



**SM 105**

**Section 1**

**Description and Operation**



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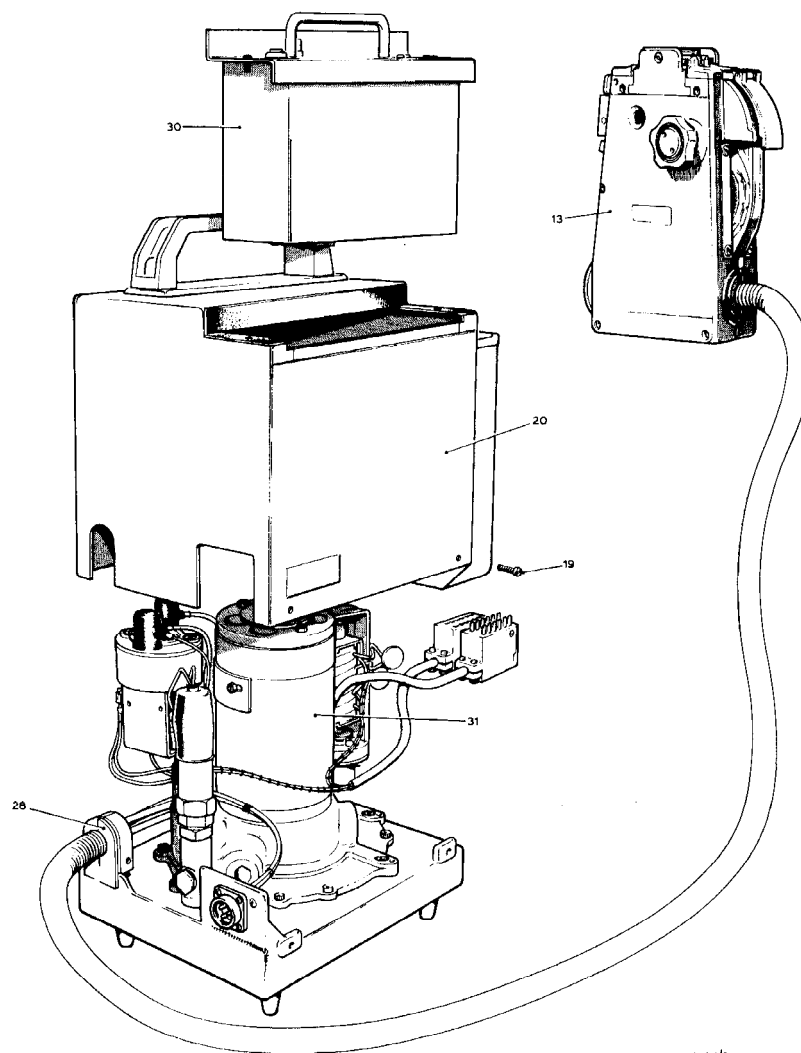
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**Exploded view of machine (24VDC)**

**Fig 1.1**

- 13 Jointing head assembly (fig 1.2)
- 19 Screw
- 20 Case assembly
- 28 Convoluted tube clamp assembly
- 30 Control box (fig. 1.4)
- 31 Pump assembly (fig. 1.3)



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### Leading Particulars

System identification, Refer parts list Section 4

Range of wires sizes, for jointing; see Operating Instructions Handbook for details, 28 to 20 A.W.G.

