

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:
Bid Receiving - PWGSC / Réception des soumissions -
TPSGC
11 Laurier St. / 11, rue Laurier
Place du Portage , Phase III
Core 0A1 / Noyau 0A1
Gatineau
Québec
K1A 0S5
Bid Fax: (819) 997-9776

SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

Vendor/Firm Name and Address
Raison sociale et adresse du
fournisseur/de l'entrepreneur

Issuing Office - Bureau de distribution
Marine Machinery and Services / Machineries et
services maritimes
11 Laurier St. / 11, rue Laurier
6C2, Place du Portage
Gatineau
Québec
K1A 0S5

Title - Sujet LOI-DIESEL DRIVEN GENERATOR CONTROL	
Solicitation No. - N° de l'invitation W8482-133370/B	Amendment No. - N° modif. 002
Client Reference No. - N° de référence du client W8482-133370	Date 2013-09-12
GETS Reference No. - N° de référence de SEAG PW-\$\$ML-034-23844	
File No. - N° de dossier 034ml.W8482-133370	CCC No./N° CCC - FMS No./N° VME
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2013-09-20	Time Zone Fuseau horaire Eastern Daylight Saving Time EDT
F.O.B. - F.A.B. Plant-Usine: <input type="checkbox"/> Destination: <input type="checkbox"/> Other-Autre: <input type="checkbox"/>	
Address Enquiries to: - Adresser toutes questions à: Clement, Gérard	Buyer Id - Id de l'acheteur 034ml
Telephone No. - N° de téléphone (819) 956-6233 ()	FAX No. - N° de FAX (819) 956-0897
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction:	

Instructions: See Herein

Instructions: Voir aux présentes

Delivery Required - Livraison exigée	Delivery Offered - Livraison proposée
Vendor/Firm Name and Address Raison sociale et adresse du fournisseur/de l'entrepreneur	
Telephone No. - N° de téléphone Facsimile No. - N° de télécopieur	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)	
Signature	Date

Solicitation No. - N° de l'invitation

W8482-133370/B

Amd. No. - N° de la modif.

002

Buyer ID - Id de l'acheteur

034ml

Client Ref. No. - N° de réf. du client

W8482-133370

File No. - N° du dossier

034mlW8482-133370

CCC No./N° CCC - FMS No/ N° VME

CETTE MODIFICATION #002 EST MISE EN PLACE POUR LA RAISON SUIVANTE:

- Publier les questions et les réponses en date du 10 septembre 2013.
- Insérer le diagramme concernant l'arrangement des câbles.

TOUS LES AUTRES TERMES ET CONDITIONS DEMEURENT INCHANGÉS.

Diesel Generator Controller LOI Bidders Questions and Answers

10 September 2013

Keys for Interpretation of Answers:

No Highlight = Questions not answered yet, Green Highlight = Answers already provided, Yellow Highlight = Current answers

Item #	LOI SOW References	Statements	Questions	Answers
1	Page 4		<p>In accordance with page 4 of the subject LOI, I would respectfully request if the following information could be provided to aid in the response that my company intends to submit. Specifically we request the following information is requested in either hard or soft copy:</p> <p>a. A cable plan and list of cables that is used for the current DGC; and</p> <p>b. Information on the Main Machinery Console (MMC) and how it interfaces with the DGC.</p>	See attached DGC Cables Arrangements drawing
2			Will the DGC be under ITAR or if the Controlled goods will apply?	No, ITAR does not apply, nor it is controlled good
3			Is front access of the field cables of the electronics in the DGC enclosure a requirements?	Yes, front access of the field wiring to the internal electronics of the DGC is essential.

