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सत्यमेव जयते

भारत सरकार - रेल मंत्रालय
अनुसंधान अभिकल्प और मानक संगठन
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Government of India-Ministry of Railways
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EL\ 1.2.9.1. Date –29.08.2002.

Chief Electrical Engineer
- Eastern Railway, Fairlie Place, Kolkata – 700 001.
- Northern Railway, Boroda House, New Delhi-110001.
- South Central Railway, Rail Nilayam, Secunderabad- 500 371
- Western Railway, Churchgage, Mumbai-400 020.
- Chittaranjan Locomotive Works, Chittaranjan-713331.

Chief Works Manager
Loco C&W work shop Western Railway Dahud.

Sub- Modification of control circuit of ac dual break locomotive provided with static converter with soft start for rolling stock application.

A modification bearing serial No- ELRS/MS/0318 (REV – 0) on the subject item is being sent herewith for information please. This modification of control circuit will be applicable to dual brake locos provided with Static Converter with soft start .

Encl – As above.

(S. S. Joshi)
For Director General/ Elec.

Copy for information and necessary action.

1 Sr.DEE/ TRS.
Electric loco shed
Northern Rly
Fazalgang
KANPUR,
UP -- 208003.

2 Sr..DEE / TRS.
Electric loco shed
South Central Rly
Lallaguda. Secenderbad
A.P- 520017

3 Sr.DEE / TRS.
Electric loco shed
Western Rly
Tuglagabad.
New Delhi- 110044

4 Sr..DEE / TRS.
Electric loco shed
Eastern Rly
Mugalsarai.
U.P – 232101.

Encl – As above .

(S. S. Joshi)
For Director General/ Elec.

Government of India
Ministry of Railways
Research Design & Standard Organisation
Manak Nagar, Lucknow – 226 011

EL\ 1.2.9.1. **Date –29.08.2002.**

Modification Sheet No. ELRS/ MS / 0318. (REV— 0)

Chief Electrical Engineer

- **Eastern Railway, Fairlie Place, Kolkata – 700 001.**
- **Northern Railway, Boroda House, New Delhi-110001.**
- **South Central Railway, Rail Nilayam, Secunderabad- 500 371**
- **Western Railway, Churchgage, Mumbai-400 020.**
- **Chittaranjan Locomotive Works, Chittaranjan-713331.**

Chief Works Manager

Loco C&W work shop Western Railway Dahud.

1.**Title:**

Modification of control circuit of dual break ac locomotives provided with Static converter for Soft start of Auxiliaries except compressor and Exhauster.

2. **Object :**

2.1. To start all the auxiliaries except compressor and Exhauster along with the static converter.

2.2 Reduction in surge current and transient due to elimination of D.O.L starting.

2.3 Reduction in starting sequence time of auxiliary motors.

2.4 Increase in life and reliability of Electro Magnetic contactors due to operation on no load.

2.5 To implement restart feature of static converter, if available.

3. **Work to be carried out :**

a) **BLSN** switch is to be used as **BLSI** (in case of locos not required for MU operation.

b) **Additional toggle switch ZSI** has to be provided on drivers-desk within the accessible distance of the driver in locos, which are required for MU operation.)

c) The **QCON** (PC-8 type) relay with 5 N/C 3 N/O interlocks is to be provided.
d) One PC-8 relay is to be added which will be designated by **QSIT**.
e) Switch BLSI is to be connected in series with SI.
f) **QSIT** (N/C) interlock two numbers are to be added in MTDJ circuit.
g) The "**ON** " status contactor closes QCON relay, whose one N/C contact in Q118 circuit, two N/O contacts in Auxiliary contact circuits and one N/O contact in **LSCHBA** circuit are to be provided.
h) The "**TRIP**" status contact closes QSIT relay whose N/C contacts are to be provided in DJ control circuit

4. **Application to class of locomotives :**

All WAG-5 and WAG-7 locomotives (Dual brake) provided with Static converter.