Hydraulic systems, Capacity 2.5 Imp. pints (1.4 litres)

Fluid, See Operating Instructions Handbook

Approximate weight (less support equipment) 24V machine 42.5 lb (19.3 kg)

110V machine 44.5 lb (20.2 kg)

### Introduction (Fig. 1.1)

1. The Telecrimp, Mk.3 is an electro-hydraulic, manually controlled machine for jointing cables with mechanically crimped connectors. The machine consists of a jointing head, a pump unit and a control box interconnected by a cable and hose assembly. A carrying case encloses the pump unit and control box and incorporates a stowage compartment for the jointing head.
2. The connectors are contained in a disposable cassette which slots into the jointing head, and are automatically fed into position so that jointing may be effected in a continuous series. No stripping of wires is required as the connectors are insulated and have internally spiked troughs, which are formed round the wires so that the insulation is pierced and electrical contact is made.
3. The machine is capable of jointing paper; paper pulp or polythene insulated copper conductors (aluminium conductors can also be jointed with minor modification to the jointing head) within the specified range of sizes.  
Support equipment is provided to mount the machine locally to the working area.

### DESCRIPTION

#### Jointing head (Fig. 1.2)

4. The jointing head houses the hydraulically operated connector crimping and feed mechanisms and the main/reset switch together with the associated electrical control circuit. A threaded fitting at the side of the head facilitates mounting of the unit on the support equipment.
5. The hydraulic ram is coupled via two pivoted lifting levers to a main slide assembly. The main-slide assembly is connected via a hook to a ram located in a slide-in jaw housing. A floating cam in the ram locates between the lower ends of two pivoted jaws that are fitted with cutter blades and overhang the ram. The ram itself is longitudinally located between two wire location blocks, which flank the jaws, in a space (breech) into which the crimp connectors are fed. The location blocks are divided into two channels in which the wires that are to be joined are laid side-by-side so that they span the blocks under the jaws (and cutters).
6. The hydraulic ram assembly incorporates an overload relief valve and is fitted with a trunnion that is adjustable for installation purposes. The relief valve by-passes fluid from the head to the underside of the piston in the event of excessive build-up of pressure during initial extension of the ram. Pressure fluid for operation of the ram is piped through two hoses from the pump unit; the hoses and a cableform are routed through a conduit secured in the jointing head by a split tube clamp. A hydraulically operated pressure switch in the pump unit and a mechanically operated switch in the jointing head control the stroke limits. The latter switch incorporates a roller actuator that is operated by a step in the mainslide.



