

Ribbon Cable Connector Assembly

10 The invention relates to a ribbon cable connector assembly for connecting an electrical ribbon cable to a connector housing by means of which the ribbon cable may be connected e.g. to conductive tracks of a circuit board.

15 Such ribbon cables (JP 6-119 956) comprise a series of electrical conductors embedded in an insulating material in juxtaposed manner. The conductors may be round conductors of circular cross-section and/or flat
20 conductors of rectangular cross-section.

 The connector housing has a cable insertion opening for pluggably receiving a ribbon cable end. Terminating in the cable insertion opening are conductor
25 contact receiving cavities for receipt of conductor contacts projecting into the cable insertion opening, for establishing contact with the individual ribbon cable conductors. The conductor contacts are in electrical connection with terminal contacts which are
30 electrically connectable e.g. to conductive tracks of a circuit board by soldering.

 For rendering possible electrical contact between the ribbon cable conductors and the conductor contacts of
35 the connector, the ribbon cable conductors are exposed

on a ribbon cable end on a broad side of the ribbon cable by stripping the insulating material up to the ribbon cable conductors. The conductor contacts have contact portions with contact springs engaging the exposed ribbon cable conductors when the ribbon cable end is introduced into the cable insertion opening of the connector.

By stripping the insulating material at the ribbon cable end for the purpose of exposing the ribbon cable conductors, the ribbon cable end loses in flexural strength. This aggravates on the one hand the process of inserting the ribbon cable end into the cable insertion opening of the connector and is opposed to establishing in unproblematic manner an electrical contact between the exposed ribbon cable conductors and the contact springs of the conductor contacts. For overcoming this problem, that broad side of the ribbon cable end where the ribbon cable conductors have not been exposed, i.e. where no insulating material has been removed, preferably has a reinforcing layer applied thereto, preferably in the form of a reinforcing film. The latter enhances the flexural strength of the ribbon cable end that has been reduced by insulation stripping. This is way a material of relatively high inherent flexural strength is used for the reinforcing film.

However, despite the use of the reinforcing film there are problems left with this type of connector assembly:

Such a ribbon cable has a film construction with a thickness of e.g. 0.4 mm only. The connectors commonly employed at present for connection of ribbon cables have a small constructional height of approx. 10 mm.

From the beginning of the cable insertion opening to the spring contacts of the conductor contacts, a lateral guiding effect for the thin ribbon cable is thus present across a short distance of about 6 mm only.

5 Furthermore, there is the fact that the presently employed connectors display considerable manufacturing tolerances for connection of such ribbon cables. The result hereof is that the ribbon cable end has to be inserted into the cable insertion opening of the con-
10 nector with only a slight guiding depth and insecure lateral guiding effect. There is thus a high risk that the ribbon cable end will be introduced into the con- nector obliquely or even with bends. Due to the narrow spacing pattern between the ribbon cable conductors
15 and, accordingly, of the conductor contacts in the connector, this may easily result in that ribbon cable conductors will not be contacted properly or not at all with the associated contacts or even may be con- tacted with wrong conductor contacts.

20 This problem is particularly prominent in case of shielded flat conductor ribbon cables which have a shielding foil disposed above an insulating material layer on each broad side of the cable and in which a
25 flat conductor disposed at one longitudinal edge of the cable is in contact with both shielding foils. The shielding foils thus abut this flat conductor without insulating material being disposed therebetween. Due to the fact that the insulating material is missing in
30 this longitudinal edge portion of the flat conductor ribbon cable, this longitudinal edge portion is particularly instable.

35 The force with which the contact spring arms of the conductor cable engage the ribbon cable conductors is only low in view of the very small size of the con-

ductor contacts. Thus, it cannot be excluded that the ribbon cable conductors are detached from the conductor contacts even when the tensile force applied to the ribbon cable is not extraordinarily high.

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EP 0 476 355 discloses a ribbon cable connector in which the stripped ends of the individual conductors of the ribbon cable are cast in an insulating material block at the transition between insulation and bare
10 conductors, so that the ribbon cable is introduced on the one side of the block and the stripped ends of the individual conductors project on the other side of the block. In the mounted condition on a circuit board, insulating material block is received by a support
15 engaging around the sidewalls of the block by means of resilient latching arms, with latching noses engaging chamfered upper edges of the insulating material block. For protecting the stripped ends of the ribbon cable during transport, a protective housing can be
20 snapped onto the insulating material block, said housing having latching noses engaging in recesses provided in both mutually opposed lateral surfaces of the insulating material block.

