26C

USE OF STEEL SHIMS

IN ORDER TO LIMIT THE NUMBER OF SHIMS USED IN A PARTICULAR PLACE TO A MINIMUM, ONLY THREE SHIM THICKNESSES ARE NECESSARY FOR ANY ·001 INS INCREMENT FROM ·002 INS TO ·021 INS. THESE THICKNESSES ARE ·002 INS, ·003 INS, AND ·007 INS. WITH THIS COMBINATION OF THICKNESSES, A MAXIMUM OF FOUR SHIMS ARE REQUIRED IN ANY INCREMENT AND CAN BE SELECTED FROM A BASIC SUPPLY OF 2 OFF EACH THICKNESS.

A ·022 INS THICK SHIM (OR SPACER) WILL EXTEND THE RANGE TO ·035 INS WITH A MAXIMUM OF FOUR SHIMS, OR TO ·043 INS WITH FIVE SHIMS.

IT IS DESIRABLE TO REDUCE THE NUMBER OF SHIMS MATING SURFACES TO A MINIMUM IN ORDER TO MITIGATE PLAY DEVELOPING DUE TO EXTRANEOUS SUBSTANCES BEING SQUEEZED BETWEEN THE SHIMS - ALSO SHIM STOCKS ARE REDUCED TO THREE THIN ONES, AND ONE THICK ONE FOR ADJUSTING INCREMENTS OF ·001 INS. STARTING FROM ·002 INS.

REAMERS.

SOME DIFFICULTY HAS BEEN EXPERIENCED ON PRODUCTION IN MAINTAINING HOLE SIZES WITH STANDARD REAMERS. THE HOLE SIZES QUOTED ON THE DRAWING HAVE USUALLY BEEN DIMENSIONED AS STANDARD HOLES WITH THE DECIMAL SIZE TO THE THIRD PLACE, WHEREAS IT SHOULD HAVE BEEN GIVEN TO THE FOURTH PLACE.

STANDARD REAMERS ARE MANUFACTURED TO COMMERCIAL TOLERANCES VARYING FROM PLUS ·0005" TO PLUS ·0014" DEPENDING ON SIZE.

AN EXAMPLE OF THE ABOVE IS ON A $^{15}/_{16}$" DIAMETER REAMER. THE MANUFACTURING TOLERANCE ON THIS REAMER IS PLUS ·0005" TO PLUS ·001" AND IF THE THIRD DECIMAL PLACE ONLY IS GIVEN THE FOLLOWING ERROR OCCURS :-

1. REAMER DIMENSIONS :- ·9375" + ½ = ·9380".
   ·9375" + 1 = ·9385".

2. DRAWING DIMENSION TO THIRD DECIMAL PLACE } ·937" + 1 = ·9370".
   ·9380".

3. DRAWING DIMENSION TO FOURTH DECIMAL PLACE } ·9375" + 1 = ·9375".
   ·9385".

IT WILL BE SEEN FROM THE ABOVE, THAT TO MAINTAIN THE TOLERANCE GIVEN AT 2 A STANDARD REAMER WOULD HAVE TO BE MODIFIED TO GIVE THE REQUIRED TOLERANCE.

ON ALL HOLES REQUIRING A TOLERANCE OF "ONE THOU'" (·001") OR LESS THE DIMENSION, WHERE NECESSARY, MUST BE GIVEN TO THE FOURTH DECIMAL POINT.

CASE HARDENING NOTES ON DRAWINGS.

WHERE A PART IS NOT REQUIRED TO BE CASE - HARDENED ALL OVER, BUT ON CERTAIN AREAS ONLY, THE FOLLOWING NOTES SHOULD BE PUT ON THE DRAWING :-

1. "TO BE CASE - HARDENED WHERE MARKED H.H. TO A DEPTH OF _____ - _____. ※ ROCKWELL OR ※ BRINELL ON CASE TO BE _____/_____"

※ QUOTE ONLY ONE AS REQUIRED.

2. (IF REQUIRED) - "LEAVE SOFT WHERE MARKED SS"

H H MARKS ARE TO BE SHOWN WHERE HARDENING IS REQUIRED AND SS MARKS WHERE THE PART MUST BE LEFT SOFT, TOGETHER WITH THE LENGTH AFFECTED. SEE FIG. 35

ALL OTHER PARTS OF THE JOB TO BE LEFT OPEN SO THAT MAKERS CAN DECIDE FOR THEMSELVES.

