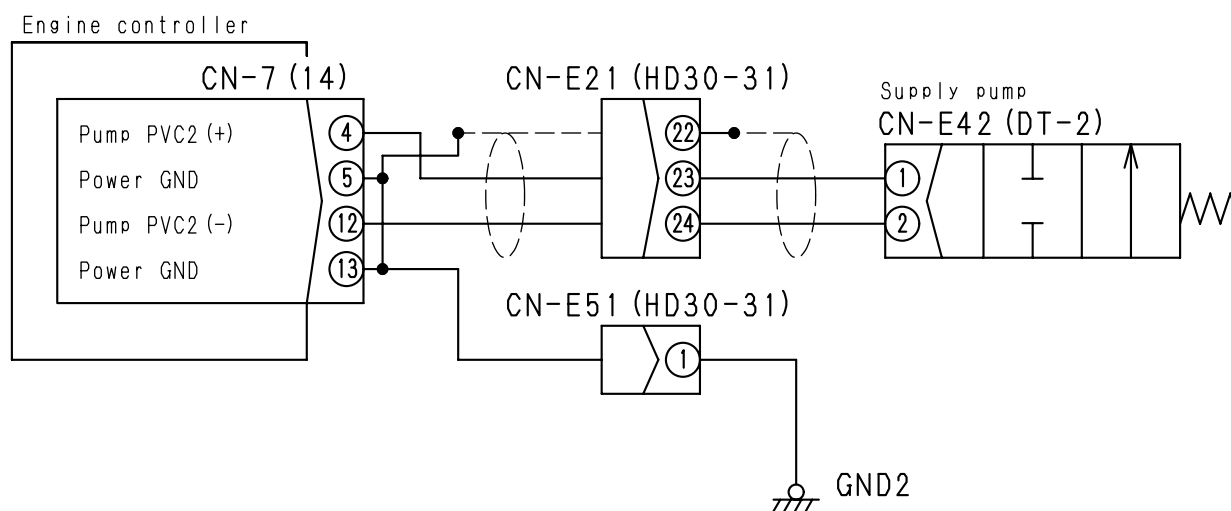
Table 1

CN-E42 (male)	Resistance
Between (1) – (2)	2.3 – 5.3 Ω
Between (1), (2) - chassis ground	Min. 1MΩ

Table 2

CN-7 (male)	Resistance
Between (4) – (12)	2.3 – 5.3 Ω
Between (4), (12) - chassis ground	Min. 1MΩ

### G-18. Related electrical circuit diagram



BJD10035

**G-19. [E0471] (Disconnection in fuel supply pump PCV2 system) is displayed**

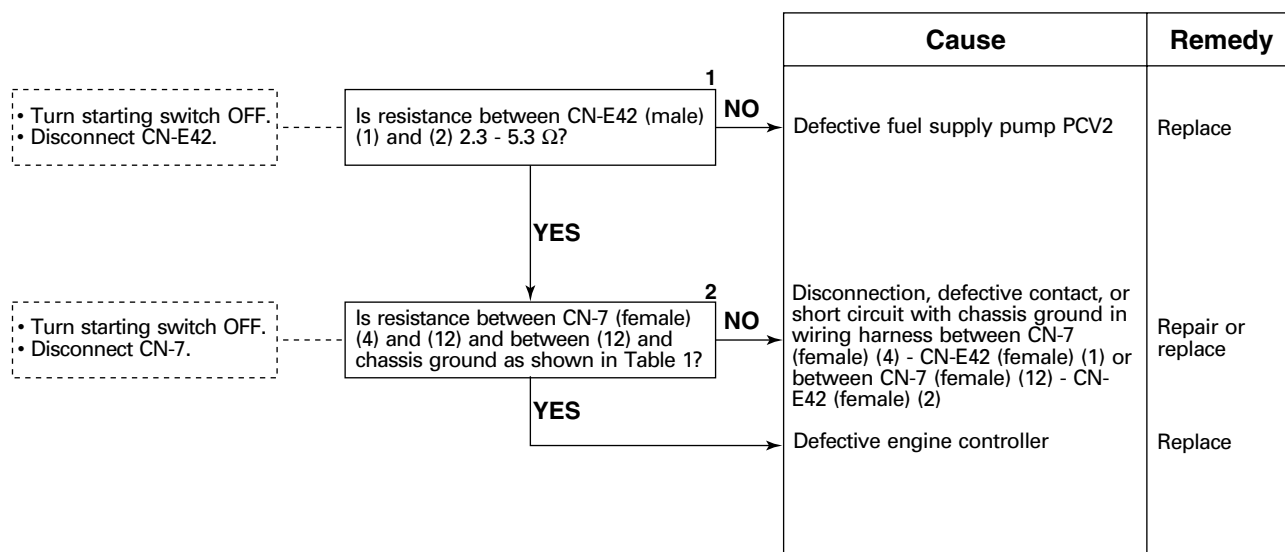
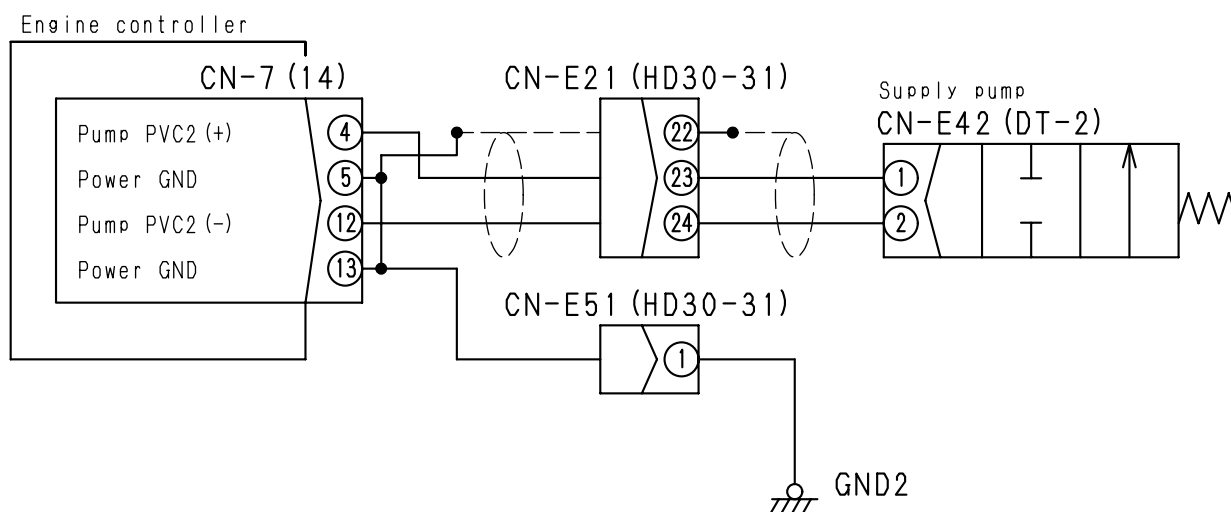


Table 1

CN-7 (male)	Resistance
Between (4) – (12)	2.3 – 5.3 Ω
Between (12) - chassis ground	Min. 1MΩ

### G-19. Related electrical circuit diagram



BJD10035



## G-20. [E0472] (Abnormality in boost pressure sensor system) is displayed

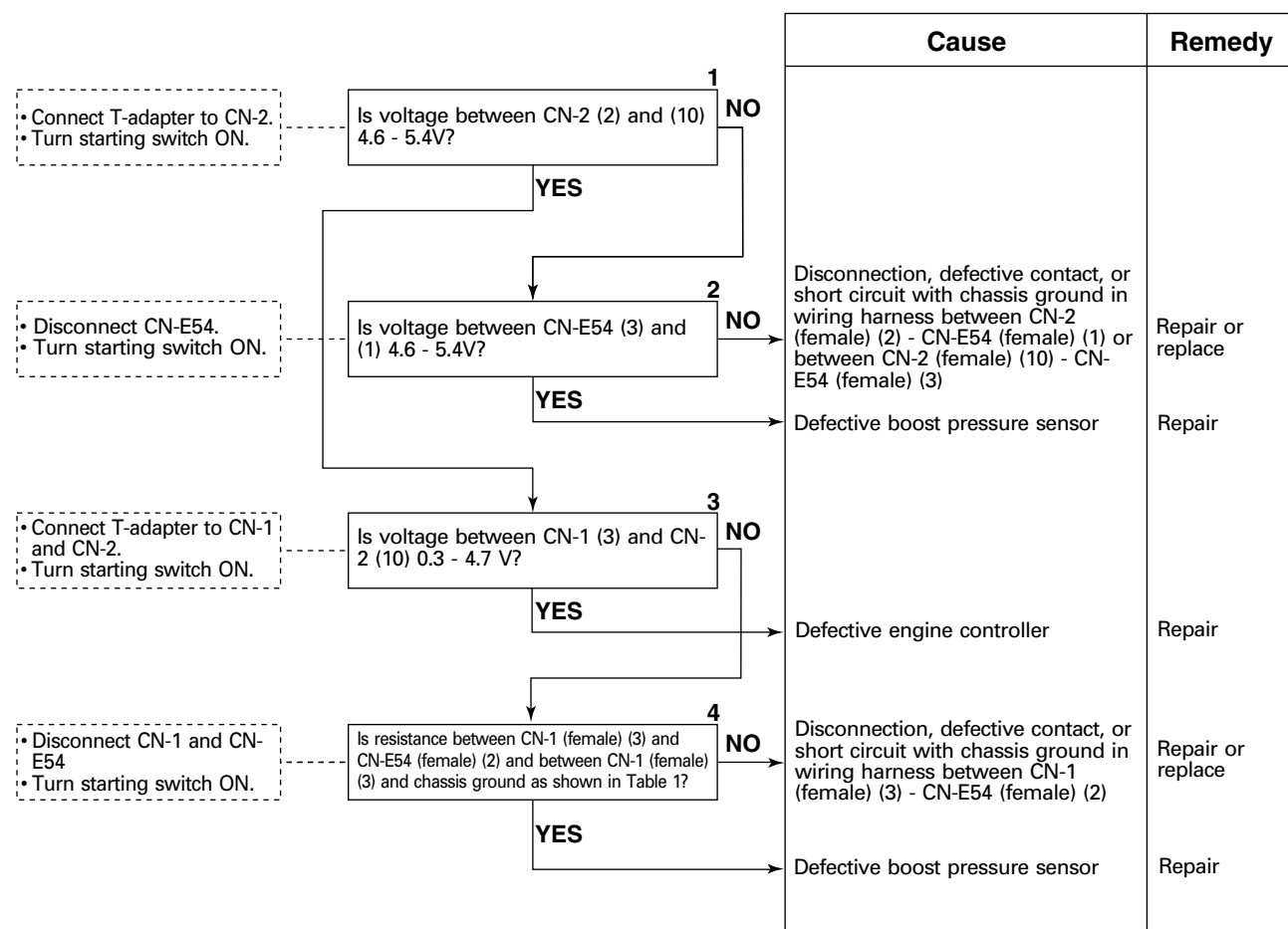
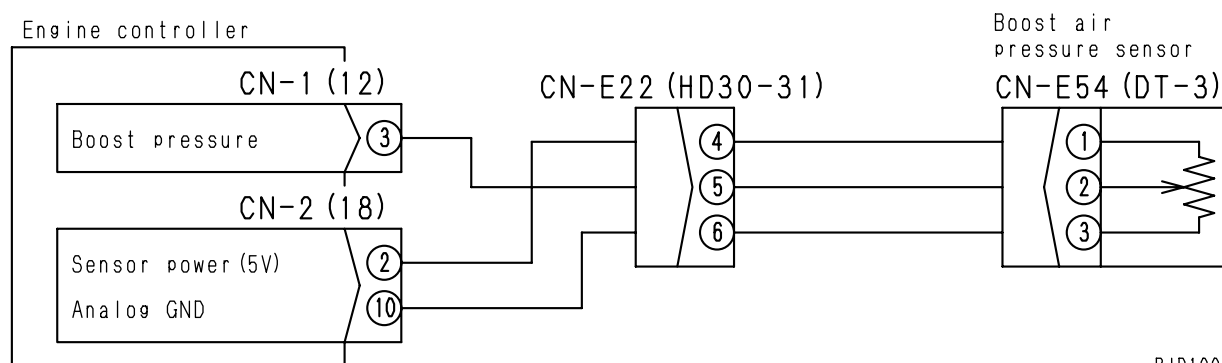


Table 3

CN-1 and CN-E35 (female)	Resistance
Between CN-1 (3) - CN-E54 (2)	Max. 1 $\Omega$
CN-1 (3) and chassis ground	Max. 1M $\Omega$

### G-20. Related electrical circuit diagram



BJD10036

**G-21. [E0474] (Abnormality in common rail fuel pressure sensor system) is displayed**

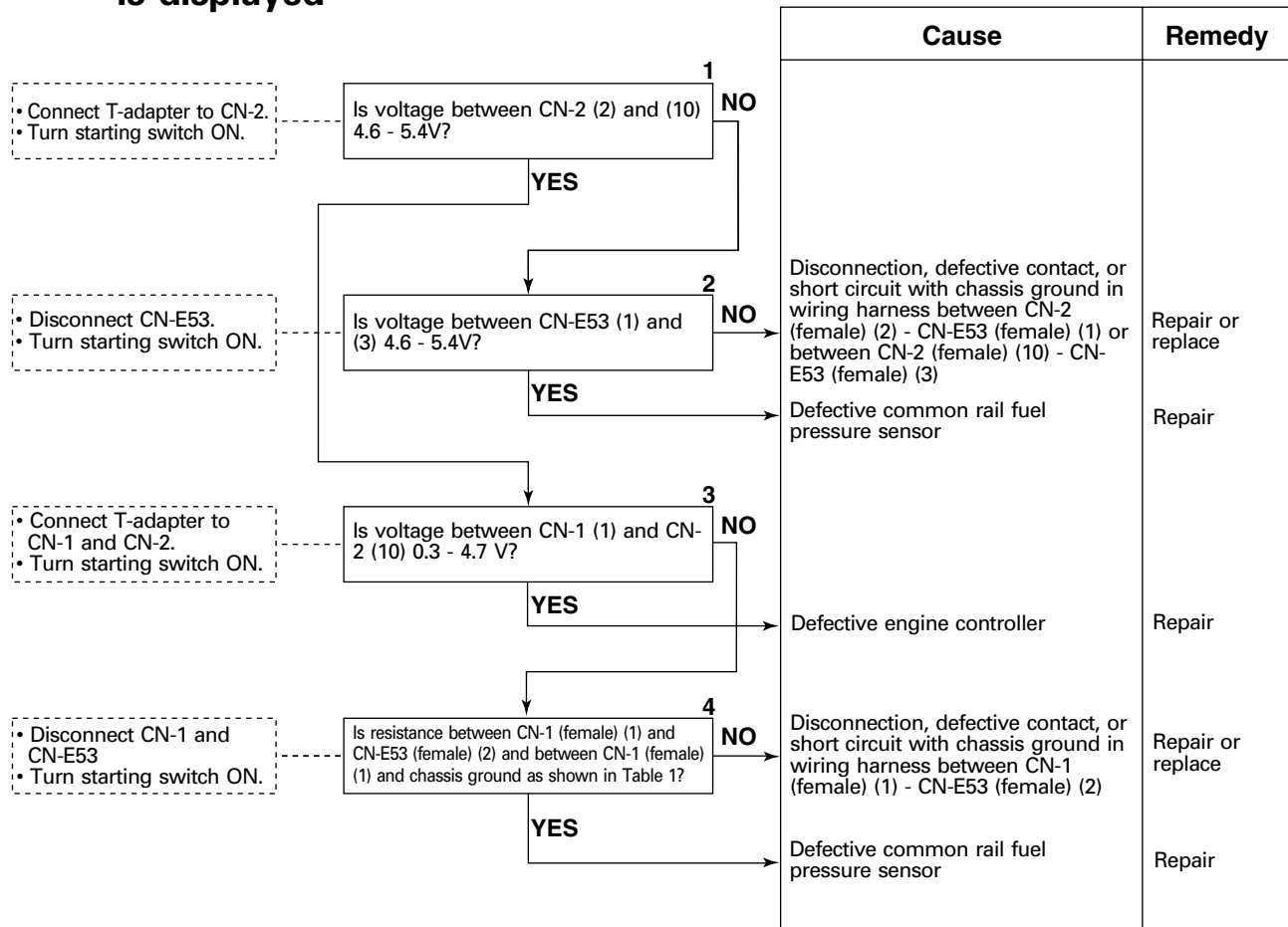
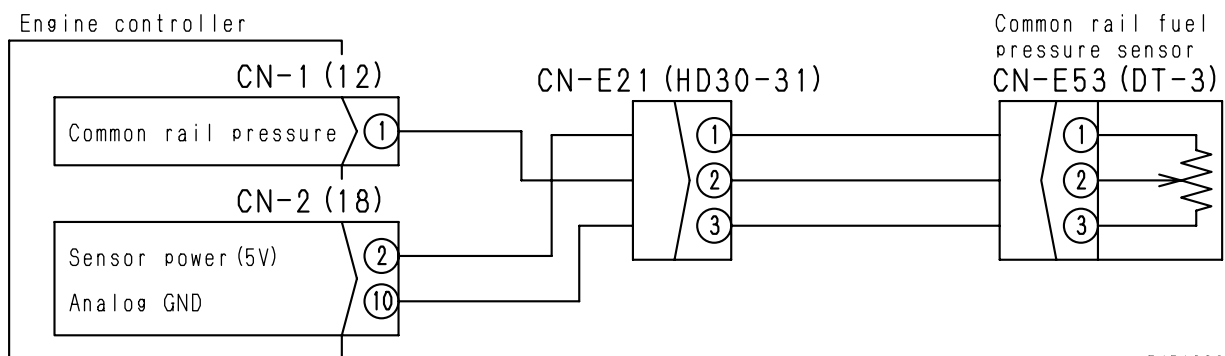


Table 1

CN-1, CN-E53 (female)	Resistance
Between CN-1 (1) – CN-E53 (2)	Max. 1 Ω
CN-1 (1) and chassis ground	Max 1MΩ

### G-21. Related electrical circuit diagram



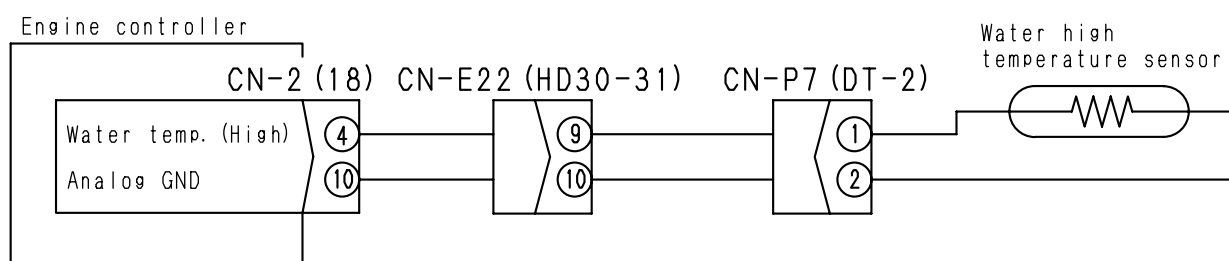
## G-22. [E0476] (Abnormality in high engine water temperature sensor system) is displayed

		Cause	Remedy
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect CN-P7.</li> <li>• Water temperature: 10 - 100°C</li> </ul>	<p>1</p> <p>Is resistance between CN-P7 (male) (1) and (2) and between (1) and chassis ground as shown in Table 1?</p> <p>YES</p>	Defective high water temperature sensor	Replace
	<p>NO</p> <p>2</p> <p>Is resistance between CN-2 (female) (4) and (10) 90 k - 3.5 kΩ?</p> <p>YES</p>	Disconnection or defective contact in wiring harness between CN-2 (female) (4) - CN-P7 (female) (1) or between CN-2 (female) (10) - CN-P7 (female) (2)	Repair or replace
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect CN-2 and CN-P7.</li> </ul>	<p>NO</p> <p>3</p> <p>Is resistance between CN-2 (female) (4) and chassis ground above 1 MΩ?</p> <p>YES</p>	Short circuit with chassis ground in wiring harness between CN-2 (female) (4) - CN-P7 (female) (1)	Repair or replace
	<p>NO</p>	Defective engine controller	Replace

Table 1

CN-P7 (male)	Resistance
Between (1) - (2)	90 k - 3.5 kΩ
Between (1) - chassis ground	Min. 1MΩ

### G-22. Related electrical circuit diagram



BJD10038

G-23. [E0478] (Abnormality in low engine water temperature sensor system) is displayed

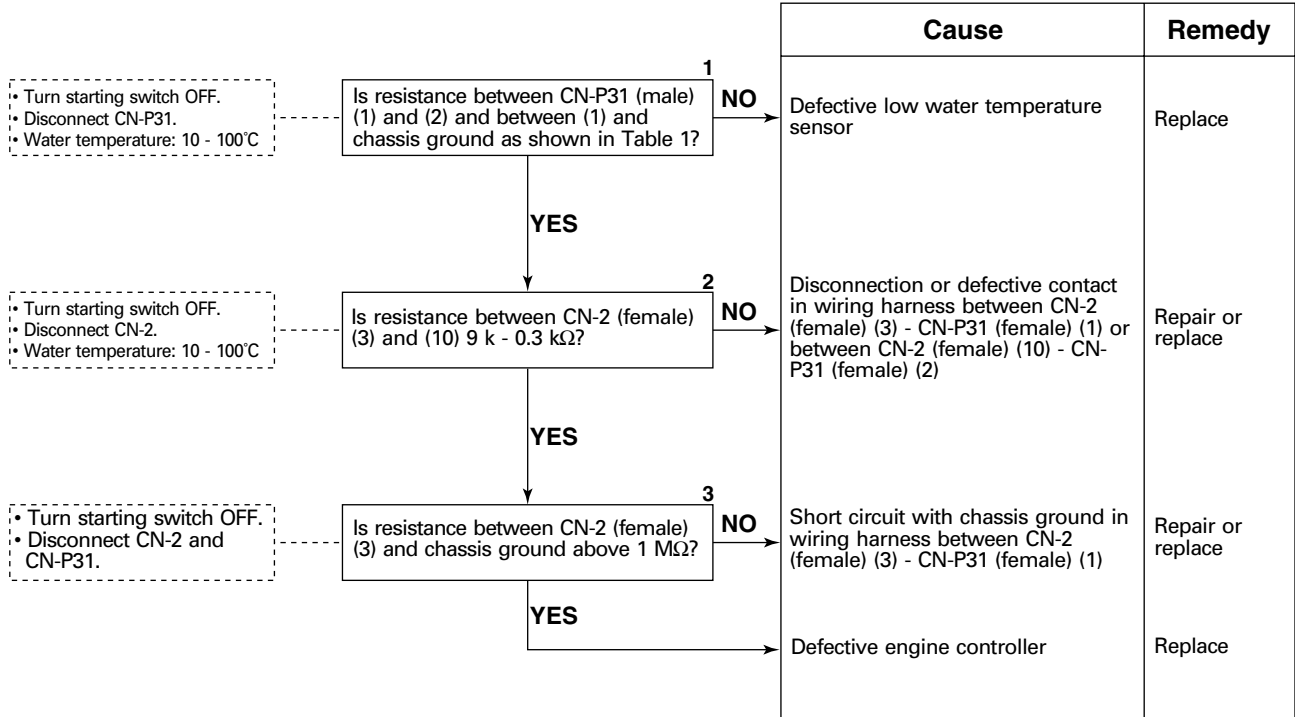
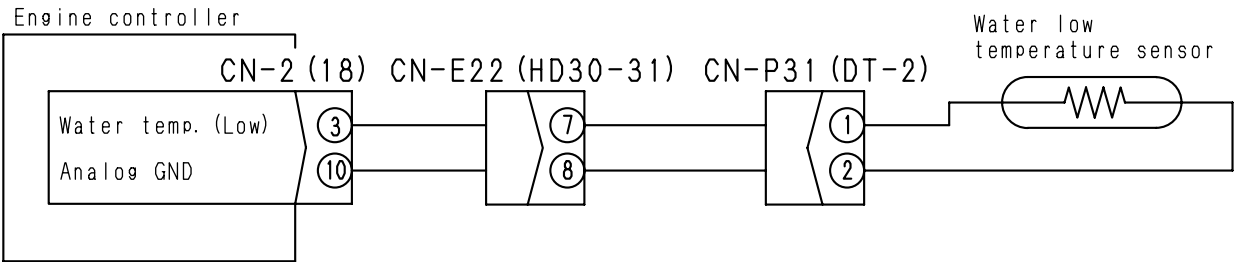


Table 1

CN-P31 (male)	Resistance
Between (1) – (2)	9 k – 0.3 kΩ
Between (1) - chassis ground	Min. 1MΩ

G-23. Related electrical circuit diagram

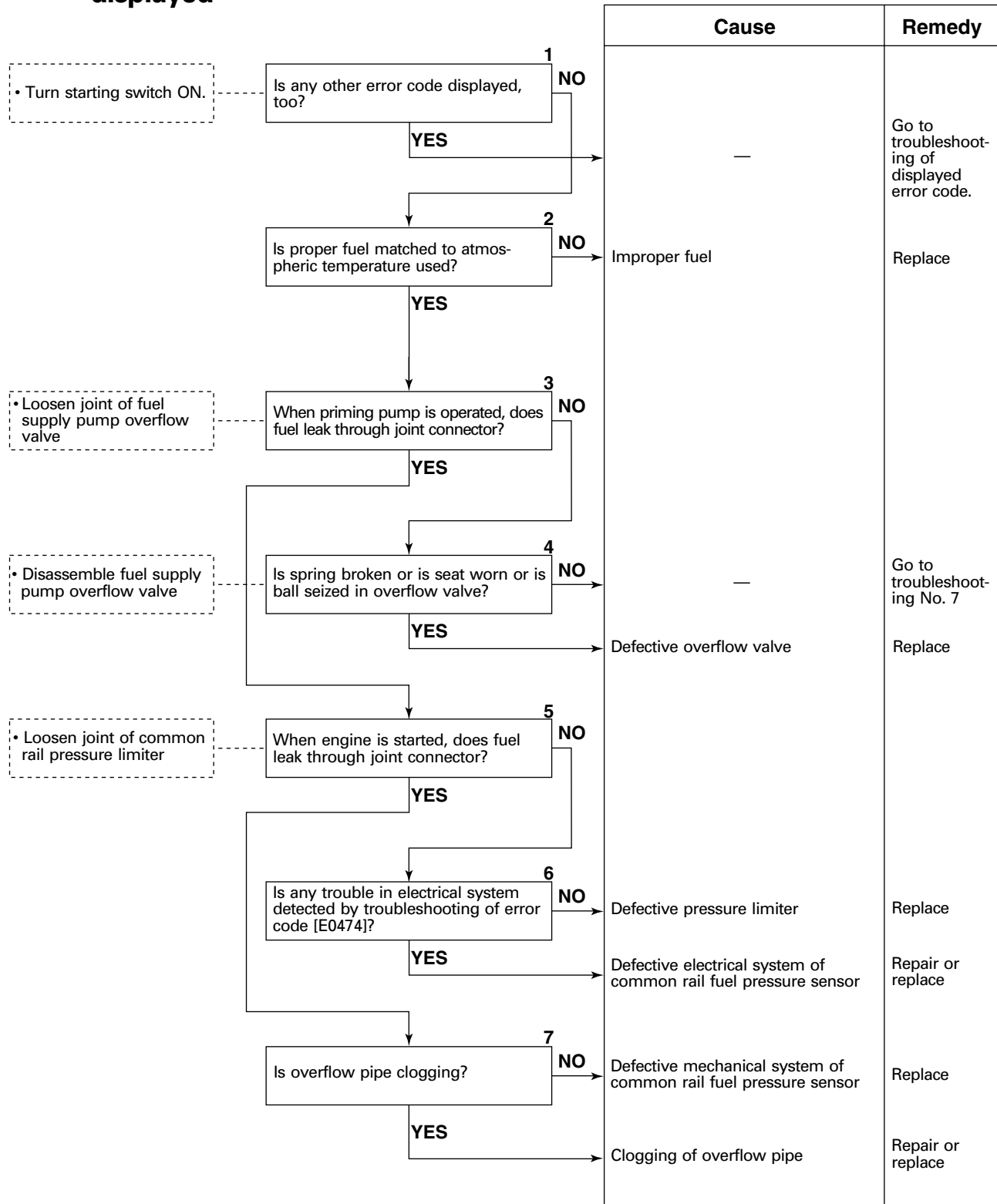


BJD10039

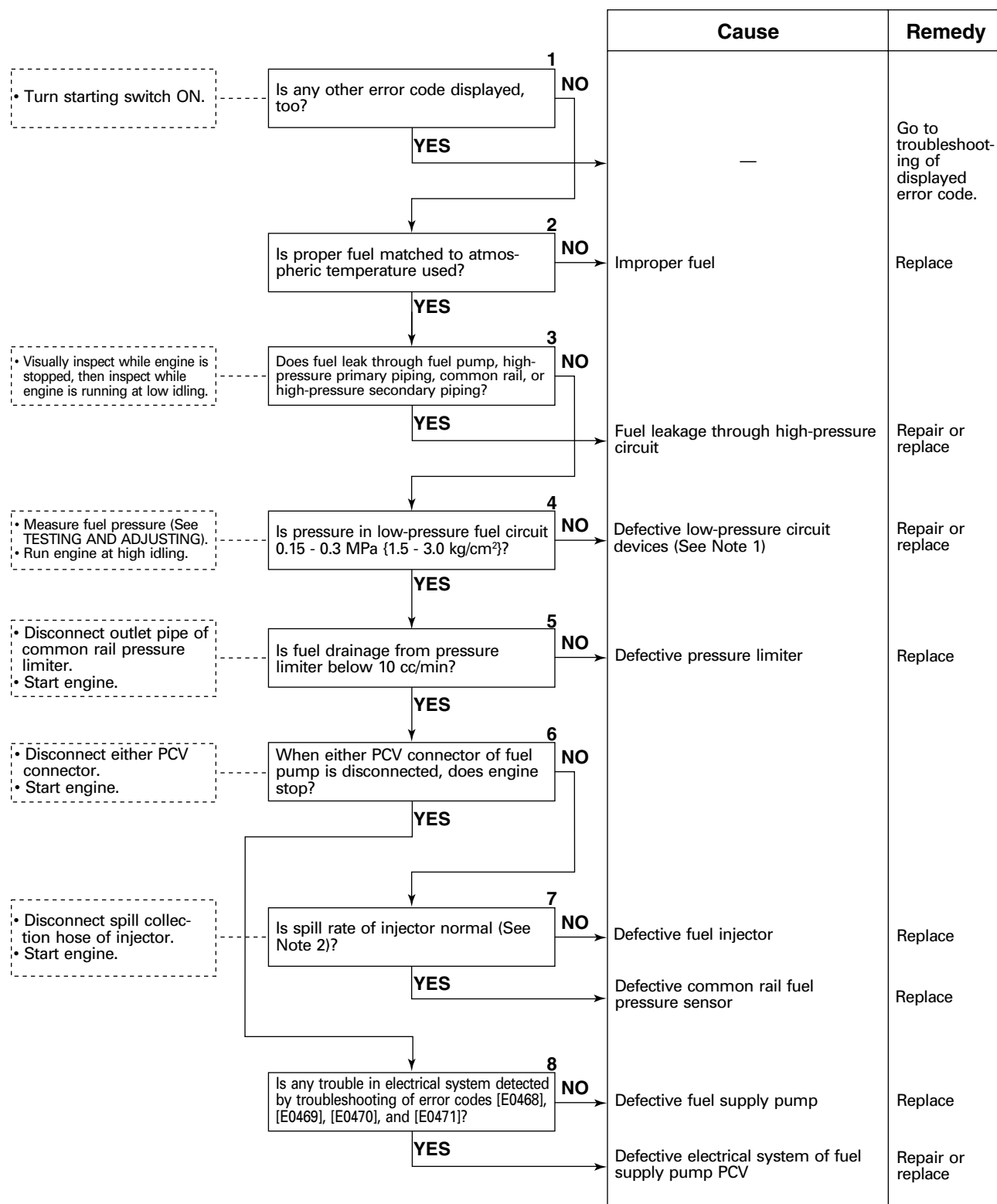
**G-24. [E0480] (Abnormality in common rail fuel pressure system) is displayed**

- ★ Go to error code [E0481] and [E0482].