25 JP-6-96 816 discloses a locking device for ribbon cables which cooperates with an insertion jig when the ribbon cable is terminated to the contacts in a connector housing. The insertion jig is attached to the end of the ribbon cable, the cable end is introduced
30 into an opening of the connector housing, and the front end of the insertion jig pushes apart two claws provided with ramp surfaces, with said claws later on, upon removal of the insertion jig, maintaining a locked condition between cable end and connector.

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US 4,172,626 reveals a ribbon cable connector in which a holding part on the one hand is mounted on the end of the ribbon cable and on the other had is adapted to be latched with a locking projection on a connector housing.

There are applications in which it is desirable to ensure a particularly high reliability of the connection between ribbon cable end and connector.

For such applications, the present invention makes available ribbon cable connectors having the features indicated in claim 1. Preferred developments are indicated in the dependent claims.

Due to the fact that the ribbon cable connector assembly according to the invention has a locking projection at the ribbon cable end and a locking arm on the connector housing provided with a complementary locking shoulder, which latchingly cooperates with the locking projection when the ribbon cable end is inserted to a sufficient depth into the cable insertion opening of the connector housing, the ribbon cable end is thus secured against withdrawal from the cable insertion opening.

The constructional height of the connector housing and the insertion depth of the cable insertion opening are preferably selected to be of such a size that the ribbon cable end is guided over a relatively large length in the cable insertion opening before contact of the ribbon cable conductors with the conductor contacts takes place. This prevents lateral pivoting of the ribbon cable end which may result in erroneous contacting between the ribbon cable conductors and the conductor contacts.

5 The insertion opening preferably is provided with a locking projection guide means which may be a guiding recess guiding the locking projection disposed on the ribbon cable end during insertion of the ribbon cable end into the cable insertion opening of the connector housing.

10 When at least one transverse end of the locking projection is provided with an end face slidably cooperating with a confining wall of the guiding recess, the guiding effect of at least one longitudinal side of the ribbon cable end may be taken over by the guiding projection as well. It is also possible to
15 provide both transverse ends of the locking projection with one end face each, which cooperate with one confining wall of the guiding recess each. In this case, both sides of the ribbon cable end are guided by the guiding projection.

20 In a particularly preferred embodiment the locking projection is of smaller width than the ribbon cable, with the locking projection being disposed in asymmetrically offset manner with respect to the longitudinal centre of the cable. For example, one end face at
25 one transverse end of the locking projection is aligned with a longitudinal edge of the ribbon cable whereas an opposite end face of the locking projection is set back with respect to the other longitudinal
30 edge of the ribbon cable end. The guiding recess in this case is disposed in correspondingly asymmetrical manner and offset in corresponding manner from the longitudinal central line of the ribbon cable. In this manner a keying effect is achieved, i.e. a protection
35 against insertion of the ribbon cable into the cable insertion opening in a wrong position, as well as a

protection against insertion of a ribbon cable end into the connector which is not supposed to be suited for connection with this specific connector. Only when the ribbon cable end is in the proper position and has the locking projection disposed at the correct location can the asymmetrically positioned locking projection enter the asymmetrically disposed guiding recess, so that only with this correct positioning of the locking projection and the ribbon cable end insertion thereof is possible into the insertion opening until the ribbon cable conductors establish contact with the conductor contacts.

The locking projection preferably has the shape of a locking rib which in turn is of block-shaped or rectangular configuration.

It is possible to provide the connector housing itself with the locking arm and possibly with the locking projection guide means or guiding recess, respectively, and to form the connector housing with such a constructional height that a depth of the cable insertion opening is achieved providing a sufficiently safe lateral guiding effect of the ribbon cable end.

If it is desired, for any reason whatsoever, to employ the conventional connectors which do not only display large manufacturing tolerances but also have a low constructional height and thus a low insertion depth for the ribbon cable end, with a correspondingly low protection against oblique insertion or tilting of the ribbon cable, an embodiment of the invention provides the use of an additional housing comprising on the one hand a cable through-opening for the ribbon cable end and on the other hand an introduction opening for slidably introducing the conventional connector

housing to such a position that the ribbon cable end may reach the cable insertion opening of the connector housing through said cable through-opening of the additional housing.