4	<p>Generator Voltage Regulation</p> <p>Section: 6.3.2 Operational Modes, Item # 5</p> <p>Section : 6.3.3 Operational Item # 6</p>	<p>A control to supply the propulsion Motor with any surplus power not required for battery charging or submarine's services.</p> <p>The DGC controls the DC voltage to the Generator Field winding, subject to the load requirements within the above operational modes.</p>	<p>Do the other loads require generator voltage regulation beyond the dynamic of the loads described for battery charging (i.e voltage transient response for load steps?</p> <p>Can load changes occur that would result in the generator transient motoring operation?</p>	<p>No</p> <p>No</p>
5	<p>Transient Requirements</p> <p>Section : 7.1 Operational requirements</p>		<p>What are the transient requirements for the propulsion switchboard loads?</p>	<p>Voltage range 340-720 V DC</p> <p>Possible ripple voltage content associated with 6 pulse rectified supplies.</p> <p>Spikes Up to 2.5KV 1.2 microsec rise time 50 microsec decay time to 50%</p> <p>Reduction Supply 340V for 50 microsec 120V for 0.1 sec 70V for 1 sec</p>

				<p>40v for 10 sec 34V continuous</p> <p>See Table 1 for details on page 9 of this document.</p>	
	<p>Generator Time Constants</p> <p>Section : 6.3.6 Power Supplies</p>	<p>The exciter to generator terminal voltage time constant will determine the minimum control sample rate for the generator controller. The following figure (6) is a model of an excitation system taken from IEEE Std 421.5-1992. The exciter time constant is shown at TE in this figure as indicated by the circled component (red).</p> <p>The generator field magnetizing reactance is incorporated into the generator model time constants shown in the figure below:</p> <p>The generator model time constants of interest are T_d', T_d'', T_q'', T_{do}', T_{do}'' and T_{qo}''. If the generator parameters (time constants) are not known, any information that would describe what is needed for the control response time (or sample</p>	<p>What are the Nominal, Steady State and maximum Loads?</p> <p>What are the generator time constants for both the excitation field and the magnetizing fields?</p>	<p>Unfortunately this information is not available. However the Generator, Exciter and Stator details are listed on pages 6, 7 and 8 of this document.</p> <p>Further, Canada will try and provide this information at the RFP phase.</p>	

		time) would help.			
7	Generator Diodes Section : 6.3.6 Power Supplies		Please confirm that there are rotating diodes used in the generator (e.g. no slip rings, synchronous alternator with brushless excitation)	Yes, there are rotating diodes used in the generator.	
8	Analog Outputs Section : 7.4.4 Table 10	We request following the Analog Outputs clarifications:	<p>1 (0-5V) - no description / what is this output for?</p> <p>5 (0-8) - from potentiometers - are these actually outputs voltages to potentiometers to allow a current to be read as an input above?</p>	<p>This analog output is from a potentiometer at the Machinery Control Console (MCC) for the Voltage/Current Trim Control Balance.</p> <p>These are voltage outputs from the DGC to the potentiometers; they are active when the generator provides a supply voltage to the DGC.</p>	
9	Supply Voltages Section : 7.4.4 Table 10	We request the following Supply Voltage clarifications:	<p>Are all of the supply voltages required (i.e. needed external to the DGC)? Or are they at the discretion of the new design of the DGC?</p> <p>If they are required, we request the current requirements for each of them.</p>	<p>All output voltages for the Sending Units are required. The output voltages to the potentiometers are at the discretion of the new controller, providing new potentiometers are provided and these fit into the existing space at the MCC. The output for the generator exciter field is also required; this is listed under the "analog outputs" in LOI SOW, 7.4.4 Table 10.</p>	

10	Dimensions Section : 7.3.1 Table 9		Are the dimensions inclusive of any shock mounting (if necessary), or would the space for shock mounts (e.g. mounts and sway space) be in addition to the dimensions noted in Table 9?	The dimensions provided are only for the DGC enclosure excluding the space required for shock mounts.
11	Reliability Section : 7.7.2 System Availability	Please provide further clarification on the 99.999% reliability for 10,000 hours:	What constitutes a failure? Does the 10,000 hours exclude schedule maintenance and repair time?	Any component of the DGC can fail as long as the system availability is maintained to 99.999% Yes
12	Spare Capacity Section : 7.5.4 Spare computing and Memory Requirements.	Please provide further clarification on the spare requirements:	Please clarify that 100% spare processing power is equivalent to only using 50% of the processor's capacity at delivery.	Yes, the proposed CPU and memory shall only utilize 50% of their capacities at the time of delivery

Generator Details

8.	Type	: ALH 112 M25
	Number of poles	: 12
	Phases	: Double 3 (30° displacement)
	Output	: 1958 to 2938A dc (via rectifier)
	Speed	: 1350 rev/min
	Voltage	: 480 - 720V dc
	Power	: 1410kW
	Enclosure	: Closed air circuit, water cooled, watertight to shaft level
	Full load excitation voltage	: 71V
	Full load excitation current	: 175A
	Period of output	: Continuous
	Efficiency (min)	: Full load 92.6% : 1/2 load 90.1%
	Stator class 'F' insulated	
	Rotor class 'F' insulated.	