**G-25. [E0481] (Abnormality in high common rail fuel pressure 1 system) is displayed**  
**[E0482] (Abnormality in high common rail fuel pressure 2 system) is displayed**



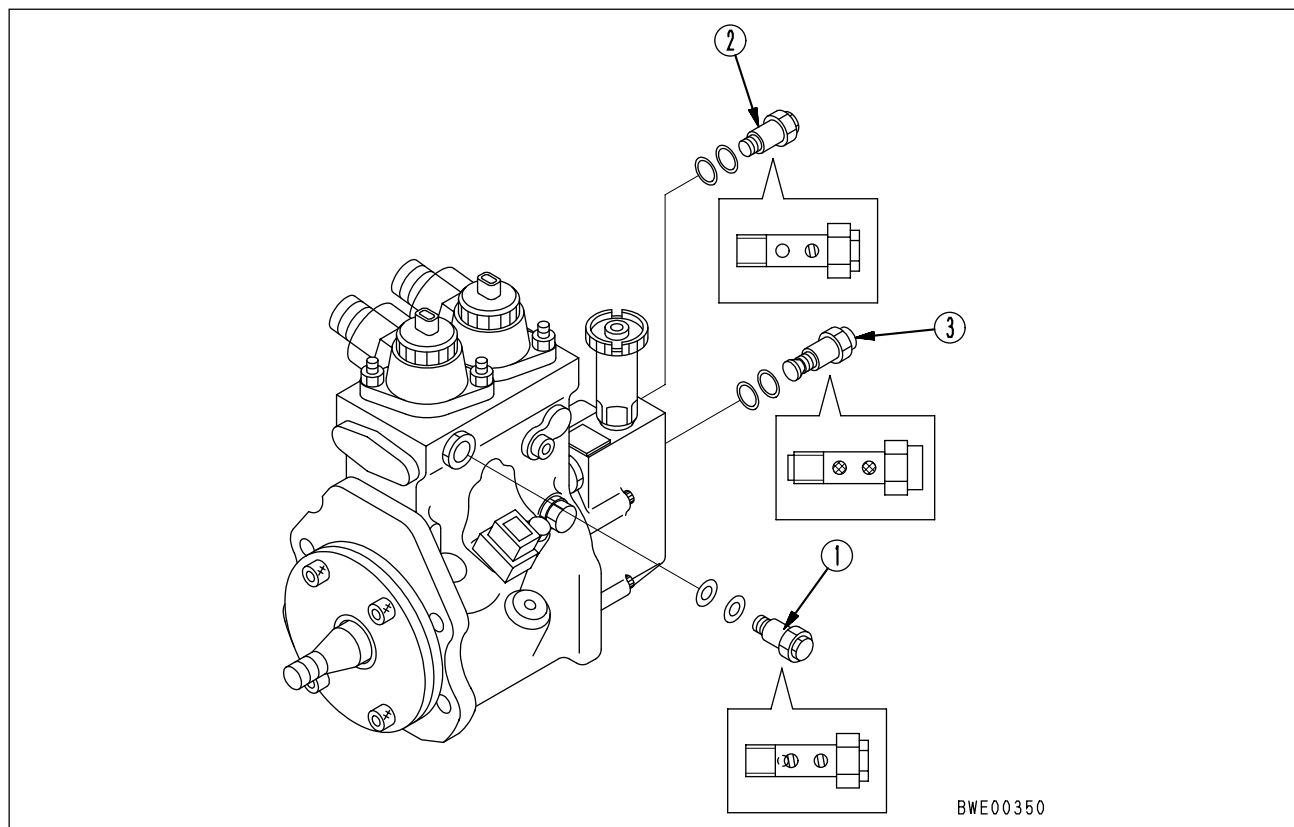
## G-26. [E0483] (No-pressure feed by fuel supply pump 1) is displayed [E0484] (No-pressure feed by fuel supply pump 2) is displayed



Note 1: If the equipment in the low-pressure circuit is defective, inspect the following points.

- 1) Remaining amount of fuel
- 2) Stuck, worn feed pump, clogged filter
- 3) Leakage, clogged low-pressure fuel piping
- 4) Defective actuation of bypass valve, incorrect assembly with other parts (See Fig. 1)
- 5) Clogged fuel filter
- 6) Fuel entering oil pan (fuel leakage inside head cover)

Fig. 1 Mounting positions of bypass valve (1), bypass valve (2), fuel inlet port joint



Note 2: Method of measuring amount of fuel spill flow

**⚠** The fuel in the spill line is at high temperature (up to 90°C), so be careful not to burn yourself during the operation.

- 1) Disconnect the hose connected to the spill tube return collection portion (rear of engine).
- 2) Connect another hose to the tip of the spill tube, and collect the spill fuel in a container.
- 3) Start the engine, stall the engine at each speed, and measure the spill fuel amount for 1 minute.

Limits for fuel spill amount (total for 6 cylinders)

Stall speed (rpm)	Spill limit (cc/min)
1,600	720
1,700	765
1,800	810
1,900	855
2,000	900



## G-27. [E0487] (Abnormality in engine oil pressure switch system) is displayed

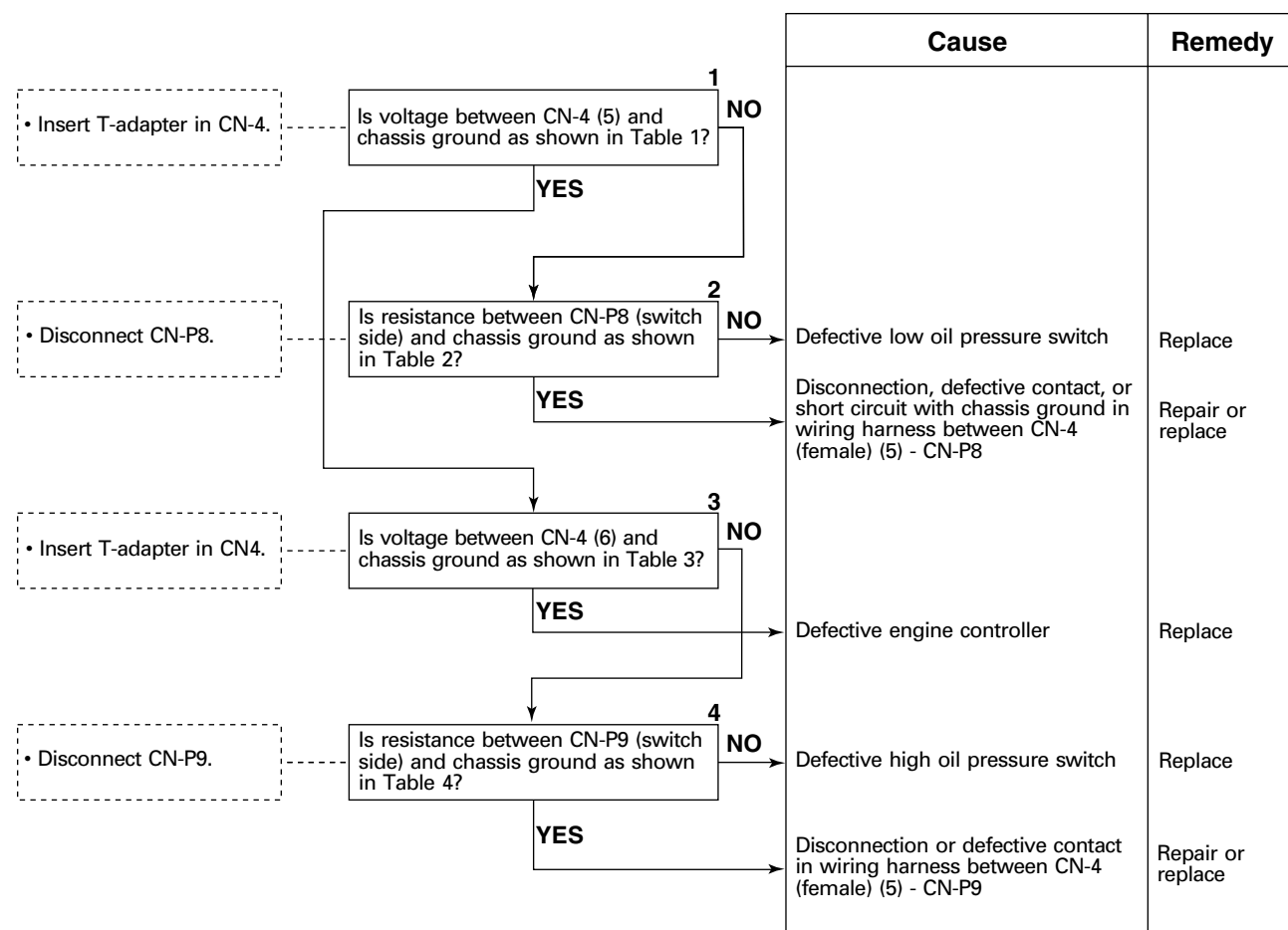


Table 1

CN-4 (male)	Engine	Voltage
Between (5) – chassis ground	Stopped	Max. 1 V
	Above 600 rpm	20 – 30 V

Table 2

CN-P8	Engine	Resistance
Between CN-P8 (switch) - chassis ground	Stopped	Max. 1 Ω
	Above 600 rpm	Min. 1 MΩ

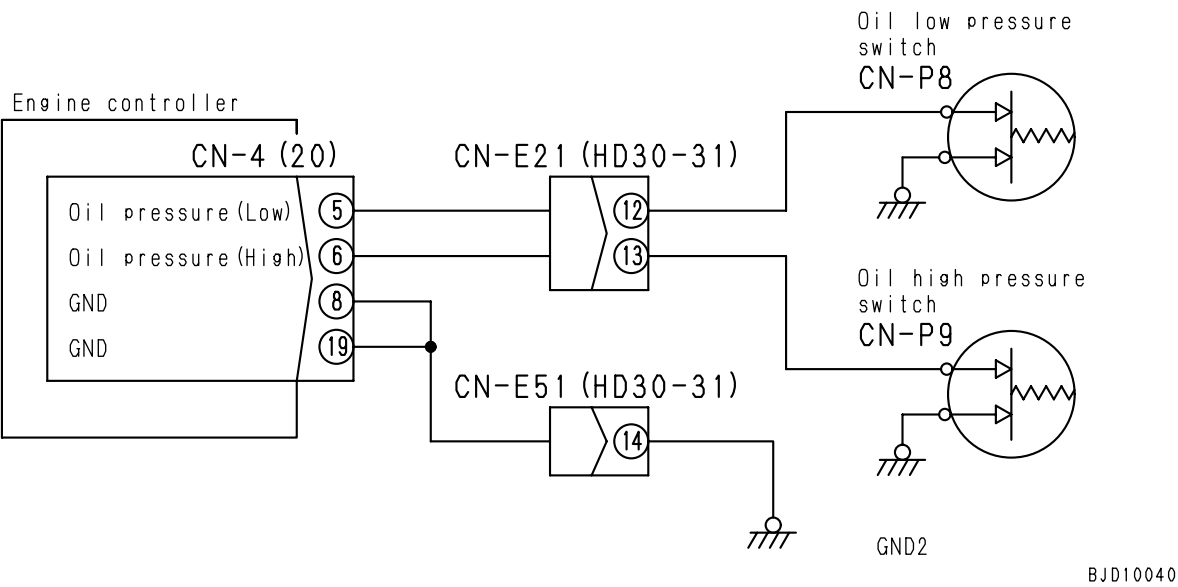
Table 3

CN-4	Engine	Resistance
Between (6) – chassis ground	Stopped	Max. 1 V
	Above 600 rpm	20 – 30 V

Table 4

CN-P9	Engine	Resistance
Between CN-P9 (switch) - chassis ground	Stopped	Max. 1 Ω
	Above 1,300 rpm	Min. 1 MΩ

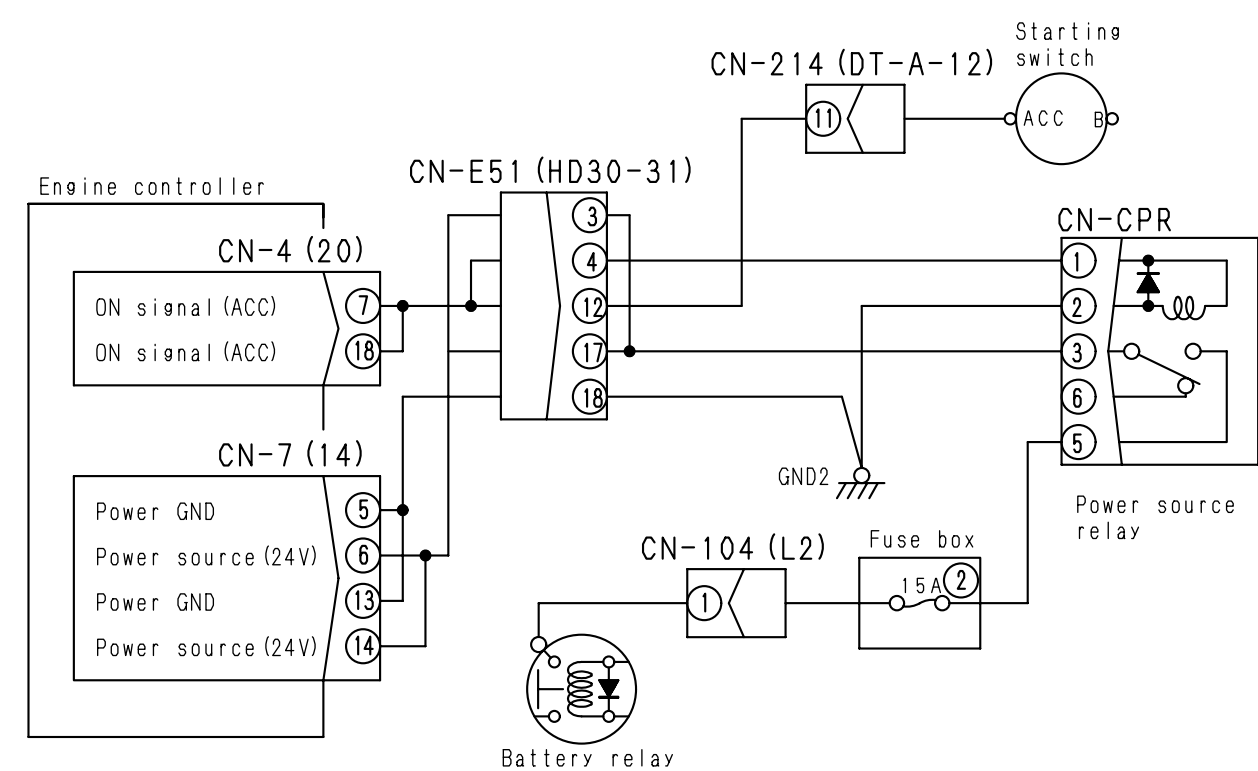
G-27. Related electrical circuit diagram



**G-28. [E0488] (Abnormality in power supply system 1) is displayed**

		Cause	Remedy
<ul style="list-style-type: none"> <li>• Insert T-adapter in CN-7.</li> <li>• Turn starting switch ON.</li> </ul>	<b>1</b> Is voltage between CN-7 (6), (14) and (5), (13) 20 - 30 V? YES NO	Defective engine controller	Replace
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect CN-CPR.</li> </ul>	<b>2</b> Is resistance between CN-CPR (male) (1) and (2) 200 - 400 Ω? YES NO	Defective power source relay (coil side)	Replace
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Insert T-adapter in CN-CPR.</li> </ul>	<b>3</b> Is voltage between CN-CPR (1) and chassis ground 20 - 30 V? YES NO	Disconnection, defective contact, or short circuit with chassis ground in wiring harness between starting switch terminal ACC - CN-CPR (female) (1)	Repair or replace
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Disconnect CN-CPR.</li> </ul>	<b>4</b> Is resistance between CN-CPR (female) (2) and chassis ground below 1Ω? YES NO	Disconnection or defective contact in wiring harness between CN-CPR (female) (2) - chassis ground	Repair or replace
<ul style="list-style-type: none"> <li>• Insert T-adapter in CN-CPR.</li> <li>• Turn starting switch ON.</li> </ul>	<b>5</b> Is voltage between CN-CPR (5) and chassis ground 20 - 30 V? YES NO	Defective battery relay or disconnection, defective contact, or short circuit with chassis ground in wiring harness between terminal B - CN-CPR (female) (5)	Repair or replace
<ul style="list-style-type: none"> <li>• Turn starting switch OFF.</li> <li>• Insert T-adapter in CN-CPR.</li> </ul>	<b>6</b> Is voltage between CN-CPR (3) and chassis ground 20 - 30 V? YES NO	Defective power source relay (contact side)	Replace
		Disconnection, defective contact, or short circuit with chassis ground in wiring harness between CN-7 (female) (6), (14) - CN-CPR (female) (3)	Repair or replace

G-28. Related electrical circuit diagram

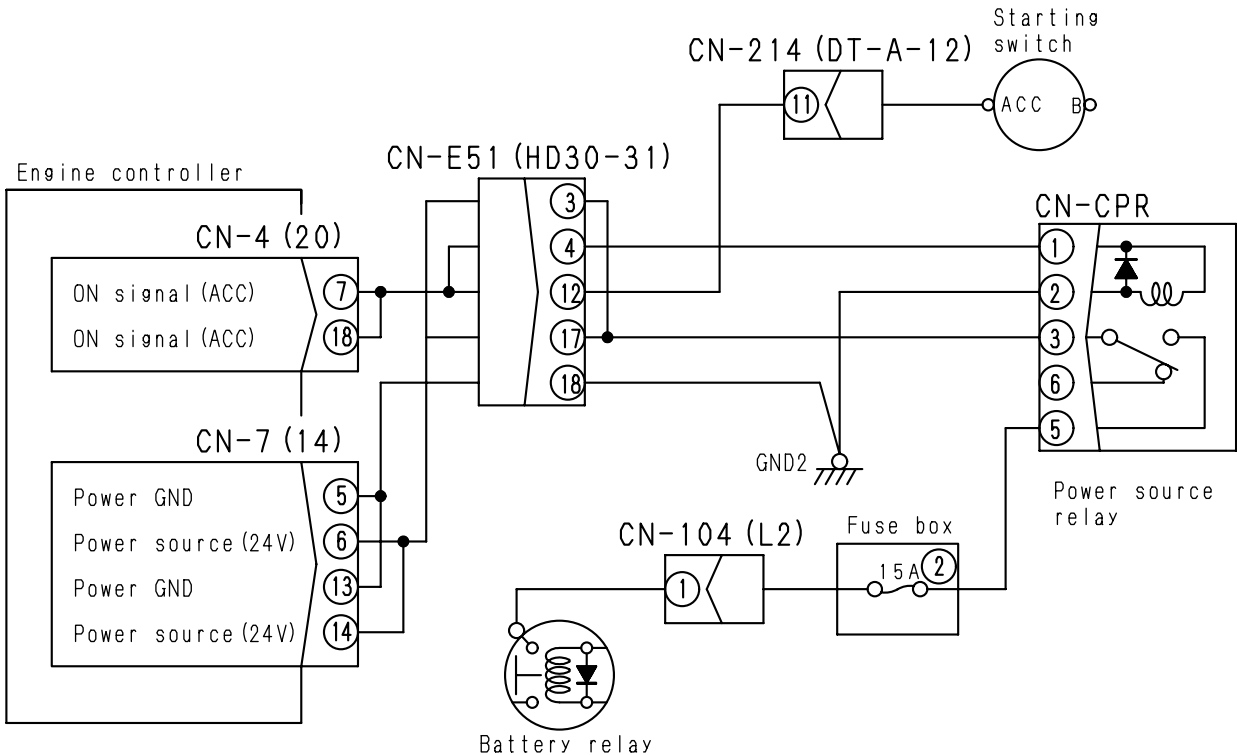


BJD10041

G-29. [E0489] (Abnormality in power supply system 2) is displayed

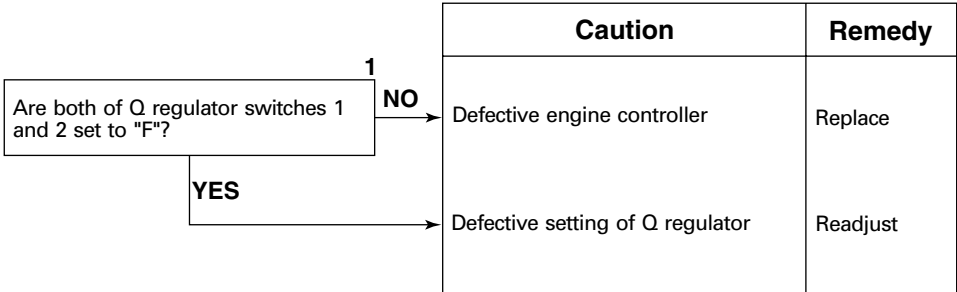
		Caution	Remedy
<div>• Turn starting switch OFF.</div> <div>• Insert T-adapter in CN-7.</div>	<div>1</div> <div>Is voltage between CN-7 (6), (14) and (5), (13) below 8 V?</div> <div>YES</div>	Defective engine controller	Replace
	<div>2</div> <div>Is voltage between CN-7 (6), (14) - (5), (13) below 8 V?</div> <div>YES</div>	Defective power source relay (contact side)	Replace
<div>• Turn starting switch OFF.</div> <div>• Disconnect CN-CPR.</div> <div>• Insert T-adapter in CN-7.</div>	<div>NO</div>	Short circuit with power source in wiring harness between CN-7 (female) (6) (14) - CN-CPR (female) (5)	Repair or replace

G-29. Related electrical circuit diagram



BJD10041

G-30. [E0490] (Abnormality in Q regulator switch signal) is displayed



G-31. [E0491] (Short circuit in starting switch C system) is displayed

• Connect T-adaptor to CN-4.

• Turn starting switch ON.

Is voltage between CN-4 (2) and chassis ground below 1 V?

1

NO

YES

• Disconnect starting switch terminal C.

• Turn starting switch ON.

Is voltage between starting switch terminal C and chassis ground below 1 V?

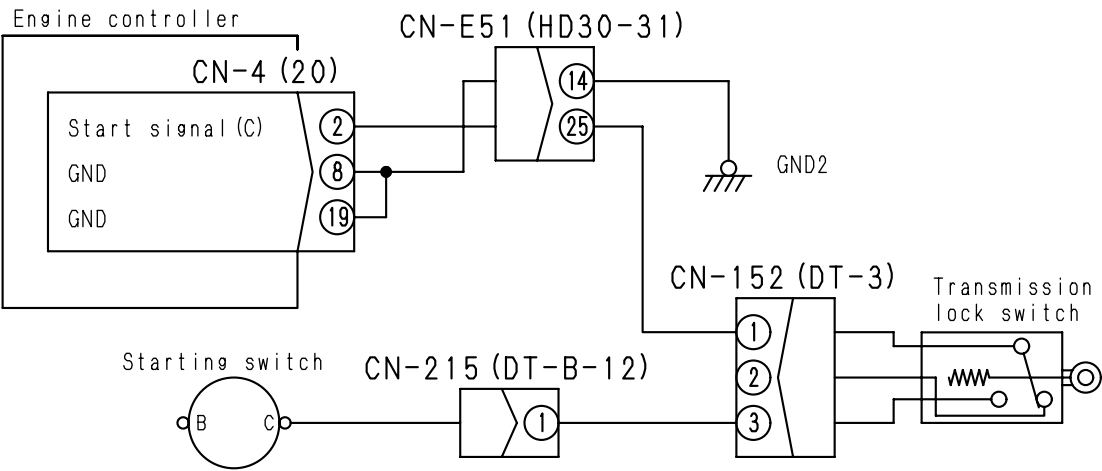
2

NO

YES

Caution	Remedy
Defective engine controller	Replace
Defective starting switch	Replace
Short circuit with power source in wiring harness between CN-4 (female) (2) - starting switch terminal C	Repair or replace

G-31. Related electrical circuit diagram



BJD10042





# TROUBLESHOOTING OF HSS CONTROLLER AND ELECTRICAL SYSTEM (E MODE)

**[Serial No. 75001 and up]**

Action taken by controller when abnormality occurs and problems on machine .....	20-902
Electrical circuit diagram for E mode .....	20-910
E-1. [E0113] (Drop of HSS controller power supply voltage) is displayed .....	20-912
E-2. [E0143] (Abnormality in HSS controller 5V power supply voltage) is displayed .....	20-913
E-3. [E0145] (Abnormality in HSS controller sensor power supply voltage) is displayed .....	20-914
E-4. [E0161] (Abnormality in HSS controller memory data of offset current) is displayed .....	20-915
E-5. [E0221] (Abnormality in gear speed switch system) is displayed .....	20-916
E-6. [E0233] (Short circuit in travel REVERSE sensing potentiometer system) is displayed .....	20-917
E-7. [E0233] (Disconnection in travel REVERSE sensing potentiometer system) is displayed .....	20-918
E-8. [E0237] (Abnormality in transmission NEUTRAL signal) is displayed .....	20-920
E-9. [E0272] (Unequality between travel REVERSE sensing potentiometer signal and backup alarm switch signal) is displayed .....	20-921
E-10. [E0360] (Disconnection in work equipment oil pressure sensor system) is displayed .....	20-923
E-11. [E0361] (Short circuit in work equipment oil pressure sensor system) is displayed .....	20-924
E-12. [E0610] (Disconnection in backup alarm relay system) is displayed .....	20-925
E-13. [E0611] (Short circuit in backup alarm relay system) is displayed .....	20-926
E-14. [E0730] (Abnormality in both steering potentiometer systems 1 and 2) is displayed .....	20-927
E-15. [E0731] (Large difference between steering potentiometer systems 1 and 2: Case I) is displayed .....	20-928
E-16. (Abnormality in steering potentiometer system on one side and large deviation of neutral position on one side) is displayed .....	20-929
E-17. [E0733] (Disconnection in steering potentiometer system 1) is displayed .....	20-930
E-18. [E0733] (Short circuit in steering potentiometer system 1) is displayed .....	20-931
E-19. [E0734] (Disconnection in steering potentiometer system 2) is displayed .....	20-932
E-20. [E0734] (Short circuit in steering potentiometer system 2) is displayed .....	20-933
E-21. [E0735] (Large difference between steering potentiometer systems 1 and 2: Case II) is displayed .....	20-934
E-22. [E0768] (Disconnection in steering oil pressure sensor A system) is displayed .....	20-935
E-23. [E0769] (Short circuit in steering oil pressure sensor A system) is displayed .....	20-936
E-24. [E0770] (Disconnection in steering oil pressure sensor B system) is displayed .....	20-937
E-25. [E0771] (Short circuit in steering oil pressure sensor B system) is displayed .....	20-938
E-26. [E0772] (Disconnection in HSS pump solenoid A system) is displayed .....	20-939
E-27. [E0773] (Short circuit in HSS pump solenoid A system) is displayed .....	20-940
E-28. [E0774] (Disconnection in HSS pump solenoid B system) is displayed .....	20-941
E-29. [E0775] (Short circuit in HSS pump solenoid B system) is displayed .....	20-942
E-30. [E0930] (Abnormality in engine speed sensor system) is displayed .....	20-943
E-31. Backup alarm does not sound .....	20-944
E-32. Blade pitch malfunctions (Machine equipped with pitch dozer) .....	20-945
E-33. Ripper pin puller malfunctions (Machine equipped with giant ripper) .....	20-947
E-34. Engine does not start (Engine does not rotate) .....	20-949

- ★ This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adaptor, or when removing the T-adaptor and returning the connector to its original position, if the monitor code display returns to normal, the problem has been removed.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.

ACTION TAKEN BY CONTROLLER WHEN ABNORMALITY  
OCCURS AND PROBLEMS ON MACHINE

Error code	Abnormal system	Nature of abnormality	Condition when normal (voltage, current, resistance)
E0113	Drop of HSS controller power supply voltage	※ When controller power source voltage lowers below 17 V 1. Disconnection or defective contact in wiring harness between controller CN-ST1 (8), (18) - fuse 5 2. Disconnection or defective contact in wiring harness between CN-ST1 (9), (19) - chassis ground 3. Lowering of battery voltage or defective fuse 5 4. Defective HSS controller	• Voltage between CN-ST1 (8), (18) - (9), (19): 20 - 30 V
E0143	Abnormality in HSS controller 5V power supply	※ When source voltage of 5 V for HSS controller sensor lowers below 4.5 V or rises above 5.5 V 1. Disconnection or defective contact in wiring harness between CN-RSS (1) - CN-ST2 (10) 2. Disconnection or defective contact in wiring harness between CN-STR (4) - CN-ST2 (10) 3. Defective HSS controller	• Voltage between CN-ST2 (10) - CN-RSS (3): 4.5 - 5.5 V • Voltage between CN-ST2 (10) - CN-STR (4): 4.5 - 5.5 V
E0145	Abnormality in HSS controller sensor power supply	※ When source voltage for HSS controller sensor lowers below 17 V 1. Disconnection or defective contact in wiring harness between CN-ST (13) - (9), (19) 2. Defective HSS controller	• Voltage between CN-ST1 (13) - (9), (19): 17 - 30 V
E0161	Abnormality in memory data of offset current	※ When offset current determined by neutral adjustment of steering system cannot be saved in non-volatile memory 1. Defective HSS controller	• When starting switch is turned OFF, offset current is saved in non-volatile memory.
E0221	Abnormality in gear speed switch system	1. Abnormality in signal of switch used to display gear speed on monitor panel	• Set joystick in 3rd or 2nd gear speed position. 3rd or 2nd gear speed: 20 - 30 V • Set joystick in 1st or 2nd gear speed position. 1st or 2nd gear speed: 20 - 30 V
E0233	Short circuit in travel REVERSE sensing potentiometer system	※ When signal voltage of sensing potentiometer rises above 4.700 V 1. Defective reverse sensing potentiometer 2. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - potentiometer CN-RSS (3) 3. Short circuit with power source in wiring harness between controller CN-ST3 (10) - potentiometer CN-RSS (2) 4. Defective HSS controller	• Voltage between CN-ST3 (10) - CN-ST2 (9) When joystick is in neutral: Max. 3.500 V When joystick is in reverse position: 3.500 - 4.400 V
E0233	Disconnection in travel REVERSE sensing potentiometer system	※ When signal voltage of sensing potentiometer lowers below 0.300 V 1. Defective reverse sensing potentiometer 2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST3 (10) - potentiometer CN-RSS (2) 3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST2 (10) - potentiometer CN-RSS (1)	• Voltage between CN-ST3 (10) - CN-ST2 (9) When joystick is in neutral: Max. 3.500 V When joystick is in reverse position: 3.500 - 4.400 V
E0237	Abnormality in transmission NEUTRAL signal	1. Defective HSS controller 2. Defective engine controller 3. Disconnection or defective contact in wiring harness between CN-6 (1), (5) - CN-ST3 (6), (4)	• Voltage between CN-6 (1) - chassis ground: 18 - 30 V • Voltage between CN-ST3 (6) - chassis ground: 18 - 30 V
E0272	Unequality of travel REVERSE sensing potentiometer signal and backup alarm switch signal	※ When reverse sensing potentiometer and backup alarm switch signal do not conform to each other 1. When error code [E0233] is displayed 2. Defective backup alarm switch 3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST2 (7) - backup alarm switch CN-25 (3) 4. Disconnection or defective contact in wiring harness between backup alarm switch CN-25 (3) - chassis ground 5. Defective HSS controller	• When joystick is in neutral Voltage between CN-ST3 (10) - CN-ST2 (9): Max. 3.500 V Voltage between CN-ST2 (7) - (9): 20 - 30 V • When joystick is in reverse position Voltage between CN-ST3 (10) - CN-ST2 (9): Max. 3.500 - 4.400 V Voltage between CN-ST2 (7) - (9): Max. 1 V
E0360	Disconnection in work equipment oil pressure sensor system	※ When signal voltage of work equipment circuit oil pressure sensor lowers below 0.500 V 1. Defective work equipment circuit oil pressure sensor 2. Disconnection or defective contact in wiring harness between CN-S51 (13) - oil pressure sensor CN-HHP (2) 3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between CN-ST3 (2) oil pressure sensor CN-HHP (3) 4. Defective HSS controller	• Voltage between CN-ST3 (2) - CN-ST2 (9) When all work equipment is in neutral: 0.90 - 1.20 V When blade is raised to relief: 2.45 - 2.90 V

Action by controller when abnormality is detected	Problem that appears on machine when there is abnormality
1. Stops all outputs.	1. Machine cannot be steered.
1. Cannot repair (Internal trouble of controller).	1. Machine may deviate from straight travel line.
1. Outputs error code and display "--" on panel.	1. Gear speed is not displayed on monitor panel.
1. Controls with signal of backup alarm switch. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Controls with signal of backup alarm switch. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Controls with signal of backup alarm switch, if error code [E0233] is displayed. 2. Controls with signal of reverse sensing potentiometer, if error code [E0233] is not displayed. 3. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Calculates with work equipment oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when work equipment is relieved.	1. If machine is steered when work equipment is relieved, engine may stall. 2. Only travel and steering operations can be executed normally.