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In that case, the additional housing is provided with the locking arm and possibly the locking device guide means or guiding recess, respectively. By way of the constructional height of this additional housing, it is possible to produce the desired insertion depth for the ribbon cable, which renders possible sufficient safety against tilting or oblique insertion of the ribbon cable end into the insertion opening of the connector. The introduction opening of the additional housing advantageously is provided with latching spring arms latchingly engaging behind the connector housing introduced into the introduction opening when said housing has been slid into the introduction opening to a sufficient depth.

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The invention will now be elucidated in more detail by way of embodiments with reference to the drawings wherein:

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Fig. 1 shows a schematic view, not to scale, of a ribbon cable end having flat conductors exposed on one side;

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Fig. 2 shows a cross-sectional view along a sectional line in the region of the flat conductors exposed on one side, said sectional line extending transversely of the longitudinal direction of extension of the ribbon cable;

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Fig. 3 shows a schematic view of a connector prior to insertion of connector terminal legs into soldering holes of a circuit board;

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Fig. 4 shows an embodiment of a connector designed in accordance with the invention;

25

Fig. 5 shows an embodiment in which a connection is effected between a ribbon cable end and a conventional connector housing by means of an additional housing;

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Fig. 6 shows a partial sectional view of the additional housing depicted in Fig. 5, with the connector housing being introduced and shown in an open state;

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Fig. 7 shows a top plan view of the additional housing according to Fig. 6; and

Fig. 8 shows a longitudinal side view of the additional housing in Fig. 6 shown from the top.

Fig. 1 shows in a schematic view, not to scale, a
5 ribbon cable end 11 having flat conductors 13 embedded
on all sides in insulating material. This is achieved
e.g. by films of insulating material applied to both
sides of the juxtaposed flat conductors 13. The in-
sulating material may be, for example, expanded poly-
10 tetrafluoroethylene (ePTFE), polyester or other
plastics materials. From an end portion 17 of ribbon
cable end 11 insulating material has been removed to
such an extent that the flat conductors 13 are exposed
on one side and thus are accessible for being con-
15 tacted electrically. On the rear side of ribbon cable
end 11, on which the flat conductors 13 are still
covered by insulating material 15, the insulating ma-
terial 15 has a reinforcing film 19 applied thereto
consisting e.g. of polyester. The latter serves on the
20 one hand for increasing again the flexural strength of
the ribbon cable end that has been reduced by
stripping flat conductors 13, and on the other hand
for bringing the ribbon cable end to the dimensions of
the plug contact. Without such a reinforcing film 19,
25 the ribbon cable end 11 having e.g. a width of 15 mm
and a thickness of 0.4 mm may become so unstable by
the removal of insulating material for the purpose of
exposing the flat conductors 13 that it could be
handled only poorly for insertion into the connector
30 housing.

The sectional view of Fig. 2 shows a cross-section of
end portion 17 in which flat conductors 13 are ex-
posed. The reinforcing film 19a proper is attached to
35 the insulating material by an adhesive layer 19b, e.g.
by means of an adhesive material.

The presentation of three flat conductors 13 has been selected for the drawings merely in arbitrary manner. Such ribbon cables generally have a considerably larger number than three flat conductors.

Fig. 3 illustrates a conventional connector 21 for pluggably receiving the ribbon cable end 11 shown in Fig. 1, as well as a circuit board 23 having soldering holes 25 serving for receipt and soldering of terminal legs 27 of connector 21. On the side remote from terminal legs 27, connector 21 is provided with a cable insertion opening 29. The latter has such dimensions that ribbon cable end 11 is adapted to be inserted into cable insertion opening 29.

A pluggable connection between a ribbon cable end according to Figs. 1 and 2 and a connector 21 according to Fig. 3 is known per se.

Such known connectors 21 have a constructional height of e.g. 10 mm and an insertion depth for the ribbon cable end 11 of e.g. about 6 mm only. Thus, upon insertion into cable insertion opening 29, ribbon cable end 11 is guided over a very short length only so that there is a high risk that ribbon cable end 11 will be inserted into cable insertion opening 29 obliquely, which may result in erroneous contacting between flat conductors 13 and conductor contacts, not shown, disposed in connector 21.