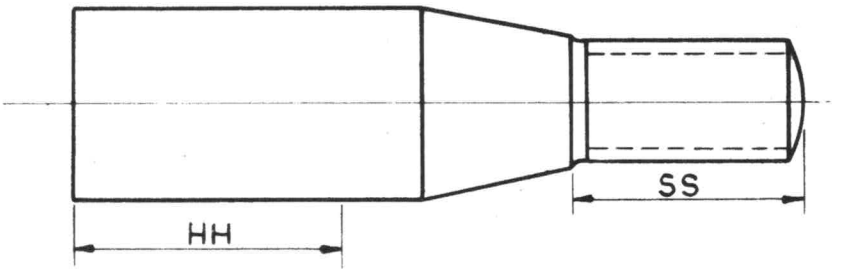


FIG. 35.

WHERE A PART IS REQUIRED TO BE CASE - HARDENED ALL OVER THIS SHOULD BE STATED IN THE APPROPRIATE COLUMN TOGETHER WITH CASE

FLYWHEEL ENERGY

RELATIVE CHANGE TO CHANGE IN SPEED.

TABLE 17 PROVIDES A HANDY REFERENCE FOR THE DETERMINATION OF THE PERCENTAGE CHANGE IN FLYWHEEL ENERGY RESULTING FROM AN INCREASE OR DECREASE IN THE PERIPHERY SPEED OF THE FLYWHEEL. THE SAME NUMERICAL VALUES APPLY TO ANY RELATIONSHIP WHEREIN ONE VARIABLE IS PROPORTIONAL TO THE SQUARE OF ANOTHER VARIABLE.

FORMULAE FOR DECREASING ENERGY.

$$xE = x\,\frac{WV^2}{2g} = \frac{W[V^2-(1-y)^2V^2]}{2g}$$

$$\therefore x = 2y - \left(\frac{y}{10}\right)^2$$

FORMULAE FOR INCREASING ENERGY.

$$xE = x\,\frac{WV^2}{2g} = \frac{W[(1+y)^2V^2-V^2]}{2g}$$

$$\therefore x = 2y + \left(\frac{y}{10}\right)^2$$

WHERE :-

E = FLYWHEEL ENERGY FT-LB.

V = PERIPHERAL VELOCITY OF FLYWHEEL FT/SEC.

W = WEIGHT OF FLYWHEEL RIM, LB.

X = PERCENT ENERGY, INCREASE OR DECREASE.

y = PERCENT VELOCITY, INCREASE OR DECREASE.

g = GRAVITY FACTOR = 32·16

SINCE VELOCITY AND R P M ARE DIRECTLY PROPORTIONAL, SPEED MAY BE READ AS R.P.M.

EXAMPLES

1. DURING THE WORK CYCLE A FLYWHEEL IS REDUCED FROM 100 R.P.M TO 94 R.P.M OR 6 PER CENT ENERGY TAKEN OUT IS 11·64 PER CENT

2. IT IS DESIRABLE TO REDUCE THE SPEED OF A MACHINE FROM 200 R.P.M TO 180 R.P.M OR 10 PER CENT. ENERGY LOSS WOULD BE 19 PER CENT.

3. A FLYWHEEL RUNNING AT 150 R.P.M IS DELIVERING INSUFFICIENT ENERGY TO DO THE WORK REQUIRED. INCREASING THE SPEED TO 165 R.P.M OR 10 PER CENT

FLYWHEEL ENERGY. CONT'D.

RELATIVE CHANGE TO CHANGE IN SPEED.