Error code	Abnormal system	Nature of abnormality	Condition when normal (voltage, current, resistance)
E0361	Short circuit in work equipment oil pressure sensor system	※ When signal voltage of oil pressure sensor B rises above 6.000 V 1. Defective work equipment circuit oil pressure sensor 2. Short circuit with power source in wiring harness between controller CN-ST3 (2) - oil pressure sensor CN-HHP (3) 3. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - oil pressure sensor CN-HHP (1) 4. Defective HSS controller	• Voltage between CN-ST3 (2) - CN-ST2 (9) When all work equipment is in neutral: 0.90 - 1.20 V When blade is raised to relief: 2.45 - 2.90 V
E0610	Disconnection in backup alarm relay system	1. Defective backup alarm relay 2. Disconnection or defective contact in wiring harness between controller CN-ST1 (11) - relay CN-014 (1) 3. Disconnection or defective contact in wiring harness between relay CN-014 (2) - chassis ground 4. Defective HSS controller	• Voltage between CN-ST1 (11) - chassis ground When joystick is in neutral: Max. 1 V When joystick is in reverse position: 20 - 30 V
E0611	Short circuit in backup alarm relay system	1. Defective backup alarm relay 2. Short circuit with chassis ground in harness between controller CN-ST (11) - relay CN-014 (1) 3. Defective HSS controller	• Voltage between CN-ST1 (11) - chassis ground When joystick is in neutral: Max. 1 V When joystick is in reverse position: 20 - 30 V
E0730	Abnormality in both steering potentiometer systems 1 and 2	※ When signal voltages of steering potentiometer systems 1 and 2 lower to 0.500 V or rise to 4.500 V at same time	• Voltage between CN-ST2 (19) - (9) (System 1) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V • Voltage between CN-ST2 (20) - (9) (System 2) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V • Sum of signal voltages of above systems 1 and 2 (VSUM) $4.6 \text{ V} \leq \text{VSUM} \leq 5.4 \text{ V}$
E0731	Large difference between steering potentiometer systems 1 and 2	※ If both potentiometers are normal when starting switch is turned ON but sum of signal voltages (VSUM) of potentiometer system 1 and potentiometer system 2 goes out of following range afterward 1. Defective steering potentiometer 2. Defective HSS controller	• Voltage between CN-ST2 (19) - (9) (System 1) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V • Voltage between CN-ST2 (20) - (9) (System 2) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V • Sum of signal voltages of above systems 1 and 2 (VSUM) $4.6 \text{ V} \leq \text{VSUM} \leq 5.4 \text{ V}$
E0732	Abnormality in steering potentiometer system of one side and large deviation of neutral position	※ If both steering potentiometer systems have following abnormalities when starting switch is turned on 1) Disconnection, defective contact, or short circuit in one system 2) Large deviation of neutral position of one system ( $2.3 \text{ V} \leq \text{Signal voltage} \leq 2.7 \text{ V}$ ) 1. Defective steering potentiometer 2. Defective HSS controller	• Voltage between CN-ST2 (19) - (9) (System 1) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V • Voltage between CN-ST2 (20) - (9) (System 2) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V • Sum of signal voltages of above systems 1 and 2 (VSUM) $4.6 \text{ V} \leq \text{VSUM} \leq 5.4 \text{ V}$
E0733	Disconnection in steering potentiometer system 1	※ When signal voltage of steering potentiometer 1 rises above 4.500 V 1. Defective potentiometer 2. Disconnection, defective contact, or short circuit with power source in wiring harness between controller CN-ST2 (19) - potentiometer CN-STR (3) 3. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - potentiometer CN-STR (1) 4. Defective HSS controller	• Voltage between CN-ST2 (19) - (9) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V

Action by controller when abnormality is detected	Problem that appears on machine when there is abnormality
1. Calculates with work equipment oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when work equipment is relieved.	1. If machine is steered when work equipment is relieved, engine may stall. 2. Only travel and steering operations can be executed normally.
1. Does not take particular action.	1. Backup alarm does not sound.
1. Stops outputting to backup alarm relay.	1. Backup alarm does not sound.
1. Controls with signal before occurrence of abnormality until machine is stopped. 2. Flashes warning lamp and sounds warning buzzer.	1. Steering operation before occurrence of abnormality is continued until machine is stopped. 2. Machine cannot be steered once it is stopped.
1. Controls with signal before occurrence of abnormality until machine is stopped. 2. Flashes warning lamp and sounds warning buzzer.	1. Steering operation before occurrence of abnormality is continued until machine is stopped. 2. Machine cannot be steered once it is stopped.
1. Controls with signal before occurrence of abnormality until machine is stopped. 2. Flashes warning lamp and sounds warning buzzer.	1. Steering operation before occurrence of abnormality is continued until machine is stopped. 2. Machine cannot be steered once it is stopped.
1. Controls with signal of steering potentiometer system 2. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.

Error code	Abnormal system	Nature of abnormality	Condition when normal (voltage, current, resistance)
E0733	Short circuit in steering potentiometer system 1	※ When signal voltage of steering potentiometer 1 lowers below 0.500 V 1. Defective potentiometer 2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between CN-ST2 (10) - potentiometer CN-STR (4) 3. Short circuit with chassis ground in harness between controller CN-ST2 (19) - potentiometer CN-STR (3) 4. Defective HSS controller	• Voltage between CN-ST2 (19) - (9) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V
E0734	Disconnection in steering potentiometer system 2	※ When signal voltage of steering potentiometer 2 rises above 4.500 V 1. Defective potentiometer 2. Disconnection, defective contact, or short circuit with power source in wiring harness between controller CN-ST2 (20) - potentiometer CN-STR (2) 3. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - potentiometer CN-STR (1) 4. Defective HSS controller	• Voltage between CN-ST2 (20) - (9) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V
E0734	Short circuit in steering potentiometer system 2	※ When signal voltage of steering potentiometer 2 lowers below 0.500 V 1. Defective potentiometer 2. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between CN-ST2 (10) - potentiometer CN-STR (4) 3. Short circuit with chassis ground in harness between controller CN-ST2 (20) - potentiometer CN-STR (2) 4. Defective HSS controller	• Voltage between CN-ST2 (20) - (9) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V
E0735	Large difference between signal values of steering potentiometer systems 1 and 2 II	※ If sum of signal voltages (VSUM) of potentiometer system 1 and potentiometer system 2 goes out of following range when starting switch is turned on $4.41 \text{ V} < V_{\text{SUM}} < 5.59 \text{ V}$ 1. Defective steering potentiometer 2. Defective HSS controller	• Voltage between CN-ST2 (19) - (9) (System 1) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 4.1 - 4.3 V When steering system is turned to right end: 0.73 - 0.89 V • Voltage between CN-ST2 (20) - (9) (System 2) When steering system is in neutral: 2.4 - 2.6 V When steering system is turned to left end: 0.6 - 1.1 V When steering system is turned to right end: 3.9 - 4.4 V • Sum of signal voltages of above systems 1 and 2 ( $V_{\text{SUM}}$ ) $4.6 \text{ V} \leq V_{\text{SUM}} \leq 5.4 \text{ V}$
E0768	Disconnection in steering oil pressure sensor A system	※ When signal voltage of oil pressure sensor A lowers below 0.500 V 1. Defective steering oil pressure sensor A 2. Disconnection or defective contact in wiring harness between CN-ST1 (13) - oil pressure sensor CN-ST1 (2) 3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST3 (1) - oil pressure sensor CN-ST1 (3) 4. Defective HSS controller	• Voltage between CN-ST3 (1) - CN-ST2 (9) When steering system is in neutral: 0.90 - 1.50 V When steering system is relieved (on right or left side): 3.95 - 4.60 V
E0769	Short circuit in steering oil pressure sensor A system	※ When signal voltage of oil pressure sensor A rises above 6.000 V 1. Defective steering oil pressure sensor A 2. Short circuit with power source in wiring harness between controller CN-ST3 (1) - oil pressure sensor CN-ST1 (3) 3. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - oil pressure sensor CN-ST1 (1) 4. Defective HSS controller	• Voltage between CN-ST3 (1) - CN-ST2 (9) When steering system is in neutral: 0.90 - 1.50 V When steering system is relieved (on right or left side): 3.95 - 4.60 V
E0770	Disconnection in steering oil pressure sensor B system	※ When signal voltage of oil pressure sensor B lowers below 0.500 V 1. Defective steering oil pressure sensor B 2. Disconnection or defective contact in wiring harness between CN-ST1 (13) - oil pressure sensor CN-ST2 (2) 3. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST3 (9) - oil pressure sensor CN-ST2 (3) 4. Defective HSS controller	• Voltage between CN-ST3 (9) - CN-ST2 (9) When steering system is in neutral: 0.90 - 1.50 V When steering system is relieved (on right or left side): 3.95 - 4.60 V

Action by controller when abnormality is detected	Problem that appears on machine when there is abnormality
1. Controls with signal of steering potentiometer system 2. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Controls with signal of steering potentiometer system 1. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Controls with signal of steering potentiometer system 1. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine can be driven and steered normally.
1. Controls with signal before occurrence of abnormality until machine is stopped. 2. Flashes warning lamp and sounds warning buzzer.	1. Steering operation before occurrence of abnormality is continued until machine is stopped. 2. Machine cannot be steered once it is stopped.
1. Calculates with steering circuit oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when steering circuit pressure is high or steering circuit is relieved. 3. Flashes warning lamp and sounds warning buzzer.	1. If machine is steered under heavy load, engine may stall. 2. Machine is steered normally under light load.
1. Calculates with steering circuit oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when steering circuit pressure is high or steering circuit is relieved. 3. Flashes warning lamp and sounds warning buzzer.	1. If machine is steered under heavy load, engine may stall. 2. Machine is steered normally under light load.
1. Calculates with steering circuit oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when steering circuit pressure is high or steering circuit is relieved. 3. Flashes warning lamp and sounds warning buzzer.	1. If machine is steered under heavy load, engine may stall. 2. Machine is steered normally under light load.

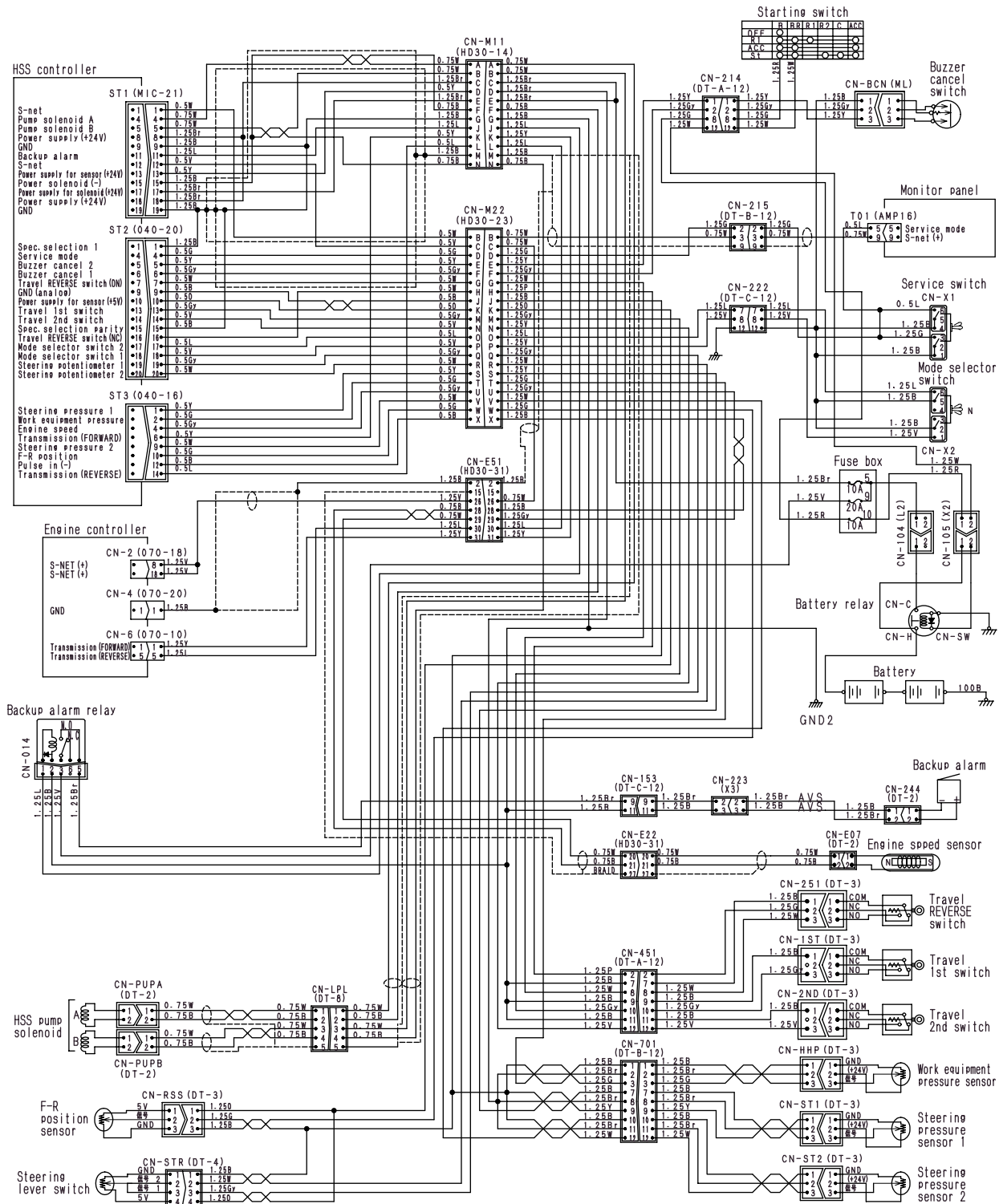
Error code	Abnormal system	Nature of abnormality	Condition when normal (voltage, current, resistance)
E0771	Short circuit in steering oil pressure sensor B system	※ When signal voltage of oil pressure sensor B rises above 6.000 V 1. Defective steering oil pressure sensor B 2. Short circuit with power source in wiring harness between controller CN-ST3 (9) - oil pressure sensor CN-ST2 (3) 3. Disconnection or defective contact in wiring harness between controller CN-ST2 (9) - oil pressure sensor CN-ST2 (1) 4. Defective HSS controller	• Voltage between CN-ST3 (9) - CN-ST2 (9) When steering system is in neutral: 0.90 - 1.50 V When steering system is relieved (on right or left side): 3.95 - 4.60 V
E0772	Disconnection in HSS pump solenoid A system	1. Defective HSS pump solenoid A 2. Disconnection or defective contact in wiring harness between controller CN-ST1 (4) - solenoid CN-PUPA (1) 3. Disconnection or defective contact in wiring harness between controller CN-ST1 (15) - solenoid CN-PUPA (2) 4. Defective HSS controller	• Resistance between CN-PUPA (male) (1) - (2): 10 - 20 $\Omega$ • Between CN-ST1 (female) (4) - (15): 10 - 20 $\Omega$ • Display of LED when starting switch is turned on (under normal condition) • When machine is steered to right or left end: 93 - 94 (Output current: 930 - 940 mA)
E0773	Short circuit in HSS pump solenoid A system	1. Defective HSS pump solenoid A 2. Short circuit with chassis ground in harness between controller CN-ST1 (4) - solenoid CN-PUPA (1) 3. Short circuit with power source in wiring harness between controller CN-ST1 (15) - solenoid CN-PUPA (2) 4. Defective HSS controller	• Resistance between CN-PUPA (male) (1) - (2): 10 - 20 $\Omega$ • Between CN-ST1 (female) (4) - (15): 10 - 20 $\Omega$ • Display of LED when starting switch is turned on (under normal condition) • When machine is steered to right or left end: 93 - 94 (Output current: 930 - 940 mA)
E0774	Disconnection in HSS pump solenoid B system	1. Defective HSS pump solenoid B 2. Disconnection or defective contact in wiring harness between controller CN-ST1 (5) - solenoid CN-PUPB (1) 3. Disconnection or defective contact in wiring harness between controller CN-ST1 (15) - solenoid CN-PUPB (2) 4. Defective HSS controller	• Resistance between CN-PUPB (male) (1) - (2): 10 - 20 $\Omega$ • Between CN-ST1 (female) (4) - (15): 10 - 20 $\Omega$ • Display of LED when starting switch is turned on (under normal condition) • When machine is steered to right or left end: 93 - 94 (Output current: 930 - 940 mA)
E0775	Short circuit in HSS pump solenoid B system	1. Defective HSS pump solenoid B 2. Short circuit with chassis ground in harness between controller CN-ST1 (5) - solenoid CN-PUPB (1) 3. Short circuit with power source in wiring harness between controller CN-ST1 (15) - solenoid CN-PUPB (2) 4. Defective HSS controller	• Resistance between CN-PUPB (male) (1) - (2): 10 - 20 $\Omega$ • Between CN-ST1 (female) (4) - (15): 10 - 20 $\Omega$ • Display of LED when starting switch is turned on (under normal condition) • When machine is steered to right or left end: 93 - 94 (Output current: 930 - 940 mA)
E0930	Abnormality in engine speed sensor system	1. Abnormality in engine speed sensor 2. Defective installation of engine speed sensor 3. Disconnection or defective contact in wiring harness between controller CN-ST3 (4) - speed sensor CN-E07 (1) 4. Disconnection, defective contact, or short circuit with chassis ground in wiring harness between controller CN-ST3 (12) - speed sensor CN-E07 (2) 5. Defective HSS controller	• Resistance between CN-E07 (male) (1) - (2): 500 - 1,000 $\Omega$ • Resistance between CN-ST3 (female) (4) - (12): 500 - 1,000 $\Omega$



Action by controller when abnormality is detected	Problem that appears on machine when there is abnormality
1. Calculates with steering circuit oil pressure at 0. 2. Cannot limit inclination angle of HSS pump when steering circuit pressure is high or steering circuit is relieved. 3. Flashes warning lamp and sounds warning buzzer.	1. If machine is steered under heavy load, engine may stall. 2. Machine is steered normally under light load.
1. Since current does not flow in solenoid, inclination angle of HSS pump becomes 0. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine cannot be steered to left (can be steered to right normally, however).
1. Since outputting to solenoid is stopped, inclination angle of HSS pump becomes 0. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine cannot be steered to left (can be steered to right normally, however).
1. Since current does not flow in solenoid, inclination angle of HSS pump becomes 0. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine cannot be steered to right (can be steered to left normally, however).
1. Since outputting to solenoid is stopped, inclination angle of HSS pump becomes 0. 2. Flashes warning lamp and sounds warning buzzer.	1. Machine cannot be steered to right (can be steered to left normally, however).
1. Calculates with engine speed at 0 rpm. 2. Cannot control inclination angle of HSS pump when engine speed is high.	1. Machine can be driven and steered normally. 2. If machine is steered frequently while traveling down slope, durability of HSS motor may be lowered. 3. Neutral position of steering cannot be adjusted.

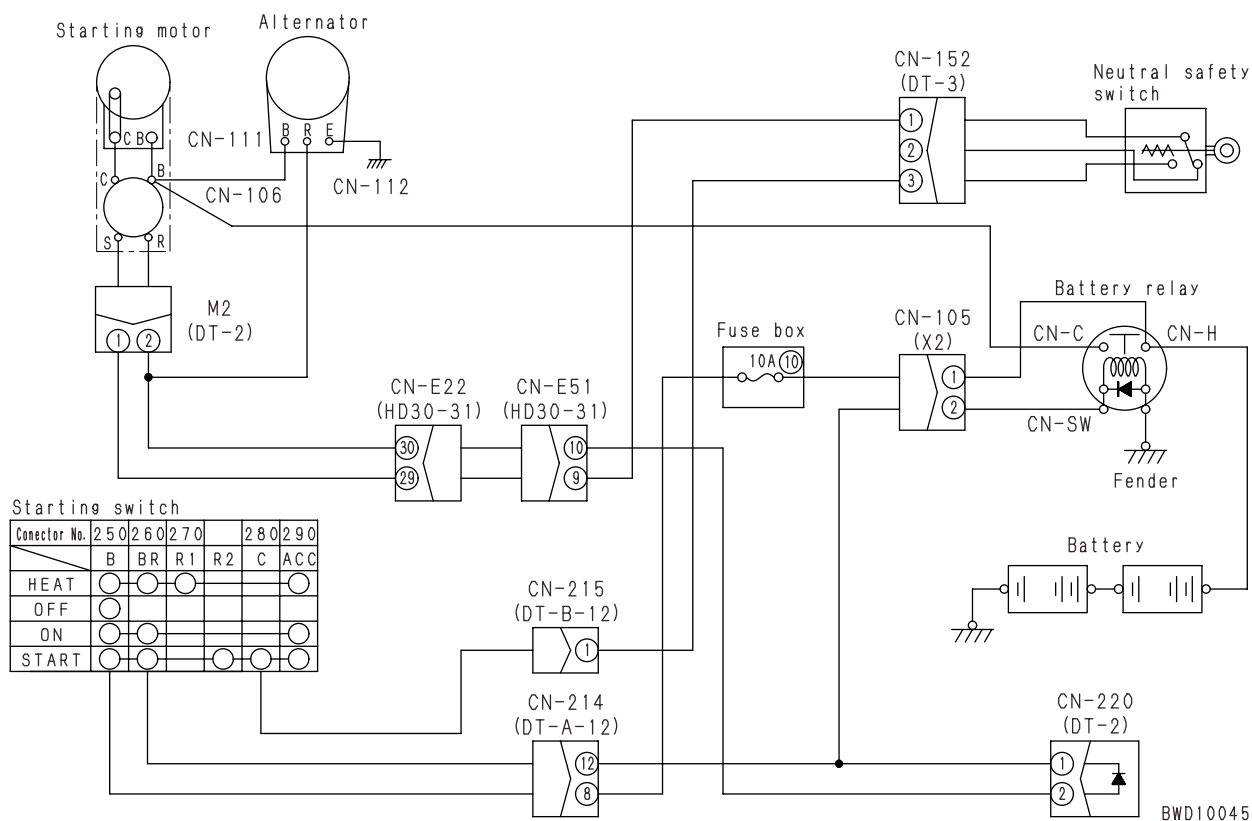
## ELECTRICAL CIRCUIT DIAGRAM FOR E MODE

## HSS control system

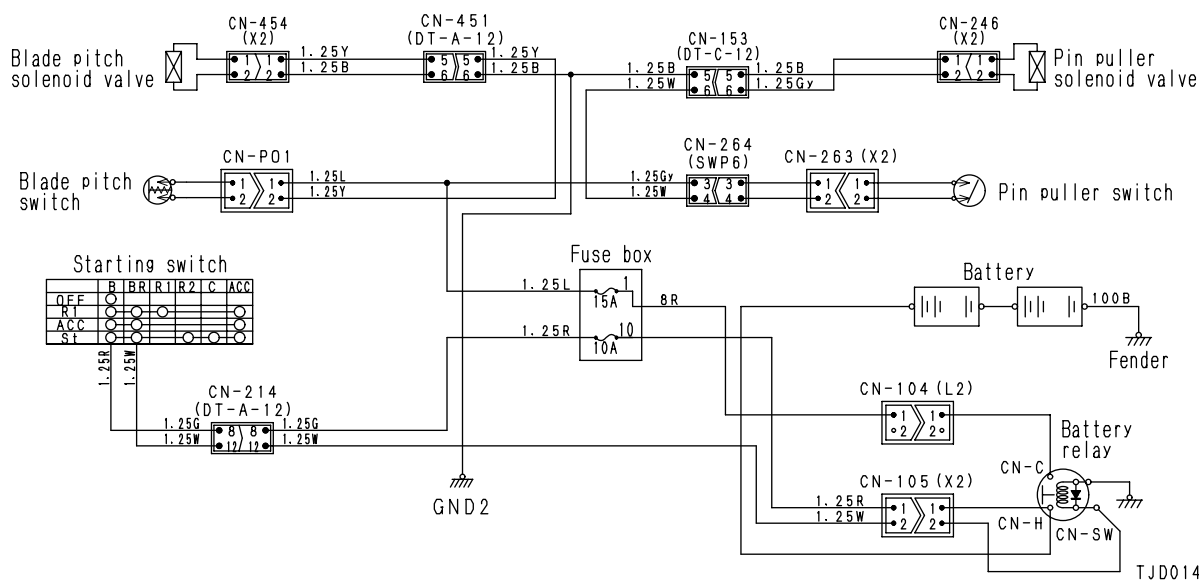


TJD01493

## Engine starting system



## Blade pitch solenoid and ripper pin puller solenoid system

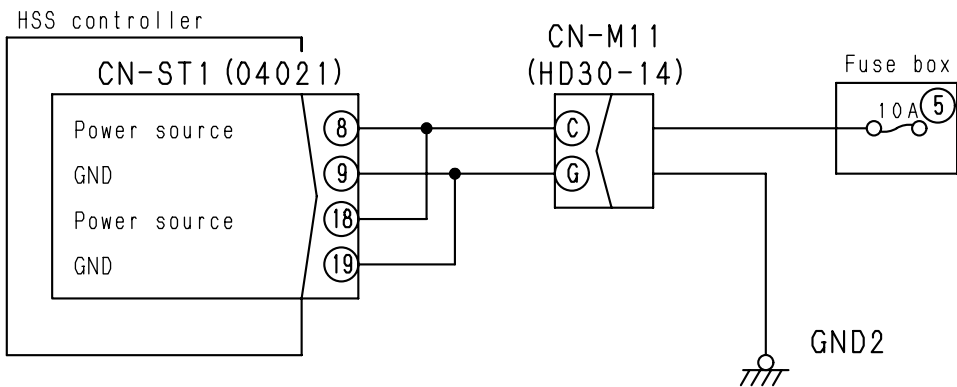


E-1. [E0113] (Drop of HSS controller power supply voltage) is displayed

- ※ This error code is displayed when the source voltage for the controller lowers below 17 V.
- ★ Check that fuse 5 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

		Cause	Remedy
<div>• Turn starting switch ON. • 20 - 30 V</div> <div>Is voltage between CN-ST1 (8), (18) and (9), (19) normal?</div>	1 NO	Defective HSS controller	Replace (Adjust neutral position of steering system)
	YES		
<div>• Turn starting switch ON. • 20 - 30 V</div> <div>Is voltage between CN-ST1 (8), (18) and chassis ground normal?</div>	2 NO	Disconnection or defective contact in wiring harness between CN-ST1 (female) (9), (19) - chassis ground	Repair or replace
	YES		
<div>• Remove fuse 5. • Turn starting switch ON. • 20 - 30 V</div> <div>Is voltage between inlet of fuse 5 and chassis ground normal?</div>	3 NO	Defective fuse box power source circuit or lowering of battery voltage	Repair or replace
	YES	Defective fuse, or disconnection or defective contact in wiring harness between outlet of fuse 5 - CN-ST1 (female) (8), (18)	Repair or replace

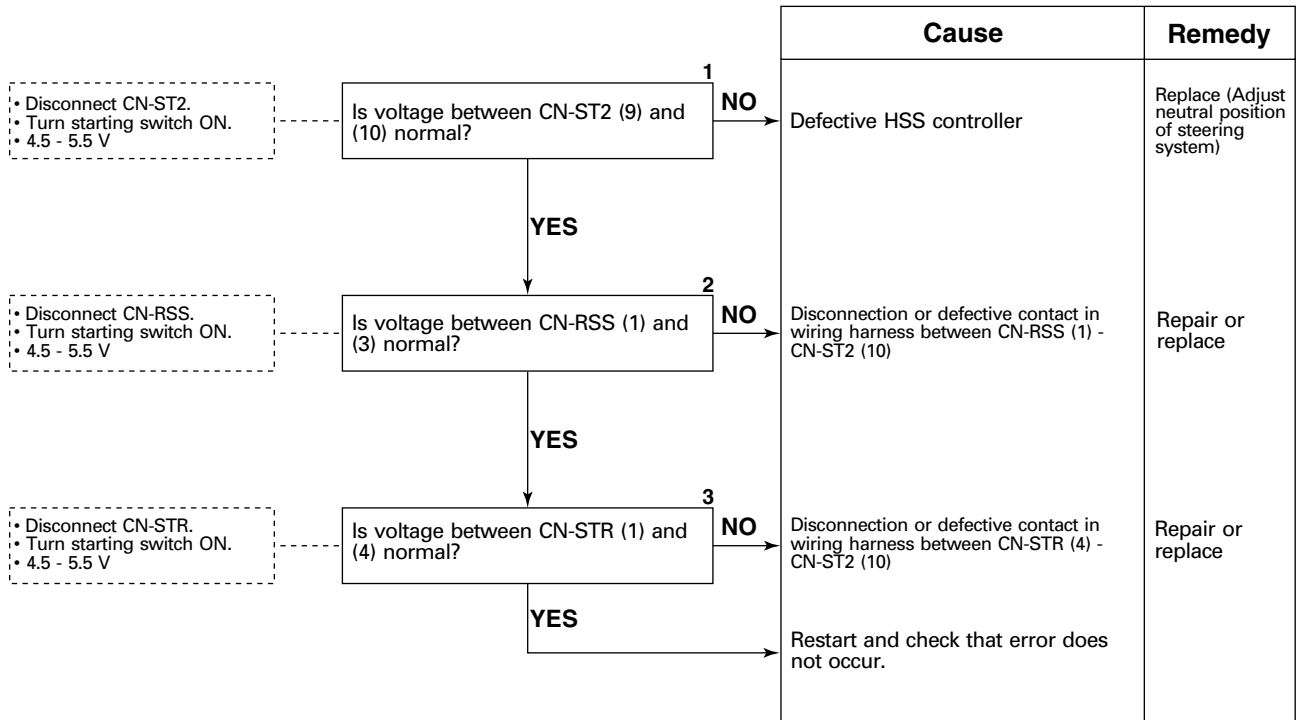
E-1. Related electrical circuit diagram



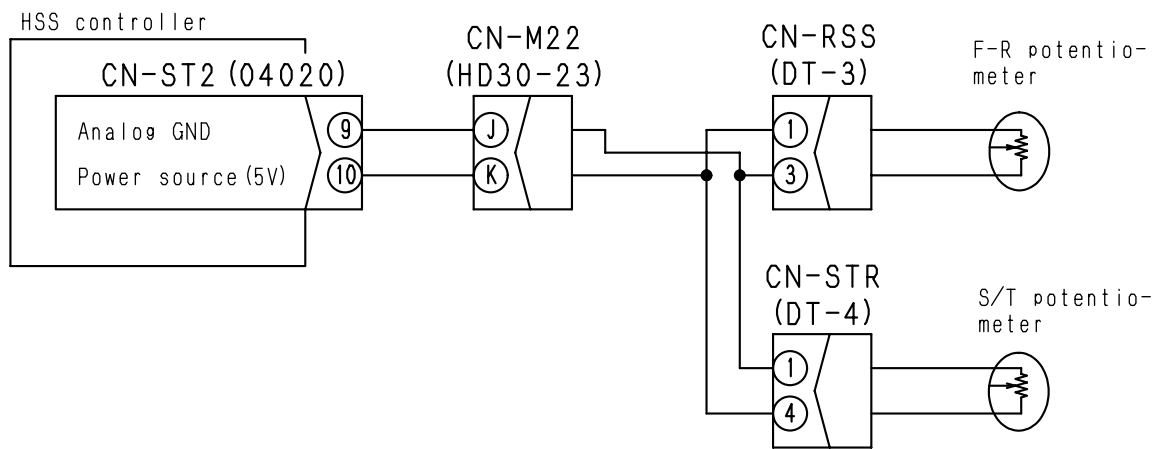
BJD10047

### E-2. [E0143] (Abnormality in HSS controller 5V power supply voltage) is displayed

※ This error code is displayed when the source voltage of 5 V for the controller sensor lowers below 4.5 V or rises above 5.5 V.