A first embodiment of the invention is illustrated in Fig. 4. In this embodiment a ribbon cable connection is established between a ribbon cable end 12 according to the invention and a connector 31 designed according to the invention. The ribbon cable end has a structure

as shown in Fig. 1, but additionally has, on the rear side of reinforcing film 19, a locking projection in the form of a locking rib 33 extending transversely of the longitudinal direction of extension of ribbon cable end 12. This locking rib has a length shorter than the ribbon cable width. Locking rib 33 is disposed asymmetrically with respect to the longitudinal centre line of ribbon cable end 11. A rib end face 35, disposed on the right-hand side in Fig. 4, is aligned with the right-hand longitudinal edge of the cable. A rib end face 39 located on the left-hand side in Fig. 4 is set back from the left-hand longitudinal edge of the cable and thus is spaced therefrom.

Connector 31 comprises a centrally disposed cable insertion opening 43 for insertion of ribbon cable end 12. Sidewall 45 disposed on the front side in Fig. 4 has a resilient locking arm 47 disposed thereon in integral manner, which at the free end thereof is provided with a locking hook 49 whose lower side in Fig. 4 constitutes a locking shoulder 51. Below locking shoulder 51 there is a guiding recess 53 to guidingly receive locking rib 33 when ribbon cable end 12 is plugged into cable insertion opening 43. When ribbon cable end 12 is inserted into cable insertion opening 43 to a sufficient depth for establishing contact between the flat conductors 13 and the conductor contacts (not shown) of connector 31, locking rib 33 is located underneath locking shoulder 51 as shown in broken line in Fig. 4.

Guiding recess 53 is disposed in offset manner with respect to the longitudinal central axis of connector 31, in accordance with the offset of locking rib 33 with respect to the longitudinal centre line of ribbon cable end 12. Guiding recess 53 has lateral confines

which are located opposite rib faces 35 and 39 when locking rib 33 is introduced into guiding recess 53.

5 The offset of guiding recess 53 from the longitudinal
centre line of connector 31 is such that the right-
hand confine in Fig. 4 of the guiding recess 53 is
aligned with right-hand inner wall 55 of cable in-
sertion opening 43, whereas the confine of guiding
10 recess 53 shown to the left in the drawing is spaced
by a distance from left-hand inner wall 57 of cable
insertion opening 43. This distance corresponds appro-
ximately to the distance between left-hand cable
longitudinal edge of ribbon cable end 12 and left-hand
15 rib end face 39. Due to this offset of guiding recess
53 from the longitudinal centre line of connector 31,
a keying possibility is established for the con-
nection. I. e., the ribbon cable end 12 with locking
rib 33 can be introduced fully into cable insertion
20 opening 43 only when locking rib 33 is located on the
correct side of cable insertion opening 43. A keying
effect may also be achieved by forming the locking rib
33 with one or several recesses and/or interruptions
distributed along its length. Guiding recess 53 then
will be formed with a complementary counter-keying
25 configuration. A ribbon cable end 12 whose locking rib
33 has a larger length and/or a different position
than the locking rib shown in Fig. 4 or which has re-
cesses and/or interruptions at inappropriate positions
cannot be introduced into connector 31. In this
30 manner, it is possible to provide protection against
insertion of such ribbon cable ends into connector 31
which are not to be connected to the latter.

35 The constructional height of connector 31 is quite a
bit larger than that of conventional connector 21.
This large constructional height allows a large in-

section depth of cable insertion opening 43, which in turn has the effect that ribbon cable end 12 during insertion thereof into cable insertion opening 43 is guided over a relatively large length. When the exposed flat conductors 13 of ribbon cable end 12 then reach the region of the contact springs of the conductor contacts, ribbon cable end 12 with great certainty is already aligned so well that erroneous contacting cannot occur any more.

The top side of locking hook 49 remote from the locking shoulder is provided with an inclined ramp 59. Locking arm 47 is in the form of an elastic spring arm adapted to be resiliently pivoted from the position shown in Fig. 4. When the lower side of locking rib 33 contacts inclined ramp 59 during insertion of ribbon cable end 12 into cable insertion opening 43, resilient locking arm 47 during further depression of locking rib 33 is deflected due to inclined ramp 59 and resiles as soon as the top side of locking rib 33 comes to lie underneath locking shoulder 51. When a tensile force is then applied to ribbon cable end 12 tending to withdraw ribbon cable end 12 from cable insertion opening 43, such withdrawal of ribbon cable end 12 is prevented due to abutment of the top side of locking rib 33 on locking shoulder 51. When ribbon cable 12 is to be withdrawn purposefully from the cable insertion opening, it is merely necessary to pivot the resilient locking arm out of engagement with locking rib 33.