PER CENT DECREASE OR INCREASE IN SPEED	PER CENT DECREASE IN ENERGY	PER CENT INCREASE IN ENERGY	PER CENT DECREASE OR INCREASE IN SPEED	PER CENT DECREASE IN ENERGY	PER CENT INCREASE IN ENERGY
2	3·96	4·04	52	76·96	131·04
4	7·84	8·16	54	78·84	137·16
6	11·64	12·36	56	80·64	143·36
8	15·36	16·64	58	82·36	149·64
10	19·00	21·00	60	84·00	156·00
12	22·56	25·44	62	85·56	162·44
14	26·04	29·96	64	87·04	168·96
16	29·44	34·56	66	88·44	175·56
18	32·76	39·24	68	89·76	182·24
20	36·00	44·00	70	91·00	189·00
22	39·16	48·84	72	92·16	195·84
24	42·24	53·76	74	93·24	202·76
26	45·24	58·76	76	94·24	209·76
28	48·16	63·84	78	95·16	216·84
30	51·00	69·00	80	96·00	224·00
32	53·76	74·24	82	96·76	231·24
34	56·44	79·56	84	97·44	238·56
36	59·04	84·96	86	98·04	245·96
38	61·56	90·44	88	98·56	253·44
40	64·00	96·00	90	99·00	261·00
42	66·36	101·64	92	99·36	268·64
44	68·64	107·36	94	99·64	276·36
46	70·84	113·16	96	99·84	284·16
48	72·96	119·04	98	99·96	292·04
50	75·00	125·00	100	100·00	300·00

TABLE. 17.

B.S.W. (S.W.G.)

S.W.G	DIA.		SECTL. AREA IN □"	WEIGHT OF 100 FT.		
	INS.	MMS.		STEEL	BRASS	COPPER
7/0	·500	12·70	·1963	66·66	70·43	76·00
6/0	·464	11·80	·1691	57·43	60·67	65·60
5/0	·432	11·00	·1466	49·80	52·60	57·00
4/0	·400	10·16	·1257	42·70	45·10	48·70
3/0	·372	9·448	·1087	36·92	39·00	42·00
2/0	·348	8·839	·0951	32·30	34·12	36·80
0	·324	8·229	·0824	28·00	29·60	32·00
1	·300	7·620	·0707	24·0	25·7	27·40
2	·276	7·010	·0598	20·1	21·6	23·30
3	·252	6·400	·0499	16·8	18·1	19·30
4	·232	5·892	·0423	14·3	15·2	16·40
5	·212	5·384	·0353	11·9	12·7	13·70
6	·192	4·876	·0290	9·7	10·5	11·15
7	·176	4·470	·0243	8·2	8·8	9·42
8	·160	4·064	·0201	6·8	7·3	7·80
9	·144	3·657	·0163	5·4	5·8	6·30
10	·128	3·251	·0129	4·34	4·65	5·07
11	·116	2·946	·0106	3·55	3·80	4·10
12	·104	2·640	·0085	2·87	3·08	3·30
13	·092	2·336	·0066	2·22	2·37	2·58
14	·080	2·032	·0050	1·70	1·83	1·94
15	·072	1·828	·0041	1·36	1·46	1·58
16	·064	1·625	·0032	1·08	1·16	1·24
17	·056	1·422	·0025	·82	·88	·95
18	·048	1·219	·0018	·62	·66	·70
19	·040	1·016	·0013	·41	·44	·487
20	·036	0·914	·0010	·34	·36	·395
21	·032	0·812	·0008	·272	·287	·312
22	·028	·711	·000616	·220	·221	·238
23	·024	·609	·000452	·153	·162	·175
24	·022	·558	·000380	·129	·136	·148
25	·020	·508	·000314	·107	·113	·122
26	·018	·457	·000254	·086	·091	·098
27	·0164	·416	·000211	·072	·076	
28	·0148	·375	·000172	·059	·062	

CHART FOR BODY SWEEPS
LENGTH OF SWEEP = 4 FEET

SWEEP NUMBER	x (INCHES)	RADIUS (IN INCHES)	SWEEP NUMBER	x (INCHES)	RADIUS (IN INCHES)
1	1/8	2304 · 0625	24	3	97 · 500
2	1/4	1152 · 125	25	3 1/8	93 · 7225
2 1/2	5/16	921 · 7562	26	3 1/4	90 · 240
3	3/8	768 · 1875	27	3 3/8	87 · 0208
3 1/2	7/16	658 · 5044	28	3 1/2	84 · 0357
4	1/2	576 · 250	29	3 5/8	81 · 2608
4 1/2	9/16	512 · 2812	30	3 3/4	78 · 675
5	5/8	461 · 1125	31	3 7/8	76 · 260
5 1/2	11/16	419 · 2528	32	4	74 · 000
6	3/4	384 · 375	33	4 1/8	71 · 8806
7	7/8	329 · 5804	34	4 1/4	69 · 8897
8	1	288 · 500	35	4 3/8	68 · 016
9	1 1/8	256 · 5625	36	4 1/2	66 · 250
10	1 1/4	231 · 025	37	4 5/8	64 · 5827
11	1 3/8	210 · 142	38	4 3/4	63 · 0065
12	1 1/2	192 · 750	39	4 7/8	61 · 5144
13	1 5/8	178 · 0432	40	5	60 · 100
14	1 3/4	165 · 4464			
15	1 7/8	154 · 5375			
16	2	145 · 000			
17	2 1/8	136 · 5919			
18	2 1/4	129 · 125			
19	2 3/8	122 · 4506			
20	2 1/2	116 · 450			
21	2 5/8	111 · 027			
22	2 3/4	106 · 1022			
23	2 7/8	101 · 6114			