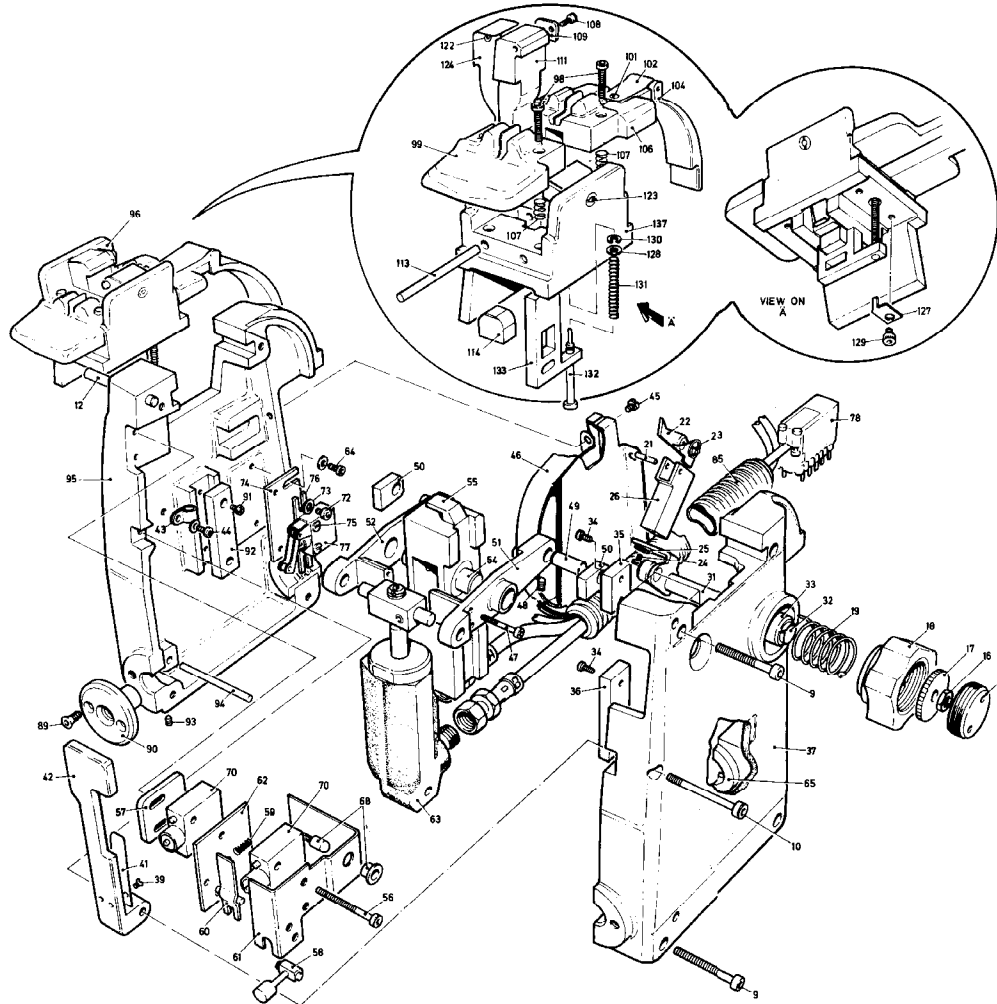
7. A fingerplate at the side of the unit operates a microswitch to initiate the jointing operation. The switch is connected into the electrical control circuit through the cable assembly; the switch button and fingerplate are spring-loaded and return to their original positions when released.
8. The chain of crimp connectors are coiled in a plastic cassette that clips into a quadrant-shaped guide housing. The connectors are indexed through a guide channel and the r.h. location block and positioned between the jaws by a spring loaded feed mechanism. The mechanism comprises a cranked operating arm fitted with a spring-tensioned pawl that engages with a hole in the underside of each connector; the operating arm carries a roller that rests on a shoulder on the mainslide. When the mainslide is moved downwards the operating arm rotates through an arc under the action of the torsion spring and the pawl indexes the connector chain into the unit. When the slide moves up the pawl ratchets under the connector chain and engages with a hole in the next connector; at the same time a spring loaded stop pin on the slide engages the connector chain through a hole in the r.h. location block to prevent backward movement of the connectors.
9. A feed knob enables the connector chain to be manually indexed into the guide channel; the knob is coupled to the shaft of the operating arm by means of a serrated drive collar that facilitates adjustment of the return spring tension.

### **Pump Unit (fig 1.3)**

10. The pump unit comprises an electro-hydraulic power pack together with a control unit loom and the supply wiring. A bracket on the base of the unit mounts the plug through which the input supplies are connected to the machine.
11. The power pack incorporates a 3-piston pump located in a cast body that is mounted on a totally enclosed tank. The body has a central aperture in which the electric motor is located and is machined to accept a solenoid-operated valve. A fluid-operated pressure switch, a pressure relief valve, a filler plug and an oil level plug. A drain plug is provided in the base of the tank and a contactor for the motor supply is bracket-mounted on the motor.
12. Three spring-loaded pistons are located in flanged cylinders that are fitted in peripheral ports spaced at 120 degrees in the pump body. The pistons extend into the pump chamber against a needle roller bearing that encircles an eccentric secured on the motor shaft. Each cylinder is retained in the body against an O-ring by a screwed cap that also retains a spring-loaded disc valve against seating in the cylinder flange. An O-ring and a spiral coil back-up washer in the valve cap provide an oil-tight joint.
13. A relief valve is fitted to the underside of the pump body in a port that connects with the pump pressure drillings and a shrouded oil filter protects the pump inlet.