Locking rib 33 and guiding recess 53 may be dimensioned such that both the left-hand and the right-hand lateral guiding feature of the ribbon cable end is effected only via rib end faces 35 and 39. Another possibility consists in effecting guiding of only one

longitudinal side of ribbon cable end 12 via one of rib end faces 35 and 39, while effecting guiding of the other longitudinal side of ribbon cable end 12 by cooperation of this longitudinal side with the opposite inner wall 55 or 57 of cable insertion opening 43.

Fig. 5 shows an embodiment of the invention in which ribbon cable end 12 provided with a locking rib 33 is inserted into cable insertion opening 29 of a conventional connector 21, however not directly, but upon passage of a cable through-opening 61 of an additional housing 63. This embodiment of the invention is advantageous when, for whatever reason, the conventional connector 21 is to be employed while the advantages according to the invention should be realized nevertheless, namely a good lateral guiding effect of ribbon cable end 12 during insertion thereof as well as safe retention thereof in the inserted position.

The upper portion of additional housing 63 is designed in the same manner as the upper portion of connector 31 of Fig. 4, comprising a locking arm 47 with locking hook 49 and locking shoulder 51 on the one hand and a guiding recess 53 on the other hand. Additional housing 63, at the lower end thereof, has an introduction opening 65 into which connector 21 can be slidably introduced. Introduction opening 65 is open at the bottom so as to prevent collisions with terminal legs 27 of connector 21. At the lower end of introduction opening 65, holding ribs 69 extend laterally towards each other from the sidewalls of introduction opening 65, said holding ribs preventing removal of additional housing 63 plugged onto connector 21 from said connector 21. The sidewalls of introduction opening 65 are each provided with a

latching spring arm 67 cut free from the corresponding sidewall. Each latching spring arm 67 at the free end thereof comprises a latching hook 69 with a latching shoulder 71 and an inclined ramp 73. Upon introduction
5 of connector 21 into the introduction opening, latching spring arms 67 are resiliently deflected when connector 21 is moved onto inclined ramps 73. When connector 21 has been slid into introduction opening 65 to a sufficient depth, latching spring arms 67 re-
10 sile, with latching shoulders 71 thereof engaging behind connector 21 and thus retaining the same in introduction opening 65.

Additional housing 63 may also be connected in different manner to connector 21, for example by adhesive
15 bonding.

Introduction opening 65 and latching spring arms 67, in relation to the dimensions of connector 21, are dimensioned such that, when connector 21 is latched in
20 introduction opening 65, cable introduction opening 29 thereof is aligned with cable through-opening 61 of additional housing 63. In this manner ribbon cable end 12 may be introduced through cable through-opening 61 of additional housing 63 into cable insertion opening
25 29 of connector 21 while being guided by said cable through-opening 61. Safety with respect to correct alignment of flat conductors 13 with respect to the conductor contacts (not shown) in connector 21 and
30 securing of ribbon cable end 12 against inadvertent withdrawal from cable insertion opening 29 is afforded by additional housing 23 in cooperation with locking rib 33. The advantages attainable with the invention are thus realized as well when a conventional con-
35 nector 21 is used for establishing the connection.

The additional housing 63 even provides the possibility of giving the safety achieved by the invention later on to connectors 21 which are already soldered on a circuit board 23, by subsequently applying additional housing 63 to soldered connector 21 and by then inserting ribbon cable end 12 provided with locking rib 33 through cable through-opening 61 of additional housing 63 into cable insertion opening 29 of already soldered connector 21.

Due to the fact that the safety and guiding effects for the ribbon cable end according to the invention, in addition to conventional ribbon cable ends 11, only require the locking rib 33, it is also possible to retrofit the ribbon cable end subsequently for a pluggable connection according to the invention. To this end, it is merely necessary to connect the locking rib 33 to reinforcing film 19 at an appropriate location, e.g. by adhesive bonding.