NOTE :-

THE SWEEP NUMBER IS THE DROP OF SWEEP (x) IN 1/8 THS OF AN INCH IN 24 INCHES. – SEE SKETCH

GENERAL INFORMATION ON WELDING.

IT IS KNOWN THAT MOLTEN STEEL HAS AN AFFINITY FOR OXYGEN AND NITROGEN, AND THAT WHEN EXPOSED TO THE ATMOSPHERE IT ENTERS INTO CHEMICAL COMBINATION WITH THE OXYGEN AND NITROGEN OF THE AIR TO FORM OXIDES AND NITRIDES IN THE STEEL. THESE IMPURITIES WEAKEN THE STEEL AND MAKE IT BRITTLE.

THIS IS OF CONSIDERABLE IMPORTANCE IN THE FUSION WELDING PROCESSES WHICH CONSIST, BASICALLY, IN MELTING THE METAL OF THE WORKPIECE AND ELECTRODE AND ALLOWING THEM TO INTERMIX. WHILST IN THE MOLTEN CONDITION THE WELD METAL ABSORBS OXYGEN AND NITROGEN FROM THE AIR, WITH THE RESULT MENTIONED ABOVE. IT IS FOR THIS REASON THAT FLUXES ARE USED, AS THESE FORM A PROTECTIVE FILM OVER THE MOLTEN METAL AND SO REDUCE, BUT NOT COMPLETELY ELIMINATE, OXIDATION. THE FLUXES MAY BE INCORPORATED IN THE ELECTRODE COATING IN THE CASE OF ARC WELDING, OR ADDED SEPARATELY AS A PASTE OR LIQUID IN THE CASE OF GAS WELDING.

DURING RECENT YEARS ANOTHER DEVELOPMENT HAS BEEN TO BLANKET THE WELD AREA WITH AN INERT GAS WHICH PREVENTS THE ATMOSPHERE FROM COMING INTO CONTACT WITH THE MOLTEN WELD METAL. IN ONE PROCESS EITHER ARGON OR HELIUM, SUPPLIED FROM A SEPARATE SOURCE (CYLINDERS) IS USED. WITH OXY-ACETYLENE WELDING THE FLAME IS SURROUNDED BY A "REDUCING" ATMOSPHERE WHICH HELPS TO REDUCE THE EFFECTS OF ATMOSPHERIC CONTAMINATION. IN MANUAL METAL ARC WELDING THE WELD AREA MAY BE "SHIELDED" BY USING SPECIAL ELECTRODES, THE COVERING OF WHICH GIVES OFF LARGE QUANTITIES OF INERT GAS WHICH ENVELOPES AND COMPLETELY SHIELDS THE MOLTEN METAL. A SIMILAR EFFECT CAN BE OBTAINED WITH AUTOMATIC ARC WELDING BY DEPOSITING A BLANKET OF GRANULAR FLUX OVER THE WELD AREA.

FOR THE PURPOSE OF WELDING, STEELS ARE GENERALLY ARRANGED IN THREE CLASSES AS FOLLOWS :-

LOW CARBON STEELS - 0·07% - 0·25% CARBON WITH A MANGANESE CONTENT OF 0·40% - 0·80%

MEDIUM CARBON STEELS - 0·26% - 0·45% CARBON WITH A MANGANESE CONTENT OF 0·40% - 1·00%

HIGH CARBON STEELS - 0·46% - 1·2% CARBON (OR

LOW CARBON STEELS

THE WELDABILITY OF MILD STEEL IS EXCELLENT AND MOST WELDING IS CARRIED OUT ON STEELS OF 0·15% - 0·25% CARBON WITH A MANGANESE CONTENT OF 0·40% - 0·80%. GENERAL PRECAUTIONS ARE NECESSARY HOWEVER, AND INCLUDE THE TYPE OF JOINT, THE "FIT-UP", PLATE THICKNESSES, AND BULK OF MATERIAL NEAR THE JOINT. UNINTERRUPTED WELDING TO BUILD UP A BODY OF HEAT, OR THE USE OF HEAVY ELECTRODES FOR CERTAIN WORK WILL ASSIST IN RETARDING COOLING, AND THEREBY OBVIATE THE RAPID QUENCHING EFFECT WHICH HAS A TENDENCY TO PRODUCE HARDNESS AND EMBRITTLEMENT IN THE HEAT AFFECTED ZONE.