5. **Material Required :**

a) Two PC-8 relays for QCON and QSIT, b) One toggle switch (ZSI). c) 2.5 mm² control cable of required length.

5.1 **Status of Relays :**

Conventional loco	**New Scheme**	**Remarks**
QCVAR	Replaced by QCON	Renamed
QOA, Q100	Eliminated	Eliminated
QTD105, QTD106,	Eliminated	Eliminated
QTD 103	Provided.	Additional (Time delay)
-----	QSIT	Additional (PC-8)
-----	C- 108	Contactor for 3 Ph MVRF.

6. **Reference :** GM (Elect.), Western Railway's letter no EL- 91/7/19 dated 02.4.2002.

7. **Modified Drawing :** Drg.no-- SKEL- 4631 Alt 0. SKEL- 4608 Alt 1.

8. **Agency Implementation :**
Electric loco shed, Electric Loco POH shops.

9. **Terminology Used** –
1. QCON -- PC-8 type relay used in lieu of QCVAR. This will indicate the healthiness of Static converter.
2. QSIT-- PC–8type relay used for trip indication of Static converter.

10. **Distribution :**

1	Sr.DEE/ TRS. Electric loco shed Northern Rly Fazalgang KANPUR, UP -- 208003.	2	Sr..DEE / TRS. Electric loco shed South Central Rly Lallaguda. Secenderbad A.P- 520017
3	Sr.DEE / TRS. Electric loco shed Western Rly Tuglakabad. New Delhi- 110044	4	Sr..DEE / TRS. Electric loco shed Eastern Rly Mugalsarai. U.P – 232101.

Enclosure : 1. Drawing 02 sheets.
2. Write up on Auxiliary control circuit. (Annexure –1).
3. Operating features and changes required in control circuit (Annexure –2).
4. Sequence of Operation by driver. (Annexure –3).

(S.S. Joshi)
For Director General Elect.
E.Mail :
dell4@rdso.railnet.gov.in

Annexure-1

WRITE UP ON AUXILIARY CONTROL CIRCUIT OF WAG-5/7 DUAL BRAKE ELECTRIC LOCOMOTIVE PROVIDED WITH 180 KVA STATIC CONVERTER WITH SOFT START FEATURES.

Operation in dual brake, WAG-5/7 Electric Locomotives provided with 180 KVA Static converter with soft start feature.

In case the locomotives are not required for multiple operation then BLSN switch on BL box should be utilized for operation of static converter and should be designated as BLSI.

In case the locomotives are required for multiple operation then one toggle switch should be provided on driver's desk at an accessible location to the driver and to be designated as ZSI for switching on the static converter.

At the time of energisation of the locomotive after closing DJ first of all switches BLVMT & BLCP have to be switched ON (in case of air brake train operation) and switches BLVMT, BLCP and BLPV have to be switched ON (in case of vacuum brake train operation). As DJ is already closed the N/O contact of DJ in traction motor blower circuit closes and energises C105, C106 & C107 on off load. After this BLSI / ZSI switch has to be switched ON. Now the static converter starts with loads MVRH, MVMT1&2, MVSI 1&2 MVSL1 & 2, MPH and battery charger and ramps up within 6 to 8 seconds and closes QCON relay.

After relay QCON closes, the N/O interlock of QCON in auxiliary control circuit closes and feed the cable no.100. As cable no 100 is getting feed, relay Q119 closes through N/C auxiliary interlocks of C101, C102 & C103 as compressor contactors C101, C102 and C103 are in open state. With the energisation of Q119 relay the N/O time delay interlock of Q119 located in unloader valve circuit closes and energises unloader valves. When QCON closes. C101, C102 and QTD 103 closes and after 5 secs C103 closes. With the closing of C101, C102 and C103 relay Q119 de-energises as the auxiliary interlocks of C101, C102 and C103 are opened out, and after 5 seconds of opening of Q119 the auxiliary N/O time delay interlock of Q119 in unloaded valves circuit opens and the unloader valves gets de-energised. The cut in and cut out of RGCP will not have any effect on the normal operation of the compressor contactor and unloader valve circuit.