With the aid of additional housing 63 and locking rib 33 it is thus possible to subsequently convert already existing connections between conventional ribbon cable ends and conventional connectors into a safe connection according to the invention.

It should be emphasized in addition that the representations in Figs. 4 and 5 are not necessarily drawn to scale.

The additional housing 63 shall now be elucidated in more detail with reference to Figs. 6 to 8.

Fig. 6 shows a connection between a ribbon cable end 12 and a conductor contact 75 using an additional housing 63. The latter is shown in a sectional view,

whereas connector 21 is shown only in outline. The terminal legs 27 of the latter may extend selectively either vertically or horizontally (as seen in Fig. 6) and are electrically connected to corresponding conductor contacts 75 in a manner not shown in Fig. 6. The hatched portions are parts of additional housing 63 shown in section.

Shown at the bottom in Fig. 6 is locking arm 47 with locking hook 49 at the free end thereof. Locking arm 47 is of lesser wall thickness than the sidewall of the additional housing from which locking arm 47 extends, in order to provide locking arm 47 with soft spring characteristics.

As can be seen from Fig. 6, end portion 17 of flat cable end 12 having the exposed flat conductors 13 is inserted between the spring arms of conductor contacts 75 and the locking shoulder 51 of locking hook 49 engages behind locking rib 33. Latching hook 69 engages behind the housing of connector 21 indicated in broken lines, with the housing being thereby secured in its position within introduction opening 65.

Fig. 7 depicts a plan view of additional housing 63, as seen from the left-hand side in Fig. 6. Fig. 7 reveals the asymmetrical or staggered position of guiding recess 53 with respect to a central line 77. Locking hook 49, at its lower side in Fig. 7, has a strap 79 forming an engagement opening 81. The latter may be engaged by a release tool or a fingernail when the locked condition between locking hook 49 and locking rib 33 is to be released in order to be able to withdraw ribbon cable end 12 from connector 21. Engagement opening 81 need not be continuous, but may also be just an engagement trough permitting engage-

ment of a release tool or fingernail, as shown in Fig. 6.

5 Fig. 8 illustrates a view of the introduction opening side of additional housing 63 when the lying construction of Figs. 6 and 7 is shown from above. In the embodiment shown in Fig. 8, locking arm 47 is cut free from the corresponding sidewall of additional housing 63 via slots 83.



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- 20 -

Patent Claims

- 5 1. A ribbon cable connector assembly for connecting
an electrical ribbon cable having a series of
electrical conductors (13) embedded in an insu-
lating material (35) in juxtaposed manner and one
side thereof being exposed in the region of a
10 ribbon cable end (12),
said connector assembly comprising a connector
housing (31) having a cable insertion opening (43)
for pluggably receiving the ribbon cable end (12)
as well as conductor contact receiving cavities
15 for receipt of conductor contacts (75) projecting
into the cable insertion opening (43), for
establishing electrical contact with the indi-
vidual exposed ribbon cable conductors (13),
characterized in
20 that a locking projection (33) is disposed on a
broad side of the ribbon cable extending over at
least part of the ribbon cable width,
that the connector housing (31) has disposed
thereon a locking arm (47) cooperating with
25 locking projection (33) in resilient manner and
having a locking shoulder (51) engaging over
locking projection (33) in the locked condition,
and that the position of the locking projection
(33) on ribbon cable end (12) on the one hand and
30 the arrangement of the locking shoulder (51) on
the other hand effect a latched condition between
locking projection (33) and locking shoulder (51)
when ribbon cable end (12) is inserted to a mini-
mum depth into the cable insertion opening (43) of
35 the connector housing (31) at which electrical
contact is established between the exposed ribbon

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- 21 -

cable conductors (13) and the conductor contacts (75) of the connector.