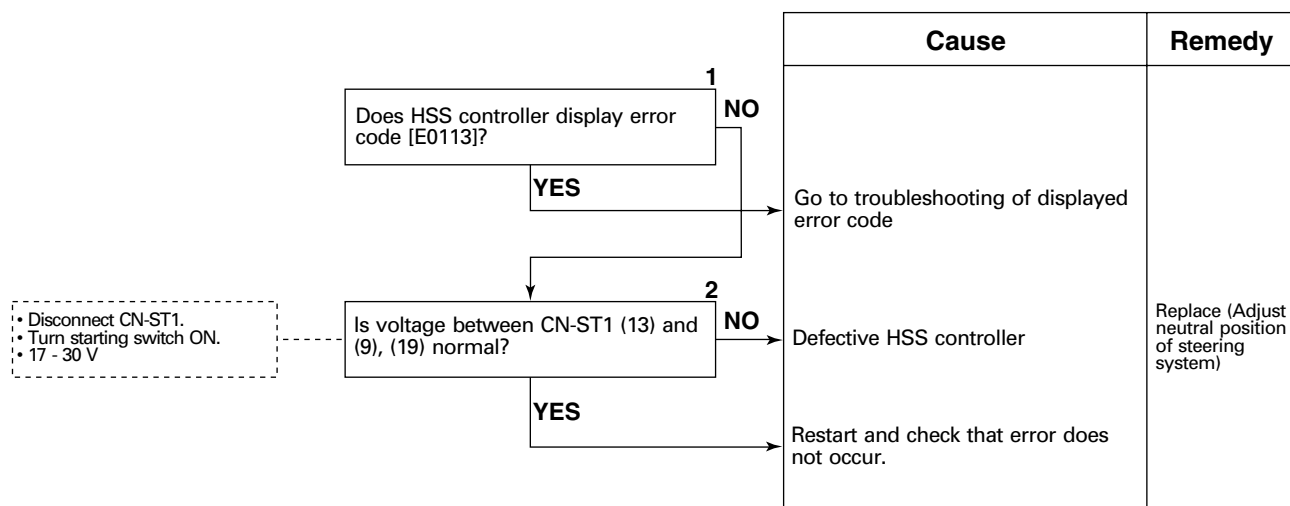
#### E-2. Related electrical circuit diagram



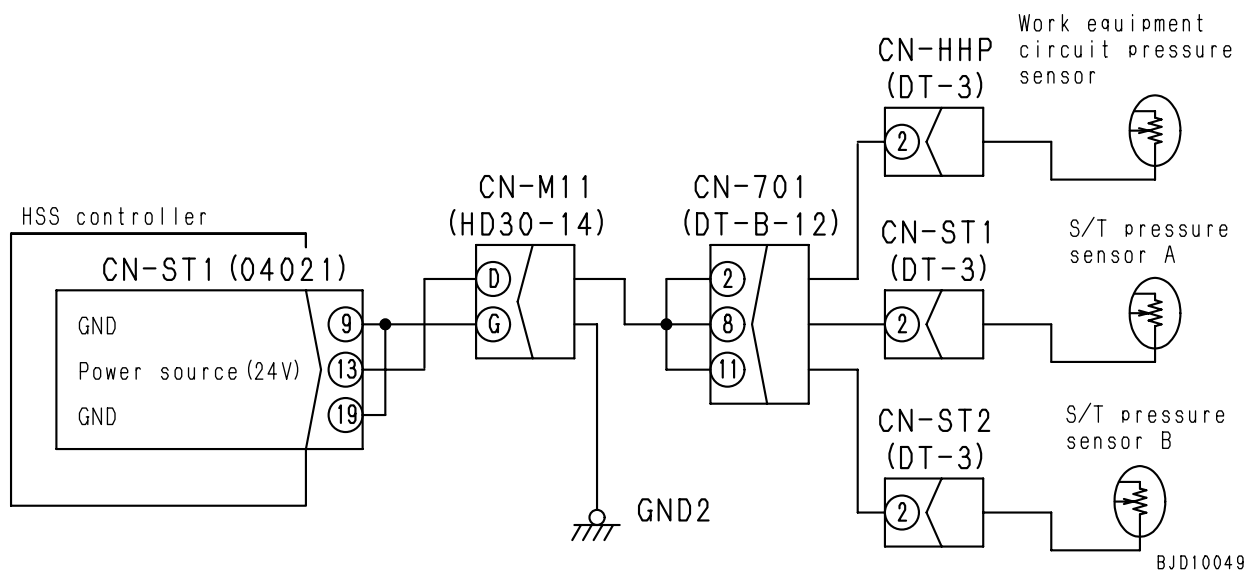
BJD10048

**E-3. [E0145] (Abnormality in HSS controller sensor power supply voltage) is displayed**

※ This error code is displayed when the source voltage of 5 V for the controller sensor lowers below 4.5 V or rises above 5.5 V.

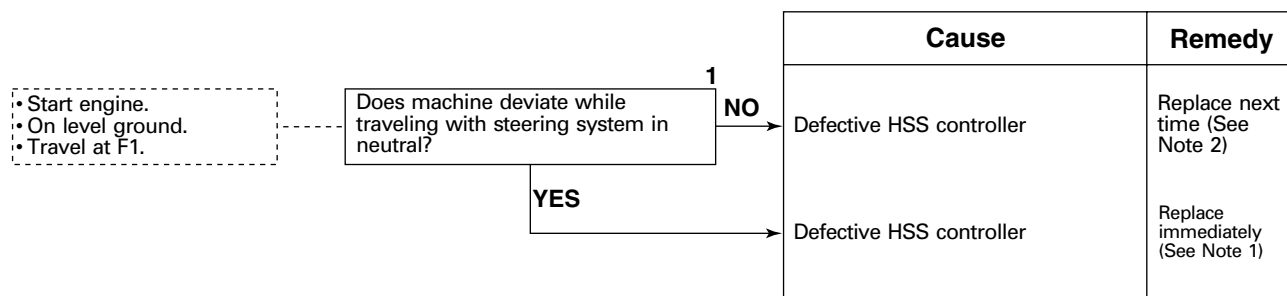


### E-3. Related electrical circuit diagram



## E-4. [E0161] (Abnormality in HSS controller memory data of offset current) is displayed

- ※ This error code is displayed when the offset current cannot be saved in the memory for an internal trouble of the controller.

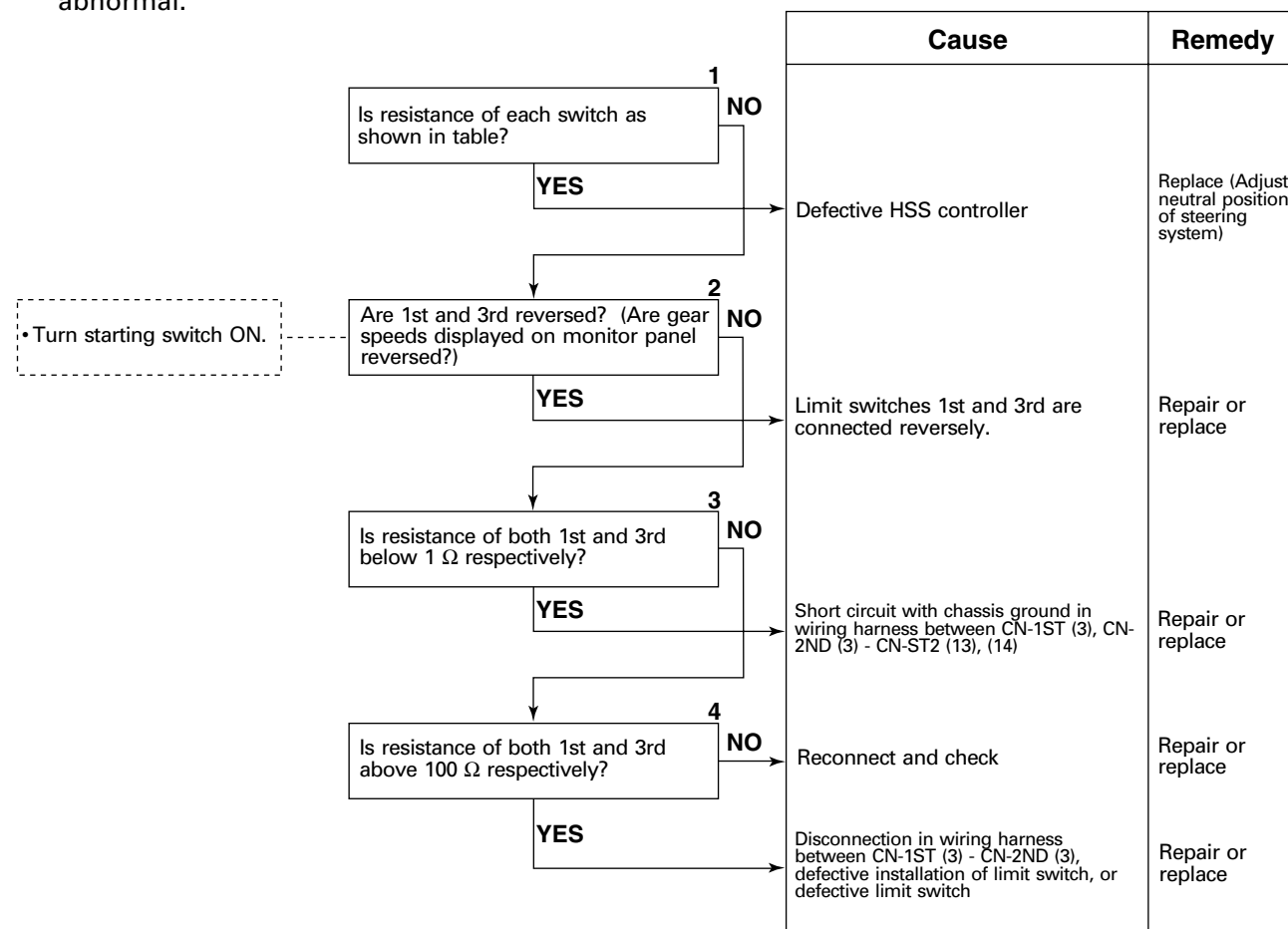


**Note 1:** If the machine deviates, it must be corrected by "Adjusting the neutral position of the steering system". If this error occurs, however, the offset current after adjustment cannot be memorized. Accordingly, replace the HSS controller with new one and carry out adjustment.

**Note 2:** Since the machine does not deviate, it can be used as it is for the present. Replace the HSS controller, however, at the earliest chance as a permanent action. (After replacing the controller, be sure to "Adjust the neutral position of the steering system".)

**E-5. [E0221] (Abnormality in gear speed switch system) is displayed**

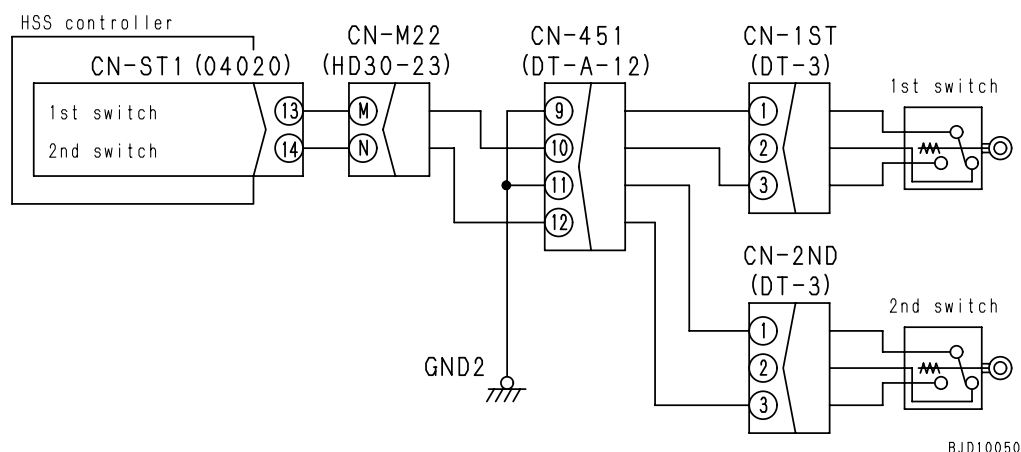
※ This error code is displayed when the information on the limit switches on the power train is abnormal.



Table

Location	Between ST2 (13) – GND	Between ST2 (14) – GND
1st	Max 1Ω	Min. 100 Ω
2nd	Min. 100 Ω	Min. 100 Ω
3rd	Min. 100 Ω	Max 1Ω

### E-5. Related electrical circuit diagram





## E-6. [E0233] (Short circuit in travel REVERSE sensing potentiometer system) is displayed

※ This error code is displayed when the input signal from the reverse sensing potentiometer rises above 4.7 V.

★ Check that the reverse sensing potentiometer is adjusted normally before troubleshooting.

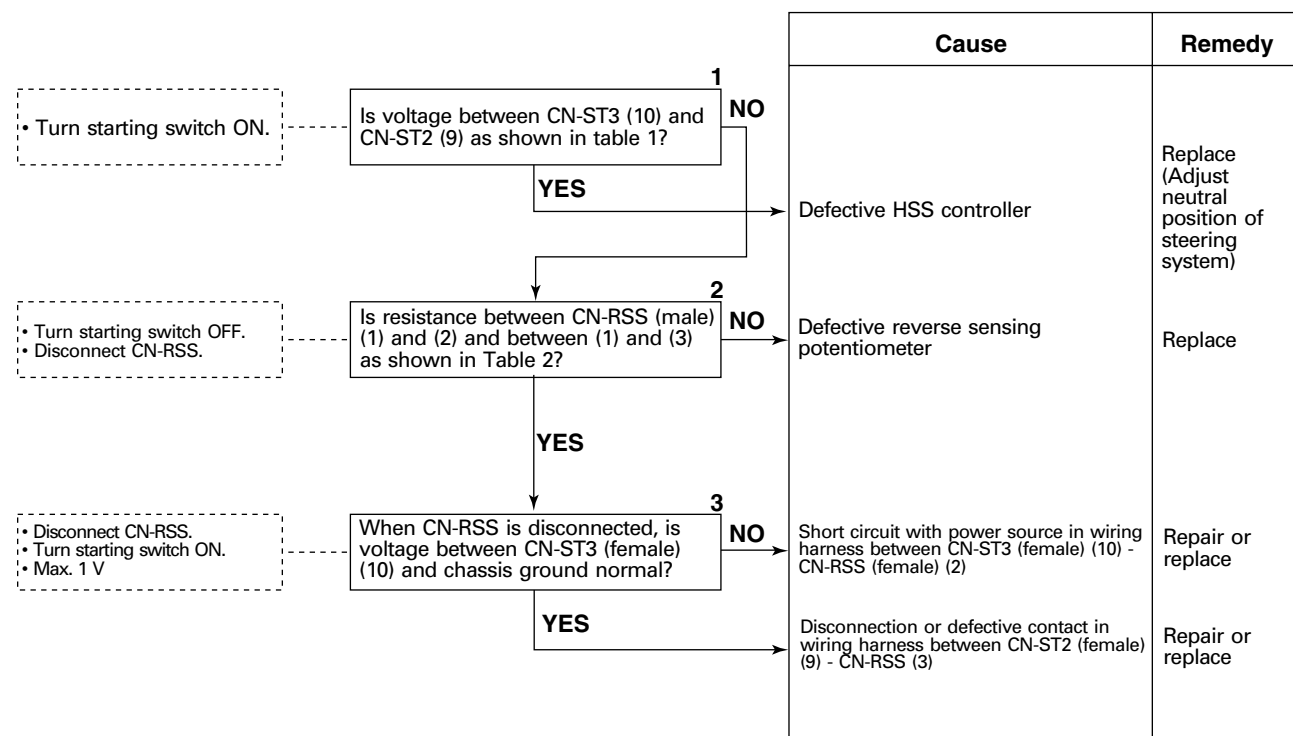


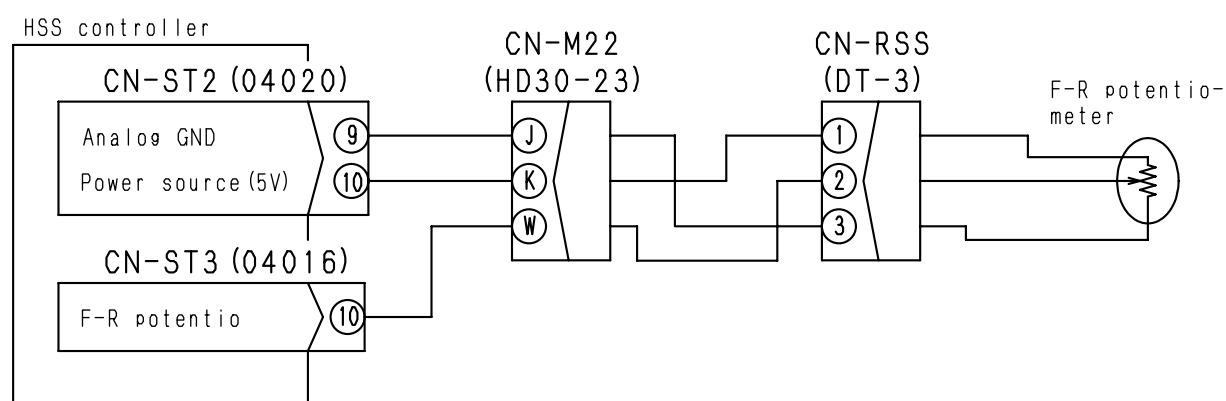
Table 1

CN-ST3, CN-ST2	Forward/Reverse	Voltage
Between CN-ST3 (10) – CN-ST2 (9)	In neutral	Max. 3.5 V
	Reverse	3.5 – 4.4 V

Table 2

CN-RSS (male)	Resistance
Between (1) – (2)	0.3 – 5.7 kΩ
Between (2) – (3)	4 – 6 kΩ

### E-6. Related electrical circuit diagram



BJD10051

## E-7. [E0233] (Disconnection in travel REVERSE sensing potentiometer system) is displayed

※ This error code is displayed when the input signal from the reverse sensing potentiometer lowers below 0.300 V.

★ Check that the reverse sensing potentiometer is adjusted normally before troubleshooting.

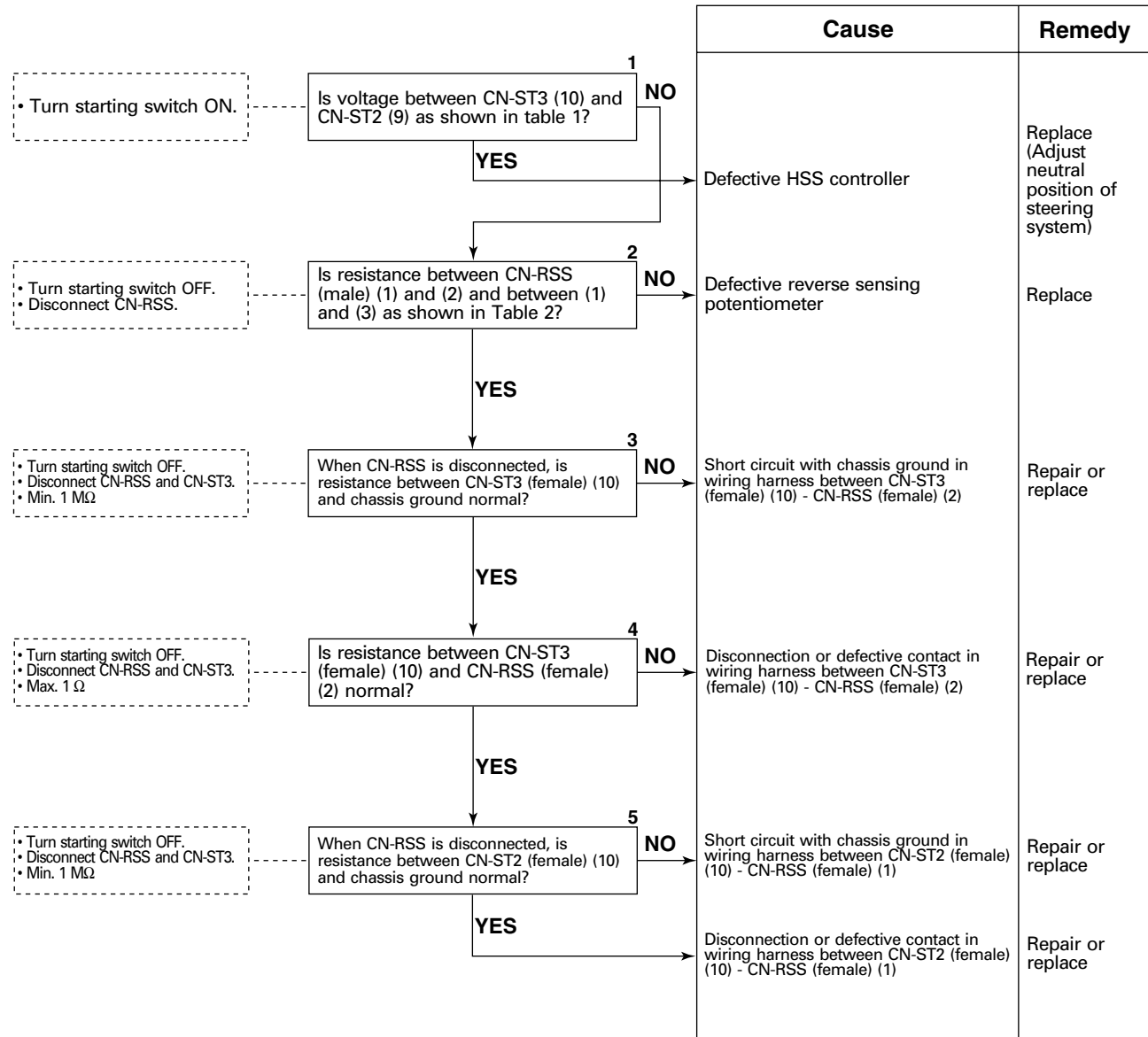
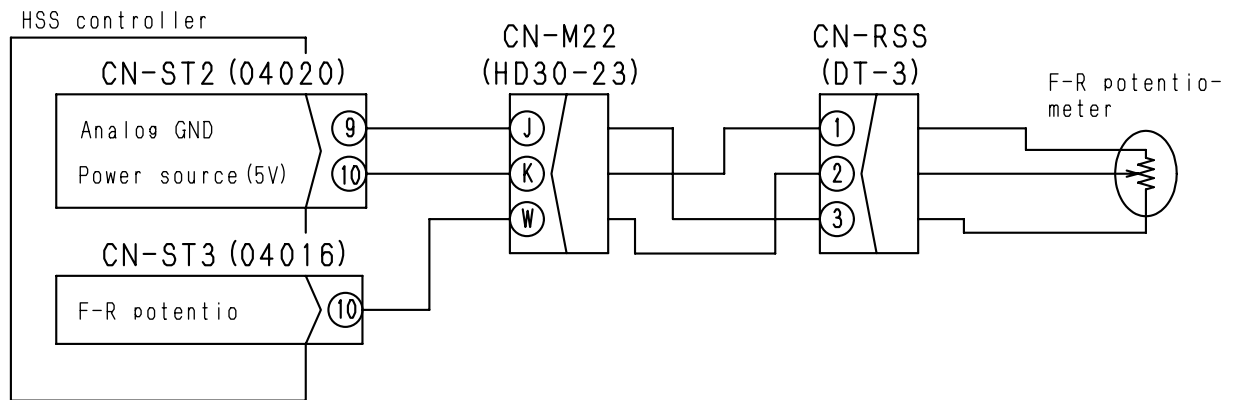


Table 1

	Lever position	Voltage
Between CN-ST3 (10) – CN-ST2 (9)	NEUTRAL	Max. 3.5 V
	REVERSE	3.5 – 4.4 V

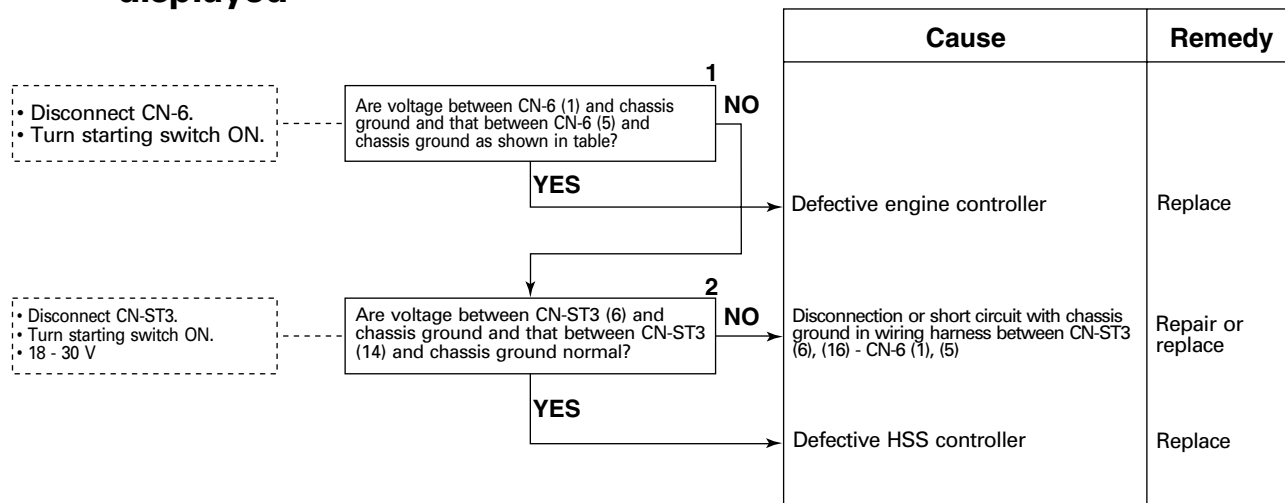
Table 2

CN-RSS (male)	Resistance
Between (1) – (2)	0.3 – 5.7 kΩ
Between (2) – (3)	4 – 6 kΩ

**E-7. Related electrical circuit diagram**

BJD10051

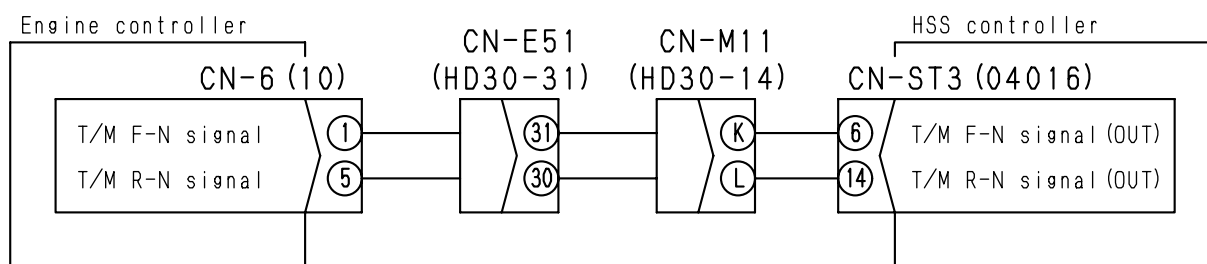
**E-8. [E0237] (Abnormality in transmission NEUTRAL signal) is displayed**



## Table

		When transmission lever is in F or R	When transmission lever is in neutral
Transmission F-N signal	Between CN-6 (1) - chassis ground	18 – 30 V	Max. 3 V
Transmission R-N signal	Between CN-6 (5) - chassis ground	18 – 30 V	Max. 3 V

### E-8. Related electrical circuit diagram



BJD10052

## E-9. [E0272] (Unequality between travel REVERSE sensing potentiometer signal and backup alarm switch signal) is displayed

- ※ This error code is displayed when the reverse sensing potentiometer does not conform to the input signal of the backup alarm switch.
- ★ Check that the backup alarm switch and reverse sensing potentiometer are adjusted normally before troubleshooting.