Exciter Details

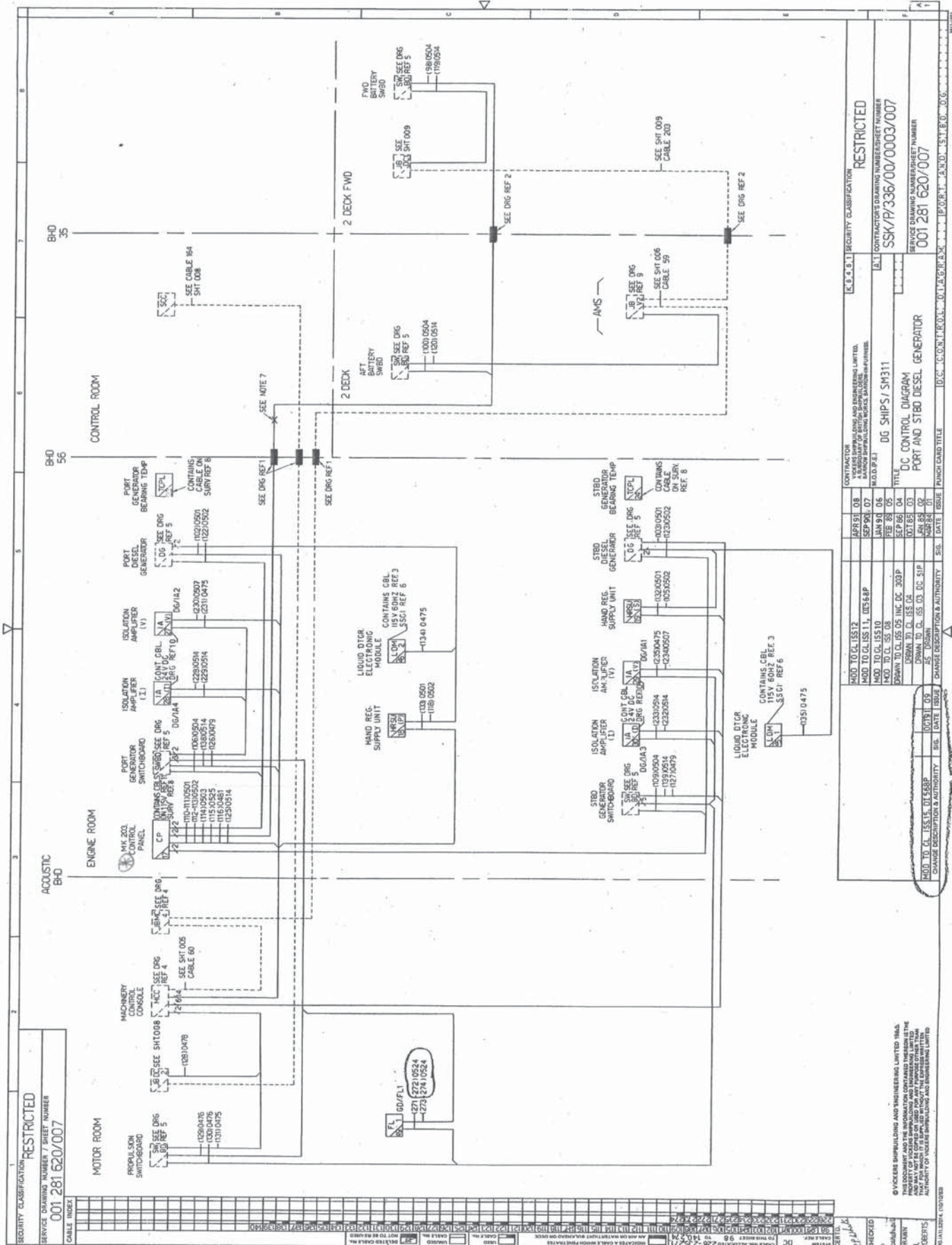
11.	Type	: OAJ 51 M5
	Number of poles	: 12
	Number of phases	: 3
	Output frequency	: 135Hz
	Speed	: 1350 rev/min
	Power	: 15.4kW
	Voltage	: 83V
	Current	: 185A
	Excitation voltage	: 56V
	Excitation current	: 3.5A
	Period of output	: Continuous
	Class 'F' insulation	