**Exploded view of jointing head (Fig. 1.2)**





### Parts List, Jointing head (Fig. 1.2)

9	Screw	64	Screw
10	Screw	65	Tube clamp
12	Dowel pin	68	Light emitting diode
15	Retaining disc	70	Microswitch
16	Nut	72	Screw
17	Drive collar	73	Washer
18	Feed knob	74	Limit switch upper plate
21	Dowel	75	Screw
22	Feed pawl	76	Limit switch lower plate
23	Spring	77	Micro switch
24	Screw	78	Plug
25	Washer	85	Flexible tube
26	Feed arm	89	Screw
29	Roller	90	Mounting flange
31	Feed arm assembly	91	Screw
32	Bearing (split)	92	Guide trip
33	Mounting sleeve	93	Screw
34	Screw	94	Pivot pin
35	Top guide strip	95	Rear body half
36	Bottom guide strip	96	Slide-in jaw housing assy
37	Front body half	98	Screw
39	Screw	99	L.H. wire location block
41	Spring	101	Screw
42	Operating lever	102	Cover spring
43	Screw	104	Cover
44	Cable clip	106	R.H. wire location block
45	Screw	107	Wire guide springs
46	Cassette guide	108	Screw
47	Screw	109	Cutter blade
48	Screw	111	Fold-over jaw
49	Pivot pin	113	Dowel pin
50	Slide block	114	Cam
51	Front ram lifting lever	122	Nut
52	Rear ram lifting lever	123	Nut
54	Stud	124	Jaw return spring
55	Main slide	127	Ram retaining bracket
56	Screw	128	Washer
57	Lever stop plate	129	Screw
58	Switch actuator	130	Circlip
59	Spring	131	Spring
60	Lever assembly	132	Clip stop pin
61	Front switch plate	133	Ram
62	Rear switch plate	137	jaw housing
63	Hydraulic ram assembly		





### Description of pump unit components

**Fig 1.3**

4	Loom, Control unit	73	'O' ring seal
13	Non-linear resistor	74	Filter shroud
18	Socket 11-way	75	Piston spring
19	Nut	76	Non-return valve spring
42	Needle roller bearing	77	Tank
43	Pump body	78	Drain plug
44	Contactora bracket	79	'O' ring seal
45	Filler plug	80	Stud
46	"O" ring seal	81	Union
47	Valve cap	83	Spring adjuster
48	Contactora	84	Ball
50	Cylinder	85	Body
51	Eccentric	86	Ball carrier
52	Oil filter	87	Spring
53	Key	88	Solenoid valve
54	Motor	89	Non-return valve
56	Nut	90	Washer
57	Nut	91	Washer
58	Pump piston	92	Washer
60	Pressure switch	93	Washer
61	Screw	94	Back-up washer
62	Screw	95	Washer
64	Screw	96	Rubber washer
65	Screw	97	Spring washer
67	Bonded seal	98	Rectifier
68	Bonded seal	99	Screw
70	"O" ring seal	101	Screw
71	"O" ring seal	103	Transformer
72	'O' ring seal	104	Washer