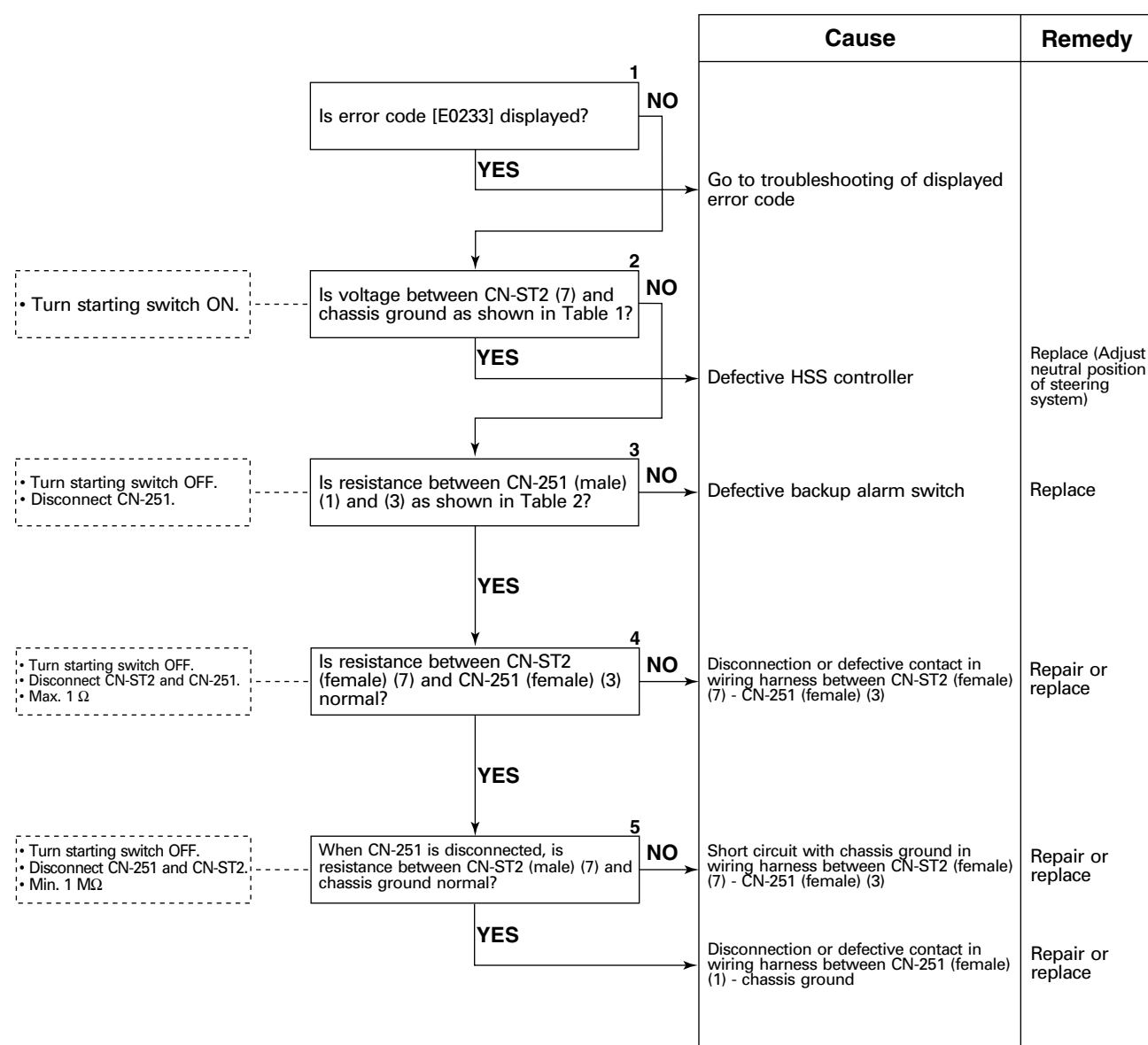


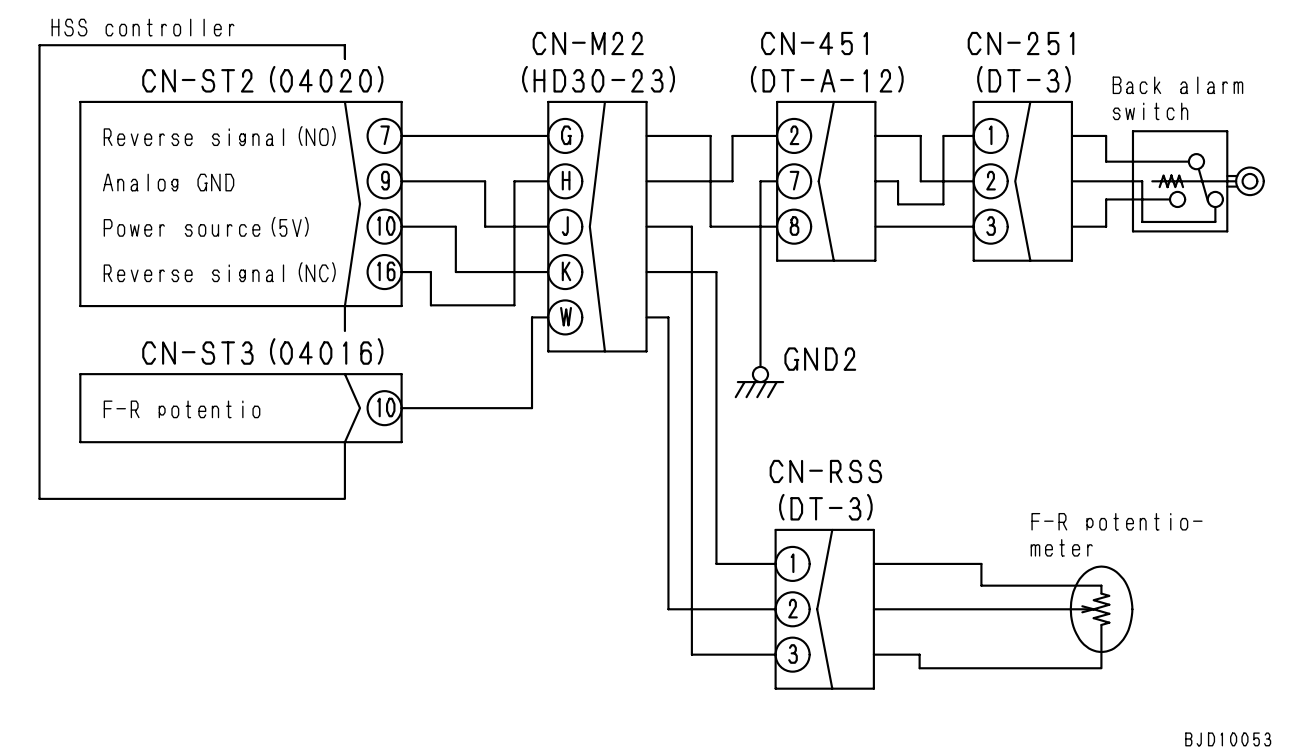
Table 1

CN-ST2	Forward/Reverse	Voltage
Between (7) – chassis	In neutral	20 – 30 V
	Reverse	Max. 1 V

Table 2

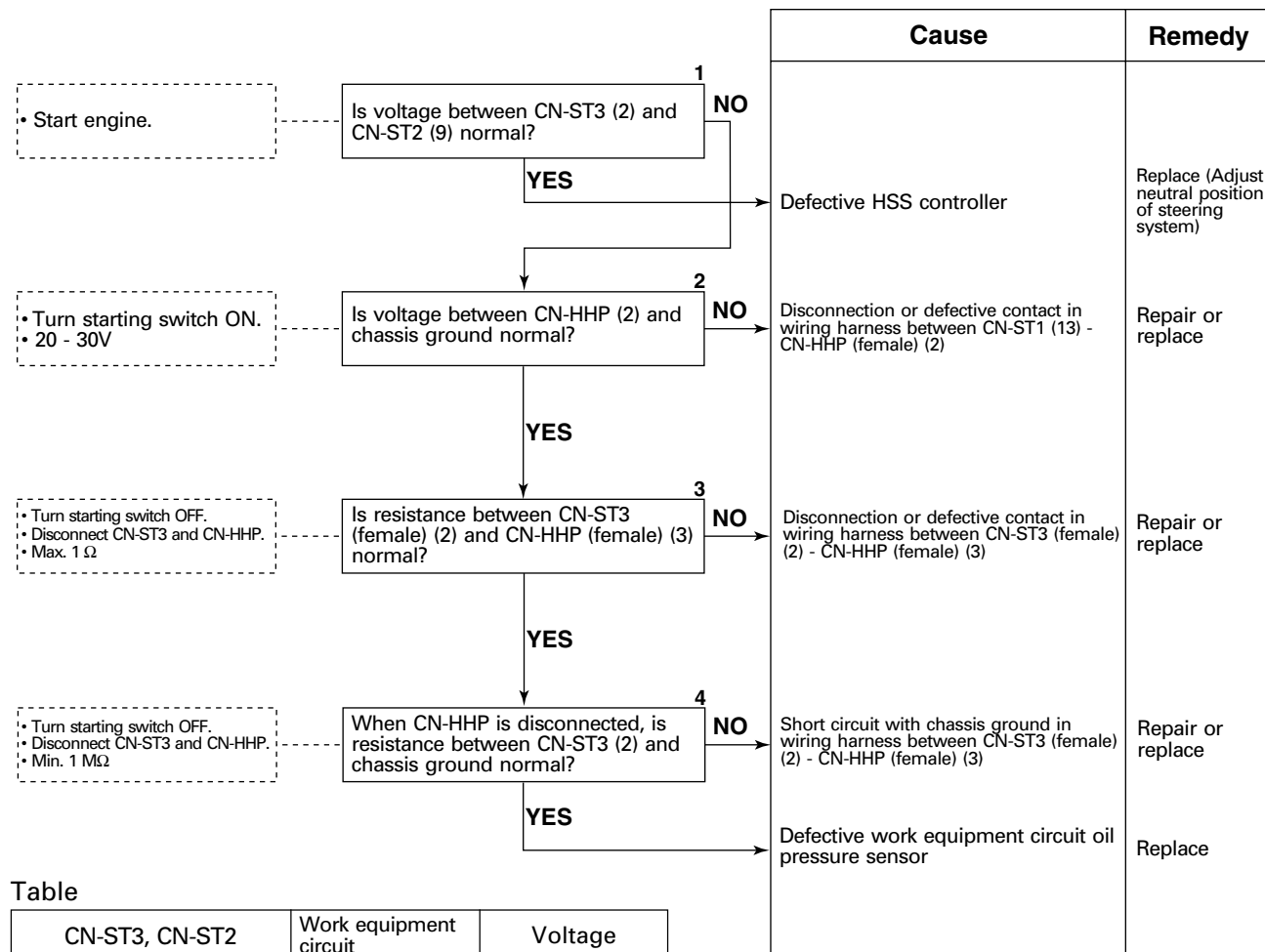
CN-251 (male)	Forward/Reverse	Resistance
Between (1) – (3) chassis	In neutral	Min. 1 MΩ
	Reverse	Max. 1 Ω

E-9. Related electrical circuit diagram



## E-10. [E0360] (Disconnection in work equipment oil pressure sensor system) is displayed

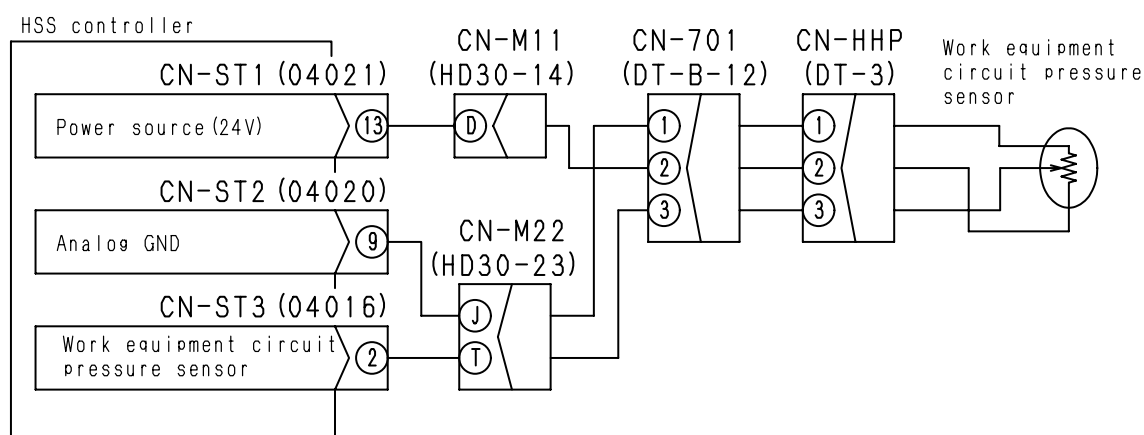
※ This error code is displayed when the input signal from the work equipment circuit oil pressure sensor lowers below 0.500 V.



Table

CN-ST3, CN-ST2	Work equipment circuit	Voltage
Between CN-ST3 (2) - CN-ST2 (9)	In neutral	0.9 - 1.2 V
	When relieved	2.45 - 2.90 V

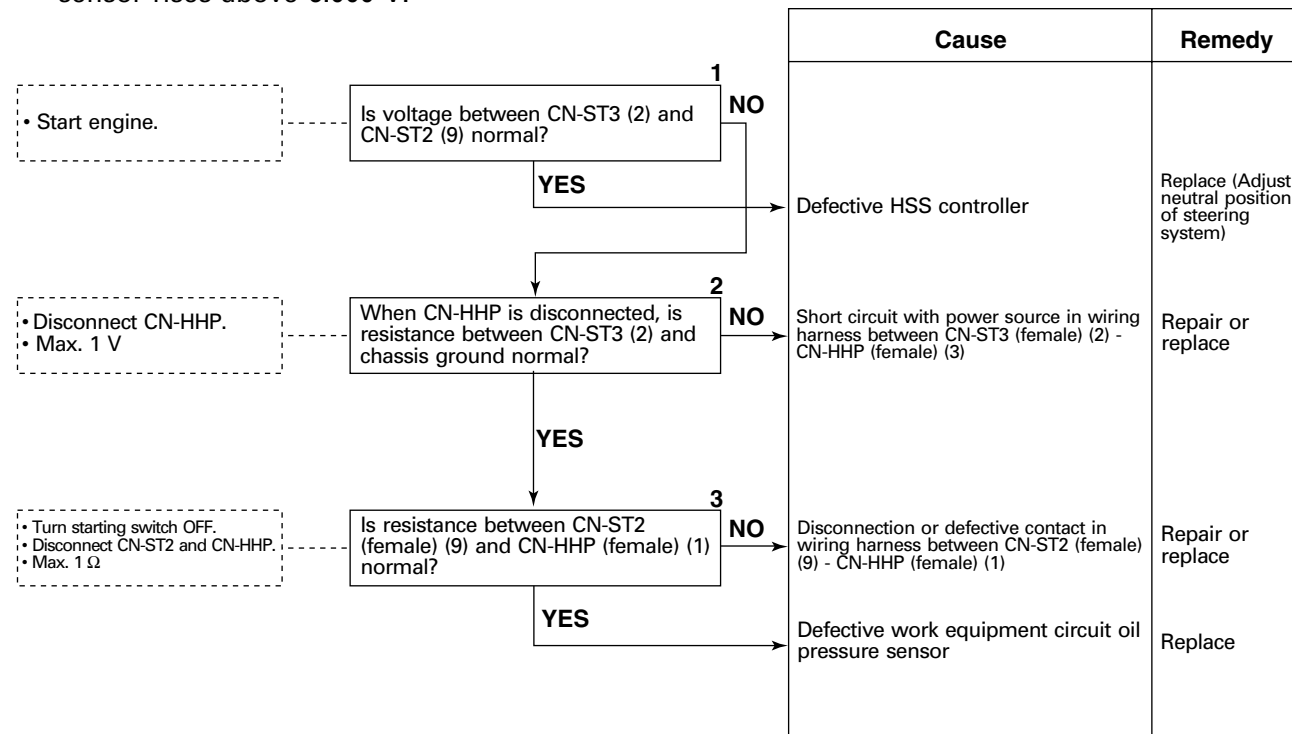
### E-10. Related electrical circuit diagram



BJD10054

**E-11. [E0361] (Short circuit in work equipment oil pressure sensor system) is displayed**

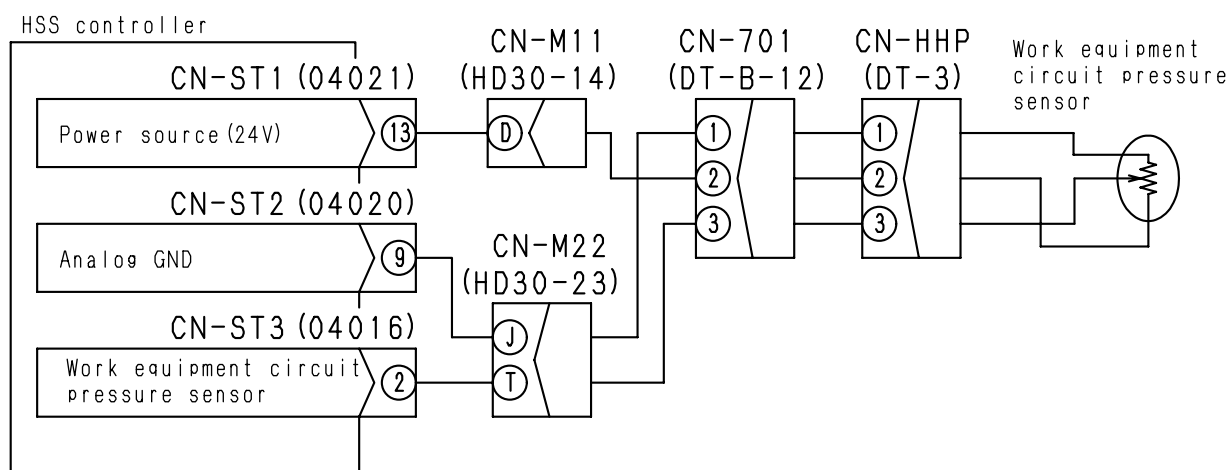
※ This error code is displayed when the input signal from the work equipment circuit oil pressure sensor rises above 6.000 V.



Table

CN-ST3, CN-ST2	Work equipment circuit	Voltage
Between CN-ST3 (2) – CN-ST2 (9)	In neutral	0.9 – 1.2 V
	When relieved	2.45 – 2.90 V

### E-11. Related electrical circuit diagram



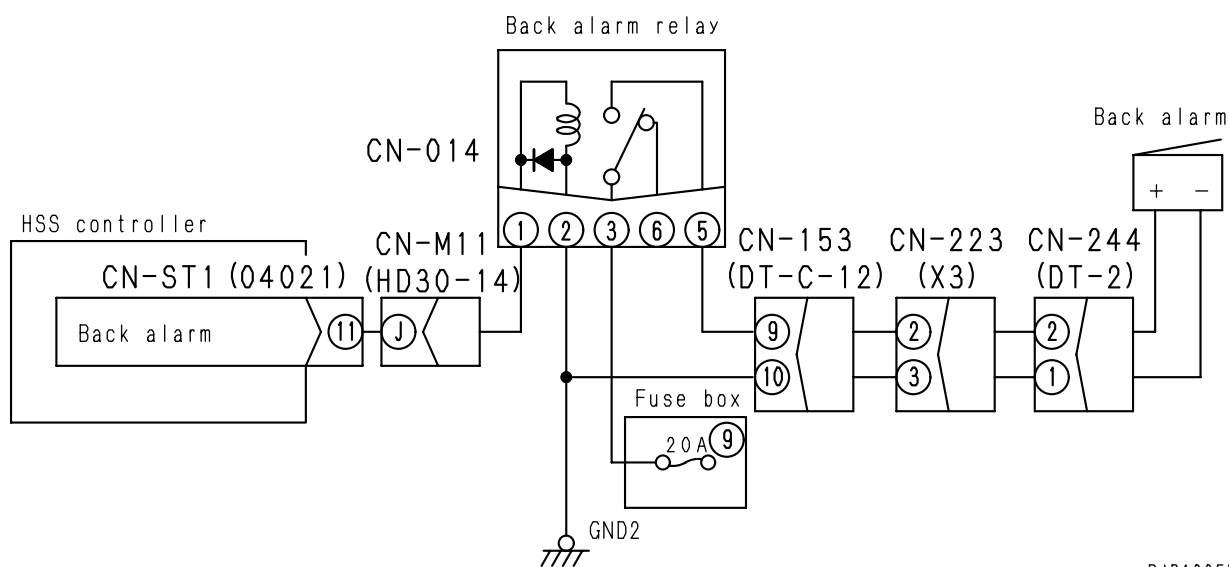
BJD10054



## E-12. [E0610] (Disconnection in backup alarm relay system) is displayed

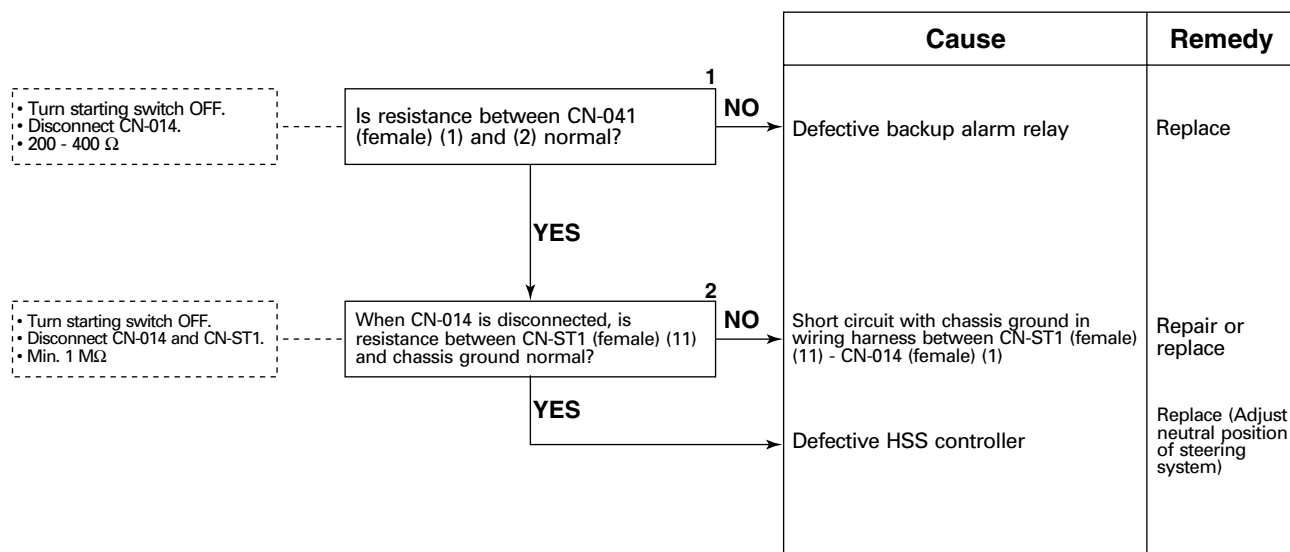
			Cause	Remedy
<div>• Turn starting switch OFF. • Disconnect CN-014. • 200 - 400 Ω</div>	<div>1</div> <div>Is resistance between CN-014 (male) (1) and (2) normal?</div>	NO	Defective backup alarm relay	Replace
	YES			
<div>• Turn starting switch OFF. • Disconnect CN-014. • Max. 1 Ω</div>	<div>2</div> <div>Is resistance between CN-014 (female) (2) and chassis ground normal?</div>	NO	Disconnection or defective contact in wiring harness between CN-014 (female) (2) - chassis ground	Repair or replace
	YES			
<div>• Turn starting switch OFF. • Disconnect CN-ST1. • 200 - 400 Ω</div>	<div>3</div> <div>Is resistance between CN-ST1 (female) and chassis ground normal?</div>	NO	Disconnection or defective contact in wiring harness between CN-ST1 (female) (11) - CN-014 (female) (1)	Repair or replace
	YES		Defective HSS controller	Replace (Adjust neutral position of steering system)

### E-12. Related electrical circuit diagram

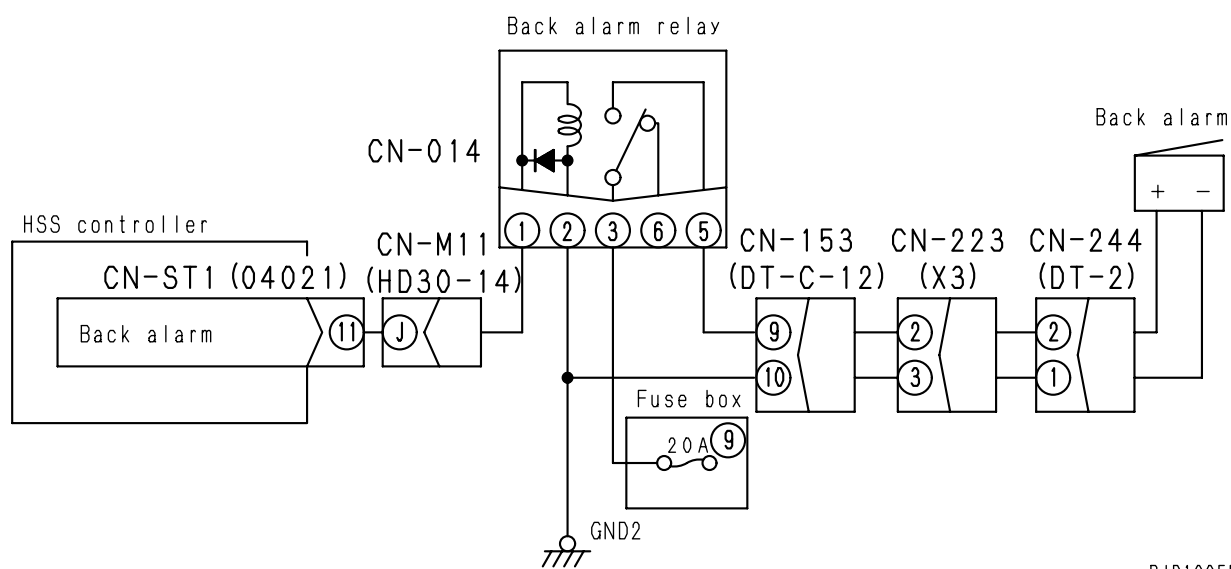


BJD10055

**E-13. [E0611] (Short circuit in backup alarm relay system) is displayed**



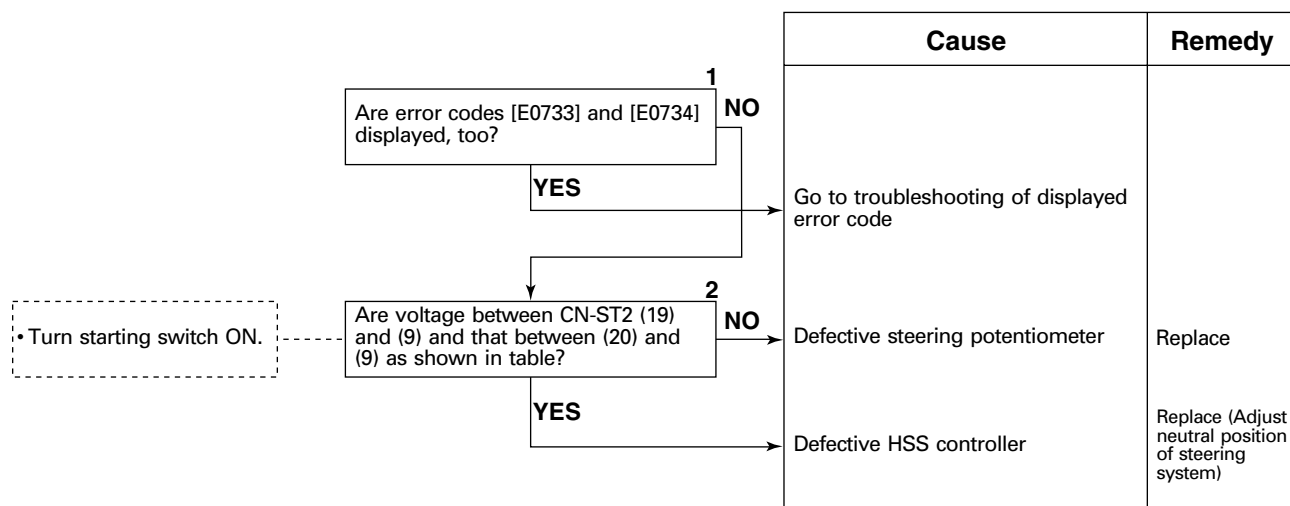
### E-13. Related electrical circuit diagram



BJD10055

## E-14. [E0730] (Abnormality in both steering potentiometer systems 1 and 2) is displayed

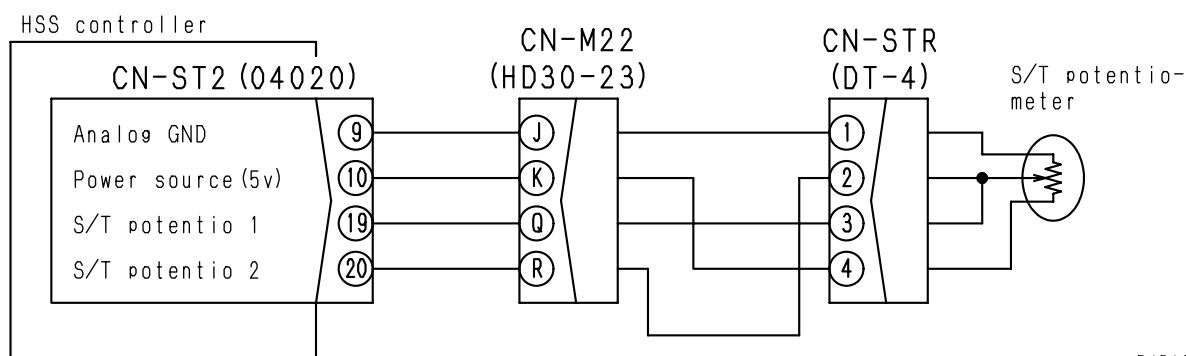
※ This error code is displayed when signal voltages from both steering potentiometers are below 0.500 V or above 4.500 V.



Table

CN-ST2	Steering		
	Steering	When fully steered to left	When fully steered to right
Between (19) – (9)	2.4 – 2.6 V	4.1 – 4.3 V	0.73 – 0.89 V
Between (20) – (9)	2.4 – 2.6 V	0.6 – 1.1 V	3.9 – 4.4 V

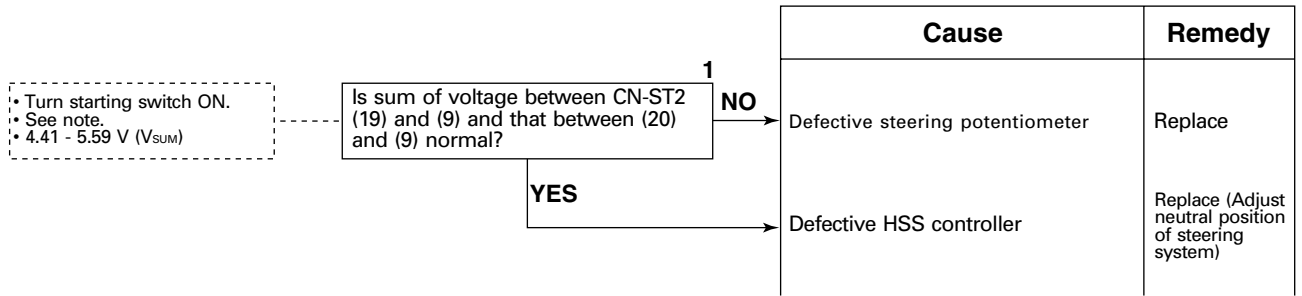
### E-14. Related electrical circuit diagram



BJD10056

E-15. [E0731] (Large difference between steering potentiometer systems 1 and 2: Case I) is displayed

※ This error code is displayed when the difference between the signal voltages of steering potentiometer systems 1 and 2 becomes large (If the signal voltages are normal when the starting switch is turned on).



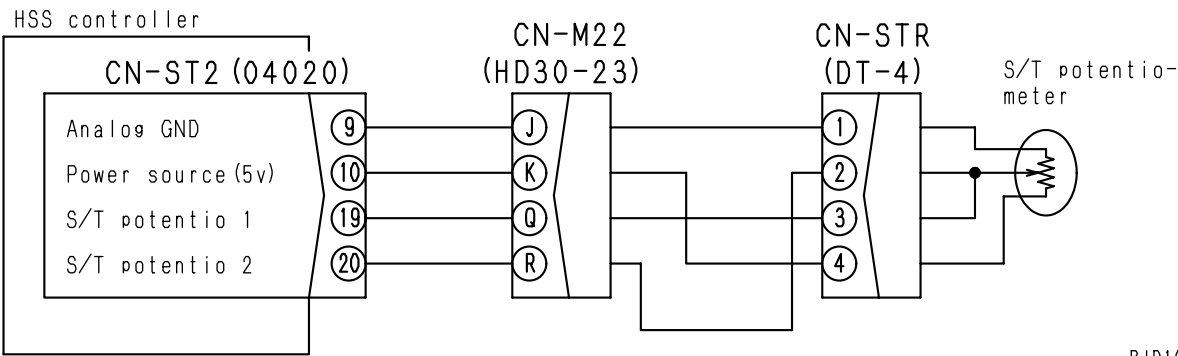
**Note:** Measure the voltage according to the following procedure.

1) Measure voltage (V1) between CN-ST2 (19) and (9) and voltage (V2) between CN-ST2 (20) and (9).

2) Add up 2 voltages (V1 and V2) to obtain the sum (V<sub>SUM</sub>).

★ The joystick does not move while the voltage is being measured.