2. A connector assembly according to claim 1,
5 characterized in that the cable insertion opening (43) comprises a locking projection guide means (53) for guiding the locking projection (33) upon insertion of the ribbon cable end (12) into cable insertion opening (43), and in that the locking
10 projection (33), on at least one of its transverse ends, has an end face (35, 39) cooperating with the locking projection guide means (53).
3. A connector assembly according to claim 2,
15 characterized in that the locking projection guide means is designed as a guiding recess (53) which is formed in a longitudinal sidewall of the cable insertion opening (43) and matched to the profile of the locking projection (33) and in which the
20 locking projection (33) is guided during insertion of the ribbon cable end (12) into the cable insertion opening (43).
4. A connector assembly according to claim 2 or 3,
25 characterized in that the ribbon cable end (12), during insertion into the cable insertion opening (43), is guided on one longitudinal side by a transverse inner wall (57) of cable insertion opening (43) and on the other longitudinal side by
30 the end face (35) of locking projection (33).
5. A connector assembly according to claim 2 or 3,
35 characterized in that the locking projection (33) on both transverse ends thereof comprises one end face (35, 39) each cooperating with the locking projection guide means ((53), and in that the

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- 22 -

ribbon cable end (12), during insertion into cable insertion opening (43), is guided on both of its longitudinal sides by one of the two end faces (35, 39) of locking projection (33) each.

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6. A connector assembly according to any of claims 3 to 5,

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characterized in that the locking projection (33) is of smaller width than the ribbon cable end (12), and in that the centre of locking projection (33) and the centre of guiding recess (53) are preferably offset from the longitudinal centre line of the ribbon cable end (12) such that the ribbon cable end (12) provided with locking projection (33) is adapted to be inserted into cable insertion opening (43) of connector housing (31) in a predetermined position only.

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7. A connector assembly according to any one of claims 1 to 6,

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characterized in that a broad side of the ribbon cable end (12) has a reinforcing layer (19) formed thereon, for example in the form of a reinforcing film adhered to the insulating material (15) of ribbon cable end (12).

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8. A connector assembly according to any one of claims 1 to 7,

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characterized in that the locking projection (33) is designed in the form of a locking rib extending transversely of the ribbon cable longitudinal direction.

9. A connector assembly according to claim 8, characterized in that the locking rib is of rectangular cross-section.

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- 23 -

10. A connector assembly according to any one of
claims 1 to 9,
5 characterized in that the locking projection (33)
is constituted by a separate member attached to
the reinforcing layer (19).

11. A connector assembly according to any one of
claims 1 to 9,
10 characterized in that the locking projection (33)
is formed by a member formed integrally with the
reinforcing layer (19).

12. A connector assembly according to any one of
15 claims 1 to 11,
characterized in that the locking arm (47) is
formed integrally with the connector housing (31).

13. A connector assembly according to any one of
20 claims 1 to 11,
characterized in that the connector housing is
constituted by a connector partial housing (21)
and an additional housing (63), and in that the
locking arm (47) is arranged on the additional
25 housing (63) adapted to be latched to connector
partial housing (21).

14. A connector assembly according to claim 13,
characterized in that the additional housing (63)
30 is provided with a cable through-opening (61), and
in that the additional housing (63), in the region
of its longitudinal end remote from cable through-
opening (61), has a connector receiving opening
(65) in which the connector partial housing (21)
35 is adapted to be received such that the cable in-
sertion opening (29) of connector partial housing

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- 24 -

(21) is aligned with the cable through-opening (61) of additional housing (63).

5 15. A connector assembly according to claim 14,
characterized in that on both sides of the con-
connector receiving opening (61) there is disposed
one resilient latching arm (67) each having a
latching shoulder (71) at the free latching arm
10 end, and in that the latching shoulders (71) of
the two latch arms (67) latchingly engage behind
connector partial housing (21) when connector
partial housing (21) is inserted into additional
housing (63) until its cable insertion opening
15 (29) is in alignment with cable through-opening
(61) of additional housing (63).

20 16. A connector assembly according to any one of
claims 13 to 15,
characterized in that the locking projection guide
means or guiding recess (53), respectively, is
formed on the cable through-opening (61) of addi-
tional housing (63).

25 17. A connector assembly according to any one of
claims 1 to 16,
characterized in that the connector housing (31)
or additional housing (63), respectively, formed
integrally with locking arm (47) is formed of
elastic plastics material.

30 18. A connector assembly according to any one of
claims 1 to 17,
characterized in that the locking arm (47), when
formed integrally with connector housing (31) or
35 additional housing (63), respectively, is cut free
from a sidewall of connector housing (31) or

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- 25 -

additional housing (63) in the form of a spring arm.

- 5 19. A connector assembly according to claim 18,
characterized in that locking arm (47) is of
lesser wall thickness than the sidewall with which
it is integrally formed.

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