THESE STEELS MAY BE WELDED BY GAS OR ELECTRICITY; FOR GAS THE FILLER METAL SHOULD BE A "HIGH-TEST" WELDING ROD, AND WHERE ELECTRIC WELDING IS CARRIED OUT A GENERAL PURPOSE COATED ELECTRODE IS SUITABLE. THE PRESENCE OF HIGH SULPHUR CONTENTS IN THE PARENT METAL CAUSES POROSITY AND CRACKING, AND SATISFACTORY WELDS THEREFORE REQUIRE TO HAVE A PROVED NEW ALL-MINERAL ELECTRODE OF LOW HYDROGEN CONTENT. THE LIME-SILICA RATIO OF THE COATING OF THE ELECTRODE FIXES THE SULPHUR IN A HARMLESS FORM AND PROMOTES SOUNDNESS IN THE WELD METAL. THE LOW HYDROGEN CONTENT OF THESE ELECTRODES ALSO PREVENTS UNDERBEAD CRACKING.

MEDIUM CARBON STEEL

AS THE CARBON CONTENT INCREASES SO DOES THE SUSCEPTIBILITY TO CRACKING WHILE WELDING, DUE TO THE EMBRITTLEMENT OF THE HEAT AFFECTED ZONE. PARTICULARLY ABOVE 0·30% CARBON, THERE IS A TENDENCY TO THE FORMATION OF BRITTLE MARTENSITE, AND IF THE JOINT IS RESTRAINED CRACKING WILL RESULT. STEELS IN THIS RANGE ARE WELDABLE, PROVIDED THAT THEY ARE GIVEN CAREFUL TREATMENT. PRE-HEATING, AND THE RETARDATION OF COOLING ARE IMPORTANT POINTS IN ENSURING SATISFACTORY WELDING AND CAREFUL JOINT DESIGN IS NECESSARY. A HIGH QUALITY TESTED FILLER ROD IS NEEDED.

GAS WELDING HAS THE ADVANTAGE THAT,

AND BRITTLE CONSTITUENTS, IS REDUCED. IN ELECTRIC WELDING THE CORRECT TECHNIQUE IS VERY IMPORTANT, AND THE JOINT WILL BE CONSIDERABLY IMPROVED IF IT CAN BE HEAT TREATED AFTER WELDING. IN ANY CASE THE AIM MUST BE TO BUILD UP HEAT IN THE METAL, AND LATER TO COOL THE ASSEMBLY SLOWLY.

FOR ELECTRIC WELDING, DUCTILE MILD STEEL ELECTRODES MAY BE EMPLOYED, AND IN CERTAIN CASES HIGH TENSILE ELECTRODES MAY GIVE GOOD RESULTS. THE USE OF A SPECIAL AUSTENITIC 18/8 LOW HYDROGEN ELECTRODE REDUCES THE POSSIBILITY OF FAILURE, BUT ON ACCOUNT OF THEIR COST, AND FOR OTHER REASONS, THEY ARE USED CHIEFLY ON SPECIAL APPLICATIONS WHERE THE RESTRAINED POSITION OF THE WELD CALLS FOR HIGH DUCTILITY TO AVOID CRACKING. LOW HYDROGEN OR HYDROGEN FREE ELECTRODES WILL REDUCE SUSCEPTIBILITY TO TOE AND ROOT CRACKING. IN ALL CASES WELDS SHOULD BE PROVED BY TEST. AS FOR GAS WELDING THE JOINT IS BETTER IF IT CAN BE HEAT TREATED.

HIGH CARBON STEELS.