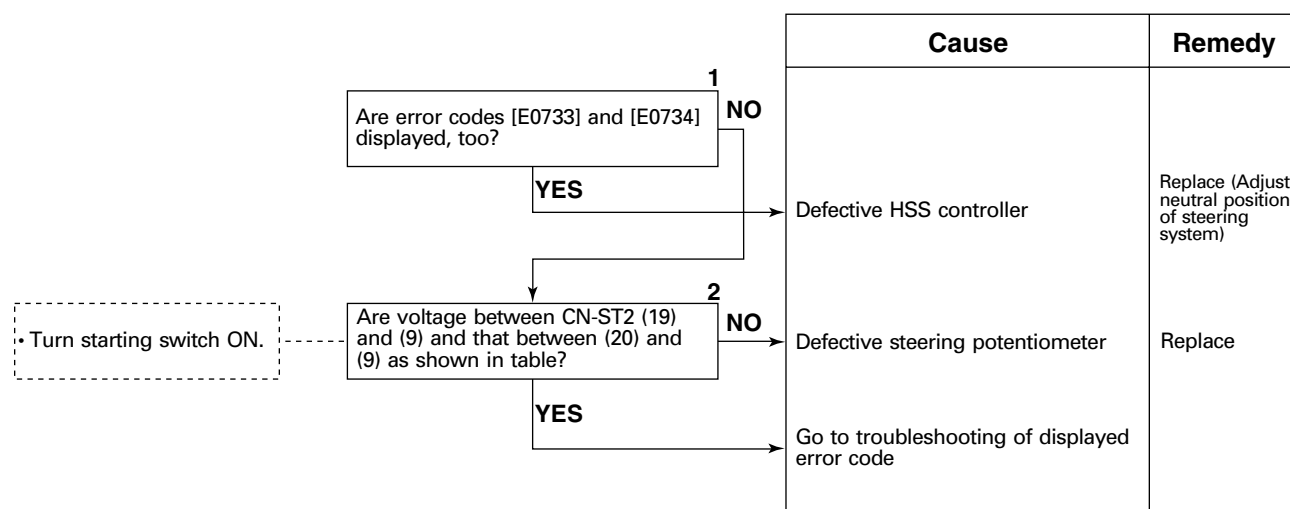
E-15. Related electrical circuit diagram



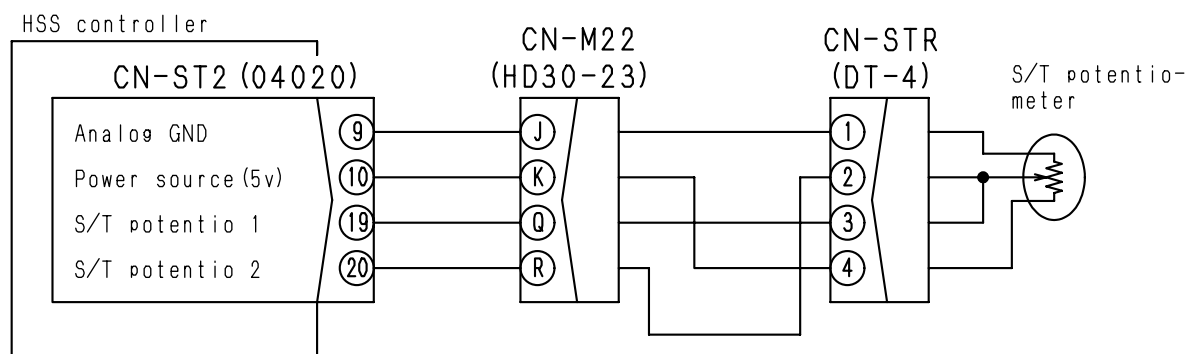
BJD10056

**E-16. (Abnormality in steering potentiometer system on one side and large deviation of neutral position on one side) is displayed**

※ This error code is displayed when 1 steering potentiometer system is abnormal and the neutral position of the other system is deviated.



### E-16. Related electrical circuit diagram



BJD10056

**E-17. [E0733] (Disconnection in steering potentiometer system 1) is displayed**

※ This error code is displayed when the signal voltage from steering potentiometer system 1 rises above 4.500 V.

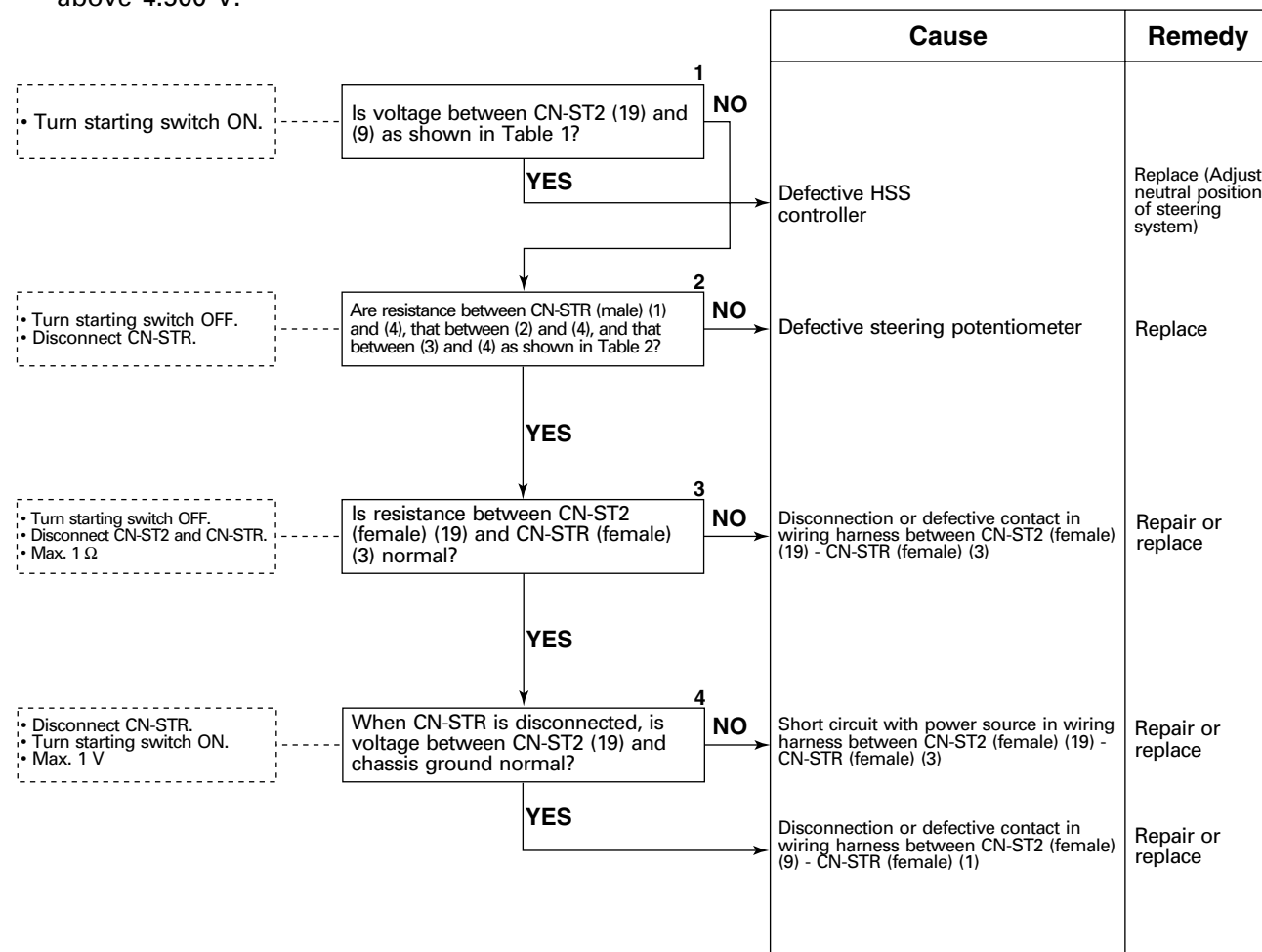


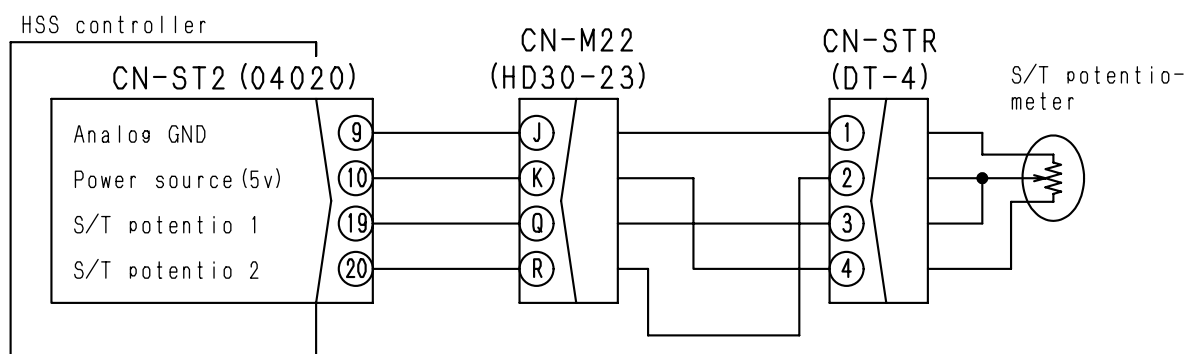
Table 1

CN-ST2	Steering		
	In neutral	When fully steered to left	When fully steered to right
Between (19) – (9)	2.4 – 2.6 V	4.1 – 4.3 V	0.73 – 0.89 V

Table 2

CN-STR (male)	Resistance
Between (1) – (4)	2.4 – 4.0 $\Omega$
Between (2) – (4)	5.0 – 8.0 $\Omega$
Between (3) – (4)	5.0 – 8.0 $\Omega$

### E-17. Related electrical circuit diagram



BJD10056

## E-18. [E0733] (Short circuit in steering potentiometer system 1) is displayed

※ This error code is displayed when the signal voltage from steering potentiometer system 1 lowers below 0.500 V.

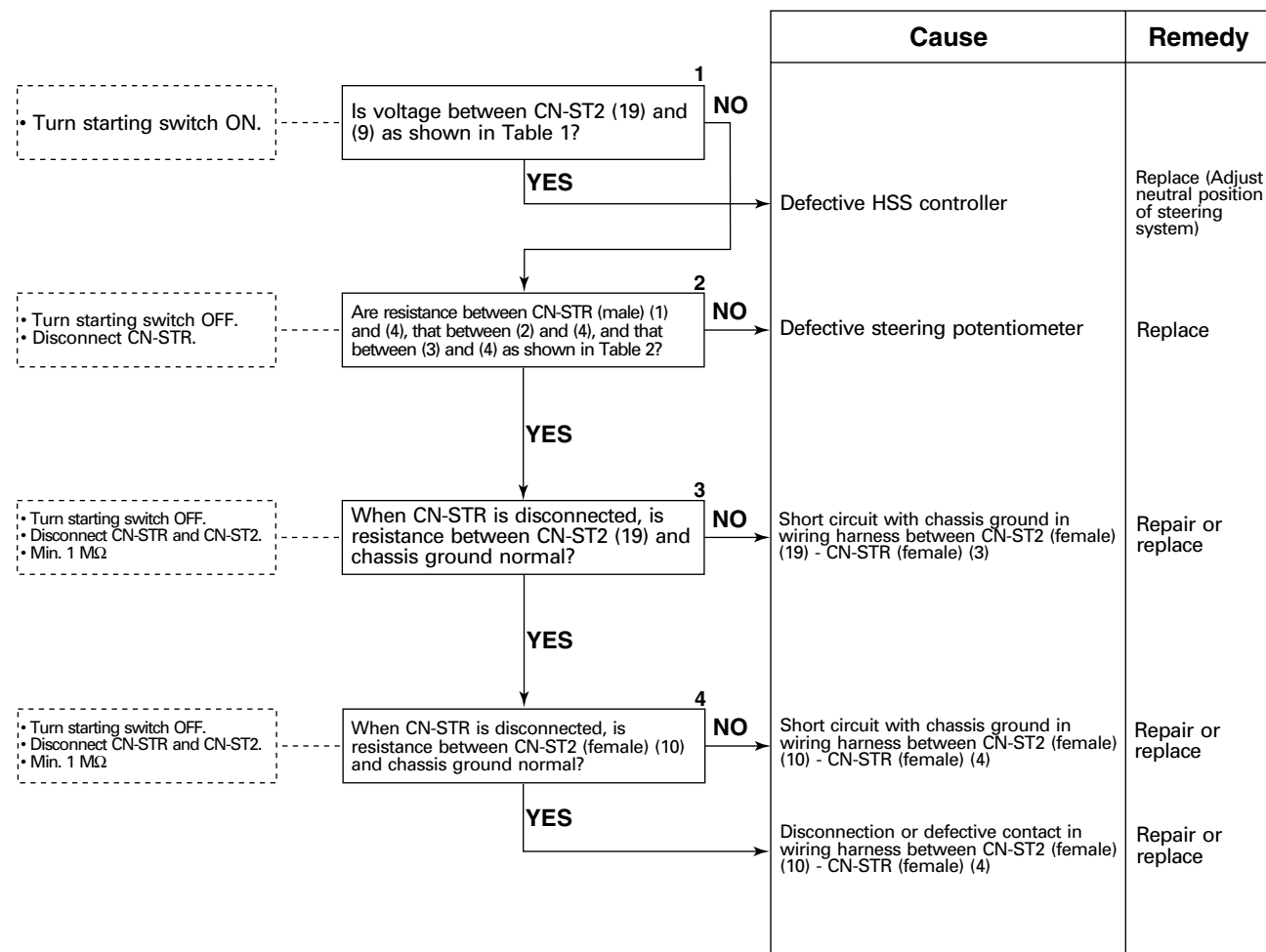


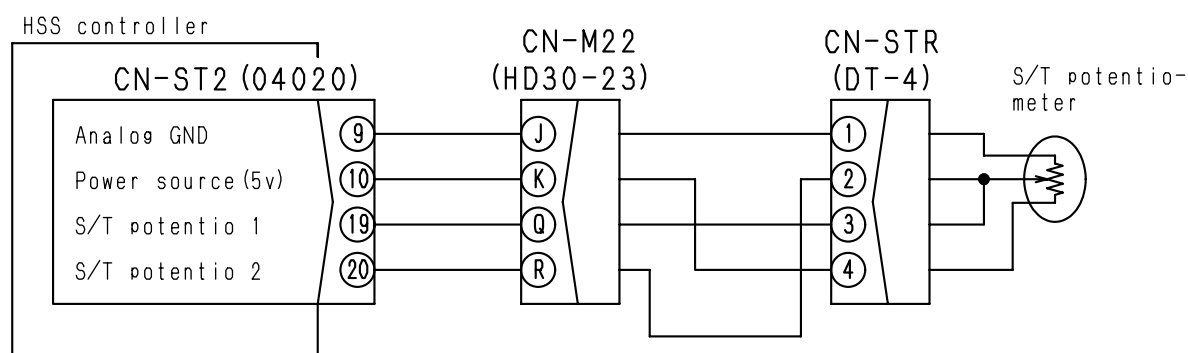
Table 1

CN-ST2	Steering		
	In neutral	When fully steered to left	When fully steered to right
Between (19) – (9)	2.4 – 2.6 V	4.1 – 4.3 V	0.73 – 0.89 V

Table 2

CN-STR (male)	Resistance
Between (1) – (4)	2.4 – 4.0 Ω
Between (2) – (4)	5.0 – 8.0 Ω
Between (3) – (4)	5.0 – 8.0 Ω

### E-18. Related electrical circuit diagram



BJD10056

E-19. [E0734] (Disconnection in steering potentiometer system 2) is displayed

※ This error code is displayed when the signal voltage from steering potentiometer system 2 rises above 4.500 V.

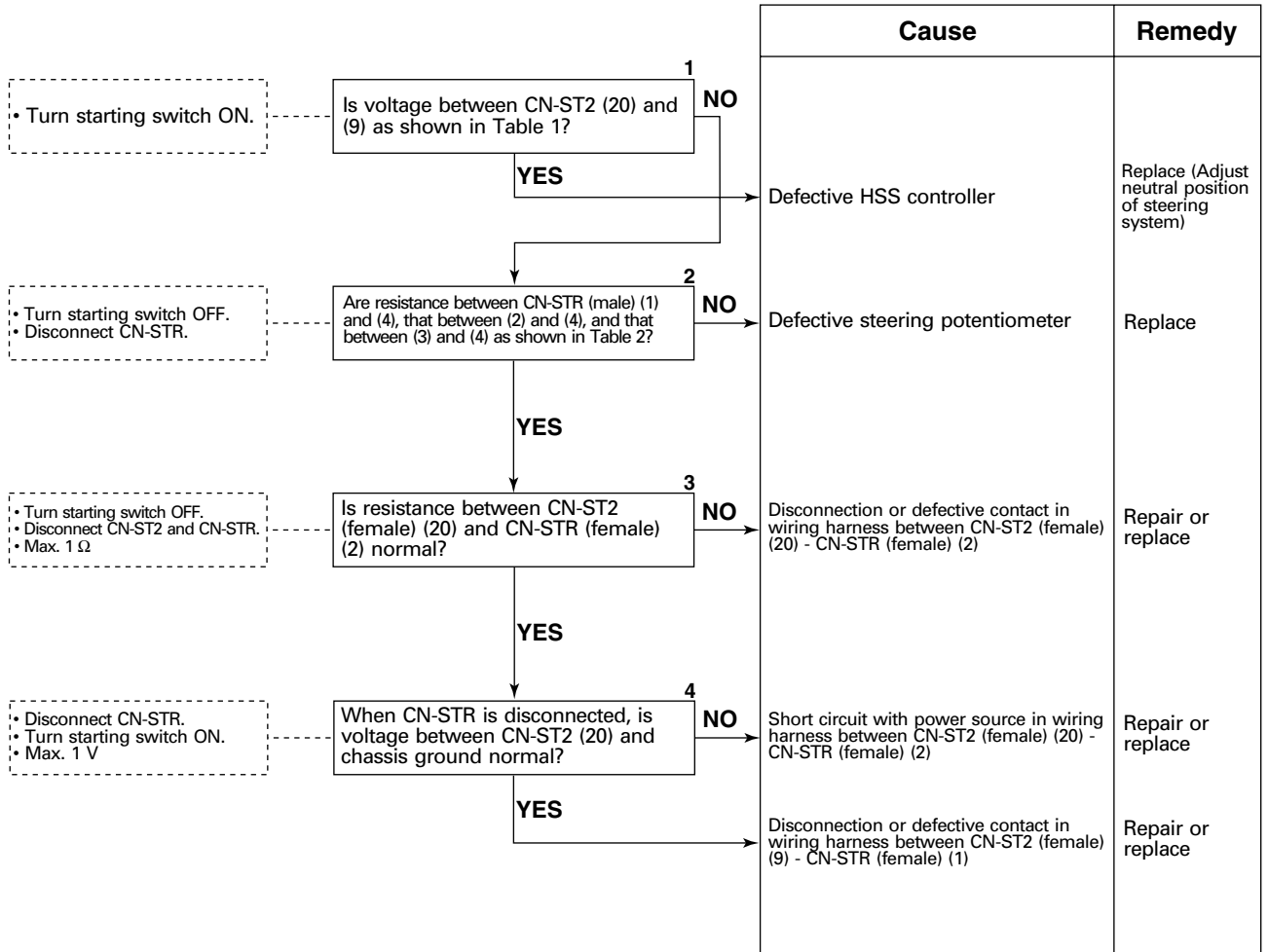


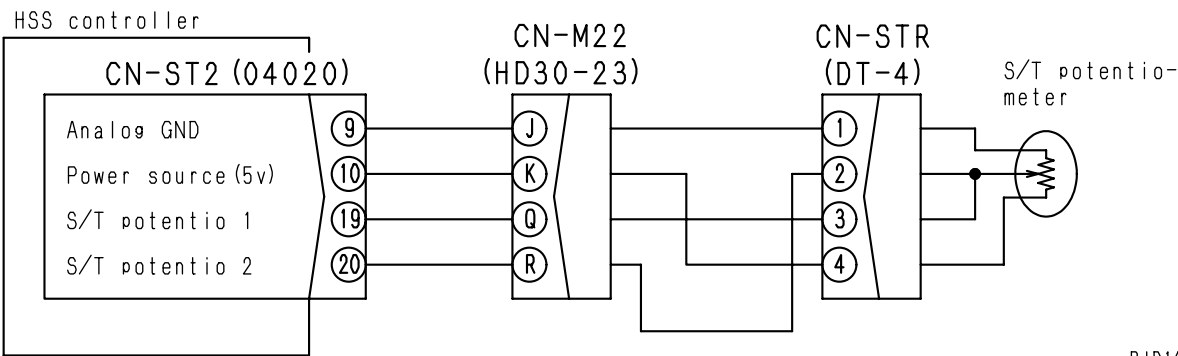
Table 1

CN-ST2	Steering		
	In neutral	When fully steered to left	When fully steered to right
Between (20) – (9)	2.4 – 2.6 V	0.6 – 1.1 V	3.9 – 4.4 V

Table 2

CN-STR (male)	Resistance
Between (1) – (4)	2.4 – 4.0 Ω
Between (2) – (4)	5.0 – 8.0 Ω
Between (3) – (4)	5.0 – 8.0 Ω

E-19. Related electrical circuit diagram



BJD10056



## E-20. [E0734] (Short circuit in steering potentiometer system 2) is displayed

※ This error code is displayed when the signal voltage from steering potentiometer system 2 lowers below 0.500 V.

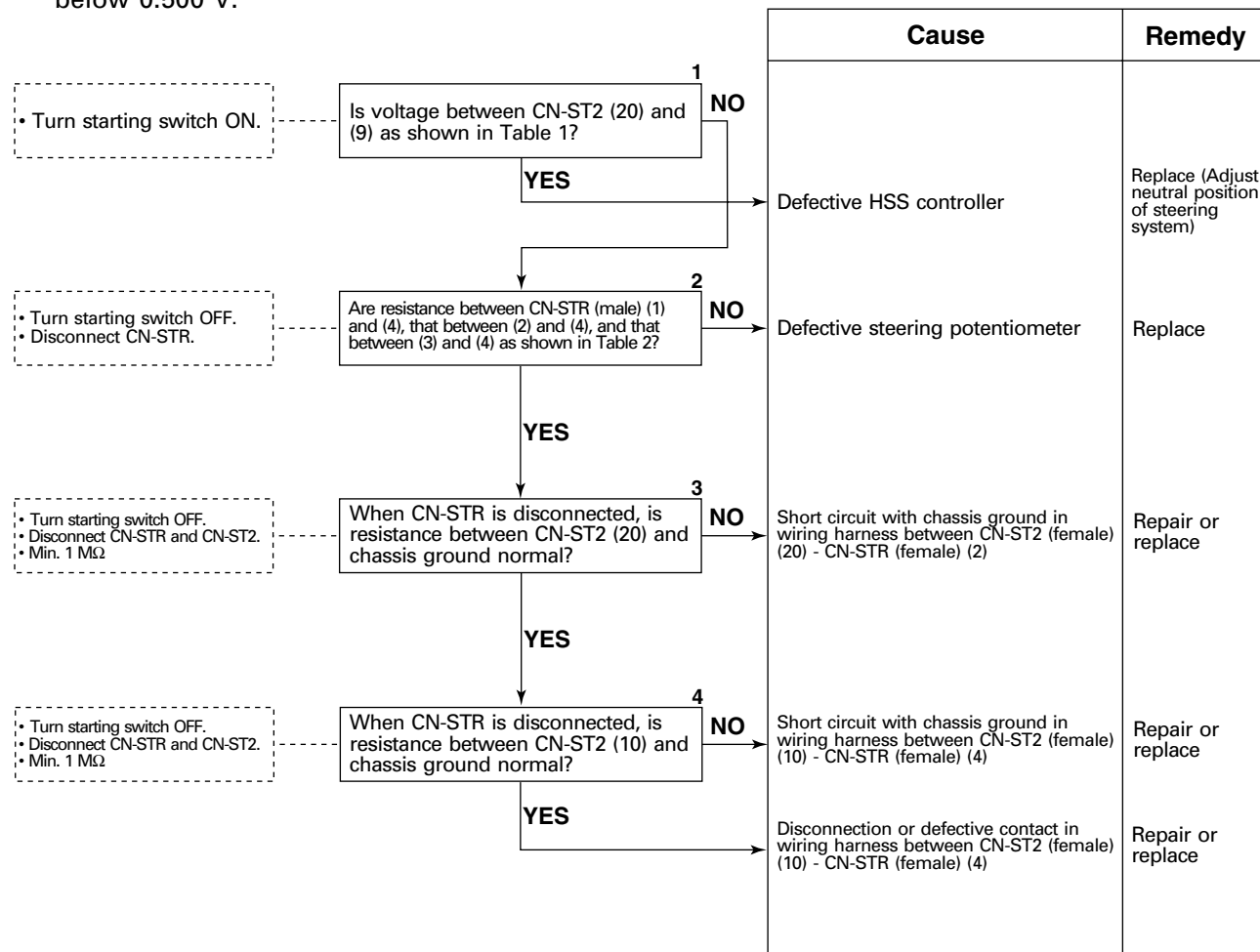


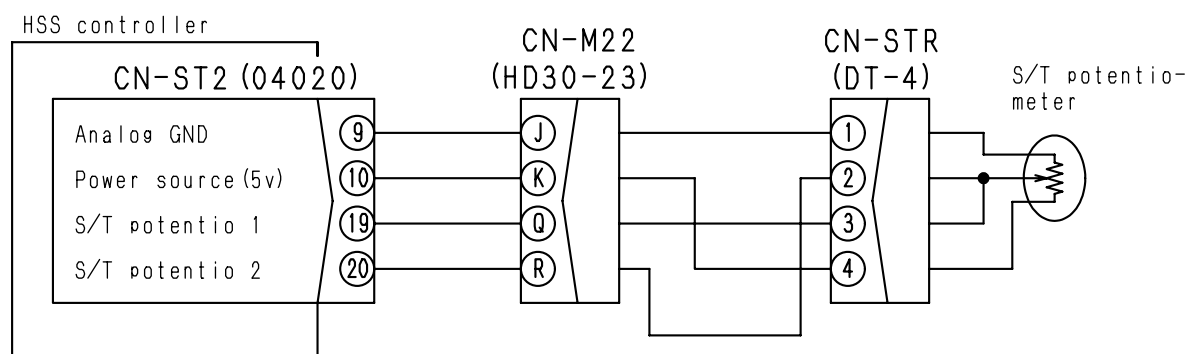
Table 1

CN-ST2	Steering		
	In neutral	When fully steered to left	When fully steered to right
Between (20) – (9)	2.4 – 2.6 V	0.6 – 1.1 V	3.9 – 4.4 V

Table 2

CN-STR (male)	Resistance
Between (1) – (4)	2.4 – 4.0 Ω
Between (2) – (4)	5.0 – 8.0 Ω
Between (3) – (4)	5.0 – 8.0 Ω

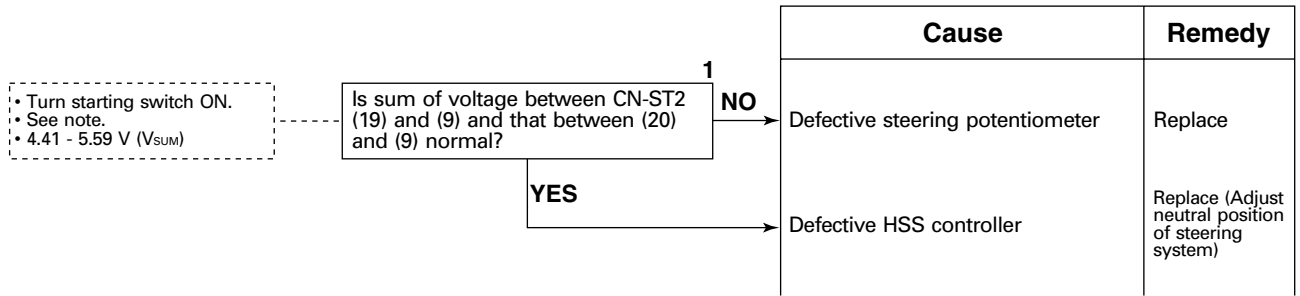
### E-20. Related electrical circuit diagram



BJD10056

E-21. [E0735] (Large difference between steering potentiometer systems 1 and 2: Case II) is displayed

※ This error code is displayed when the difference between the signal voltages of steering potentiometer systems 1 and 2 becomes large (If the signal voltages are normal when the starting switch is turned on).



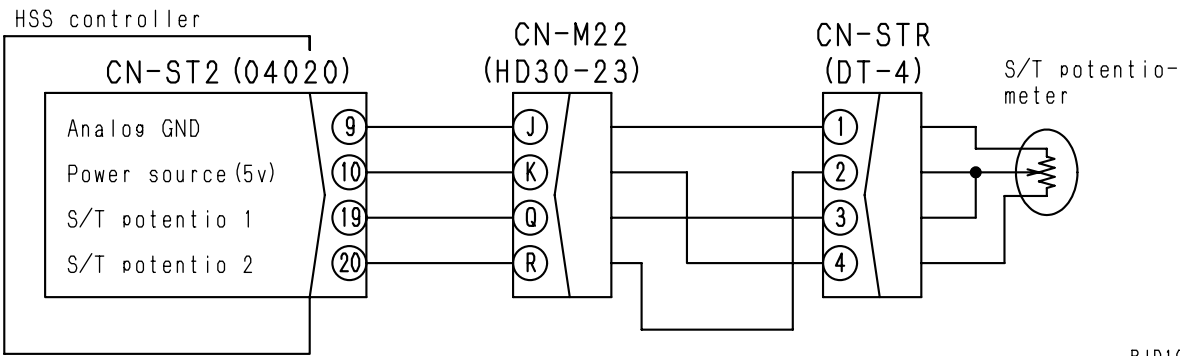
**Note:** Measure the voltage according to the following procedure.

1) Measure voltage (V1) between CN-ST2 (19) and (9) and voltage (V2) between CN-ST2 (20) and (9).

2) Add up 2 voltages (V1 and V2) to obtain the sum (V<sub>SUM</sub>).

★ The joystick does not move while the voltage is being measured.

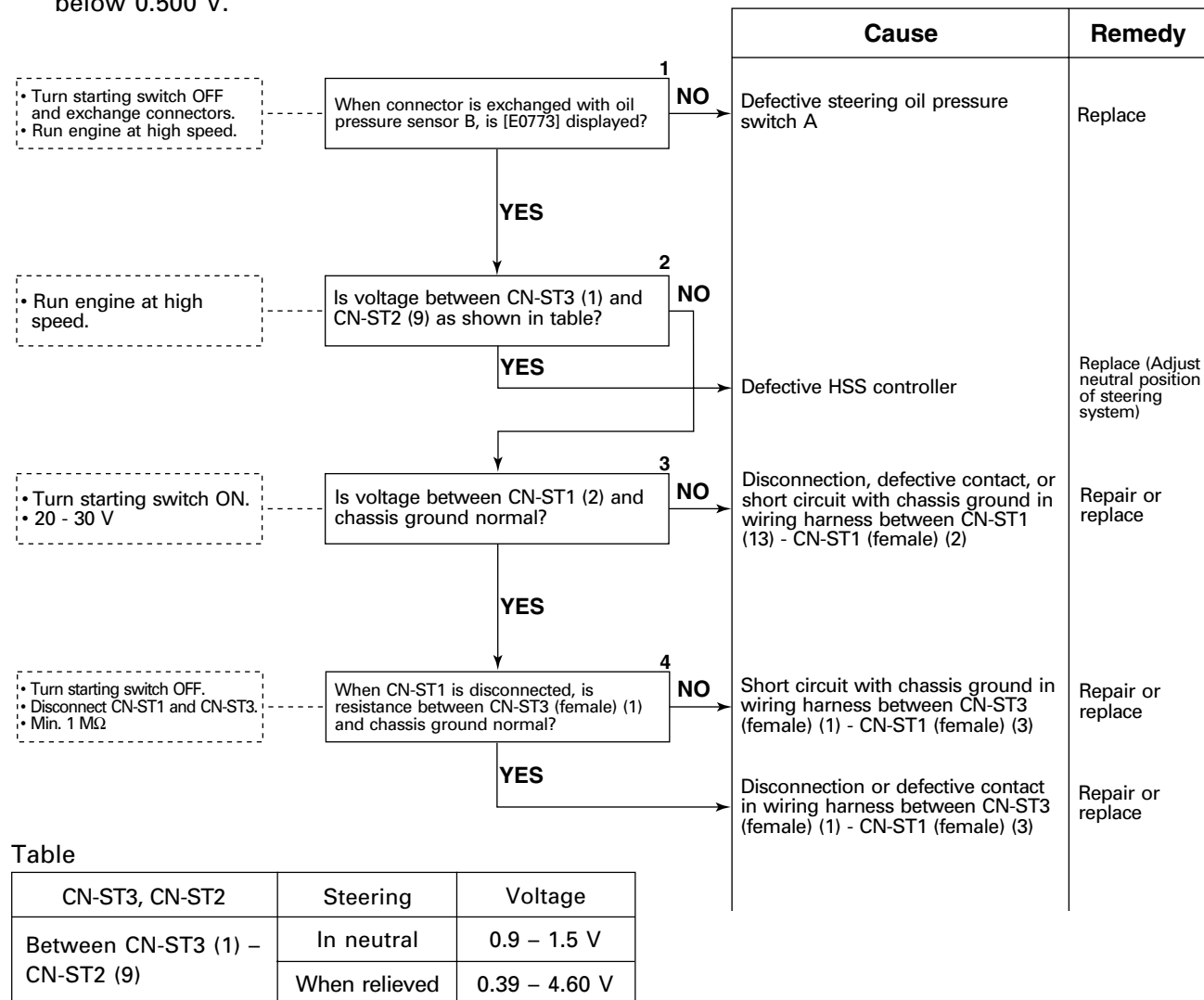
E-21. Related electrical circuit diagram



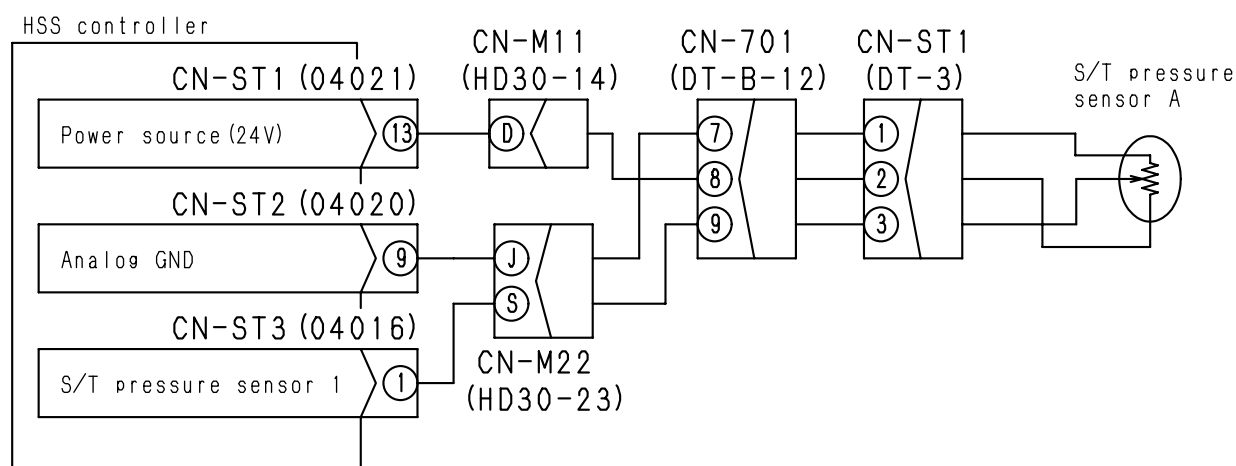
BJD10056

## E-22. [E0768] (Disconnection in steering oil pressure sensor A system) is displayed

※ This error code is displayed when the signal voltage from steering oil pressure sensor A lowers below 0.500 V.