12. Stator data.

(a)	Number of coils	: 12
(b)	Number of turns per coil	: 500
(c)	Method of connection	: Series
(d)	Method of winding	: Mummified
(e)	Size of conductor (bare)	: 1.0mm. x 3.15mm
(f)	Insulation of conductor	: POLYESTER IMIDE (Grade 2)
(g)	Size of conductor (insulated)	: 1.15mm x 3.30mm
(h)	Resistance per coil (in ohms) at 20°C	: 1.09
(j)	Weight of copper per coil	: 6kg

TABLE 1 PROPULSION SWITCHBOARD OUTPUTS

Voltage		Current		Motor Rating	
		Armature	Total		
Submerged					
Batteries in Series Armatures in Parallel (Batteries-in-Series)	870	870	2510	5020	1 Hour
	680	680	3290	6580	1 Hour
	940	940	1170	2340	Continuous
	750	750	1490	2890	Continuous
Batteries in Parallel Armatures in Parallel (Group Up)	470	470	2450	4900	2½ Hours
	380	380	3090	6180	2½ Hours
	490	490	320	640	Continuous
	410	410	370	740	Continuous
Batteries in Parallel Armatures in Series (Group Down)	245	490	620	620	Continuous
	210	420	730	730	Continuous
	250	500	115	115	Continuous
	210	420	125	125	Continuous
Shorting with Batteries Floating at 510V					
Group Up	510	510	2500	5000	Continuous
	510	510	430	860	Continuous
Group Down	255	510	860	860	Continuous
	255	510	120	120	Continuous
Shorting with Batteries Charging at 576V					
Grouping Up	576	576	1400	2800	Continuous
	576	576	535	1070	Continuous
Group Down	288	576	1050	1050	Continuous
	288	576	140	140	Continuous
Shorting with Batteries Charging at 720V					
Group Up	720	720	1450	2900	Continuous
	720	720	770	1540	Continuous
Group Down	360	720	1500	1500	Continuous
	360	720	200	200	Continuous



© VICKERS SHIPBUILDING AND ENGINEERING LIMITED 1965

10 JAN 1984 11:00 UTC

SECURITY CLASSIFICATION		SERVICE DRG. No. / SHT. No.		3		4		5		6		7		8		9		10		11	
RESTRICTED		001 281 620 015		©VICKERS SHIPBUILDING AND ENGINEERING LIMITED 1955		THIS DOCUMENT AND THE INFORMATION CONTAINED THEREON IS THE PROPERTY OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED AND MAY NOT BE COPIED OR USED FOR ANY PURPOSE OTHER THAN THAT FOR WHICH IT IS SUBMITTED WITHOUT THE EXPRESS WRITTEN AUTHORITY OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED															
CABLE		CIRCUIT		FROM		TO															
No.	TYPE	CORE	LINE	LENGTH																	
91	SPARE																				
92	SPARE																				
93	SPARE																				
94	SPARE																				
95	SPARE																				
96	SPARE																				
97	SPARE																				
98	0504 (G)	1	A	50	SIGNAL																
		2	B		SIGNAL COMMON																
		3	C		+20V SUPPLY																
		4	D		0 V																
		5	E		-20V SUPPLY																
		6	A		SIGNAL																
		7	B		SIGNAL COMMON																
		8	C		+20V SUPPLY																
		9	D		0 V																
		10	E		-20V SUPPLY																
		11																			
		12																			
		13																			
		14																			
		SCR																			
99	DELETED																				
100	0504 (G)	1	A	30	SIGNAL																
		2	B		SIGNAL COMMON																
		3	C		+20V SUPPLY																
		4	D		0 V																
		5	E		-20V SUPPLY																
		6	A		SIGNAL																
		7	B		SIGNAL COMMON																
		8	C		+20V SUPPLY																
		9	D		0 V																
		10	E		-20V SUPPLY																
		11																			
		12																			
		13																			
		14																			
		SCR																			