THE WELDABILITY OF THESE STEELS IS POOR DUE TO THE TENDENCY TOWARDS EMBRITTLEMENT. PRE-HEATING IS A NECESSITY AND HIGH CARBON FILLER RODS ARE FREQUENTLY USED ALTHOUGH MEDIUM CARBON FILLER METAL, WHICH PRODUCES A WELD OF ONLY MODERATE STRENGTH MAY PROVE BENEFICIAL IN INCREASING DUCTILITY. THESE STEELS ARE USUALLY HEAT TREATED AND NECESSITATE HEAT TREATMENT AFTER WELDING TO ELIMINATE THE AFFECT OF THE WELDING HEAT AND TO IMPROVE THE STRENGTH OF THE WELD. GAS WELDING MAY USUALLY GIVE BETTER RESULTS THAN ARC WELDING

ELECTRIC WELDS DO NOT HAVE GOOD MECHANICAL PROPERTIES AND WHILST MEDIUM CARBON ELECTRODES ARE USED, AUSTENITIC ELECTRODES ARE USUALLY RECOMMENDED, THE RESULTING WELDS HAVING GOOD PHYSICAL PROPERTIES, BUT THE FUSION ZONE STILL USUALLY HARD AND BRITTLE.

PRE-HEATING AND SLOW COOLING FOLLOWED BY HEAT TREATMENT ARE ESSENTIAL EXCEPT IN SPECIAL CASES.

THE OBJECT OF THE ABOVE IS TO EXPLAIN THE OBJECTIONS TO WELDING STEELS OF ROVER 1030 QUALITY AND OF HIGHER CARBON QUALITIES. THE VALUE OF HEAT TREATMENT AFTER WELDING FOR UNIFYING THE STRUCTURE IS IMPORTANT AND SHOULD

PROPOSITION. OBVIOUSLY CERTAIN PROCEDURES ARE ADOPTED WHICH MAY NOT NECESSARILY BE WHOLLY TO OUR SATISFACTION, BUT HAVE TO BE ADOPTED TO MEET CIRCUMSTANCES.

DRAWINGS SHOULD GIVE DETAILS REGARDING PRE-HEATING, POST-HEATING OR SUBSEQUENT HEAT-TREATMENT, WHERE THESE ARE REQUIRED. FOR MEDIUM CARBON STEELS WE SHOULD REGARD VERY CAREFULLY STIPULATIONS AS TO THE ACTUAL TECHNIQUE TO BE EMPLOYED AS A NECESSITY ON THE DRAWING

EXAMPLE.

WELDED PEDAL ROD & PAD ASSEMBLY.

THE RECOMMENDATION HERE IS TO USE AS THE MATERIAL OF THE ROD, STEEL TO SPECIFICATION EN 14. A, THE ESSENTIAL COMPOSITION BEING:-

CARBON 0·15% - 0·25%

MANGANESE 1·30% - 1·70%.

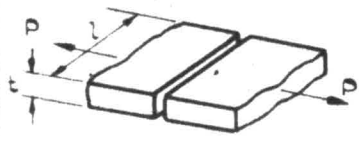
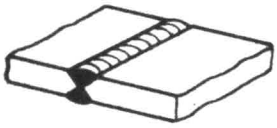
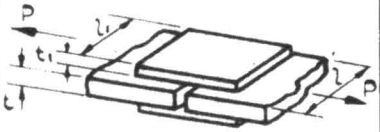
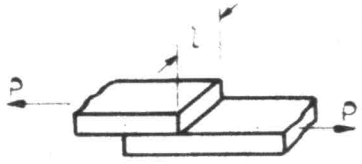
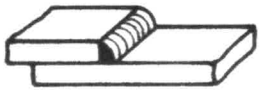
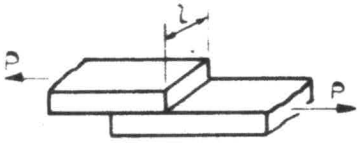
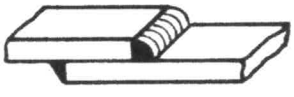
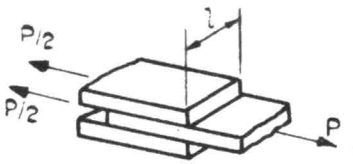
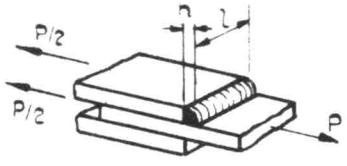
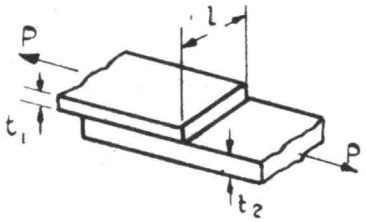
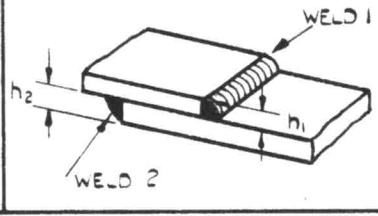
UP TO A RULING SECTION OF 1 1/8" DIA. THIS MATERIAL IN THE HEAT TREATED CONDITION HAS SIMILAR PROPERTIES TO ROVER 1035 MATERIAL. A MAXIMUM CARBON CONTENT OF 0·23% IS DESIRABLE, BUT IT CAN BE ACCEPTED UP TO 0·25% CARBON, AND THIS MATERIAL SHOULD WELD SATISFACTORILY TO THE ROVER 1010 MATERIAL. STEELS OF THIS TYPE, BECAUSE OF THE HARDENING CAPACITY OF THE ALLOYING CONSTITUENT MANGANESE, ARE FREQUENTLY LIMITED TO 5/8" AS THE MAXIMUM THICKNESS PERMISSIBLE FOR WELDING OWING TO THE DANGER OF JUNCTION CRACKS IN THE HEAT AFFECTED ZONE IN THICKER MATERIAL. IT IS OBVIOUS HOWEVER THAT THE ASSEMBLY IN MIND WILL MEET THE DIMENSIONAL LIMITATIONS REFERRED TO.