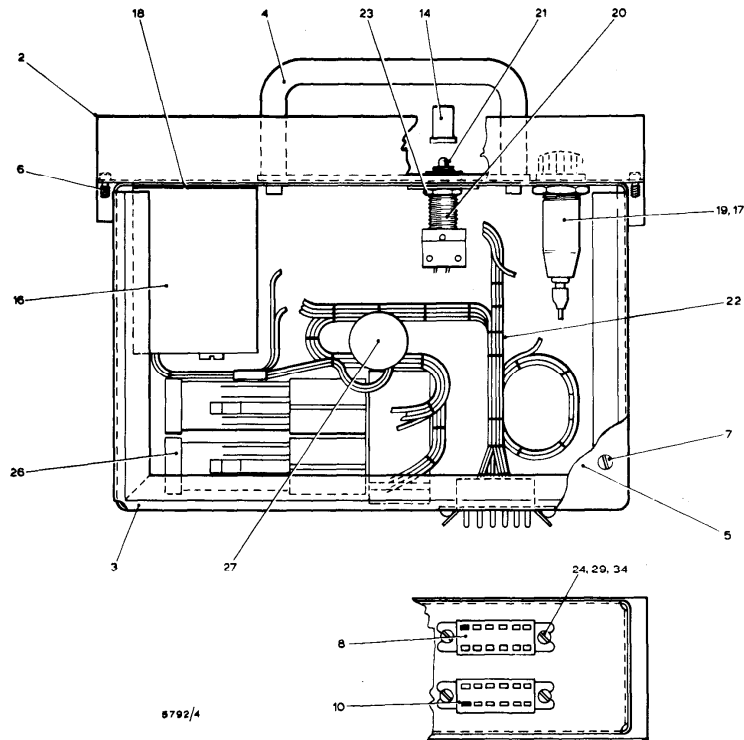


### Solenoid valve assembly

14. Two in-line solenoids are secured to a bracket that is mounted on the valve housing. The armature plunger of the upper solenoid is freely located in the coil housing and is spaced apart from the lower plunger by a push rod. The lower plunger is linked by a trunnion and a diaphragm mounted gimbal ring to the spool valve.
15. The diaphragm is clamped between the mounting bracket and the valve housing and the valve is centred in the housing by a spring that is retained between two abutments that determine the limits of travel of the spool. The inner abutment seats on a shoulder in the housing and spring loading is adjusted by means of washers under the retaining circlip.

### View of Control box

**Fig 1.4**



2	Panel	10	Socket	20	Lamp fitting
4	Handle	14	Cap, red	21	Filament lamp
5	Lid	16	6 – Digit counter	22	Link set
6	Captive screw	17	Panel fuse, 5A	26	Relay unit (RLA/RLB)
7	Screw, self-tapping	19	Fuse holder	27	Non-linear resistor
8	Plug				



16. The spool valve is bored throughout its length and has three transversely drilled ports; the valve housing is drilled at three relieved sections forming annular grooves that are separated by O-ring seals. The solenoid positions are adjusted at assembly and fixed by roll pins fitted through the bracket and solenoid frame.

### **Pressure switch assembly**

17. A sliding spring housing in the body is loaded against a pommel by an encircling spring, which is retained by the pressure adjusting screw. A spring-loaded plunger, retained in the housing by an underflush pin, extends through the adjusting screw and bears against the actuator of the micro switch. A locking plate held in position by a hose clip locks the adjusting screw.
18. The spring housing is actuated by pressure fluid acting on a bearing roller, which slides in a hollow stud screwed into the pommel. An O-ring seal and a bonded seal prevent fluid leakage from the pommel and stud. The micro switch is mounted on a plate secured to an extension of the valve body, which is enclosed by a rubber boot. The mounting plate has a stud and a slotted hole for mounting purposes. This arrangement permits adjustment of the switch position on installation.

### **Control box (Fig. 1.4)**

19. The control box comprises a case one side of which is enclosed by a plate secured by screws. An indicator lamp, a panel fuse and a digital counter are mounted on the panel which forms the upper side wall. This panel has an upright flange for slide location of the box in the unit carrying case and it extends from the sides to provide a seating platform. Captive screws and a rigid handle facilitate installation.
20. A twin relay unit, a plug and a socket are secured to the lower wall of the case. Internal interconnections are made with wire and all connections are protected with insulating sleeves.

### **Support equipment and mounting accessories (Fig. 1.5)**

21. The support equipment and accessories are provided to mount the jointing head local to the work. A carrying case is provided to store and transport the equipment that is fully listed in Section 4.
22. The support bracket is secured to the mounting bush at the base of the head with the hand screw and washer and slotted into the indexing carriage. The carriage has a gear wheel that engages a rack in the bar and is transversely by a hand wheel. The carriage also incorporates a click stop mechanism, which engages the gear wheel and rack every quarter-turn of the hand wheel. The accessories permit several mounting arrangements of the carriage and bar so that the best position in relation to the work is obtained.