CERT'D		SYSTEM CABLE REFERENCE		DC		CONTRACTOR		V S E L		K 6.4.5.1 SECURITY CLASSIFICATION	
CABLES 91 TO 100						BARRON-IN-FURNISH		RESTRICTED		K 6.4.5.1	
CHECKED	P. P. B. B. B.	DRAWN TO CL ISS 05	05	SEP 85	05	SEP 85	DG SHIPS / SM 311	CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
DRAWN	P. P. B. B. B.	DRAWN TO CL ISS 04	04	OCT 85	04	OCT 85		CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
		DRAWN TO CL ISS 03	03	JAN 85	03	JAN 85		CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
		DRAWN TO CL 02	02	MAR 64	02	MAR 64		CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
		CHANGE						CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
PUNCH CARD TITLE		D.C. CONTROL DIAGRAM		CABLE SCHEDULE		001 281 620 015		CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	
PUNCH CARD TITLE		D.C. CONTROL DIAGRAM		CABLE SCHEDULE		001 281 620 015		CONTRACTOR'S DRAWING NUMBER		SSK / P / 336 / 00 / 0003 / 015	

SECURITY CLASSIFICATION

RESTRICTED

SERVICE DRG No./SHT. No.

001 281 620 017

© VICKERS SHIPBUILDING AND ENGINEERING LIMITED 1966

THIS DOCUMENT AND THE INFORMATION CONTAINED THEREIN IS THE PROPERTY OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED AND MAY NOT BE COPIED OR USED FOR ANY PURPOSE OTHER THAN THAT AUTHORIZED BY VICKERS SHIPBUILDING AND ENGINEERING LIMITED

11

10

9

8

7

6

5

4

3

2

1

No.	TYPE/EMC	CABLE			CIRCUIT	FROM	TO
		TYPE/EMC	CORE	LINE LENGTH			
112	0502 (G)	1	SIG	15	MK 203 CONTROL PANEL AUTO TRIM		
		2	+				
		3	SPARE				
		SCR					
113	0502 (G)	1	SIG	15	MK 203 CONTROL PANEL- POWER CONTROL (STBD)		
		2	+				
		3	COMM				
		SCR					
114	0503 (G)	1	SIG	15	POWER CONTROL (PORT)		
		2	COMM				
		3	+				
		4	+				
		5	SIG				
		6	COMM				
		7	SPARE				
		SCR					
115	0525 (G)	1	CONTACT	15	AUTO/MODE SWITCHES		
		2	COMMON				
		SCR					
		3	CONTACT				
		4	COMMON				
		SCR					
		5	SPARE				
		6	SPARE				
		SCR					
116	0481 (G)	1	+	15	REGULATOR WING		
		2	-				
		3	COMMON				
		4	SPARE				
		5	PWR LIMIT REACHED				
		6	RECT FAIL DETECTION				
		7	SPARE				
		8	REGULATOR WING				
		9	COMMON				
		10	SPARE				
		11	PWR LIMIT REACHED				
		12	RECT FAIL DETECTION				
		13	SPARE				
		14	INTERMEDIATE				
		15	COMMON				
		16	INITIAL				
		17	SPARE				
		18	WARNING				
		19	FINISH				
		SCR					
117	DELETED						
118	0502 (RT)	1	A	20	PORT DIESEL GEN HAND FIELD SUPPLY		
		2	SPARE				
		3	C				
		SCR					

CERTD

P. P. P. P. P.

SYSTEM CABLE REFERENCE DC

CABLES 112 TO 118

CONTRACTOR VICKERS SHIPBUILDING GROUP LTD.