IN CARRYING OUT THE WELDING OF MANGANESE STEELS OF THIS TYPE PRE-HEATING AND THE USE OF A HEAVY RUN IS RECOMMENDED. PROVIDED THAT THE MATERIAL IS PRE-HEATED AND SLOWLY COOLED, STRESS RELIEVING SHOULD NOT BE NECESSARY. OBVIOUSLY STRESS RELIEVING AT SOMETHING ABOVE 450°C WILL INFLUENCE THE OTHER PART OF THE ASSEMBLY. IF ELECTRIC WELDING IS EMPLOYED A LOW HYDROGEN COATED ELECTRODE SHOULD BE EMPLOYED, AND THE PROCEDURE MUST AIM AT OBTAINING A PRE-HEATING AFFECT AND THE WELD BE CONTINUOUS WITH THE OBJECT OF BUILDING UP HEAT IN SUCH A WAY THAT COOLING IS RETARDED AND THE

VALUES FOR STRESS CONCENTRATION FACTORS * FOR FATIGUE DESIGN

TYPE OF JOINT	FACTOR K
AT EDGE OF REINFORCED BUTT WELD	1·2
AT TOE OF TRANSVERSE FILLET WELD	1·5
AT END OF PARALLEL FILLET WELD.	2·7
T-BUTT JOINT WITH SHARP CORNERS	2·0
TRANSVERSE BEAD ON PLATE	1·3
TRANSVERSE FILLET WELDED COVER PLATES.	3·0

* MULTIPLES OF CALCULATED STATIC STRESS

METHOD OF LOADING	TYPE OF JOINT	STRESS IN WELD
		$f = \frac{P}{tl}$
		IN FILLET $f = \frac{\frac{1}{2}P}{0.707\,t_1 l_1}$ IN BUTT $f = \frac{P}{(2t_1 l_1 + tl)}$
		f (MAX PRINCIPAL STRESS) $= \frac{4.24P}{tl}$ WHERE t = PLATE THICKNESS
		f (MAX PRINCIPAL STRESS) $= \frac{1.618P}{tl}$ WHERE t = PLATE THICKNESS
		$f = \frac{0.707P}{tl}$ WHERE $t = h$ = PLATE THICKNESS
		f_1 (STRESS IN WELD 1) $= \frac{1.414\,P\,t_1}{l h_1 (t_1 + t_2)}$ f_2 (STRESS IN WELD 2) $= \frac{1.414\,P\,t_2}{l h_2 (t_1 + t_2)}$ WHERE t_1 AND t_2 ARE EQUAL $f_1 = f_2 = \frac{1.414\,P}{l(t_1 + t_2)}$ (t_1 AND t_2 ARE PLATE THICKNESSES AND h_1 AND h_2 ARE WELD DEPTHS)