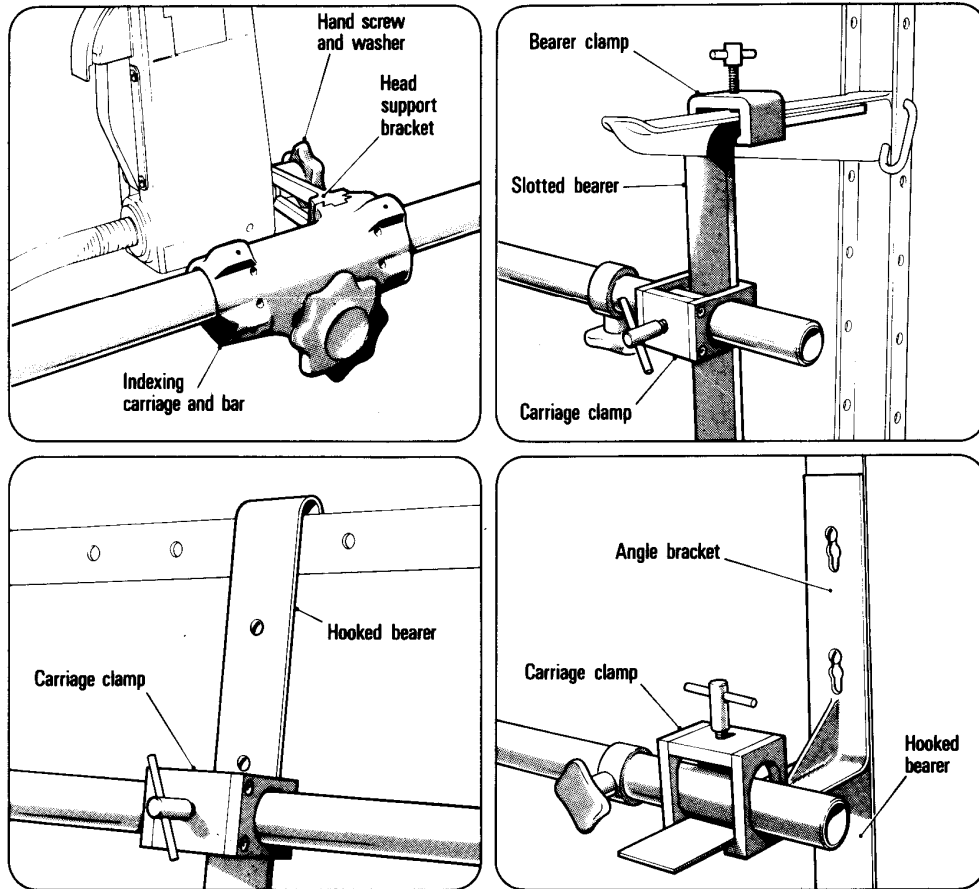
### OPERATION

23. The control system operates on 24V D.C., which is provided directly from the primary source in the D.C. machine and via a transformer-rectifier unit in the A.C machine. The circuit diagram is shown in Fig. 1.6 and the hydraulic system diagram in Fig. 1.7.
24. When the main/reset switch on the jointing head is closed relay RLA3 which is slugged to delay release by a period greater than 100 milliseconds, is energized, via the finger switch, and contacts RLA/1 are closed. When the finger switch is operated, relay RLA is de-energized and R1B is energized (during the delay release time of RLA/1) and is held in by its contact RLB/1, via the pressure switch. The delay release of RLA/1 ensures that operation commences as soon as the finger switch is pressed and even if it is held in; when the finger plate is released the circuit is prepared for the next operation i.e. RLA energized.
25. When relay RLB is energized, contacts RLB/4 and RLB/2 close. making the motor contactor and solenoid valve SV1 (UP) circuits, respectively; contact RLB/3 opens, disabling solenoid valve SV2 (DOWN) circuit. Simultaneously. The counter (CTR) is pulsed via contact RLB/2. The motor operates, driving the hydraulic pump, and fluid is directed via the solenoid valve to the hydraulic ram in the jointing head. The ram extends and the