BARROW SHIPBUILDING WORKS

M.O.D. (PE)

DG SHIPS / SW 311

CONTRACTOR'S DRAWING NUMBER

SSK/P/336/00/0003/017

SERVICE DRAWING NUMBER/SHEET NUMBER

001 281 620 017

PUNCH CARD TITLE

DC CONTROL DIAGRAM

CABLE SCHEDULE

11

10

9

8

7

6

5

4

3

2

1

RESTRICTED
001 281 614/046

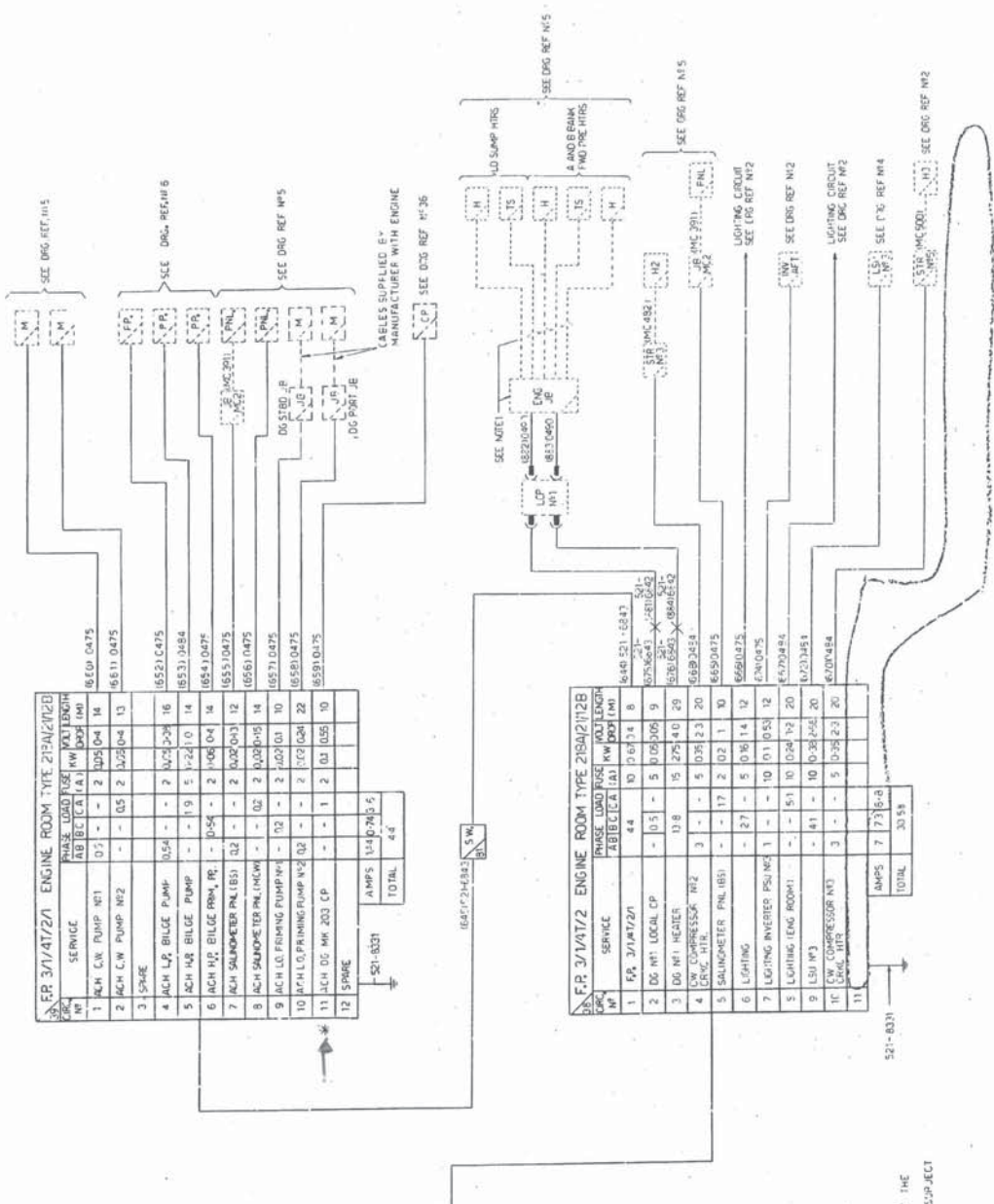
CABLE INDEX

NO.	FROM	TO	TYPE	DATE	BY	REMARKS
1	FR 3/1/4T/21	ENGINE ROOM	TYPE 218A/21/2B	12/84	SW	
2	FR 3/1/4T/2	ENGINE ROOM	TYPE 128A/B	12/84	SW	