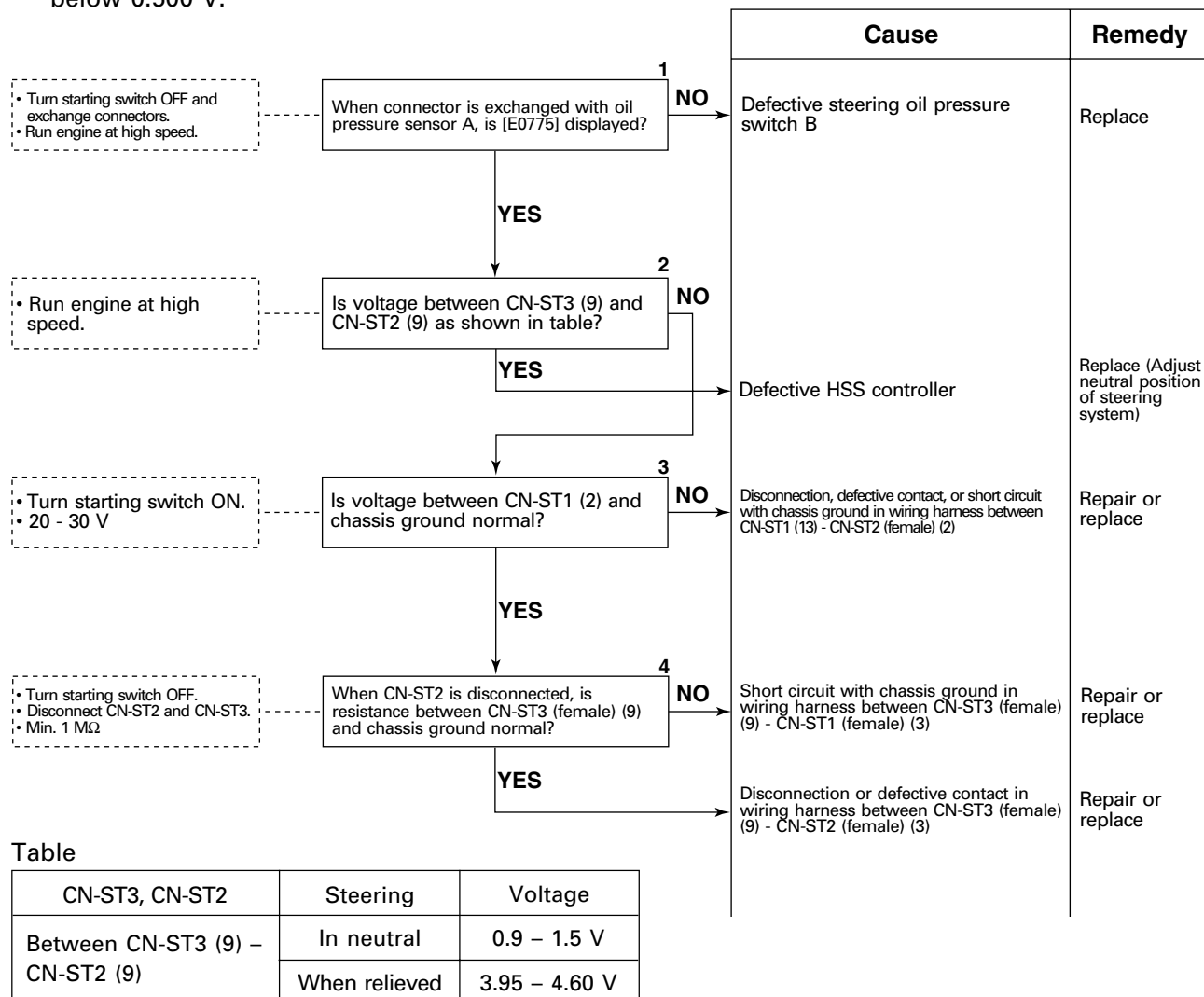
### E-22. Related electrical circuit diagram



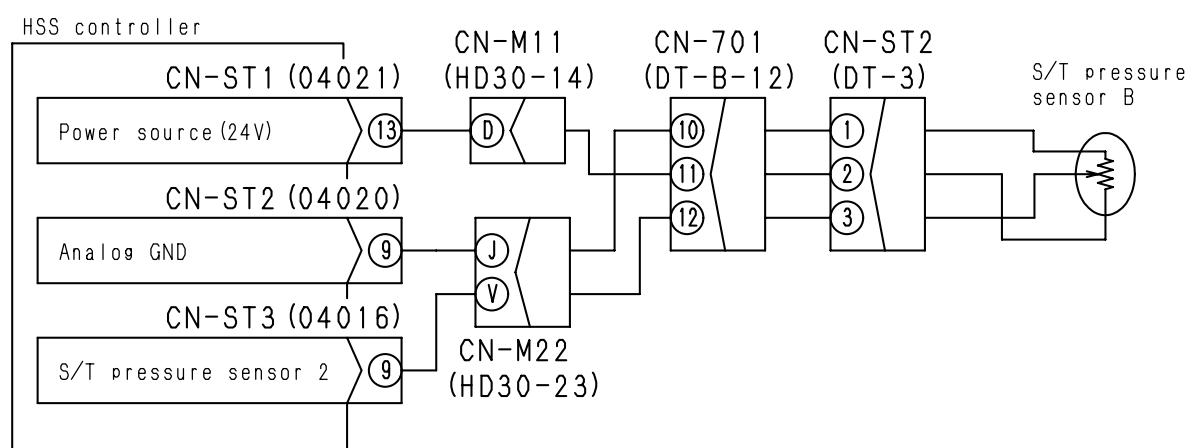


## E-24. [E0770] (Disconnection in steering oil pressure sensor B system) is displayed

※ This error code is displayed when the signal voltage from steering oil pressure sensor B lowers below 0.500 V.

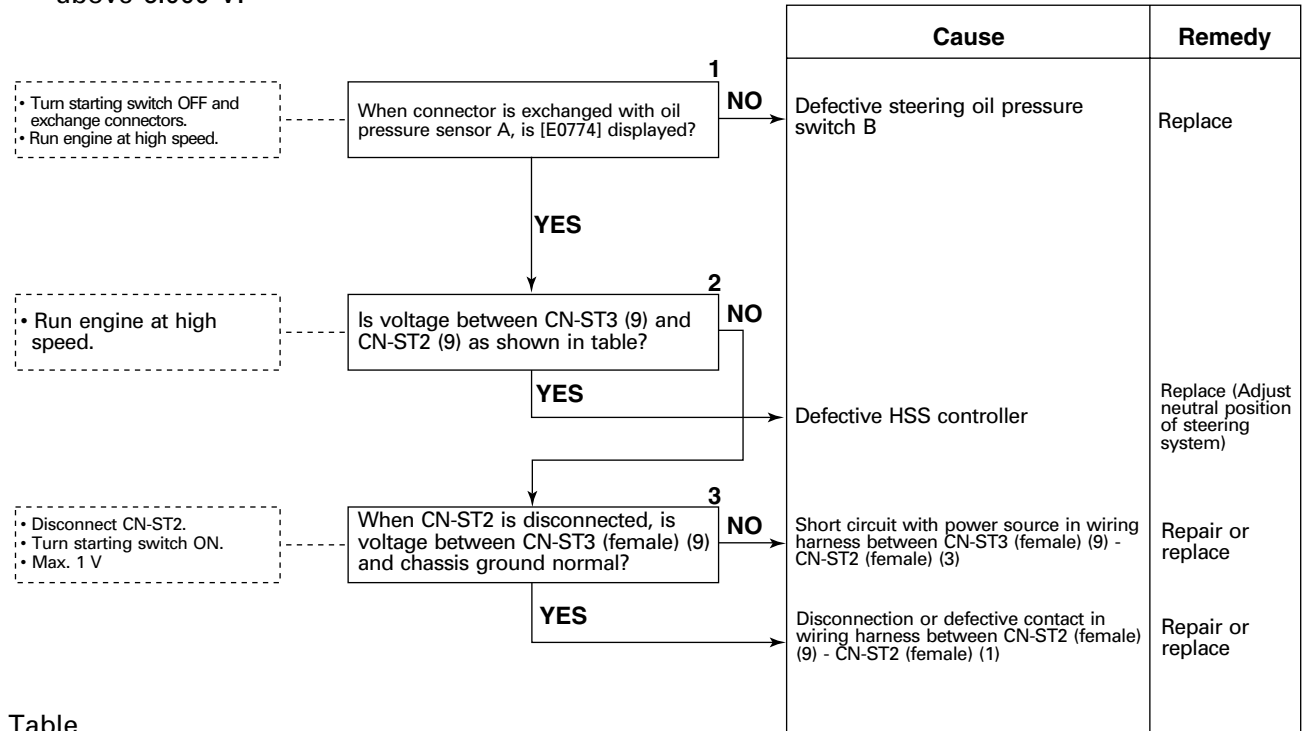


### E-24. Related electrical circuit diagram



**E-25. [E0771] (Short circuit in steering oil pressure sensor B system) is displayed**

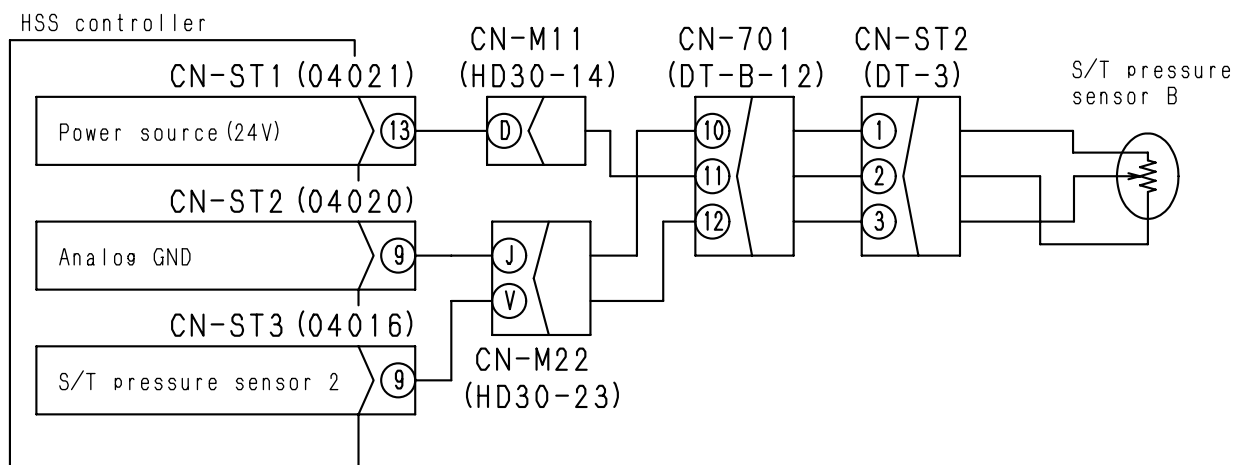
※ This error code is displayed when the signal voltage from steering oil pressure sensor B rises above 6.000 V.



Table

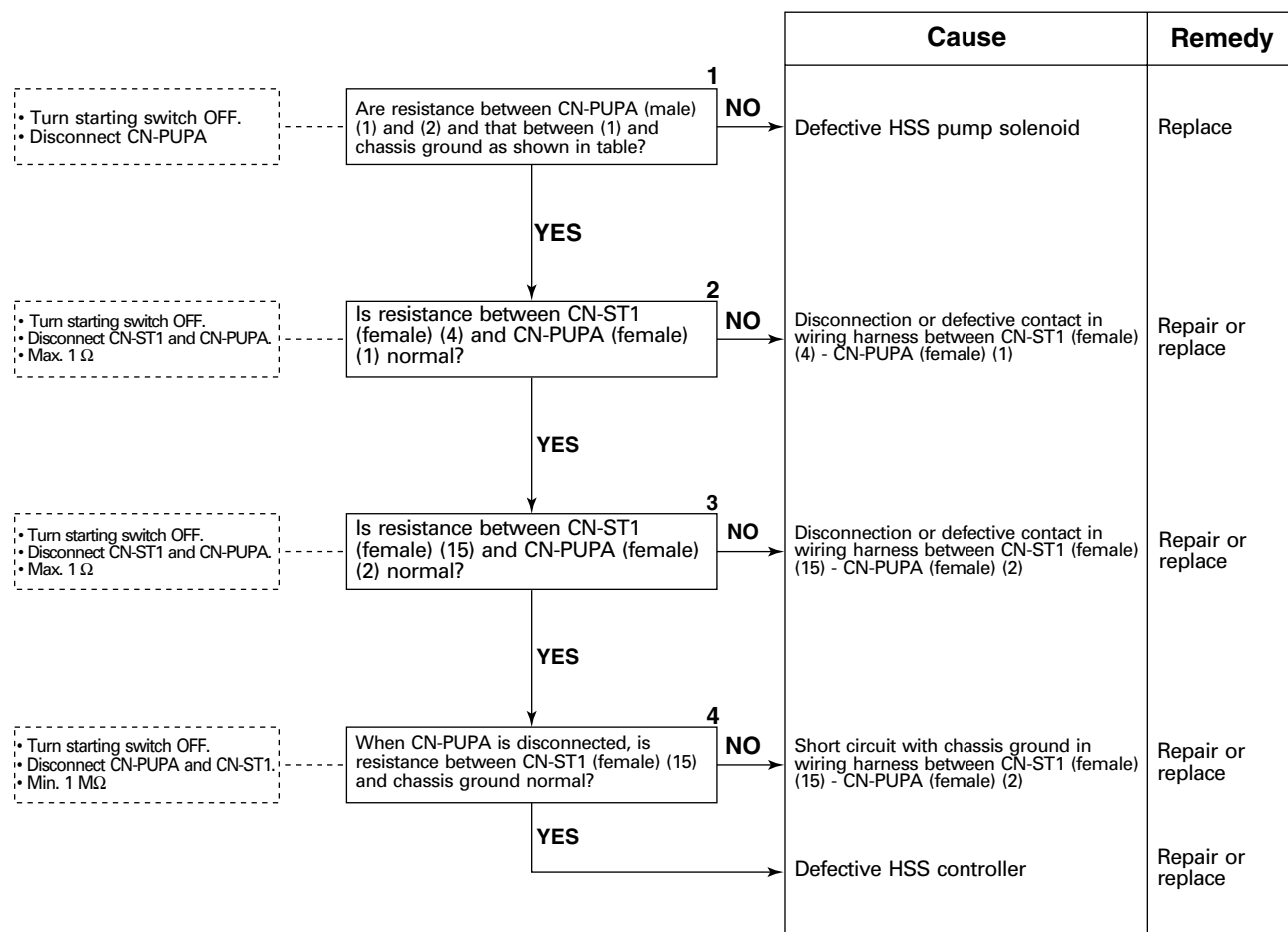
CN-ST3, CN-ST2	Steering	Voltage
Between CN-ST3 (9) – CN-ST2 (9)	In neutral	0.9 – 1.5 V
	When relieved	3.95 – 4.60 V

### E-25. Related electrical circuit diagram



BJD10058

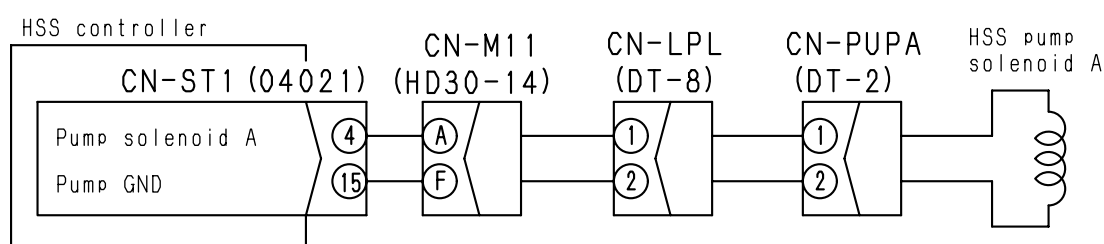
## E-26. [E0772] (Disconnection in HSS pump solenoid A system) is displayed



Table

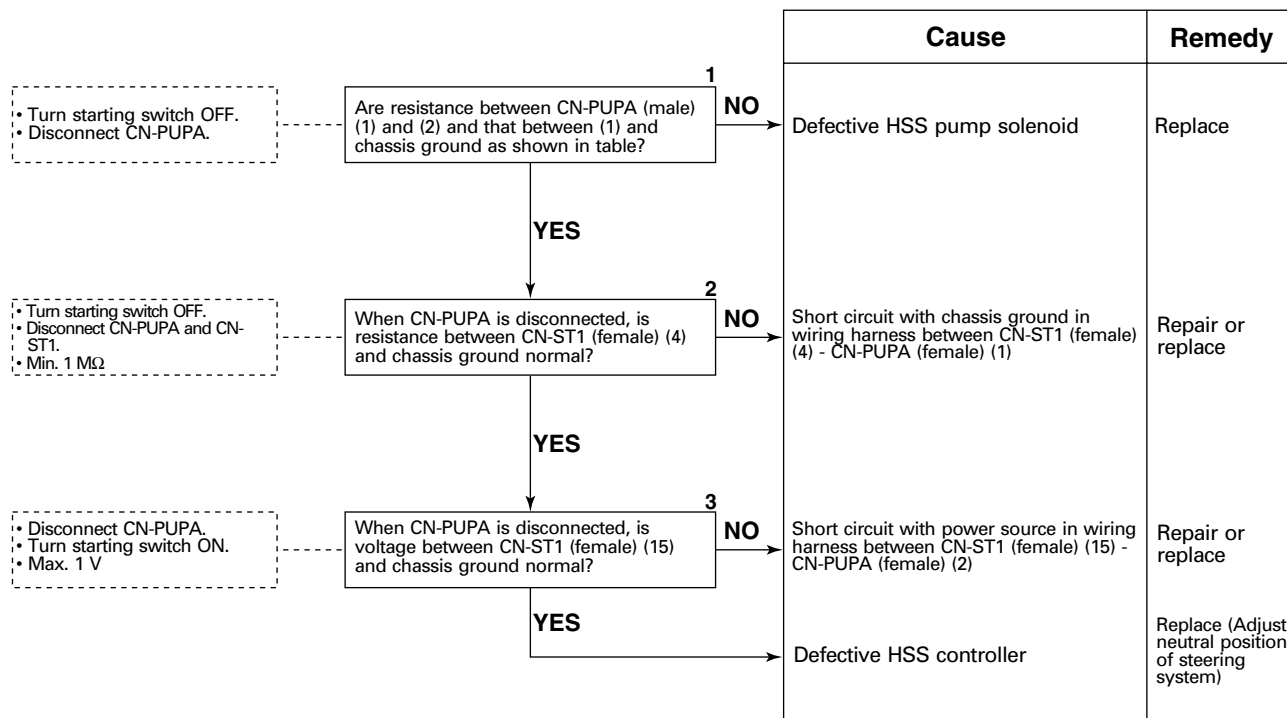
CN-PUPA (male)	Resistance
Between (1) – (2)	10 – 20 Ω
Between (1) – chassis	Min. 1 MΩ

### E-26. Related electrical circuit diagram



BJD10059

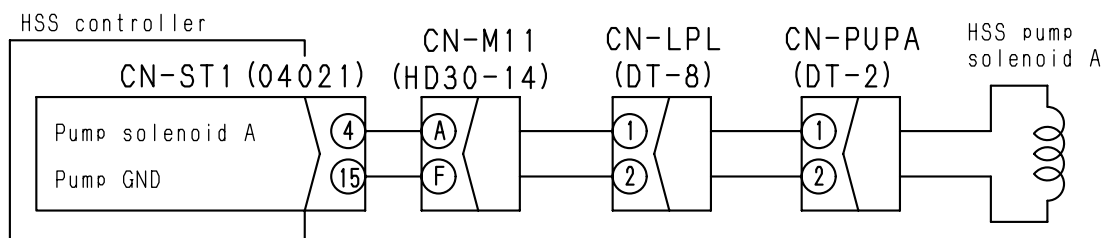
**E-27. [E0773] (Short circuit in HSS pump solenoid A system) is displayed**



Table

CN-PUPA (male)	Resistance
Between (1) – (2)	10 – 20 Ω
Between (1) – chassis	Min. 1 MΩ

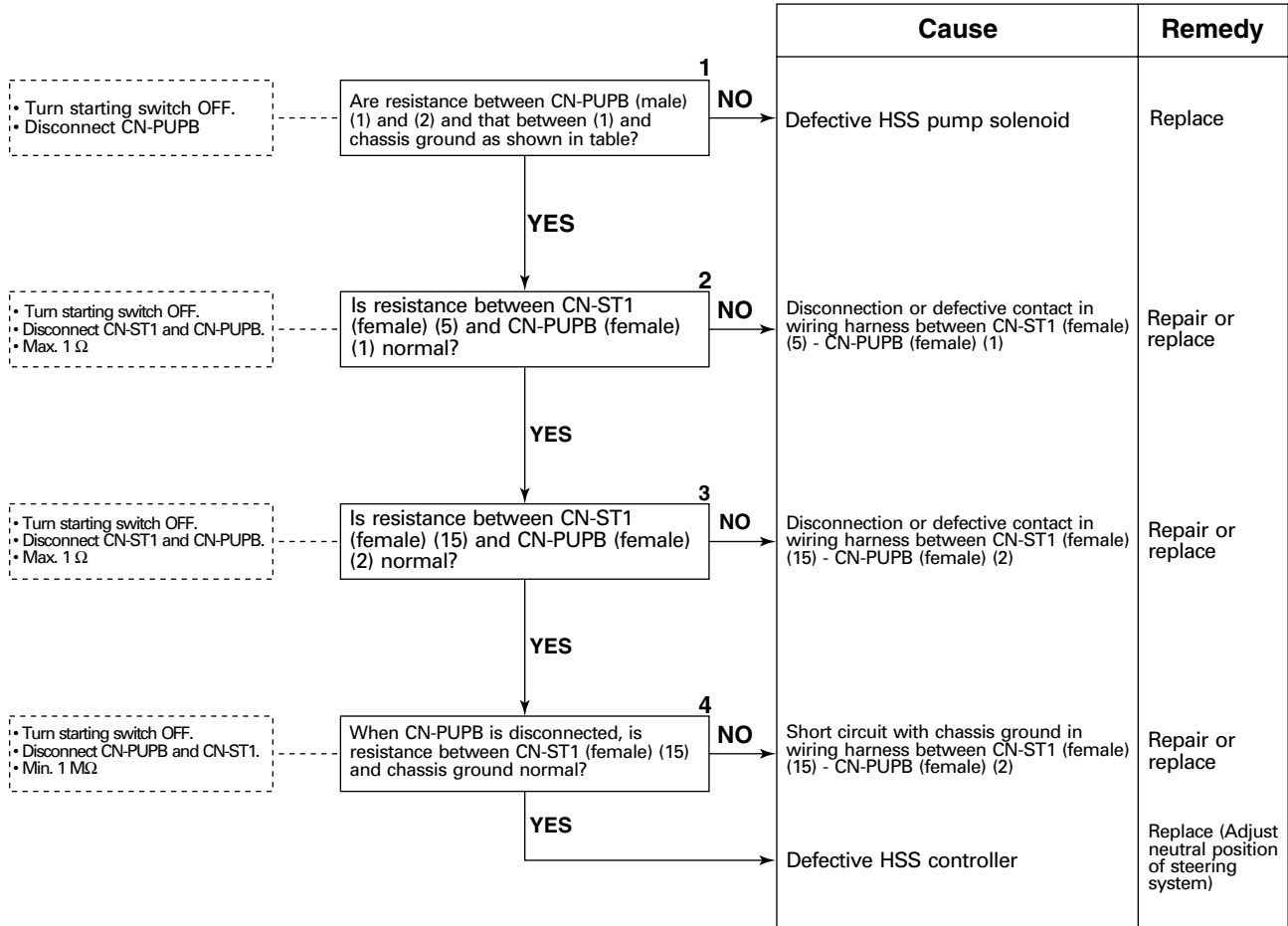
### E-27. Related electrical circuit diagram



BJD10059



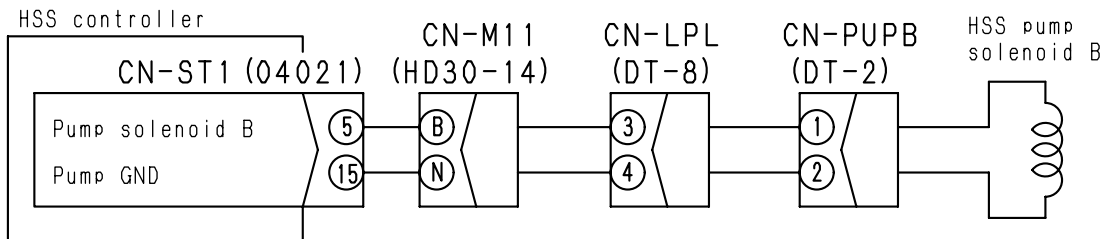
**E-28. [E0774] (Disconnection in HSS pump solenoid B system) is displayed**



Table

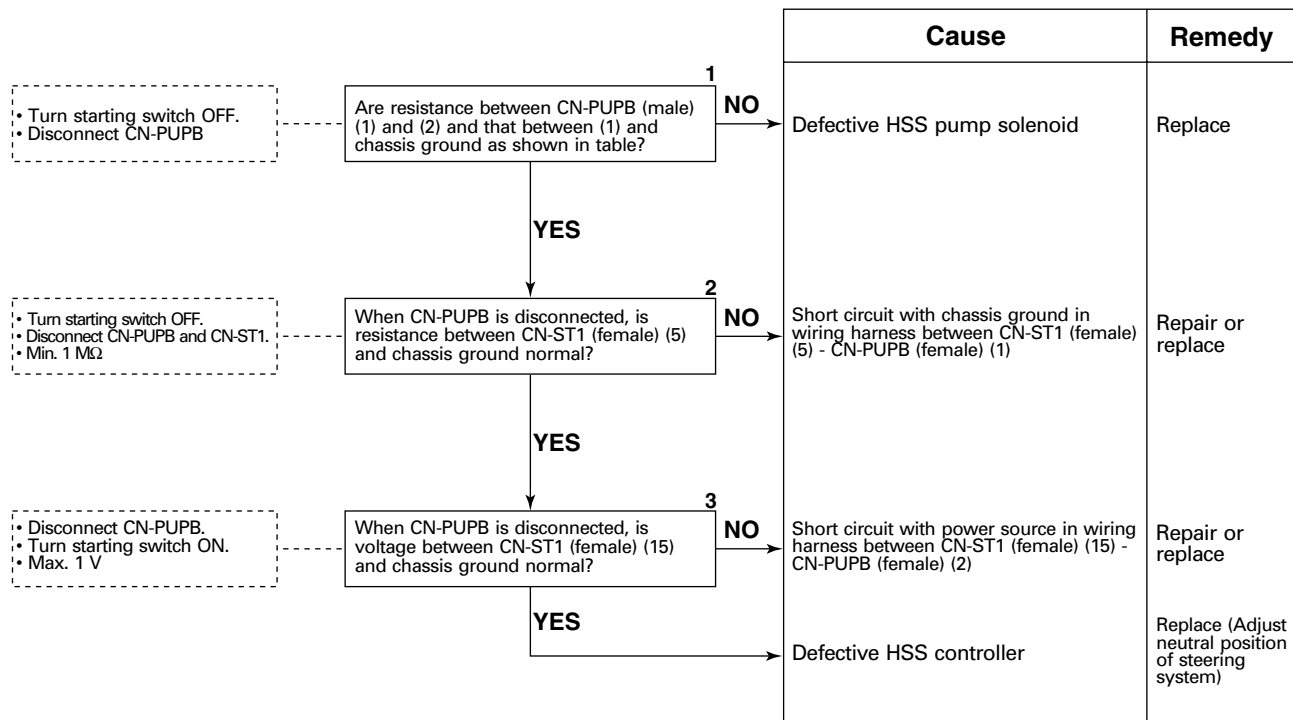
CN-PUPB (male)	Resistance
Between (1) – (2)	10 – 20 Ω
Between (1) – chassis	Min. 1 MΩ

**E-28. Related electrical circuit diagram**



BJD10060

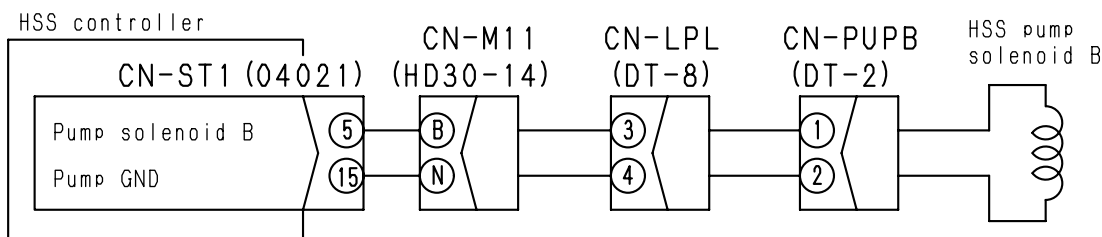
**E-29. [E0775] (Short circuit in HSS pump solenoid B system) is displayed**



## Table

CN-PUPB (male)	Resistance
Between (1) – (2)	10 – 20 $\Omega$
Between (1) – chassis	Min. 1 M $\Omega$

### E-29. Related electrical circuit diagram



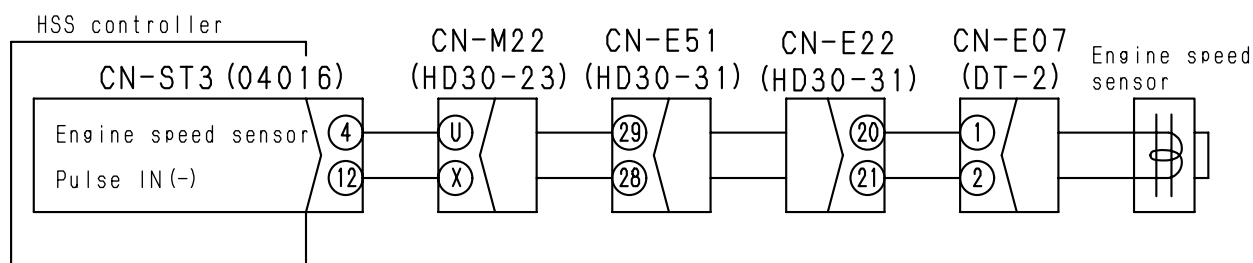
BJD10060

## E-30. [E0930] (Abnormality in engine speed sensor system) is displayed

※ Check that the engine speed sensor is adjusted normally before troubleshooting.