main slide is moved up, allowing the limit switch to close, which has no effect at this stage; as the main slide continues to travel the crimping jaws are closed, the ram butts solidly against the connector and hydraulic pressure builds up. At the preset value the pressure switch opens and relay RLB is de-energized. Relay RLB contacts now return to their original positions, as shown in the circuit diagram so that solenoid valve SV1 is de-energized. However, as the limit switch is closed the motor contactor coil and solenoid valve DOWN circuits are made so that the motor continues to operate and hydraulic fluid is directed to retract the hydraulic ram. The main slide is now moved downwards so that the jaws open and release the crimped joint. At the bottom limit of the stroke, the limit switch is opened so that the motor contactor and solenoid



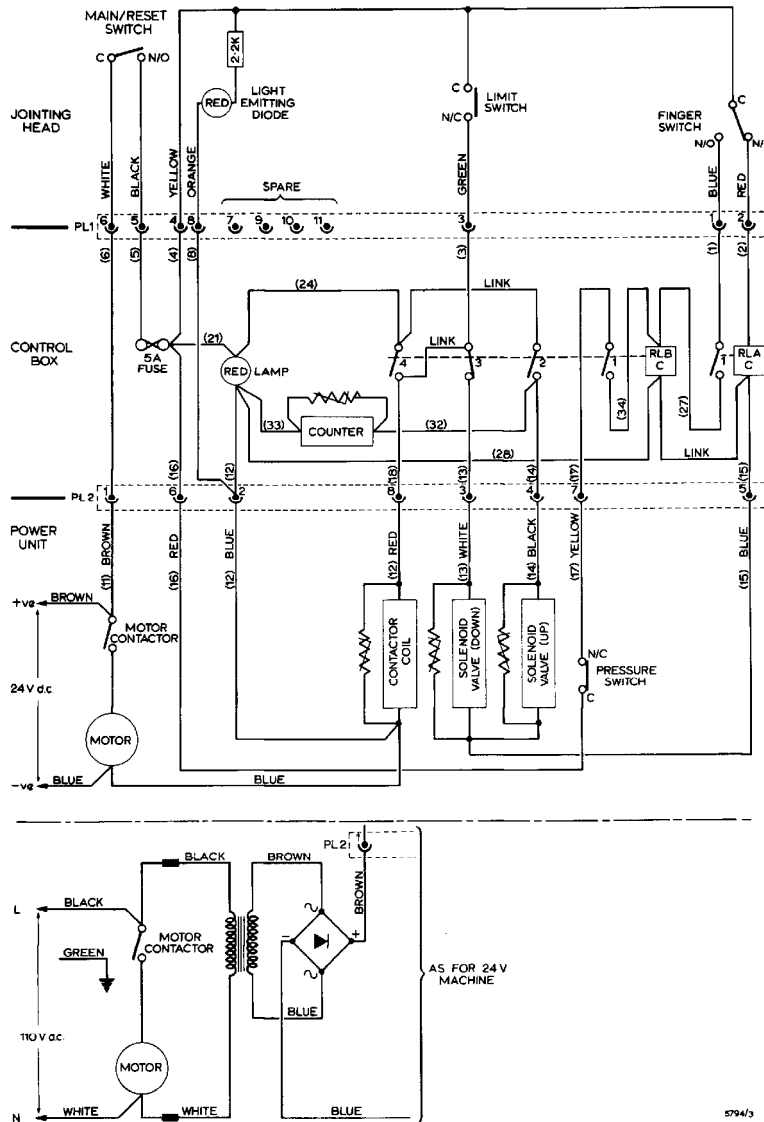
**Support equipment and mounting accessories**

**Fig 1.5**





**Circuit / wiring diagram**  
**Fig 1.6**



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valve is de-energized. Thus the motor and hydraulic pump stop operating, the slide is arrested and the circuit is restored to the original condition. The connector feed mechanism, driven by the main slide on the upward stroke, is returned by spring action to index the connector chain for the next jointing operation.