NO.	SERVICE	PHASE	LOAD (KW)	LOAD (KVA)	LOAD (AMP)	WATT	VOLTS	PHASE	TYPE	DATE	BY	REMARKS
1	ACH C.W. PUMP	W1	0.5	-	2	105	04	14				
2	ACH C.W. PUMP	W2	-	0.5	2	105	04	13				
3	SPARE											
4	ACH L.P. BILGE PUMP	0.54	-	2	105	04	16					
5	ACH H.P. BILGE PUMP	-	1.9	2	105	04	14					
6	ACH H.P. BILGE PUMP	0.54	-	2	105	04	14					
7	ACH SALINOMETER PNL (BS)	0.2	-	2	105	04	12					
8	ACH SALINOMETER PNL (NCW)	-	0.2	2	105	04	14					
9	ACH H.P. FRIMING PUMP	0.2	-	2	105	04	22					
10	ACH H.P. FRIMING PUMP	0.2	-	2	105	04	22					
11	ACH DG MK 203 CP	-	1	2	01	055	10					
12	SPARE											
TOTAL												4.4

NO.	SERVICE	PHASE	LOAD (KW)	LOAD (KVA)	LOAD (AMP)	WATT	VOLTS	PHASE	TYPE	DATE	BY	REMARKS
2	FR 3/1/4T/2	ENGINE ROOM	30.58	40	162	0.5	3					

2 FR 3/1/4T/2 30.58 40 162 0.5 3 16.31.521-8846



NO.	SERVICE	PHASE	LOAD (KW)	LOAD (KVA)	LOAD (AMP)	WATT	VOLTS	PHASE	TYPE	DATE	BY	REMARKS
1	FR 3/1/4T/21	ENGINE ROOM	4.4	10	162	0.5	3					
2	DG M1 LOCAL CP	-	0.5	5	0.05	0.9						
3	DG M1 HEATER	0.8	15	275	4.0	29						
4	DG COMPRESSOR M2	3	-	5	0.35	2.3	20					
5	SALINOMETER PNL (BS)	-	17	2	0.2	1	10					
6	LIGHTING	-	27	5	0.16	1.4	12					
7	LOGGING INVERTER PSU M2	1	-	10	0.1	0.55	12					
8	LOGGING (ENG ROOM)	-	5.1	10	0.24	1.2	20					
9	LSU M2	-	4.1	10	0.28	2.4	20					
10	DG COMPRESSOR M2	3	-	5	0.35	2.3	20					
11	SPARE											
TOTAL												30.58

NOTE: 1. TERMINAL BLOCK AND THE JUNCTION ARE APPROVED BY THE ENGINEER OF THE MANUFACTURER.
2. WHERE * APPLIES IT INDICATES THAT THE SUPPLY IS ESTIMATED AND SUBJECT TO CHANGE WHEN MANUFACTURE INFORMATION IS AVAILABLE.

© VICKERS SHIPBUILDING AND ENGINEERING LIMITED 1982
PROPERTY OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED
THIS DRAWING IS THE PROPERTY OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED
IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS
WITHOUT THE WRITTEN PERMISSION OF VICKERS SHIPBUILDING AND ENGINEERING LIMITED

RESTRICTED		SECURITY CLASSIFICATION	
CONTRACTOR'S DRAWING NUMBER		CONTRACTOR'S DRAWING NUMBER	
SSK/P/334/03/0001/046		SSK/P/334/03/0001/046	
115V 60HZ POWER DISTRIBUTION SYSTEM		115V 60HZ POWER DISTRIBUTION SYSTEM	
FUSE PANEL 3/1/4T		FUSE PANEL 3/1/4T	
001 281 614/046		001 281 614/046	
AP LANCOS		AP LANCOS	