		Cause	Remedy
<div> <ul style="list-style-type: none"> <li>Start engine.</li> <li>Measure with tester in AC range.</li> <li>0.5 - 3.0 V</li> </ul> </div> <div> <ul style="list-style-type: none"> <li>Turn starting switch OFF.</li> <li>Disconnect CN-E07.</li> <li>500 - 1,000 <math>\Omega</math></li> </ul> </div> <div> <ul style="list-style-type: none"> <li>Turn starting switch OFF.</li> <li>Disconnect CN-ST3 and CN-E07.</li> <li>Max. 1 <math>\Omega</math></li> </ul> </div> <div> <ul style="list-style-type: none"> <li>Turn starting switch OFF.</li> <li>Disconnect CN-ST3 and CN-E07.</li> <li>Min. 1 M<math>\Omega</math></li> </ul> </div>	<p>1</p> <p>Is voltage between CN-ST3 (4) and (12) normal?</p> <p>YES</p> <p>NO</p> <p>2</p> <p>Is resistance between CN-E07 (male) (1) and (2) normal?</p> <p>YES</p> <p>NO</p> <p>3</p> <p>Is resistance between CN-ST3 (female) (4) and CN-E07 (female) (1) normal?</p> <p>YES</p> <p>NO</p> <p>4</p> <p>When CN-E07 is disconnected, is resistance between CN-ST3 (female) (4) and chassis ground normal?</p> <p>YES</p> <p>NO</p>	<p>Defective HSS controller</p> <p>Defective engine speed sensor</p> <p>Disconnection or defective contact in wiring harness between CN-ST3 (female) (4) - CN-E7 (female) (1)</p> <p>Short circuit with chassis ground in wiring harness between CN-ST3 (female) (4) - CN-E7 (female) (1)</p> <p>Disconnection or defective contact in wiring harness between CN-ST3 (female) (12) - CN-E07 (female) (2)</p>	<p>Replace (Adjust neutral position of steering system)</p> <p>Replace</p> <p>Repair or replace</p> <p>Repair or replace</p> <p>Repair or replace</p>

### E-30. Related electrical circuit diagram



BJD10061

E-31. Backup alarm does not sound

★ Check that fuse 9 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

1

Does HSS controller display error code [E0610] [E0611]?

YES

Go to troubleshooting of displayed error code

2

• Turn starting switch ON.

• 20 - 30 V

Is voltage between CN-014 (4) and chassis ground normal?

NO

Disconnection or defective contact in wiring harness between fuse 9 - CN-014 (female) (3)

Repair or replace

3

When backup alarm relay is replaced, does system become normal?

YES

Defective backup alarm relay

Replace

4

• Turn starting switch OFF.

• Disconnect CN-014 and CN-244.

• Max. 1 Ω

Is resistance between CN-014 (female) (5) and CN-244 (female) (2) normal?

NO

Disconnection or defective contact in wiring harness between CN-041 (female) (5) - CN-244 (female) (2)

Repair or replace

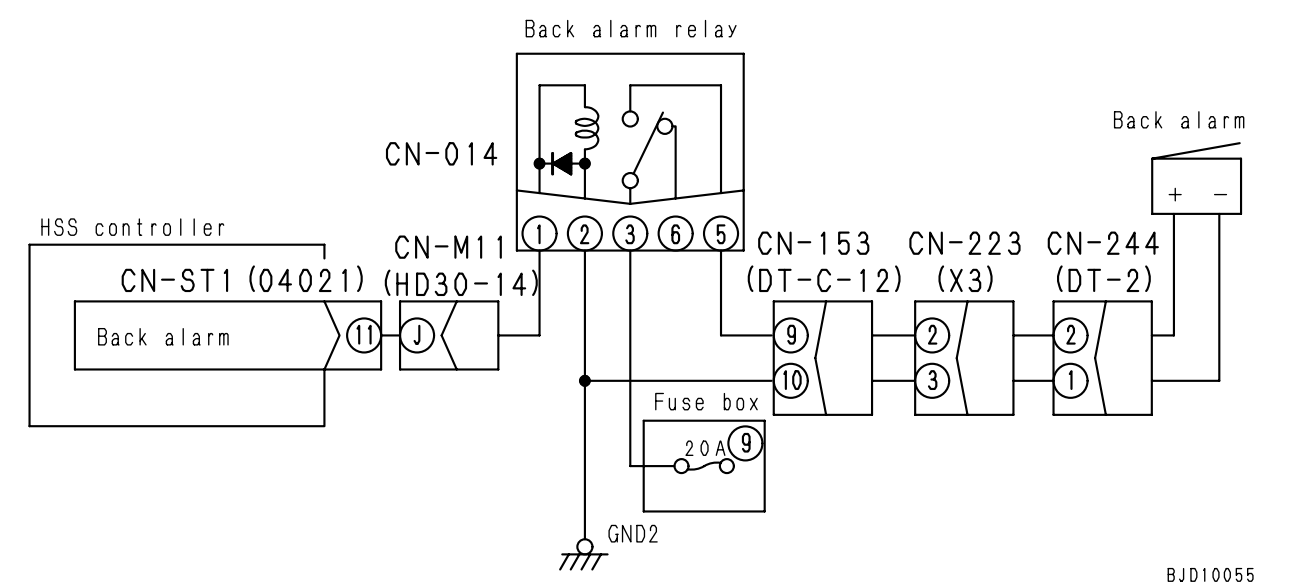
YES

Defective backup alarm

Replace

Cause	Remedy
Go to troubleshooting of displayed error code	
Disconnection or defective contact in wiring harness between fuse 9 - CN-014 (female) (3)	Repair or replace
Defective backup alarm relay	Replace
Disconnection or defective contact in wiring harness between CN-041 (female) (5) - CN-244 (female) (2)	Repair or replace
Defective backup alarm	Replace

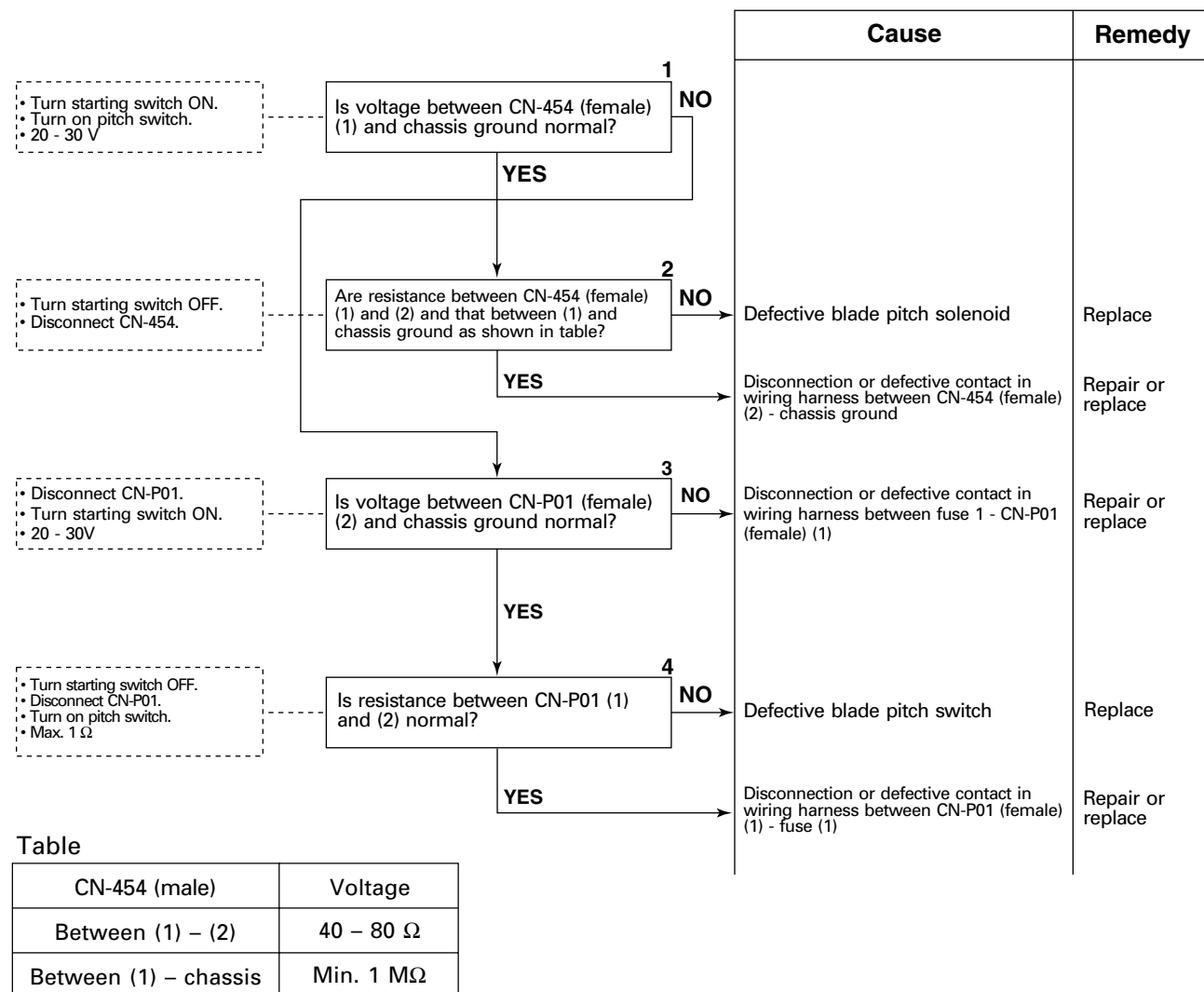
E-31. Related electrical circuit diagram



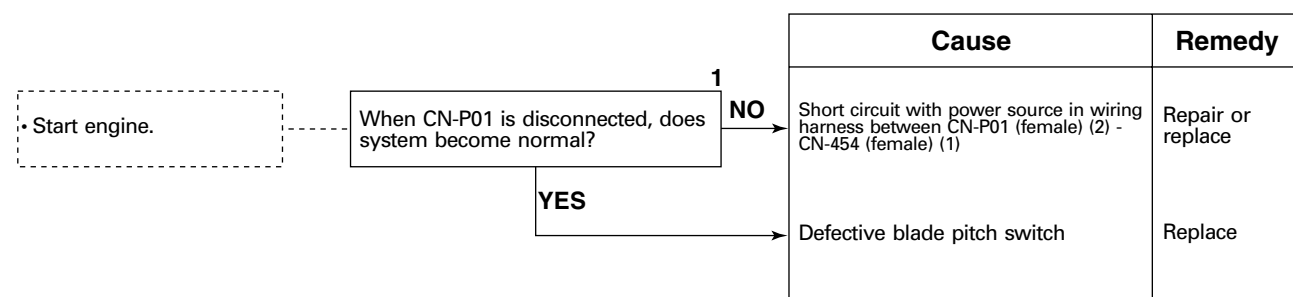
## E-32. Blade pitch malfunctions (Machine equipped with pitch dozer)

- ★ Check that fuse 1 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

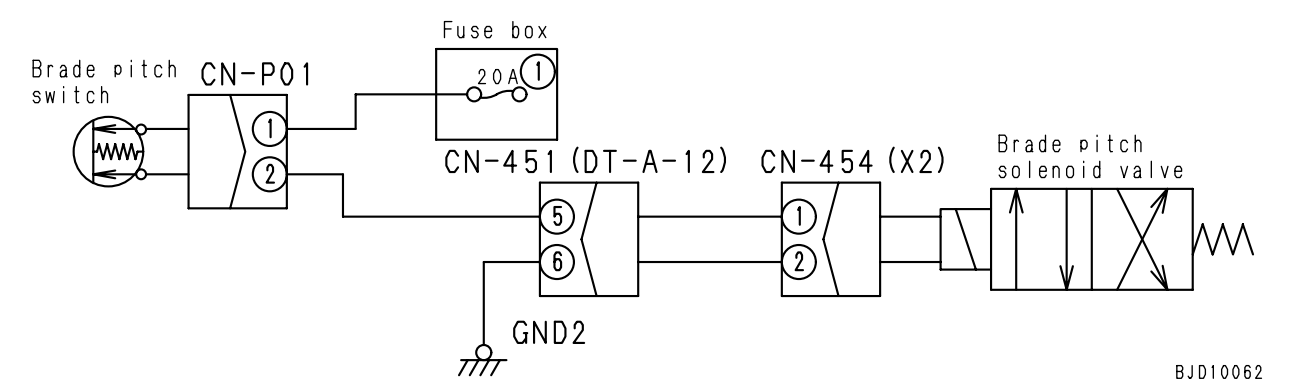
### a) Blade pitch does not work (Solenoid is not turned on)



### b) Blade tilt does not work (Solenoid is not turned off)



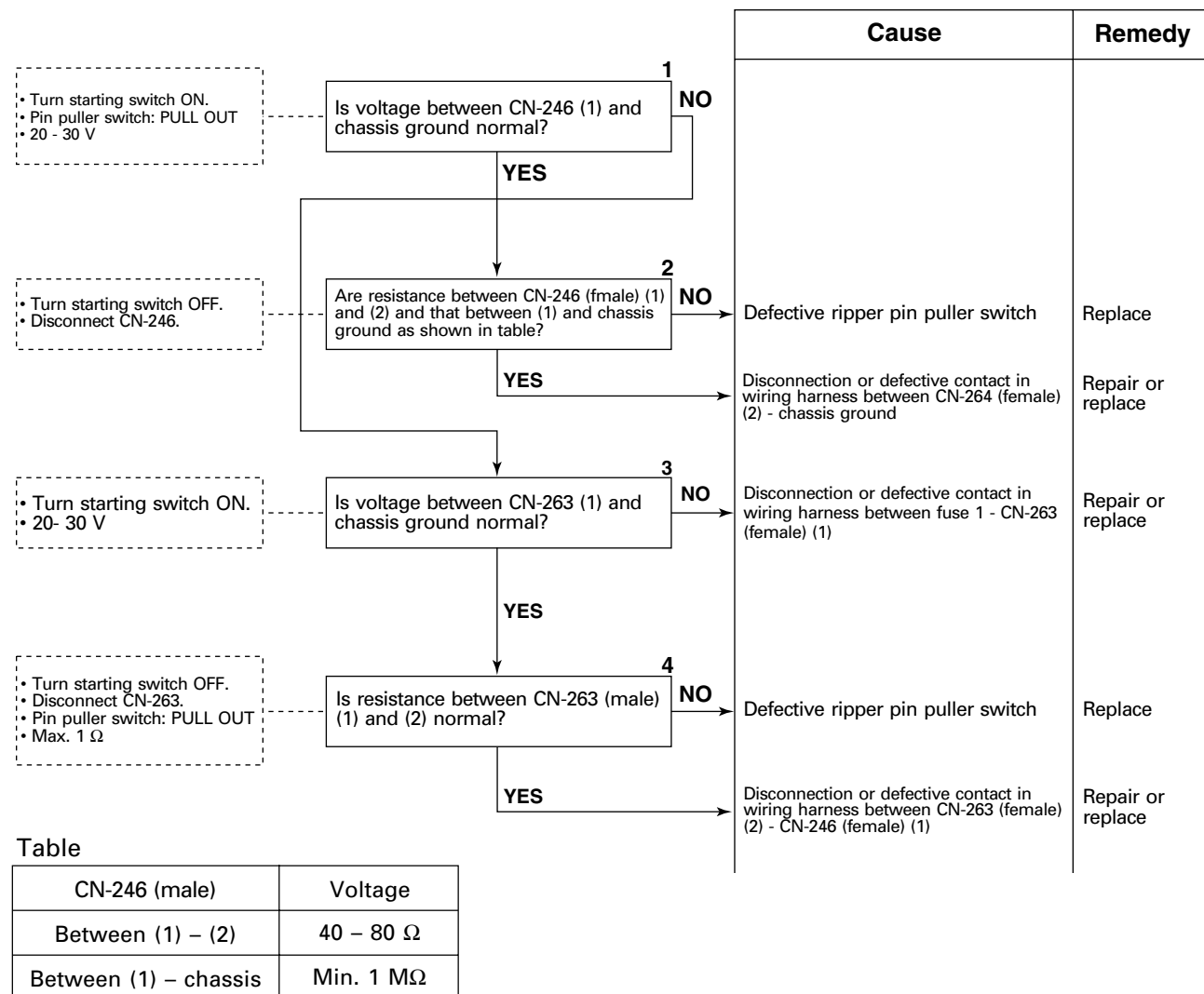
E-32. Related electrical circuit diagram



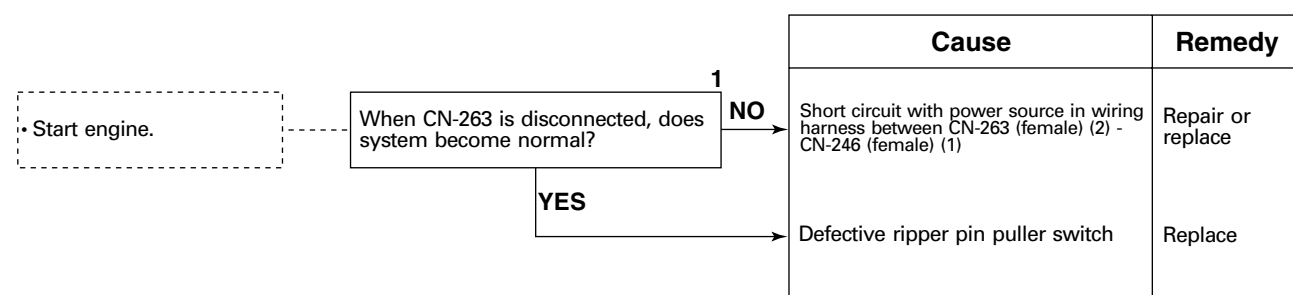
## E-33. Ripper pin puller malfunctions (Machine equipped with giant ripper)

- ★ Check that fuse 1 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)

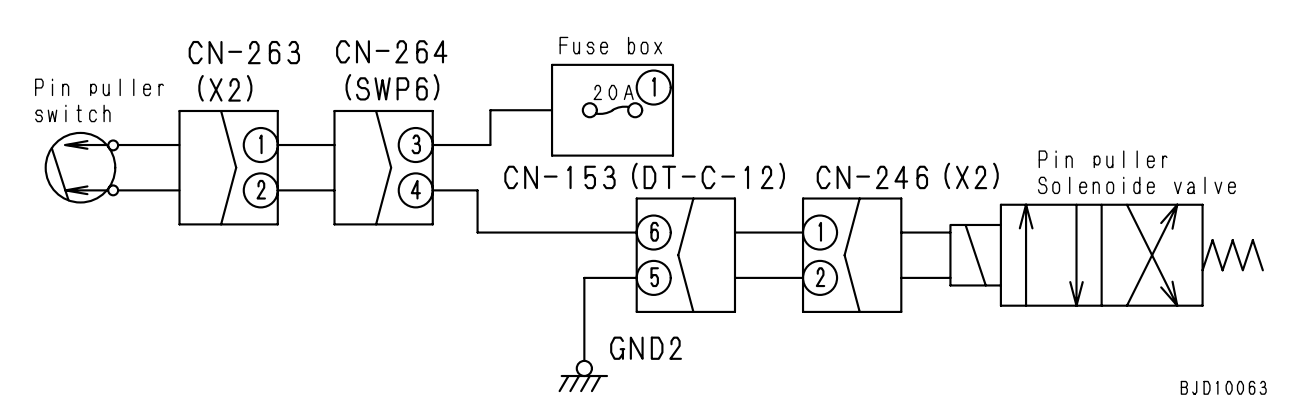
### a) Pin cannot be pulled out (Solenoid is not turned on)



### b) Pin cannot be pushed in (Solenoid is not turned off)



E-33. Related electrical circuit diagram

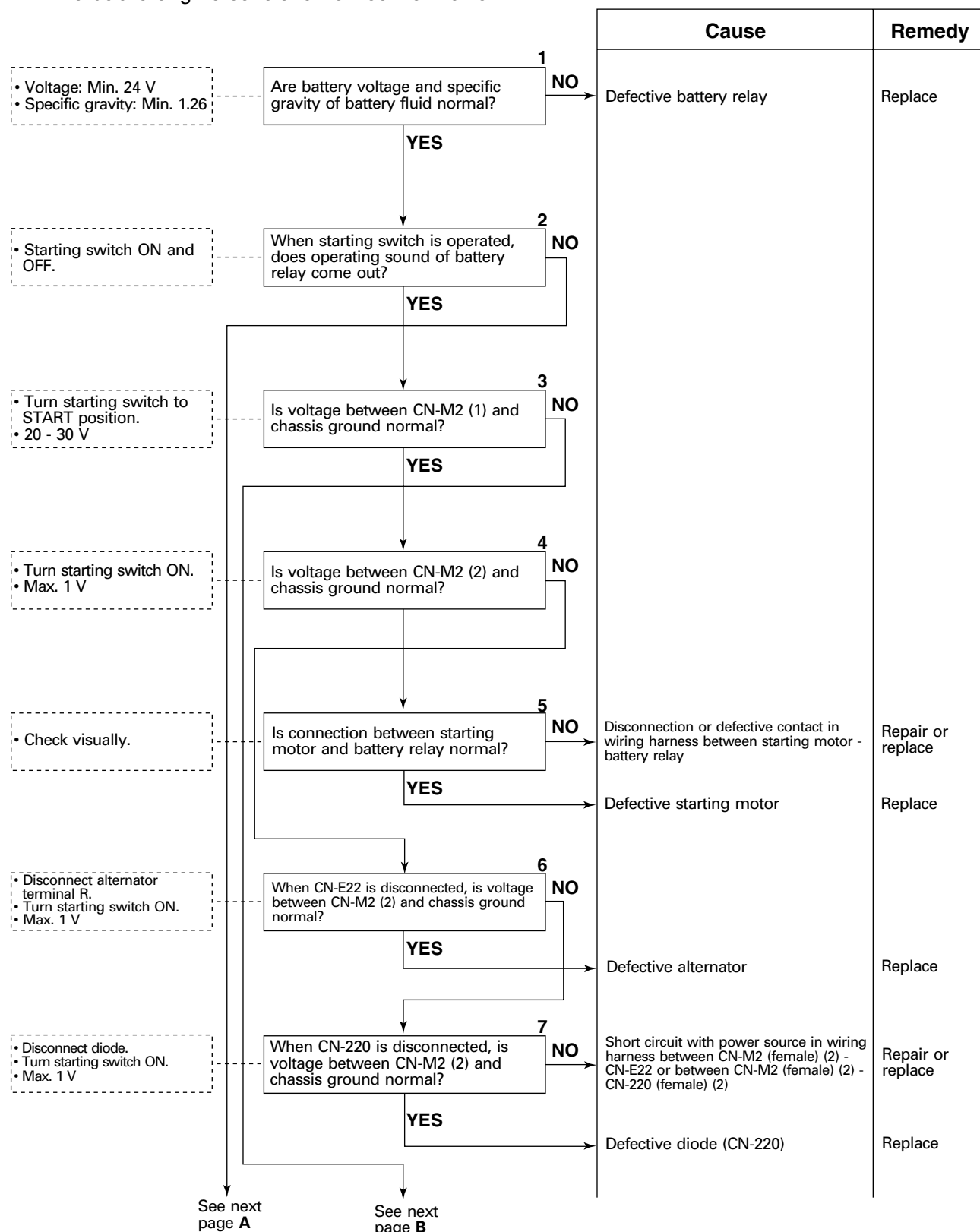


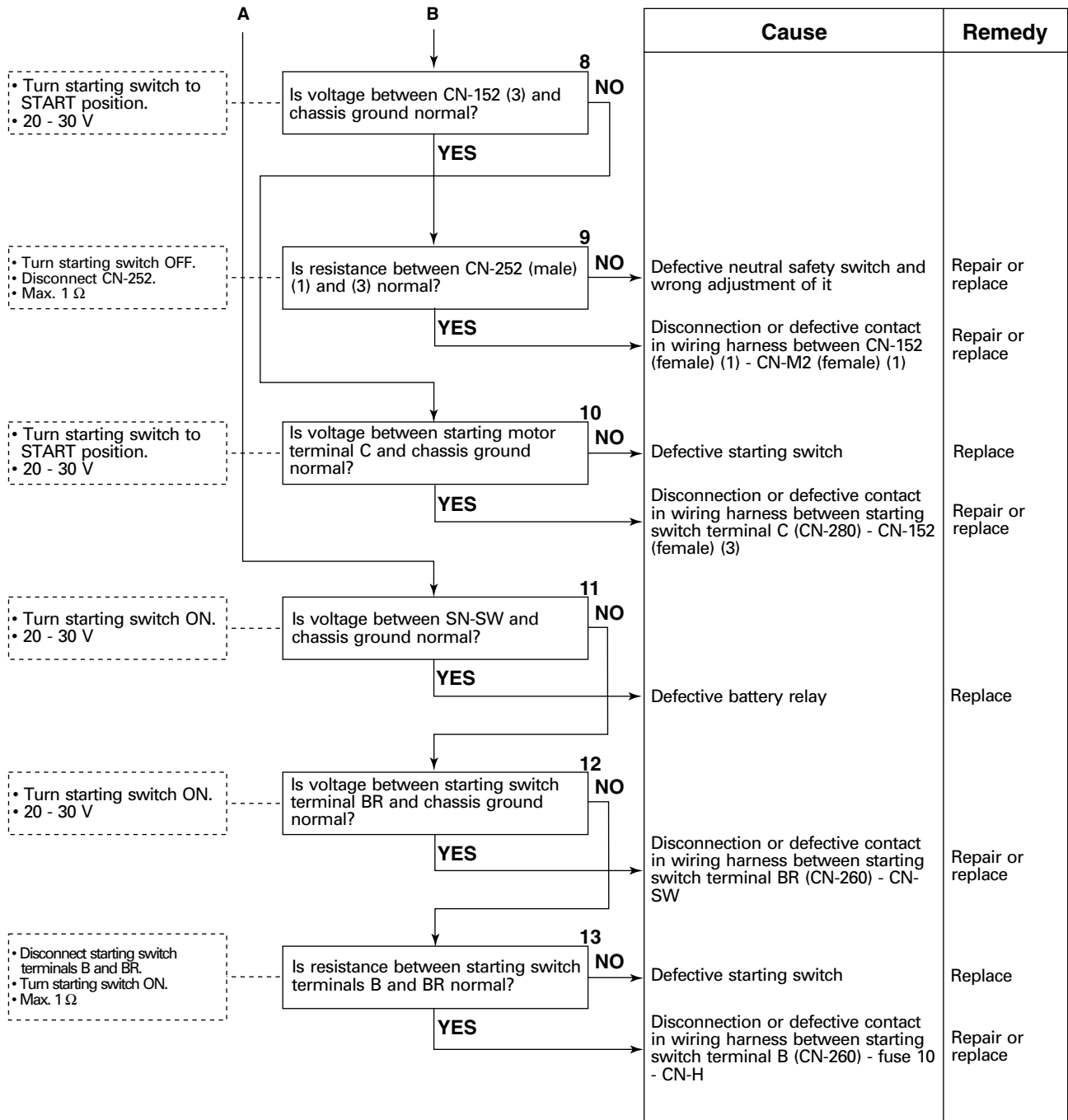


## E-34. Engine does not start (Engine does not rotate)

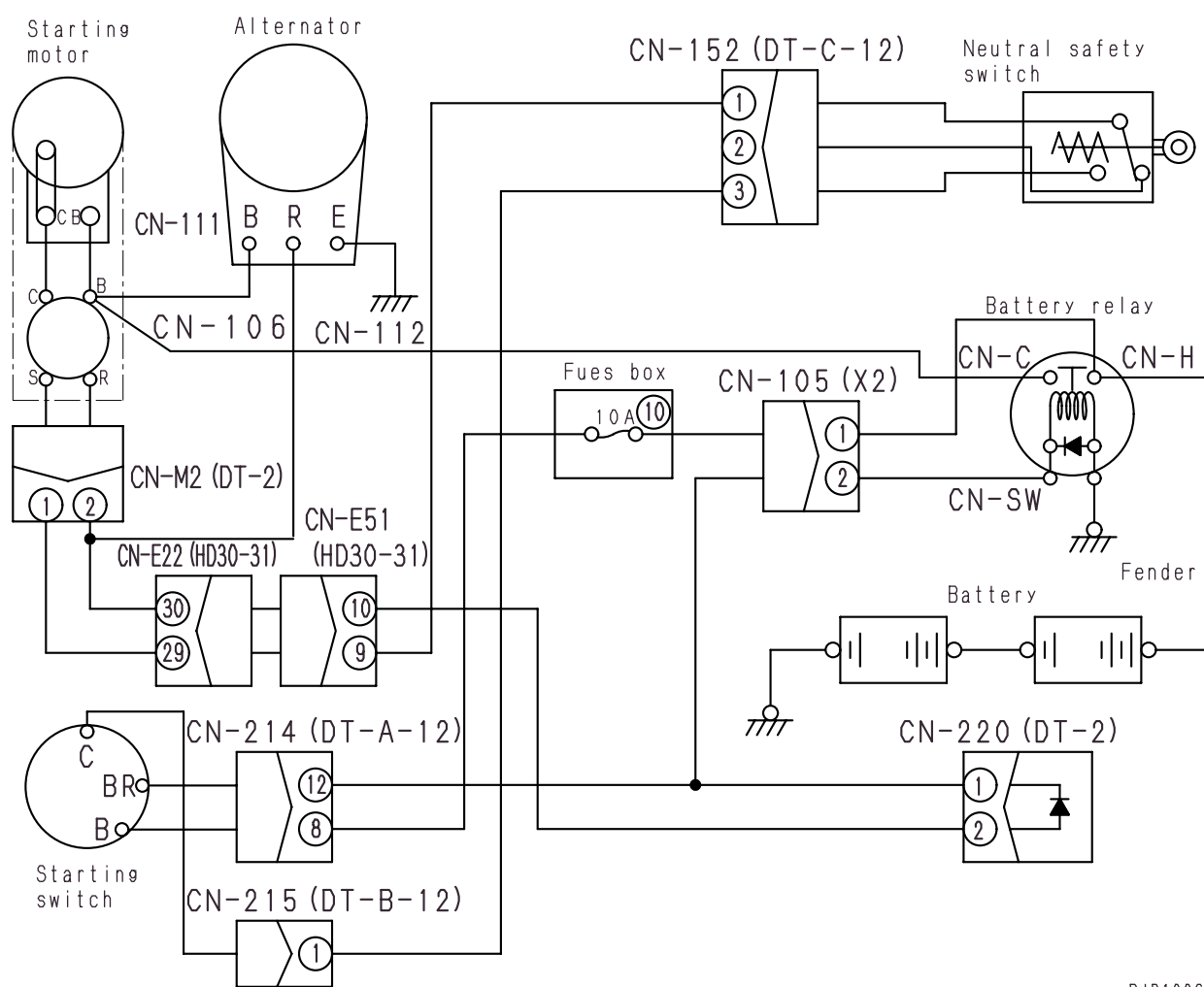
- ★ Check that fuse 10 is normal. (If it is broken, check the circuit related to it for short circuit with chassis ground.)
- ★ When troubleshooting, set the parking brake lever in the lock position.
- ★ Check that any error code related to the engine (E mode) is not displayed.

**Note:** In this section, troubleshooting related to the battery relay will be performed on the assumption that the engine controller is free from error.





E-34. Related electrical circuit diagram



BJD10064