In vacuum brake system only one compressor has to be in working mode for which the selection of compressor 1,2 or 3 has to be made by keeping HCP in required position. When HCP is kept in 1, 2 or 3 position the HCP contact located in C111 and C112 circuit closes. When compressed air pressure in the break pipe of the locomotive is about 4.5kg/ cm^2 QRS relay closes and make the exhauster circuit ready for operation. Depending upon the position of HPV either exhauster 1 or exhauster 2 will start working when C111 or C112 closes for fast

creation of vacuum in the pneumatic circuit both the exhausters can be run at the same time by pressing BLQPV spring loaded switch. After full creation of vacuum BLQPV switch can be released so that only one exhauster will be in working condition

Operation of VEF is as usual as in the normal dual brake locomotive.

During application of dynamic braking the master controller should be brought to"0" position and then only BLSI/ZSI switch should be switched off, after that the master controller has to be taken to the position "P" on braking side. The sequence of operations will be throwing of CFT to braking position, opening of C107 contactor, closing of C145 & C108, then only BLSI/ZSI has to be switched on to enable static converter to start with loads MVRF, MVMT1 & 2, MVSI 1 & 2, MVSL 1 & 2, MPH & battery charger. During braking operation, C107 is cut of through CTF running contact and so MVRH is isolated. During change over from braking to traction operation first of all master controller has to be brought to 'P' position, then switch off BLSI/ZSI so that all the loads are switched off when static converter is in working order. Now the master controller has to be brought to "0" position so that CTF is thrown to traction position thus, C145 & C108 are opened out and C107 closes. Now the switch BLSI/ZSI has to be switched on so that the static converter will start and ramp up with loads.

Annexure - 2

Operational features and Changes required in the control circuit of WAG5/WAG7 dual brake Electric locomotives provided with 180 KVA Static Convertor with soft start features.

The static converter has been provided with two internal status contacts, the first one is for **"ON"** and the other is for **"TRIP".**

1. The **"ON"** status contact closes **QCON** relay whose N/C contact is in **Q118** circuit, two N/O contacts in auxiliary control circuit and one N/C contact in LSCHBA circuit.
2. The "**TRIP"** status contact closes **QSIT** relay whose N/C contacts are in **DJ** control circuit.

Hardware requirements---

From old scheme: QCVAR, QOA, Q100, QTD105, QTD106 are to be Eliminated.

In New scheme;
a) QCON, QSIT, QTD-103, C-108 (contactor for 3Ø MVRF) are to be introduced.
b) BLSN is to used as BLSI (in case locos are not required for M U operation.).
c) ZSI (One toggle switch is to be provided within the accessibility of the driver in case the locos are required for M U operation.)

Energisation of air brake loco –
Switch on – HBA, BLVMT, BLCP/ BLCPD, BLDJ, BLRDJ and BLSI / ZSI.

Sequence of operation –
Traction – DJ closes, Static inverter starts along with loads MVRH, MVMT-1, MVMT-2, MPH, MVSI-1, MVSI -2 MVSL-1, MVSL 2, Battery charger and other a.c loads ramps up fully within 6 to 8 secs. QCON closes, C-101, C-102, and QTD-103 closes. Compressor 1 and 2 starts immediately and after 5 secs compressor 3 starts.
Switching off –The loads should be switched off through BLSI switch only.

Change over to braking-- Ensure DJ is in closed condition
Bring MP to "0" and GR to "0"
Open BLSI / ZSI switch
Keep MP on "P" – CTF is thrown to braking position, C-145 and C-108 closes.