26. If the machine is switched off during a jointing operation, automatic re-setting occurs when the machine is switched on again. During jointing relay RLB is energized and the limit switch is closed. Hence if the main/ reset switch is opened in this condition, RLB is de-energized but the limit switch remains closed as it is opened only when the slide reaches the bottom of the retract stroke. Thus when the main/reset switch is again closed. the motor and solenoid valve are energized so that retraction immediately occurs.

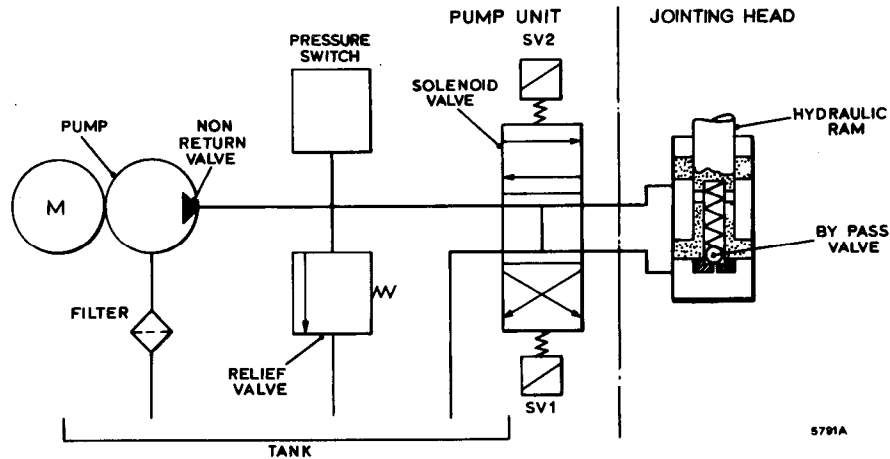
### **Safety features**

27. If there is an obstruction preventing closure of the jaws on the initial upward travel of the slide, hydraulic pressure builds up prematurely before the ram butts against the connector in the breech. This build up of pressure opens the by pass valve in the hydraulic ram and causes the piston to stall although the hydraulic pump continues to operate; thus jointing is inhibited. preventing damage to the head. In this condition re-setting must be effected, by switching off and on, and the obstruction removed before normal operation is resumed. During normal operation the outlet ports of the by-pass valve are closed by the bearing at the end of the cylinder, allowing full working pressure to be applied for crimping purposes.
28. A light emitting diode in the jointing head and a lamp on the control box are illuminated when the main/reset switch is closed; the lamps are connected between the D.C. supply lines on the output side of the fuse which protects the control circuit. It should be noted that the fuse does not protect the motor as the high starting current at each operation renders it impracticable to do so.
29. The motor contactor, solenoid valve and counter are protected against damage by high voltages, induced on energization and de-energization, by non-linear resistors connected across the coils.



**Hydraulic system diagram**

**Fig 1.7**



30. The motor-driven pump draws fluid from the tank, through a filter, and delivers it to the solenoid-operated spool valve from where the fluid is directed to the top or bottom of the hydraulic cylinder or recirculated back to the tank. The pressure switch and a relief valve are tapped into the pump supply upstream of the solenoid valve. The relief valve protects the system in the event of malfunction.
31. Environmental – Jointing Head (Fig 1.2)  
All switches or electrical components of the Jointing Head are environmentally sealed for use in the Hazardous Atmospheres frequently encountered in manholes.



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**Service Manual for the TELECRIMP® Mark 3 / 4**

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