1		2		3		4		5		6		7		8		9		10		11	
SECURITY CLASSIFICATION		SERVICE DRG. No. / DMT. No.		001 281 614/ 72		001 281 614/ 72															
RESTRICTED																					
CABLE		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT	
No.		TYPE		CORE		LINE		LENGTH		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT		CIRCUIT		EQUIPMENT	
640 0475		1 X		2 Y		12 M		SUPPLY TO FW COOL PP N2 - ACH		FUSE PANEL 3/1/4T/1		ENG ROOM		F.W. COOL PP NO.2 ROOM		FUSE PANEL 3/1/4T/2		ENG ROOM		SALINOMETER PNL (FWD)	
641 DELETED																				DG NO1 JB	
642 SPARE																				DG NO2 JB	
643 521-6846		1 R		2 Y		8 M		SUPPLY TO FP 3/1/4T/2		FUSE PANEL 3/1/4T		ENG ROOM		FUSE PANEL 3/1/4T/2		ENG ROOM		CONTROL PANEL		ENG ROOM	
644 6843		1 R		2 Y		7 M		SUPPLY TO FP 3/1/4T/2/1		FUSE PANEL 3/1/4T/2		ENG ROOM		FUSE PANEL 3/1/4T/2/1		ENG ROOM		MOTOR		ENG ROOM	
645 6843		1 R		2 Y		1 M				SWITCH		ENG ROOM		FUSE PANEL 3/1/4T/2/1		ENG ROOM		MOTOR		ENG ROOM	
646 DELETED																					
647 DELETED																					
648 DELETED																					
649 DELETED																					
650 DELETED																					
651 DELETED																					
652 0475		1 X		2 Y		16 M		SUPPLY TO LP BILGE PUMP - ACH		FUSE PANEL 3/1/4T/2/1		ENG ROOM		LP BILGE PUMP		FUSE PANEL 3/1/4T/2		ENG ROOM		JB MC2	
653 0484		1 X		2 Y		14 M		SUPPLY TO HP BILGE PUMP - ACH		FUSE PANEL 3/1/4T/2/1		ENG ROOM		HP BILGE PUMP		FUSE PANEL 3/1/4T/2		ENG ROOM		LIGHTING	
654 0475		1 X		2 Y		14 M		SUPPLY TO HP BILGE PRIM. PP - ACH		FUSE PANEL 3/1/4T/2/1		ENG ROOM		HP BILGE PRIM. P.P.		FUSE PANEL 3/1/4T/2		ENG ROOM		C.W. COMP. STR N23	
655 0475		1 X		2 Y		12 M		SUPPLY TO SAL. PNL - ACH (BATTERY SERVICE)						JB MC2						C.W. COMP. STR N25	

CERTO		SYSTEM CABLE REFERENCE PM		CONTRACTOR		VICKERS SHIPBUILDING & ENGINEERING LTD.		SECURITY CLASSIFICATION		K 6.4.5.1		RESTRICTED		CONTRACTORS DRAWING NUMBER		SSK/P/334/000/001/072		SERVICE DRAWING NUMBER/SHEET NUMBER		001 281 614/ 72	
P.P. White		CABLES 640 TO 671		M.O.D. (PBI)		BARBER SHIPBUILDING PONS		A.3		D.G. SHIPS/DPT. 22		A.3		CONTRACTORS DRAWING NUMBER		SSK/P/334/000/001/072		SERVICE DRAWING NUMBER/SHEET NUMBER		001 281 614/ 72	
CHECKED		APPROVED IAW CL ISSUE 04		APPROVED IAW CL ISSUE 03		APPROVED IAW CL ISSUE 02		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED	
DRAWN		APPROVED IAW CL ISSUE 03		APPROVED IAW CL ISSUE 02		APPROVED IAW CL ISSUE 01		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED	
M.J. MACALLAN		APPROVED IAW CL ISSUE 03		APPROVED IAW CL ISSUE 02		APPROVED IAW CL ISSUE 01		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED	
LID 2 5743 (8/81)		APPROVED IAW CL ISSUE 03		APPROVED IAW CL ISSUE 02		APPROVED IAW CL ISSUE 01		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED		APPROVED	

115V 60HZ POWER DISTRIBUTION SYSTEM
CABLE SCHEDULE
11.1.5V 60HZ PWR DIST. SYSTEM SCHEDULE
A.P. LAN 107.81