Close BLSI / ZSI switch.
The sequence of operation is similar to traction mode except that MVRF comes in place of MVRH.

Switching off --The loads should be switched off through BLSI switch only.

Energisation of vaccum brake loco –

Sequence of operation –

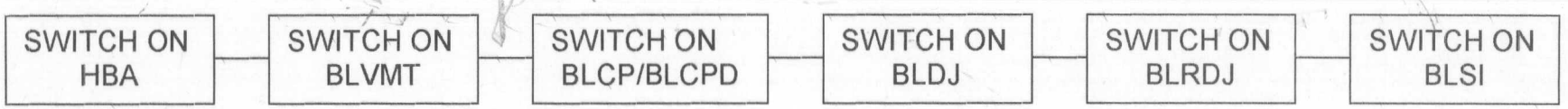
Traction – Switch on HBA, BLVMT, BLCP,/BLCPD , BLPV, BLDJ, BLRDJ and BLSI /ZSI.
Static inverter starts along with loads MVRH, MVMT-1, MVMT-2, MPH, MVSL-1, MVSL-2, MVSI-1, MVSI-2, CHBA, and other a.c loads. After 6 to 8 secs with closing of QCON, one compressor 1, 2, or 3 and exhauster 1 or 2, will start working.

Change over to braking--Ensure DJ is in closed condition
Bring MP to "0" and GR to "0".
Open BLSI / ZSI switch
Keep MP on "P" – CTF is thrown to braking position, C-145 and C-108 closes.
Close BLSI /ZSI switch
The sequence of operation is similar to traction mode except that MVRF comes in place of MVRH.

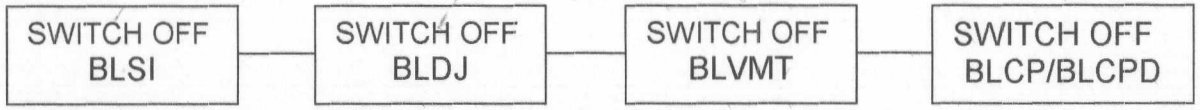
Annexure- 3

OPERATION OF DUAL BRAKE WAG5/WAG7 LOCOMOTIVE FITTED WITH STATIC CONVERTER (SOFT START) FOR AIR BRAKE ONLY

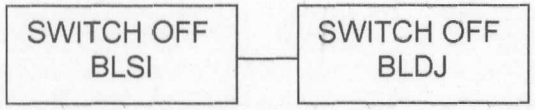
LOCO ENERGISATION



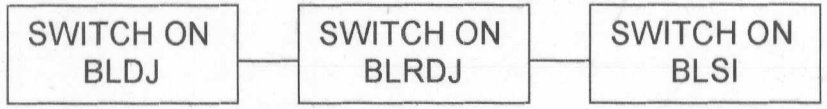
LOCO TRIPPING



BEFORE APPROCHING NEUTERL SECTION



AFTER PASSING NEUTRAL SECTION

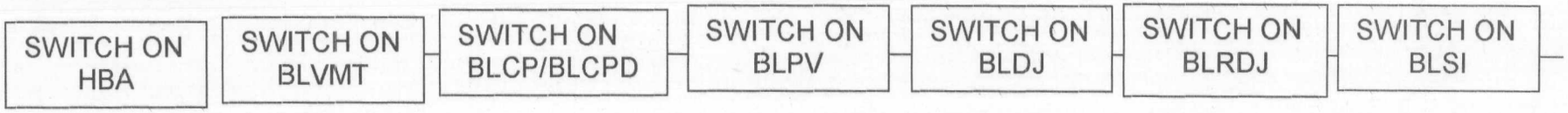


IF LOCO STANDS MORE THAN 20 MINUTES AT STN/YARD

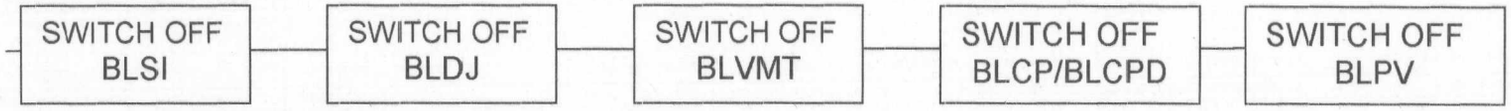
WHEN LOCO STARTS AFTER 20 MINUTES FROM STN/YARD

OPERATION OF DUAL BRAKE WAG5/WAG7 LOCOMOTIVE FITTED WITH STATIC CONVERTER (SOFT START) FOR VACUUM BRAKE LOCO WITHOUT MULTIPLE OPERATION.

LOCO ENERGISATION



LOCO TRIPPING



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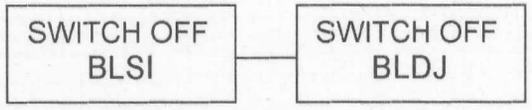
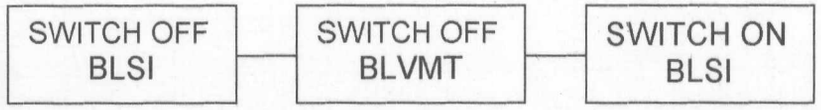


AFTER PASSING NEUTRAL SECTION

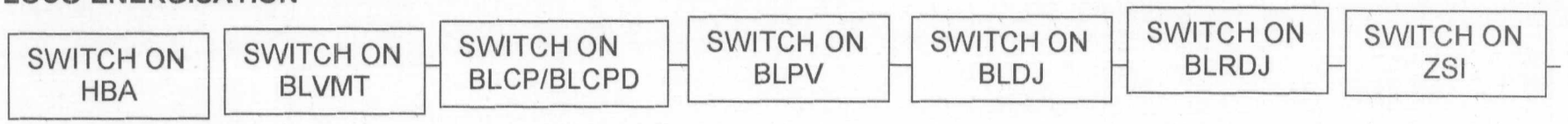
IF LOCO STANDS MORE THAN 20 MINUTES AT STN/YARD



WHEN LOCO STARTS AFTER 20 MINUTES FROM STN/YARD

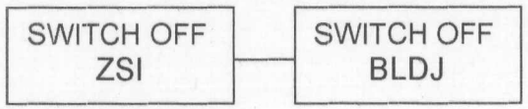
OPERATION OF DUAL BRAKE WAG5/WAG7 LOCOMOTIVE FITTED WITH STATIC CONVERTER (SOFT START) FOR VACUUM BRAKE LOCO WITH MULTIPLE OPERATION.

LOCO ENERGISATION



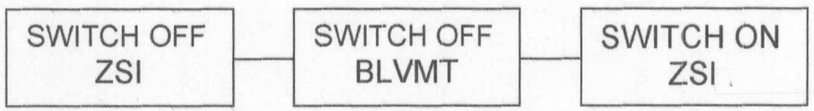
LOCO TRIPPING

BEFORE APPROCHING NEUTERL SECTION

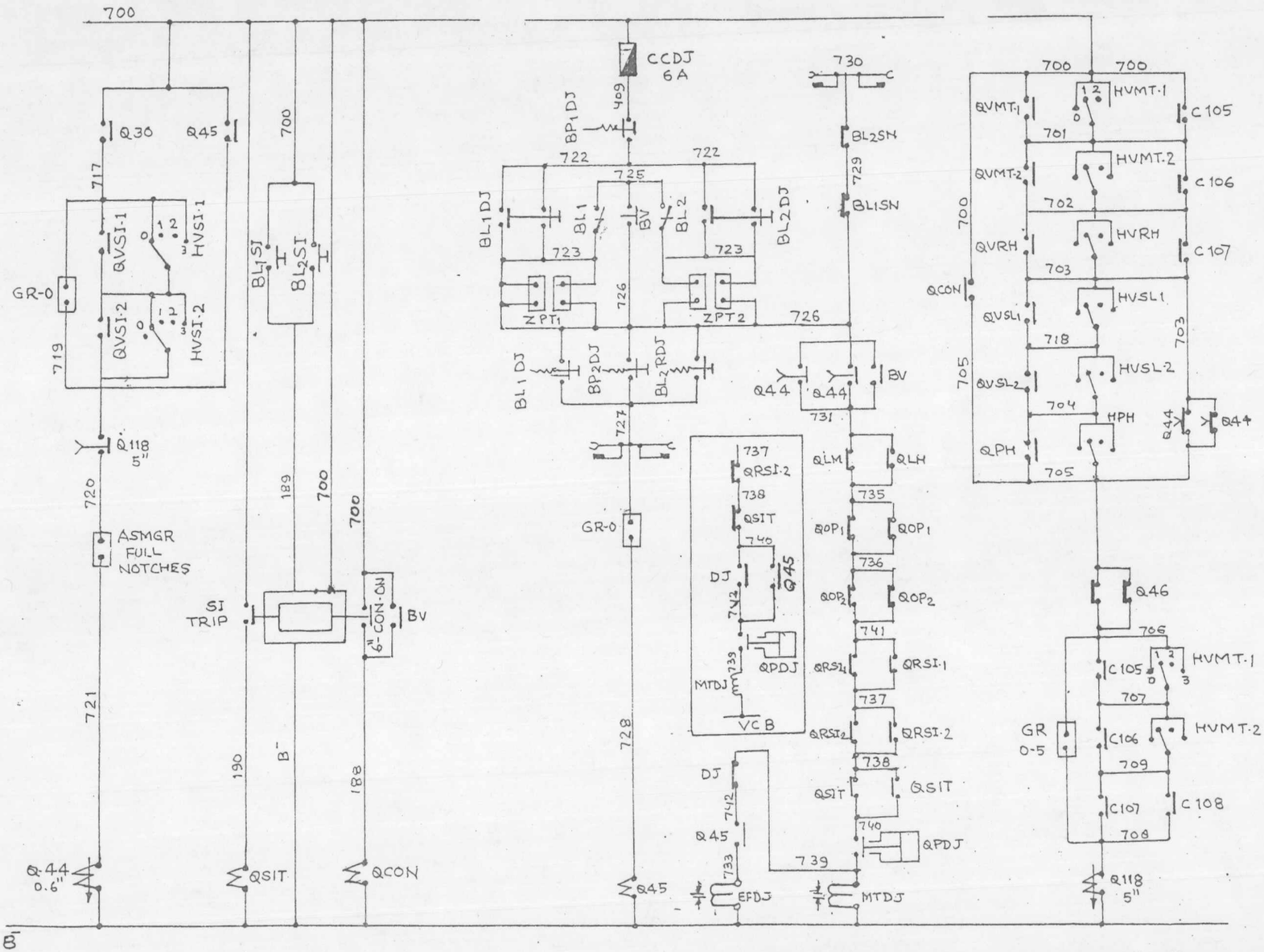


AFTER PASSING NEUTRAL SECTION

IF LOCO STANDS MORE THAN 20 MINUTES AT STN/YARD



WHEN LOCO STARTS AFTER 20 MINUTES FROM STN/YARD



REF:-		SCALE: NTS	APPROVED BY: (FOR DG)
TRACTION CONTROL CIRCUIT WITH 180 KVA STATIC CONVERTER WITH SOFT START.			FIRST ISSUED
			SUPERSEDES
R D SO-ELECT. DTE.	SKEL-4608, ALT '1'		SUPERSEDED BY

STATUS	ALT.	REF. No.	DESCRIPTION	APPROVED	DATE
	1		QCON N/C Contact removed from VCB CKT.		24.4.02

2.12.2001